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WELL SURVEY EVALUATION SUMMARY REPORT FOR THE RODALE MANUFACTURING SITE EMMAUS, PENNSYLVANIA

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1.0 INTRODUCTION

1.1 Purpose of Report

This Well Survey Evaluation Summary Report (Report) provides the details and results of the well survey and associated sampling activities conducted by Geo-Environmental Consultants, Inc. (GEC) at the former Rodale Manufacturing (Rodale) site in Emmaus, Pennsylvania. The activities described herein were conducted from January to October 1993.

As described in the document entitled, "Work Plan for a Well Survey in the Vicinity of the Rodale Manufacturing Site, Emmaus, Pennsylvania" (Well Survey Work Plan, GEC, August 31, 1992), the objectives of the well survey and sampling activities were to:

1. Characterize groundwater quality in the study area to determine the effect of the Rodale site and other potential sources of contamination on groundwater quality.

2. Characterize water quality in the Borough of Emmaus production wells.

3. Characterize water quality in any seeps, springs or streams to determine water quality at groundwater discharge locations.

4. Characterize sediment quality at selected stream locations.

As described in the Well Survey Work Plan, the following sampling activities were proposed to accomplish the objectives listed above. The results of these sampling activities are the focus of this Report:

Activity A: Sampling of Private Wells
Activity B: Sampling of Borough of Emmaus Wells
Activity C: Sampling of On-site Wells at the Rodale Site
Activity D: Sampling of Seeps, Springs, and Streams
Activity E: Sediment Sampling

1.2 Report Organization

This report is organized into the following sections:

Section 1.0 - *Introduction* (contains a general description of the site and study area, site historical information, nature of environmental concerns, and summary of previous sampling activity)

Section 2.0 - *Study Area Investigation* (contains a description of field activities)

Section 3.0 - *Well Survey Investigation Results* (presents the results of the investigation, including laboratory results)

Section 4.0 - *Groundwater Mapping Information* (presents the results of groundwater and surface water elevation measurements at onsite and offsite locations)

Section 5.0 - *Discussion and Conclusions* (presents a discussion of major findings, and general conclusions reached from the study)

Section 6.0 - *References* (includes a listing of all sources used in the compilation of this report)

1.3 Related Documents

Well Survey Work Plan

The well survey and sampling tasks were conducted in accordance with the Well Survey Work Plan. The Well Survey Work Plan was prepared in advance of the Remedial Investigation/ Feasibility Study (RI/FS) Work Plan, which will be prepared in 1994. The Well Survey Work Plan was intended to provide a framework for obtaining data on an accelerated schedule for well survey-related tasks. In this manner, results of the well survey activity will be used to prepare

the RI/FS Work Plan. To help expedite the process, EPA suggested that the associated Quality Assurance Project Plan (QAPP, GEC, May 7, 1993) and Health and Safety Plan (HASP, GEC, May 7, 1993) be initially excluded from the Well Survey Work Plan and be submitted at a later date, thereby allowing planning tasks outlined in the Well Survey Work Plan to begin.

Quality Assurance Project Plan (QAPP)

After approval of the Well Survey Work Plan, the QAPP was prepared in accordance with guidelines outlined in the document entitled, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (EPA, October 1988). The QAPP provides guidance for conducting all field sampling and sampling-related activities. The QAPP also contains components describing organization, functional activities, and quality assurance and quality control protocols necessary to achieve the intended and specified use of the data. Specifically, the QAPP was developed to:

- Assign responsibilities for personnel involved the in the sampling and analysis program.
- Document the project in terms of sample collection, custody, analysis, auditing, and validation.
- Provide a means to evaluate the implementation of sampling activities and the achievement of the project goals.

Health and Safety Plan

The HASP provides site background information, site-specific health and safety procedures, personal protection standards and emergency contacts and procedures for anyone engaged in onsite field activities.

The QAPP and HASP were submitted for regulatory review on January 11, 1993. Following regulatory review and subsequent changes, the QAPP and HASP were finalized upon their submittal to the regulatory agencies on May 7, 1993.

1.4 Site Description and History

1.4.1 Site Location

The Rodale site is an inactive manufacturing facility located at Sixth and Minor Streets within the Borough of Emmaus, Lehigh County, Pennsylvania, approximately five miles south of the City of Allentown (see Figure 1-1). Approximate geographic coordinates for the Rodale site are: Latitude 40° 31' 53" N, Longitude 75° 29' 37" W.

1.4.2 Physical Description of Site

Demolition activity began at the Rodale site in August 1993 and was nearly completed in December 1993. The description presented below is for the pre-demolition state of the property. Figure 1-2 presents the dashed outline of the building, indicating its removal.

Prior to demolition, the Rodale site consisted of a large three-story building that served as a manufacturing, warehouse and office facility on a parcel of property approximately 1.2 acres in size. The site is bordered by Minor Street to the north, Sixth Street to the west, a small alleyway to the east, and the Perkiomen railroad line to the south. The area surrounding the Rodale site is primarily residential. Prior to demolition, a majority of the site was occupied by the building itself. An exterior, open-space courtyard area existed on the south side of the facility. This courtyard area was expanded in 1989 as a result of the demolition of Building D (the south wing). Several injection wells (Wells 1, 2 and 3) are located in this open area along with Wells 4, 5, 6 and monitor well MW-1 (see Figure 1-2). This exterior portion of the property is bounded by a 6-foot chain-link security fence and is accessible from the alleyway through a locking gate.

Overhead electrical lines were present in the exterior portion of the facility. Several overhead transformers were present in the southwestern portion of the building and were removed in May 1993 prior to the full-scale demolition activity. Power is currently being supplied to the property through a temporary electrical service to the south side of the property. The electrical connection consists of 120/240 volt, 200 amp single phase service, mounted on a pole near the operations trailer. A temporary (contractor's) two-inch water service connection is also

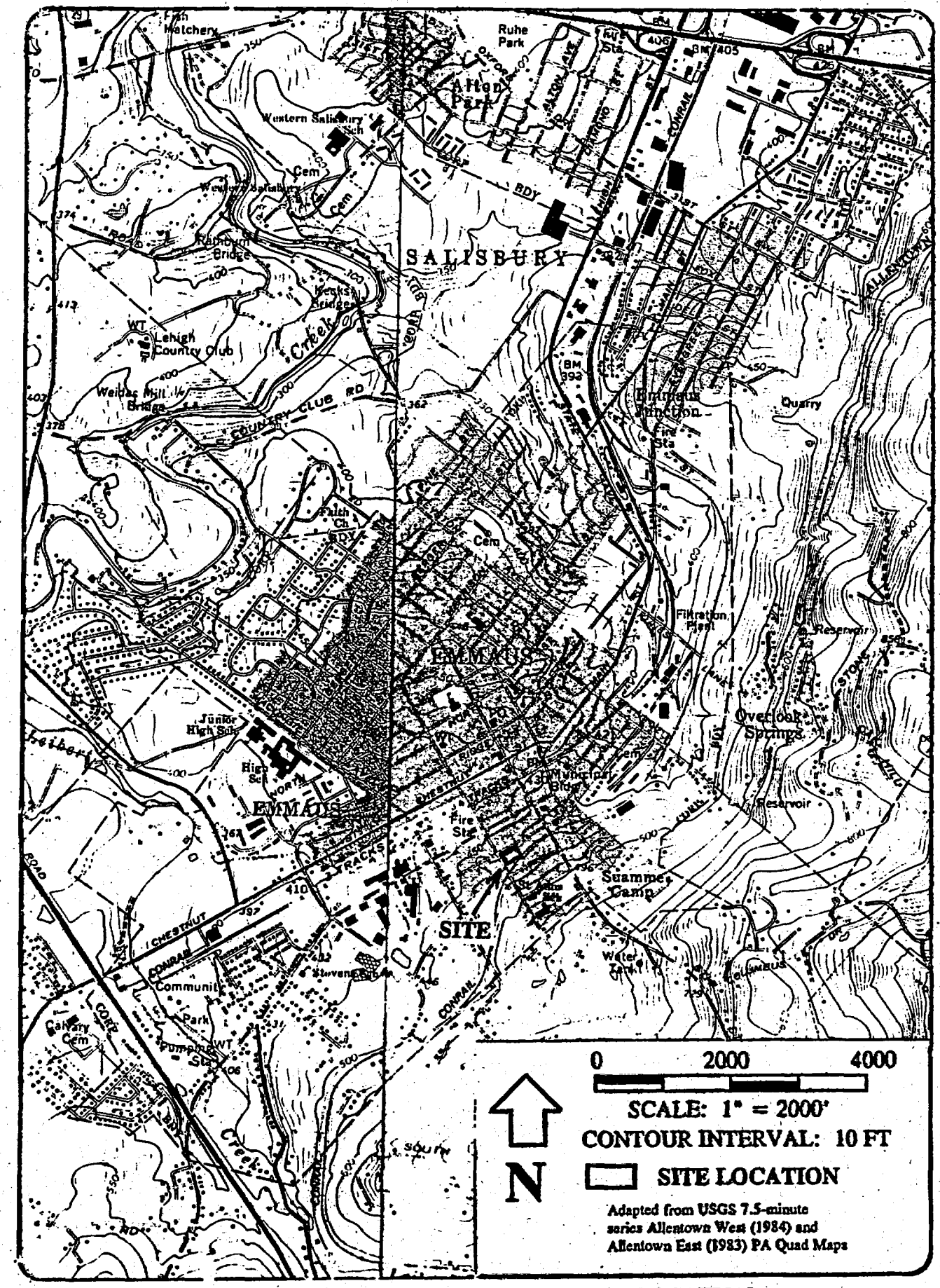
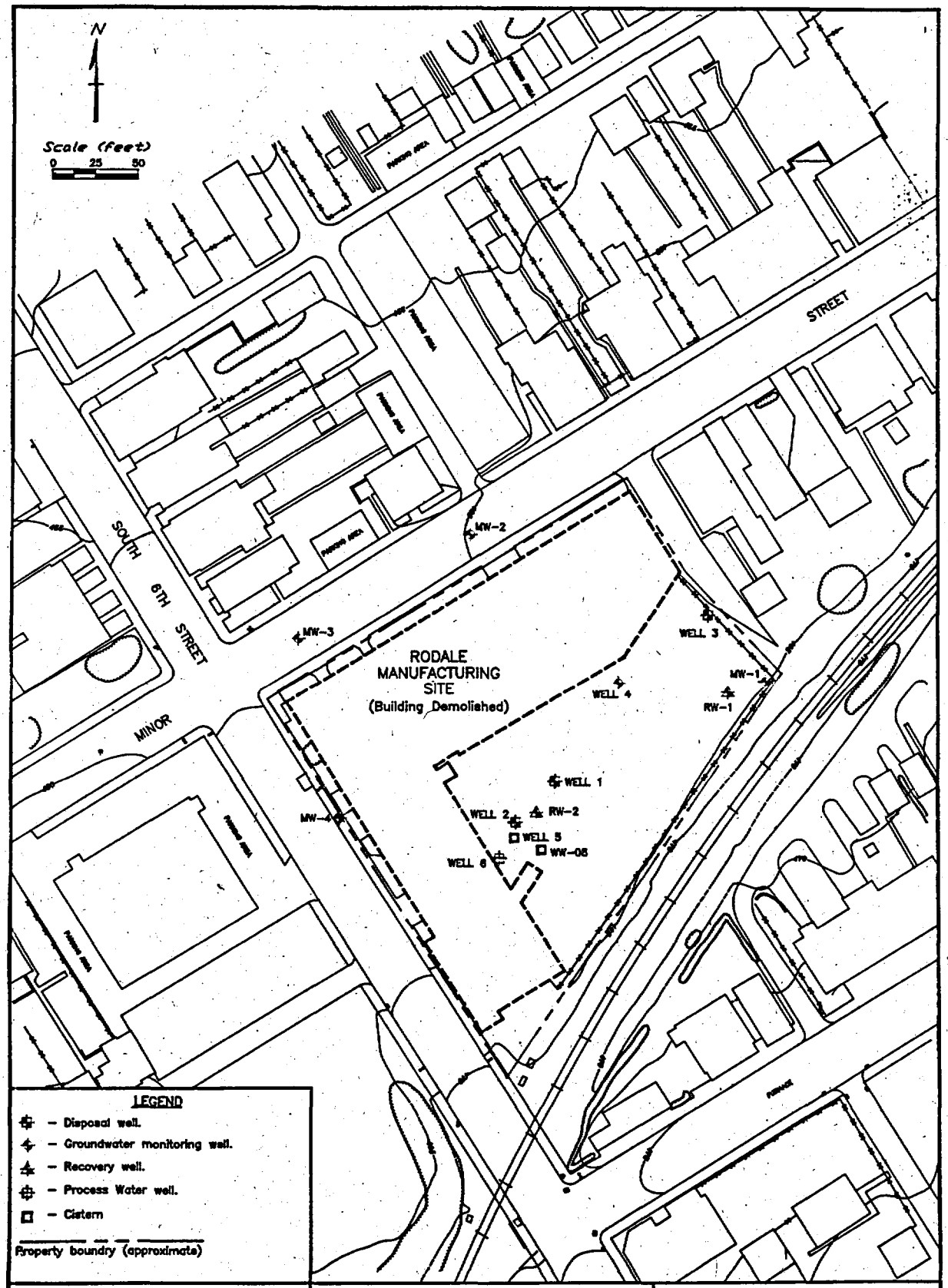


FIGURE 1-1 - REGIONAL MAP WITH SITE LOCATION



GEC
Geo-Environmental Consultants, Inc.

RODALE MANUFACTURING SITE
EMMAUS, PENNSYLVANIA

FIGURE 1–2
SITE PLAN

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supplied to the north side of the property via the Borough of Emmaus water main on Minor Street. A sanitary sewer line is present at the south side of the former building location, and trends east to the alleyway, then north to join the sewer main along Minor Street. A catch basin for storm water runoff exists near the southwest corner of the property. The catch basin is connected to the storm sewer along South Sixth Street.

1.4.3 Site History

Included herein is a brief summary of available site operations and history information. Unless otherwise noted, this information was obtained from sources referenced in the report entitled, "Site History and Laboratory Results for the Rodale Manufacturing Site" (GEC, October 1991).

The Rodale site has been used for commercial or manufacturing purposes since at least the 1920s. Prior to the 1930s, the site was occupied by the D.G. Dery Silk Corporation and later by Amalgamated Silk Corporation. According to annual versions of the Pennsylvania Industrial Directory, Rodale Press, a book publisher, occupied the building from at least 1938 until the late 1950s (Pennsylvania Department of Health, 1991). From the late 1950s until 1975, the site was operated by Rodale Manufacturing Company (Rodale) to make wiring devices and electrical connectors. The manufacturing process included various electroplating techniques. In 1975, the site was sold to Bell Electric, a wholly-owned subsidiary of Square D which manufactured similar electrical components. In 1986, manufacturing operations were halted by Square D. In 1989, demolition of the south wing of the facility (Building D) was conducted. Demolition of the remaining structure was conducted from August 1993 to January 1994.

1.4.3.1 Activities Under Rodale Operation

Specific operational practices prior to 1961 are largely unknown. PADER files indicate that, under Rodale operation of the facility, several wells were used for disposal of various wastes. PADER files indicate approximately 3,000 gallons per day (gpd) of rinse water from copper and zinc plating and acid brass dipping were discharged to a 452-feet deep borehole (subsequently identified as Well 1) located in the courtyard area (Figure 1-2).

From 1961 to 1967, PADER files indicate Rodale apparently disposed of various quantities of wastes in Well 1 and possibly other wells while refining the plating process and seeking permission to discharge to the Emmaus/Allentown sewer system. Borough files indicate that the electroplating room at the site was connected to the Emmaus sanitary sewer by January 1967.

1.4.3.2 Activities Under Square D Operation

In March 1981, under Square D operation of the facility, a capped borehole (Well 1 - 452 feet in depth) was discovered during the installation of new equipment. Long-time employees of Rodale indicated that two other wells (Well 2 and Well 3) were also used for disposal purposes, and the locations of these wells were identified. Square D immediately hired an environmental consultant (Gilbert/Commonwealth) to develop cleanup plans for these wells. From June to September 1981, wastes were removed from Wells 1, 2 and 3 and disposed of by licensed haulers at approved disposal facilities. A monitor well (Well 4) was also installed by Gilbert/Commonwealth in June 1981. Water samples collected from these wells revealed the presence of varying concentrations of metals, cyanide and volatile organic compounds (VOCs).

In addition to the three disposal wells (Wells 1, 2 and 3), two additional wells (Wells 5 and 6) were also identified at the site. Well 5, located near the west end of the courtyard area, was discovered by Gilbert/Commonwealth in late 1981. Well 5 consists of an open-top iron tank (cistern) approximately four feet in diameter and eight feet in depth. Several pipes with diameters ranging from one to two inches lead into the upper three feet of the cistern. No evidence of a well located within the cistern was found. Well 6, located at the west end of the courtyard, was apparently used for makeup cooling water and not for disposal purposes.

In 1984, operation of an air-stripping tower at Well 1 commenced to remove VOCs from groundwater. Associated water quality monitoring was also initiated. A permit for discharge of the treated effluent to Liebert Creek was issued by PADER. The air-stripping activity continued until 1989, when demolition of Building D (the south wing) and EPA site assessment activities were initiated. Laboratory results indicate that the air-stripping activity was effective in lowering the concentrations of VOCs in the aquifer at the site.

Following closure of the facility by Square D in 1986, investigative and remedial activity continued. Square D retained SNR Company as the environmental consultant for the site. In 1988, four groundwater monitor wells (originally designated SW-A through SW-D but now referred to as MW-1 through MW-4) were installed around the perimeter of the facility. The wells were screened near the top of the uppermost aquifer, at depths of approximately 140 feet. In 1989, Roy F. Weston (Weston) replaced SNR Company as the environmental consultant. In 1989, the south wing (Building D) was demolished to provide space for additional remedial activities (Figure 1-2). During demolition activity, a "well" (designated WW-08, six feet in diameter and approximately 55 feet in depth) was uncovered. Two underground storage tanks (USTs) were also removed.

In January 1989, NUS Corporation conducted a Site Inspection (SI) on behalf of EPA at the Rodale site. The SI consisted of the collection of water samples from three on-site injection/disposal wells, four on-site monitor wells, three Borough of Emmaus water supply wells and three residential wells. In November 1989, PADER collected several water samples from wells located downgradient of the study area, including one of the six Borough of Emmaus water supply wells (PSW-7) and four downgradient private wells in Lower Macungie Township. Some VOCs (primarily TCE) were detected in some wells at concentrations that exceeded health based levels.

In 1990, Weston supervised the installation of a monitoring/recovery well (RW-2) at the Rodale site. A second monitoring/recovery well (RW-1) was partially completed. The locations of all disposal, production, monitoring and recovery wells are indicated on Figure 1-2. Based on available information, Table 1-1 provides a description of the wells at the site. Table 1-2 provides information for monitoring wells MW-1 through MW-4.

In December 1990, GEC became the primary environmental consultant for the site. On July 29, 1991, following the Hazard Ranking System review process by EPA, the Rodale site was proposed for placement on the National Priorities List.

TABLE 1-1: SUMMARY OF AVAILABLE INFORMATION FOR ONSITE WELLS EXISTING PRIOR TO FACILITY CLOSURE IN 1986

Well No.	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6
Well Owner/ Operator	Rodale Manufacturing	Rodale Manufacturing	Rodale Manufacturing	Square D Company	Rodale Manufacturing	Rodale Manufacturing
General Location	West Central Courtyard; east of Well #2	Boiler House, West End of Courtyard; West of Well #1; Northeast of Well #6	Behind Plant in Alley, East End of Building, Outside Courtyard; East of Well #4	East Courtyard Area; Northeast of Well #1	West End of Courtyard; East of Well #6; West of Well #2	Far West End of Courtyard
Year Drilled/ Driller	1952 or earlier/ not known	1938/ not known	Not known	06/81/ Gill Enterprises	Not known	Possibly 1945/ Biery?
Well Type	Disposal	Disposal	Disposal	Monitor	Possible Disposal	Process Make-up Water
Method of Installation	Not known	Not known	Not known	Air Hammer/Air Rotary	Not known	Not known
Total Drilled Depth	452' *	251'	426'	342'	Not known	Not known, Possibly 330'
Present Well Depth	452' *	148'	416' *	247'	8'	231'
Casing Material	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Not known	Carbon steel
Depth of Casing	444'	50'	400'	192.5'	Not known	Not known
Method of Completion	Open hole production	Open hole production	Slotted section upper hole and open hole production	Open Hole Production to 342'	Not known	Not known
Initial Completion Interval	444' - 452'/ 8'	50' - 251'/ 201'	400' - 426'/ 26'	192.5' - 342'/ 149.5'	Not known	Not known
Current Completion Interval	444' - 452'/ 8'	50' - 148'/ 98'	400' - 416'/ 16'	192.5' - 247'/ 54.5'	Not known	Not known
Completion Interval Diameter	6 ¼"	6"	6"	6 ¼" ID Production String 6" open hole	Not known	6"
Formation Penetrated at Total Depth	Leithsville Limestone	Leithsville Lmst.	Leithsville Lmst.	Leithsville Lmst.	Glacial drift	Leithsville Lmst.
Type of Materials Disposed of	Electroplating wastes, Hydraulic Cutting Oils, TCE and other solvents	Toilet wastes, Electroplating Wastes, Hydraulic Cutting Oils, TCE and other solvents	Oils, TCE and Other solvents, Oakite (sodium phosphate, tribasic) cleaner	Not used for disposal	Details not known Boiler Blowdown wastes	Not used for disposal
Maximum Period of Disposal/ # years	1952 - 1967/ 15 years	1938 - 1967/ 29 years	1938 - 1967/ 29 years	Not used for disposal/ NA	Not known/ Not known	Not used for disposal/ NA
Depth to Water - 9/93	119.40'	114.02'	117.40'	116.42'	2.65 '	113.63'
Elevation at Top of Water	348.28' (MSL)	352.08' (MSL)	348.70' (MSL)	349.66' (MSL)	460.74' (MSL)	349.13' (MSL)

SOURCE: "Ground Water Monitoring Plan," SNR Company, March 17, 1989.
TABLE NOTES: * - Unconfirmed; MSL - Mean Sea Level (relative to U.S. Geological Survey Datum)
Locations indicated on Figure 1-2.

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TABLE 1-2: MONITOR WELL CONSTRUCTION DETAILS				
DETAILS	MW-1	MW-2	MW-3	MW-4
Top of Casing Elevation*	466.84	459.51	458.91	461.52
Total Well Depth (feet below TOC)	138.0	134.0	138.5	136.0
Estimated Screened Interval (feet below TOC)	113 - 138	109 - 134	113.5 - 138.5	111.0 - 136.0
Depth to Groundwater (feet below TOC)	115.61	109.41	109.18	111.40
Groundwater Elevation*	351.23	350.10	349.73	350.12

SOURCE: "Ground Water Monitoring Plan," SNR Company, March 17, 1989.

TABLE NOTES:
* - Elevations in Mean Sea Levels.
Wells are constructed of 4"-diameter PVC pipe and screen.
Wells installed in November and December, 1988 by SNR Company.
TOC elevations surveyed in September - October 1993 by Martin, Bradbury & Griffith
Depth to water and total depth measured by GEC in September 1993
Well locations are indicated on Figure 1-2

1.4.4 Nature of Environmental Concerns at the Rodale Site

Groundwater sampling was previously conducted in on-site disposal wells and monitor wells MW-1 through MW-4 to help determine the nature and extent of contamination. Prior to the current investigation, the most recent sampling activity was conducted by NUS Corporation in 1989 as part of the Site Inspection. Several VOCs (including TCE), semi-volatile organic compounds (SVCs), metals and cyanide were detected in the disposal wells (Wells 1, 2, and 3) and other wells at the Rodale site. The well locations are indicated on Figure 1-2.

The four monitor wells were installed to a depth of approximately 140 feet. In downgradient off-site monitor wells MW-3 and MW-4, several VOCs (TCE, vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene, PCE and toluene) were detected, but SVCs, metals and cyanide were either not detected or were detected at significantly lower concentrations than on-site disposal wells. The extent of off-site groundwater contamination attributed to the Rodale site was not determined based on the 1989 sampling activity. Also, upgradient groundwater quality was not defined since upgradient monitor well MW-1 revealed elevated concentrations of several VOCs, SVCs and metals, which may or may not be site-related.

1.4.5 Summary of Previous Sampling Activity

For additional detail on previous sampling events, see the report entitled, "Site History and Laboratory Results for the Rodale Manufacturing Site" (GEC, October 1991).

1.5 Description of Study Area

As defined in the Well Survey Work Plan, the study area includes the Rodale site and an area bounded by a three mile radius of the site (as designated on Plate 1). This area includes the entire Borough of Emmaus, parts of Lower Macungie, Salisbury, Upper Milford, and Upper Saucon Townships, and a small section of the City of Allentown. An area that is bounded by the two- and three-mile radius and upgradient of the site was excluded from the study area. The following sections give a brief description of the study area.

1.5.1 Geology and Hydrogeology

The Rodale site is situated along the southern margin of the Great Valley Section of the Valley and Ridge physiographic province. The Great Valley Section is primarily underlain by a thick sequence of extensively fractured and weathered Cambrian to Ordovician age carbonate rocks (Wood, et al., 1972). These carbonate rocks are characterized by karst hydrologic features such as springs, solution sinks, disappearing streams and high secondary porosity. The carbonate rocks in the study area include the following geologic units in descending order: the Jacksonburg Formation (cement limestone and cement rock), the Beekmantown Group, the Allentown Formation and the Leithsville Formation. All of these units are exposed at the surface within a four-mile radius of the study area. Rocks of the Great Valley Section are in fault contact with older crystalline rocks of the Reading Prong, principally the Hardyston Formation. The Reading Prong, marked by South Mountain (see Figure 1-1), is an area of high hills and ridges composed of Precambrian metamorphic and igneous rocks, minor amounts of Cambrian quartzite (Hardyston Formation) and limestone, and likely forms a groundwater divide in the study area.

The Rodale site is directly underlain by the Leithsville Formation, the oldest member of the Great Valley Section. Nearly all rocks of the Leithsville Formation in Lehigh County occur on or near the flanks of South Mountain. Although the formation has a considerable range in lithologic properties, it is composed predominantly of gray to yellowish, thin-bedded, high-magnesium dolomites that grade locally into sericitic shales. There are some massive beds of blue dolomite, and a large number of joints and fractures, many of which are quartz-filled. Shaly beds are present in the upper parts of the formation. Sixty three drilled wells within the Leithsville were available for analysis. The wells, some of which may no longer be in service, range in depth from 60 to 903 feet with a median depth of 200 feet. In most localities, the static water level was less than 90 feet below land surface. Most of these wells are reported to yield adequate water for domestic supplies (Wood).

Overlying the Leithsville Formation, and present north of the Rodale site in and beyond the vicinity of Little Lehigh Creek, is the Allentown Formation, the most extensive unit of carbonate

rocks in the county. The Allentown Formation generally consists of alternating dark and light beds of dense, blue-gray to gray, magnesian limestones several feet thick interspersed with some sandy, shaly and argillaceous limestones. Two hundred and ninety (290) drilled wells and several springs in Lehigh County were used for evaluating the water-yielding characteristics of the Allentown Formation. The wells range in depth from 50 to 1,023 feet, with an average depth of 220 feet. The average depth to water is about 67 feet. Most wells are reported to yield adequate quantities of water for domestic and industrial supply (Wood).

The Leithsville and Allentown Formations are the most important water bearing units in the study area. These carbonate units are typically overlain by a saprolite (weathered soil horizon) and glacial drift deposits from the Illinoian glaciation, which at the Rodale site ranged between 59 and 80 feet in thickness based on available on-site data. Of the six wells in the Borough of Emmaus water supply system, four wells (PSW-1, PSW-2, PSW-3 and PSW-4) are completed in the Leithsville Formation, one (PSW-7) is completed in the Allentown Formation, and one well (PSW-6) is completed in the Hardyston Formation. According to Wood, the Leithsville, Allentown, Beekmantown and Jacksonburg limestone act much as a single hydrologic unit. The general groundwater flow direction is to the north/northeast (Wood). A generalized stratigraphic column, depicting relationships of these geologic formations, is included as Figure 1-3.

1.5.2 Surface Water Hydrology

Little Lehigh Creek is the primary drainage feature in the study area. Little Lehigh Creek is present northwest of the Borough of Emmaus, and flows generally from southwest to northeast toward the City of Allentown where it discharges to the Lehigh River. Little Lehigh Creek is located approximately 1.5 miles northwest of the site. Tributary to Little Lehigh Creek is Liebert Creek, flowing generally from south to north and discharging to Little Lehigh Creek northwest of the Borough of Emmaus. Liebert Creek is located approximately one mile west of the site. Both surface water features are indicated on Plate 1.

Liebert Creek has two main tributaries: 1) an unnamed tributary (designated for purposes of this study as the "unnamed tributary") approximately five feet in with flowing through Vera Cruz

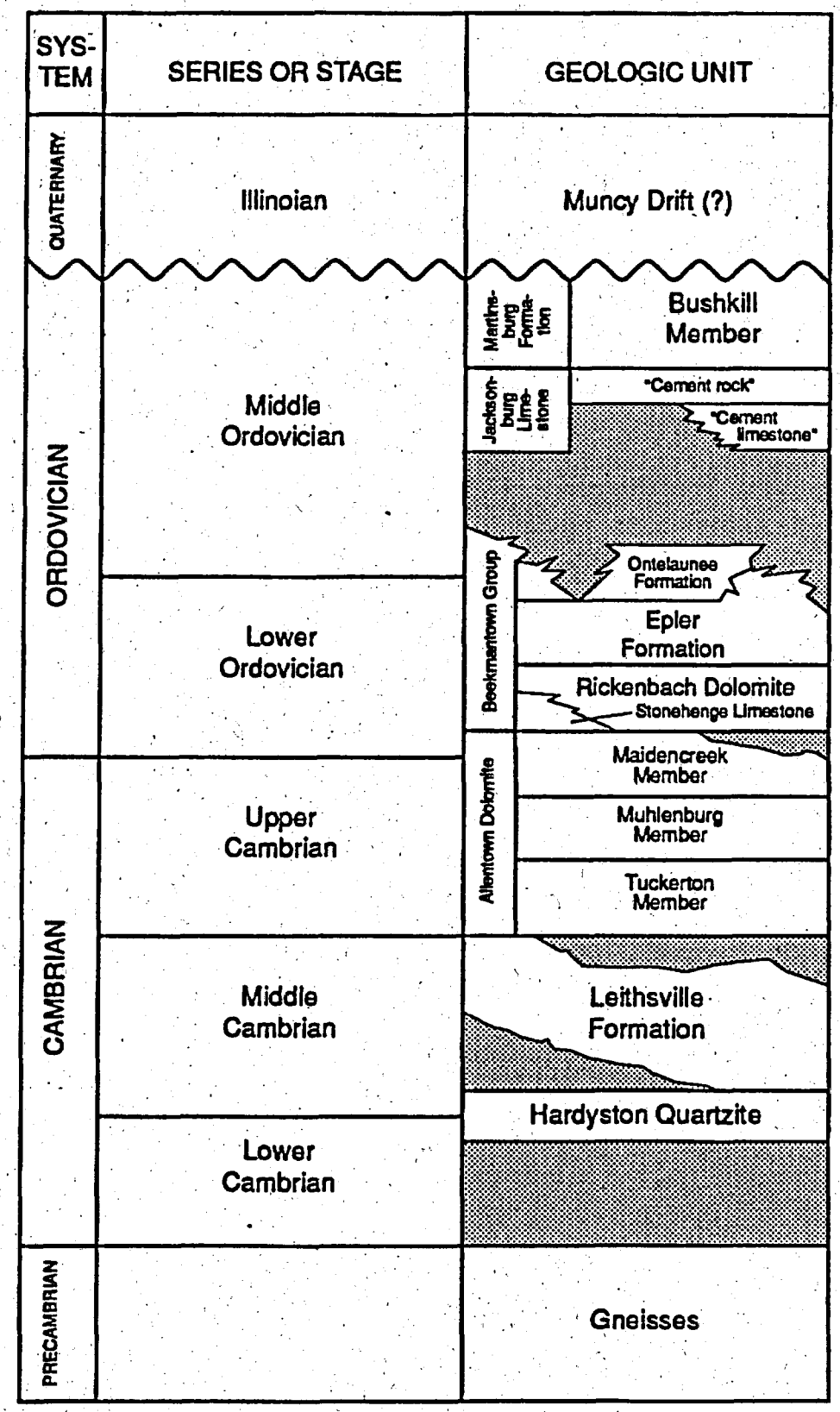


FIGURE 1-3: GENERALIZED STRATIGRAPHIC COLUMN
(After Sloto, 1991)

in Upper Milford Township, and discharging to Liebert Creek near Quarry Lane; 2) an unnamed intermittent tributary (designated for purposes of this study as the "south intermittent tributary") flowing through the southwest portion of the Borough of Emmaus and discharging into Liebert Creek west of Route 29 near Emmaus High School.

In addition, there exists an unnamed intermittent tributary (designated for purposes of this study as the "north intermittent tributary") discharging directly to Little Lehigh Creek in Salisbury Township near Keck's Bridge (Keystone Road). This tributary has been modified as a runoff channel for some stormwater from the Borough.

Additional information regarding the regional surface water features was collected as part of the Work Plan tasks and is presented in Section 2.5.3

1.5.3 Water Supply

The following is a discussion of the drinking water supply for the municipalities within the study area (excluding the City of Allentown). Those portions of the study area not serviced by the Borough of Emmaus or other regional water authorities are assumed to rely on private wells.

Borough of Emmaus

The Borough of Emmaus water system is the primary public supply in the immediate study area, serving over 4,000 metered connections (NUS, 1989) with production from six supply wells: PSW-1 through PSW-4, PSW-6, and PSW-7. An additional well, PSW-5, was plugged and sealed in December 1988 because of elevated levels of TCE. The wells are completed open-hole, and range in depth from 195 feet (PSW-4) to 526 feet (PSW-3). Five of the wells are located within the Borough of Emmaus, while one well (PSW-7) is located in Lower Macungie Township. Approximately 200 additional connections are serviced in Salisbury Township, located north of the Borough. Portions of Upper Milford and Upper Saucon Townships are also served by the Borough. The average daily water use for the Emmaus system is nearly two million gallons per day (gpd). Water is reportedly chlorinated and filtered before entering the distribution network.

Additional information regarding the water supply system was gathered as part of the Work Plan tasks and is presented in Section 2.7. The well locations are indicated on Plate 1. The approximate area serviced by the Borough of Emmaus water system is indicated on Figure 1-4. Table 1-3 provides a description of the Borough supply wells based on available information.

Upper Milford Township

Portions of Upper Milford Township receive water from the Borough of Emmaus. The extent of service from the Borough is limited to the northern and western portions of the township that border the Borough. All other areas of the Township can be assumed to utilize private groundwater wells except for an area served by the Phillip Buss Water Company, a small private, water company (Upper Milford Township Comprehensive Plan).

Lower Macungie Township

Large portions of Lower Macungie Township are serviced by Lehigh County Authority (LCA). LCA is the utility responsible for water supply and sanitary services in the Township and surrounding area (Burtner, personal discussion, 1992). The LCA reportedly uses 14 production wells to provide service to more than 7,000 customers in portions of Lower Macungie and Salisbury Townships as well as several communities north and west of the survey area. The average daily water use for the LCA system is four million gallons per day (Lehigh County Authority 1992 Annual Report).

Salisbury Township

Lower Salisbury Township obtains all of its water from surrounding communities, primarily the cities of Allentown and Bethlehem. The Township receives some water from the Borough of Emmaus and South Whitehall Township. The Township does not operate any water supply production wells; it only maintains a distribution network within the Township. According to plans of the distribution system, small portions of the Township located within the survey area are not serviced by the Township and can be assumed to use private wells (Gantert, personal discussion, 1992).

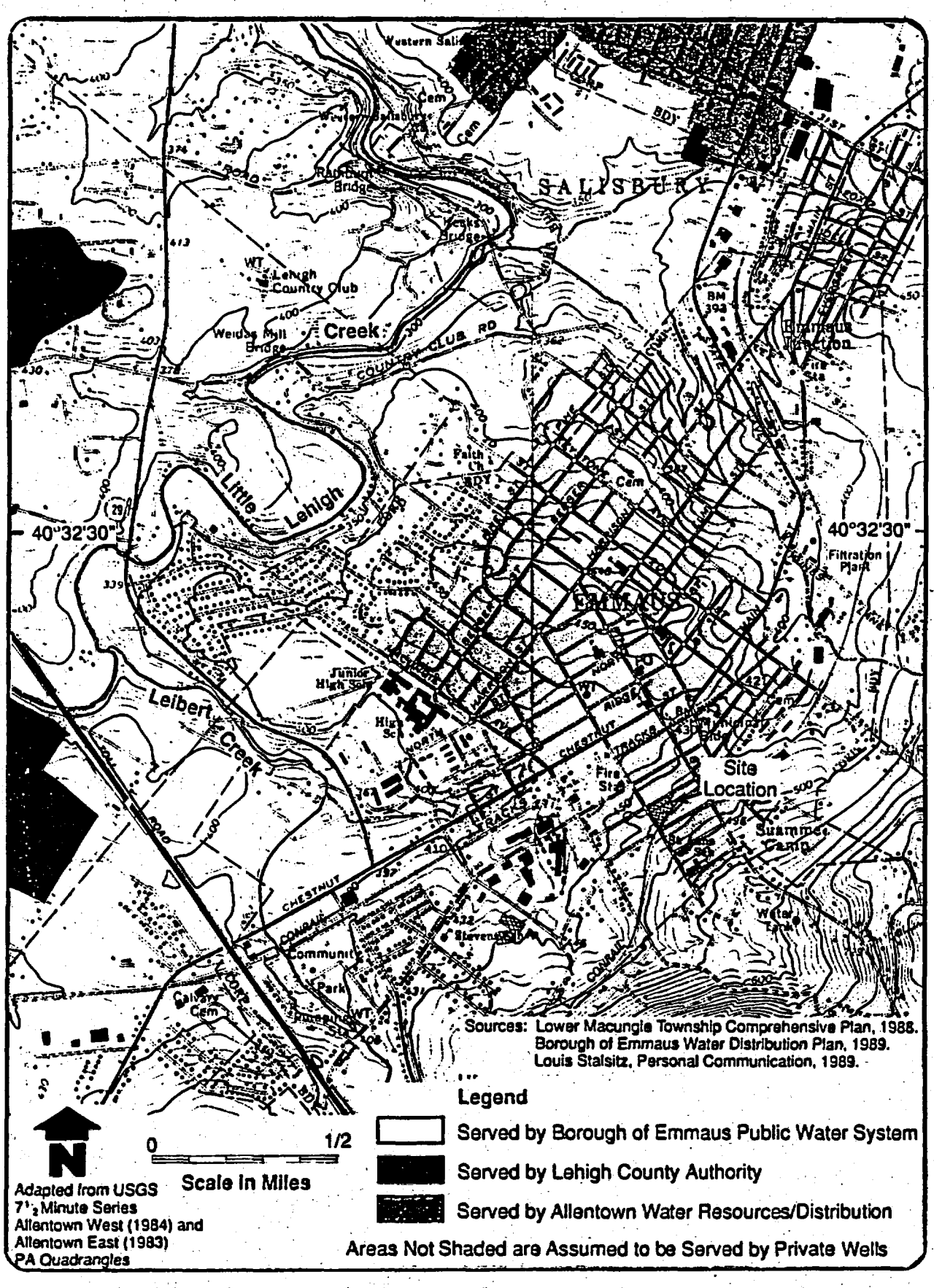


FIGURE 1-4 AREAS SERVED BY PUBLIC WATER SYSTEMS

(after Weston, 1989)

AR100113

TABLE 1-3: CONSTRUCTION DETAILS FOR BOROUGH OF EMMAUS WATER SUPPLY WELLS

Well No.	Location	Date of Construction	Well Depth (ft bgl)	Construction Details	TOC Elevation (ft)	Static Water Level (ft bgl)	Pumping level (ft) at Specified Q (gpm)	Remarks/Screened Aquifer
PSW-1 (LE-84)	West of Pump Station building (Klines Lane)	1923	315	Diameter: 10"; Cased 90' to limestone	422	81	82 (400)	Discharge of wells 1 and 2 combined and jointly chlorinated in pit adjacent to pump station; Leithsville Formation
PSW-2 (LE-85)	East of Pump Station building	1923	375	Diameter: 10"; cased 110' to rock	422	73	68 (453)	Leithsville Formation
PSW-3 (LE-86)	10th and Broad Sts.	1949	526	Diameter: 10"; cased 166'	410	68	97 (300) 110 (350)	Artesian pressure; various strata w/ clay to 455', limestone to 526'; Leithsville Formation
PSW-4 (LE-87)	Glenwood St. and Mountain Blvd.	1951	187	Diameter: 10"; cased 124' to rock	462	124	NA	Pump setting: 183'; Manual operation; Leithsville Formation
PSW-5	6th and Berger Sts.	1954	462	12" casing 16' into sandstone to 72' TD	458	NA	140 (600)	Plugged and closed in December 1988
PSW-6 (LE-521)	Broad St. between 14th and 15th (Emmaus Community Park)	1961	350	12" casing to 106', 10" casing to 350'	402	NM	74 (530)	LOG: 0-25': soil; 25'-98': stones and boulders; 98'-165': sandstone and granite; 165'-350': granite Hardyston Formation
PSW-7 (LE-1318)	Lower Macungie Township near Macungie Ave. (218' from Little Lehigh Creek)	1973	400	10" casing to 150', 10" open hole to 400'	358	54	76 (555)	Water bearing zones: 160', 180', 200', 340', and 390' (from log); Allentown Formation

SOURCE:
1. "Emmaus Borough Wells - Basic Data", compiled by R. Barry Greenawald (PADER) for Ecology and Environment, Inc., August, 1982
2. "Preliminary Assessment for Rodale Manufacturing Company" (PA #1276), Pennsylvania Department of Environmental Resources, May, 1987
3. "Hydrology and Groundwater Flow in the Carbonate Rocks of the Little Lehigh Creek Basin" Water Resources Investig. Report 90-4076, U.S. Geologic Survey (Sloto, R. and L DeWayne, Lisa Senior)

NOTES:
ft bgl - feet below ground level; TOC - Top of Casing (provided by Borough)
TOC (top-of-casing) elevation provided as feet above mean sea level.
NA - Not applicable; NM = Not measured
See Plate 1 for well locations.

AR100114

Upper Saucon Township

Upper Saucon Township currently obtains about 90% of its public water from the City of Bethlehem. The remaining 10% is provided by pumping from areas within the Township formerly mined by the New Jersey Zinc Company. Public water service is not available for most parts of South Mountain or along Vera Cruz Road west of Chestnut Hill Road. The Township is experiencing moderate growth and has plans to expand the public water service by utilizing subsurface mine water (Stahlnecker, personal discussion, 1993).

1.5.4 Potential Sources of Groundwater Contamination in Study Area

There is a general groundwater quality problem in the Emmaus area. The Borough operates six production wells, and elevated levels of trichloroethene (TCE) have been historically detected in five of the six production wells. At PSW-4, elevated concentrations of tetrachloroethene (PCE) have also been detected. In response to the elevated TCE and PCE concentrations, air-stripping units have been installed by the Borough to remove VOCs from the groundwater at PSW-1, PSW-2 and PSW-7. Plans for the installation of an air-stripping unit at PSW-4 were being implemented at the time of the writing of this document. Since several of the Borough wells (PSW-1, PSW-2, PSW-3, PSW-4 and PSW-6) are apparently cross-gradient to the site, it is likely that other sources of contamination exist in the area (see Section 4.0 for more specific information on groundwater flow conditions as determined from this study).

Some of these possible sources, which can be broadly classified as either industrial/commercial or quarry/dump site areas, are indicated on Plate 1. These possible source areas were identified based on Section 104.e. responses, information from EPA and PADER files, and historical records for the Borough of Emmaus area. Note that, at the request of PADER, GEC focused some of the groundwater and surface water sampling activity in the vicinity of the suspected Vera Cruz/Quarry Road dump site located in Upper Milford Township.

2.0 STUDY AREA INVESTIGATION

2.1 General Summary

The purpose of the investigation was to evaluate possible environmental impacts from activities at the former Rodale site on the study area. As outlined in the Well Survey Work Plan (GEC, August 31, 1992), the investigation consisted of several tasks culminating in the collection of groundwater, surface water, and stream sediment samples. This section discusses procedures related to the completion of the nine specific tasks outlined in the Well Survey Work Plan:

- Task 1: Aerial Photography and Map Preparation
- Task 2: Site Operations Preparation
- Task 3: Well Record Search
- Task 4: Preliminary Assessment and Location Confirmation
- Task 5: Evaluation of Borough of Emmaus Water Distribution System
- Task 6: Selection of Locations to be Sampled
- Task 7: Sampling Activity
- Task 8: Surveying and Groundwater Mapping
- Task 9: Data Evaluation and Presentation

2.2 Task 1 - Aerial Photography/ Map Preparation

2.2.1 Purpose

The objective of this task was to obtain scaled aerial photographs and topographic base maps of the study area for use during Tasks 3, 4, 5, 6, 8, and 9 of the Work Plan. In particular, the aerial photographs and topographic maps were used to locate and plot well users and sample locations, to evaluate the Borough of Emmaus water distribution system, and to determine the direction of groundwater flow.

2.2.2 Procedures

The preparation of aerial photographs and base maps was initiated in October 1992. Aerial Data Reduction Associates, Inc. (ADR, a photogrammetric firm based in Pennsauken, New Jersey) was contracted to prepare individual, large-scale site maps from existing aerial photographs for

the Rodale site and the Vera Cruz/Quarry Road sites. In addition, a composite aerial photograph of the entire Borough of Emmaus Area was prepared.

Final versions of the photogrammetric site maps were obtained from ADR in January 1993 for both the Rodale site and the Vera Cruz/Quarry Road site. Two maps were prepared for each site at a scale of one inch equals 20 feet and one inch equal 40 feet. These maps were contoured at one foot intervals and show a variety of natural and man-made features. In addition, ADR prepared an aerial photograph of the entire Borough area at a scale of one inch equals 600 feet.

In order to obtain a base map for the entire survey area, GEC contracted Rowly Schere Reprographics (RSP, based in Gaithersburg, Maryland) in December 1992 to prepare a 2X enlargement of portions of the Allentown East and Allentown West USGS topographic quadrangle maps. These topographic maps were used to locate and evaluate the wells inventoried during Task 3 (Well Record Search) of the Work Plan. The enlargement process increased the scale of the topographic maps from 1 inch equals 2,000 feet to 1 inch equals 1,000 feet, providing sufficient resolution and clarity to plot the inventoried wells.

GEC also obtained digital U.S. Geological Survey (USGS) 7.5-minute series topographic maps for the Allentown West and Allentown East (Pennsylvania) quadrangles from Blue Highways Map Company (based in Caledonia, Illinois). These digital map files are compatible with AutoCad and contain the following layers: double line roads, surface water features, geographic names, and municipal boundaries. The digital maps were used in this Report to accurately plot the sampling locations and groundwater elevations contours.

2.3 Task 2 - Site Operations Preparation

Prior to the start of sampling activities, work was conducted as part of Task 2 (Site Operations Preparation) of the Well Survey Work Plan. This work included the securing of on-site wells, the delivery and set-up of a field operations trailer, the installation of utilities at the site, and the construction of two (2) decontamination pads. A brief discussion of each of these items is included herein.

2.3.1 Securing of Wells

Work to secure the on-site wells (including the exterior sumps and pits) began on January 25, 1993 and was completed on February 23, 1993. The objective of this work was to protect against tampering and vandalism, minimize surface water infiltration, protect against damage during demolition activities, and provide ease of sampling. The wells were secured at the surface with square concrete pads and locking covers, and protective ballards were installed around the wells to prevent damage from vehicles and machinery.

2.3.2 Field Operations Trailer

On April 22, 1993, a field operations trailer was set up at the site to provide a central location for all activities related to the Well Survey. The operations trailer functioned as a field laboratory, health and safety station, equipment storage facility, and site office. The operations trailer was equipped with laboratory supplies, fire extinguishers, an emergency eye wash station, first aid supplies, two refrigerators for sample storage, and field and office supplies.

2.3.3 On-Site Utilities

During May and June 1993, temporary utility connections for electricity, water and telephone were installed at the site under the supervision of GEC personnel. On May 24, 1993, Albarell Electric, Inc. installed a temporary electrical connection at the site to provide 120/240 volt, 200 amp single-phase service. The connection was made from a power pole near the southwest corner of the site on Sixth Street and extended to the area near the southeast corner of the site near the operations trailer. This connection was required to supply the field trailer and to operate pumps and other equipment during the sampling activities. Power to the site was activated by Pennsylvania Power and Light (PP&L) in early June 1993. A temporary water connection was established at the site on May 25, 1993 on the north side of the building, utilizing a pre-existing two-inch lateral from the Borough's water main along Sixth Street. The connection supplied water for decontamination purposes during the sampling activities and for fire protection during demolition activities. Finally, GTE installed a phone line to provide telephone service to the field operations trailer on June 15, 1993.

2.3.4 Decontamination Pads

Two decontamination pads were constructed at the site on June 24, 1993, to minimize the physical transfer of any contaminated substance between people and/or equipment. One pad was built for personnel decontamination and the second for equipment decontamination. The personnel decontamination pad consisted of three stations: 1) an equipment drop station; 2) an outer glove and boot wash station; 3) an outer garment removal station. The personnel decontamination pad was underlain by three layers of plastic sheeting (6 mm thick) to prevent potentially-contaminated materials from contacting the ground surface. A temporary fence was erected around the perimeter of the decontamination area to limit access and to control the flow of personnel through the decontamination area.

The equipment decontamination area consisted of two stations. The first station contained a work bench and cleaning utensils to clean small equipment, such as bailers and glassware. The second station consisted of two 55 gallon polyethylene drums (one filled with tap water and the other with tap water and Liquinox™ cleaner), to clean the pumps used for onsite groundwater sampling. As with the personnel decontamination pad, the equipment decontamination pad was underlain with plastic sheeting and was surrounded by a temporary fence.

2.4 Task 3 - Well Record Search

2.4.1 Purpose of Well Record Search

The objective of this task was to compile a list of private groundwater users whose wells might be sampled to assess any potential impact on the quality of their water from the Rodale site or other potential sources in the area. For purposes of this study, a private groundwater user was defined as a household, business or organization that obtains water from wells other than those utilized by the Borough of Emmaus or other public water providers. Also included in this task was a survey of seeps, springs, and streams (identified as Task 3A and described in Section 2.5). This section briefly summarizes the methodology used to compile the well list and the results. Detailed procedures used for completing Tasks 3 and 3A are in the document entitled, "Well Survey Procedures and Proposed Sampling List Report for the Rodale Manufacturing Site" (Sampling List Report, GEC, May 7 1993).

2.4.2 Methodology of Well Record Search

Step 1: Identification of Search Area

As stated in the Sampling List Report, a search was conducted to identify, to the best possible extent, private groundwater users in the study area utilizing a two-tiered approach:

1. All groundwater users within a two-mile radius of the Rodale site were located based on available information. As depicted on Plate 1, the two-mile radius includes the entire Borough of Emmaus, parts of Lower Macungie, Salisbury, Upper Milford and Upper Saucon townships, and a small portion of the south side of the City of Allentown.

2. All groundwater users within the area bounded by a two-mile and three-mile radius of the site that were located in critical areas were inventoried. For purposes of this study, a critical area was defined as an area which is generally downgradient or laterally gradient to the site. The largest noncritical area was located south of South Mountain, which likely represents a regional groundwater flow divide.

Step 2: Collection of Information from Literature and Regulatory Agencies

A number of sources were utilized to compile a list of wells in the survey area. Table 2-1 summarizes the sources GEC utilized to obtain the well record information, together with the types of data available and important limitations. Because of the large amount of data generated from the sources listed in Table 2-1, GEC determined that consultation with local drillers for their well records was not necessary.

Step 3: Consultation with Local Municipalities

Additional information related to groundwater users was obtained from the Borough of Emmaus and the townships of Upper Milford, Upper Saucon, Salisbury, and Lower Macungie. This information is presented in Section 3.1.2.3 of the Sampling List Report, and summarized in Section 1.5.3 above.

TABLE 2-1: SUMMARY OF SOURCES USED IN WELL RECORD SEARCH			
Source No.	Source	Data Available	Comments/ Limitations
1	PADER Well Inventory Database	Well data for wells installed prior to 1986	•wells office-located, not field-located by PADER on USGS quadrangle maps •no database info for wells drilled previous to 1966; not updated since 1986 •contains only data from logs submitted by drillers •not considered a complete list •obtained database info, not well records
2	PADER well records on file	Well records for wells installed after 1986	•wells not entered on database or located on maps by PADER •well records obtained for area of interest by GEC
3	U.S. Geological Survey, Malvern, PA office	Well records for area of interest	•wells reportedly field-located by USGS •well records obtained for area of interest and located on maps by GEC
4	Report: "Ground Water in Southeastern Pennsylvania", PADER, 1934, as listed in: "Hydrogeologic Investigation of Rodale Manufacturing Site, Emmaus, Pennsylvania" (Weston, 1989).	Well data for area of interest	•results of early well location attempts, mainly by PADER •most wells are probably no longer in use
5	Report: "Groundwater Monitoring Plan" (SNR Company, 1989), as listed in: "Site History and Laboratory Results for the Rodale Manufacturing Site in Emmaus, Pennsylvania" (GEC, 1991).	Well data for area of interest	•results of early well location attempts, mainly by PADER •most wells from Wood report (1972) •many wells are probably no longer in use
6	Project files of Roy F. Weston, Inc., as listed in: "Site History and Laboratory Results for the Rodale Manufacturing Site in Emmaus, Pennsylvania" (GEC, 1991).	Well data for area of interest	•results of early well location attempts, mainly by PADER •most wells from Wood report (1972) •many wells are probably no longer in use
7	Field investigations conducted by GEC from October - April 1993.	Location of select wells, seeps, springs and streams	•visual and limited door-to-door survey of locations in critical areas by GEC •for homes with observed wells, no drilling or well construction information obtained
8	Lehigh County Authority (LCA) well records.	Well records for LCA wells	•well records and location map obtained from LCA office
9	Report: "Water Resources in Lehigh County, Pennsylvania", (Wood, 1972).	Well data for area of interest	•results of early well location attempts, mainly by PADER •many wells are probably no longer in use

NOTES:

Source numbers correspond to those in GEC database
PADER - Pennsylvania Department of Environmental Resources
LCA - Lehigh County Authority

Step 4: Preparation of Database

GEC compiled the data from all sources and entered them into the computer database program PARADOX™. Two database files were created to store pertinent well record information. The first file, "WELL LOC", stored available information related to the location of each well including: well identification number, longitude and latitude, municipality, street name, owner's name, owner's phone number, information source, and any additional information regarding the location of the well. The well identification numbers were adopted from the numbering system employed by PADER and USGS. Wells inventoried in PADER's well record database are numbered consecutively and have no prefix; USGS inventoried wells have the prefix "LE" (for Lehigh County wells). Finally, wells compiled from PADER's on-file well records (wells installed since 1986 and not yet entered into the PADER database), and those identified during GEC field investigations, were assigned the prefix of the municipality: "EM" for Emmaus; "LM" for Lower Macungie; "SA" for Salisbury; "UM" for Upper Milford, and; "US" for Upper Saucon.

The second file, "WELL DATA", stored information related to well construction details and hydrogeologic conditions encountered during drilling, including: well identification number, well use, well depth, yield, driller, date installed, aquifer, well diameter, rock type, top-of-casing elevation, and any additional comments.

2.4.3 Results of Well Record Search

A total of 367 wells were inventoried and entered into the database files WELL LOC and WELL DATA. Wells in the database represent a compilation from all sources listed in Table 2-1. The well record information is subject to the limitations provided in Table 2-1. It should be noted that the database cannot be expected to include all the wells that exist in the study area. Although drillers are currently required to provide records for all wells they drill, the State of Pennsylvania does not rigidly enforce this law. In addition, some records provided to the State could not be office-located, do not appear on the State's maps, and were not plotted by GEC.

The complete database and a USGS topographic map depicting all inventoried wells were provided in the Sampling List Report. A summary table that consists of the important fields from the database is included in Appendix 1.

2.5 Task 3A - Survey of Seeps, Springs and Streams

2.5.1 Purpose of Survey

As part of Task 3A , the locations of significant seeps, springs and streams were located in order to identify potentially important groundwater discharge locations and to select several locations for sampling to assess water and stream sediment quality.

2.5.2 Methodology of Survey

GEC personnel made two visits (December 2 and December 9, 1992) to the study area and physically walked the major watercourses located within the survey area. During the field investigation, the locations of significant seeps, springs and tributaries were recorded in a field notebook. GEC also recorded pertinent characteristics such as flow rate estimates, water depth, channel width, etc. In addition, GEC field-verified the locations of the major springs identified in published geologic reports for the area.

During the field survey, significant stretches of Liebert Creek, Little Lehigh Creek and their tributaries were investigated. It was not possible to survey some stretches because they traversed private property. In addition, GEC conducted the field survey within a single season, late fall; some surface water features may be more or less prominent in other seasons.

2.5.3 Results of Survey

The major watercourses in the study area are the Little Lehigh Creek and its main tributary, Liebert Creek. These watercourses are described in detail in Section 1.5.2.

A total of eight springs were identified in the study area. All are located along Little Lehigh Creek in areas generally downgradient of the site along. Three springs (LE-SP-72, LE-SP-73 and LE-SP-78) were identified in the literature and field-located by GEC. The remaining five

springs (SP-01 through SP-05) were identified during the field search by GEC. Most springs, with the possible exception of SP-02, SP-04 and SP-5, appeared to be perennial springs.

In addition, two seeps (SE-01 and SE-02, both in Upper Milford Township) and several small tributaries (LCTR-01 through LCTR-06, in Upper Milford Township, and LCTR-07 through LCTR-09 in the Borough of Emmaus and Lower Macungie Township) were located. The seeps and tributaries are expected to be seasonal and flow only after significant precipitation events.

The seep, spring, and stream locations were entered into a separate database (included in Appendix 1). The survey of seeps, springs, and streams, provided several locations for inclusion on the Proposed Sampling List.

2.6 Task 4 - Preliminary Assessment and Location Confirmation

Following the compilation of the list of private groundwater users and other locations of interest, an evaluation was made to determine the reliability and accuracy of the collected data. It was necessary to field-verify the presence or absence of wells at many locations: older well logs indicated the presence of a well at a particular location when in fact the well was abandoned or no longer in use. In other cases, insufficient location data was provided in the well logs: in these cases, secondary sources, such as phone books, were used to supplement location data.

In addition, GEC personnel made several trips to the study area during March and April 1993 to confirm the location of wells for which insufficient data was obtained during Task 3. Any additional information obtained during Task 3 or 4 was entered into the well database for consideration as a final well sampling location.

2.7 Task 5 - Evaluation of Borough of Emmaus Water Distribution System

2.7.1 Purpose of System Evaluation

The main objective of this task was to determine the path groundwater takes from its source in the six production wells to the user. A secondary objective was to determine appropriate sample locations for the evaluation of water quality.

2.7.2 Methodology of System Evaluation

GEC worked closely with the Borough of Emmaus to evaluate the water distribution system. GEC obtained a map of the water distribution system including locations of production wells, reservoirs, and water mains. During discussions between GEC and the Borough, GEC obtained information regarding operating details and locations frequently sampled within the system.

2.7.3 Results of System Evaluation

Important details regarding the Emmaus water distribution system, as determined during this study, are listed as follows:

Production Well Details

The Borough utilizes six production wells (PSW-1 through PSW-4, PSW-6 and PSW-7) located throughout the Borough. The water is chlorinated and filtered prior to distribution. Air stripping towers are currently in use to treat water at PSW-1, PSW-2 and PSW-7. As of December 1993, an air stripping tower was under construction at PSW-4.

All Borough wells have sample ports for ease of collection. A pumping schedule was obtained which also presents the daily production values. In general, the wells pump on an alternating schedule, with three or four wells in operation on a given day (as presented in Table 1-3). The wells are generally pumped from 3:00 P.M. until 6:00 A.M.

Distribution System Details

The Borough distribution system distributes water from all six municipal supply wells. The system is a combined system in which all water mains are interconnected allowing for mixing from all water sources. With the exception of fire hydrants, no direct access points exist to the water mains for sampling.

2.8 Task 6 - Selection of Locations to be Sampled and Access

Based on data obtained during the Well Record Search and preliminary assessment, GEC compiled a Proposed Sampling List, including all onsite wells, Borough production wells, and

selected spring, stream and stream sediment locations proposed for sampling. Included in this section is a rationale for selection of the locations on the Proposed Sampling List. These locations were finalized following a meeting between EPA, PADER and GEC on April 20, 1993, and after a final review by EPA and PADER of a revised Sampling List submitted on April 30, 1993. Note that some additional changes were necessary during access procurement, particularly for private wells; these changes are documented in Sections 2.8.6 and 2.9. The Final Sampling List (Table 2-2) indicates by shading those locations that were not sampled.

The following sections describe the rationale for sample selection, according to location type.

2.8.1 Onsite Well Locations

As stated in the Work Plan (Activity C - Sampling of Onsite Wells), groundwater samples were to be collected at all onsite well locations except RW-1 and RW-2. These wells are included as numbers 1 through 11 on Table 2-2.

2.8.2 Borough of Emmaus Well Locations

As stated in the Work Plan (Activity B - Sampling of Borough of Emmaus Wells and Distribution System), groundwater samples were to be collected from all six Borough of Emmaus production wells. These wells are included as numbers 12 through 17 on Table 2-2.

2.8.3 Borough of Emmaus Distribution System

As stated in the Work Plan (Activity B - Sampling of Borough of Emmaus Wells and Distribution System), samples were to be collected from the distribution system at locations throughout the Borough. However, in accordance with EPA's guidance in the March 29, 1993 comment letter and during an April 20, 1993 meeting, sampling of Borough production wells was considered sufficient to meet the study objectives, and distribution system sampling was dropped from the Work Plan tasks. Therefore, no distribution system samples were included on the Sampling List.

TABLE 2-2: FINAL SAMPLING LIST

List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
			ONSITE WELLS				
1	OW-WELL1	Emmaus	Rodale site (Well 1)	YES	--	7/15/93	disposal well
2	OW-WELL2	Emmaus	Rodale site (Well 2)	YES	--	7/14/93	disposal well
3	OW-WELL3	Emmaus	Rodale site (Well 3)	YES	--	7/16/93	disposal well
4	OW-WELL4	Emmaus	Rodale site (Well 4)	YES	--	7/13/93	monitor well
5	OW-WELL5	Emmaus	Rodale site (Well 5)	YES	--	7/6/93	shallow cistern approx 8' in depth
6	OW-WELL6	Emmaus	Rodale site (Well 6)	YES	--	7/7/93	former water supply well for the facility
7	--	Emmaus	Rodale site (WW-08)	YES	--	not sampled	old cistern; very little recharge after purging
8	OW-MW1	Emmaus	Rodale site (MW-1)	YES	--	6/30/93	monitor well
9	OW-MW2	Emmaus	Rodale site (MW-2)	YES	--	6/30/93	monitor well
10	OW-MW3	Emmaus	Rodale site (MW-3	YES	--	7/1/93	monitor well
11	OW-MW4	Emmaus	Rodale site (MW-4)	YES	--	7/6/93	monitor well
			BOROUGH OF EMMAUS PRODUCTION WELLS				
12	PSW-1	Emmaus	Kline's Lane pump station	YES, 1/11/93 letter from Borough	--	7/22/93	pumps M, Th, Sa
13	PSW-2	Emmaus	Kline's Lane pump station	YES, 1/11/93 letter from Borough	--	7/21/93	pumps Su, M, W, F
14	PSW-3	Emmaus	Tenth Street and Broad Street	YES, 1/11/93 letter from Borough	--	7/22/93	pumps M, W, Th, F
15	PSW-4	Emmaus	Glenwood Street and Mountain Blvd.	YES, 1/11/93 letter from Borough	--	7/20/93	pumps Su, T, W, Th, Sa
16	PSW-6	Emmaus	Emmaus Community Park	YES, 1/11/93 letter from Borough	--	7/20/93	pumps Su, T, Th, Sa
17	PSW-7	Lower Macungie	Macungie Ave. near Donald Drive	YES, 1/11/93 letter from Borough	--	7/21/93	pumps M, T, W, F

TABLE 2-2: FINAL SAMPLING LIST

List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
			SPRING LOCATIONS				
18	LE-SP73	Lower Macungie	Camp Olympic, west side of Little Lehigh Creek	YES, consent from 6/25/93 phone conversation with property owner	--	7/30/93	Q to 400 gpm; Allentown aquifer; used for supply at Camp
19	SP-02	Lower Macungie	Camp Olympic, East side of Little Lehigh Creek	YES, consent from 6/25/93 phone conversation with property owner	--	7/30/93	not used; Q = 1-2 gpm; Allentown Formation
20	LE-SP78	Salisbury/ Allentown	at Fish Hatchery	YES, verbal consent from 7/30/93 conversation w/ Allentown employee	--	7/30/93	Reported Q up to 1200 gpm; Allentown aquifer
21	SP-03	Salisbury	Keystone Road S. of Keck's Bridge	YES, verbal consent from 7/30/93 conversation with property owner	--	7/30/93	Q = 25 gpm+; used for home consumption
			SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS				
22	SW-1/SD-1	Upper Milford	Unnamed trib to Liebert Creek at Vera Cruz Rd	YES, public property	--	7/27/93	
23	SW-2/SD-2	Upper Milford	Liebert Creek, past Quarry Rd.	YES, based on conversation with property owner	--	7/27/93	
24	SW-3/SD-3	Emmaus	South intermittent tributary at Chestnut St.	YES, public property	--	7/27/93	
25	SD-4	Emmaus	S. intermittent prior to confluence with Liebert Ck	YES - Verbal consent from ICGC in 6/22/93 visit	--	7/27/93	Losing stream; no water sample collected
26	SW-5/SD-5	Emmaus	Liebert Ck prior to confluence with S. intermit. trib.	YES - Verbal consent from ICGC in 6/22/93 visit	--	7/28/93	
27	SW-6/SD-6	Lower Macungie	Little Lehigh prior to confluence with Liebert Ck	YES, consent from 6/25/93 phone conversation with property owner	--	7/28/93	
28	SW-7/SD-7	Lower Macungie	Liebert Ck prior to confluence with Little Lehigh Ck	YES, consent from 6/25/93 phone conversation with property owner	--	7/28/93	
29	SW-8/SD-8	Lower Macungie	Little Lehigh Ck at Route 29 bridge	YES, public property	--	7/28/93	
30	SW-9/SD-9	Lower Macungie	L. Lehigh Ck at Orchid Pl (Poole W.S. bridge)	YES, public property	--	7/28/93	

TABLE 2-2: FINAL SAMPLING LIST							
List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
31	SW-10/SD-10	Lower macungie	Little Lehigh Ck at Weidas Mill Bridge	YES, public property	--	7/29/93	
32	SW-11/ SD-11	Salisbury	Little Lehigh Ck at Keck's Bridge	YES, public property	--	7/29/93	
33	SW-12/ SD-12	Salisbury	Little Lehigh Ck near Fish hatchery	YES, public property	--	7/29/93	
34	--	Emmaus	N. intermittent tributary	--	SW-15 location was substituted	--	Storm water runoff channel
35	--	Salisbury	N. intermittent trib near confluence with Little Lehigh Ck	--	SW-16 location was substituted	--	Storm water runoff channel
**	SW-15/ SD-15	Upper Milford	S. intermittent tributary at S. 7th St.	yes, public property	--	7/29/93	Addition to Sampling List
**	SW-16/ SD-16	Upper Milford	Liebert Ck at Quarry Road	yes, public property	--	7/30/93	Addition to Sampling List
PRIVATE WELL LOCATIONS							
36	LE-169	Emmaus	Impress Industries (former Owens-Corning) 728 W. Broad St	NO - no well on property based on 6/25/93 phone conversation	NONE - no other reported private wells in Emmaus area	--	
37	LE-667	Emmaus	Air Products, Inc. 733 W. Broad St	NO - no response from two contacts	NONE - no other reported private wells in Emmaus area	--	Facility inactive
38	LE-669	Emmaus	General Machine Corp 4th and Furnace St	NO - forms returned from JEP Mgmt, Inc. on 6/9/93; no well on property	NONE - no other reported private wells in Emmaus area	--	
39	LE-311	Upper Milford	Rinker & Assoc. (former Vera Cruz Elem School) 5093 Vera Cruz Rd.	YES - Verbal consent from Rinker & Assoc. on 6/23/93 visit	--	Wed., 8/4/93	
40	EM-08	Lower Macungie	Peter, D. 3729 Orchid Lane	YES - Forms returned 6/9/93	--	Mon., 8/9/93	
41	EM-09	Lower Macungie	Leube, H. 3705 Orchid Place	YES - Verbal consent from Donald Peter (prop owner) from 6/18/93 visit	--	Mon., 8/9/93	
42	0351	Lower Macungie	Lehigh Country Club 2319 Cedar Crest Blvd.	YES - Verbal consent from 6/22/93 visit; forms returned 7/6/93	--	Thur., 8/5/93	Home well on property

TABLE 2-2: FINAL SAMPLING LIST

List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
43	1406	Lower Macungie	Bagin, J. 2390 Riverbend Rd	NO - Not able to contact; left messages but no response	Alternate 1: 2321 Riverbend Dr. Alternate 2: 2345 Riverbend Dr.	--	Priority 2; none were sampled
44	LE-1293	Lower Macungie	Lehigh County Authority 1053 Spruce Rd	YES - Verbal consent in 7/19/93 phone conversation	--	Thur., 8/5/93	LCA Well 8
45	LE-411	Lower Macungie	Kemmerer, P. 4197 Indian Creek Rd	YES - Forms returned 6/8/93	--	Thur., 8/12/93	
46	LE-677	Lower Macungie	Lehigh Country Club 2319 Cedar Crest Blvd.	YES - Verbal consent from 6/22/93 visit; forms returned 7/6/93	--	Thur., 8/5/93	Irrigation well
47	LM-10	Lower Macungie	Lynn, M. E. 4226 Indian Creek Road	YES - Forms returned 6/11/93	--	Tues., 8/3/93	
48	LM-17	Lower Macungie	Nace, R. Riverbend Rd	NO - Verbal refusal in 6/23/93 phone conversation	Alternate 2: Bader, M. (LM-27) 2532 Riverbend Rd	Wed., 8/11/93	Priority 1; alt. was sampled after consent
49	LM-19	Lower Macungie	Wildland Conservancy (now Pool Wildlife Cons)	NO - Verbal refusal in 6/16/93 phone conversation	Alternate 1: 2584 Riverbend Rd Alternate 2: 2700 Riverbend Rd	--	Priority 2; none were sampled
50	LM-20	Lower Macungie	Rader, C.K. 3612 Orchid Lane	YES - Forms returned 6/8/93	--	Tues., 8/10/93	
51	LM-21	Lower Macungie	Simonds, Wm 3465 Orchid Place	YES - Verbal consent in 7/8/93 phone conversation; forms returned 7/27/93	--	Thur., 8/12/93	
52	LM-22	Lower Macungie	Fretz, D. (now Abrams residence) 3403 Orchid Lane	NO - declined during 8/6/93 phone conversation after verbal consent from 6/18/93 visit	No alternates selected	--	
53	LM-23	Lower Macungie	Lee, R.E. 3430 Orchid Place	YES - Verbal consent from 6/18/93 visit; forms returned 7/2/93	--	Mon., 8/9/93	
54	0763	Salisbury	Stein, P. Jr. 2619 West Rock Rd	No - Verbal refusal in 6/16/93 phone conversation	NONE were suggested; location is upgradient from Rodale site	--	
55	0772	Salisbury	Kulaleski, T. Golf Circle Rd	NO - Not able to contact; left messages, no response	Alternate 1: Olivers (SA07) 2891 Golf Circle	Tues., 8/10/93	Priority 1; alternate was sampled
56	0776	Salisbury	O'Boyle, J. 3645 Salisbury Dr	NO - Verbal refusal in 7/21 phone conversation	Alternate 1: 3655 Salisbury Dr Alternate 2: 3661 Salisbury Dr	--	Priority 2; none were sampled
57	0789	Salisbury	Khoury, T. 3540 Fox Run Dr	NO - Not able to contact; left messages, no response	Alternate 1: 802 Keystone Dr Alternate 2: 1480 Keystone Dr	--	Priority 2; none were sampled

TABLE 2-2: FINAL SAMPLING LIST

List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
58	LE-797	Salisbury	Beible, A. 419 Dalton St	NO - Based on 6/15/93 phone conversation, well no longer in use	Alt 1: Mazzeo, S. (SA-09) 412 Mountain Dr (near PSW-4)	Thur., 8/12/93	Priority 2; alternate was sampled
59	SA-03	Salisbury	Patt, C. 3732 Devonshire Rd	NO - Verbal refusal during 6/22/93 visit	Alt 1: 3741 Devonshire Rd Alt 2: 3721 Devonshire Rd	--	Priority 2; none were sampled
60	SA-05	Salisbury	Churylo, T. 820 East Rock Rd	YES - Forms returned 6/25/93	--	Thur., 8/5/93	
61	0261	Upper Milford	Mosig, W.R. 4340 Knollwood Dr	YES - Forms returned 6/27/93, then: NO - declined in 8/11/93 call to GEC	--	--	Not sampled; sampled UM-64 in this area
62	1492	Upper Milford	Stauffer, D. 4701 Mill Rd	YES - Forms returned 6/8/93	--	Thur., 8/5/93	
63	1501	Upper Milford	Doney, S. 4832 Linda Lane	YES - Forms returned 6/9/93	--	Tues., 8/3/93	
64	1541	Upper Milford	Hiestand, A. 5123 Vera Cruz Rd	NO - Verbal refusal in 6/22/93 phone conversation	NONE suggested; other wells in area were sampled	--	
65	LE-1301	Upper Milford	Buss Water Company R.D. 1, Emmaus	NO - Verbal refusal in 6/18/93 phone conversation	NONE suggested; other wells in area were sampled	--	
66	LE-312	Upper Milford	Schuster, S. 5202 Vera Cruz Rd	YES - Verbal consent in 6/18/93 phone conversation	--	Thur., 8/12/93	
67	LE-570	Upper Milford	Vera Cruz Fire Co. R.D. 1, Emmaus	NO - Not able to contact after several visits	NONE suggested; other wells in area sampled	--	
68	LE-890	Upper Milford	Umlauf, C. 220 Hamilton	NO - Not able to contact; left messages but no response	Alt 3: Bogert, B. (LM-26) 4140 Tank Farm Rd.	Tues., 8/10/93	Priority 1; this alternate was sampled
69	UM-33	Upper Milford	Hoffman, D. 7th St (Emmaus)	NO - Not able to contact; left message but no responses	Alternate 2: (UM62) 600 S. 7th St. (3302 Donaldson)	Thur., 8/12/93	Priority 1; sampled alternate location. Also sampled nearby UM-63
70	UM-39	Upper Milford	Gary, R. 4896 Skytop Dr	NO - Not able to contact	Alt 1: 5443 S. Mountain Drive Alt 2: 5421 S. Mountain Drive	--	Priority 2; no access given from alternates
71	UM-40	Upper Milford	Kline, M. 3732 Allen St	YES - Verbal consent in 6/22/93 phone conversation	--	Wed., 8/4/93	
72	UM-43	Upper Milford	Baumann, L. 4587 N. Vera Cruz Rd	YES - Forms returned 6/16/93	--	Tues., 8/3/93	Artesian well

TABLE 2-2: FINAL SAMPLING LIST

List No.	Sample ID	Municipality	Name and Address	Status of Access (Y/N) with Description	Alternate Location (if applicable)	Sample Date	Notes
73	UM-45	Upper Milford	Torrence, L. 4867 Vera Cruz Rd	YES - Verbal consent from 6/22/93 visit	--	Wed., 8/4/93	
74	UM-49	Upper Milford	Wittman 4873 Vera Cruz Rd	NO - Verbal refusal from 6/22/93 visit	Alt 1: Sherman, S. (UM-59) 4819 Vera Cruz Rd	Wed., 8/4/93	Priority 1; alternate was sampled
75	UM-53	Upper Milford	Nishnic, M. 3501 Quarry Rd	NO - Verbal refusal from 6/22/93 visit	Alt 2: Weida, B. (UM-60) 3471 Quarry Rd	Tues., 8/10/93	Priority 1; alternate was sampled (Vera Cruz Rd)
76	UM-57	Upper Milford	Hanchett 1490 Pennsylvania	NO - Verbal refusal from 6/22/93 visit	Alternate 1: Stoudt, E. (UM-61) 4777 Vera Cruz Rd	Tues., 8/10/93	Priority 1; alternate was sampled
77	US-01	Upper Saucon	Dannecker Box 247 Vera Cruz Rd	NO - Forms returned (address not locatable)	Alternate 1: 155 White Oak Rd (UM-11)	--	Priority 1; alternate not sampled - Borough water provided to this area
78	US-04	Upper Saucon	Birosik, C. 290 Chestnut Hill Rd	NO - Forms returned (address not locatable)	NONE suggested; this is upgradient location on south side of South Mountain	--	
79	UM-58	Upper Milford	Indian Creek Golf Course 1449 Chestnut Street	YES - Verbal consent from 6/22/93 visit	--	Tues., 8/3/93	Sampled restaurant well
**	LM-28	Lower Macungie	Peter, D. 3729 Orchid Lane	YES - Verbal consent from 8/9/93 visit	--	Wed., 8/11/93	Addition to Sampling List; shallow dug well no longer in use
**	SA-08	Salisbury	348 Keystone Rd	YES - Verbal consent from Floyd Keim (prop. owner) from 8/10/93 visit	--	Wed., 8/11/93	Addition to Sampling List
**	UM-63	Upper Milford	Evans, J. 3331 S. 7th Street	YES - Verbal consent from 8/24/93 phone call	--	Wed., 8/25/93	In vicinity of UM-33 (List No. 69 above)
**	UM-64	Upper Milford	Steager, E. 4359 S. Fifth St	YES - Verbal consent from 8/23/93 telephone call	--	Wed., 8/25/93	In vicinity of 0261 (List No. 61 above)

TABLE NOTES:
- SHADING DENOTES THOSE LOCATIONS THAT WERE NOT SAMPLED.
- This table summarizes status of all locations from Sampling List (Table 2) in report, "Well Survey Procedures and Proposed Sampling List Report" (GEC, May 7, 1993). Because access to all locations was not possible, alternate locations were selected and agreed on in communication with EPA and PADER.
- For all final sample locations, see map included as Plate 1 in this report.
- Reference "ID from Database" number to look up well or spring record in database (Appendix 3 of Sampling List Report)
- Alt 1: Alternate Number 1
- ** = indicates an addition to Sampling List
- Q = discharge; ICGC = Indian Creek Golf Course

2.8.4 Seep, Spring and Stream Locations

Seep Locations

Only two significant seeps were identified during the survey. Both seeps are in Upper Milford Township along the unnamed tributary to Liebert Creek. Since these locations are considerably upgradient of the Rodale site and represent very small contributions to the volume of the unnamed tributary, they were not included on the Sampling List.

Spring Locations

As stated in Section 2.5.3, a total of eight springs were identified, all located within the Little Lehigh Creek area. A total of four were selected for inclusion on the Sampling List: LE-SP-73, LE-SP-78, SP-02 and SP-03. Springs LE-SP-73 and LE-SP-78 are located in Camp Olympic in Lower Macungie Township and the Fish Hatchery area in Salisbury Township, respectively. Both springs represent significant points of groundwater discharge to Little Lehigh Creek, with discharge of several hundred gpm reported in the literature and verified by field observation. Also located in Camp Olympic, Spring SP-02 discharges from the south side of Little Lehigh Creek closer to the Rodale site. Finally, SP-03 is located along Little Lehigh Creek, near Keck's Bridge and the confluence of the north intermittent stream. This spring represents a favorable location to monitor groundwater quality discharging to this portion of the creek. The spring locations are included as numbers 18 through 21 on Table 2-2.

Stream and Sediment Locations

As stated in the Work Plan, a number of stream samples (Activity D) and stream sediment samples (Activity E) were to be collected during the sampling activity. A total of 14 locations (SW-1 through SW-14) were selected for sampling. These locations were selected to provide comprehensive surface water and stream sediment quality data for the primary watercourses in the study area. Locations were selected in both upgradient and downgradient areas and near the confluence of streams. Both water and sediment samples were to be collected at each stream location. The surface water and sediment samples are included as numbers 22 through 35 on Table 2-2.

2.8.5 Private Well Locations

Key data fields from the Well Survey database were selected and incorporated into a table to aid in the selection of wells for inclusion on the Proposed Sampling List. The following factors influenced the selection of private well locations:

1. The locations relative to the Rodale site and other potential sources of contamination were identified. Preference was given to locations up- and downgradient of these sites.

2. Wells with more recent installation dates were considered more likely to be in use and were given preference. At locations deemed important, wells with older dates or no dates were still included with the hope they could be sampled.

3. Wells with the owner's name and a nearly complete address facilitating location identification were given preference. At locations deemed important, complete addresses were not identified; however, given the owner's name, phone contact could be made to identify the well location and status of use.

4. The well depth and aquifer were considered important to assess the hydrogeologic correlation within the study area. Because the carbonate rock units in the area are considered to be an interconnected aquifer, wells from a range of depths were selected.

The Sampling List included 43 private well locations. Due to anticipated difficulties in obtaining access to all locations, EPA and PADER agreed to establishing the goal of obtaining 30 samples.

2.8.6 Sample Collection Access

The final step in the selection of sample locations was to obtain permission to collect samples from the private well owners. On June 2, 1993 GEC sent a package containing a cover letter, well questionnaire, and an access consent form to the selected well owners. GEC personnel then followed up the mailing with telephone calls and personal visits. Based on responses of property owners, several wells were deleted from the Proposed Sampling List for the following reasons:

1. In spite of repeated attempts, the property or well owner could not be contacted to request permission to sample the well.

2. The well no longer existed, was damaged or of questionable construction, or was not easily accessible for collection of a sample.

3. The property or well owner refused access for collection of the sample.

In a July 22, 1993 letter from GEC to EPA and PADER, GEC summarized the efforts to obtain access for private well sampling. As described in this letter, GEC had obtained written or verbal approval from 21 of the 43 locations to which the mailing was sent. This number was considerably less than the goal of 30 locations agreed upon by GEC, EPA, and PADER. The letter contained a list of alternative well locations for review by EPA and PADER. Based on a July 26, 1993 telephone conversation, PADER provided approval of the approach described in the letter suggesting one change which GEC implemented. EPA provided approval of this approach based on an August 4, 1993 telephone conversation. The private well sample locations are included as numbers 36 - 79 on Table 2-2. Shading on the table denotes those sample locations deleted for the reasons provided; locations marked with an asterisk (*) denote subsequent additions to the Sampling List.

2.9 Task 7 - Sampling Activity

2.9.1 General Procedures

Appendix 2 describes the general procedures from the sampling activities that pertain to: 1) health and safety; 2) environmental monitoring; 3) field instrument calibration; 4) field equipment decontamination; 5) field filtration; 6) field documentation procedures, and; 7) quality assurance and quality control (QA/QC) procedures. These procedures were followed in accordance with the Well Survey Work Plan, HASP, and QAPP. Any deviations from these procedures were noted in the field log book and are discussed herein in sections describing the individual sampling activities, as appropriate.

2.9.2 Sampling of Onsite Wells (Activity C)

2.9.2.1 Objective

The objective of onsite well sampling was to obtain a recent round of groundwater quality data for the site. The onsite groundwater quality data can be compared with offsite data to help determine the relationship of contaminants detected in both locations. Groundwater samples were collected at all onsite well locations (except RW-1, RW-2 and WW-08), and monitor wells MW-1 through MW-4 (see Figure 1-2).

2.9.2.2 Sampling Procedures

The ten onsite well samples were collected from June 30 through July 16, 1993. The procedures for sample collection are listed as follows:

1. The static water level and total depth were first measured in each well using the Solinst water level meter.

2. The minimum purge volume, equal to three well volumes, was calculated.

3. Plastic sheeting was placed around each well to capture any incidental spillage.

4. A Grundfos submersible pump with stainless steel components and polyethylene tubing were lowered into the well using an Up-Z-Daisy™ pump puller. Well 5 was purged with a surface centrifugal pump due to the shallow depth to water in this well.

5. Each well was purged a minimum of three well volumes or until the well was pumped dry. After this, the conductivity and pH of the purge water was monitored until three consecutive readings were within ten percent of each other.

6. The pump was pulled from the well. The sample was collected by lowering a pre-cleaned Teflon bailer with nylon twine or rope. The first three bailer volumes were discarded to acclimate the bailer to the groundwater. This water was placed into proper

containers for eventual disposal. The fourth bailer volume retrieved was used to begin filling sample containers. The sample fractions were collected in the following order: VOCs (with no headspace); SVCs; PCBs; TAL metals and cyanide; general water quality parameters, and; final field parameters. For metals analysis, both an unfiltered and filtered sample (to test for total and dissolved metals, respectively) were collected. Filtering was conducted as discussed in Appendix 2.

7. The final field parameters of pH, specific conductivity, temperature, and Eh were measured immediately after sample collection, according to GEC Standard Operating Procedures (SOPs).

8. Samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.2.3 Purge Water Collection and Treatment

The purged groundwater was collected and stored in two onsite, above-ground high density polyethylene (HDPE) storage tanks with 7,100 gallon and 4,900 gallon capacities. In a June 24, 1993 letter to the City of Allentown (City), which receives and treats Emmaus's sanitary sewer discharges, GEC requested authorization for discharge to the sanitary sewer following onsite treatment of the water by granular activated carbon. The City issued a preliminary, conditional approval for this work on July 16, 1993. This approach was also discussed with EPA, PADER, and the Borough of Emmaus, who considered it acceptable.

On July 20, 1993, GEC conducted a 45-minute trial run of the treatment system and stored the effluent in a 550-gallon tank. The treatment system consisted of two 55-gallon drums of activated carbon connected in series. An influent and effluent sample were collected near the end of the trial run and submitted to LLI for analysis of VOCs, lead, and mercury. The results indicated that no VOCs or metals were found above detection limits in the effluent sample. These results were submitted to the City in a July 26, 1993 letter; the City provided verbal authorization for discharge on July 27, 1993 and issued a followup confirmation letter on August 2, 1993.

Following this approval, GEC operated the treatment system between July 27, 1993 and August 2, 1993. A total of approximately 9,000 gallons were treated and discharged to the sanitary sewer in batches. In an August 20, 1993 letter, GEC notified the Borough of Emmaus of the exact discharge volume for invoicing purposes. Copies of these letters are in Appendix 3.

2.9.2.4 Additional Comments

Although well WW-08 was scheduled to be sampled as part of Activity C, a sample could not be obtained from this well. During purging, the well was pumped to dryness and did not recharge at an appreciable rate. Subsequent depth to water measurements indicated no significant recharge, rising approximately 0.5 feet over a two week period. This recharge was determined to be insufficient for sampling, and well WW-08 was deleted from the sampling list. It was assumed that because of its shallow depth, the well does not receive a significant amount of water from aquifer recharge, but rather from surface runoff. Well WW-08 is completed to a depth of 64 feet, and does not likely penetrate the Leithsville Formation; therefore, it does not provide representative water quality data for this aquifer.

Finally, as part of this task, a representative from Tetra-Tech, Inc. (TTI) was onsite to obtain split samples on behalf of EPA. These split samples were obtained from well MW-2 (June 30, 1993) and Well 6 (July 7, 1993). GEC personnel filled sample containers for TTI personnel.

2.9.3 Sampling of Borough of Emmaus Wells (Activity B)

2.9.3.1 Objective

The objective of Borough of Emmaus well sampling was to obtain laboratory data for groundwater at these location to help determine the effect of the Rodale site and other potential sources on groundwater quality. Water samples were collected from all six Borough of Emmaus wells. In accordance with EPA guidance in a March 29, 1993 letter to GEC, samples were not collected from any individual sample taps within the Borough of Emmaus distribution system.

2.9.3.2 Procedures

The six Borough of Emmaus water supply wells were sampled over a three day period: 1) July

20 (PSW-6 and PSW-4); 2) July 21 (PSW-7 and PSW-2), and; 3) July 22, 1993 (PSW-1 and PSW-3).

During all portions of the sampling activity, GEC was accompanied by a technician from the Borough of Emmaus Water Department. In accordance with the QAPP, the Borough wells were allowed to operate for at least 30 minutes prior to sampling to flush the well and lines of any stagnant water. The water samples were collected prior to any treatment (chlorination or air-stripping) from sample ports provided for such purposes. Water was allowed to run at each sample port at a rate of approximately one gpm for a minimum of 10 minutes to flush the line.

The specific conductance and pH were monitored until three consecutive readings were within 10 percent of each other. The flow rate was then slowed for sampling to minimize aeration of the water. Sample containers, chilled to 4°C, were filled so that minimal or no headspace existed, as required for the particular analytical method. The sample aliquots were collected in the following order: VOCs, SVCs, and metals. The samples for dissolved metals were field filtered according to the procedure outlined in Appendix 2. The field parameters of pH, conductivity, and temperature were measured immediately after sample collection according to GEC SOPs. All samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.3.3 Additional Comments

As part of Activity B, a representative of TTI obtained a split sample on behalf of EPA. The split sample was obtained during sampling at PSW-7 on July 21, 1993.

2.9.4 Surface Water Sampling (Activity D)

2.9.4.1 Objective

The objective of surface water sampling (including stream and spring samples) was to obtain laboratory data for these media to help determine the effect of possible groundwater or surface water discharge at these locations.

2.9.4.2 Stream Water Sampling

2.9.4.2.1 Sample Locations

Stream water samples were collected at all surface water (SW) locations on the approved Sampling List except SW-4, SW-13, SW-14. These three stream locations were dry at the time of sampling and were deleted from the Sampling List. Locations SW-13 and SW-14 were located on the north intermittent tributary which, according to Borough personnel, was constructed/modified for storm water run-off purposes. In response to this, two locations were added to the Sampling List by the Project Geologist to insure adequate coverage in the study area. These additional locations were approved by EPA and were designated SW-15 and SW-16. Location SW-15 is located on the south intermittent tributary at S. Seventh Street (Emmaus), and SW-16 is located at the intersection of Liebert Creek and Quarry Road (Upper Millford Township). Therefore, a total of thirteen (13) stream samples were collected from the following water courses:

1) unnamed tributary to Liebert Creek (SW-1);
2) Liebert Creek (SW-2, SW-5, SW-7, and SW-16);
3) south intermittent tributary to Liebert Creek (SW-3 and SW-15)
4) Little Lehigh Creek (SW-6, SW-8, SW-9, SW-10, SW-11, and SW-12)

The surface water sample locations are shown on Plate 1.

2.9.4.2.2 Stream Sampling Procedures

Stream water sampling was conducted from July 27 through July 30, 1993. Sampling was conducted in accordance with GEC SOP G8-1 (Appendix 4, QAPP). During the collection of multiple samples along a single watercourse, samples were first collected downstream and successive samples collected in the upstream direction. Samples were collected from the center of the water body and at mid-depth, whenever possible. The samples were collected by directly filling containers. All efforts were made to minimize the disturbance of the sampling medium and prevent sediment from entering the sample container. The sample aliquots were collected in the following order: VOCs and metals. The dissolved metals aliquot from each stream water sample was field filtered as described in Appendix 2.

Field parameters (pH, conductivity, and temperature) were measured immediately upon sample collection, except at locations SW-1, SW-2, SW-3. Samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.4.2.3 Gas Chromatography (GC) Screening

At each sample location, the VOC fraction was collected in duplicate for rapid screening of VOCs. The duplicate fraction was transported at 4 °C to GEC's main office and analyzed by GEC personnel using a gas chromatograph (GC) equipped with purge-and-trap capabilities. In the event that a sample tested positive for VOCs, additional sample locations in the same area could be sampled immediately to adequately profile stream water quality. Since VOCs were not detected in any screened samples, no additional samples were required.

Table 2-3 summarizes the results of the GC screening for surface water samples. The SOP and sample chromatogram are presented in Appendix 4.

As required by the QAPP, laboratory confirmation was to be performed on at least 10% of the screened samples. GEC submitted four samples (SW-3, SW-8, SW-10, and SW-11) to LLI for laboratory confirmation of the screening results.

2.9.4.2.4 Additional Comments

As part of this task, a representative from TTI obtained two split samples on behalf of EPA. These split samples were obtained at surface water locations SW-10 and SW-12 on July 29, 1993.

2.9.4.3 Spring Water Sampling

2.9.4.3.1 Sample Locations

All springs from the Sampling List were sampled during Activity D. The four springs are located adjacent to and discharge into or near Little Lehigh Creek. Springs LE-SP73 and LE-SP78 are located on the west side of the creek, while springs SP-02 and SP-03 are located on the east side of the creek (see Plate 1).

TABLE 2-3: SUMMARY OF FIELD GC ANALYTICAL RESULTS FOR SURFACE WATER AND SPRING SAMPLES			
SAMPLE ID	COLLECTION DATE	ANALYSIS DATE	RESULTS (ppb)
SURFACE WATER SAMPLES			
SW-1	7/27/93	7/28/93	ND
SW-2	7/27/93	7/28/93	ND
SW-3	7/27/93	7/28/93	ND
SW-3D	7/27/93	7/28/93	ND
SW-5	7/28/93	7/29/93	ND
SW-6	7/28/93	7/29/93	ND
SW-7	7/28/93	7/29/93	ND
SW-7D	7/28/93	7/29/93	ND
SW-8	7/28/93	7/29/93	ND
SW-9	7/28/93	7/29/93	ND
SW-10	7/29/93	7/30/93	ND
SW-11	7/29/93	7/30/93	ND
SW-12	7/29/93	7/30/93	ND
SW-15	7/29/93	7/30/93	ND
SW-15D	7/29/93	7/30/93	ND
SW-16	7/30/93	7/30/93	ND
SPRING WATER SAMPLES			
SP-02	7/30/93	7/30/93	ND
SP-03	7/30/93	7/30/93	TCE = 10.7
SP-03D	7/30/93	7/30/93	TCE = 11.0
SP-LESP73	7/30/93	7/30/93	ND
SP-LESP78	7/30/93	7/30/93	ND

TABLE NOTES:

SW = Surface Water Sample
SP = Spring Sample
ND = Not Detected
D = Duplicate
ppb = parts per billion
TCE = Trichloroethene
See Appendix 4 for chromatograms from these samples and SOP for analysis.

2.9.4.3.2 Procedures

The four spring water samples were collected on July 30, 1993 in accordance with the procedures outlined in the QAPP. Samples were collected in the upstream direction, starting with the most downstream spring location (LE-SP78). The samples were collected by filling containers directly from the spring discharge. All efforts were made to collect the sample prior to the mixing of the spring water with the Little Lehigh Creek to obtain representative water quality data for the springs. Care was taken to prevent sediment from entering the sample containers. The sample aliquots were collected in the following order: VOCs and metals. The dissolved metals fraction for each spring was field filtered according to procedures outlined in Appendix 2. Field parameters (pH, conductivity and temperature) were measured immediately after sample collection according to GEC SOPs. Samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.4.3.3 GC Screening

As with the stream water samples, the spring samples were screened for VOCs by GEC personnel in accordance with the SOP in Appendix 4. In addition, samples from two spring locations were submitted to LLI for laboratory confirmation of the GC screening results. Confirmation samples were submitted for spring SP-03, for which TCE was detected during the screening process and a rapid turnaround time was requested, and for spring LE-SP73. The results of the GC screening are summarized in Table 2-3. The chromatograms from these samples are included in Appendix 4.

2.9.5 Sediment Sampling (Activity E)

2.9.5.1 Objective

The objective of sediment sampling was to obtain laboratory data to help determine any impact to sediments from groundwater discharge to surface water features in the study area.

2.9.5.2 Sample Locations

Sediment samples were collected at the same locations on the approved Sampling List where stream water samples were obtained (SW-1 through SW-12, SW-15, SW-16). In addition, a

sediment sample was obtained at SW-4, even though no stream water sample was obtained at that location. Sediment samples were not obtained at SW-13 and SW-14 because the stream beds were lined with cobbles and boulders installed during construction of this storm water run-off channel. Sediment samples were not collected from spring locations.

2.9.5.3 Procedures

The sediment samples were obtained immediately following collection of the stream water sample at each surface water location. At each location, the sediment sample was collected after the stream water sample was obtained to minimize the amount of sediment in the water sample. Each sediment sample was collected from the center of the stream bed, if possible, or along the side closest to the Rodale site.

The samples were collected using a stainless steel trowel. The sediment was transferred directly into clean sample containers. Care was taken to minimize disturbance of the sample. Samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.6 Residential Well Sampling (Activity A)

2.9.6.1 Objective

The objective of private well sampling was to obtain laboratory data for groundwater in the vicinity of the Rodale site to determine the effect of the site and other potential sources on groundwater quality. Relevant information obtained about the private wells is in Table 2-4.

2.9.6.2 Sample Locations

Water samples were collected at those locations on the approved Sampling List for which access was obtained. In addition, it was necessary to add several alternate well locations to the Sampling List to provide adequate sample coverage in areas where access was not obtained. These alternate locations were submitted to USEPA and PADER in a letter on July 22, 1993. PADER approved the additional locations in a July 26, 1993 phone conversation, and EPA provided approval in an August 4, 1993 telephone conversation. Three additional wells were added to the Sampling List during the sampling activity because: 1) access to alternate locations could not be obtained, or; 2) the sampling team located additional wells in critical areas.

TABLE 2-4 SUMMARY OF PRIVATE WELL SAMPLING INFORMATION (PAGE 1 OF 2)

List No.	Location ID	Street/Township	Sample Date	Well Information					Notes
				Date Drilled	Total Depth (ft)	Diam (in)	Depth to Water (ft)	Water Treatment	
39	LE-311	Vera Cruz Rd., Upper Milford	8/4/93	1927	300	6	NM	–	
40	EM-08	Orchid Lane, Lower Macungie	8/9/93	–	–	–	11.90	None	
41	EM-09	Orchid Lane, Lower Macungie	8/9/93	4/85	106	6	12.6	None	
42	0351	Cedar Crest Blvd., Lower Macungie	8/5/93	1974	75	6	NM	–	
44	LE-1293	Spruce Rd., Lower Macungie	8/5/93	11/74	295	8	88	Chlorine added	LCA Well 8
45	LE-411	Indian Creek Rd., Lower Macungie	8/12/93	12/7/54	160	6	NM	None	
46	LE-677	Cedar Crest Blvd., Lower Macungie	8/5/93	1979	120	6	NM	None	
47	LM-10	Indian Creek Rd., Lower Macungie	8/3/93	6/20/89	225	8	75.5	None	
48	LM-27	Riverbend Rd., Lower Macungie	8/11/93	5/76	77	–	NM	–	Alternate for LM-17
50	LM-20	Orchid Place, Lower Macungie	8/10/93	1987	50	6	7.7	None	
51	LM-21	Orchid Place, Lower Macungie	8/12/93	–	12.5	–	7.4	None	Hand dug well
53	LM-23	Orchid Place, Lower Macungie	8/9/93	3/12/81	175	6	73.5	Softener	
55	SA-07	Golf Circle Rd., Salisbury	8/10/93	1950s	–	–	NM	None	Alternate for 0772
58	SA-09	Mountain Dr., Salisbury	8/12/93	1980	300	–	120.8	–	Alternate for LE-797
60	SA-05	East Rock Rd, Salisbury	8/5/93	7/88	296	6	NM	Softener	
62	1492	Mill Rd, Upper Milford	8/5/93	4/14/77	250	6	77.8	Filter, carbon	
63	1501	Linda Lane, Upper Milford	8/3/93	1979	125	8	9.2	Acid	
66	LE-312	Vera Cruz Rd Upper Milford	8/12/93	1949	127	6	2.1	None	
68	LM-26	Tank Farm Rd Upper Milford	8/10/93	1957	176	–	NM	–	Alternate for LE-890
69	UM-62	S. 7th St Upper Milford	8/12/93	1980	75	–	33.1	–	Alternate for UM-33

TABLE 2-4 SUMMARY OF PRIVATE WELL SAMPLING INFORMATION (PAGE 2 OF 2)

List No.	Location ID	Street/Township	Sample Date	Well Information					Notes
				Date Drilled	Total Depth (ft)	Diam. (in)	Depth to Water (ft)	Water Treatment	
71	UM-40	Allen Str., Upper Milford	8/4/93	9/92	240	–	52.8	None	
72	UM-43	Vera Cruz Rd., Upper Milford	8/3/93	1987	265	6	N/A	None	Artesian well - flowing
73	UM-45	Vera Cruz Rd., Upper Milford	8/4/93	1955	50	–	NM	Softener	
74	UM-59	Vera Cruz Rd., Upper Milford	8/4/93	–	180	–	17.75	None	Alternate for UM-49
75	UM-60	Quarry Rd., Upper Milford	8/10/93	–	–	–	NM	None	Alternate for UM-53
76	UM-61	Vera Cruz Rd., Upper Milford	8/10/93	1977	120	–	NM	Filter	Alternate for UM-57
79	UM-58	Chestnut Str., Upper Milford	8/3/93	–	–	–	NM	None	
**	SA-08	Keystone Rd, Salisbury	8/11/93	1981	160	–	12.85	None	Addition to Sampling List
**	UM-63	S. 7th Str, Upper Milford	8/25/93	–	74	–	29.2	Filter	Addition to Sampling List
**	UM-64	S. 5th Str, Upper Milford	8/25/93	1964	80	–	NM	Filter, soft-ener	Addition to Sampling List
**	LM-28	Orchid Lane, Lower Macungie	8/11/93	–	15	–	10.65	None	Hand dug well, not in use

TABLE NOTES:

NM = Not measured
– = Information not available
N/A = Not applicable
Depth to water values measured by GEC and are rounded to the nearest 0.1 foot.
Sources: PADER Well Records
USGS Well Records
Well Questionnaires completed by residents
GEC field observations

The location of each sample collection point is indicated on Plate 1.

2.9.6.3 Procedures

A total of 31 residential well samples were collected over an eight day period, as outlined below:

Day 1 (August 3, 1993): UM-43, UM-58, 1501, LM-10
Day 2 (August 4, 1993): LM-59, UM-45, LE-311, LM-40
Day 3 (August 5, 1993): SA-05, 1492, LE-677, 0351, LE-1293
Day 4 (August 9, 1993): EM-08, EM-09, LM-23
Day 5 (August 10, 1993): SA-07, LM-20, LM-26, UM-60, UM-61
Day 6 (August 11, 1993): LM-27, SA-08, LM-28
Day 7 (August 12, 1993): LE-312, LE-411, LM-21, SA-09, UM-62
Day 8 (August 25, 1993): UM-63, UM-64

The samples were collected prior to any treatment (water softening, chlorination, etc.). If possible, the sample was collected from the kitchen faucet, the common sample point. An alternate location, such as an exterior faucet, was used if the residents were not home at the time of sampling or if the kitchen faucet was connected to a treatment system. If an aerator was present, it was removed from the faucet prior to sampling. The water was allowed to run at a cold temperature and a high rate for approximately ten minutes for purging purposes. The specific conductance and pH was monitored until three consecutive readings were within ten percent of each other. The flow rate was then slowed for sampling to minimize water aeration.

Sample containers, which were chilled to 4°C, were filled so that minimal or no headspace existed, as required for the particular analytical method. The sample aliquots for VOCS were filled first, followed by those for metals. The sample for dissolved metals was field filtered according to the procedures in Appendix 2. Field parameters (pH, conductivity, and temperature) were measured after sample collection according to GEC SOPs. Measurements of pH were not obtained for samples from LE-1293 and LM-20 because of pH probe malfunction. Samples were packaged at 4°C and transported via LLI courier for laboratory analysis.

2.9.6.4 GC Screening

At each location, the VOC fraction was collected in duplicate. The duplicate fraction was analyzed by GEC personnel using a GC, according to the method outlined in Appendix 4. The GC screening results are presented in Table 2-5, and the chromatograms are presented in Appendix 4. Regardless of the screening results, all samples were sent to the laboratory for analysis of VOCs by the CLP June 1991 Statement of Work (6/91 SOW). Based on the results of the screening activity, those samples that revealed the presence of any VOCs were analyzed on a rapid (48 hour) turnaround time to allow for a quick response if any private wells revealed the presence of contamination at or above the lowest published health-based standards.

During the screening process, six residential wells in Lower Macungie and Salisbury Townships were found to have detectable levels of VOCs. Laboratory analysis at LLI of these samples confirmed the GC results. Following discussion with EPA and PADER about the results, GEC sent notification letters on behalf of Square D, dated August 19, 1993, to the property owner and/or tenant at the locations where VOCs were detected. Copies of these letters were also sent to project contacts at EPA, PADER, and Lower Macungie and Salisbury Townships.

2.9.6.5 Additional Comments

As with the other tasks relating to the Work Plan, a representative from TTI obtained split samples on behalf of USEPA. The split samples were obtained on August 5, 1993 at residential wells UM-59 and UM-45.

2.10 Task 8 - Surveying and Water Level Measurements

2.10.1 Objectives

The objectives of the surveying and groundwater mapping were threefold:

1. To determine the location of sample points in hydrologic relation to the Rodale site and other potential sources in the area.

TABLE 2-5: SUMMARY OF FIELD GC ANALYTICAL RESULTS FOR PRIVATE WELL SAMPLES (PAGE 1 OF 2)			
SAMPLE ID	COLLECTION DATE	ANALYSIS DATE	RESULTS (ppb)
PW-1501	8/3/93	8/4/93	ND
PW-LM10	8/3/93	8/4/93	ND
PW-LM10D	8/3/93	8/4/93	ND
PW-UM43	8/3/93	8/4/93	ND
PW-UM58	8/3/93	8/4/93	ND
PW-LE311	8/4/93	8/4/93	ND
PW-UM59	8/4/93	8/4/93	ND
PW-UM45	8/4/93	8/4/93	ND
PW-UM45D	8/4/93	8/4/93	ND
PW-LE1293	8/5/93	8/5/93	ND
PW-SA05	8/5/93	8/5/93	ND
PW-UM40	8/5/93	8/5/93	ND
PW-1492	8/5/93	8/5/93	ND
PW-0351	8/5/93	8/5/93	ND
PW-677	8/5/93	8/5/93	ND
PW-EM08	8/9/93	8/9/93	TCE = 0.3
PW-EM08D	8/9/93	8/9/93	TCE = 0.5
PW-EM09	8/9/93	8/9/93	TCE = 0.5
PW-LM23	8/9/93	8/9/93	ND
PW-LM20	8/10/93	8/11/93	TCE = 4.0
PW-LM20D	8/10/93	8/11/93	TCE = 4.5
PW-LM26	8/10/93	8/11/93	ND
PW-SA07	8/10/93	8/11/93	ND
PW-SA07D	8/10/93	8/11/93	ND

TABLE 2-5: SUMMARY OF FIELD GC ANALYTICAL RESULTS FOR PRIVATE WELLS SAMPLES (PAGE 2 OF 2)			
SAMPLE ID	COLLECTION DATE	ANALYSIS DATE	RESULTS (ppb)
UM-60	8/10/93	8/11/93	ND
PW-UM61	8/10/93	8/11/93	ND
PW-UM27	8/11/93	8/12/93	ND
PW-LM28	8/11/93	8/12/93	ND
PW-SA08	8/11/93	8/12/93	TCE = 0.6
PW-SA08D	8/11/93	8/12/93	TCE = 0.7
PW-LE312	8/12/93	8/13/93	ND
PW-LE411	8/12/93	8/13/93	ND
PW-LM21	8/12/93	8/13/93	TCE = 1.4
PW-LM21D	8/12/93	8/13/93	TCE = 1.6
PW-SA09	8/12/93	8/13/93	TCE = 0.6
PW-UM62	8/12/93	8/13/93	ND
PW-UM63	8/25/93	8/26/93	ND
PW-UM64	8/25/93	8/26/93	ND

TABLE NOTES:

PW = Private Well
ND = Not Detected
D = Duplicate
ppb = parts per billion
TCE = Trichloroethene
See Appendix 4 for chromatograms for these samples and SOP for analysis

2. To determine dominant flow directions and likely locations of groundwater discharge.

3. To assist in mapping the location of any groundwater plumes in the area.

2.10.2 Surveying Activity

2.10.2.1 Purpose

In order to establish vertical elevation control for the water-level measurements, GEC retained a local surveying firm, Martin, Bradbury & Griffith, to survey the water-level measuring points. Surveying commenced on September 29, 1993 and was completed by the end of October, 1993.

2.10.2.2 Procedures

All of the elevations obtained during the surveying activity were referenced to the USGS datum (NGVD 1929). For the on-site wells, elevations were obtained for the top-of-casing (PVC or cast iron) and for the top of the concrete pad surrounding each well. The residential wells were surveyed for top-of-well and ground elevations. The surface water sample locations were surveyed by chiseling a survey point into a nearby bridge abutment or retaining wall, for use as a water level gauge. Additional details and information regarding the surveying activity are provided in Appendix 5.

2.10.3 Water Level Measurements

As required by the Well Survey Work Plan, a complete round of static water levels was made following the sampling activity in as short a time period as possible. The water-level measuring points consisted of 10 onsite wells, five Borough of Emmaus wells, 18 residential wells, and 15 surface water locations (comprised of 13 stream locations and two springs). Water levels from all locations were obtained between September 28 - 30, 1993. Water levels were measured using a Solinst electric water level meter in accordance with GEC SOP G1-2.

Static water levels in the Borough wells were measured on September 29, 1993 using the pre-installed air lines. A water level was not obtained for Borough Well 6, due to a broken air line.

The measurements were collected after all pumps in the Borough had been shut off for at least two hours to allow for water level recovery to static conditions.

Results for all water level measurements are presented in Section 4.0.

2.11 Task 9 - Data Validation

2.11.1 Purpose

As required in the Work Plan and QAPP, GEC performed validation of data received from LLI for all sampling activities. The reported data were examined to determine usability of analytical results and compliance relative to the specific analytical method.

2.11.2 Procedure

The firm of Environmental Standards, Inc. (ESI) of Valley Forge, PA provided technical support for the data validation procedure. The data validation process involved a rigorous examination of all CLP organics data (TCL volatile, semi-volatile, and PCB compounds) and CLP inorganics data (TAL metals) in accordance with the EPA document entitled "Region III Modifications to National Functional Guidelines for Organic Data Review" (June 1992). ESI issued two Quality Assurance Review (QAR) reports for the organics data and one QAR report for inorganics data:

1. "Quality Assurance Review of the Rodale Manufacturing Site in Emmaus, Pennsylvania" (ESI, October 28, 1993) - single volume, organic data.

2. "Quality Assurance Review of the Rodale Manufacturing Site in Emmaus, Pennsylvania" (ESI, October 29, 1993) - single volume, organic data.

3. "Quality Assurance Review of the Rodale Manufacturing Site in Emmaus, Pennsylvania" (ESI, October 29, 1993) - three volumes, inorganic data.

Rigorous data validation by ESI was not conducted for the general water quality parameters because these are non-CLP parameters and do not generally represent contaminants of concern.

GEC performed a general assessment of these parameters by examining compliance with holding times, blank analysis results, field duplicates, and laboratory control sample recoveries.

2.11.3 Results of Data Validation

As stated in the QAR reports, the overall data quality was very good. A small portion of the data was qualified "R" (unusable) due to very low relative response factors obtained in the associated calibrations. Some data were qualified "B" due to blank contamination. Several volatile, semivolatile and TAL metals results were qualified as estimated due to low internal standard areas or field duplicate imprecision. The flags that denote qualification of the data are included on all data summary tables (Section 3.0). The complete summary texts from the three QAR reports, and the associated ESI data tables with qualifiers, are included in Appendix 7.

Also included in Appendix 7 is a data validation assessment prepared by GEC for the non-CLP data (water quality parameters). In general, the data are considered very good, and no qualifiers were added.

3.0 WELL SURVEY INVESTIGATION RESULTS

3.1 General Summary

This section presents the laboratory results for the sampling and sampling-related activities in the vicinity of the Rodale site. Sampling and analysis of onsite and offsite groundwater, surface water and stream sediments were conducted. In accordance with QA/QC procedures outlined in the QAPP (GEC, May 7, 1993), all laboratory data have been evaluated for accuracy, correctness and usefulness in meeting the objectives of the Work Plan. Results of data validation have been documented in Quality Assurance Review (QAR) reports issued by Environmental Standards, Inc. (ESI) for all CLP organic and inorganic data. GEC has conducted an evaluation of the non-CLP laboratory data (general water quality parameters). Data that have not met QA/QC protocol requirements or that have been found in blanks ("B" code) or are at estimated concentrations ("J" code) have been appropriately flagged on the data summary tables. Section 2.11 presents a general summary of the data validation procedures.

The laboratory data for all investigative and duplicate samples is summarized in tabular form at the end of the text portion of this report. Table 3-1 contains a summary of the samples collected, the analytical parameters, and a listing of corresponding tables where the data appear. Descriptions of laboratory results within the text of this section reference the appropriate data summary tables. Copies of chain-of-custody forms for all sampling activities are included in Appendix 6. The laboratory analytical summary tables for all investigative, duplicate and field QA/QC samples, provided by Lancaster Laboratories, Inc. (LLI) with qualifiers added by ESI, are contained in Appendix 7. The complete validated data packages were submitted by GEC to EPA on November 17, 1993; therefore, complete data packages are not included in this report.

3.2 Groundwater Quality Results

Groundwater was sampled from 10 onsite wells, six (6) Borough of Emmaus water supply wells, and 31 private wells. Discussion of groundwater quality is organized according to type of well sampled (onsite, Borough, private), and secondly according to parameter type. Summary tables are provided for all investigative and duplicate samples and are referenced herein. The discussion in this section focuses on those compounds without blank ("B") designations that were

TABLE 3-1: SUMMARY OF ANALYTICAL PROGRAM AND LOCATION OF DATA IN SUMMARY TABLES

Sample Medium	Sample Loc.	No. of samples (*)	ANALYTICAL PARAMETERS								Table No.
			TCL VOCs (3/90 SOW)	TCL VOCs (6/91 SOW)	TCL SVCs	TCL PCBs	TAL Total Metals	TAL Diss. Metals	Water Quality	Field Para-meters	
Groundwater	Onsite Wells	10	X								3-2
					X						3-3
						X					None
							X				3-4
								X			3-5
									X	X	3-6
	Borough of Emmaus Wells	6		X	X						3-7
							X				3-8
								X			3-9
									X	X	3-10
	Private Wells	31		X							3-11
							X				3-12
								X			3
										X	3-1
Surface Water	Streams in Study Area	13		X							3-15
							X				3-16
								X			3-17
										X	3-18
	Springs in Study Area	4		X							3-15
							X				3-16
								X			3-17
										X	3-18
Stream Sediment	Streams in Study Area	14	X								3-19
							X				3-20

TABLE NOTES:
* - This number includes investigative samples only (no QA/QC samples included in total)
3/90 SOW - EPA March 1990 Statement of Work
6/91 SOW - EPA June 1991 Statement of Work (with low-level detection limits)
TCL = Target Compound List;
VOCs = Volatile Organic Compounds
SVCs = Semivolatile Organic Compounds
TAL metals - Target Analyte List metals; "total" and "dissolved" refer to analysis of an unfiltered and filtered sample, respectively.
Water Quality Parameters include alkalinity, chloride, sulfate, nitrogen series, total organic carbon, and total dissolv
Field Parameters include pH, specific conductance, temperature and, in some samples, oxidation/reduction potential (

found above MCLs. For convenience, Maximum Contaminant Levels (MCLs) from the Safe Drinking Water Act (SDWA) have been included on each water quality summary table. In addition, those values exceeding the MCL have been shaded for emphasis. When both investigative and duplicate samples were collected at a given location and the results differed, data for both samples are presented in the text separated by a foreslash. As an example, "1,200/1,400 ppb" denotes the concentration in the investigative and duplicate sample, respectively.

3.2.1 Onsite Groundwater Quality

A total of 10 onsite wells were sampled and analyzed for the following parameters:

1. TCL VOCs, by the EPA March 1990 Statement of Work (3/90 SOW);
2. TCL SVCs;
3. TCL PCBs (samples were not analyzed for pesticides);
4. TAL metals and cyanide (total and dissolved), and;
5. General water quality and field parameters.

The following section presents the results of these analyses according to parameter type. Note that the phrase "onsite wells" refers generally to all disposal, supply and monitor wells at or in the immediate vicinity of the site. Results from those wells located in the central site area are compared with results from the monitor wells located just offsite (MW-2, MW-3 and MW-4) to provide an indication of which compounds may be migrating offsite. Refer to Figure 1-2 for onsite well locations.

Volatile Organic Compounds

Table 3-2 presents a positive results summary for VOCs found in groundwater from onsite wells. These results indicate that six primary VOCs are present in onsite groundwater. These are listed as follows:

- **TCE** was the most widespread of all VOCs, identified in each of the ten wells except Well 5 (the shallow cistern). Onsite well concentrations ranged from 97/99 ppb (Well 1) to 180,00 ppb (Well 2). Offsite monitor well concentrations ranged from 21/22 ppb (MW-2) to 140,000/130,000 ppb (MW-4).

- **1,2-Dichloroethene (1,2-DCE, total)** was the second most prevalent VOC detected in groundwater at the site. 1,2-DCE was found in onsite wells Well 1 (560 ppb), Well 2 (43,000 ppb), Well 3 (6,400/6,500 ppb), Well 4 (2,000/2,800 ppb), and Well 6 (1,300/1,400 ppb). This compound was also detected in onsite monitor well MW-1 (310 ppb) and offsite monitor well MW-4 (2,600/3,300 ppb).

- **Vinyl Chloride (VC)** was found in onsite wells Well 1 (810/800 ppb), Well 3 (3,200 ppb), Well 4 (180/310 ppb) and Well 6 (150/160 ppb). VC was not detected in any of the three offsite monitor wells (MW-2, MW-3 or MW-4).

- **Tetrachloroethene (PCE)** was found in Well 2 (3,900 ppb), Well 4 (48/91 ppb), Well 5 (10 ppb), and Well 6 (11 ppb). PCE was also found in offsite monitor wells MW-3 (3 ppb) and MW-4 (1,300/1,200 ppb).

- **1,1-Dichloroethene (1,1-DCE)** was only detected in Well 4 at a concentration of 14/27 ppb.

- **1,1,2-Trichloroethane (1,1,2-TCA)** was found in onsite wells Well 2 (270 ppb) and Well 4 (9/15 ppb). 1,1,2-TCA was not detected in any of the three offsite monitor wells (MW-2, MW-3, or MW-4).

The aromatic hydrocarbons toluene, ethylbenzene and xylenes (total) were found at various concentrations in onsite wells Well 1, Well 2, Well 3 and Well 4. Benzene was assigned a "B" designation on all positive results due to its presence in associated blank samples. Concentra-

tions of toluene, ethylbenzene and xylene were all below MCLs, and none of the aromatic hydrocarbons were detected in offsite monitor wells MW-2, MW-3 or MW-4.

Finally, acetone and methylene chloride (as well as benzene, mentioned above) were found in several samples, but most of these data were flagged with a "B" code, indicating their trace-level presence in laboratory method blanks or other blank samples.

Semi-Volatile Organic Compounds

Table 3-3 presents a positive results summary for semi-volatile organic compounds (SVCs) found in groundwater from onsite wells. These results indicate that several SVCs were detected in groundwater, primarily in samples from the disposal wells. The following observations are made based on these results:

- The highest concentrations of SVCs were found in Well 3. In this well, naphthalene (2,000/1,200 ppb), 2-methylnaphthalene (540/300 ppb), N-nitrosodiphenalylamine (77/66 ppb), phenanthrene (130/100 ppb), bis(2-ethylhexl)phthalate (6,000/3,800 ppb), and di-n-octylphthalate (160/110 ppb) were detected. Note that the concentration of naphthalene in the Well 3 investigative sample exceeds the EPA Region III risk-based concentration of ingestion of water containing naphthalene (1,500 ug/l).

- In Well 2, phenol and naphthalene were found at 11 and 22 ppb, respectively, which represented the highest concentrations for any SVCs from this well. Several other SVCs (2-methylphenol, 2,4-dimethylphenol, 2-methylnaphthalene, 2,4,5-trichlorophenol, pentachlorophenol, and phenanthrene) were also detected in Well 2 at estimated (J-coded) concentrations of 8 ppb or less. Of these compounds, only pentachlorophenol (5 ppb) exceeded the available MCL (1 ppb).

- In Well 1, Well 4, and Well 6, three to four SVCs were detected at estimated (J-coded) or blank (B-coded) concentrations of 7 ppb or less.

- Several SVCs were found in Well 5, the shallow cistern approximately eight feet in depth. Water quality data from this sample provide an indication of interstitial soil water quality. A total of 21 SVCs were detected in this well at relatively low concentrations. With the exception of phenol (84 ppb) and 4-methylphenol (39 ppb), the SVC concentrations were 14 ppb or less. Of all SVCs detected in Well 5, only six were detected in groundwater samples from the deeper wells at the site.

It is important to note that no positively identified SVCs were detected in offsite monitor wells MW-2, MW-3 or MW-4, or in onsite monitor well MW-1. (with the exception of bis(2-ethylhexl)phthalate in all samples, which was also found in blank samples).

PCBs

PCBs were not detected in any groundwater samples collected from onsite wells. The PCB results, therefore, are not summarized in tabular form in this section. The validated laboratory data for PCB analysis are included in Appendix 7.

Target Analyte List Metals and Cyanide

1. Total Metals and Cyanide:

Table 3-4 presents a summary of onsite investigative and duplicate samples analyzed for total (unfiltered) TAL metals and cyanide. Total metals concentrations were below available MCLs for all but four parameters, listed below.

- Beryllium was found above its MCL (4 ppb) in Well 2 (6.0 J ppb) only.

- Cadmium was found above its MCL (5 ppb) in samples from Well 1 (6.1/6.0 ppb), Well 2 (35.8 ppb), Well 5 (13.0 ppb), and MW-2 (5.0 ppb). Cadmium was not found above the MCL in offsite monitor wells MW-3 or MW-4.

- Lead was found above its MCL (15 ppb) in samples from onsite wells Well 2 (120 ppb), Well 3 (37.3/34.2 ppb), Well 4 (28.2/29.6 ppb), Well 5 (555 ppb), and Well 6

(23.9/28.3 ppb). Lead was also found in MW-2 at a concentration of 22.1/26.4 ppb.

- Nickel was found above its MCL (100 ppb) in Well 2 at a concentration of 115 ppb. Nickel was not found above the MCL in any offsite monitor wells.

- Cyanide was found above its MCL (200 ppb) in onsite Well 1 (313/402 ppb). Cyanide was not found above detection limit in offsite monitor wells MW-2, MW-3, or MW-4.

2. Dissolved Metals and Cyanide:

Table 3-5 presents a summary of onsite investigative and duplicate samples analyzed for dissolved (filtered) TAL metals and cyanide. Dissolved metals and cyanide concentrations were below MCLs for all parameters.

These data indicate that dissolved concentrations of metals were not present above MCLs in groundwater at the Rodale site. The metals that exceeded MCLs in the total TAL metals analysis were all well below MCLs in the dissolved TAL metals analysis. Therefore, the presence of elevated metals in the unfiltered samples can likely be attributed to silt in the groundwater sample, and not to their presence as dissolved species. The possibility of total metals migration as colloidal particles cannot be dismissed, however, and will be further evaluated in upcoming sampling events.

General Water Quality Parameters

Onsite water samples were analyzed for several additional parameters to assess general water quality. Table 3-6 presents a summary of the laboratory data from the investigative and duplicate samples. The following observations are made based on these results:

- Groundwater from disposal Well 2 generally exhibits the poorest water quality, with a low pH (5.73), and among the highest concentrations for total dissolved solids (TDS, 470 ppm), specific conductance (974 μmhos), total Kjeldahl Nitrogen (TKN, 19 ppm), ammonia nitrogen (17 ppm), sulfate (83 ppm), total organic carbon (16 ppm) and

chloride (90 ppm) relative to other wells (Well 5 excluded). These values do not, however, exceed available MCLs (except for pH). The presence of these parameters at high levels can likely be attributed to the reported historic usage of Well 2 for disposal of toilet wastes, as well as other wastes.

- Water from Well 5 revealed elevated values of pH (9.95), total alkalinity (393 ppm), and total organic carbon (TOC, 38 ppm) relative to most other samples. Due to its shallow depth (about eight feet in depth), water quality at this well is attributed to soil pore water that may be impacted from nearby shallow soils.

- Measurement of oxidation/reduction potential (ORP or Eh) was conducted for all onsite well samples to determine whether localized oxidizing or reducing conditions existed within the aquifer. In general, Eh values were in the range for oxidizing conditions (positive) with the following exceptions: Well 1 (-37 mV) and Well 6 (-39 mV). In addition, Well 4 exhibited an Eh value (45 mV) considerably less than the 250 mV range of most other concentrations. These values indicate reducing conditions do exist in some portions of the aquifer at the site.

- In general, concentrations in offsite monitor wells reveal lower concentrations of these water quality parameters. Notable exceptions include low pH values at MW-1 (4.5), MW-2 (4.7), and MW-3 (4.6), and elevated nitrate values (slightly above the MCL of 10 ppm) at MW-1 (16 ppm) and MW-2 (12/13 ppm).

3.2.2 Borough of Emmaus Wells - Groundwater Quality

The six (6) Emmaus production wells were sampled and analyzed for the following parameters:

1. TCL VOCs by 6/91 SOW (low-level detection limits);
2. TCL SVCs;
3. TAL metals and cyanide (total and dissolved), and;
4. General water quality parameters.

The sample results are presented for each parameter type as follows.

Volatile Organic Compounds

Table 3-7 presents a summary of positive results for all organic compounds from the Borough of Emmaus production wells. Plate 3 displays the positive results for VOCs from the Borough of Emmaus and other offsite wells. The following three VOCs were found in Borough wells at concentrations above quantitation limits:

- TCE was found in all wells except PSW-6, ranging in concentration from 4.5/4.4 ppb (PSW-4) to 14 ppb (PSW-7). TCE exceeded the MCL (5 ppb) in four of the five wells in which it was detected.

- Tetrachloroethene (PCE) was found in two wells at concentrations of 1.4 ppb (PSW-7) and 19/21 ppb (PSW-4).

- Cis-1,2-Dichloroethene (1,2-DCE) was found at 2.0 ppb at PSW-1, and below quantitation levels (J-coded) at PSW-2, PSW-3, PSW-4, and PSW-7.

In addition to these compounds, several VOCs were found at concentrations generally less than 1 ppb and qualified with "J" or B" codes. These include:

- 1,1,1-Trichloroethane (TCA) was identified below the quantitation level (1 ppb) and was therefore "J"-coded in samples from PSW-1, PSW-2, PSW-6 and PSW-7.

- Carbon Tetrachloride was identified below the quantitation level (1 ppb) and was therefore "J"-coded in samples from PSW-3, PSW-4 and PSW-7.

- Toluene, ethylbenzene, and xylene were found below quantitation levels in the duplicate sample from PSW-4.

- Finally, carbon disulfide, methylene chloride and chloroform were found in several samples, but all these data were flagged with a "B" code, indicating their trace-level presence in laboratory method blanks or other blank samples. Also, it is likely that the low concentrations of acetone may be attributed to a laboratory artifact, since this is a common laboratory agent.

Semi-Volatile Organic Compounds

As indicated in Table 3-7, the only semi-volatile organic compound (SVC) found above detection limit was bis(2-ethylhexyl)phthalate, found in PSW-4 and PSW-4D. However, this compound was assigned a "B" designation, indicating its trace-level presence in laboratory method blanks or other blank samples.

Target Analyte List Metals and Cyanide

1. Total Metals and Cyanide:

The total (unfiltered) metals results for the Borough of Emmaus water supply wells indicate that only barium in PSW-4 (at a concentration of 23,100 ppb) was found above its MCL (2,000 ppb). The duplicate sample for PSW-4, however, indicated that barium was detected at a concentration of 27.9 ppb. The large discrepancy between the investigative and duplicate sample, and the difference relative to other samples, suggest that the high barium result is an anomaly. All other metals (including cyanide) were either not detected or were at concentrations well below MCLs.

2. Dissolved Metals and Cyanide:

The dissolved (filtered) metals results for the Borough of Emmaus water supply wells indicate that all metals (including barium) were either not detected or were at concentrations well below the MCL.

General Water Quality Parameters

All Borough of Emmaus water samples were analyzed for the general water quality parameters. All values were within the normal range for these parameters in similar geologic settings. Well PSW-7 revealed levels at or near the highest concentration among Borough wells for TDS (270

ppm), specific conductance (582 μmhos), nitrate (5.9 ppm), sulfate (33 ppm), and chloride (26 ppm). These values, however, are still well below MCLs.

3.2.3 Private Wells - Groundwater Quality

A total of 31 private wells were sampled and analyzed for the following parameters:

1. TCL VOCs by 6/92 SOW (low-level detection limits), and;
2. TAL metals and cyanide (total and dissolved).

The sample results are presented for each parameter type as follows. Refer to Plate 1 for private well sample locations.

Volatile Organic Compounds

Low concentrations of VOCs were found in several offsite private wells (see Table 3-11 and Plate 3). The following items summarize the results of the VOC analyses:

- Of the 31 private wells sampled, only two locations revealed the presence of VOCs at concentrations exceeding MCLs:
  1. TCE was found in LM-20 at a concentration of 5.2 ppb, and;
  2. PCE was found in SA-08 at concentrations of 4.9 ppb (investigative sample) and 5.3 ppb (duplicate sample).

- In addition to the two wells listed above, TCE was found at lower concentrations (below MCLs) in the following wells: LE-677 (0.4 J ppb); 0351 (0.4 J ppb); EM-08 (1.1 ppb); EM-09 (1.1 ppb); SA-08 (1.2 ppb); LM-21 (2.0/1.8 ppb), and; SA-09 (1.4 ppb).

- In addition to the two wells listed above, PCE was found at lower concentrations (below MCLs) in samples from the following wells: LM-10 (2.0 ppb); UM-40 (0.3 J ppb); EM-08 (0.3 J ppb); EM-09 (0.2 J ppb); LM-20 (0.5 J ppb); LM-21 (0.2 J ppb), and; SA-09 (0.3 J ppb).

- Acetone, carbon disulfide, methylene chloride and chloroform were found in samples from several wells but generally had blank ("B") designations.

- Cis-1,2-dichloroethene was found in SA-09 (0.2 J ppb) only.

- 2-Butanone was found in samples from LM-27 (12 L ppb), SA-08 (9.8 L), LM-28 (8.7 L), and UM-63 (15 L). The "L" designation indicates the result is considered a low estimate.

- 1,1,1-TCA was found in LM-10 (0.1 J ppb), SA-05 (0.5 J ppb), and EM-09 (0.1 J ppb).

- Carbon Tetrachloride was found in LM-20 (0.2 J ppb) only.

- Toluene was found in UM-59 (0.2 J ppb) only.

- Xylene was found in LM-26 (0.7 J ppb) only.

- Bromoform was found in LM-10 (2.0 ppb) and SA-05 (0.2 J ppb).

VOCs were not founds above MCLs in any wells sampled north of Little Lehigh Creek, suggesting that creek represents a groundwater discharge boundary..

Target Analyte List Metals and Cyanide

2. Total Metals and Cyanide

Table 3-12 presents the analytical results for TAL total metals and cyanide in private wells. The following statements can be made in describing these results:

- Of the 31 private well locations that were sampled, only two locations revealed the presence of any metals above available MCLs:

1. Lead was found in sample UM-61 (231/25.8 J ppb), where an in-line filter is in use.

2. Lead was also found in the sample from LM-28 at a concentration of 129 ppb. This well is a shallow, dug well that is no longer used for consumption.

- Lead was found in UM-60 at a concentration (14.0 ppb) approaching the MCL (15 ppb).

- Well LM-28 also revealed among the highest concentrations in private wells for aluminum (1,070 ppb), calcium (76,800 ppb), iron (1,910 ppb), manganese (188 ppb), potassium (4,910 ppb) and zinc (83.1 ppb).

- Cyanide was not found in any samples above detection limit.

2. Dissolved Metals and Cyanide

Table 3-13 presents the analytical results for TAL total metals and cyanide in private wells. The following statements can be made in describing these results:

- Of the two samples listed above (LM-28, UM-61) that revealed concentrations of total lead above the MCL, the dissolved lead was not found above detection limit. Also, the sample from UM-60 revealed a dissolved lead concentration of only 0.60 ppb.

- No other samples revealed the presence of any dissolved metals or cyanide with levels above the MCLs.

3.3 Surface Water Quality Results

Surface water samples were collected from 17 locations within the study area. This number included 13 locations from the primary watercourses: four locations were along Leibert Creek; one location was along its unnamed tributary in Vera Cruz; two locations were along its south intermittent tributary in the Emmaus area, and six locations were along Little Lehigh Creek (note that water samples were not collected from the SW-3, SW-13, and SW-14 locations

because of lack of flow in these areas). In addition, four samples were obtained from four contributing springs, all located near Little Lehigh Creek. Plate 1 indicate the location of the sample points. Tables 3-15, 16, 17 and 18 provide the result summaries for TCL Volatile Organic Compounds, TAL Total Metals and Cyanide, TAL Dissolved Metals and Cyanide, and field parameters, respectively.

Volatile Organic Compounds

GEC personnel screened all surface water samples for VOCs using a portable gas chromatograph as described in Section 2.4.2.2. Based on the results of the GC screening, only one spring sample (SP-03) was identified as containing VOCs and was submitted for analysis of VOCs on a rapid turn-around-time basis. To confirm the results of the GC analysis, one additional spring sample (LE-SP73) and four stream water samples (SW-3, SW-8, SW-10, and SW-11) were submitted for laboratory analysis of VOCs.

Table 3-15 presents the positive results for VOC analyses. The only surface water sample to show positive results for VOCs was the sample from spring SP-03, revealing the presence of TCE (14 ppb) and PCE (8.7 ppb) at levels that exceeded MCLs. Other samples revealed the presence of several VOCs, but concentrations were generally 0.5 ppb or less and were typically assigned a "B" or "J" designation.

TAL Metals and Cyanide

1. Total Metals and Cyanide

Table 3-16 presents the results for analysis of TAL Total Metals and Cyanide. Based on these results, the following statements can be made:

- No surface water samples demonstrated total metal concentrations higher than MCLs.

- In general, the heavy metals (cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) and cyanide were undetected in all samples collected.

- Concentrations of seven metals were found to vary over the study area: aluminum, barium, calcium, iron, magnesium, manganese, and sodium. Of these parameters, calcium and magnesium concentrations are of greatest interest. In general, increasing concentrations of these compounds as a surface water body flows down stream may indicate groundwater discharge, due to the observed presence of these parameters at high concentrations in groundwater samples. This information combined with groundwater elevations in monitoring wells leads to a better understanding of study area hydrology. The stream sample point of highest elevation should have the least groundwater infiltration and hence the lowest calcium and magnesium concentrations. In the study area, this point occurs at SW-1 with an elevation approximately 300 ft above the lowest sample point, SW-12. As expected, the calcium and magnesium concentrations are the lowest found in the study area, at 19,500 ppb and 7,440 ppb respectively. Concentrations of these parameters are highest (40,000 ppb and 20,000 ppb range, respectively) in the Little Lehigh Creek discharge area.

- Calcium concentrations increase where the unnamed tributary joins with Leibert Creek, averaging 25,000 ppb for sample points SW-16, SW-2, and SW-5. Calcium concentrations in the south intermittent tributary decrease from 35,200 ppb at SW-15 to 29,800/29,100 ppb at SW-3. The mixing of these waters with Leibert Creek, and probably additional groundwater discharge, raise the calcium concentration at SW-7 to 31,600 ppb. Calcium concentrations along Little Lehigh Creek, where significant groundwater discharge is occurring, are the highest in the study area at relatively constant values between 40,000 and 45,000 ppb. The four springs which drain into this section of river also have calcium concentrations within this range.

- Similarly, magnesium concentrations increase along Leibert Creek from 9,000 to 10,000 ppb. Concentrations in the south intermittent tributary decrease from 12,200 ppb at SW-15 to 8,990/8,790 ppb at SW-3. The mixing of these waters with Leibert Creek, and probably additional groundwater discharge, raise the concentration at SW-7 to 14,400 ppb. Concentrations along Little Lehigh Creek (groundwater discharge area) are highest

in the study area, within the range of 18,000 to 20,000 ppb. The four springs which also drain into this section of river have magnesium concentrations in the 25,000 ppb range.

- Iron concentrations range from 100 to 250 ppb over the study area. The only exception occurs in the south intermittent tributary (SW-15), where the concentration is 697 ppb.

- Aluminum concentrations range from between 50 and 250 ppb over the study area. The only apparent flow related concentration trend occurs in the south intermittent tributary. Aluminum concentrations at SW-15 are the study area highest (422 ppb) and decrease to 48.6/56.4 ppb at SW-3.

- Barium concentrations are relatively constant throughout the study area at approximately 25 ppb. The only exception to this pattern occurs in the south intermittent tributary where concentrations are 72.5 ppb at SW-15 and 43.4/41.9 ppb at SW-3.

- Manganese concentrations within the study area range from 6 to 11 ppb. The only exception occurs in the south intermittent tributary at SW-15 where the manganese concentration is 39.3 ppb.

- The concentration of sodium in Leibert Creek and its tributaries varies between 9000 and 13,000 ppb. Sodium concentrations in Little Lehigh Creek range from 6000 - 7000 ppb.

- Elevated concentrations of several metals were found in sample SW-15, which is proximal to the former Volney Felt Dump. This sample revealed among the highest concentrations of any samples for aluminum (422 ppb), barium (72.5 ppb), iron (697 ppb), manganese (39.3 ppb).

2. TAL Dissolved Metals and Cyanide

The analysis of TAL dissolved metals and cyanide in surface water samples did not show any analyte distribution patterns different from those observed with TAL total metals.

Field Parameter Measurements

Field measurements of pH, specific conductivity and water temperature were made at all sample location points. Due to an electrode malfunction, pH measurements are not available for SW-3. In general, pH varied from 7.13 to 9.34 S.U. over the study area, with the lowest and highest readings occurring at SW-15 and SW-5, respectively. The pH of Leibert Creek increases from SW-1 (pH 7.53) on the un-named tributary through SW-5 (pH 9.34). The pH decreases with the addition of south intermittent tributary (pH at SW-7 is 8.52 S.U.). The pH of the Little Lehigh River generally decreases from SW-6 (pH 8.38) to SW-12 (pH 7.59). The pH of the four contributing springs and seeps are approximately 7.5 S.U.

The specific conductivity of the surface water was determined at each sampling point. In general, Leibert Creek and its tributaries showed a specific conductivity between 200 and 275 micromhos, with an exception at SW-15 where the specific conductivity was measured at 331 micromhos. The Little Lehigh was measured at between 312 and 375 microhmos. The specific conductivity of the four contributing springs and seeps was between 430 and 480 microhmos.

Water temperature measurements were also made at each sample point. Surface water temperatures varied between 19.5 and 27.9 °C. Spring water temperature was 12.6 or 12.7 °C except for the small Camp Olympic spring, SP-02, which was 15.6 °C.

3.4 Stream Sediment Quality Results

Stream sediment samples were collected at 14 locations within the study area. All samples were analyzed for VOCs and TAL total metals and cyanide. Samples were collected at the same locations as the surface water samples. The sediment locations are indicated on Plate 1.

TCL Volatile Organic Compounds

Table 3-19 presents the positive results for VOCs in stream sediment samples. No positively identified volatile organic compounds were detected in any of the sediment samples. The VOCs chloromethane, acetone, methylene chloride, and 2-butanone were each assigned a "B" designation due to their detection in associated blank samples. Toluene was found in one sample (SW-9) at a concentration of only 9 ppb.

TAL Total Metals and Cyanide

Table 3-20 presents the results for analysis of TAL Total Metals and Cyanide. Based on these results, the following statements can be made:

- Elevated aluminum concentrations were detected in all sediment samples from the south intermittent tributary and at two locations in Little Lehigh Creek. Concentrations in SW-15, SW-3 and SW-4 were 12,100, 6,700/8,100, and 17,400 ppb, respectively. Concentrations at SW-9 and SW-10 were 12,300/12,100 and 8,710 ppb, respectively.

- The antimony concentration at SW-3 was 210 ppb.

- Arsenic was found in all samples at relatively low concentrations ranging from 2 to 10 ppb. No trends in arsenic concentrations were observed.

- Beryllium concentrations greater than 1 ppb were detected at SW-3 (2.2/2.1 ppb) and SW-4 (1.2 ppb) along the south intermittent tributary. Sample points SW-10 and SW-11 showed concentrations of 9.4 ppb and 1.9 ppb of beryllium, respectively.

- Cadmium concentrations ranged from 1.5 to 13.2 ppb along the south intermittent tributary, lower Leibert Creek and at all locations in the Little Lehigh Creek.

- Chromium concentrations above 24 ppb were detected in all samples taken along the south intermittent tributary and at two locations in the Little Lehigh Creek.

- Cobalt concentrations above 20 ppb were detected in the south intermittent tributary samples and in SW-9 and SW-10. The highest concentration, 43.5 ppb, was in SW-10.

- Zinc concentrations greater than 75 ppb were detected in all samples from the south intermittent tributary and at two locations in the Little Lehigh River. Zinc concentrations in SW-15, SW-3 and SW-4 were 87.3, 1,260/985, and 142 ppb, respectively.

Section 4.0 presents a discussion and conclusions reached from an evaluation of data from these sampling activities.

4.0 GROUNDWATER AND SURFACE WATER FLOW CONDITIONS

4.1 Hydrogeologic Description of Site

4.1.1 Stratigraphy

The Rodale site is underlain by a stratigraphic sequence that includes, with increasing depth, miscellaneous fill material, unconsolidated glacial deposits, a carbonate bedrock aquifer, and a lower Cambrian quartzite. Each of these is described briefly as follows. See Figure 1-3 for a generalized stratigraphic column for the study area.

Due to the development of the site, it is unlikely that native surface soils remain. Fill material placed during building construction and demolition, and miscellaneous site work likely form the upper two feet at most areas at the site.

Below the fill material and any remaining native soil zone are unconsolidated sediments, representing deposits of the Muncy Drift from the Illinoian glaciation. According to Sloto, et al. (1991), thickness of glacial deposits on the carbonate rocks in the study area range from a thin veneer to 120 feet. Based on an examination of construction records for wells MW-1 through MW-4 (installed in 1989), the thickness of drift deposits over bedrock at the Rodale site range from 59 to 80 feet. These deposits are classified as silt with varying amounts of clay, and fine to coarse sand and gravel (SNR, March 1989). The shallow cistern (Well 5) and deeper cistern (WW-08) at the site, with approximate depths of 8 and 38 feet, respectively, are located within the glacial deposits. According to Sloto, et. al. (1991), a minor perched aquifer exists within the glacial deposits in the study area; perched conditions would be expected to be more prevalent in the topographically-lower, central portion of the study area than along the flanks of South Mountain where the site is located. Based on an examination of well records obtained during well survey activity, the perched aquifer was not identified as a usable groundwater unit.

Underlying the glacial drift deposits is the Leithsville Formation, the oldest carbonate unit in the study area. According to lithologic descriptions made during the installation of monitor wells MW-1 through MW-4 in 1989, the upper part of the Formation consists of argillaceous shale/siltstone. The shale and siltstone is light brown to olive green in color and thinly bedded

with interbeds of hard and soft layers. Thin interbeds of fine-grained, reddish-brown (iron-stained) sandstone were found from 90 to 140 feet in depth (SNR, March 1989). The Formation is generally described as a medium to dark-medium gray, thick-bedded, finely-crystalline dolomite "with shaly beds in the upper part", with a thickness of about 400 feet (Sloto, et. al., 1991). Based on the thickness information, the base of the Leithsville Formation would be at a depth of 400 to 500 feet at the site. All wells at the site other than cisterns Well 5 and WW-08 appear to be screened within the Leithsville Formation.

The Leithsville Formation is conformable (continuous deposition with little erosion) or in fault contact (displacement from tectonic activity) with the underlying Lower Cambrian Hardyston Quartzite. The Hardyston is described as a light gray, medium to thick-bedded quartzite and feldspathic sandstone, with a thickness from 100 to more than 800 feet (Sloto).

4.1.2 Groundwater Flow Direction

Table 4-1 presents the top-of-casing elevation, depth to water and resulting groundwater elevations for each of the 10 wells that were sampled at the site as well as other monitoring points in the study area. The top of the aquifer is defined as the free surface of the water table. At the site, the water-table surface averages approximately 115 feet below ground surface. The groundwater elevations were determined by subtracting the depth-to-water measurements (September 1993) from the top-of-casing elevations. Figure 4-1 presents a groundwater elevation contour map for the site. Groundwater elevations for monitor wells MW-1 through MW-4 were the only ones used in constructing Figure 4-1, as explained below:

- The 10 wells are screened at various depths so that correlation of groundwater elevations from all wells in plotting the potentiometric surface would yield spurious results. For example, wells MW-1 through MW-4 are screened at similar depths from approximately 110 to 135 feet bgl. In contrast, Well 1 is reportedly screened from 444 to 452 feet bgl, Well 3 from 400 to 416 feet bgl, and Well 4 from 192.5 to 246 feet bgl. Because vertical hydraulic-head gradients and differences in permeability exist at various levels within the aquifer, water levels from all wells cannot be accurately correlated.

TABLE 4-1 - WATER LEVEL ELEVATIONS FOR SURVEYED ONSITE AND OFFSITE WELLS AND SURFACE WATER LOCATIONS (PAGE 1 OF 2)

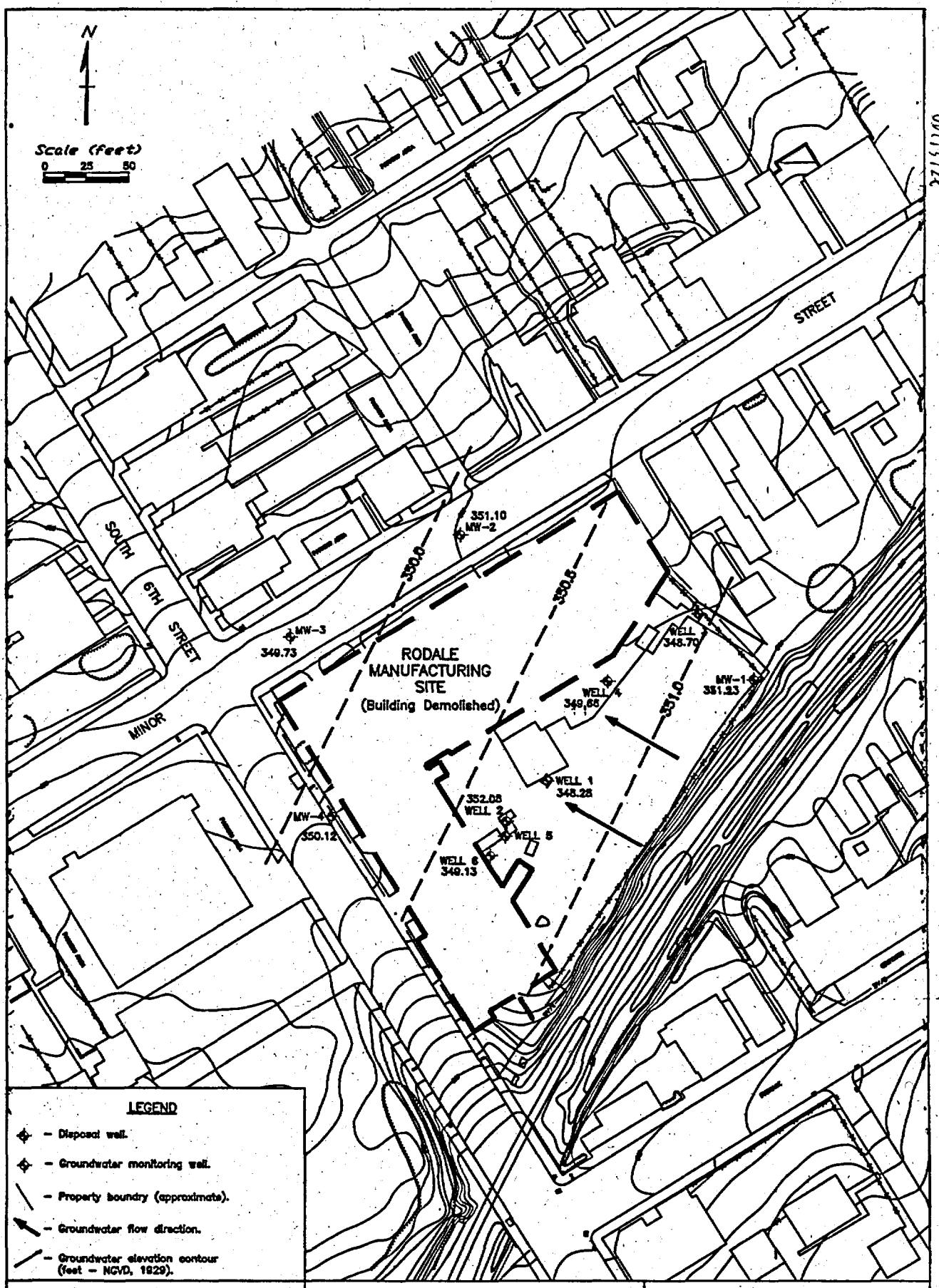
Location ID	Location Description	TOC/Gauge Elevation (ft)	Total Depth (ft below TOC)	Depth to Water (ft)	Water Elevation (ft)	Notes/ Aquifer
			ONSITE WELLS			
Well 1	Rodale site (disposal)	467.68	452@	119.40	348.28	Leithsville
Well 2	Rodale site (disposal)	466.10	148	114.20	352.08	Leithsville
Well 3	Rodale site (disposal)	466.10	416@	117.40	348.70	Leithsville
Well 4	Rodale site (monitor)	466.08	247	116.42	349.66	Leithsville
Well 5	Rodale site (cistern)	463.39	8	2.65	460.74	Drift
Well 6	Rodale site (water supply)	462.76	231	113.63	349.13	Leithsville
MW-1	Rodale site (monitor)	466.84	138	115.61	351.23	Leithsville
MW-2	Rodale site (monitor)	459.51	134	109.41	350.10	Leithsville
MW-3	Rodale site (monitor)	458.91	138.5	109.18	349.73	Leithsville
MW-4	Rodale site (monitor)	461.52	136	111.40	350.12	Leithsville
			EMMAUS WATER SUPPLY WELLS			
PSW-1	Klines Lane pump station, Emmaus	422.00	315	81.0	341.00	Leithsville
PSW-2	Klines Lane pump station, Emmaus	422.00	375	73.00	349.00	Leithsville
PSW-3	10th and Broad St., Emmaus	410.00	526	68.00	342.00	Leithsville
PSW-4	Glenwood St and Mountain Ave, Emmaus	462.00	187	124.00	338.00	Leithsville
PSW-6	Emmaus Community Park, Emmaus	400.00	350	0.00	400.00	Hardyston
PSW-7	Macungie Ave and Donald Dr., Lower Macungie	360.00	400	54.00	306.00	Allentown
			PRIVATE WELLS			
EM-08	Orchid Lane, Lower Macungie	323.83	–	11.90	311.93	Allentown*
EM-09	Orchid Lane, Lower Macungie	324.46	106	12.60	311.86	Allentown*
LE-1293	Spruce Road, Lower Macungie (LCA well)	417.00	295	88.00	329.00	Allentown
LM-28	Orchid Lane, Lower Macungie	322.55	15	10.65	311.90	Allentown*
LM-20	Orchid Lane, Lower Macungie	317.41	50	7.70	309.71	Allentown*
LM-21	Orchid Lane, Lower Macungie	317.02	12.5	7.40	309.62	Allentown*
LM-23	Orchid Lane, Lower Macungie	390.42	175	73.5	316.92	Allentown*
SA-08	Keystone Road, Salisbury	309.07	160	12.85	296.22	Allentown*

TABLE 4-1 - WATER LEVEL ELEVATIONS FOR SURVEYED ONSITE AND OFFSITE WELLS AND SURFACE WATER LOCATIONS (PAGE 2 OF 2)

Location ID	Location Description	TOC/Gauge Elevation (ft)	Well Depth (ft below TOC)	Depth to Water (ft)	Water Elevation (ft)	Notes
PRIVATE WELLS (CONT.)						
LM-10	Indian Creek Rd, Lower Macungie	423.01	225	75.55	347.46	
SA-09	Mountain Dr, Salisbury	467.68	300	120.85	346.83	
1492	Mill Rd, Upper Milford	516.69	250	77.85	438.84	
1501	Linda Lane, Upper Milford	676.66	125	19.25	657.41	
UM-40	Allen St, Upper Milford	421.68	240	52.85	371.83	
UM-43	Vera Cruz Rd, Upper Milford	452.22	265	0.01	452.21	
UM-59	Vera Cruz Rd, Upper Milford	493.01	180	17.75	475.26	
UM-63	S. 7th St, Upper Milford	506.80	74	29.2	477.60	Leiths-ville*
SURFACE WATER LOCATIONS						
SWG-1	Unnamed trib to Liebert Ck, U Milford	559.69	--	8.15	551.54	
SWG-2	Liebert Ck, past Quarry Rd, U Milford	470.33	--	6.25	464.08	
SWG-3	S. trib at Chestnut St, Emmaus	389.43	--	10.3	379.13	
SWG-4	S. trib prior to conf. w/ Liebert Ck, Emmaus	374.35	--	7.7	366.65	
SWG-5	Liebert Creek near Chestnut St, Emmaus	384.62	--	9.65	374.97	
SWG-6	L Lehigh Ck at Camp Olympic, L Macungie	328.59	--	6.5	322.09	
SWG-8	L Lehigh Ck at Rt 29 bridge, L Macungie	332.73	--	16.2	316.53	
SWG-9	L Lehigh Ck at Poole W.S., L Macungie	318.07	--	6.9	311.17	
SWG-10	L Lehigh Ck at Weidas Mill Br, L Macungie	310.97	--	10.7	300.27	
SWG-11	L Lehigh Ck at Keck's bridge, Salisbury	308.79	--	12.5	296.29	
SWG-12	L Lehigh Ck at Devonshire Rd br, Salisbury	303.33	--	14.6	288.73	
SWG-15	S. trib. at S. 7th St, Upper Milford	506.82	--	6.4	500.42	
SWG-16	Liebert Ck at Quarry Rd, Upper Milford	500.61	--	6.4	494.21	
SPRING LOCATIONS						
SP-03	Near Keck's bridge, Salisbury	298.88	--	2.5	296.38	Allen town*
LE-SP73	Camp Olympic, W. side of Little Lehigh Ck					Allen town*

TABLE NOTES:

Surveying conducted by martin, Bradbury & Griffith in Sept-Oct 1993.
Total depth figure obtained through literature or field measurement by GEC personnel.
@ = depth readings at site which are unconfirmed by GEC personnel.
* = unconfirmed in the literature but expected based on the location.



Prepared by:
Geo–Environmental Consultants, Inc.

RODALE MANUFACTURING SITE
EMMAUS, PENNSYLVANIA

FIGURE 4–1
SITE PLAN WITH
GROUNDWATER ELEVATION CONTOURS

AR100176

- Water levels were similar in the two deep wells that are screened at similar elevations in the aquifer: Well 1 (348.28) and Well 3 (348.70). These elevations, however, are approximately two feet lower than levels measured in nearby, shallower wells. This is possibly attributable to a downward vertical hydraulic-head gradient that may exist within the aquifer, and/or the small screened portions (8 and 16 feet, respectively) that intersect lower permeability zones at greater depths.

- Well 2, reportedly screened from 50 to 148 feet bgl, has a groundwater elevation (352.08) that is approximately two feet higher than levels measured in nearby, shallower wells which have lower top-of-screen elevations. This is possibly attributable to more infiltration to this well because it is screened across a large thickness of unconsolidated bedrock from 50 to approximately 115 feet bgl.

- Differences in construction, well damage, waste disposal and other factors may contribute to relative differences in permeability across the screened portions within the aquifer.

- The water levels were comparable in the four monitor wells (MW-1 through MW-4) screened at similar elevations in the aquifer. The construction details were uniform, and the wells are relatively new and free from damage. Therefore, correlating the groundwater elevations among these wells is considered acceptable.

Using water level data from the monitor wells MW-1 through MW-4 provides an indication of the horizontal groundwater flow direction for the upper portion of the aquifer. Based on these data, the flow direction is generally to the northwest. This determination is consistent with previous reports for the site (SNR, March 1989).

4.1.3 Hydraulic Head Gradients

Horizontal Hydraulic-Head Gradient

The aquifer horizontal hydraulic-head gradient is defined as the unit drop in hydraulic head per unit distance. This horizontal hydraulic head gradient is measured parallel to the direction of

groundwater flow and is calculated by measuring the horizontal distance between the groundwater elevation contour lines in the area of interest. Based on data from monitor wells MW-1 through MW-4, the horizontal hydraulic-head gradient at the site is approximately 0.006 ft/ft or 32 feet per mile.

Vertical Hydraulic-Head Gradient

Determination of the vertical hydraulic-head gradient is useful to establish the potential for upward or downward migration of contaminants in the groundwater. Vertical flow direction is obtained by comparing hydraulic head measured in wells screened in both shallow and deep portions of the aquifer. Density differences in this case are considered negligible. As discussed in Section 4.1.2, deep wells at the site are of varying construction and different screen lengths than shallow wells, limiting the degree of confidence in the vertical hydraulic head determination. Generally, however, Well 1 and Well 3, the deepest wells at the site, have groundwater elevations approximately two feet less than shallow wells.

4.2 Hydrogeologic Description of Study Area

4.2.1 Stratigraphy

Table 4-1 contains a column that lists the screened aquifer for the wells that were sampled in the study area, based on available information. Most of the wells at or near the Rodale site are screened in the Liethsville Formation, which occurs primarily on the flanks of South Mountain. Many wells present are likely screened in the overlying Allentown Dolomite Formation, which is present over a majority of the northern portion of the study area near Little Lehigh Creek and beyond. The Tuckerton member is the lowest of three members within the Allentown Formation, and is generally described as a light to dark-medium gray, medium to thick-bedded dolomite. The Tuckerton Member is 500 to 650 feet in thickness; the total thickness of the Allentown Formation is about 2,500 feet (Sloto).

Available literature indicates that wells near Little Lehigh Creek (LE-411, LE-1318), as well as springs LE-SP73 (Camp Olympic) and LE-SP78 (Fish Hatchery), intersect the Allentown Dolomite (Wood).

4.2.2 Groundwater Flow Direction

Description of Water Level Measurements and Map Preparation

Table 4-1 presents the top-of-casing elevation, depth to water and resulting groundwater elevations for the public and private wells from which water levels could be measured. All Borough of Emmaus water supply wells (except PSW-6) and well LCA Well No. 8 (LE-1293) have air lines from which water levels can be measured. During private well sampling, GEC examined each well to determine if a water level could be measured. Many private wells were not easily accessible for water level measurement because of screw-down caps or interfering pump equipment. For those wells from which water levels could be measured, surveying for top-of-casing and ground elevations was performed.

In addition, GEC established a number of surface water gauges along the primary surface water features in the study area, denoted with a "SWG" prefix. The surface water gauges were established as marked and surveyed points on bridges over the watercourses. Elevations measured at appropriate surface water gauges were correlated with measured groundwater elevations when determining groundwater flow patterns.

Plate 2 presents a groundwater elevation contour map for the study area. Water levels from Table 4-1 that were measured at onsite wells, Borough of Emmaus wells, private wells and surface water gauges were plotted with the well locations on the large study area map. The water levels were examined to determine relative flow patterns within the study area. As expected, several water levels measured in wells and streams in the Vera Cruz area did not correlate with levels measured in the central portion of the study area. There appears to be a groundwater divide north of Vera Cruz; north of this divide, groundwater flows to the north toward Little Lehigh Creek, while south of this divide, groundwater flows southward toward the unnamed tributary to Liebert Creek in Vera Cruz. It is likely that the groundwater divide closely parallels the South Mountain ridge in the study area.

Please note the following additional items regarding Plate 2:

- The figure includes only those wells from which water levels were measured.

- A computer contouring package (SURFER™) was used to help construct the groundwater elevation contours. A contour interval of 40 feet was used. The contours have been dashed to indicate that they should be considered approximate.

- A water level elevation of 350.00 feet was assigned for the site, as generally observed in onsite wells.

- Wells 1501 and LE-312 in Vera Cruz appear to be south of the groundwater divide, and therefore were not included in groundwater elevation contouring.

- Water levels measured at most surface water gauges indicate that there is hydraulic communication between groundwater and surface water. Several surface water gauges were not included, however, in the contouring because they are not likely in communication with the carbonate aquifer system. Those locations not included in the contouring are: SWG-3, SWG-4, and SWG-15, all located along the south tributary. See section 4.3 for more discussion of surface water elevations.

- Elevations measured at surface water gauges along Little Lehigh Creek correlate very well with nearby groundwater elevations, and therefore were included in the contouring.

Results of Groundwater Elevation Contour Mapping

Based on the groundwater elevation contour map, the general groundwater flow direction is from southeast to northwest. This determination is consistent with that observed at the site (see Figure 4-1), and with that reported in the literature (Wood, 1972, and Sloto, 1991).

4.2.3 Hydraulic Head Gradients

Horizontal Hydraulic-Head Gradient

The horizontal hydraulic head gradient, measured parallel to the direction of groundwater flow,

varies across the study area. The horizontal hydraulic-head gradient in the southern and central portion of the study area, where the contour lines are more closely-spaced, is approximately 0.028 ft/ft or 160 feet per mile. The horizontal hydraulic-head gradient in the northern portion of the study area, where the contour lines are more widely-spaced, is approximately 0.007 ft/ft or 40 feet per mile. The hydraulic-head gradient appears to be proportional to the topographic gradient, which is greater on the flanks of South Mountain (southern portion of study area) and decreases to the north toward Little Lehigh Creek.

Vertical Hydraulic-Head Gradient

Determination of the vertical hydraulic-head gradient was not conducted at any offsite well locations due to the lack of closely-spaced wells that are screened at different depths.

4.3 Surface Water Flow Conditions

Water levels were measured at the surface water gauges listed in Table 4-1. These data indicate that most stretches of these watercourses appear to be in hydraulic communication with the uppermost aquifer unit at the site. Based on Plate 1 and Table 4-1, the following observations are made:

- In Vera Cruz, there appears to be a correlation between water levels measured at LE-312 and SWG-1 (elevation is higher in LE-312 than in SWG-1), which suggests that groundwater flows at least locally toward the unnamed tributary to Liebert Creek. This is because when the altitude of the water table is above the altitude of the stream surface, groundwater discharges to the stream and the stream gains water.

- In Upper Milford Township, there appears to be a correlation between water levels measured at wells UM-59 and UM-43 with stream water gauges SWG-1, SWG-2 and SWG-16, which suggests groundwater discharge to Liebert Creek in this area.

- Water levels measured at SWG-3 and SWG-15 are considerably above nearby groundwater elevations, indicating that this tributary carries primarily surface water

runoff. Plate 1 indicates the location of a pond near the former Volney Felt Mills Dump area. This pond, which was apparently constructed as a water storage basin during operations at the felt plant, provides flow to the south tributary. Between SWG-3 and SWG-4, the creek bed transitioned from flowing to dry, which indicates a losing stream. This is because when the altitude of the water table is below the altitude of the stream surface, the stream loses water to the groundwater system and can become dry.

- Surface water elevation measurements along Little Lehigh Creek indicate that groundwater discharge occurs in this area. Water levels measured in wells EM-08, EM-09, LM-20, LM-21, LM-23,and SA08 correspond well with stream gauge elevations.

- The water level in Little Lehigh Creek drops substantially across the study area, from 322.09 feet at Camp Olympic (SWG-6) to 296.29 at Keck's Bridge (SWG-11). This hydraulic gradient is approximately 0.0022 ft/ft or 12 feet per mile.

Findings of this study are supported by hydrogeologic reports prepared for the study area. According to Wood, groundwater discharging at springs LE-SP73 and LE-SP78 in this area is from the Allentown Dolomite Formation. Sloto states that "the groundwater and surface water systems are well connected in the Little Lehigh Creek basin". Based on water budget calculations, he determined that the groundwater (baseflow) contribution comprises 82 percent (median value) of streamflow in the eastern portion of the basin (page 19).

The water level measured in well LE-1293 (329.00), located in Lower Macungie Township north of Little Lehigh Creek, is above the water level measured in the nearest surface water gauge SWG-6 (322.09). These data indicate that groundwater flow on the north side of the creek is likely to be southeastward toward Little Lehigh Creek. Underflow of groundwater beyond Little Lehigh Creek is considered to be minimal; this is supported by the fact that no VOCs were found above detection limit in groundwater from wells located north of Little Lehigh Creek.

5.0 DISCUSSION AND CONCLUSIONS

A well survey and associated sampling tasks were conducted in the vicinity of the Rodale Manufacturing site in Emmaus, Pennsylvania. The objectives of the well survey activity were to characterize groundwater, surface water and stream sediment quality in the study area to help determine the environmental effects from activities at the Rodale site and other potential sources of contamination on these media. Historically, groundwater contamination by volatile organic compounds (VOCs) has been documented at several public and private wells within the study area, including the Rodale site. Because groundwater contamination by VOCs is of a regional nature, it is likely that a number of potential sources exist in the area. For purposes of the well survey activity, the study area was defined as that area within a three-mile radius (not separated by a groundwater flow divide) of the Rodale site, and included the Borough of Emmaus and parts of Lower Macungie, Upper Milford, Salisbury and Upper Saucon Townships (Plate 1).

To meet the objectives of the study, the following four primary activities were conducted:

1. *Identification of Water Supply Providers*
2. *Well and Surface Water Evaluation*
3. *Groundwater, Surface Water and Stream Sediment Sampling*
4. *Groundwater Elevation Contouring*

A brief description and the results of each of these items is described as follows:

5.1 Identification of Public Water Providers

The identification of public water providers and the approximate extent of service was conducted within the study area. The Borough of Emmaus provides groundwater to all residents within Borough boundaries (Figure 1-4), and to additional connections in Upper Milford and Salisbury Townships, located south and northeast of the Borough, respectively. The Borough utilizes six groundwater production wells (PSW-1, PSW-2, PSW-3, PSW-4, PSW-6 and PSW-7, Plate 1); water is filtered and chlorinated prior to distribution. Water from PSW-1, PSW-2, and PSW-7 is treated with an air-stripper to remove VOCs; an air stripper is being installed at PSW-4.

Significant portions of Lower Macungie and Salisbury Township, located northwest of the Borough, are served by Lehigh County Authority (LCA). LCA reportedly utilizes 14 production wells to provide service to more than 7,000 customers. Salisbury and Upper Saucon Townships reportedly receive water from the nearby cities of Allentown and Bethlehem. Most portions of Upper Milford Township, as well as some areas within the other townships, are not served by public water and therefore can be assumed to rely on private wells.

5.2 Well and Surface Water Evaluation

The identification of groundwater users in the study area was conducted based on well logs and other information obtained from several sources, including USGS and PADER files, appropriate geologic reports, discussions with municipal officials, and a field survey (see Table 2-1). Based on these sources, over 350 wells were identified in the study area and information was compiled into a database. The well record search was subject to the limitations described in Section 2.4.3.

This information was evaluated to select appropriate groundwater sampling locations. In addition, an assessment was also conducted of the primary watercourses, seeps and springs in the study area. Information from the surface water assessment was also entered into a database and evaluated to select appropriate sample locations.

5.3 Groundwater, Surface Water and Stream Sediment Sampling

An assessment of groundwater quality in the study area included collection and laboratory analysis of samples from 10 onsite wells, 6 Borough of Emmaus water supply wells, and 31 private wells. In addition, 13 surface water, 4 spring, and 14 stream sediment samples were collected. The primary findings for each parameter type are as follows:

5.3.1 Volatile Organic Compounds

Onsite Wells

Groundwater at the Rodale site is impacted (found above MCLs) with six primary VOCs at the indicated concentration ranges:

1. Trichloroethene (TCE, 97 to 180,000 ppb)

2. 1,2-Dichloroethene (1,2-DCE, 310 to 43,000 ppb)

3. Vinyl Chloride (VC, 150 to 3,200 ppb)

4. Tetrachloroethene PCE, (3 to 3,900 ppb)

5. 1,1,2-Trichloroethane (1,1,2-TCA, 9 to 270 ppb)

6. 1,1-Dichloroethene (1,1-DCE, 27 ppb in one well)

VOC concentrations are highest for all VOCs in onsite disposal wells (Wells 1, 2 and 3). Concentrations have decreased at most wells since the previous round of sampling conducted by EPA in 1989. Of these six VOCs, only three (TCE, 1,2-DCE, and PCE) were found in offsite monitor wells MW-2, MW-3 or MW-4 at concentrations above MCLs.

Offsite Wells

VOCs were detected at concentrations above or near MCLs in five of the six Borough of Emmaus water supply wells:

1. PSW-1. TCE was detected at a concentration of 10 ppb;

2. PSW-2. TCE was detected at a concentration of 5.9 ppb;

3. PSW-3. TCE was detected at a concentration of 6.7 ppb;

4. PSW-4. PCE and TCE were detected at concentrations of 21/19 and 4.5/4.4 ppb, respectively, and;

5. PSW-7 TCE was detected at a concentration of 14 ppb.

These concentrations are consistent with the results from the quarterly monitoring for VOCs conducted by the Borough per PADER requirements.

Of the 31 private wells and 4 springs, VOCs were found above MCLs at only 3 locations:

1. Well LM-20, Orchid Place in Lower Macungie Township. At this location, TCE was found at a concentration of 5.2 ppb.

2. Well SA-08, Keystone Road, Salisbury Township. At this location, PCE was detected at a concentration of 5.3 ppb.

3. Spring SP-03, Keystone Road, Salisbury Township (adjacent to SA-08 location above). At this spring, which is used for residential supply, PCE and TCE were found at concentrations of 14 and 8.7 ppb, respectively.

Based on these water quality results and groundwater flow information summarized in Section 4.0, the following observations are made:

- The concentration of PCE in Borough of Emmaus well PSW-4, which is located more than one mile northeast (and cross-gradient) of the Rodale site, is higher than any other location in the study area. The SA-08 and SP-03 locations, where PCE was also found, are generally downgradient of PSW-4. These data suggest that additional sources of contamination may be present in that portion of the study area.

- Based on data for an aquifer pumping (yield) test conducted at PSW-4 in September 1991, the Liethsville Formation is a very prolific aquifer. This well was pumped at a rate of 900 gpm for 48 hours, and the total drawdown measured was 1.85 feet, which corresponded to a calculated transmissivity of 792,000 gallons per day per foot (gpd/ft).

Based on this value, a routine calculation was made to estimate the zone of influence (capture zone) of PSW-4. The boundary of the capture zone can be estimated using the following equation (from Todd, 1980, page 122):

$$2Y_L = Q/2Ti$$

where:

Y = coordinate location of capture boundary (well assumed to be located at X = 0 and Y = 0 with direction of flow parallel to X-axis); the capture zone width is $2Y_L$

Q = discharge rate of well

T = transmissivity of aquifer

i = horizontal hydraulic head gradient

This equation is based on the assumptions of a uniform flow field.

For this calculation, the following input parameter values were used:

Q = 900 gpm (pumping rate during aquifer test; this rate is greater than the daily average pumping rate of 300-350 gpm [see Table 1-3], and therefore results in a more conservative capture zone estimate)

T = 792,000 gallons per day/ft (based on results of Borough's aquifer test at PSW-4)

i = 0.028 ft/ft (average horizontal hydraulic head gradient based on water level measurements collected by GEC [see section 4.2.3])

Substituting these values yields the following estimate for the capture zone:

$$2Y_L = 2\ [(900\ \text{gal/min})(1440\ \text{min/day})]/\ [2(792{,}000\ \text{gal/day*ft})(0.028\ \text{ft/ft})]$$
$$= 60\ \text{feet}$$

Based on this estimate, it appears unlikely that pumping from PSW-4 will induce the flow of contaminants in groundwater from the Rodale site.

- Borough of Emmaus wells PSW-1 and PSW-2 are located more than one-half mile east, and hydraulically cross-gradient from, the Rodale site. It is possible that another source(s) of VOCs is present in that portion of the study area. Furthermore, while VOC concentrations decrease in the side gradient (northwesterly) direction from the site toward PSW-1/PSW-2, concentrations then increase in a northwesterly direction between PSW-1/PSW-2 and PSW-4 (a distance of 0.75 mile).

- Borough well PSW-3 is located approximately one-half mile from, and hydraulically cross-gradient to, the Rodale site. PSW-3 is located close to the Broad Street industrial area (see Plate 2), where several former and existing industrial operations are located.

- The remaining wells where VOCs were found above MCLs (PSW-7 and LM-20) are close to Little Lehigh Creek, which is the primary groundwater discharge zone in the study area. VOCs in these wells may have originated at a number of possible upgradient sources.

- VOCs were not found above MCLs at any of the four wells (LE-1293, LM-27, LE-677, and 0351) sampled on the north side of Little Lehigh Creek. These data suggest that groundwater with VOCs above MCLs are not migrating beyond the creek to northern portions of the study area. Available literature states that groundwater and surface water are connected within the Little Lehigh Creek basin, and that groundwater contributes approximately 80 percent of baseflow in this region (Sloto, 1991). For these reasons, Little Lehigh Creek likely represents the groundwater discharge boundary in the area.

- VOCs were not found above MCLs in any of the six wells (UM-43, UM-45,UM-59, UM-60, UM-61, and LE-312) sampled in the vicinity of the Vera Cruz/Quarry Road site in Upper Milford Township.

Surface Water

VOCs were not found above quantitation limit in any surface water samples from the study area.

Springs

As stated above, PCE and TCE were found in spring sample SP-03 at concentrations above MCLs. VOCs were not detected in the remaining three spring samples from the study area.

Stream Sediment

No VOCs were detected in stream sediment samples, with the exception of 4-methyl-2-pentanone (4 J ppb) in SD-2, acetone (290 J ppb) and toluene (8 J ppb) in SD-9D, and several VOCs at very low concentrations marked with a "B" (blank) designation. Results for these three VOCs appear to be anomalous and do not suggest any patterns or sources of contamination.

5.3.2 Semi-Volatile Organic Compounds

Onsite Wells

Several semivolatile organic compounds (SVCs) were detected at concentrations up to 6,000 ppb. The largest number of SVCs were found in Well 5 (the shallow cistern approximately 8 feet in depth), and are likely attributed to localized soil contamination. It is significant to note that SVCs were not found above quantitation limits at offsite monitor wells MW-2 through MW-4.

Borough of Emmaus Wells

SVCs were also not found above quantitation limits in any of the Emmaus water supply wells that were sampled. Based on these data, it appears that SVCs are confined to the Rodale site.

5.3.3 TAL Total and Dissolved Metals and Cyanide

Onsite Wells

MCLs were exceeded in some onsite wells for total (unfiltered) analysis of the following: beryllium (1 well), cadmium (4 wells), lead (6 wells), nickel (1 well) and cyanide (1 well). For the dissolved (filtered) analysis, however, concentrations were below MCLs for all these parameters.

These data indicate that the site is not contributing dissolved metals or cyanide at levels that exceed MCLs. An evaluation of these concentrations versus risk-based concentrations will be made during later stages of the RI/FS process, as necessary (i.e., the Risk Assessment). The possibility of total metals migration as colloidal particles cannot be dismissed, however, and will be further evaluated in upcoming sampling events.

Offsite Wells

Results of analyses for TAL total and dissolved metals and cyanide in offsite (Borough of Emmaus and private) wells indicate that only one sample displayed an MCL exceedance: UM-61, with a total lead concentration in the investigative and duplicate sample of 231 and 25.8 ppb, respectively. The dissolved lead concentration, however, was below detection limit. It is important to note that this residence utilizes a whole-house filter for incoming water from the well (the sample was collected from an in-line sample tap prior to the filter); this concentration is expected to be silt-related and not indicative of any regional water quality problem for lead. No other wells in the area reveal elevated lead concentrations.

Surface Water

Results of analyses for TAL total and dissolved metals and cyanide in surface water samples indicate that no samples displayed MCL exceedances.

Calcium and magnesium concentrations generally increase along downgradient stretches of Liebert and Little Lehigh Creek, suggesting that significant groundwater discharge is occurring in these areas (since groundwater typically has elevated calcium and magnesium concentrations relative to surface water).

Stream Sediment

Results of analyses for TAL metals and cyanide in stream sediment samples indicate that low concentrations (2 - 10 ppb) of arsenic were detected in all samples. Chromium concentrations above 24 ppb, and zinc concentration above 75 ppb, were detected in all samples from the south intermittent tributary and at two locations in Little Lehigh Creek. Concentrations of some metals (chromium, lead, nickel, and zinc) in SD-10 were high relative to other samples.

Since metals and cyanide were not found above MCLs in groundwater and surface water (with the exception noted above), it is unnecessary to closely compare results from sediment samples.

5.3.4 General Water Quality Parameters

Results of analyses for general water quality parameters indicate that nitrates are present above MCLs in monitor wells MW-1 (16 ppm) and MW-2 (12/13 ppm). The source of nitrates is unknown. In addition, low pH conditions (below 5 standard units) were found to exist at MW-1 (4.47), MW-2 (4.71) and MW-3 (4.59).

5.4 Groundwater Elevation Contouring

Measurement of water levels was conducted at available, surveyed onsite wells, Borough of Emmaus water supply wells, private wells and surface water gauges to assess groundwater flow conditions at the site and in the study area. Based on these measurements, the following statements can be made:

- Groundwater flow at the site is generally to the northwest at a horizontal hydraulic-head gradient of 0.006 ft/ft or 32 feet per mile (see Figure 4-1).

- Groundwater flow in the study area was also determined to be to the northwest (see Plate 2). This determination is consistent with that observed at the site and reported in the literature (Wood, 1972, and Sloto, 1991). The horizontal hydraulic-head gradient was found to vary from the southern portion of the study area to the northern portion, and appears to be proportional to the topography.

- Little Lehigh Creek appears to be the primary groundwater discharge feature in the study area. Several springs and a steep streambed gradient of 0.0022 ft/ft or 12 feet per mile were observed along Little Lehigh Creek within the study area.

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EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID 150434
PAGE # AR100196

IMAGERY COVER SHEET
UNSCANNABLE ITEM

SITE NAME Rodale Manufacturing

OPERABLE UNIT 001

ADMINISTRATIVE RECORDS- SECTION 1 VOLUME I

REPORT OR DOCUMENT TITLE Well Survey Evaluation Summary Report

DATE OF DOCUMENT 9/28/94

DESCRIPTON OF IMAGERY Ground Elevation Contour Map

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 oversized map

TABLES

TABLE 3-1: SUMMARY OF ANALYTICAL PROGRAM AND LOCATION OF DATA IN SUMMARY TABLES

Sample Medium	Sample Loc.	No. of samples (*)	ANALYTICAL PARAMETERS								Table No.
			TCL VOCs (3/90 SOW)	TCL VOCs (6/91 SOW)	TCL SVCs	TCL PCBs	TAL Total Metals	TAL Diss. Metals	Water Quality	Field Para-meters	
Groundwater	Onsite Wells	10	X								3-2
					X						3-3
						X					None
							X				3-4
								X			3-5
									X	X	3-6
	Borough of Emmaus Wells	6		X	X						3-7
							X				3-8
								X			3-9
									X	X	3-10
	Private Wells	31		X							3-11
							X				3-12
								X			3-13
										X	3-14
Surface Water	Streams in Study Area	13		X							3-15
							X				3-16
								X			3-17
										X	3-18
	Springs in Study Area	4		X							3-15
							X				3-16
								X			3-17
										X	3-18
Stream Sediment	Streams in Study Area	14	X								3-19
							X				3-20

TABLE NOTES:
* - This number includes investigative samples only (no QA/QC samples included in total)
3/90 SOW - EPA March 1990 Statement of Work
6/91 SOW - EPA June 1991 Statement of Work (with low-level detection limits)
TCL = Target Compound List;
VOCs = Volatile Organic Compounds
SVCs = Semivolatile Organic Compounds
TAL metals - Target Analyte List metals; "total" and "dissolved" refer to analysis of an unfiltered and filtered sample, respectively.
Water Quality Parameters include alkalinity, chloride, sulfate, nitrogen series, total organic carbon, and total dissolved solids
Field Parameters include pH, specific conductance, temperature and, in some samples, oxidation/reduction potential (Eh).

DATA SUMMARY TABLES:

ONSITE WELLS

3-2: TCL Volatile Organic Compounds
3-3: TCL Semi-Volatile Organic Compounds
3-4: TAL Total Metals
3-5: TAL Dissolved Metals
3-6: Water Quality and Field Parameters

TABLE 3-2 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN ONSITE WELLS (PAGE 1 OF 2)

Location ID:		WELL 1		WELL 2	WELL 3		WELL 4		WELL 5
Well Type*, Depth (ft)		D, 452'		D, 148'	D, 416'		M, 247'		C, 7.9'
GEC Sample No.:		OW-WELL1	OW-WELL1D	OW-WELL2	OW-WELL3	OW-WELL3	OW-WELL4	OW-WELL4D	OW-WELL5
EPA Sample No:		OW-1-	OW-1D	OWW2E	OW-3-	OW-3D	OWEL4	OWL4D	WEL5-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV
Sample Date:		7/15/93	7/15/93	7/14/93	7/16/93	7/16/93	7/13/93	7/13/93	7/06/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)							
Vinyl Chloride	2	810 J	800 J	1500	3200 J	3200 J	180 J	310 J	
Acetone	–	6 J	7 J			37 J	2 J		37 B
1,1-Dichloroethene	7						14 J	27 J	
Methylene chloride	5					10 B	5 B	8 B	
1,1-Dichloroethane	N							2 J	
1,2-Dichloroethene (total)**	cis-70 trans-100	560 J	560 J	43,000 J	6,400 J	6,500 J	2,000 J	2,800 J	
2-Butanone	N								13
Chloroform	100						4 J	6 J	
Benzene	5			160 B	24 B	30 B	9 B	17 B	
1,2-Dichloroethane	5						1 J	3 J	
Trichloroethene	5	97	99	180,000 J	1,000 J	1,200 J	3,000 J	4,200 J	4 B
Toluene	1000	9 J	8 J	480 J	440	530	1 J	2 J	
1,1,2-Trichloroethane	5			270 J			9 J	15	
Tetrachloroethene	5			3900			48 J	91 J	10 J
Ethylbenzene	700	10 J	9 J		340 J	540 J			
Xylene (total)	10000	64	61	360 J	3,100 J	4,600 J	11	20	

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TABLE 3-2 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN ONSITE WELLS (PAGE 2 OF 2)

Location ID:		WELL 6		MW-1	MW-2		MW-3		MW-4	
Well Type*, Depth (ft)		W, 231'		M, 138'	M, 134'		M, 138.5'		M, 136'	
GEC Sample No.:		OW-WELL6	OW-WELL6D	OW-MW-1	OW-MW-2	OW-MW-2D	OW-MW3	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:		WELL6-	WELL6D	OWMW1	OWMW2	WMW2D	OWMW3	MW3D-	OWMW4	MW4D-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV	DUP
Sample Date:		7/07/93	7/07/93	6/30/93	6/30/93	6/30/93	7/01/93	7/01/93	7/06/93	7/06/93
Compounds	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Vinyl Chloride	2	150	160							
Acetone	--			760 B	7 B	5 B	8 B	3 B		
1,1-Dichloroethene	7									
Methylene Chloride	5									
1,1-Dichloroethane	N									
1,2-Dichloroethene (total)	cis-70 trans-100	1300	1400	310 J					2600 J	3300 J
2-Butanone	N									
Chloroform	100									
Benzene	5									
1,2-Dichloroethane	5									
Trichloroethene	5	2800 J	3000 J	18,000	21	22	35	35	140,000	130,000 J
Toluene	1000									
1,1,2-Trichloroethane	5									
Tetrachloroethene	5	11 J	11 J				3 J	3 J	1,300 J	1,200 J
Ethylbenzene	700									
Xylene (total)	10000									

NOTES: *M = Monitor Well; D = Disposal Well; W = Water Supply Well; C = Cistern. Depths are ft below top-of-casing measured by GEC except Wells 1 and 3 (these depths from previous reports).
MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, April 1992); N = listed for regulation, but no MCL yet assigned; shading indicates MCL exceedance
INV = Investigative; DUP = Duplicate
[illegible] Qualifiers: J = Estimated value (is below quantitation limit or is outside instrument calibration range); B = analyte also detected in blank
[illegible]s- and trans- are isomers of 1,2-dichloroethene (1,2-DCE); analysis was for total 1[illegible] (includes both isomers); MCLs are specified for each isomer.

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TABLE 3-3 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN ONSITE WELLS (PAGE 1 OF 2)

Location ID:		WELL 1		WELL 2	WELL 3		WELL 4		WELL 5
Well Type*, Depth (ft)		D, 452'		D, 148'	D, 416'		M, 247'		C, 7.9'
GEC Sample No:		OW-WELL1	OW-WELL1D	OW-WELL2	OW-WELL3	OW-WELL3D	OW-WELL4	OW-WELL4D	OW-WELL5
EPA Sample No:		OW-1-	OW-1D	OWW2E	OW-3-	OW-3D	OWEL4	OWL4D	WEL5-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV
Sample Date:		7/15/93	7/15/93	7/14/93	7/16/93	7/16/93	7/13/93	7/13/93	7/06/93
COMPOUND:	MCL (ppb)	CONCENTRATION (µg/l or ppb)							
Phenol	--			11			1 J	2 J	84 J
2-Methylphenol	--			3 J					
4-Methylphenol	--	7 J	6 J						39
2,4-Dimethylphenol	--			3 J					
Naphthalene	1,500@	4 J	4 J	22	2,000 J	1,200 J	6 J	6 J	4 J
2-Methylnaphthalene	--	1 J	1 J	2 J	540	300 J			
2,4,5-Trichlorophenol	--			8 J					
N-Nitrosodiphenyl-amine (1)	--				77 J	66 J			
Pentachlorophenol	1			5 J					
Acenaphthene	--								2 J
Dibenzofuran	--								1 J
Diethylphthalate	--								
Fluorene	--								2 J
Phenanthrene	--			2 J	130 J	100 J			10
Anthracene	--								2 J
Carbazole	--								2 J
Di-n-butylphthalate	--						1 J	1 J	14
Fluoranthene	--								11
Pyrene	--					71 J			14 J
Benzo(a)anthracene	0.1								6 J
bis(2-Ethylhexl)phthalate	6 @	3 B	4 B		6,000 J	3,800 J	3 B	3 B	3 B
Chrysene	0.2								7 J
Di-n-octylphthalate	--				160 J	110 J			
Benzo(b)fluoranthene	--								10 J
Benzo(k)fluoranthene	0.2								10 J
Benzo(a)pyrene	0.2								6 J
Indeno(1,2,3-cd)pyrene	0.4								6 J
Dibenz(a,h)anthracene	0.3								1 J
Benzo(g,h,i)perylene	--								5 J

TABLE 3-3 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN ONSITE WELLS (PAGE 2 OF 2)										
Location ID:		WELL 6		MW-1	MW-2		MW-3		MW-4	
Well Type*, Depth (ft)		W, 231'		M, 138'	M, 134'		M, 138.5'		M, 136'	
GEC Sample No.:		OW-WELL6	OW-WELL6D	OW-MW-1	OW-MW-2	OW-MW2D	OW-MW3	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:		WEL6-	WEL6D	OWMW1	OWMW2	WMW2D	OWMW3	MW3D-	OWMW4	MW4D-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV	DUP
Sample Date:		7/07/93	7/07/93	6/30/93	6/30/93	6/30/93	7/01/93	7/01/93	7/06/93	7/06/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Phenol	--	2 J	1 J							
Diethylphthalate	--	1 J								
bis(2-Ethylhexl)phthalate	6@	3 B	2 B	1 B	2 B		2 B	2 B	2 B	2 B

NOTES: *M = Monitor Well; D = Disposal Well; W = Water Supply Well; C = Cistern. Depths are ft below TOC measured by GEC except Wells 1 and 3 (these depths from previous reports).
MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, Office of Water, April 1992);
@ = EPA Region III risk-based concentration for ingestion of tap water containing this compound
(--) = no MCL assigned.
INV = Investigative; DUP = Duplicate
Data Qualifiers: J = Estimated value (is below quantitation limit or is outside instrument calibration range); B = analyte also detected in blank sample

TABLE 3-4 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN ONSITE WELLS (PAGE 2 OF 2)

Location ID:		WELL 6		MW-1	MW-2		MW-3		MW-4	
Well Type*, Depth (ft)		W, 231'		M, 138'	M, 134'		M, 138.5'		M, 136'	
GEC Sample No.:		OW-WELL6	OW-WELL6D	OW-MW1	OW-MW2	OW-MW2D	OW-MW3	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:		WEL6-	WEL6D	OWMW1	OWMW2	OW-MW2D	OWMW3	MW3D-	OWMW4	MW4D-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV	DUP
Sample Date:		7/07/93	7/07/93	6/30/93	6/30/93	6/30/93	7/01/93	7/01/93	7/06/93	7/06/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	85.1	95.7	1120	8460 J	13000 J	3670 J	2860 J	2780	3260
Antimony	6	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	50	1.2 UR	1.2 UR	1.2 UR	1.2 UR	1.2 UR	1.2 UR	1.2 UR	1.2 UR	1.2 UR
Barium	2000	213	207	73.0	136	165	79.7 J	80.6	27.9	30.4
Beryllium	4	0.60 U	0.60 U	0.60 U	1.8	2.3	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	5	3.5	3.7	2.0 U	3.8	5.0	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	26000	25300	6390	6460	6530	7310 J	7500	1780	1700
Chromium	100	7.0 B	10.2 B	5.5 U	17.8 B	21.3 B	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	--	6.7	7.2	5.3	39.7	41.8	3.8	3.8	4.9	4.9
Copper	1,300#	32.4	38.4	6.2 U	44.3	54.9	7.7	9.8	7.6	6.3
Iron	--	25800 L	27600 L	2520 L	35600 J	52300 J	5120 L	5220 L	4260 L	4510 L
Lead	15	23.9	28.3	2.3 B	22.1	26.4	3.3 B	3.4 B	0.88 B	0.60 U
Magnesium	--	13800	13200	7980	13700	17000	7840	7920	2730	2880
Manganese	--	1800	2020	353	1220	1480	60.0	60.7	37.2	33.7
Mercury	2	0.93 J	1.2 J	0.06 U	0.16	0.10	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	16.5	18.8	4.4 U	40.5	49.6	5.7	6.8	5.1	4.4 U
Potassium	--	26100 J	28400	7650	12300	15100	6700	6540	7290	7640
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	24.6 B	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	17400	17600	16400	17600	18000	13500	13700	9490	9840
Thallium	2	1.9 UL	1.9 UL	1.9 UL	1.9 UL	1.9 UL	1.9 UL	1.9 UL	1.9 UL	1.9 UL
Vanadium	--	3.7 U	3.7 U	4.4	24.4	33.7	3.9	3.7 U	5.5	7.4
Zinc	N	374	405	27.0 B	160 B	212 B	48.0 B	47.2 B	32.5 B	24.7 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: *M = Monitor Well; D = Disposal Well; W = Water Supply Well; C = Cistern. Depths are ft below TOC measured by GEC except Wells 1 and 3 (these depths from previous reports).
MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, Office of Water, April 1992); N = listed for regulation, but no MCL yet assigned;
(--) = no MCL assigned; # = MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit; UL = biased low detection limit; J = estimated value (below quantitation limit or outside calibration range);
L = biased low result; B = analyte also detected in blank sample; R = unreliable result

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TABLE 3-4 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN ONSITE WELLS (PAGE 1 OF 2)

Location ID:		WELL 1		WELL 2	WELL 3		WELL 4		WELL 5
Well Type*, Depth (ft)		D, 452'		D, 148'	D, 416'		M, 247'		C, 7.9'
GEC Sample No.:		OW-WELL1	OW-WELL1D	OW-WELL2	OW-WELL3	OW-WELL3D	OW-WELL4	OW-WELL4D	OW-WELL5
EPA Sample No:		OW-1-	OW-1D	OWW2E	OW-3-	OW-3D	OWEL4	OWL4D	WEL5-
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV
Sample Date:		7/15/93	7/15/93	7/14/93	7/16/93	7/16/93	7/13/93	7/13/93	7/06/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)							
Aluminum	N	32.5 U	33.6 J	27300 J	201 J	175 J	200 J	231 J	20400
Antimony	6	9.2 U	9.2 U	12.4 B	15.2 B	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	50	1.9	1.0 U	3.6	1.0 U	1.0 U	1.0 U	1.0 U	8.7 L
Barium	2000	1140 J	1040 J	817 J	137 J	139 J	76.4 J	72.3 J	271
Beryllium	4	0.60 U	0.60 U	6.0 J	0.60 U	0.60 U	0.60 U	0.60 U	0.82
Cadmium	5	6.1 J	6.0 J	35.8 J	4.6 J	4.8 J	2.6 J	3.9 J	13.0
Calcium	--	43500 J	41700 J	72900 J	17900 J	18200 J	7270 J	7890 J	192000
Chromium	100	14.5 J	11.9 J	56.2 J	10.3 B	8.1 B	5.5 U	5.5 U	81.8
Cobalt	--	10.3 B	7.4 B	186 J	11.2 B	10.2 B	10.8 B	8.3 B	40.0
Copper	1,300#	103 B	100 B	249 J	63.2 B	45.0 B	11.5 B	11.5 B	709
Iron	--	13800 J	12000 J	87400 J	35700 B	36000 B	24500 J	24900 J	80800 L
Lead	15	4.6 J	3.8 J	120 J	37.3 J	34.2 J	28.2 J	29.6 J	555
Magnesium	--	23300 J	23000	40500 J	11400 J	11300 J	4500 J	4440 J	27000
Manganese	--	6320 J	5680 J	6230 J	1190 J	1210 J	526 J	550 J	1720
Mercury	2	0.06 UJ	0.07 J	0.80 J	0.24 J	0.33 J	0.10 J	0.13 J	0.49
Nickel	100	16.5 B	14.1 B	115 J	9.6 B	10.0 B	18.5 B	15.8 B	45.3
Potassium	--	4600 J	4400 J	28600 J	7590 J	7780 J	12100 J	12500 J	8440
Selenium	50	0.90 UL	0.90 UJ	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	10300	10200	51000	35300	34700	41900	41000	3140
Thallium	2	0.80 UL	0.80 UL	1.6 L	0.80 UL	0.80 UL	0.80 UL	0.80 UL	1.9 UL
Vanadium	--	3.7 U	3.7 U	97.6 J	3.7 U	3.7 U	3.7 U	3.7 U	40.8
Zinc	N	1520 J	1400 J	2260 J	164 J	152 J	2080 J	2040 J	1620
Cyanide	200	313 J	402 J	61.0 J	17.6 J	12.5 J	2.5 UJ	2.5 UJ	126

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TABLE 3-5 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN ONSITE WELLS (PAGE 1 OF 2)

Location ID:		WELL 1		WELL 2	WELL 3		WELL 4		WELL 5
Well Type*, Depth (ft)		D, 452'		D, 148'	D, 416'		M, 247'		C, 7.9'
GEC Sample No.:		OW-WELL1	OW-WELL1D	OW-WELL2	OW-WELL3	OW-WELL3D	OW-WELL4	OW-WELL4D	OW-WELL5
EPA Sample No:		OW-1D	OW1DD	OWW2-	OW-3-	OW3DD	4OWEL	4DWEL	WEL5F
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV
Sample Date:		7/15/93	7/15/93	7/14/93	7/16/93	7/16/93	7/13/93	7/13/93	7/06/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)							
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	211
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 UL	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	50	1.0 UL	1.0 UL	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UL	1.0 UL	1.2 U
Barium	2000	831	747	82.3	101	104	53.8	55.5	12.6
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	42300	40900	70700	16700	17600	6810	7100	38900
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.4	3.3 U	3.3 U	3.3 U
Cobalt	--	2.7	2.6 U	7.9	7.1	7.1	4.8	3.5	2.6 U
Copper	1,300#	4.4 U	4.4 U	4.4 U	4.4 U	9.0 B	4.4 U	4.4 U	18.2
Iron	--	382	341 B	10500	26700	23800	2380	2480	58.3 B
Lead	15	0.94 B	0.50 UL	0.99 B	0.62 B	0.72 B	1.2 B	1.1 B	0.50 U
Magnesium	--	22200	21800	26600	10100	10700	3900	4070	2080
Manganese	--	1140	1100	2420	1040	1130	301	316	2.8 B
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.10	0.06 U	0.09 B
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	8.4	5.3	4.9	4.9
Potassium	--	4490	4430	12000	7330	7610	12000	12500	6980
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	9510	9470	46600	32400	33700	38000	39700	2710
Thallium	2	0.80 UL	1.2 B	0.90 B	1.2 B	0.90 B	0.80 B	0.80 UL	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.9
Zinc	N	13.7 B	19.9 B	29.1 B	17.5 B	8.1 B	383 J	403 J	3.7 B
Cyanide	200	16.9 J	18.7 J	21.4 J	10.5 J	6.6 J	2.5 U	2.5 U	34.8

TABLE 3-5 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN ONSITE WELLS (PAGE 2 OF 2)

Location ID:		WELL 6		MW-1	MW-2		MW-3		MW-4	
Well Type*, Depth (ft)		W, 231'		M, 138'	M, 134'		M, 138.5'		M, 136'	
GEC Sample No.:		OW-WELL6	OW-WELL6D	OW-MW1	OW-MW2	OW-MW2D	OW-MW3	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:		FWEL6	FWELD	WMW1F	WMW2F	MW2DF	MW3FL	MW3DF	WMW4F	MW4DF
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV	DUP
Sample Date:		7/07/93	7/07/93	6/30/93	6/30/93	6/30/93	7/01/93	7/01/93	7/06/93	7/06/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	32.5 U	32.5 U	38.1 B	42.5 B	46.1 B	601	496	32.5 U	35.3 B
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	145	143	61.2	37.5	33.2	28.8	24.4	15.1	16.2
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	22400	21600	6380	3820	3460	3280	2840	1990	1920
Chromium	100	3.3 U	3.3 U	3.3 U	29.4 J	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	--	1320	1190	11.2 B	289 J	131 B	876 J	642 J	28.2 B	32 B
Lead	15	0.50 B	0.50 UL	0.75 B	1.0 B	0.59 B	1.2 B	0.80 B	0.50 U	0.79 B
Magnesium	--	11700	11500	7640	4980	4420	3240	2770	1170	1140
Manganese	--	746	692	300	36.6	34.0	14.2	13.4	26.9	26.6
Mercury	2	0.15 B	0.13 B	0.08 B	0.08 B	0.06 U	0.09 B	0.08 B	0.21 B	0.16 B
Nickel	100	4.3 U	5.7	4.3 U	4.9	4.3 U	5.4	4.3 U	4.3 U	4.3 U
Potassium	--	32400 J	34500	7080	4140	3770	2780	2430	5980	5840
Selenium	50	0.90 UL	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	6.5 B	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	18300	19000	17100	11400	10100	6300	5470	9970	9740
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	64.2	48.4 B	24.1 B	51.2 B	44.5 B	29.8 B	20.9 B	23.9 B	19.6 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: *M = Monitor Well; D = Disposal Well; W = Water Supply Well; C = Cistern. Depths are ft below TOC measured by GEC except Wells 1 and 3 (these depths from previous reports).
MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, Office of Water, April 1992); N = listed for regulation, but no MCL yet assigned;
(--) = no MCL assigned; # = MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Qualifiers: U = not detected at stated detection limit; UL = biased low detec[illegible]nit; J = estimated value (below quantitation limit or outside calibration range);
L = biased low result; B = analyte also detected in blank sample

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TABLE 3-6- SUMMARY OF RESULTS FOR ANALYSIS OF GENERAL WATER QUALITY AND FIELD PARAMETERS IN ONSITE WELLS (PAGE 1 OF 2)

Location ID:		WELL 1		WELL 2	WELL 3		WELL 4		WELL 5
Well Type*, Depth (ft)		D, 452'		D, 148'	D, 416'		M, 247'		C, 7.9'
GEC Sample No.:		OW-WELL1	OW-WELL1D	OW-WELL2	OW-WELL3	OW-WELL3D	OW-WELL4	OW-WELL4D	OW-WELL5
EPA Sample No:		OW-1-	OW-1D	OWW2E	OW-3-	OW-3D	OWEL4	OWL4D	WEL5F
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV
Sample Date:		7/15/93	7/15/93	7/14/93	7/16/93	7/16/93	7/13/93	7/13/93	7/06/93
Water Quality Parameters:	MCL (ppm):	CONCENTRATION (mg/l or ppm)							
Alkalinity to pH 8.3	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	56
Alkalinity to pH 4.5	--	186	189	231	122	124	63	64	337
Total Dissolved Solids	500	220	220	470	200	210	170	180	170
Kjeldahl Nitrogen	--	2.4	1.8	19	5	5	2.5	2.5	< 10
Nitrite Nitrogen	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Nitrate Nitrogen	10	< 0.5	1.3	< 0.5	< 0.5	< 0.5	1.9	1.4	< 0.5
Ammonia Nitrogen	--	1	1	17	4	5	3	3	2
Sulfate	400/500	7	6	83	< 3	< 3	21	21	20
Total Organic Carbon	--	14	15	16	12	11	3.3	3.2	38
Chloride	250	14	16	90	40	40	41	41	8
Field Parameters:									
pH (S.U.)	6.5 - 8.5	6.22	6.22	5.73	5.76	5.76	5.65	5.65	9.95
Specific Conductivity (micromhos)	--	368	368	974	462	462	340	3400	251
Temperature (°C)	--	17.3	17.3	18.0	15.6	15.6	16.8	16.8	18.6
Eh (mV)	--	- 37	- 37	238	NM	NM	45	45	268

TABLE 3-6- SUMMARY OF RESULTS FOR ANALYSIS OF GENERAL WATER QUALITY AND FIELD PARAMETERS IN ONSITE WELLS (PAGE 2 OF 2)

Location ID:		WELL 6		MW-1	MW-2		MW-3		MW-4	
Well Type*, Depth (ft)		W, 231'		M, 138'	M, 134'		M, 138.5'		M, 136'	
GEC Sample No.:		OW-WELL6	OW-WELL6D	OW-MW-1	OW-MW-2	OW-MW-2D	OW-MW3	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:		WEL6-	WEL6D	WMW1F	WMW2F	MW2DF	MW3FL	MW3DF	OWMW4	WMW4D
Sample Type:		INV	DUP	INV	INV	DUP	INV	DUP	INV	DUP
Sample Date:		7/07/93	7/07/93	6/30/93	6/30/93	6/30/93	7/01/93	7/01/93	7/06/93	7/06/93
Water Quality Parameters:	MCL (ppm)	CONCENTRATION (mg/l or ppm)								
Alkalinity to pH 8.3	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Alkalinity to pH 4.5	--	102	108	11	17	17	24	23	24	22
Total Dissolved Solids	500	220	230	150	140	140	120	120	60	60
Kjeldahl Nitrogen	--	< 1	< 1	3	< 1	< 1	< 1	< 1	< 10	2
Nitrite Nitrogen	1	0.10	0.08	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Nitrate Nitrogen	10	1.5	1.5	16	12	13	8.9	9.5	1.7	1.7
Ammonia Nitrogen	--	< 1	< 1	3	< 1	< 1	< 1	< 1	1	2
Sulfate	400/500	44	39	< 3	< 3	< 3	< 3	< 3	7	7
Total Organic Carbon	--	13	12	1.3	1.2	1.6	1.1	0.7	4.6	2.9
Chloride	250	15	16	20	20	21	14	14	5	5
Field Parameters:										
Temperature (°C)	--	17.1	17.1	15.4	15.8	15.8	16.4	16.4	17.1	17.1
pH (S.U.)	6.5 - 8.5	6.26	6.26	4.47	4.71	4.71	4.59	4.59	6.15	6.15
Specific Conductivity (micromhos)	--	391	391	213	198.1	198.1	174.1	174.1	109.1	109.1
Eh (mV)	--	- 39	- 39	295	281	281	239	239	277	277

NOTES: *M = Monitor Well; D = Disposal Well; W = Water Supply Well; C = Cistern. Depths are ft below TOC measured by GEC except Wells 1 and 3 (these depths from previous reports).
MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, Office of Water, April 1992);
INV = Investigative; DUP = Duplicate
NM = Not measured (see text for description)

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DATA SUMMARY TABLES:

BOROUGH OF EMMAUS SUPPLY WELLS

3-7: TCL Volatile and Semi-Volatile Organic Compound
3-8: TAL Total Metals
3-9: TAL Dissolved Metals
3-10: Water Quality and Field Parameters

TABLE 3-7 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE AND SEMI-VOLATILE ORGANIC COMPOUNDS IN BOROUGH OF EMMAUS PUBLIC WATER SUPPLY WELLS

Location ID:		PSW-1	PSW-2	PSW-3	PSW-4		PSW-6	PSW-7
GEC Sample No:		PSW-1	PSW-2	PSW-3	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:		PSW-1	PSW-2	PSW-3	PSW-4	PSW4D	PSW-6	PSW-7
Sample Type:		INV	INV	INV	INV	DUP	INV	INV
Sample Date:		7/22/93	7/21/93	7/22/93	7/20/93	7/20/93	7/20/93	7/21/93
VOC Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)						
Acetone	--			9.5 L	3.4 L			
Carbon disulfide	--	0.2 B	0.2 B	0.1 B	0.2 B	0.2 B	0.2 B	0.2 B
Methylene Chloride	5	0.5 B	0.4 B	0.6 B	0.4 B	0.4 B	0.5 B	0.2 B
cis-1,2-Dichloroethene	70	2.0	0.8 J	0.1 J		0.7 J		0.1 J
Chloroform	100	0.1 B			0.1 B	0.1 B		0.5 B
1,1,1-Trichloroethane	200	0.2 J	0.1 J	0.2 B			0.7 J	0.1 J
Carbon Tetrachloride	5			0.4 J	0.2 J	0.2 J		0.2 J
Trichloroethene	5	10	5.9	6.7	4.5	4.4		14
Toluene	1000					0.2 J		
Tetrachloroethene	5				21	19		1.4
Ethylbenzene	700					0.2 J		
Xylene (total)	10000					3.3 J		
SVC Compounds:		CONCENTRATION (µg/l or ppb)						
bis(2-Ethylhexyl)phthalate	6@				2 B	4 B		

NOTES: MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, 1992);
(--) = no MCL assigned.
@ = EPA Region III risk-based concentration for ingestion of tap water containing this compound
INV = Investigative; DUP = Duplicate
Data Qualifiers: J = estimated value (below quantitation limit or outside calibration range);
B = analyte also detected in blank;
L = biased low result

TABLE 3-8 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN BOROUGH OF EMMAUS PUBLIC WATER SUPPLY WELLS

Location ID:		PSW-1	PSW-2	PSW-3	PSW-4		PSW-6	PSW-7
GEC Sample No.:		PSW-1	PSW-2	PSW-3	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:		PSW-1	PSW-2	PSW-3	PSW-4	PSW4D	PSW-6	PSW-7
Sample Type:		INV	INV	INV	INV	DUP	INV	INV
Sample Date:		7/22/93	7/21/93	7/22/93	7/20/93	7/20/93	7/20/93	7/21/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l)						
Aluminum	N	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL
Antimony	6	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	2000	35.7 J	39.2 J	27.0 J	23100 J	27.9 J	360 J	42.2 J
Beryllium	4	0.63 B	0.63 B	0.60 U	0.60 U	0.60 U	0.64 B	0.63 B
Cadmium	5	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Calcium	--	41300	41900	26800	30200	30700	20800	54000
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.8 U	2.8 U	2.8 U	3.5	2.8 U	2.8 U	2.8 U
Copper	1,300#	6.2 U	6.2 U	6.2 U	6.2 U	4.4 U	4.4 U	6.2 U
Iron	--	20.4 B	7.5 B	4.9 U	13.2 B	11.5 B	4.9 B	17.7 B
Lead	15	0.50 U	0.65 B	0.70 B	0.62 B	0.50 U	2.2 B	0.75 B
Magnesium	--	23700	22900	19700	17700	17300	13900	31400
Manganese	--	1.4 B	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	4.1 B
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	--	2780	2500	2160	2330	2200	2240	2380
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	--	9950	18300	4790	4960	4920	7160	13700
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U
Cyanide	200	2.5 U	3.9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, 1992);
N = listed for regulation, but no MCL yet assigned;
(--) = no MCL assigned; # = MCLG (MCL goal) for copper;
INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit;
UL = biased low detection limit;
J = estimated value (below quantitation limit or outside calibration range);
L = biased low result;
B = analyte also detected in blank sample.

TABLE 3-9 - SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN BOROUGH OF EMMAUS PUBLIC WATER SUPPLY WELLS								
Location ID:		PSW-1	PSW-2	PSW-3	PSW-4		PSW-6	PSW-7
GEC Sample No.:		PSW-1	PSW-2	PSW-3	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:		PSW1F	PSW2F	PSW3F	PSW4F	PSW4DF	PSW6F	PSW-7
Sample Type:		INV	INV	INV	INV	DUP	INV	INV
Sample Date:		7/22/93	7/21/93	7/22/93	7/20/93	7/20/93	7/20/93	7/21/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l)						
Aluminum	N	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL
Antimony	6	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	50	1.2 U	1.2 UL	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	36.9 J	39.4 J	28.4 J	26.0 J	28.1 J	362 J	42.2 J
Beryllium	4	0.64 B	0.63 B	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	5	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Calcium	--	41800	42600	27800	29800	31200	21100	55000
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	1,300#	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.5 B	4.4 U
Iron	--	4.9 U	4.9 B	4.9 U	5.4 B	4.9 U	4.9 U	4.9 U
Lead	15	0.50 U	0.81 B	0.72 B	0.56 B	0.5 U	2.3 B	0.5 U
Magnesium	--	23500	23900	19400	18400	17900	14300	31600
Manganese	--	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.2 B	1.6 B
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	--	2920	2600	2230	2400	2310	2400	2490
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	--	9710	18900	4620	5140	5010	7450	13800
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	7.4 B	22.6 B	6.5 U	6.5 U	6.5 U	7.8 B	6.5 U
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, 1992);
N = listed but no MCL assigned
(--) = no MCL assigned; # = MCLG (mcl goal) for copper;
INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit;
UL = biased low detection limit;
J = Estimated value (below quantitation limit or outside calibration range);
L = biased low result;
B = analyte also detected in blank sample.

TABLE 3-10 - SUMMARY OF RESULTS FOR GENERAL WATER QUALITY AND FIELD PARAMETERS IN BOROUGH OF EMMAUS PUBLIC WATER SUPPLY WELLS

Location ID:		PSW-1	PSW-2	PSW-3	PSW-4		PSW-6	PSW-7
GEC Sample No:		PSW-1	PSW-2	PSW-3	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:		PSW-1	PSW-2	PSW-3	PSW-4	PSW4D	PSW-6	PSW-7
Sample Type:		INV	INV	INV	INV	DUP	INV	INV
Sample Date:		7/22/93	7/21/93	7/22/93	7/20/93	7/20/93	7/20/93	7/21/93
Water Quality Parameters:	MCL (ppm)	CONCENTRATION (mg/l or ppm)						
Alkalinity to pH 8.3	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Alkalinity to pH 4.5	--	165	162	119	125	125	78	206
Total Dissolved Solids	500	240	320	170	170	170	150	270
Kjeldahl Nitrogen	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Nitrite Nitrogen	1	< 0.02	< 0.02	< 0.02	<0.02	< 0.02	< 0.02	< 0.02
Nitrate Nitrogen	10	2.2	1.9	1.9	2.6	2.6	2.5	5.9
Ammonia Nitrogen	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sulfate	400/500	22	23	15	16	16	10	33
Total Organic Carbon	--	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5
Chloride	250	18	32	11	8	8	22	26
Field Parameters:								
pH (S.U.)	6.5 - 8.5	NM	6.19	NM	6.92	6.92	6.29	6.51
Specific Conductivity (micromhos)	--	433	481	307	312	312	268	582
Temperature (C°)	--	12.0	11.0	12.5	11.5	11.5	11.7	12.2
Eh (mV)	--	NM	NM	NM	NM	NM	NM	NM

NOTES: MCL = Maximum Contaminant Level, from "Drinking Water Regulations and Health Advisories" (EPA, 1992);
(--) = no MCL assigned.
INV = Investigative; DUP = Duplicate
NM = Not measured (see text for description)

DATA SUMMARY TABLES:

PRIVATE WELLS

3-11: TCL Volatile Organic Compounds
3-12: TAL Total Metals
3-13: TAL Dissolved Metals
3-14: Field Parameters

TABLE 3-11 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELL SAMPLES (PAGE 1 OF 5)

Location ID:		UM-43	UM-58		1501	LM-10	LE-311	UM-45		UM-59
Sample List No.:		72	79		63	47	39	73		74, Alt. 1
GEC Sample No.:		PW-UM43	PW-UM58	PW-UM58D	PW-1501	PW-LM10	PW-LE311	PW-UM45	PW-UM45D	PW-UM59
EPA Sample No:		UM43-	UM58-	UM58D	1501-	LM10-	LE311	UM49-	UM49D	UM59-
Sample Type:		INV	INV	DUP	INV	INV	INV	INV	DUP	INV
Sample Date:		8/3/93	8/3/93	8/3/93	8/3/93	8/3/93	8/4/93	8/4/93	8/4/93	8/4/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Acetone	--			0.6 B						8.9 L
Carbon Dislufide	--									
Methylene Chloride	5	0.5 B	0.6 B	0.7 B	0.7 B		0.4 B	0.6 B	0.5 B	1.5 B
cis-1,2-Dichloroethene	70									
2-Butanone	L									
Chloroform	100									
1,1,1-Trichloroethane	200					0.1 J				
Carbon Tetrachloride	5									
Trichloroethene	5									
Toluene	1000									0.2 J
Tetrachloroethene	5					2.0				
Xylene	10000									
Bromoform	100					2.0				

TABLE 3-11 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELL SAMPLES (PAGE 2 OF 5)

Location ID:		LE-677		1492	SA-05	0351	LE-1293	UM-40	EM-08	EM-09
Sample List No.:		46		62	60	42	44	71	40	41
GEC Sample No.:		LE677	LE677D	PW-1492	PW-SA05	PW-0351	PW-LE1293	PW-UM40	PW-EM08	PW-EM09
EPA Sample No:		LE677	LE67D	1492-	SA05-	0351-	1293-	UM40-	EM08-	EM09-
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	INV	INV
Sample Date:		8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	8/4/93	8/9/93	8/9/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Acetone	--							9.6 L		0.6 B
Carbon Disulfide	--							0.2 B	0.4 B	
Methylene Chloride	5	0.5 B	0.4 B	0.4 B	0.4 B	0.3 B	0.8 B	0.8 B		0.3 B
cis-1,2-Dichloroethene	70									
2-Butanone	--									
Chloroform	--								0.2 J	0.1 B
1,1,1-Trichloroethane	200				0.5 J					0.1 J
Carbon Tetrachloride	5									
Trichloroethene	5	0.4 J	0.4 J			0.4 J			1.1	1.1
Toluene	1000									
Tetrachloroethene	5							0.3 J	0.3 J	0.2 J
Xylene	1000									
Bromoform	100				0.2 J					

TABLE 3-11 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELL SAMPLES (PAGE 3 OF 5)

Location ID:		LM-23		SA-07	LM-20	LM-26	UM-60	UM-61		LM-27
Sample List No.:		53		55, Alt. 1	50	68, Alt. 3	75, Alt. 2	76, Alternate 1		48, Alt. 2
GEC Sample No.:		PW-LM23	PW-LM23D	PW-SA07	PW-LM20	PW-LM26	PW-UM60	PW-UM61	PW-EM61D	PW-LM27
EPA Sample No:		LM23-	LM23D	SA07-	LM20-	LM26-	UM60-	UM61-	UM61D	LM27-
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	DUP	INV
Sample Date:		8/9/93	8/9/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/11/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Acetone	--	1.6 B			12 L					
Carbon Disulfide	--			0.1 B	0.4 B					
Methylene Chloride	5	0.4 B	0.4 B	0.2 B	1.0 B		0.4 B	0.6 B	0.2 B	0.9 B
cis-1,2-Dichloroethene	70									
2-Butanone	--									12 L
Chloroform	100				0.3 B		0.5 B			
1,1,1-Trichloroethane	200									
Carbon Tetrachloride	5				0.2 J					
Trichloroethene	5				5.2					
Toluene	1000									
Tetrachloroethene	5				0.5 J					
Xylene	10000					0.7 J				
Bromoform	100									

TABLE 3-11 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELL SAMPLES (PAGE 4 OF 5)

Location ID:		SA-08		LM-28	LE-312	LE-411	LM-21		SA-09	UM-62
Sample List No.:		81*		80*	66	45	51		58, Alt. 1	69, Alt. 2
GEC Sample No.:		PW-SA08	PW-SA08D	PW-LM28	PW-LE312	PW-LE411	PW-LM21	PW-LM21D	PW-SA09	PW-UM62
EPA Sample No:		SA08-	SA08D	LM28-	LE312	LE411	LM21-	LM21D	SA09-	UM62-
Sample Type:		INV	DUP	INV	INV	INV	INV	DUP	INV	INV
Sample Date:		8/11/93	8/11/93	8/11/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)								
Acetone	--								1.9 B	2.8 B
Carbon Disulfide	--				0.7 B				0.4 B	0.1 B
Methylene Chloride	5	0.9 B	0.3 B	0.5 B	0.6 B	1.6 B	0.5 B	1.6 B	0.7 B	
cis-1,2-Dichloroethene	70								0.2 J	
2-Butanone	--	9.8 L		8.7 L						
Chloroform	100						0.2 B	0.1 B	0.1 B	
1,1,1-Trichloroethane	200									
Carbon Tetrachloride	5									
Trichloroethene	5	1.2	1.2				2.0	1.8	1.4	
Toluene	1000									
Tetrachloroethene	5	4.9	5.3				0.2 J	0.2 J	0.3 J	
Xylene	10000									
Bromoform	100									

TABLE 3-11 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN PRIVATE WELL SAMPLES (PAGE 5 OF 5)

Location ID:		UM-63	UM-64	
Sample List No.:		82*	83*	
GEC Sample No.:		PW-UM63	PW-UM64	PW-UM64D
EPA Sample No:		UM63-	UM64-	UM64D
Sample Type:		INV	INV	DUP
Sample Date:		8/25/93	8/25/93	8/25/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)		
Acetone	--	1.2 L		
Carbon Disulfide	--	0.1 B	0.2 B	0.2 B
Methylene Chloride	5	0.1 B	0.3 B	0.2 B
cis-1,2-Dichloroethene	70			
2-Butanone	--	15 L		
Chloroform	100			
1,1,1-Trichloroethane	200			
Carbon Tetrachloride	5			
Trichloroethene	5			
Toluene	1000			
Tetrachloroethene	5			
Xylene	10000			
Bromoform	1000			

NOTES: Sample List No.: Refers to the updated Sample List (Table 2-1); * = addition to early Sampling List
MCL = Maximum Contaminant Level (EPA, 1992)
INV = Investigative; DUP = Duplicate
Data Qualifiers: J = estimated value (below quantitation limit or outside calibration range);
B = analyte also detected in blank; L = biased low result

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TABLE 3-12 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN PRIVATE WELLS (PAGE 1 OF 5)

Location ID:		UM-43	UM-58		1501	LM-10	LE-311	UM-45		UM-59
Sample List No.:		72	79		63	47	39	73		74, Alt. 1
GEC Sample No.:		PW-UM43	PW-UM58	PW-UM58D	PW-1501	PW-LM10	PW-LE311	PW-UM45	PW-UM45D	PW-UM59
EPA Sample No:		UM43-	UM58-	UM58D	1501-	LM10-	LE311	UM49-	UM49D	UM59-
Sample Type:		INV	INV	DUP	INV	INV	INV	INV	DUP	INV
Sample Date:		8/03/93	8/03/93	8/03/93	8/03/93	8/03/93	8/04/93	8/04/93	8/04/93	8/04/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	13.6 U	13.6 U	13.6 U	14.1 B	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	6	13.3 B	12.4 B	9.2 U	11.2 B	14.6 B	9.2 U	9.2 U	20.5 B	9.7 B
Arsenic	50	1.6	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	169	27.6	29.3	9.2 B	26.8	217	6.7 B	6.7 B	36.0
Beryllium	4	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	41000	46000	46400	10100	30300	17700	25400	25100	33200
Chromium	100	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	--	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	1,300#	6.2 U	12.7	8.7	137	17.2	75.1	6.4	6.2 U	41.7
Iron	--	307	15.3	14.6	112	38.1	165	15.9	13.0	36.6
Lead	15	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.6	0.50 U	0.50 U	0.53
Magnesium	--	13000	26300	26500	7900	18500	8440	16900	16700	19400
Manganese	--	37.4	3.4	5.3	25.5	4.4	78.9	13.8	12.2	3.5
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	8.1	4.4 U	4.4 U	4.4 U
Potassium	--	2910	2660	2580	1620	2110	4510	1880	1850	1850
Selenium	50	2.0 L	1.10 L	0.90 UL	1.10	0.97	0.90 U	0.90 U	0.90 U	2.1
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	--	8740	20900	21000	9530	5920	10500	4100	3990	5100
Thallium	2	3.8 B	4.0 B	4.5 B	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	N	6.5 U	34.5	34.5	16.4	9.1	4870	9.9	11.8	14.9
[illegible]de	200	2.5 U	2.5 U	2.5 U	[illegible] U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

AR100221

TABLE 3-12 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN PRIVATE WELLS (PAGE 2 OF 5)

Location ID:		LE-677		1492	SA-05	O351	LE-1293	UM-40	EM-08	EM-09
Sample List No.:		46		62	60	42	44	71	40	41
GEC Sample No.:		PW-LE677	PW-LE677D	PW-1492	PW-SA05	PW-0351	PW-LE1293	PW-UM40	PW-EMO8	PW-EM09
EPA Sample No:		LE677	LE67D	1492-	SA05-	0351-	1293-	UM40-	EM08-	EM09-
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	INV	INV
Sample Date:		8/05/93	8/05/93	8/05/93	8/05/93	8/05/93	8/05/93	8/04/93	8/09/93	8/09/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	13.6 U	13.6 U	153	15.3 B	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	6	15.5 B	12.4 B	14.1 B	11.2 B	11.0 B	20.7 B	21.8 B	13.4 B	14.1 U
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	24.2	21.7	97.0	67.7	22.6	25.1	19.2	22.6	28.2 B
Beryllium	4	0.60 U	0.60 U	0.60 U	0.99 B	0.60 U	0.60 U	0.60 U	0.60 U	0.30 U
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.8 U
Calcium	--	38200	35600	15200	10400	35200	43900	40800	65900	53800
Chromium	100	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	3.3 U
Cobalt	--	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.6 U
Copper	1,300#	6.2 U	6.2 U	32.9	8	6.2 U	6.2 U	10.5	11.9	18.9
Iron	--	19.3	32.3	775	1630	16.7	15.3	66.2	23.2	107
Lead	15	1.3	1.9	0.65	1.6	2.1	0.50 U	0.50 U	0.50 U	0.79 B
Magnesium	--	21300	20000	9600	4550	19600	25100	27600	31900	29000
Manganese	--	5.2	3.4	11.6	281	8.7	5.8	9.7	11.2	9.2 B
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.3 U
Potassium	--	1970	1840	1550	1370	1820	2120	2190	2310	2380
Selenium	50	0.90 U	0.90 U	0.90 U	0.90 U	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	3.1 U
Sodium	--	6000	5470	9470	15300	5520	4310	3090	12100	12400
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 B	1.9 U	1.9 B
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	2.0 U
Zinc	N	60.2 J	83.6 J	12.0	36.0	365	20.8	6.6	25.1	11.8 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-12 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN PRIVATE WELLS (PAGE 3 OF 5)

Location ID:		LM-23		SA-07	LM-20	LM-26	UM-60	UM-61		LM-27
Sample List No.:		53		55, Alt. 1	50	68, Alt. 3	75, Alt. 2	76, Alternate 1		48, Alt. 2
GEC Sample No.:		PW-LM23	PW-LM23D	PW-SA07	PW-LM20	PW-LM26	PW-UM60	PW-UM61	PW-UM61D	PW-LM27
EPA Sample No:		LM23-	LM23D	SA07-	LM20-	LM26-	UM60-	UM61-	UM61D	LM27-
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	DUP	INV
Sample Date:		8/09/93	8/09/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/11/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	13.6 U	13.6 U	13.6 U	15.6	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	50	1.2 U	1.3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	34.6	34.6	10.7 B	28.8 B	46.0	42.6	4.5 B	4.8 B	1.4 U
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	67300	66900	9460	48300	31700	47000	23600	25300	682
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	9.5	12.8	11.4	19.9	27.9	6.6	72.0 J	13.3 J	4.4 U
Iron	--	26.3 B	33.9 J	19.3 B	15.2 B	5.0 B	9.8 B	89.4	56.1	4.9 U
Lead	15	0.5 U	0.5 U	0.50 U	0.50 U	1.4 B	14.0	231 J	25.8 J	1.8 B
Magnesium	--	44100	43900	20900	31800	22300	29900	17500	17900	413
Manganese	--	3.4 B	3.5 B	2.1 B	3.2 B	1.8 B	3.0 B	19.4	19.5	1.2 U
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	1670	1690	17100	1790	3450	2470	1680	1760	392
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	25.5 K	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	32000	32700	118000	8420	5790	11200	4290	4360	99700
Thallium	2	1.9 B	2.0 B	2.0 B	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	2.2 B
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	8.4 B	12.3 B	17.1 B	5.6 B	15.2 B	19.4 B	13.1 B	4.9 B	7.0 B
[illegible]de	200	2.5 U	2.5 U	2.5 U	[illegible]J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-12 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN PRIVATE WELLS (PAGE 4 OF 5)

Location ID:		SA-08		LM-28	LE-312	LE-411	LM-21		SA-09	UM-62
Sample List No.:		81*		80*	66	45	51		58, Alt. 1	69, Alt. 2
GEC Sample No.:		PW-SA08	PW-SA08D	PW-LM28	PW-LE312	PW-LE411	PW-LM21	PW-LM21D	PW-SA09	PW-UM62
EPA Sample No:		SA08-	SA08D	LM28-	LE312	LE411	LM21-	LM21D	SA09-	UM62-
Sample Type:		INV	DUP	INV	INV	INV	INV	DUP	INV	INV
Sample Date:		8/11/93	8/11/93	8/11/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	13.6 U	13.6 U	1070	27.6	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	9.2 U	9.6 B
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	24.9 B	24.9 B	48.1	81.2	77.4	39.0	40.3	19.3	11.2
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.60 U	0.78 B
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.0 U	2.3 B
Calcium	--	34200	34500	76800	2700	55300	62500	62200	25000	5680
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	5.5 U	5.5 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	6.9	6.4	8.5	169	4.4 U	28.9	30.3	12.2 B	196
Iron	--	10.2 B	5.7 B	1910	58.3	66.9	37.9	49.8	36.0	387
Lead	15	1.8 B	1.6 B	129	2.0 B	2.0 B	7.3 B	8.6	0.50 UL	1.7 L
Magnesium	--	21900	22400	34200	542	39000	39800	40800	14500	4450
Manganese	--	2.5 B	2.5 B	188	1.2 B	4.2 B	7.0 B	7.1 B	3.5	18.0
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.11 B	0.09 B
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.5	6.8
Potassium	--	2140	2100	4970	2410	5260	2200	2380	1840	637
Selenium	50	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 U	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	10.6 K	6.9 U	6.9 U
Sodium	--	6930	6920	33500	7880	89200	29800	32500	3500	5430
Thallium	2	1.9 U	2.2 B	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 B	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	5.3 B	5.6 B	83.1	11.8 B	47.4 B	19.0 B	21.1 B	12.2 B	15.0 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-12 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN PRIVATE WELLS (PAGE 5 OF 5)

Location ID:		UM-63	UM-64	
Sample List No.:		82*	83*	
GEC Sample No.:		PW-UM63	PW-UM64	PW-UM64D
EPA Sample No:		UM63-	UM64-	UM64D
Sample Type:		INV	INV	DUP
Sample Date:		8/25/93	8/25/93	8/25/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)		
Aluminum	N	13.6 UL	13.6 UL	13.6 UL
Antimony	6	9.2 U	9.2 U	9.2 U
Arsenic	50	2.1 B	3.2 B	2.0 B
Barium	2000	63.0	47.3	47.3
Beryllium	4	0.6 U	0.6 U	0.6 U
Cadmium	5	2.0 U	2.0 U	2.0 U
Calcium	--	13000	33700	33500
Chromium	100	5.5 U	5.5 U	5.5 U
Cobalt	--	2.8 U	2.8 U	2.8 U
Copper	1,300#	25.3	32.5	33.5
Iron	--	196 L	697 J	543 J
Lead	15	2.5 B	7.5	9.0
Magnesium	--	6910	18800	18700
Manganese	--	8.8 B	12.5 B	11.3 B
Mercury	2	0.06 U	0.08 B	0.07 B
Nickel	100	4.4 U	4.4 U	4.4 U
Potassium	--	2140	2110	2110
Selenium	50	1.2 L	0.90 UL	0.90 UL
Silver	--	3.1 U	3.1 U	3.1 U
Sodium	--	7980	9620	9560
Thallium	2	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U
Zinc	N	132	14.8 B	12.1 B
Cyanide	200	2.5 U	2.5 U	2.5 U

N[illegible]: MCL = Maximum Contaminant Level (EPA, April 1992); N = listed, no MCL assigned; (--) = no MCL assigned
= MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit; UL = biased lo[illegible]on limit; J = estimated value;
L = biased low result; K = biased high result; B = detecte[illegible] blank

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TABLE 3-13 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN PRIVATE WELLS (PAGE 1 OF 5)

Location ID:		UM-43	UM-58		1501	LM-10	LE-311	UM-45		UM-59
Sample List No.:		72	79		63	47	39	73		74, Alt. 1
GEC Sample No.:		PW-UM43	PW-UM58	PW-UM58D	PW-1501	PW-LM10	PW-LE311	PW-UM45	PW-UM45D	PW-UM59
EPA Sample No:		UM43F	UM58F	U58DF	1501F	LM10F	E311F	UM49F	U49DF	UM59F
Sample Type:		INV	INV	DUP	INV	INV	INV	INV	DUP	INV
Sample Date:		8/03/93	8/03/93	8/03/93	8/03/93	8/03/93	8/04/93	8/04/93	8/04/93	8/04/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	50	2.6 B	3.2 B	2.0 B	2.4 B	1.2 U	1.2 U	3.5 B	1.5 B	1.7 B
Barium	2000	165	26.6	27.1	7.1	23.1	198	6.2	7.1	32.8
Beryllium	4	0.3 U	0.3 U	0.3 U	0.48 B	0.30 U	0.30 U	0.3 U	0.3 U	0.3 U
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	41400	45500	47200	9620	30000	17000	23400	23400	32300
Chromium	100	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	--	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	1,300#	6.2 U	6.7 B	6.2 U	105	12.7 B	61.4	6.2 U	6.2 U	14.8 B
Iron	--	118	12.8 B	9.7 U	9.7 U	11.0 B	38.6 B	9.7 U	19.4 B	9.7 U
Lead	15	0.5 U	0.5 U	0.5 U	0.5 B	0.50 U	0.50 U	0.5 U	0.5 U	0.5 U
Magnesium	--	13200	26100	27000	7550	18300	8240	15700	15600	18900
Manganese	--	27.5 L	1.2 UL	1.2 UL	20.7 L	1.2 UL	69.7	4.5 L	4.2 L	1.2 UL
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	8.3	4.3 U	4.3 U	4.3 U
Potassium	--	2840	2580	2550	1440	2050	4390	1660	1650	1780
Selenium	50	0.9 UL	0.9 UL	0.9 UL	0.92	0.90 UL	0.90 U	0.9 U	0.9 U	1.2 L
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	--	8920	20900	21700	9240	5980	10700	3910	4010	5080
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	N	6.0 B	37.5 B	37.0 B	19.6 B	8.2 B	4390	9.8 B	24.8 B	8.0 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-13 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN PRIVATE WELLS (PAGE 2 OF 5)

Location ID:		LE-677		1492	SA-05	0351	LE-1293	UM-40	EM-08	EM-09
Sample List No.:		46		62	60	42	44	71	40	41
GEC Sample No.:		LE677	LE677D	PW-1492	PW-SA05	PW-0351	PW-LE1293	PW-UM40	PW-EMO8	PW-EM09
EPA Sample No:		LE67F	LE67DF	1492F	SA05F	0351F	1293F	UM40F	EM08F	EM09F
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	INV	INV
Sample Date:		8/05/93	8/05/93	8/05/93	8/05/93	8/05/93	8/05/93	8/04/93	8/09/93	8/09/93
Compounds:	MCL (ppb):	CONCENTRATION (μg/l or ppb)								
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.6 B	1.4 B	1.2 U	1.2 U	1.2 U
Barium	2000	21.7	21.3	87.4	62.1	23.5	21.3	18.6	20.0	24.0
Beryllium	4	0.30 U	0.3 U	0.3 U	0.96 B	0.3 U	0.3 U	0.3 U	0.30 U	0.36 B
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	33800	34500	13900	9830	36600	39700	36700	58700	52500
Chromium	100	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	--	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	1,300#	6.2 U	6.2 U	16.2 B	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	11.4 B
Iron	--	9.7 U	9.7 U	9.7 U	20.4 B	9.7 U	18.7 B	22.6 B	9.7 U	9.7 U
Lead	15	0.50 U	0.50 U	0.5 U	0.5 U	1.4 B	0.5 U	0.65 B	0.84 B	0.74 B
Magnesium	--	19200	19500	8860	4320	20500	22900	25100	28800	25900
Manganese	--	1.2 UL	1.2 UL	1.2 UL	269	1.3 L	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	1720	1750	1260	1190	1680	1870	2020	2270	2230
Selenium	50	0.90 U	0.90 U	0.9 U	0.9 U	0.9 UL	0.9 UL	0.9 UL	0.90 UL	0.9 U
Silver	--	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	--	5500	5630	9130	14700	5960	4280	2960	11500	10700
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	N	17.3 B	18.0 B	19.5 B	30.6 B	355	23.5 B	13.5 B	28.3 B	20.6 B
[illegible]	200	2.5 U	2.5 U	2.5 U	[illegible]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

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TABLE 3-13 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN PRIVATE WELLS (PAGE 3 OF 5)

Location ID:		LM-23		SA-07	LM-20	LM-26	UM-60	UM-61		LM-27
Sample List No.:		53		55, Alt. 1	50	68, Alt. 3	75, Alt. 2	76, Alternate 1		48, Alt. 2
GEC Sample No.:		PW-LM23	PW-LM23D	PW-SA07	PW-LM20	PW-LM26	PW-UM60	PW-UM61	PW-UM61D	PW-LM27
EPA Sample No:		LM23F	M23DF	SA07F	LM20F	LM26F	UM60F	UM61F	M61DF	LM27F
Sample Type:		INV	DUP	INV	INV	INV	INV	INV	DUP	INV
Sample Date:		8/09/93	8/09/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93	8/11/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	50	1.4 B	1.7 B	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.9	1.2 U
Barium	2000	29.3	30.2	10.2	29.3	46.8	43.9	5.4	6.3	1.8 U
Beryllium	4	0.36 B	0.48 B	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	65400	64100	10400	49800	35000	50100	25800	25100	754
Chromium	100	5.5 U	5.5 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.8 U	2.8 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	6.2 U	6.2 U	17.2 B	10.0 B	14.6 B	4.4 U	4.4 UL	4.4 UL	4.4 UL
Iron	--	9.7 U	9.7 U	4.9 U	4.9 U	4.9 U	5.7 B	16.1 B	15.4 B	4.9 U
Lead	15	0.86 B	1.1 B	0.71 L	0.52 L	1.4 L	0.60 L	0.50 U	0.50 U	0.50 UL
Magnesium	--	39400	38400	22700	33100	22800	29100	17300	17200	369 B
Manganese	--	1.2 UL	1.2 UL	1.9 U	3.6	2.9	3.5 B	17.2	18.3	1.9 U
Mercury	2	0.06 U	0.06 U	0.06 B	0.06 U	0.06 U	0.06 U	0.06 B	0.06 B	0.06 B
Nickel	100	4.3 U	4.3 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	--	1340	1450	14700	1430 L	2970 L	2410 L	1640	1590	365
Selenium	50	4.5 U	4.5 U	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	--	6.9 U	6.9 U	3.1 U	181 R	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	27800	27500	117000	9040	6190	10700	4190	4160	99600
Thallium	2	1.9 B	1.9 U	4.8 B	3.9 B	4.0 B	4.7 B	3.6 B	3.4 B	3.7 B
Vanadium	--	3.7 U	3.7 U	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Zinc	N	16.4 B	19.8 B	22.1 B	9.7 B	17.7 B	26.6 B	8.6 B	13.4 B	10.0 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-13 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN PRIVATE WELLS (PAGE 4 OF 5)

Location ID:		SA-08		LM-28	LE-312	LE-411	LM-21		SA-09	UM-62
Sample List No.:		81*		80*	66	45	51		58, Alt. 1	69, Alt. 2
GEC Sample No.:		PW-SA08	PW-SA08D	PW-LM28	PW-LE312	PW-LE411	PW-LM21	PW-LM21D	PW-SA09	PW-UM62
EPA Sample No:		SA08F	A08DF	LM28F	E312F	E411F	LM21F	M21DF	SA09F	UM62F
Sample Type:		INV	DUP	INV	INV	INV	INV	DUP	INV	INV
Sample Date:		8/11/93	8/11/93	8/11/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93	8/12/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)								
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	233 J	32.5 U	32.5 U
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	2000	43.9 R	23.4	32.2	79.6	87.8	44.4	43.4	21.0 B	11.2 B
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	--	35400	34600	72800	2860	60400	66700	65700	25100	5660
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 UL	4.4 UL	4.4 UL	76.8 B	4.4 UL	18.7 B	18.2 B	4.4 UL	151
Iron	--	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	16.7 B	298 J	14.3 B	54.7 B
Lead	15	0.5 U	0.5 U	0.5 UL	0.57	0.5 UL	10.1	8.2	0.5 U	0.5 U
Magnesium	--	22200	22200	31700	538 B	42400	43400	43200	15700	4600
Manganese	--	2.8	1.9 U	6.2	1.9 U	8.2	7.9	7.2	4.0 B	15.0 B
Mercury	2	0.06 U	0.06 B	0.1 B	0.08 B	0.1 B	0.1 B	0.13 B	0.15 B	0.07 B
Nickel	100	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	--	1830 L	1960	4460	2350	5180	2310	2290	2000 B	736 B
Selenium	50	0.9 UL	0.9 UL	0.9 UL	0.9 UL	0.9 UL	0.9 UL	0.9 UL	0.90 UL	0.90 U
Silver	--	3.1 U	9.6 J	3.1 U	3.1 U	24.1 K	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	7070	6470	31900	8060	97400	33300	32800	3220	4990
Thallium	2	3.5 B	3.7 B	4.1 B	3.0 B	4.7 B	3.9 B	4.4 B	4.3 B	4.2 B
Vanadium	--	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Zinc	N	6.5 B	6.5 U	12.0 B	14.5 B	56.2	19.9 B	20.1 B	8.4 B	22.2 B
[illegible]	200	2.5 U	2.5 U	2.5 U	[illegible]	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

TABLE 3-13 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN PRIVATE WELLS (PAGE 5 OF 5)

Location ID:		UM-63	UM-64	
Sample List No.:		82*	83*	
GEC Sample No.:		PW-UM63	PW-UM64	PW-UM64D
EPA Sample No:		UMF63	UMF64	UMF4D
Sample Type:		INV	INV	DUP
Sample Date:		8/25/93	8/25/93	8/25/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)		
Aluminum	N	13.6 UL	13.6 UL	13.6 UL
Antimony	6	9.2 U	9.2 U	9.2 U
Arsenic	50	2.6 B	2.5 B	2.8 B
Barium	2000	63.0	47.3	47.3
Beryllium	4	0.60 U	0.60 U	0.60 U
Cadmium	5	2.0 U	2.0 U	2.0 U
Calcium	--	12900	33900	34200
Chromium	100	5.5 U	5.5 U	5.5 U
Cobalt	--	2.8 U	2.8 U	2.8 U
Copper	1,300#	27.2	41.3	28.1
Iron	--	9.7 UL	9.7 UL	12.9 L
Lead	15	0.87 J	9.3 J	4.6 J
Magnesium	--	6840	18900	19000
Manganese	--	8.9 B	11.1 B	11.1 B
Mercury	2	0.06 U	0.08 B	0.06 U
Nickel	100	4.4 U	4.4 U	4.4 U
Potassium	--	2080	2150	2290
Selenium	50	1.6 L	0.90 UL	0.90 UL
Silver	--	3.1 U	3.1 U	3.1 U
Sodium	--	7890	9680	10100
Thallium	2	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U
Zinc	N	145	21.3 B	15.6 B
Cyanide	200	2.5 UR	2.5 UR	2.5 UR

NOTES: MCL = Maximum Contaminant Level (EPA, 1992); N = listed, no MCL assigned; (--) = no MCL assigned
= MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit; UL = biased low detection limit; J = estimated value;
L = biased low result; K = biased high result; B = analyte detected in blank

TABLE 3-14 SUMMARY OF FIELD PARAMETERS MEASURED AT PRIVATE WELL LOCATIONS (PAGE 1 OF 2)

List No.	Sample ID	Street/Township	Sample Date	Field Parameters			Notes
				pH (S.U.)	Specific Conductivity (micromhos)	Temperature (C°)	
39	PW-LE311	Vera Cruz Rd., Upper Millford	8/4/93	6.28	244	24.5	No odor
40	PW-EM08	Orchid Lane, Lower Macungie	8/9/93	7.50	582	14.9	No odor, trace silt
41	PW-EM09	Orchid Lane, Lower Macungie	8/9/93	8.62	536	15.2	
42	PW-0351	Cedar Crest Blvd., Lower Macungie	8/5/93	7.70	369	22.1	
44	PW-LE1293	Spruce Rd., Lower Macungie	8/5/93	NM	396	11.2	pH electrode malfunction
45	PW-LE411	Indian Creek Rd., Lower Macungie	8/12/93	7.31	1096	14.0	Trace silt in sample
46	PW-LE677	Cedar Crest Blvd., Lower Macungie	8/5/93	7.08	347	12.6	
47	PW-LM10	Indian Creek Rd., Lower Macungie	8/3/93	7.49	382	17.2	No odor, sample clear
48 (alt 2)	PW-LM27	Riverbend Rd., Lower Macungie	8/11/93	7.12	421	12.6	Trace silt in sample
50	PW-LM20	Orchid Lane, Lower Macungie	8/10/93	NM	520	16.7	pH electrode malfunction
51	PW-LM21	Orchid Place, Lower Macungie	8/12/93	7.07	753	15.3	
53	PW-LM23	Orchid Place, Lower Macungie	8/9/93	8.62	780	16.5	
55 (alt 1)	PW-SA07	Golf Circle Rd., Salisbury	8/10/93	7.68	732	18.6	Trace silt in sample
58 (alt 1)	PW-SA09	Mountain Dr., Salisbury	8/12/93	7.97	242	15.5	
60	PW-SA05	East Rock Rd., Salisbury	8/5/93	6.29	179	12.2	Lt. orange tint
62	PW-1492	Mill Rd., Upper Milford	8/5/93	6.31	191	13.9	
63	PW-1501	Linda Lane, Upper Milford	8/3/93	6.55	175.7	17.5	

TABLE 3-14 SUMMARY OF FIELD PARAMETERS MEASURED AT PRIVATE WELL LOCATIONS (PAGE 2 OF 2)							
List No.	Sample ID	Street/Township	Sample Date	Field Parameters			Notes
				pH (S.U.)	Specific Conductivity (micromhos)	Temperature (C°)	
66	PW-LE312	Vera Cruz Rd., Upper Milford	8/12/93	5.88	61	17.3	
68 (alt 3)	PW-LM26	Tank Farm Rd., Upper Milford	8/10/93	8.49	357	17.6	
69 (alt 2)	PW-UM62	S. 7th Str., Upper Milford	8/12/93	6.0	89.4	14.4	Moderate silt, lt. orange color
71	PW-UM40	Allen Str., Upper Milford	8/4/93	7.76	412	14.0	
72	PW-UM43	Vera Cruz Rd., Upper Milford	8/3/93	7.25	372	13.1	
73	PW-UM45	Vera Cruz Rd., Upper Milford	8/4/93	7.72	254	14.3	
74 (alt 1)	PW-UM59	Vera Cruz Rd., Upper Milford	8/4/93	7.20	325	14.2	
75 (alt 2)	PW-UM60	Quarry Rd., Upper Milford	8/10/93	8.20	531	14.4	Trace silt in sample
76 (alt 1)	PW-UM61	Vera Cruz Rd., Upper Milford	8/10/93	8.57	269	15.8	
79	PW-UM58	Chestnut Str., Upper Milford	8/3/93	7.20	554	14.1	No odor, sample clear
80**	PW-LM28	Orchid Lane, Lower Macungie	8/11/93	6.80	728	14.0	
81**	PW-SA08	Keystone Rd., Salisbury	8/11/93	7.47	360	13.0	
82**	PW-UM63	S. 7th Str., Upper Milford	8/25/93	5.68	168	17.0	
83**	PW-UM64	S. 5th Str., Upper Milford	8/25/93	6.20	391	15.3	

TABLE NOTES:

NM = Not measured

** = Additions to Sampling List

Field parameters measured with Presto-Tek Model 500 Multimeter or Hydac Meter

DATA SUMMARY TABLES:

SURFACE WATER (STREAM WATER AND SPRINGS)

3-15: TCL Volatile Organic Compounds
3-16: TAL Total Metals
3-17: TAL Dissolved Metals
3-18: Field Parameters

TABLE 3-15 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER SAMPLES								
Location ID:		Spring SP-03	Spring LE-SP73	SW-3		SW-8	SW-10	SW-11
GEC Sample No.:		SP-03	SP-LESP73	SW-3	SW-3D	SW-8	SW-10	SW-11
EPA Sample No:		SP-03	LESP7	SW3--	SW3D-	SW8--	SW10-	SW11-
Sample Type:		INV	INV	INV	DUP	INV	INV	INV
Sample Date:		7/30/93	7/30/93	7/27/93	7/27/93	7/28/93	7/29/93	7/29/93
Compounds:	MCL (ppb)	CONCENTRATION (µg/l or ppb)						
Acetone	--		1.4 L	10 J				1.2 L
Carbon disulfide	--				0.4 J			
Methylene Chloride	5	0.4 B	0.5 B	0.5 B	1.5 B	0.2 B	0.2 B	
cis-1,2-Dichloroethene	70	0.1 J						1.0 J
Chloroform	100	0.9 B						
1,1,1-Trichloroethane	200	0.1 J						
Carbon Tetrachloride	5	0.5 J						
Benzene	5	0.1 J			0.1 J			
Trichloroethene	5	14	0.2 J				0.2 J	0.2 J
Toluene	1000			0.1 J	0.2 J			
Tetrachloroethene	5	8.7	0.2 J					1.0 J

NOTES: MCL = Maximum Contaminant Level (EPA, 1992);
(--) = no MCL assigned.
INV = Investigative; DUP = Duplicate
Data Qualifiers: J = estimated value (below quantitation limit or outside calibration range);
B = analyte also detected in blank;
L = biased low result

TABLE 3-16 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN SURFACE WATER SAMPLES (PAGE 1 OF 2)

Location ID:		SW-1	SW-2	SW-3		SW-5	SW-6	SW-7	SW-8	SW-9	
GEC Sample No.:		SW-1	SW-2	SW-3	SW-3D	SW-5	SW-6	SW-7	SW-8	SW-9	SW-9D
EPA Sample No:		SW-1-	SW-2-	SW-3-	SW-3D	SW-5-	SW-6-	SW-7-	SW-8-	SW-9-	SW-9D
Sample Type:		INV	INV	INV	DUP	INV	INV	INV	INV	INV	DUP
Sample Date:		7/27/93	7/27/93	7/27/93	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)									
Aluminum	N	122	134	48.6	56.4	64.8	106	81.2	73.1	902 J	131 J
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	50	1.2 U	1.5 K	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 K
Barium	2000	29.5	28.7	43.4	41.9	28.9	25.1	34.4	24.9	31.0	25.7 R
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 B	0.30 U	0.30 U	0.30 U	0.30 U	0.43 B	0.30 U
Cadmium	5	2.8 U	2.8 U	3.3 K	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	19500	25400	29800	29100	26500	44500	31600	44200	43800	43100
Chromium	100	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	--	149	187	134	143	104	170	135	102	1280 J	203 J
Lead	15	1.9 B	0.51 B	1.4 B	1.7 B	0.65 B	1.0 B	0.56 B	1.8 B	3.2 B	1.8 B
Magnesium	--	7440	9820	8990	8790	10200	18700	14400	19200	19200	18800
Manganese	--	11.3	9.5	10.4	10.1	6.4	8.8	6.6	6.9	35.6 J	8.8 J
Mercury	2	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	1670	1570	1710	1720	1850	1920	1990	1870	2000	1930
Selenium	50	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	10200	8820	9400	9110	12600	6310	10900	6890	6710	6680
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	N	9.6 B	8.2 B	7.0 B	15.2 B	10.9 B	6.5 B	7.0 B	2.7 B	27.5	8.6 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

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TABLE 3-16 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN SURFACE WATER SAMPLES (PAGE 2 OF 2)

Location ID:		SW-10	SW-11		SW-12	SW-15	SW-16	SPRING SP-02	SPRING SP-03	SPRING LE-SP73		SPRING LE-SP78
GEC Sample No.:		SW-10	SW-11	SW-11D	SW-12	SW-15	SW-16	SP-02	SP-03	SP-LESP73	SP-LESP73D	SP-LESP78
EPA Sample No:		SW-10	SW-11	SW11D	SW-12	SW-15	SP-16	SP-02	SP-03	LESP7	LEP73	SPLES
Sample Type:		INV	INV	DUP	INV	INV	INV	INV	INV	INV	DUP	INV
Sample Date:		7/29/93	7/29/93	7/29/93	7/29/93	7/29/93	7/30/93	7/30/93	7/30/93	7/30/93	7/30/93	7/30/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)										
Aluminum	N	86.0	121	208	46.5	422	126	134	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 U	14.1 UL	14.1 UL	14.1 U	14.1 U	14.1 UL
Arsenic	50	1.2 U	1.2 U	1.2 U	1.2 U	1.8 K	1.2 UL	1.2 U	1.2 U	1.2 UL	1.2 UL	1.2 U
Barium	2000	25.7	24.6	26.8	25.5	72.5	25.4 B	28.3 B	30.2	35.2	25.1 B	23.8
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 B	0.30 U	0.30 U	0.37	0.30 B	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	41800	40700	41700	41700	35200	25400	43100	43000	42400	42000	41700
Chromium	100	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 U	3.3 U	3.3 UL	3.3 U	3.3 U	3.3 UL
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	6.7 B	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	--	157	200	262	84.5	697	195	213	8.8 B	26.7 B	7.4 B	9.6 B
Lead	15	0.83 B	0.95 B	0.97 B	0.62 B	1.6 B	1.5 B	1.6 B	0.50 U	0.95 B	0.73 B	0.50 U
Magnesium	--	18500	18200	18700	19700	12200	9150	23800	27200	25100	25000	24300
Manganese	--	11.3	12.6	15.2	7.2	39.3	6.2	5.9	1.3	1.2 U	1.2 U	1.2 U
Mercury	2	0.06 UL	0.06 UL	0.06 UL	0.10 L	0.06 UL	0.06 U	0.06 UL	0.06 UL	0.06 U	0.06 U	0.06 UL
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	1970	2010	2100	1890	1800	1680	2400	2690	2230	2270	2220
Selenium	50	0.90 U	0.90 U	0.90 U	0.90 U	0.90 UL	0.90 UL	0.90 UL	0.90 U	0.90 UL	0.90 UL	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	6.9 U	6.9 U	3.1 U	6.9 U	6.9 U	3.1 U
Sodium	--	6700	6930	7090	6910	11500	9410	11200	9920	5950	5950	8530
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	2.1	2.0 U	3.7 U	2.0 U	2.0 U	3.7 U
Zinc	N	4.6 B	12.8 B	18.8	5.4 B	40.5	2.9	8.0	2.1 U	6.9	2.1 U	7.0 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: MCL = Maximum Contaminant Level (EPA, 1992); N = listed for regulation, no MCL assigned; (--) = no MCL assigned
= MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit; UL = biased low detection limit;
J = estimated value; L = biased low result; K = biased high result; B = analyte detected in blank

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TABLE 3-17 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN SURFACE WATER SAMPLES (PAGE 1 OF 2)

Location ID:		SW-1	SW-2	SW-3		SW-5	SW-6	SW-7	SW-8	SW-9	
GEC Sample No.:		SW-1	SW-2	SW-3	SW-3D	SW-5	SW-6	SW-7	SW-8	SW-9	SW-9D
EPA Sample No:		SW-1F	SW-2F	SW-3F	SW3DF	SW-5F	SW-6F	SW-7F	SW-8F	SW-9F	SW9DF
Sample Type:		INV	INV	INV	DUP	INV	INV	INV	INV	INV	DUP
Sample Date:		7/27/93	7/27/93	7/27/93	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)									
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	47.9	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	50	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	2000	29.3	27.5	43.4	43.2	29.3	26.0	34.3	27.5	27.5	241 R
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	19500	25200	29700	29800	27600	46600	32300	46200	45200	44900
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 U	5.9	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	--	52.0 B	32.2 B	52.4 B	55.7 B	29.1 B	26.7 B	59.9 B	37.1 B	22.6 B	28.4 B
Lead	15	0.90 B	0.50 U	0.50 U	0.64 B	0.52 B	0.50 U	0.50 U	0.61 B	0.55 B	0.50 U
Magnesium	--	7430	9730	8980	9010	10700	19600	14700	20100	19700	19600
Manganese	--	6.2	2.1	3.0	2.6	4.0	6.3	2.7	3.9	6.9	7.5
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	1880	1640	1660	1770	2000	2190	2060	2040	2130	2120
Selenium	50	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	--	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	10100	8810	9440	9270	13200	6630	11300	7310	7020	7020
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.1	2.2	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	6.1 B	5.5 B	5.6 B	3.6 B	4.6 B	2.8 B	11.4 B	5.6 B	4.4 B	12.5 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

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TABLE 3-17 SUMMARY OF RESULTS FOR ANALYSIS OF TAL DISSOLVED METALS IN SURFACE WATER SAMPLES (PAGE 2 OF 2)

Location ID:		SW-10	SW-11		SW-12	SW-15	SW-16	SPRING SP-02	SPRING SP-03	SPRING LE-SP73		SPRING LE-SP78
GEC Sample No.:		SW-10	SW-11	SW-11D	SW-12	SW-15	SW-16	SP-02	SP-03	SP-LESP73	SP-LESP73D	SP-LESP78
EPA Sample No:		SW10F	SW11F	S11DF	SW12F	SW15F	SW16F	SP02F	SP03F	LSP7F	LP7DF	LESPF
Sample Type:		INV	INV	DUP	INV	INV	INV	INV	INV	INV	DUP	INV
Sample Date:		7/29/93	7/29/93	7/29/93	7/29/93	7/29/93	7/30/93	7/30/93	7/30/93	7/30/93	7/30/93	7/30/93
Compounds:	MCL (ppb):	CONCENTRATION (µg/l or ppb)										
Aluminum	N	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	6	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	50	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	2000	26.3	25.8	26.7	26.8	67.8	25.2 B	30.3	31.0	27.0	27.0	24.8
Beryllium	4	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	5	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	--	42200	42400	41400	43700	35300	25900	43400	42900	41500	41700	41900
Chromium	100	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.9	2.6 U	2.6 U	2.6 U
Copper	1,300#	4.4 U	4.4 U	14.5 J	4.4 U	4.4 U	4.5 B	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	--	24.2 B	26.8 B	21.0 B	18.2 B	76.6 B	36.1 B	4.9 U	7.2 B	8.3 B	4.9 U	4.9 U
Lead	15	9.10 B	5.10 B	6.80 B	7.70 B	7.10 B	1.6 B	0.73 B	0.50 U	0.53 B	0.68 B	8.7 B
Magnesium	--	18700	18900	18500	20600	12200	9310	24000	27200	24700	24800	24500
Manganese	--	8.1	6.9	8.1	5.2	2.5	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Mercury	2	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	100	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	--	2200	2020	2180	2160	1890	1680	2470	2820	2340	2340	2160
Selenium	50	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 UL	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	--	36.4 R	3.1 U	3.1 U	3.1 U	3.1 U	6.9 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	--	6740	7020	6870	7320	11400	10100	11500	9960	5920	5910	8550
Thallium	2	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	N	9.5 B	4.9 B	12.5 B	15.3 B	17.3 B	2.1 U	8.7 B	12.6 B	8.0 B	4.5 B	6.1 B
Cyanide	200	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

NOTES: MCL = Maximum Contaminant Level (EPA, 1992); N = listed, but no MCL assigned; (--) = listed, but no MCL assigned.
= MCLG (MCL goal) for copper; INV = Investigative; DUP = Duplicate
Data Qualifiers: U = not detected at stated detection limit; UL = biased low detection limit; J = estimated value;
L = biased low result; K = biased high result; B = analyte detected in blank

TABLE 3-18 SUMMARY OF FIELD PARAMETERS MEASURED AT SURFACE WATER LOCATIONS

List No.	Sample ID	Location	Sample Date	Field Parameters			Notes
				pH (S.U.)	Specific Conductivity (micromhos)	Temperature (C°)	
			STREAM LOCATIONS				
22	SW-1	Unnamed trib to Liebert Ck at Vera Cruz Rd. (Upper Milford)	7/27/93	7.53	202	23.6	
23	SW-2	Liebert Ck, past Quarry Rd. (Upper Milford)	7/27/93	7.95	245	24.1	
24	SW-3	S. intermittent tributary at Chestnut St (Emmaus)	7/27/93	NM	273	24.1	pH electrode malfunction
25	SW-4	S. intermit. tributary prior to conf. w/ Liebert Ck (Emmaus)	7/27/93	NM	NM	NM	Stream was dry; sample not collected
26	SW-5	Liebert Ck prior to conf. w/ S. intermit. tributary (Emmaus)	7/28/93	9.34	260	27.9	
27	SW-6	Little Lehigh Ck prior to conf. w/ Liebert Creek (Lower Macungie)	7/28/93	8.38	362	21.4	
28	SW-7	Liebert Ck prior to conf. w/ Little Lehigh Ck (Lower Macungie)	7/28/93	8.52	312	23.7	
29	SW-8	Little Lehigh Ck at Route 29 bridge (Lower Macungie)	7/28/93	8.00	375	19.5	
30	SW-9	Little Lehigh Ck on Orchid Pl (at Poole W.S) (Lower Macungie)	7/28/93	7.36	389	20.7	
31	SW-10	Little Lehigh Ck at Weidas Mill Br (Lower Macungie)	7/29/93	7.34	327	21.5	
32	SW-11	Little Lehigh Ck at Keck's Br/Keystone Rd. (Salisbury)	7/29/93	7.96	370	21.4	
33	SW-12	Little Lehigh Ck at Fish Hatchery Rd. (Salisbury)	7/29/93	7.59	329	21.0	
**	SW-15	S. intermittent tributary at S. 7th Str (Upper Milford)	7/29/93	7.13	331	23.1	Addition to Sampling List
**	SW-16	Liebert Ck at Quarry Rd (Upper Milford)	7/30/93	7.89	274	20.3	Addition to Sampling List
			SPRING LOCATIONS				
18	SP-LESP73	Camp Olympic (Lower Macungie); large spring	7/30/93	7.45	432	12.7	
19	SP-02	Camp Olympic (Lower Macungie); small spring	7/30/93	7.48	470	15.6	
20	SP-LESP78	Fish Hatchery (Allentown)	7/30/93	7.60	439	12.7	
21	SP-03	Keystone Rd at Keck's Bridge (Allentown)	7/30/93	7.53	480	12.6	

TABLE NOTES:

NM = Not measured

** = Additions to Sampling List. Note that SW-13 and SW-14 not sampled because locations were dry.

Field parameters measured with Presto-Tek Model 500 Multimeter or Hydac meter

DATA SUMMARY TABLES:

STREAM SEDIMENT

3-19: TCL Volatile Organic Compounds
3-20: TAL Total Metals

TABLE 3-19 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN STREAM SEDIMENT SAMPLES (PAGE 1 OF 2)

Location ID:	SW-1	SW-2	SW-3		SW-4	SW-5	SW-6	SW-7	SW-8
GEC Sample No.:	SD-1	SD-2	SD-3	SD-3D	SD-4	SD-5	SD-6	SD-7	SD-8
EPA Sample No:	SD-1-	SD-2-	SD-3-	SD-3D	SD-4-	SD-5-	SD-6-	SD-7-	SD-8-
Sample Type:	INV	INV	INV	DUP	INV	INV	INV	INV	INV
Sample Date:	7/27/93	7/27/93	7/27/93	7/27/93	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93
Compounds:	CONCENTRATION (µg/kg or ppb)								
Chloromethane				6 B			5 B		
Acetone	8 B	10 B	8 B	12 B	10 B	10 B	6 B	11 B	5 B
Methylene Chloride	2 B	3 B	3 B	2 B	3 B	3 B	6 B	3 B	2 B
2-Butanone									
Toluene									
4-Methyl-2-Pentanone		4 J							

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TABLE 3-19 - SUMMARY OF POSITIVE (DETECTED) RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN STREAM SEDIMENT SAMPLES (PAGE 2 OF 2)								
Location ID:	**SW-9**		**SW-10**	**SD-11**		**SW-12**	**SW-15**	**SW-16**
GEC Sample No.:	SD-9	SD-9D	SD-10	SD-11	SD-11D	SD-12	SD-15	SD-16
EPA Sample No:	SD-9-	SD-9D	SD-10	SD-11	SD11D	SD-12	SD-15	SD-16
Sample Type:	INV	DUP	INV	INV	DUP	INV	INV	INV
Sample Date:	7/28/93	7/28/93	7/29/93	7/29/93	7/29/93	7/29/93	7/29/93	7/30/93
Compounds:	**CONCENTRATION (µg/kg or ppb)**							
Chloromethane								
Acetone	140 B	290 J	16 B	5 B	7 B	3 B	7 B	3 B
Methylene Chloride	6 B	6 B		2 J	2 B		1 B	2 B
2-Butanone	32 B	67 B	6 B					
Toluene		8 J						

NOTES: Note that sediment samples ("SD" prefix) were collected at surfcae water ("SW" prefix) locations
INV = Investigative; DUP = Duplicate
Data Qualifiers: J = estimated value (below quantitation limit or outside instrument calibration range);
B = analyte also detected in blank

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TABLE 3-20 SUMMARY OF RESULTS FOR ANALYSIS OF TAL METALS IN STREAM SEDIMENT SAMPLES (PAGE 1 OF 2)

Location ID:	SW-1	SW-2	SW-3		SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	
GEC Sample No.:	SD-1	SD-2	SD-3	SD-3D	SD-4	SD-5	SD-6	SD-7	SD-8	SD-9	SD-9D
EPA Sample No:	SD-1-	SD-2-	SD-3-	SD-3D	SD-4-	SD-5-	SD-6-	SD-7-	SD-8-	SD-9-	SD-9D
Sample Type:	INV	INV	INV	DUP	INV	INV	INV	INV	INV	INV	DUP
Sample Date:	7/27/93	7/27/93	7/27/93	7/27/93	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93	7/28/93
Compounds:	CONCENTRATION (µg/kg or ppb)										
Aluminum	2330	2920	6700	8100	17400	1920	4140	2520	3620	12300	12100
Antimony	2.9 U	3.4 U	4.1 B	210 J	4.4 B	3.1 U	3.5 U	3.3 U	3.5 U	6.1 U	5.9 U
Arsenic	0.76 J	1.0 J	4.7 J	10.5 J	7.9 J	1.9 J	4.3 J	3.0 J	9.7 J	6.2 J	5.8 J
Barium	22.7	26.3	88.3	128	118	19.3	24.6	27.2	49.9	88.6	81.0
Beryllium	0.12 U	0.34	2.2	2.1	1.2	0.13 U	0.73	0.66	0.96	0.70	1.0
Cadmium	0.58 U	1.1	5.5	5.4	2.5	0.97	2.3	1.8	4.2	2.4	2.8
Calcium	4170 J	4150 J	67300 J	52400 J	3550 J	28200 J	6800 J	4600 J	11800 J	7500 J	7700 J
Chromium	11.0 J	12.2 J	52.4 J	140 J	35.2 J	5.3 J	14.8 J	17.1 J	28.6 J	24.2 J	23.0 J
Cobalt	5.0 B	5.4 B	28.6	22.3	23.4	4.3 B	10.6	5.3 B	15.2	18.8	21.0
Copper	5.5 B	5.8 B	823 J	260 J	48.5	2.1 B	5.4 B	8.4 B	29.9	29.6 B	27.6 B
Iron	6380	11400	41000	40600	26600	8190	19000	14800	35800	22100	24100
Lead	12.4 J	4.8 J	273 J	126 J	20.1 J	3.6 J	16.2 J	16 J	3.7 J	41.1 J	35.7 J
Magnesium	1200 J	1590 J	22500 J	17400 J	7200 J	3660 J	4610 J	2270 J	6870 J	5940 J	6110 J
Manganese	169 J	218 J	496 J	2910 J	615 J	481 J	536 J	235 J	715 J	311 J	289 J
Mercury	0.03 U	0.03 U	0.02 U	0.03 U	0.14 B	0.03 U	0.03 U	0.03 U	0.04 U	0.06 U	0.06 B
Nickel	2.5	4.7	137	94.6	33.7	3.7	8.2	6.2	15.7	18.5	18.4
Potassium	265	232	476	681	2310	591	1060	371	772	1250	1070
Selenium	0.20 UL	0.21 UL	0.91 L	0.54 L	0.21 U	0.20 U	0.22 U	0.21 U	0.22 U	0.60	0.62
Silver	1.4 U	1.7 U	1.6 U	3.0 K	1.7 U	1.5 U	1.7 U	1.6 U	1.7 U	3.0 U	2.9 U
Sodium	84.3 B	51.1 B	283	336	134	41.6 B	54.8 B	57.4 B	72.4 B	90.6 B	102 B
Thallium	0.42 U	0.44 U	0.42 U	0.42 U	0.45 U	0.43 U	0.47 U	0.44 U	0.47 U	0.81 U	0.79 U
Vanadium	14.2	18.9	29.0	68.8	49.8	8.0	12.9	11.7	25.6	30.4	30.3
Zinc	28.8	31.4	1260	985	142	27.8	49.1	53.1	54.6 K	148	125
Cyanide	0.27 U	0.30 U	0.29 U	0.35 K	0.30 U	0.29 U	0.32 U	0.30 U	0.31 U	0.55 U	0.54 U

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TABLE 3-20 SUMMARY OF RESULTS FOR ANALYSIS OF TAL TOTAL METALS IN STREAM SEDIMENT SAMPLES (PAGE 2 OF 2)

Location ID:	SW-10	SW-11		SW-12	SW-15	SW-16
GEC Sample No.:	SD-10	SD-11	SD-11D	SD-12	SD-15	SD-16
EPA Sample No:	SD-10	SD-11	SD11D	SD-12	SD-15	SD-16
Sample Type:	INV	INV	DUP	INV	INV	INV
Sample Date:	7/29/93	7/29/93	7/29/93	7/29/93	7/29/93	7/30/93
Compounds:	CONCENTRATION (µg/kg or ppb)					
Aluminum	8710	5010	4920	3530	12100	3060
Antimony	3.3 U	3.6 U	3.3 U	3.5 U	4.0 U	3.4 UL
Arsenic	6.9 J	7.0 J	4.9 J	6.8 J	4.2 J	1.5 J
Barium	93.7	39.4	40.0	49.7	121	57.5
Beryllium	9.4	0.60	1.9	0.28	0.22	0.73
Cadmium	13.2	2.9	5.0	1.8	3.5	0.67 U
Calcium	32800	9840 J	5110 J	28300 J	8530 J	8880 J
Chromium	221 J	18.7 J	17.8 J	12.1 J	24.4 J	21.2 J
Cobalt	43.5	17.4	19.8	8.1	27.6	4.5 B
Copper	588	10.5 B	14.4 B	3.8 B	44.2	6.7 B
Iron	12400	22900	36700	14400	28900	14400
Lead	402 J	20.3 J	21.6 J	19.9 J	19.3 J	13.2 J
Magnesium	14300	5580 J	4460 J	11000 J	2040 J	5050 J
Manganese	2640 J	679 J	1010 J	646 J	1550 J	727 J
Mercury	0.03 U	0.04 U	0.03 U	0.03 U	0.04 U	0.04 B
Nickel	145	13.6	13.4	6.1	13.4	4.2
Potassium	1250	733	1060	499	443	471
Selenium	0.26	0.26	0.24	0.22 U	0.29	0.24 L
Silver	1.6 U	1.7 U	1.6 U	1.7 U	2.0 U	1.6 U
Sodium	600	75.3 B	40.7 B	61.1 B	107 B	47.1 B
Thallium	0.45 UL	0.48 U	0.47 U	0.47 U	0.54 U	0.43 U
Vanadium	94.6	17.7	17.0	10.8	49.1	19.5
Zinc	3230	60.1	69.8	53.9	87.3	52.8
Cyanide	0.30 U	0.32 U	0.31 U	0.31 U	0.36 U	0.30 U

NOTES: INV = Investigative; DUP = Duplicate
Qualifiers: U = not detected at stated detection limit; UL = biased low detection limit;
J = estimated value; L = biased low result;
K = biased high result; B = analyte detected in blank

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APPENDICES

1

WilsonJones · Quick Reference Index System

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APPENDIX 1

WELL SURVEY DATABASE SUMMARY TABLE

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
0405	ALLENTOWN CITY	*4541 INDIAN CREEK RD (HACUNGIE)	PLAAR, RONALD		N	115	00/00/73	371CCCG	
0765	ALLENTOWN CITY		LEWVICH, IRA		N	172		377MRDS	
LE-163	ALLENTOWN CITY	PARK DRIVE NEAR AIRPORT	HAGELBUCH,ALLEN		N	140	02/11/52	371ALUN	320
LE-200	ALLENTOWN CITY	5TH STREET NEAR EMMAUS AVE	MOUNTAIN WEAVING CO.		N	225	00/00/20	374LSVL	350
LE-211	ALLENTOWN CITY	1920 S. 5TH STREET	PENN PRETZEL CORP.		N		00/00/15	374LSVL	330
LE-221	ALLENTOWN CITY	3111 ARCADIA AVE.	MORRIS,SAFIER		N	122	00/00/38	374LSVL	390
LE-458	ALLENTOWN CITY	EAST TEXAS ROAD NEAR DEVONSHIRE RD	FINK,ROY JR		N	200	00/00/51		480
LE-460	ALLENTOWN CITY	CATHERINE AVE	EVGER, NILES		N	155	12/16/54		380
LE-483	ALLENTOWN CITY	*307 W EMMAUS AVE.	WILSON SCHOOL		U	153	00/00/14		379
0767	EMMAUS BOROUGH	*1250 W LEHIGH, DETWILEWEN	HAROLD, ROBERT		N	110	00/00/00	- 370CMBR	
0768	EMMAUS BOROUGH	5TH AND FURNACE STREETS	ROLAND, P		N	130	00/00/00	370CMBR	
1956	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE D	WELL 4	N	342	06/00/81	374LSVL	
51A	EMMAUS BOROUGH	NOT LOCATED	EMMAUS BOROUGH	NOT LOCATED, ONLY LISTED IN TABLE		260			
51B	EMMAUS BOROUGH	NOT LOCATED	EMMAUS BOROUGH	NOT LOCATED, ONLY LISTED IN TABLE		325			
EM-01	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	RODALE MANUFACTURING	WELL 1	X	452	00/00/52	374LSVL	
EM-02	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	RODALE MANUFACTURING	WELL 2	X	251	00/00/38	374LSVL	
EM-03	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	RODALE MANUFACTURING	WELL 3	X	426		374LSVL	
EM-04	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	RODALE MANUFACTURING	WELL 5	X			374LSVL	
EM-05	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE-D	MW-1	N	138	11-12/88		467
EM-06	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE-D	MW-2	N	141	11-12/88		459
EM-07	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE-D	MW-3	N	140	11-12/88		460
EM-08	EMMAUS BOROUGH	3729 (3719) ORCHID PLACE	PETER, DONALD	SAMPLED 11/15/89 BY WESTON	N				
EM-09	EMMAUS BOROUGH	3705 ORCHID PLACE	LEUDY, HELMUT	SAMPLED 11/15/89 BY WESTON	N				
EM-10	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE-D	MW-6	N	141	11-12/88		462
EM-11	EMMAUS BOROUGH	SIXTH AND MINOR STREETS	SQUARE-D	MW-8B (CISTERN)	O				
EM-12	EMMAUS BOROUGH	608 S. 7TH STREET	DOMITROVITS, STEPHEN AND JANE	SAMPLED BY NUS	N				
EM-13	EMMAUS BOROUGH	620 S. 7TH STREET	APGAR, CLARK	SAMPLED BY NUS	N	225			
EM-14	EMMAUS BOROUGH	610 S. 7TH STREET	ZIMMERMAN, NELSON	SAMPLED BY NUS	N	110			
LE-1279	EMMAUS BOROUGH	JUBILEE AND FIFTH STREETS	KOSTERBADER BREWING COMPANY		U	270	00/00/10	374LSVL	450
LE-1288	EMMAUS BOROUGH	NORTH AND 2ND STREETS	EMMAUS SILK COMPANY	COULD NOT BE LOCATED BY USGS OR GEC	N	125	00/00/15	374LSVL	460
LE-1296	EMMAUS BOROUGH	RD 1 EMMAUS	FLOWERS		P			OOOMOLD	470
LE-149	EMMAUS BOROUGH	728 WEST BROAD STREET	IMPRESS INDUSTRIES	OWENS CORNING FELT, INTERNATIONAL FELT	N	251	06/30/07	374LSVL	430
LE-170	EMMAUS BOROUGH	728 WEST BROAD STREET	IMPRESS INDUSTRIES	OWENS CORNING FELT, INTERNATIONAL FELT	N	227	08/23/1899	374LSVL	4 30
LE-218	EMMAUS BOROUGH	6 TH AND MINOR STREETS	RODALE MFG. CO.	WELL 6	N	330		374LSVL	470
LE-311	EMMAUS BOROUGH	RD 1 EMMAUS	VERA CRUZ ELEMENTARY SCHOOL		N	300	00/00/27		510
LE-399	EMMAUS BOROUGH	RD 1 EMMAUS (*1309 NEWPORT AV., NORTHAMPTON)	DREISBACH,STEPHEN		N	28			510
LE-478	EMMAUS BOROUGH	752 FRANK AVE, EMMAUS	WEIDA, TERRY (FORMER OWNER - RUTH, LAWRENCE)	ORIGINAL HOME DESTOYED IN FIRE: OWNER - NO LONGER A WELL	N	91	00/00/49		400
LE-479	EMMAUS BOROUGH	6TH AND BERGER STREETS	EMMAUS BOROUGH	EMMAUS WELL 5 - SEALED	P	462	00/00/54		
LE-521	EMMAUS BOROUGH	BROAD STREET IN EMMAUS COMMUNITY PARK	EMMAUS BOROUGH	EMMAUS WELL 6	P	350	05/11/61		400
LE-669	EMMAUS BOROUGH	9 TH & FURNACE STREET	EMMAUS FOUNDRY & MACH. CO.		N	216	01/19/47	377MSH	470
LE-673	EMMAUS BOROUGH	733 W BROAD STREET	AIR PRODUCTS & CHEM. INC.		U	200	10/24/56		430
LE-83	EMMAUS BOROUGH	106 STATE ROAD, EMMAUS	EMMAUS AUTO PARTS (FORMER OWNER-EMMAUS ICE & STORAGE)	WELL IN POOR CONDITION - NOT USED SINCE 1955: 4/26/93 (GEC)	N	125	1928	374LSVL	370
LE-84	EMMAUS BOROUGH	KLINES LANE PUMP STATION	EMMAUS BOROUGH	EMMAUS WELL 1	P	315	02/00/23	374LSVL	410
LE-85	EMMAUS BOROUGH	KLINES LANE PUMP STATION	EMMAUS BOROUGH	EMMAUS WELL 2	P	305	02/00/23		
LE-86	EMMAUS BOROUGH	10TH AND BROAD STREETS	EMMAUS BOROUGH	EMMAUS WELL 3	P	526	00/00/69		410
LE-87	EMMAUS BOROUGH	GLENWOOD ST. AND MOUNTAIN BLVD.	EMMAUS BOROUGH	EMMAUS WELL 4	P	187	06/00/51	374LSVL	470

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevatio
LE-88	EMMAUS BOROUGH	LOCATION NOT KNOWN	EMMAUS BOROUGH	ABANDONED	U	200	00/00/10	377WRO5	550
LE-89	EMMAUS BOROUGH	LOCATION NOT KNOWN	EMMAUS BOROUGH	ABANDONED	U	120	00/00/10	377WRO5	550
LE-90	EMMAUS BOROUGH	2ND STREET	HILLEGRASS, JOHN		U	260	00/00/00	374LSVL	430
LE-91	EMMAUS BOROUGH	LOCATION NOT KNOWN	EMMAUS BOROUGH	ABANDONED 1928	U	325	00/00/10	374LSVL	440
LE-92	EMMAUS BOROUGH	LOCATION NOT KNOWN	EMMAUS BOROUGH	ABANDONED PRIOR TO 1925	U	700	00/00/00	377WRO	600
0150	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD NEAR WEIDAS MILL BRIDGE	MCNEIL		H	44	00/00/66		
0345	LOWER MACUNGIE TOWNSHIP	*2910 LINDBERG AVE., ALLENTOWN	BROOKHAVEN SALES		H	102	00/00/75	371CCC8	
0346	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD NEAR RT 29	ORGUNCE		H	137	00/00/74	371CCC8	
0347	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD (*2910 LINDBERG AVE., ALLENTOWN)	BROOKHAVEN SALES		H	102	00/00/74	371CCC8	
0348	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD (*2910 LINDBERG AVE., ALLENTOWN)	BROOKHAVEN SALES		H	227	00/00/75	371CCC8	
0351	LOWER MACUNGIE TOWNSHIP	*2319 S CEDAR CREST BLVD.	LEHIGH COUNTRY CLUB		H	75	00/00/74	370CMRR	
0352	LOWER MACUNGIE TOWNSHIP	HEATHER ROAD	ANDERSON, DOUG	SAME WELL AS 253, 254, 255	H	152	00/00/71	371CCC8	
0353	LOWER MACUNGIE TOWNSHIP	*4781 SPRING DR., CENTER VALLEY	SCHWELLMAN CONSTRUCTION	SAME WELL AS 252, 254, 255	H	120	00/00/74	371CCC8	
0390	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD WEST OF RT.29	KELLER,LOWHEY		H	140	00/00/73	371CCC8	
1385	LOWER MACUNGIE TOWNSHIP	LILAC ROAD	EXECUTIVE EST		H	200	00/00/00	371CCC8	
1386	LOWER MACUNGIE TOWNSHIP	LILAC ROAD	EXECUTIVE EST		H	150	00/00/00	371CCC8	
1387	LOWER MACUNGIE TOWNSHIP	RD 7 ALLENTOWN	VANDERHORN,E		H	250	00/00/00	371CCC8	
1388	LOWER MACUNGIE TOWNSHIP	*2918 WHITEMARSH PL, MACUNGIE	GRAUL,V		H	200	00/00/00	371CCC8	
1389	LOWER MACUNGIE TOWNSHIP	AZALEA ROAD	EXECUTIVE EST		H	152	00/00/00	371CCC8	
1392	LOWER MACUNGIE TOWNSHIP	NINMITE AND EAST TEXAS ROADS	OWENS,B		H	210	00/00/00	371CCC8	
1393	LOWER MACUNGIE TOWNSHIP	*1755 NINESITE RD (ALLENTOWN)	SCHNYDER,R		H	225	00/00/00	371CCC8	
1394	LOWER MACUNGIE TOWNSHIP	*1821 NINESITE RD (ALLENTOWN)	HEIDECKER,P		H	175 *	00/00/00	371CCC8	
1395	LOWER MACUNGIE TOWNSHIP	*1837 NINESITE RD (ALLENTOWN)	BITTING, DONALD		H	218	00/00/00	371CCC8	
1396	LOWER MACUNGIE TOWNSHIP	*1958 MAPLEWOOD CIR, ALLENTOWN (?)	CARCHUFF,V		H	127	00/00/00	371CCC8	
1397	LOWER MACUNGIE TOWNSHIP	*1990 ELDOV LN, ALLENTOWN	MERKLE,T		H	262	00/00/00	371CCC8	
1398	LOWER MACUNGIE TOWNSHIP	*765 DAYNE CIRCLE (EMMAUS) (? ML)	RICE,WM		H	242	00/00/00	371CCC8	
1399	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD NEAR MAPLEWOOD LANE	EAGLES NERE DEV		H	200	00/00/00	371CCC8	
1400	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD NEAR MAPLEWOOD LANE	EAGLES NERE DEV		H	200	00/00/00	371CCC8	
1401	LOWER MACUNGIE TOWNSHIP	NINESITE ROAD ADJACENT TO WELL 1402	HERMAN,R		H	225	00/00/00	371CCC8	
1402	LOWER MACUNGIE TOWNSHIP	*1790 NINESITE ROAD (ALLENTOWN) (? ML)	HARTZELL,R		H	200	00/00/00	371CCC8	
1403	LOWER MACUNGIE TOWNSHIP	*2313 RIVERDEND ROAD (ALLENTOWN)	ECK,T		H	148	00/00/00	371CCC8	
1404	LOWER MACUNGIE TOWNSHIP	RIVERDEND CIRCLE/ROAD	FENSTERMACHER,B		H	175	00/00/00	371CCC8	
1405	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD	STEPHENS,V		H	180	00/00/00	371CCC8	
1406	LOWER MACUNGIE TOWNSHIP	*2390 RIVERDEND ROAD (ALLENTOWN)	BAGIN,JOE		H	175	00/00/00	371CCC8	
1417	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	KILARESKI, T		H	175	00/00/00	371CCC8	
1418	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	GRESSMAN, DAVID		H	80	00/00/00	371CCC8	
1424	LOWER MACUNGIE TOWNSHIP		ETTINGER, D		H	90	00/00/00	370CMRR	
1425	LOWER MACUNGIE TOWNSHIP	BUCKEYE AND BROOKSIDE ROADS	CHURCH OF NAZARENE		H	114	00/00/00	370CMRR	
1594	LOWER MACUNGIE TOWNSHIP	LOWER MACUNGIE ROAD (*120 PINE STR., EMMAUS ?)	ETTINGER, R		H	250	08/00/85	371ALMN	
1595	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	BRUNGARD,T		H	125	08/00/85	371ALMN	
1599	LOWER MACUNGIE TOWNSHIP	SAUERKRAUT LANE	BURTNARDT, L		H	225	08/26/83	371ALMN	
1600	LOWER MACUNGIE TOWNSHIP	TANK FARM ALONG MACUNGIE ROAD	RE WRIGHT ASSOC.		H	80	09/00/81	374LSVL	
1601	LOWER MACUNGIE TOWNSHIP	TANK FARM ALONG MACUNGIE ROAD	RE WRIGHT ASSOC.		H	108	08/00/81	374LSVL	
1604	LOWER MACUNGIE TOWNSHIP	*2910 LINDBERG AVE, ALLENTOWN	BROOKHAVEN SALES		H	260	08/08/83	371ALMN	
LE-1293	LOWER MACUNGIE TOWNSHIP	MACUNGIE ROAD NEAR LOWER MACUNGIE RD	LEHIGH COUNTY AUTHORITY	LEHIGH COUNTY AUTHORITY WELL # 8	P	295	11/19/74		
LE-1294	LOWER MACUNGIE TOWNSHIP		LEHIGH COUNTY AUTHORITY	LEHIGH COUNTY AUTHORITY WELL # 11	P	130	02/00/73		
LE-1299	LOWER MACUNGIE TOWNSHIP	DEVONSHIRE NEAR RT. 29	RODALE, ROBERT		H		00/00/64	371ALMN	375

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Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
LE-1318	LOWER MACUNGIE TOWNSHIP	NEAR MACUNGIE AVE.	EMMAUS BOROUGH	EMMAUS WELL 7	P	400	12/00/77	371ALWN	
LE-410	LOWER MACUNGIE TOWNSHIP	RD 2 - 2319 CEDAR CREST BLVD	LEHIGH COUNTRY CLUB		H	145	00/00/27		320
LE-411	LOWER MACUNGIE TOWNSHIP	*4197 INDIAN CREEK ROAD (EMMAUS)	KEMMERER,PAUL		H	145	00/00/40		410
LE-461	LOWER MACUNGIE TOWNSHIP	RD 1 - LOWER MACUNGIE ROAD AND HIDDEN VALLEY RD	MERKEL, GEO		H	72	00/00/47		390
LE-462	LOWER MACUNGIE TOWNSHIP	RD 1 - 901 WILLOW LANE	BROOKSIDE COUNTRY CLUB		H	300	00/00/25		350
LE-463	LOWER MACUNGIE TOWNSHIP	RD 1 - 901 WILLOW LANE	BROOKSIDE COUNTRY CLUB		H	400	00/00/30		350
LE-544	LOWER MACUNGIE TOWNSHIP		MACUNGIE TOWNSHIP		P	310	09/00/66	376LBVL	375
LE-584	LOWER MACUNGIE TOWNSHIP	BUCKEYE RD - NEAR TANK FARMS	PHILIPS PETROLEUM		H	237	10/26/62	377TNSN	440
LE-588	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE - 901 WILLOW LANE	BROOKSIDE COUNTRY CLUB		I	109	09/27/62	371ALWN	360
LE-601	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE	HARVEY,FARR		H	300	06/26/61	371ALWN	425
LE-677	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE	LEHIGH COUNTRY CLUB		H	125	08/04/55	377TNSN	315
LE-693	LOWER MACUNGIE TOWNSHIP	5536 INDIAN CREEK ROAD	LOWER MACUNGIE TOWNSHIP	TOWNSHIP GARAGE	H	70	11/11/63		385
LE-760	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE - *6066 SWEETWOOD DR, MACUNGIE	RAUCH, R.H		H	285	00/00/52	377MROS	510
LE-862	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE - KRICK AND MACUNGIE ROADS	HARRIS,WILLIAM		U	200	07/14/67	371ALWN	339
LE-873	LOWER MACUNGIE TOWNSHIP	RIVERDEND RD. NEAR PHEASANT CT.	MAYERNIK,JOSEPH		H	177	07/25/67	371ALWN	460
LE-878	LOWER MACUNGIE TOWNSHIP	*4515 E. TEXAS ROAD (ALLENTOWN)	KODACK,JOSEPH		H	178	07/20/67	371ALWN	485
LE-880	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE - *901 WILLOW LANE (MACUNGIE)	BROOKSIDE COUNTRY CLUB		H	100	07/24/67	371ALWN	365
LE-962	LOWER MACUNGIE TOWNSHIP	RD 1 MACUNGIE - *4801 E. TEXAS ROAD (ALLENTOWN)	DEIDERT,W F JR		H	167	06/26/55	371ALWN	428
LE-997	LOWER MACUNGIE TOWNSHIP	RD 1 EMMAUS - BUCKEYE ROAD	ACKERMAN,ERWIN		H	138	00/00/44	377TNSN	418
LH-01	LOWER MACUNGIE TOWNSHIP	INDIAN CREEK ROAD	SSA HOMES		H	110	10/00/89		
LH-02	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD AT EMERALD CIRCLE	HANCOCK HOMES		H	140	01/00/88		
LH-04	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	WRIGHT, ARTHUR		H	200	10/00/87		
LH-05	LOWER MACUNGIE TOWNSHIP	2106 RIVERDEND ROAD	BELL, KENNETH		H	145	01/00/89		
LH-06	LOWER MACUNGIE TOWNSHIP	3848 MAULFAIR ROAD	GILDOT, JOHN		H	250	12/00/87		
LH-07	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD	HALDEMAN, PAUL		H	210	11/00/87		
LH-08	LOWER MACUNGIE TOWNSHIP	2168 COVERT ROAD	STONEBACK, THOMAS		H	200	08/00/87		
LH-09	LOWER MACUNGIE TOWNSHIP	1680 HIDDEN VALLEY ROAD	DRIES, DONALD		H	200	12/00/87		
LH-10	LOWER MACUNGIE TOWNSHIP	4226 INDIAN CREEK ROAD, EMMAUS	LYNN, THOMAS		H	225	06/00/89		
LH-11	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	HANCOCK HOMES (HIDDEN VALLEY ESTATES)		H	160	06/00/86		
LH-12	LOWER MACUNGIE TOWNSHIP	2182 RIVERDEND ROAD	MERKLE, ARTHUR		H	150	01/00/89		
LH-13	LOWER MACUNGIE TOWNSHIP	2177 RIVERDEND ROAD	RAINE, STEVE		H	200	01/00/89		
LH-14	LOWER MACUNGIE TOWNSHIP	4244 EAST TEXAS ROAD	FUNK, LAMAR		H	300	11/00/89		
LH-15	LOWER MACUNGIE TOWNSHIP	HONEYSUCKLE AND E. TEXAS	FEATHERMAN, RICHARD		H	300	11/00/89		
LH-16	LOWER MACUNGIE TOWNSHIP	INDIAN CREEK ROAD	KLASE, RUSSELL		H	275	05/09/91		
LH-17	LOWER MACUNGIE TOWNSHIP	RIVERDEND ROAD	HACE, ROBERT		H	240	06/00/91		
LH-18	LOWER MACUNGIE TOWNSHIP	HIDDEN VALLEY ROAD	GETL, JOHN		H	320	12/00/91		
LH-19	LOWER MACUNGIE TOWNSHIP	6101 ORCHID LANE	WILDLAND CONSERVANCY	SAMPLED 11/15/92 BY VESTON	H				
LH-20	LOWER MACUNGIE TOWNSHIP	3612 ORCHID LANE	BADOR, C	SAMPLED 11/15/92 BY VESTON	H				
LH-21	LOWER MACUNGIE TOWNSHIP	3465 ORCHID LANE	STYRONS, WILLIAM	SAMPLED 11/15/92 BY VESTON	H				
LH-22	LOWER MACUNGIE TOWNSHIP	3403 ORCHID LANE	FRETZ, DAVID	SAMPLED 11/15/92 BY VESTON	H				
LH-23	LOWER MACUNGIE TOWNSHIP	3430 ORCHID LANE	LEE, ROBERT E.	SAMPLED 11/15/92 BY VESTON	H				
LH-24	LOWER MACUNGIE TOWNSHIP	EAGLE STREET	LEHIGH COUNTY AUTHORITY	WELL #2	H	334	04/09/64		
LH-25	LOWER MACUNGIE TOWNSHIP	SHEPARDS HILL AVE AND KROCKS RD	LEHIGH COUNTY AUTHORITY	WELL #1	H	305	05/00/63		
0354	LOWER MACUNGIE TOWNSHIP	*3861 LILAC RD (ALLENTOWN)	LOVIS JOHN	SAME WELL AS 252, 253, 255	H	172	00/00/69	371CCCB	
0355	LOWER MACUNGIE TOWNSHIP	HEATHER ROAD	IACONIANNI,J	SAME WELL AS 252, 253, 254	H	202	00/00/69	371CCCB	
LE-734	LOWER MILFORD TOWNSHIP	LIMEPORT PIKE	FEGELYS DAIRY		H	86	08/00/27	371ALWN	520
LE-735	LOWER MILFORD TOWNSHIP	LIMEPORT PIKE	FEGELYS DAIRY		H	175	08/00/27		520

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
LE-783	LOWER MILFORD TOWNSHIP	RD 1 EMMAUS - VERA CRUZ ROAD	HILLEBAS,_ROBERT		H	70	09/00/63	400FRCL	740
LE-846	LOWER MILFORD TOWNSHIP	LIMEPORT PIKE	BRUNNER,FRED		H	105	10/23/63		530
0222	SALISBURY TOWNSHIP	*2910 LINDERG AV. , ALLENTOWN	BROOKHAVEN SALES		H	200	00/00/69	371CCCB	
0223	SALISBURY TOWNSHIP	*2910 LINDERG AV. , ALLENTOWN	BROOKHAVEN SALES		H	126	00/00/74	371CCCB	
0224	SALISBURY TOWNSHIP	*2910 LINDERG AV. , ALLENTOWN	BROOKHAVEN SALES		H	152	00/00/74	371CCCB	
0344	SALISBURY TOWNSHIP	DEVONSHIRE ROAD NEAR CEDAR CREST	AIR ENGINEERS INC		H	272	00/00/69	371CCCB	
0761	SALISBURY TOWNSHIP	WEST ROCK ROAD	NEIL,C		H	125	00/00/00	000GRGS	
0762	SALISBURY TOWNSHIP	WEST ROCK ROAD	FAIRFIELD HOMES		H	300	00/00/00	000GRGS	
0763	SALISBURY TOWNSHIP	*2619 WEST ROCK ROAD (ALLENTOWN)	STEIN,PAUL JR		H	100	00/00/00	000GRGS	
0764	SALISBURY TOWNSHIP	WEST ROCK ROAD	SCHNELMAN COWS		H	102	00/00/00	000GRGS	
0766	SALISBURY TOWNSHIP	OAK HILL RD NEAR	TAVANO,RICHARD		H	227	00/00/00	000GRGS	
0772	SALISBURY TOWNSHIP	GOLF CIRCLE ROAD	KULALESKI, TED		H	237	00/00/00	371CCCB	
0773	SALISBURY TOWNSHIP	SALISBURY DRIVE	LEIDERMAN,G		H	350	00/00/00	000GRGS	
0774	SALISBURY TOWNSHIP	*3660 SALISBURY DRIVE (ALLENTOWN)	KHUBCHANDANI,I		H	440	00/00/00	000GRGS	
0775	SALISBURY TOWNSHIP	DEVONSHIRE ROAD EAST OF RT.29	BOGER,GLEN		H	190	00/00/00	000GRGS	
0776	SALISBURY TOWNSHIP	*3645 SALISBURY DRIVE (ALLENTOWN)	DOYLE,JAY		H	200	00/00/00	370CMBR	
0777	SALISBURY TOWNSHIP	SEE 774	KHUBCHANDANI,I		H	499	00/00/00	370CMBR	
0778	SALISBURY TOWNSHIP	SEE 774	KHUBCHANDANI,I		H	477	00/00/00	370CMBR	
0779	SALISBURY TOWNSHIP	BRIARWOOD LANE	BROOKHAVEN SALE		H	77	00/00/00	370CMBR	
0780	SALISBURY TOWNSHIP	WEATHER DRIVE	EXECUTIVE EST		H	152	00/00/00	371CCCB	
0781	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	140	00/00/00	371CCCB	
0783	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	160	00/00/00	371CCCB	
0784	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	150	00/00/00	371CCCB	
0785	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	150	00/00/00	371CCCB	
0786	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV #13		H	150	00/00/00	371CCCB	
0787	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV #12		H	148	00/00/00	371CCCB	
0788	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV #10		H	200	00/00/00	371CCCB	
0789	SALISBURY TOWNSHIP	*3548 FOX RUN DR (ALLENTOWN)	KNOURY,T		H	450	00/00/00	371CCCB	
0790	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	138	00/00/00	371CCCB	
0791	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV #5		H	143	00/00/00	371CCCB	
0792	SALISBURY TOWNSHIP	NEAR INTERSECTION OF RT. 29 AND HATCHERY RD	FOX RUN DEV		H	146	00/00/00	371CCCB	
1407	SALISBURY TOWNSHIP	PLEASANT ROAD	DALMAS BROS		H	150	00/00/00	371CCCB	
1408	SALISBURY TOWNSHIP	PLEASANT ROAD	DALMAS BROS		H	227	00/00/00	371CCCB	
1409	SALISBURY TOWNSHIP	PLEASANT ROAD	DALMAS BROS		H	200	00/00/00	371CCCB	
1410	SALISBURY TOWNSHIP	PLEASANT ROAD	DALMAS BROS		H	150	00/00/00	371CCCB	
1605	SALISBURY TOWNSHIP	KEYSTONE ROAD	DALMAS BROS		H	100	10/80	377NRDS	
1606	SALISBURY TOWNSHIP	KEYSTONE ROAD	DALMAS BROS		H	175	07/80	377NRDS	
LE-242	SALISBURY TOWNSHIP	IN WALDWEIN PARK	WALDWEIN CAMP ASSOCIATION		H	325	00/00/12	377NRDS	570
LE-243	SALISBURY TOWNSHIP	IN WALDWEIN PARK	WALDWEIN CAMP ASSOCIATION		H	200	00/00/12	377NRDS	550
LE-486	SALISBURY TOWNSHIP	WEST ROCK ROAD	CAMP MOUNTAIN HOUSE		H	145		400BYRM	
LE-504	SALISBURY TOWNSHIP	RD 2 ALLENTOWN	COUNTRY HOME		H	300	06/03/61	371ALMN	
LE-512	SALISBURY TOWNSHIP	RD 1 EMMAUS	MILLER,RICHARD		H	181	00/00/58		
LE-516	SALISBURY TOWNSHIP	WEST ROCK RD	THOMAS,RUTH		H	120	00/00/58	400BYRM	
LE-517	SALISBURY TOWNSHIP	WEST ROCK RD	RAYFORD,BODSON		H	65	00/00/63	400BYRM	780
LE-520	SALISBURY TOWNSHIP	101 LINDERY AVE	MEADOWBROOK DEV		P	327	03/10/61	371ALMN	410
LE-550	SALISBURY TOWNSHIP	698 SOUTH PIKE AVENUE	THE CAPTAINS TABLE		H	127	08/03/65	400BYRM	580
LE-611	SALISBURY TOWNSHIP	RD 2 ALLENTOWN - WASHINGTON AVE.	WESTERN SALISBURY FIRE CO.		H	201	03/14/60		375

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Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
LE-636	SALISBURY TOWNSHIP	[redacted] (g)	[redacted] (g)		U	123	11/12/54	371ALIM	385
LE-667	SALISBURY TOWNSHIP				U	250	05/04/57	377TMSN	430
LE-683	SALISBURY TOWNSHIP				N	202	07/19/64	371ALIM	415
LE-797	SALISBURY TOWNSHIP				N	175	06/00/65		420
LE-963	SALISBURY TOWNSHIP			WELL LOCATION VERIFIED, WELL EXISTENCE UNKNOWN; 4/26/95 GEC	N	210	00/00/30	377TMSN	410
LE-964	SALISBURY TOWNSHIP			NO WELL AT THIS LOCATION; 4/26/95 (GEC)	N	180	00/00/31	377TMSN	392
LE-965	SALISBURY TOWNSHIP				N	99	10/05/67		387
SA-01	SALISBURY TOWNSHIP				N	360	04/00/92		
SA-02	SALISBURY TOWNSHIP				N	233	12/00/87		
SA-03	SALISBURY TOWNSHIP				N	595	01/00/88		
SA-04	SALISBURY TOWNSHIP				N	337	02/00/88		
SA-05	SALISBURY TOWNSHIP				N	296	07/00/92		
SA-06	SALISBURY TOWNSHIP				N	500	09/00/88		
LE-531	SOUTH WHITEHALL TOWNSHIP				P	275	00/00/60	371ALIM	370
0259	UPPER MILFORD TOWNSHIP			RESIDENCE NO LONGER EXISTS - 4/26/95 (GEC)	N	208	00/00/66	370CMBR	
0260	UPPER MILFORD TOWNSHIP				N	175	00/00/72	370CMBR	
0261	UPPER MILFORD TOWNSHIP				N	160	00/00/74	370CMBR	
0262	UPPER MILFORD TOWNSHIP				N	80	00/00/73	377NRDS	
0263	UPPER MILFORD TOWNSHIP				N	80	00/00/74	000GRGS	
0272	UPPER MILFORD TOWNSHIP				N	76	00/00/68	370CMBR	
0273	UPPER MILFORD TOWNSHIP				N	150	00/00/73	370CMBR	
0274	UPPER MILFORD TOWNSHIP				N	200	00/00/73	371CCCB	
0275	UPPER MILFORD TOWNSHIP				N	120	00/00/72	000GRGS	
0276	UPPER MILFORD TOWNSHIP				N	100	00/00/72	370CMBR	
0277	UPPER MILFORD TOWNSHIP				N	140	00/00/72	370CMBR	
0279	UPPER MILFORD TOWNSHIP				N	400	00/00/72	370CMBR	
0293	UPPER MILFORD TOWNSHIP				N	140	00/00/73	377NRDS	
0399	UPPER MILFORD TOWNSHIP				N	160	00/00/72	370CMBR	
0402	UPPER MILFORD TOWNSHIP				N	230	00/00/73	377NRDS	
1488	UPPER MILFORD TOWNSHIP				N	172	00/00/00	370CMBR	
1489	UPPER MILFORD TOWNSHIP				N	250	00/00/00	370CMBR	
1490	UPPER MILFORD TOWNSHIP				N	78	00/00/00	370CMBR	
1491	UPPER MILFORD TOWNSHIP				N	140	00/00/00	370CMBR	
1492	UPPER MILFORD TOWNSHIP				N	250	00/00/00	377NRDS	
1495	UPPER MILFORD TOWNSHIP				N	200	00/00/00	000NBLD	
1497	UPPER MILFORD TOWNSHIP				N	200	00/00/00	377NRDS	
1498	UPPER MILFORD TOWNSHIP				N	300	00/00/00	377NRDS	
1499	UPPER MILFORD TOWNSHIP				N	300	00/00/00	000GRGS	
1500	UPPER MILFORD TOWNSHIP				N	340	00/00/00	000GRGS	
1501	UPPER MILFORD TOWNSHIP				N	125	00/00/00	377NRDS	
1502	UPPER MILFORD TOWNSHIP				N	300	00/00/00	370CMBR	
1503	UPPER MILFORD TOWNSHIP				N	260	00/00/00	000NBLD	
1504	UPPER MILFORD TOWNSHIP				N	350	00/00/00	000NBLD	
1506	UPPER MILFORD TOWNSHIP				N	100	00/00/00	000NBLD	
1539	UPPER MILFORD TOWNSHIP				N	220	00/00/00		
1540	UPPER MILFORD TOWNSHIP				N	130	00/00/00	371CCCB	
1541	UPPER MILFORD TOWNSHIP				N	68	00/00/00	371CCCB	

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
1542	UPPER MILFORD TOWNSHIP	[redacted]			N	300	00/00/00	371CCCB	
1543	UPPER MILFORD TOWNSHIP				N	360	00/00/00	000WBLD	
1544	UPPER MILFORD TOWNSHIP				N	140	00/00/00	000WBLD	
1545	UPPER MILFORD TOWNSHIP				N	100	00/00/00	000WBLD	
1547	UPPER MILFORD TOWNSHIP				N	750	00/00/00	000GRGB	
1620	UPPER MILFORD TOWNSHIP				N	175	05/00/83	371ALWN	
1800	UPPER MILFORD TOWNSHIP				N	123	10/00/81	374LSVL	
1802	UPPER MILFORD TOWNSHIP				N	155	11/00/80	000GRGB	
1810	UPPER MILFORD TOWNSHIP				N	150	09/00/85	374LSVL	
1816	UPPER MILFORD TOWNSHIP				N	197	02/00/84	374LSVL	
1821	UPPER MILFORD TOWNSHIP				N	160	11/00/81	377WRDS	
1822	UPPER MILFORD TOWNSHIP				N	200	10/00/83	000GRGB	
1824	UPPER MILFORD TOWNSHIP				N	300	11/00/83	000WBLD	
1825	UPPER MILFORD TOWNSHIP				N	125	12/00/83	377WRDS	
1827	UPPER MILFORD TOWNSHIP				N	200	01/00/82	000GRGB	
1829	UPPER MILFORD TOWNSHIP				N	200	04/09/81	000GRGB	
1844	UPPER MILFORD TOWNSHIP				N	300	09/00/81	377WRDS	
1848	UPPER MILFORD TOWNSHIP				N	200	01/00/84	377WRDS	
1855	UPPER MILFORD TOWNSHIP				N	200	00/00/83	371ALWN	
1858	UPPER MILFORD TOWNSHIP				N	180	08/00/83	374LSVL	
1859	UPPER MILFORD TOWNSHIP				N	75	12/00/83	000WBLD	
1860	UPPER MILFORD TOWNSHIP				N	500	07/00/81	000WBLD	
LE-1081	UPPER MILFORD TOWNSHIP				N	63	00/00/58	400PCCK	820
LE-1301	UPPER MILFORD TOWNSHIP			c/o Phillip Duss Construction Co.	P	200	08/00/72	377WRDS	740
LE-204	UPPER MILFORD TOWNSHIP				N				800
LE-304	UPPER MILFORD TOWNSHIP				N	75	00/00/45		460
LE-309	UPPER MILFORD TOWNSHIP				N	21		371ALWN	555
LE-310	UPPER MILFORD TOWNSHIP					183	11/00/53	371ALWN	585
LE-312	UPPER MILFORD TOWNSHIP					127	00/00/49		555
LE-534	UPPER MILFORD TOWNSHIP				N	62	08/07/57	371ALW	140
LE-558	UPPER MILFORD TOWNSHIP				N	127	12/27/63	377WRDS	560
LE-570	UPPER MILFORD TOWNSHIP				N	162	04/04/64	377WRDS	485
LE-694	UPPER MILFORD TOWNSHIP				N	270	09/20/57	400BYDM	850
LE-757	UPPER MILFORD TOWNSHIP				N	395	02/21/57	377WRDS	490
LE-761	UPPER MILFORD TOWNSHIP				N	96	00/00/61	371ALWN	650
LE-782	UPPER MILFORD TOWNSHIP				N	150	04/05/58	347WCKB	410
LE-785	UPPER MILFORD TOWNSHIP				N	152	12/31/63	347WCKB	695
LE-791	UPPER MILFORD TOWNSHIP				N	105	00/00/60	377TMSN	475
LE-841	UPPER MILFORD TOWNSHIP				N	385	06/27/67	374LSVL	610
LE-855	UPPER MILFORD TOWNSHIP				N	171	00/00/59	377TMSN	520
LE-890	UPPER MILFORD TOWNSHIP				N	132	00/00/48	377TMSN	05
LE-906	UPPER MILFORD TOWNSHIP				N	192	00/00/67		3
LE-907	UPPER MILFORD TOWNSHIP				N	270	08/11/67	377WRDS	490
LE-911	UPPER MILFORD TOWNSHIP				N	250	00/00/66	377TMSN	480
LE-949	UPPER MILFORD TOWNSHIP				N	130	00/00/55	377TMSN	475
LE-968	UPPER MILFORD TOWNSHIP				N	90	05/00/61	377WRDS	620
LE-969	UPPER MILFORD TOWNSHIP								35

(b) (6)

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
LE-973	UPPER MILFORD TOWNSHIP	[redacted]			N	220	11/30/67	377KRDS	600
LE-978	UPPER MILFORD TOWNSHIP				N	160	12/00/65	377TMSR	433
LE-979	UPPER MILFORD TOWNSHIP				N	131	04/30/61	377KRDS	570
UM-01	UPPER MILFORD TOWNSHIP					300	10/00/87		
UM-02	UPPER MILFORD TOWNSHIP					150	03/00/88		
UM-03	UPPER MILFORD TOWNSHIP					225	03/00/88		
UM-04	UPPER MILFORD TOWNSHIP					400	07/00/88		
UM-05	UPPER MILFORD TOWNSHIP					200	05/00/88		
UM-06	UPPER MILFORD TOWNSHIP				N	450	09/21/88		
UM-07	UPPER MILFORD TOWNSHIP				N	275	09/20/88		
UM-08	UPPER MILFORD TOWNSHIP				N	500	10/00/88		
UM-09	UPPER MILFORD TOWNSHIP				N	500	09/23/88		
UM-10	UPPER MILFORD TOWNSHIP				N	240	09/00/88		
UM-11	UPPER MILFORD TOWNSHIP					240	10/00/88		
UM-12	UPPER MILFORD TOWNSHIP				N	260			
UM-13	UPPER MILFORD TOWNSHIP				N	280	10/00/88		
UM-14	UPPER MILFORD TOWNSHIP				N	180	01/00/89		
UM-15	UPPER MILFORD TOWNSHIP				N	400	08/00/89		
UM-16	UPPER MILFORD TOWNSHIP				N	340	11/00/88		
UM-17	UPPER MILFORD TOWNSHIP				N	500	11/00/88		
UM-18	UPPER MILFORD TOWNSHIP				N	800	02/00/89		
UM-19	UPPER MILFORD TOWNSHIP				N	240	04/00/89		
UM-20	UPPER MILFORD TOWNSHIP				N	300	06/00/89		
UM-21	UPPER MILFORD TOWNSHIP				N	320	06/00/89		
UM-22	UPPER MILFORD TOWNSHIP				N	175	06/00/89		
UM-23	UPPER MILFORD TOWNSHIP				N	260	07/00/89		
UM-24	UPPER MILFORD TOWNSHIP				N	280	03/00/90		
UM-25	UPPER MILFORD TOWNSHIP				N	440	10/00/89		
UM-26	UPPER MILFORD TOWNSHIP				N	280	01/00/90		
UM-27	UPPER MILFORD TOWNSHIP				N	200	10/00/90		
UM-28	UPPER MILFORD TOWNSHIP				N	180	08/00/90		
UM-29	UPPER MILFORD TOWNSHIP				N	300	10/00/90		
UM-30	UPPER MILFORD TOWNSHIP				N	675	03/00/91		
UM-31	UPPER MILFORD TOWNSHIP				N	150	06/11/91		
UM-32	UPPER MILFORD TOWNSHIP				N	175	09/23/91		
UM-33	UPPER MILFORD TOWNSHIP				N	140	04/00/91		
UM-34	UPPER MILFORD TOWNSHIP				N	210	10/00/91		
UM-35	UPPER MILFORD TOWNSHIP				N	175	08/23/91		
UM-36	UPPER MILFORD TOWNSHIP				N	100	11/00/91		
UM-37	UPPER MILFORD TOWNSHIP				N	200	11/18/91		
UM-38	UPPER MILFORD TOWNSHIP				N	120	12/00/91		
UM-39	UPPER MILFORD TOWNSHIP				N	150	11/22/91		
UM-40	UPPER MILFORD TOWNSHIP				N	240	7/27/92		
UM-41	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	N				
UM-42	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	N				
UM-43	UPPER MILFORD TOWNSHIP			LOCATED BY GEC, INC - 12/2/92	N				
UM-44	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	N				

(9) (9)

AR100254

Well #	Municipality	Street	Owner	Comment	Well Use	Depth (ft)	Date Installed	Aquifer	TOC Elevation
UM-45	UPPER MILFORD TOWNSHIP	[redacted] (9) (9)		PROBABLE WELL LOCATION	U				
UM-46	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-47	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-48	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-49	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-50	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-51	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-52	UPPER MILFORD TOWNSHIP			PROBABLE WELL LOCATION	U				
UM-53	UPPER MILFORD TOWNSHIP			LOCATED BY GEC, INC. - 12/2/92	U				
UM-54	UPPER MILFORD TOWNSHIP			LOCATED BY GEC, INC. - 12/2/92	U				
UM-55	UPPER MILFORD TOWNSHIP			LOCATED BY GEC, INC. - 12/2/92	U				
UM-56	UPPER MILFORD TOWNSHIP			NEXT TO OLD BARN - ARTESIAN WELL	U				
UM-57	UPPER MILFORD TOWNSHIP				U				
0454	UPPER SAUCON TOWNSHIP				U	180	00/00/00	000NBLD	
0455	UPPER SAUCON TOWNSHIP				U	120	00/00/00	377NWTN	
1862	UPPER SAUCON TOWNSHIP				U	512	07/00/83	367MCKB	
1890	UPPER SAUCON TOWNSHIP				U	250	10/81	367EPLR	
LE-134	UPPER SAUCON TOWNSHIP				U	117	05/11/53	367MCKB	440
LE-135	UPPER SAUCON TOWNSHIP				U	32	05/11/53	367MCKB	440
LE-153	UPPER SAUCON TOWNSHIP				U	105	04/03/53	367EPLR	430
LE-200	UPPER SAUCON TOWNSHIP				U	126	00/00/28	367EPLR	420
LE-501	UPPER SAUCON TOWNSHIP				U	101	09/00/57		
LE-672	UPPER SAUCON TOWNSHIP				U	162	12/04/56	400BYRN	400
LE-784	UPPER SAUCON TOWNSHIP				U	350	00/00/61	367MCKB	400
LE-786	UPPER SAUCON TOWNSHIP				U	215	00/00/56	367EPLR	420
LE-787	UPPER SAUCON TOWNSHIP				U	300	00/00/65	367MCKB	450
LE-788	UPPER SAUCON TOWNSHIP				U	140	07/25/67	367MCKB	275
LE-792	UPPER SAUCON TOWNSHIP				U	376	00/00/59	367MCKB	
LE-793	UPPER SAUCON TOWNSHIP				U	290	00/00/59	400PCCK	510
US-01	UPPER SAUCON TOWNSHIP				U	225	01/28/91		
US-02	UPPER SAUCON TOWNSHIP				U	200	00/00/90		
US-03	UPPER SAUCON TOWNSHIP				U	250	09/19/88		
US-04	UPPER SAUCON TOWNSHIP				U	620	07/00/88		
US-05	UPPER SAUCON TOWNSHIP				U	200	01/00/88		
US-06	UPPER SAUCON TOWNSHIP				U	216	11/00/87		
US-07	UPPER SAUCON TOWNSHIP				U	250	11/00/87		
US-08	UPPER SAUCON TOWNSHIP				U	300	03/08/89		
US-09	UPPER SAUCON TOWNSHIP				U	140	11/00/89		
US-10	UPPER SAUCON TOWNSHIP				U	700	08/00/91		

SPRING NUMBER: LE-SP-73
MUNICIPALITY: LOWER MACUNGIE TOWNSHIP
LOCATION: CAMP OLYMPIC, INC.
OWNER: (b) (6) [redacted]
AQUIFER: 371ALNN
DISCHARGE (GPM): 400
USE: R
COMMENTS: SPRINGHOUSE
SOURCE: 9

SPRING NUMBER: LE-SP-78
MUNICIPALITY: ALLENTOWN CITY
LOCATION: FISH HATCHERY
OWNER: ALLENTOWN CITY
AQUIFER: 371ALNN
DISCHARGE (GPM): 1200
USE: R
COMMENTS: SPRINGHOUSE
SOURCE: 9

SPRING NUMBER: LE-SP-72
MUNICIPALITY: LOWER MACUNGIE TOWNSHIP
LOCATION: CAMP OLYMPIC, INC.
OWNER: JOHNSON, JOHN
AQUIFER: 371ALNN
DISCHARGE (GPM):
USE:
COMMENTS:
SOURCE: 9

SPRING NUMBER: SP-01
MUNICIPALITY: LOWER MACUNGIE TOWNSHIP
LOCATION: MILLRACE ROAD - EAST SIDE
OWNER:
AQUIFER:
DISCHARGE (GPM): 10-15
USE:
COMMENTS:
SOURCE: 7

SPRING NUMBER: SP-02
MUNICIPALITY: LOWER MACUNGIE TOWNSHIP
LOCATION: CAMP OLYMPIC - EAST SIDE OF LL CREEK
OWNER: (b) (6) [redacted]
AQUIFER:
DISCHARGE (GPM): 1.0
USE:
COMMENTS: 310 FT NORTH OF BRIDGE
SOURCE: 7

SPRING NUMBER: SP-03
MUNICIPALITY: ALLENTOWN CITY
LOCATION: KEYSTONE ROAD AT KECKS BRIDGE
OWNER: ALLENTOWN CITY
AQUIFER:
DISCHARGE (GPM): 5-10
USE:
COMMENTS: SPRINGHOUSE, IN LITTLE LEHIGH PARK
SOURCE: 7

SPRING NUMBER: SP-04
MUNICIPALITY: ALLENTOWN CITY
LOCATION: KEYSTONE ROAD - OPPOSITE #1676
OWNER: ALLENTOWN CITY
AQUIFER:
DISCHARGE (GPM): NONE
USE:
COMMENTS: SPRINGHOUSE, IN LITTLE LEHIGH PARK
SOURCE: 7

SPRING NUMBER: SP-05
MUNICIPALITY: LOWER MACUNGIE TOWSHIP
LOCATION: FARR ROAD - WEST SIDE
OWNER:
AQUIFER:
DISCHARGE (GPM): NONE
USE:
COMMENTS: SUSPECTED SPRING - ROCK LINED, DRY
SOURCE: 7

SPRING NUMBER: SE-01
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: UNKNOWN TRIB, 755' WEST OF VERA CRUZ RD
OWNER:
AQUIFER:
DISCHARGE (GPM): <1
USE:
COMMENTS:
SOURCE: 7

SPRING NUMBER: SE-02
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: UNKNOWN TRIB, 1/4 MILE NE OF VERA CRUZ
OWNER:
AQUIFER:
DISCHARGE (GPM): NONE
USE:
COMMENTS: SEEP IS WET, BUT NO FREE STANDING WATER
SOURCE: 7

SPRING NUMBER: LCTR-01
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: PARALELL TO MAIN STREET IN VERA CRUZ
OWNER:
AQUIFER:
DISCHARGE (GPM):
USE:
COMMENTS: UNAMED TRIB TO LIEBERT CRREK
SOURCE: 7

SPRING NUMBER: LCTR-02
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: EAST SIDE LCTR-01, 215' SOUTH OF VERA CRUZ RD
OWNER:
AQUIFER:
DISCHARGE (GPM): 2
USE:
COMMENTS: TRIBUTARY TO LCTR-01
SOURCE: 7

SPRING NUMBER: LCTR-03
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: WEST SIDE LCTR-01, 415' SOUTH OF VERA CRUZ RD
OWNER:
AQUIFER:
DISCHARGE (GPM): 5
USE:
COMMENTS: TRIBUTARY TO LCTR-01
SOURCE: 7

SPRING NUMBER: LCTR-04
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: WEST SIDE LCTR-01, 465' SOUTH OF VERA CRUZ RD
OWNER:
AQUIFER:
DISCHARGE (GPM): 8-10
USE:
COMMENTS: TRIBUTARY TO LCTR-01
SOURCE: 7

SPRING NUMBER: LCTR-05
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: WEST SIDE LCTR-01, NORTH OF VERA CRUZ RD.
OWNER:
AQUIFER:
DISCHARGE (GPM):
USE:
COMMENTS: CONTAINS SINKHOLE - TRIB TO LCTR-01
SOURCE: 7

SPRING NUMBER: LCTR-06
MUNICIPALITY: UPPER MILFORD TOWNSHIP
LOCATION: WEST OF QUARRY ROAD ALONG VERA CRUZ RD.
OWNER:
AQUIFER:
DISCHARGE (GPM):
USE:
COMMENTS:
SOURCE: 7

SPRING NUMBER: LCTR-07
MUNICIPALITY: EMMAUS BOROUGH
LOCATION: SOUTH SIDE LC, 250' EAST OF SHIMMERSVILLE RD
OWNER:
AQUIFER:
DISCHARGE (GPM):
USE:
COMMENTS:
SOURCE:

SPRING NUMBER: LCTR-08
MUNICIPALITY: EMMAUS BOROUGH
LOCATION: INDIAN CREEK GOLF COURSE
OWNER:
AQUIFER:
DISCHARGE (GPM): DRY
USE:
COMMENTS: FLOWS THROUGH EMMAUS BOROUGH
SOURCE: 7

SPRING NUMBER: LCTR-09
MUNICIPALITY: EMMAUS BOROUGH
LOCATION: INDIAN CREEK GOLF COURSE
OWNER:
AQUIFER:
DISCHARGE (GPM): <1
USE:
COMMENTS: DRAINAGE DITCH FROM CONSTRUCTION SITE
SOURCE: 7

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APPENDIX 2

GENERAL SAMPLING PROCEDURES

A2.0 Task 7 - Sampling Activity General Procedures

This appendix describes the general procedures from the sampling activities that pertain to: 1) health and safety; 2) environmental monitoring; 3) field instrument calibration; 4) field equipment decontamination; 5) field filtration; 6) QA/QC sampling, and 7) field documentation procedures. These procedures were followed in accordance with the Well Survey Work Plan, HASP, and QAPP. Any deviations from these procedures were noted in the field log book and are discussed herein and/or in sections describing the individual sampling activities (Section 2.9).

A2.1 Health and Safety Procedures

This portion presents general safety procedures followed during the performance of well survey activities. These measures were supplemented with appropriate standard safe work practices.

On-site Control

On-site control was provided by a six-foot chain-link security fence with locking gate. A number of safety signs (displaying "WARNING" or "CAUTION - DO NOT ENTER") were posted around the perimeter of the facility at intervals of approximately 50 feet.

Work Zones

Control boundaries were established during performance of onsite sampling activity (Activity C) only. The control boundaries consisted of the Exclusion Zone, Contamination Reduction Zone and Support Zone. Due to the continually changing nature of the work performed, these zones were transient. The Exclusion Zone was designated as the area immediately surrounding the onsite well being sampled. All personnel within the Exclusion Zone wore the highest level of PPE prescribed for this activity.

The Contamination Reduction Zone (CRZ) provided the interface between the Exclusion Zone and the Support Zone. This zone limited the physical transfer of any contaminated substance on people, equipment or in the air through a combination of decontamination, distance, air dilution and work functions. As previously discussed, two decontamination pads were constructed in the CRZ under the direction of the site Health and Safety Officer. Materials were staged within the CRZ for the servicing of equipment and personnel.

The Support Zone, designated as the area surrounding the temporary on-site field trailer, was considered to be "clean" or uncontaminated. This area served as the entry point for site personnel, equipment and materials. A log was maintained to record the presence of all personnel who performed work at the site as well as visitors to the site.

Personal Protective Equipment

Due to the various levels of risk involved in collecting samples from several locations, several levels of health and safety protection were required, as described in Table A2-1.

During sampling activities B and C, monitoring for the presence of VOCs was conducted. An HNu Systems photoionization detector (PID) Model 101 was used to monitor for VOCs at each sampling location. If vapor concentrations in the breathing zone exceeded 5 ppm (instrument gauge units) using the HNu PID, an upgrade from Level D to Level C would be made.

The decision to use optional equipment and to upgrade from Level D was made based on air monitoring and following consultation with the GEC Site Health and Safety Officer. In some cases, a downgrade from Level D was acceptable. For instance, hard hats were not always necessary. The appropriate level of PPE for GEC staff was continuously evaluated through the use of air monitoring and visual inspection. Based on this monitoring, an upgrade to Level C protection was not necessary for any of the sampling activities.

A2.2 Environmental Monitoring

Monitoring Requirements

Air quality monitoring was conducted during Activities B and C. A Neotronics portable multi-gas monitor (Minigas) was used to monitor the level of combustible and toxic gases (hydrogen sulfide) and the oxygen concentration in the exclusion zone and other areas where appropriate. The instrument is equipped with a preset audible and visible alarm. Oxygen is measured as percent volume in air, ranging from zero to 35% with a resolution of 0.1%. The preset audible and visible alarm is activated at an oxygen deficiency level of 19.5% and an oxygen enrichment level of 23%. Hydrogen sulfide (H_2S) is measured as parts per million (ppm) in air, ranging

TABLE A2-1: SUMMARY OF HEALTH AND SAFETY REQUIREMENTS				
Activity	Description of Activity	Level of PPE	Description of PPE	Upgrade Level
A	Sampling of Private Wells	General	None required	Level D
B	Sampling of Borough of Emmaus Wells and Distribution System	Level D	Steel-toed boots, safety glasses, latex gloves and hardhat (optional)	Modified Level D
C	Sampling of On-site Wells	Modified Level D	Polyethylene-coated Tyvek suits, steel-toed boots, safety glasses, inner and outer gloves and hardhat	Level C
D, E	(D) Sampling of Seeps, Springs, Streams and (E) Sediments	Level D	Steel-toed boots, safety glasses, latex gloves and hardhat (optional)	Modified Level D

TABLE NOTES:

- PPE = Personal Protective Equipment
- Level C protection includes Modified Level D PPE plus an approved air-purifying respirator.

from zero to 499 ppm, with a resolution of 1 ppm. The preset alarm is activated at a hydrogen sulfide level of 50 ppm. Explosive environment is measured as a percent of the Lower Explosive Limit (LEL). The range of the instrument is zero to 99% with a resolution of 1% LEL. The preset alarm is activated at an LEL of 20%.

In addition, an HNu PID (with 11.7 eV lamp) was used to monitor the level of VOCs in air during Activities B and C.

Monitoring Schedule and Results

Air monitoring measurements were obtained according to the schedule outlined in Section 4.5.2 of the HASP. Calibration of the instruments was conducted on a daily basis, as described in Section 2.8.1.3. The results of all onsite monitoring readings, calibration checks and resulting changes in protocol were recorded in the field notebook.

Monitoring Action Levels

The monitoring instruments were utilized in part to select the appropriate level of PPE for the various tasks. Action levels were established such that, if vapor concentrations in the breathing zone as measured by the HNu PID consistently exceeded 5 units, then an upgrade to Level C would be required. If the concentration consistently exceeded 11 ppm (units), then Level C activities would be halted and an evaluation made regarding further action. If the preset alarm levels on the multi-gas meter were exceeded for any sensor (oxygen, combustible gases or hydrogen sulfide), then all work would be halted and an evaluation made regarding further action.

A2.3 Field Instrument Calibration

A field calibration program was implemented to ensure that routine calibration was performed on all field instruments. This calibration ensured that the equipment was functioning within the allowable tolerances established by the manufacturer and required by the project. This section reviews the calibration procedures and schedule used during the sampling activities.

The in-field monitoring and analytical instruments used during this project are listed below:

- Hnu Photo-Ionization Detector
- Neotronics Ambient Air Gas Detection Instrument
- Presto-Tek, Porto-Lab Model 500 Multi-meter (measures Ph, specific conductance, temperature, and Eh)
- Solinst Water Level Indicator

These instruments were calibrated before and after each field use or as otherwise described below. Where necessary, instruments were calibrated each day during field use. The general calibration procedures conformed to manufacturer's standard instructions. An Equipment Calibration and Maintenance Log was maintained in the field trailer to document all instrument calibrations. This information was also recorded in field logbooks.

Portable Photoionization Analyzer

The photoionization analyzer used for this project was an Hnu Systems Model PI 101 or DL 101 equipped with an 11.7 Ev lamp. Calibration was performed at the beginning of each day of use with a standard calibration gas of a concentration within the expected range of use. The calibration gas was HNu Span Gas with an approximate concentration of 66 ppm as benzene.

A battery check was conducted at the beginning and end of each working day. If required, the photoionization analyzer was charged overnight and checked in the morning for proper voltage.

Ambient Air Gas Detection Instrument

The ambient air gas detection instrument used was the Neotronics Minigas multi-gas monitor (Minigas). The Minigas simultaneously monitors oxygen, hydrogen sulfide and explosive environment. The Minigas measures concentrations of these gases using built-in sensors, provides real-time digital readout, is equipped with an audible and visual alarm, and operates on a rechargeable or dry cell battery source. The Minigas was used to ensure that onsite workers were not exposed to a potentially hazardous ambient air environment.

The Minigas was factory-calibrated under contract prior to the initiation of field activities. The instrument was prepared for use each day using the autozeroing feature and confirming alarm and battery levels. The Minigas was operated in accordance with the user's manual.

pH Meter

The pH meter used was the Presto-Tek Corporation Porto-Lab Model 500 multimeter (Presto-Tek multimeter). The Presto-Tek multimeter is a combination meter with specific probes for pH, conductivity, temperature, and Eh (oxidation-reduction potential). Calibration of the pH meter was performed at the start of each day of use. The calibration was checked at least once during the workday with calibration standards, and necessary adjustments were made. The pH meter was calibrated to National Bureau of Standards-traceable standard buffer solutions with pH values of 4.0, 7.0 and 10.0 standard units. The pH calibration and slope knobs were used to set the meter to display the value of the standard being checked.

The Hydac™ conductivity, temperature, and pH tester (Hydac meter) was used to measure field parameters for some samples; the Hydac meter was used in accordance with the user's manual.

Specific Conductivity Meter

The specific conductivity meter used was the Presto-Tek multimeter. Calibration checks of the conductivity standards were performed at the start of each day of use. The calibration was checked at least once during the workday with calibration standards, and necessary adjustments were made. Potassium chloride (KCl) solutions that conformed to the reagent requirements of Standard Methods for the Examination of Wastes and Waters (16th Edition) were used to calibrate the meter. The solutions were prepared by Cole Palmer, a laboratory supply company. The calibration solutions had conductivity values of 46.7, 447.1, and 3920 microhmos.

The internal meter calibration was performed at the beginning of the project and at any time in which the meter readings for the verification standards varied by more than 10 percent of their value. The internal calibration was completed by first connecting the conductivity probe to the unit and rinsing with deionized water. The probe was dipped into the appropriate standard

solution for the scale range in question. The appropriate internal pots were adjusted until the corresponding reading was displayed in the meter.

Redox (Eh) Electrode Meter

The redox electrode meter used was the Presto-Tek multimeter (equipped with the ion-specific probe for Eh). Calibration of the electrode and meter was performed at the start of each day using pre-made calibration standards. The calibration process was performed as follows:

1. Two calibration solutions (designated A and B) were prepared by Northeastern Analytical Corporation (NAC, not LLI as specified in the QAPP). NAC prepared the solutions in accordance with procedures outlined in the QAPP. Calibration solution A consisted of 0.1 molar (M) potassium ferrocyanide and 0.05 M potassium ferricyanide, and calibration solution B consisted of 0.01 M potassium ferrocyanide, 0.05 M potassium ferricyanide, and 0.36 M potassium fluoride.

3. GEC field personnel placed the Eh electrode in solution A until the reading stabilized. The potential measurement in milivolts (mV) was recorded in the field log book.

4. GEC field personnel rinsed the electrode and repeated the measurement with solution B. The potential difference was specified to be 66 mV greater in solution B than in solution A for the calibration to be accurate. This potential was maintained throughout the sampling activty, so that no adjustments were necessary to the internal calibration pots.

A2.4 Equipment Decontamination Procedures

Decontamination was minimal for the following sampling events: private wells (Activity A); Borough of Emmaus wells (Activity B); streams and springs (Activity D), and sediments (Activity E). For these activities, the electric water level meter, filtering apparatus, and stainless-steel dipper were decontaminated prior to sampling and following the collection of each sample using a solution of Liquinox in tap water, a tap water rinse, and a final deionized water rinse.

Activity C (On-site Well Sampling) required more extensive decontamination procedures. In accordance with the QAPP, the pump was decontaminated by circulating a solution of Liquinox in tap water for approximately five minutes. Tap water rinse was then circulated through the pump for approximately five minutes. The exterior portion of the pump and cables were cleaned by brushing with a solution of Liquinox in tap water followed by a tap water rinse. The polyethylene tubing used to purge the on-site wells was discarded after each use. The Teflon bailers used to collect samples were decontaminated by scrubbing in a solution of Liquinox in tap water followed by a tap water rinse. A final deionized water rinse was used for the pump and bailers.

The decontamination rinseate was containerized in labelled 55 gallon drums and disposed of with the purge water. All equipment decontamination occurred on the equipment decontamination pad constructed at the site.

A2.5 Field Filtration Procedure

The sample fraction to be analyzed for dissolved metals (TAL) was field filtered using a manual filtering unit according to the following procedure:

1. The sample fraction was collected with a Teflon bailer and transferred into 400 ml disposable polyethylene beakers or collected directly into the beakers, as specified by the particular sampling activity.

2. The manual filtration unit was assembled and operated in GEC's field trailer or near the remote sampling site, as appropriate. The filter unit consisted of a 250-ml glass receiving flask, a glass filter paper holder with a stainless steel filter support screen, and a 1000 ml receiving flask. A metal clamp was used to attach the receiving flask to the filter support and receiving flask.

3. The sample was transferred into the holding flask.

4. A vacuum pressure was applied to the receiving flask using a hand vacuum pump. The sample fraction was pulled through a 0.45-micron acetate membrane filter into the receiving flask. The filter was changed as needed until sufficient volume was obtained.

5. After sufficient volume was collected, the filtering unit was disassembled, and the filtered sample was transferred to the appropriate sample container. The filtered samples were preserved with nitric acid after filtration.

6. The field filtering equipment was decontaminated after each use by the procedures outlined in Section 2.9.1.4.

A2.6 Quality Assurance/Quality Control Program

Blank and Duplicate Samples

As part of the Quality Assurance/Quality Control (QA/QC) program, blank and duplicate samples were prepared or collected and analyzed to:

- evaluate the precision and accuracy of laboratory analytical methods
- insure proper sample bottle preparation both in the laboratory and in the field

As part of the QA program, QA samples were prepared and collected to provide control over the collection, validation and interpretation of the analytical data. Four types of QA samples were prepared or collected: 1) trip (travel) blanks; 2) field (equipment rinseate) blanks; 3) ambient air blanks; 4) field duplicate samples, and; 5) matrix spikes and matrix spike duplicate (MS/MSD) samples. Field blanks and duplicates were prepared by LLI for all sampling parameters; trip blanks were only prepared when sampling for TCL VOCs was conducted.

Trip Blanks

The primary purpose of trip blanks was to detect potential sources of contamination that may quantitatively or qualitatively influence the presence of VOCs in actual samples. Trip blanks

served as a mechanism of control on sample bottle preparation, blank water quality, and sample handling. The trip blanks traveled to the site with the empty sample containers and back from the site with the collected samples in an effort to simulate sample handling conditions.

Each trip blank consisted of a set of sealed 40-milliliter vials filled at the laboratory with analyte-free water. Trip blanks were handled, transported, and analyzed in the same manner as the other analytical samples except that the trip blank containers were not opened in the field. In general, trip blanks were not kept on site for more than 48 hours and were returned with the same container sets they accompanied to the field.

Ambient Air and Equipment Rinseate Blanks

Ambient air blanks were used to test for potential contamination from the air at the site. Equipment rinseate blanks were used to test for potential contamination from sampling instruments used to collect and transfer samples from point of collection into sample containers. Due to the lack of sampling equipment and expected absence of ambient air contamination, air blank and equipment blank samples were not collected during sampling of private wells (Activity A), sampling of Borough of Emmaus wells and distribution system (Activity B), surface water sampling (Activity D), or sediment sampling (Activity E). Air blank and equipment blank samples were collected during on-site well sampling (Activity C) only. Two air blanks and eight equipment blanks (one per day of sampling for the latter) were collected during the course of Activity C.

Air blanks were prepared by filling a sample container with analyte-free water from the laboratory. This container was then opened and exposed to the ambient atmosphere in an area of the site considered to be the most contaminated (near the injection wells). After this exposure, the air blank container was sealed and handled in the same manner as the other analytical samples. Equipment rinseate blanks were prepared by passing laboratory-supplied analyte free water or the distilled/deionized water used for decontamination through decontaminated sampling equipment and collecting it in an empty sample container for analysis.

Duplicate Samples

The analysis of duplicate samples provided a means of evaluating the relative precision of the sample collection procedure. An important factor in evaluating the analytical data from sample pairs is the homogeneity of the analyte within the sample matrix.

Duplicates of liquid samples were obtained by alternately filling the sample and duplicate containers with aliquots of liquid collected with the same sampling device. VOC samples and duplicates were collected first in order to minimize the potential loss of VOCs.

Duplicate samples were collected at a rate of 10 percent per day for each matrix. If less than ten samples were collected for a day of sampling for a given matrix, then one duplicate sample was collected per day. The exception to this practice occurred during Borough well sampling when one duplicate sample was collected over the course of the three-day sampling of the six Borough wells; this procedure was in accordance with EPA approval in a July 20, 1993 telephone conversation.

Matrix Spikes/Matrix Spike Duplicates

The purpose of collecting and analyzing matrix spikes and matrix spike duplicate (MS/MSD) samples was to determine what effect the sample matrix may have upon laboratory analyses, and to provide extra volume for the laboratory to conduct QA/QC testing. MS/MSD pairs are spiked at the laboratory with known amounts of certain analytes and the detected concentration of these spiked analytes is used to assess the potential affect of the matrix upon the analytical parameters of interest. MS/MSD pairs were collected in association with a particular sample and were collected from the same location or interval and in the same manner as the investigative sample. MS/MSD pairs were collected and analyzed at a rate of one MS/MSD pair per twenty (20) samples of a sample matrix.

Quality Assurance Audit Checklist

Two QA/QC field audits were performed during the sampling program. One audit was conducted during the collection of onsite groundwater samples on July 6, 1993, and the other

was performed during the collection of private well samples on August 10, 1993. The audits were conducted by the QA/QC officer and were designed to assess the performance of GEC and subcontractor personnel. The QA/QC audits evaluated the following: accuracy and completeness of documentation, conformance to procedures outlined in the QAPP, adherence to sample custody procedures, and adherence to procedures outlined in the HASP. No significant excursions from these criteria were denoted during the audit. Copies of the QA/QC audits are included in Attachment 1.

A2.7 Field Notebooks

Information pertinent to several of the tasks associated with the Work Plan was recorded in bound, sealed field logbooks. These field logbooks were used to document site operation (Task 2), well record search, confirmation, and selection (Tasks 3, 4, and 6), sampling (Task 7) , and surveying/water level measurement (Task 8) activities.

ATTACHMENT 1

QA/QC AUDIT FORMS

TABLE 4 - QUALITY ASSURANCE AUDIT CHECKLIST
RODALE MANUFACTURING SITE, EMMAUS, PA

PROJECT MANAGER: (b) (6) [redacted]

AUDITOR: same

DATE: 7/7/93

ONSITE WELL SAMPLING

QUESTION	YES	NO	COMMENT/DOCUMENTATION
HEALTH AND SAFETY			
1. Was an on-site safety officer appointed?	✓		KM, JG
2. Is safety equipment being used by field personnel?	✓		per HASP
3. Is emergency safety equipment available as required in the Health & Safety Plan?	✓		" "
4. Was a briefing held off-site, before any site work was begun to acquaint personnel with sampling equipment, assign field responsibilities, and review safety procedures?	✓		6/30/93 @ 0945
SAMPLING			
5. Did site personnel receive a copy of the site-specific sampling and analytical plan (QAPP) in a timely manner to allow for sufficient review?	✓		
6. Are copies of the site-specific sampling and analytical plan (QAPP) available in the field during sampling?	✓		
7. Are the number and location of samples collected following procedures as specified in the site specific sampling and analytical plan?	✓		
8. Are samples labeled as described in the Work Plan?	✓		
9. Are samples being collected following the procedures specified in the Work Plan?	✓		
10. Are samples preserved as specified in the Work Plan?	✓		
12. Are the number, frequency, and type of samples (including blanks and duplicates) collected as described in the Work Plan?	✓		
13. Was a chain of custody form filled out for all samples collected?	✓		
14. Do field personnel have a field notebook?	✓		GEC # 105
15. Are well designations clearly labeled? (i.e., well numbers)	✓		
16. Are caps on wells locked if not being used?	✓		
EQUIPMENT			
17. Are operating procedures for field equipment available?	✓		3-ring binder in trailer
18. Is a record maintained of calibration of field equipment?	✓		Equip cal forms
19. Is field equipment being calibrated as required?	✓		
OFFICE			

July 7, 1993
p. 2 of 2

QUESTION	YES	NO	COMMENT/DOCUMENTATION
20. Are laboratory data verification sheets signed and filed?	✓		
21. Are sampling sheet records completed and filed?	✓		
22. Are laboratory QA data on file?	✓		
23. Is field calibration of instruments documented?	✓		
24. Are Chain-of-Custody forms completed and on file?	✓		
25. Are originals of all procedures which form the Work Plan retained in the Quality Assurance file?	✓		
26. Are any revisions to procedures adequately documented?	✓		field notebook
27. Is a file for Chain-of-Custody records and other sample traffic control forms maintained?	✓		
28. Have any accountable documents been lost?		✓	

TABLE 4 - QUALITY ASSURANCE AUDIT CHECKLIST
RODALE MANUFACTURING SITE, EMMAUS, PA

(b) (6) [redacted]

PROJECT MANAGER: [redacted]

AUDITOR: same

DATE: 8/10/93

Private well sampling

QUESTION	YES	NO	COMMENT/DOCUMENTATION
HEALTH AND SAFETY			
1. Was an on-site safety officer appointed?	✓		JG, KM
2. Is safety equipment being used by field personnel?	✓		
3. Is emergency safety equipment available as required in the Health & Safety Plan?	✓		
4. Was a briefing held off-site, before any site work was begun to acquaint personnel with sampling equipment, assign field responsibilities, and review safety procedures?	✓		6/30/93, 0945
SAMPLING			
5. Did site personnel receive a copy of the site-specific sampling and analytical plan (QAPP) in a timely manner to allow for sufficient review?	✓		
6. Are copies of the site-specific sampling and analytical plan (QAPP) available in the field during sampling?	✓		
7. Are the number and location of samples collected following procedures as specified in the site specific sampling and analytical plan?	✓		some modifications because of access; being discussed w/ EPA, PADEP
8. Are samples labeled as described in the Work Plan?	✓		
9. Are samples being collected following the procedures specified in the Work Plan?	✓		
10. Are samples preserved as specified in the Work Plan?	✓		
12. Are the number, frequency, and type of samples (including blanks and duplicates) collected as described in the Work Plan?	✓		
13. Was a chain of custody form filled out for all samples collected?	✓		
14. Do field personnel have a field notebook?	✓		
15. Are well designations clearly labeled? (i.e., well numbers)		✓	private wells not labeled
16. Are caps on wells locked if not being used?		✓	locks not typical for priv. wells
EQUIPMENT			
17. Are operating procedures for field equipment available?	✓		
18. Is a record maintained of calibration of field equipment?	✓		
19. Is field equipment being calibrated as required?	✓		
OFFICE			

QUESTION	YES	NO	COMMENT/DOCUMENTATION
20. Are laboratory data verification sheets signed and filed?	✓		
21. Are sampling sheet records completed and filed?	✓		
22. Are laboratory QA data on file?	✓		
23. Is field calibration of instruments documented?	✓		
24. Are Chain-of-Custody forms completed and on file?	✓		
25. Are originals of all procedures which form the Work Plan retained in the Quality Assurance file?	✓		
26. Are any revisions to procedures adequately documented?	✓		
27. Is a file for Chain-of-Custody records and other sample traffic control forms maintained?	✓		
28. Have any accountable documents been lost?		✓	

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AR100280

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APPENDIX 3

DOCUMENTATION FOR PURGE WATER TREATMENT AND DISPOSAL

Kevin

GEC
Geo-Environmental Consultants, Inc.

55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355
Telephone: (215) 251-0900
FAX No.: (215) 251-2366

June 24, 1993

Mr. Bob Rost
City of Allentown Water Resources
112 Union Street
Allentown, PA 18102

GEC PN: 1001-02-12

SUBJECT: Temporary Discharge of Treated Groundwater

Dear Mr. Rost:

The purpose of this letter is to request authorization to temporarily discharge treated groundwater to the City of Allentown's sanitary sewer system. The discharge will originate from the former Rodale Manufacturing site located at Sixth and Minor Streets in the Borough of Emmaus, Lehigh County, Pennsylvania. The Rodale site is owned by the Square D Company.

Between about June 30 and July 9, 1993, approximately 5,000 to 10,000 gallons of groundwater will be pumped from eleven on-site wells as part of a groundwater sampling effort. The groundwater will be collected and stored in an above-ground tank (7,100-gallon capacity) prior to treatment.

Attached is a table which summarizes the analytical results from a January 1989 sampling of many of the on-site wells. The table provides the most current data concerning known groundwater contaminants. This information was used to determine the volatile organic compound (VOC) loading on the carbon bed and to size the bed. Geo-Environmental Consultants, Inc. (GEC) anticipates that average influent concentrations for trichloroethene (TCE) will be at or below 100 parts per million (ppm); 1,2 dichloroethene (DCE) concentrations will be at or below 15 ppm.

The treatment system will be comprised of two liquid-phase granular, activated-carbon canisters connected in series. Flow rates through the carbon treatment system will range from one to six gallons per minute. Treated effluent will be periodically discharged to the sanitary sewer during a one to two week period after discharge approval is granted.

GEC plans to implement groundwater treatment in the following manner:

1. Initially, groundwater will be pumped from the storage tank, through the carbon units and discharged to an on-site, 550-gallon storage tank.

2. After 30 to 60 minutes of operation, an influent and an effluent sample will be collected and submitted to a certified laboratory for analysis of VOCs by EPA method 8240, lead and mercury. A one week turnaround time for analytical results will be requested.

3. The laboratory results will then be submitted to the City of Allentown's Water Resources Department with a request to begin treatment and discharge. After approval is granted, GEC will begin discharge to the sanitary sewer system.

4. Effluent from the treatment system will be periodically monitored by GEC for TCE with a portable gas chromatograph (GC) system.

5. GEC will notify the Water Resources Department when discharge is completed.

Based on our conversation of June 10, 1993, GEC understands that you will provide verbal authorization to proceed with the treatment plan summarized above within one to two days of your receipt of this letter (with written authorization to follow). If you have any questions or need additional information, please contact Kevin Murdock or me at (215) 251-0900.

Sincerely,

Geo-Environmental Consultants, Inc.
(b) (4) [redacted]

Project Engineer

MR/mr

enclosures

cc: Jane Anderson - Square D Company
Angie Garcia - US EPA
Ron Schock - PA DER (Bethlehem Office)
(b) (4) [redacted] r - GEC
R(b) (4) [redacted] - GEC

GEC

E 5-1: SUMMARY OF POSITIVE RESULTS FOR GROUNDWATER SAMPLES COLLECTED DURING THE U.S. EPA SITE INSPECTION OF JANUARY 1989

Well No.	Well 1	Well 6	Well 4	MW-1	MW-2	MW-3	MW-4	PSW-1	PSW-3	PSW-7	HW-1	HW-2	HW-3
EPA Sample ID No.	PW-1	PW-6	PW-4	MW-1	MW-2	MW-3	MW-4	PSW-1	PSW-3	PSW-7	HW-1	HW-2	HW-4
Location or Owner/ Description	Onsite INJ.	Onsite INJ.	Onsite INJ.	BGD Monitor	BGD Monitor	Onsite Monitor	Onsite Monitor	Emmaus Public	Emmaus Public	Emmaus Public	Eastwood Potable*	Gollie Potable+	Schaeffer Potable#
CHEMICAL GROUP AND CONSTITUENTS	CONCENTRATIONS IN UG/L (PPB)												
VOLATILE ORGANIC COMPOUNDS:													
EPA Lab ID No.	CAE01	CAE02	CAE04	CAE06	CAE07	CAE08	CAE09	CAE11	CAE12	CAE13	CAE14	CAE15	CAE16
Vinyl Chloride	79	120	390 E	—	—	—	42 J						
Methylene Chloride	7 BJ	7 B	14 B	17 BJ	—	—	16 BJ						
Acetone	56 B	14 B	12 B	41 BJ	9 BJ	5 BJ	110 B						
1,1-dichloroethene	—	4 J	44	—	—	—	15 J						
1,1-dichloroethane	—	—	1 J	—	—	—	—						
1,2-dichloroethene (total)	290	1500 D	5000 D	450	3 J	—	1600						
Chloroform	—	—	3 J	—	—	—	11 J						
1,2-dichloroethane	—	—	7 N	—	—	—	—						
1,1,1-trichloroethane	—	1 J	3 J	—	—	—	—						
Trichloroethene	160	1200 D	20000 D	23000 D	120	53	35000 D						
Benzene	—	1 J	14	—	—	—	—						
4-methyl-2-pentanone	—	—	2 BJ	—	—	—	—						
Tetrachloroethene	—	1 J	52	79	—	3 J	420						
Toluene	—	—	4 J	—	—	—	22 J						
Total Xylenes	12 J	—	36	—	—	—	—						
SEMI-VOLATILE ORGANIC COMPOUNDS:													
Bis (2-ethylhexyl) phthalate	43 R	5 B	4 B	8 B	6 B	6 B	3 B						
Benzoic Acid	—	12 J	5 J	5 J	—	—	10 J						
Naphthalene	—	—	6 J	—	—	—	—						
N-nitrosodiphenylamine	—	—	—	—	—	—	—						

THESE WELLS ARE NOT PART OF THE SAMPLING ACTIVITIES RELATED TO THIS DISCHARGE AUTHORIZATION.

TABLE 5-1: SUMMARY OF POSITIVE RESULTS FOR GROUNDWATER SAMPLES COLLECTED DURING THE U.S. EPA SITE INSPECTION OF JANUARY 1989

Well No.	Well 1	Well 6	Well 4	MW-1	MW-2	MW-3	MW-4	PSW-1	PSW-3	PSW-7	HW-1	HW-2	HW-3
METALS (DISSOLVED):													
EPA Lab ID No.	MCAE77	MCAE79	MCAE83	MCAE87	MACE88	MCAE91	MCAE93	MCAE96	MCAE97	MCAE98	MCAE99	MCP467	MCP468
Aluminum	—	—	—	—	—	—	—						
Antimony	—	—	—	—	—	—	—						
Arsenic	—	—	2.90	—	2.30 J	—	—						
Barium	139	50.30	122	90.10	51.90	39.30	17.90						
Beryllium	—	—	—	—	—	—	—						
Cadmium	—	—	4.80	—	—	—	—						
Calcium	32900	27300	5480	7650	8020	4250	3640						
Chromium	13 B	—	—	—	—	10.10 B	—						
Cobalt	—	—	—	—	—	—	—						
Copper	—	—	47.80 B	—	—	—	—						
Iron	—	—	274 J	—	—	—	—						
Lead (analyzed by GFAA)	—	—	24.80	—	—	5.50	—						
Magnesium	19800	12400	4020 J	7940 J	6870 J	2870 J	1030 J						
Manganese	739	32.20	166	412	222	16.40	80.40						
Mercury	0.66 B	0.20 B	0.47 B	0.24 B	0.35 B	0.31 B	4.10 J						
Nickel	48.30 B	45.90 B	44 B	40.60 B	44.20 B	33.90 B	47.70 B						
Potassium	2890	7320	9920	7320	5940	3190	4120						
Silver	—	—	—	—	—	—	—						
Sodium	5790	15300	164000	13200	18200	5090	7780						
Zinc	67.70 R	26.50 R	91400 D	74.10 R	181 R	75.90 R	56.70 R						
CYANIDE (TOTAL CN):	— @	—	—	—	—	—	—	—					

THESE WELLS ARE NOT PART OF THE SAMPLING ACTIVITIES RELATED TO THIS DISCHARGE AUTHORIZATION.

SOURCE: "Site Inspection of Rodale Manufacturing Company," TDD No. F3-8812-02, NUS Corporation, November 15, 1989

TABLE NOTES: INJ - injection well; BGD - background well; — not detected;
* - 1001 Cedarcrest Blvd (60' deep); + - RD No. 2, Box 228 (80' deep); # - RD No. 2, Box 22 (depth apparently unknown)
Note that dissolved metals results are from filtered samples; unfiltered samples also analyzed for total metals but results not included here (CN detected in unfiltered sample from Well 1 at 610 ug/l (ppb)). Water samples from Borough and home wells were in pretreated form.
For description of data qualifiers, see "Description of Data Qualifiers" page at beginning of appendices section

GEC
Geo-Environmental Consultants, Inc.

55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355
Telephone: (215) 251-0900
FAX No.: (215) 251-2366

June 24, 1993

Angie Garcia
USEPA Region III
Hazardous Waste
Enforcement Branch
841 Chestnut Building
Philadelphia, PA 19107

GEC PN: 1001-02-12

RE: Temporary Discharge of Treated Groundwater
Former Rodale Manufacturing Site (Square D Company)
Emmaus, PA

Enclosed is a copy of a letter sent to the Allentown Water Resources Department requesting permission to discharge treated groundwater at the above referenced site.

If you need any additional information, please contact Kevin Murdock or me at (215) 251-0900.

Sincerely,

Geo-Environmental Consultants

(b) (4)

[redacted]

Project Engineer

MR/sr

enclosures

GEC
Geo-Environmental Consultants, Inc.

55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355
Telephone: (215) 251-0900
FAX No.: (215) 251-2366

June 24, 1993

Ron Schock
PADER
Bureau of Waste Management
4530 Bath Pike
Bethlehem, PA 18017

GEC PN: 1001-02-12

RE: Temporary Discharge of Treated Groundwater
Former Rodale Manufacturing Site (Square D Company)
Emmaus, PA

Enclosed is a copy of a letter sent to the Allentown Water Resources Department requesting permission to discharge treated groundwater at the above referenced site.

If you need any additional information, please contact Kevin Murdock or me at (215) 251-0900.

Sincerely,

Geo-Environmental Consultants
(b) (4) [redacted]
Project Engineer

MR/sr

enclosures

GEC

Geo-Environmental Consultants, Inc.

Mary R
Originator

PHONE CONVERSATION RECORD

Conversation with:

Name: BOB ROST

Company: CITY OF ALLENTOWN

Address:

Phone:

Subject:

Date: 6/22/93

Time: 10 AM/PM

___ Originator Placed Call

✓ Originator Received Call

P.N. 1001-~~09-05~~ 02-12

****

Notes:

BOB ROST -
- did not see effluent concentrations
told him expecting less than 5 ppb
- EVERYTHING looks good WITH LETTER
+ WE CAN CONTINUE.

-TOLD HIM THAT WE WOULD GET IN TOUCH WITH
HIM AFTER WE HAVE COLLECTED SAMPLES
- HE SAID TO MAKE A NOTE FOR THE FUTURE. THEY
WILL NOT ACCEPT TREATED ~~WATES~~ WATER ONCE A
REMEDIATION SYSTEM IS SET UP.

****

___ File

___ Follow-up by:

___ Copy/Route To: KEVIN M.

Follow-up Action

Originator's Initials

AR100288

CITY OF ALLENTOWN

ALLENTOWN

PENNSYLVANIA

18101-1699

DEPARTMENT OF PUBLIC WORKS
WATER RESOURCES/WWT
112 UNION STREET
ALLENTOWN, PA 18102-4910

July 16, 1993

(b) (4) [redacted]
Geo-Environmental Consultants, Inc.
55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355

RE: Rodale Manufacturing Site
Temporary Discharge of Treated Ground Water

Dear (b) (4) [redacted]

As confirmation of our phone conversation, the referenced discharge is approved.

This is approval is granted under the following conditions:

1. The volume of groundwater to be discharged is 5,000 to 10,000 gallons. Upon completion of the project, GEC will provide the Borough of Emmaus with figures for the total volume discharged. The Borough may bill GEC for this volume.

2. The water will be treated and stored in a 550 gallon tank. Analysis of the stored water will be submitted to the City and Borough prior to discharge to the sanitary sewer.

3. Post-treatment concentrations of VOCs are expected to be less than 5 ppb per our phone conversation on June 28, 1993. This level must be achieved prior to discharge.

4. This approval is for the this project only, which has been described as short term groundwater pumping for the purposes of sampling. No long term remediation pumping or discharge will be accepted.

ARI00289

TELEPHONE 215-437-7681 FAX 215-437-8790
—AN EQUAL OPPORTUNITY EMPLOYER M/F/H—

ALLENTOWN ALL-AMERICA CITY 1962-'63 1975-'76

If you have any questions about any of the above points, you can call me at (215) 437-7681.

Sincerely,

Robert A. Rost
Manager Industrial Waste

RAR:par

cc: Daniel E. Koplish, Manager Water Resources
Joseph M. McMahon III, Manager Operations
Bruce E. Fosselman, Manager, Borough of Emmaus
(b) (4) [redacted] Emmaus
[redacted] PSC Environmental Services

KEVIN

GEC
Geo-Environmental Consultants, Inc.

55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355
Telephone: (215) 251-0900
FAX No.: (215) 251-2366

July 26, 1993

Mr. Robert A. Rost
Manager, Industrial Waste
Department of Public Works - Water Resources/WWT
City of Allentown
112 Union Street
Allentown, PA 18102-4910

GEC PN: 1001-02-12

RE: Rodale Manufacturing Site - Emmaus, Pennsylvania
Temporary Discharge of Treated Groundwater -
Report of Influent and Effluent Laboratory Results

Dear Mr. Rost:

This letter is a followup to our letter of June 24, 1993, in which Geo-Environmental Consultants, Inc. (GEC) presented a request for a temporary discharge of treated groundwater to the City of Allentown's (City) sanitary sewer system. That letter provided details of the activated carbon treatment system, and stated that a 30- to 60-minute trial run would be conducted whereby the water would be treated and stored in a 550-gallon tank, and an influent and effluent sample would be collected. The City provided a verbal approval of this approach immediately after receiving the GEC letter, and formalized the approval with conditions in a July 16, 1993 letter to GEC.

GEC conducted a 45-minute trial run of the system on July 20, 1993. An influent (GW-PRE) and effluent (GW-POST) sample were collected and submitted to Lancaster Laboratories, Inc. for analysis of volatile organic compounds (VOCs), lead and mercury, in accordance with GEC's letter of June 24, 1993. The laboratory results are summarized in Table 1. The laboratory report forms are included as an attachment to this letter. The results for the influent sample reveal that the total VOC concentration is less than 15 ppm. The results for the effluent sample reveal that no VOCs were found above the method quantitation limit. Also, lead and mercury were not found above detection limit in either the influent or effluent sample.

These laboratory results indicate that the influent VOC concentrations are lower than expected, and that the carbon treatment system is effectively removing the VOCs. GEC would like to obtain authorization from the City to proceed with treatment and begin discharge to the sanitary sewer system. Please note that, as discussed in the June 24, 1993 letter, GEC will discharge the treated effluent over a one- to two-week period following approval from the City. GEC will employ a gas chromatograph to periodically analyze effluent samples for TCE, so that system adjustments can be made if necessary. We will record discharge quantities and report this amount to the Borough of Emmaus upon completion.

Thank you for your cooperation in this matter. Please contact Kevin Murdock or me at (215) 251-0900 with your response to our inquiry for discharge.

Sincerely,

Geo-Environmental Consultants, Inc.

(b) (4) [redacted]

Project Engineer

KNM

enclosures

cc/enc: Jane Anderson - Square D
Angie Garcia - U.S. EPA
Ron Schock - PADER Bethlehem District Office
Dan DeLong - Borough of Emmaus
(b) (4) [redacted] - GEC
(b) (4) [redacted] - GEC
(b) (4) [redacted] - GEC

TABLE 1: LABORATORY RESULTS FOR INFLUENT AND EFFLUENT SAMPLES FROM CARBON TREATMENT SYSTEM - POSITIVELY IDENTIFIED COMPOUNDS RODALE MANUFACTURING SITE - EMMAUS, PENNSYLVANIA		
Compound	SAMPLE ID: GW-PRE (influent)	SAMPLE ID: GW-POST (effluent)
	Concentration (ppb)	Concentration (ppb)
Methylene Chloride	29	<5
1,2-Dichloroethene (total)	890	<5
1,1,1-Trichloroethane	680	<5
Trichloroethene	11,000	<5
Tetrachloroethene	800	<5
Toluene	540	<5

TABLE NOTES:

- Samples collected on July 20, 1993 by Geo-Environmental Consultants, Inc. after a 45-minute trial run of the carbon treatment system. The discharge was collected in a 550-gallon storage tank.
- Samples submitted for analysis of volatile organic compounds (VOCs) by EPA Method 8240, lead and mercury to Lancaster Laboratories, Inc. of Lancaster, PA.

@

Lancaster Laboratories Inc.

Interim Analytical Reports

For

(b) (4) [redacted]

with

Geo-Environmental Consultants

from

(b) (4) [redacted]

with Lancaster Laboratories, Inc.

If you experience transmission problems please call (b) (4) [redacted] at 717-656-230[redacted]

For any other questions please call Lynn M. Hebner
Your Client Service Representative at 717-656-2301

The number of pages including the cover sheet are 5

LLI FAX NO 717-656-2681

COMMENTS:

All analytical results should be considered preliminary and are subject to further review until the final report is issued.

***** Lancaster Laboratories, Inc. Analytical Report *****
2425 New Holland Pike, Lancaster, PA 17601

Sample Number: WW 1997136 Account: 07440 Geo-Environmental Consultants
Date Submitted: 07/20/93 Date Reported: NOT REP
Date Collected: 07/20/93

GW-PRE Influent Grab Water Sample
Rodale MFG Site

Analysis Name	As Received	Units
1508 Purgeables (SW846/8240)		attached

The quantitation limits for the GC/MS volatile compounds were raised because sample dilution was necessary to bring target compounds into the calibration range of the system.
==========

The GC/MS volatile sample was preserved with 1 + 1 HCl to pH < 2. Low recovery of acid labile compounds, such as 2-chloroethyl vinyl ether, is likely to occur.
==========

1258 Chloromethane	< 50.	ug/l
1257 Bromomethane	< 50.	ug/l
3492 Vinyl Chloride	< 50.	ug/l
3494 Chloroethane	< 50.	ug/l
3495 Acrolein	< 500.	ug/l
3496 Acrylonitrile	< 500.	ug/l
3497 Methylene Chloride	29.	ug/l
1264 Trichlorofluoromethane	< 25.	ug/l
3500 1,1-Dichloroethene	< 25.	ug/l
3501 1,1-Dichloroethane	< 25.	ug/l
3502 1,2-Dichloroethene (total)	890.	ug/l
3503 Chloroform	< 25.	ug/l
3504 1,2-Dichloroethane	< 25.	ug/l
3505 1,1,1-Trichloroethane	680.	ug/l
3506 Carbon Tetrachloride	< 25.	ug/l
3508 Bromodichloromethane	< 25.	ug/l
3523 1,1,2,2-Tetrachloroethane	< 25.	ug/l
3509 1,2-Dichloropropane	< 25.	ug/l

3510	trans-1,3-Dichloropropene	< 25.	ug/l
3511	Trichloroethene	11,000.	ug/l
3512	Dibromochloromethane	< 25.	ug/l
3513	1,1,2-Trichloroethane	< 25.	ug/l
3515	Benzene	< 25.	ug/l
3516	cis-1,3-Dichloropropene	< 25.	ug/l
3645	2-Chloroethyl Vinyl Ether	< 50.	ug/l
3518	Bromoform	< 25.	ug/l
3522	Tetrachloroethene	800.	ug/l
3524	Toluene	540.	ug/l
3525	Chlorobenzene	< 25.	ug/l
3526	Ethylbenzene	< 25.	ug/l
3529	Xylene (total)	< 25.	ug/l
2255	Lead	< 0.10	mg/l
2259	Mercury	< 0.00020	mg/l

***** Lancaster Laboratories, Inc. Analytical Report *****
2425 New Holland Pike, Lancaster, PA 17601

Sample Number: WW 1997137 Account: 07440 Geo-Environmental Consultants
Date Submitted: 07/20/93 Date Reported: NOT REP
Date Collected: 07/20/93

GW-Post Effluent Grab Water Sample
Rodale MFG Site

Analysis Name	As Received	Units
1508 Purgeables (SW846/8240)		attached

The GC/MS volatile sample was preserved with 1 + 1 HCl to pH < 2. Low recovery of acid labile compounds, such as 2-chloroethyl vinyl ether, is likely to occur.

==========

1258 Chloromethane	< 10.	ug/l
1257 Bromomethane	< 10.	ug/l
3492 Vinyl Chloride	< 10.	ug/l
3494 Chloroethane	< 10.	ug/l
3495 Acrolein	< 100.	ug/l
3496 Acrylonitrile	< 100.	ug/l
3497 Methylene Chloride	< 5.	ug/l
1264 Trichlorofluoromethane	< 5.	ug/l
3500 1,1-Dichloroethene	< 5.	ug/l
3501 1,1-Dichloroethane	< 5.	ug/l
3502 1,2-Dichloroethene (total)	< 5.	ug/l
3503 Chloroform	< 5.	ug/l
3504 1,2-Dichloroethane	< 5.	ug/l
3505 1,1,1-Trichloroethane	< 5.	ug/l
3506 Carbon Tetrachloride	< 5.	ug/l
3508 Bromodichloromethane	< 5.	ug/l
3523 1,1,2,2-Tetrachloroethane	< 5.	ug/l
3509 1,2-Dichloropropane	< 5.	ug/l
3510 trans-1,3-Dichloropropene	< 5.	ug/l
3511 Trichloroethene	< 5.	ug/l

3512	Dibromochloromethane	< 5.	ug/l
3513	1,1,2-Trichloroethane	< 5.	ug/l
3515	Benzene	< 5.	ug/l
3516	cis-1,3-Dichloropropene	< 5.	ug/l
3645	2-Chloroethyl Vinyl Ether	< 10.	ug/l
3518	Bromoform	< 5.	ug/l
3522	Tetrachloroethene	< 5.	ug/l
3524	Toluene	< 5.	ug/l
3525	Chlorobenzene	< 5.	ug/l
3526	Ethylbenzene	< 5.	ug/l
3529	Xylene (total)	< 5.	ug/l
2255	Lead	< 0.10	mg/l
2259	Mercury	< 0.00020	mg/l

GEC
Geo-Environmental Consultants, Inc.

55 Valley Stream Parkway, Suite 140
Great Valley Corporate Center
Malvern, PA 19355
Telephone: (215) 251-0900
FAX No.: (215) 251-2366

August 20, 1993

Mr. Dan DeLong
Public Works Superintendent
Borough of Emmaus Municipal Building
28 South Fourth Street
Emmaus, PA 18049

GEC PN: 1001-02-12

RE: Former Rodale Manufacturing Site
Sixth and Minor Streets, Emmaus, PA

Dear Dan:

This letter is a followup to a previous telephone conversation during which we discussed an approved discharge of treated water to the sanitary sewer system from the referenced site. Provided herein is a brief description of the treatment and discharge activity, and a total discharge volume. Since sanitary discharges from the Borough of Emmaus (Borough) are connected to and treated by the City of Allentown (City) wastewater treatment plant, and the Borough is billed accordingly, you suggested that GEC report the final volume to the Borough so that GEC could be invoiced for the discharge.

GEC stored purged groundwater and decontamination water from sampling of wells at the site in two (2) onsite, above-ground storage tanks. In a June 24, 1993 letter to the City, GEC requested authorization for treatment of the water by granular activated carbon followed by discharge to the sanitary sewer for treatment by the City's wastewater treatment plant. The City issued a letter on July 16, 1993 which provided a preliminary, conditional approval for this work. The U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Resources (PADER) were also consulted by GEC and verbally approved of this treatment methodology.

On July 20, 1993 (after completion of onsite sampling), GEC conducted a 45-minute trial run of the system and stored the effluent in a 550-gallon tank. An influent and effluent sample were collected near the end of the trial run period. The samples were submitted to Lancaster Laboratories, Inc. for analysis of volatile organic compounds (VOCs), lead and mercury. The laboratory results indicated that no VOCs or metals were found above detection limit in the effluent sample. The results were presented to the City in a July 26, 1993 letter, and, based on these results, GEC asked for authorization to proceed with treatment and begin discharge to the sanitary sewer system. On July 27, 1993, the City provided verbal authorization for discharge, and followed up with a confirmation letter dated August 2, 1993.

Following this authorization from the City, GEC operated the treatment system and discharged to the sanitary sewer from Tuesday, July 27 through Monday, August 2, 1993. Treated water was discharged at a rate of approximately five gallons per minute; the system was not operated in the evenings or on weekends. On Wednesday, July 28, 1993, an effluent sample was screened by GEC with a gas chromatograph (GC) and no VOCs were detected. The aboveground storage tanks and 550-gallon tank were cleaned and the rinseate was also passed through the treatment system. The final discharge volume was approximately 9,000 gallons. The above ground tanks were returned to the supplier on August 4, 1993.

Please invoice GEC for the stated discharge volume. If you have any questions, please contact me at (215) 251-0900.

Sincerely,

Geo-Environmental Consultants, Inc.

(b) (4) [redacted]

KNM

cc: Robert Rost - City of Allentown
Angie Garcia - EPA
Ron Schock - PADER
(b) (4) [redacted] - GEC
(b) (4) [redacted] - GEC

Phone Inquiries To:
965-9292 ☐
965-9231 ☐
967-1322 ☐

BOROUGH OF EMMAUS

28 South Fourth Street Emmaus, Pa. 18049

№ 26219

To: Geo-Environmental Consultants, Inc.
55 Valley Stream Parkway Suite 140
Malvern, Pa. 19355
Attention: (b) (4) [redacted]

Date: August 28th., 1993

For:

9,000 gallons of water discharged (test water) during July, at the former Rodale Manufacturing site, 6th. & Minor sts. Emmaus, Pa.
GEC PN: 1001-02-12

Sewer only.....$20.00

OK 9/1/93
Square D -
Emmaus
1001-02-12
KMM

Borough Manager

AR100301

4

AR100302

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APPENDIX 4

FIELD SCREENING WITH GAS CHROMATOGRAPH

4-1: STANDARD OPERATING PROCEDURE FOR VOC SCREENING USING GAS CHROMATOGRAPH

4-2: CHROMATOGRAMS FROM FIELD SCREENING ACTIVITY

4-1: STANDARD OPERATING PROCEDURE FOR VOC SCREENING USING GAS CHROMATOGRAPH

GEO-ENVIRONMENTAL CONSULTANTS, INC.
STANDARD OPERATING PROCEDURE

Portable Gas Chromatograph Analytical Procedures - Aqueous Samples

Scope: The following Standard Operating Procedure (SOP) outlines the procedures to accurately analyze volatile organic compounds in aqueous samples using a Sentex Scentograph Portable Gas Chromatograph

Equipment: Sentex® Scentograph® Portable Gas Chromatograph with built-in laptop computer
Argon Ionization Detector (AID)
30 Meter Vocol Capillary Column
Purge and Trap Apparatus

Standard Preparation

Calibration standards are prepared on each day which field sample analyses were performed following the procedure outlined below.

1. A 100 milliliter ("ml"), glass, graduated cylinder is filled with cold, clean water.

2. The appropriate volume of the liquid standard is injected into the water using a 25 μl glass syringe equipped with a teflon®-tipped plunger. The liquid standard used is TCE in methanol at a certified concentration of 0.1 μg/μl.

3. The calibration standard is gently mixed by slowly inverting the graduated cylinder, taking care to minimize agitation, thus minimizing volatilization of the standard.

4. The calibration standard is then transferred into 40 ml, teflon®-lined, septa-cap vials, leaving zero head-space.

5. The full vials are refrigerated until use.

The equation used to calculate the concentration of the calibration standard is as follows:

$$CSC = \frac{sc \times sva}{tv}$$

where:
CSC = calibration standard concentration
sc = standard concentration in methanol
sva = standard volume added to the total volume
tv = total volume of water and standard used to prepare the calibration standard

For most projects, a 15 μg/l TCE standard is prepared by adding 15 μl (av) of 0.1 μg/μl (sc) TCE in methanol to 0.100 l (tv) of water.

$$15\mu g/l = \frac{0.1\mu g/\mu l \times 15\mu l}{0.100l}$$

Since only 15 μl of the standard is added to 0.100 l of water, it is unnecessary to compensate for the volume of standard added to the water. This produces only a 1.5×10^{7} percent error in the final calibration standard concentration, which is well within the precision and accuracy of the volume measurements and analytical method.

Standards in methanol, as opposed to neat (pure) solvent standards, are used to obtain a more accurate and reproducible calibration standard. Using standards in methanol produces a more accurate and reproducible calibration standard for the following reasons:

1. Most solvents are relatively insoluble in water. Using a solvent standard pre-mixed in methanol helps to ensure that solvent standard completely dissolves when added to water. This is due to the fact that the solvent is soluble in methanol and methanol is soluble in water.

2. Since the solvents are dissolved in methanol at a known and certified concentration (0.1 μg/μl for the TCE standard used), variables such as density, molecular weight, purity, and solubility in water are not needed to calculate the concentration of the calibration standard.

3. Using a neat standard would require a serial dilution to obtain the necessary low concentration (15 μg/l) of the calibration standard. Performing serial dilutions may produce a less accurate calibration standard due to precision of volume measurements, more opportunities for measurement and/or calculation errors, and loss of the volatile solvents during addition, mixing, and transfer of media necessitated by serial dilutions.

Gas Chromatograph Setup

A Sentex® Scentograph® portable gas chromatograph ("GC") fitted with an argon ionization detector ("AID"), a 30 meter VOCOL capillary column in an isothermal oven, and a heated-line purge and trap is used to analyze the aqueous samples. The GC is set-up for analyzing aqueous samples according to manufacturer's instructions. The general GC setup procedures are outlined below.

1. Carrier gas (99.9% pure Argon) is started running through the GC; the GC is then turned on.

2. The operating parameters are then entered into the GC.

3. The GC column oven is then allowed to come to operating temperature prior to analyses.

Typical operating parameters pertinent to sample analyses are listed below:

Calibration Standard:	15 μg/l TCE
Column Pressure:	14 psi
Column Temperature:	70°C
Cell Fill Time:	10 sec
Cell Exhaust Time:	10 sec
Sample Time:	20 sec
Inhibit Time:	20 sec
Magnification (Gain):	4.0

Analytical Procedures

The portable GC screening analytical procedures are outlined below. These analytical procedures are designed to ensure that sample analyses are precise, accurate, and reproducible.

1. The calibration standards, blanks, and field samples are removed from their chilled environments.

2. Approximately half of the contents of one of the calibration standard vials is removed and the resulting liquid level is marked.

3. The remaining full vials containing field samples, blanks, and additional calibration standards are then marked at the same level as the initial calibration standard. Their contents are then emptied to the marked level.

4. The calibration standards, blanks, and field samples are allowed to come to ambient temperature. Analyzing the samples at ambient temperature, as opposed to cold or heated samples, helps to ensure that the calibration standards, blanks, and field samples are at approximately the same temperature when analyzed.

Reducing the temperature variability between samples increases the accuracy of the analytical method and the comparability of the results.

5. After coming to ambient temperature, the sample vial is agitated vigorously for approximately 15 seconds.

6. The sample vial is then attached to the heated-line purge and trap sampling apparatus following manufacturer's instructions and the sample is analyzed.

7. All analytical results are saved onto floppy disks. Hard copies of the chromatographs are printed on a bubble jet printer.

Quality Assurance/Quality Control ("QA/QC") Procedures

The QA/QC procedures outlined below are followed on each day which sample analyses are performed.

1. At a minimum, one calibration standard is analyzed to calibrate the GC prior to analyses of field samples. One calibration standard is also analyzed at the completion of field sample analyses to check the GC calibration. Additional calibration standards are analyzed, as needed, to check for, and, if necessary, compensate for, retention time drift.

2. A blank sample (consisting of the same water used to prepare the calibration standard) is analyzed immediately following the initial calibration standard run. Addition blank samples were analyzed, as necessary, following analyses of field samples in which significant VOC concentrations were detected. Blank sample results are used to confirm that the system is clean prior to addition sample analyses and to identify peaks which are potentially a result of water vapor or from carry-over from the previous sample run.

3. Duplicate field samples are analyzed at a minimum frequency of 1 for every 10 samples, or one per sample set if less than 10 samples are analyzed in a given day. The results of the duplicate sample analyses are used to determine the reproducability of the portable GC analytical method.

Only one sample from an individual sample vial is analyzed, thus eliminating the potential reduction in the concentration due to removal of VOCs during initial analyses. Multiple analyses of a sample (i.e., multiple calibration and blank analyses and duplicate field sample analyses) is conducted using a second sample vial or splits of the original sample taken prior to the first analytical run.

4-2: CHROMATOGRAMS FROM FIELD SCREENING ACTIVITY

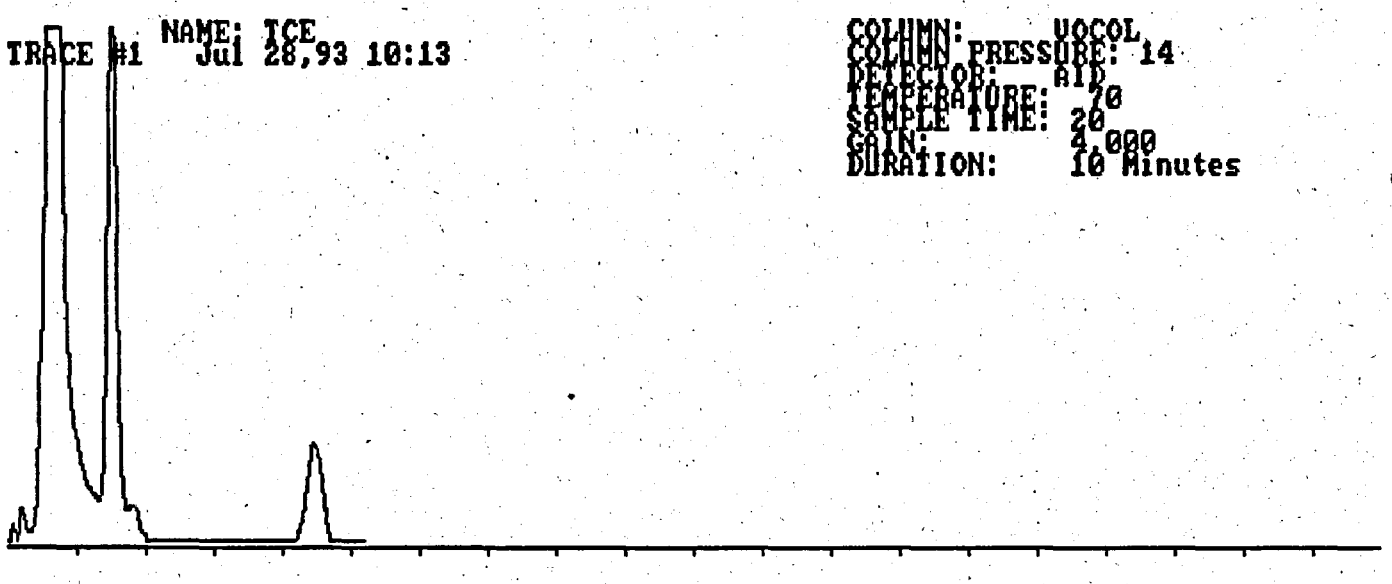
TRACE PRINTOUT

TRACE #1 DATE: Wed Jul 28 10:13:02 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	154	140290	15.000 PPB

TOTAL AREA: 140290



AR100310

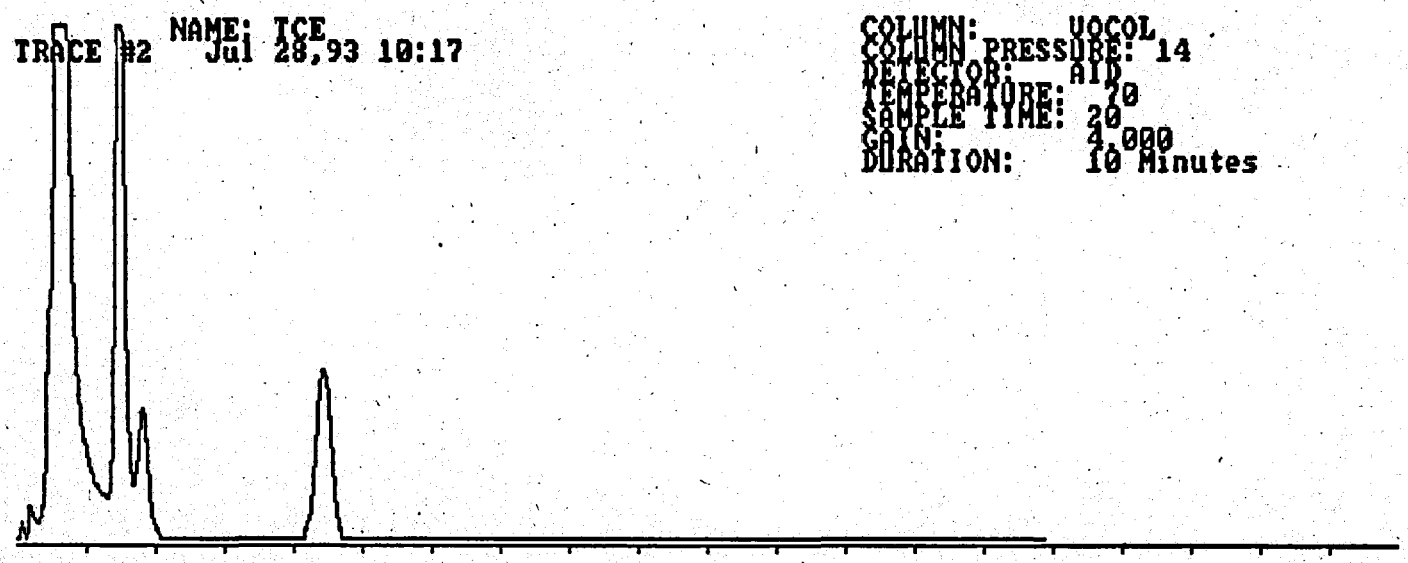
TRACE PRINTOUT

TRACE #2 DATE: Wed Jul 28 10:17:55 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	153	232116	15.000 PPB

TOTAL AREA: 232116



TRACE PRINTOUT

TRACE #3 DATE: Wed Jul 28 10:31:19 1993

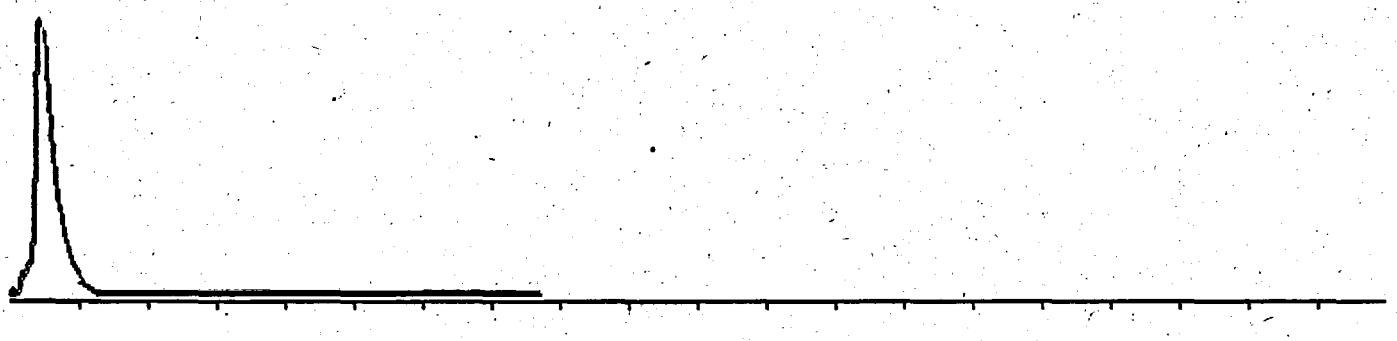
NAME:	BLANK	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME;	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	33	562451	36.347 PPB

TOTAL AREA: 562451

NAME: BLANK
UPPER TRACE #3 19.25% Jul 28,93 10:31
LOWER TRACE #2 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100312

TRACE PRINTOUT

TRACE #4 DATE: Wed Jul 28 10:37:45 1993

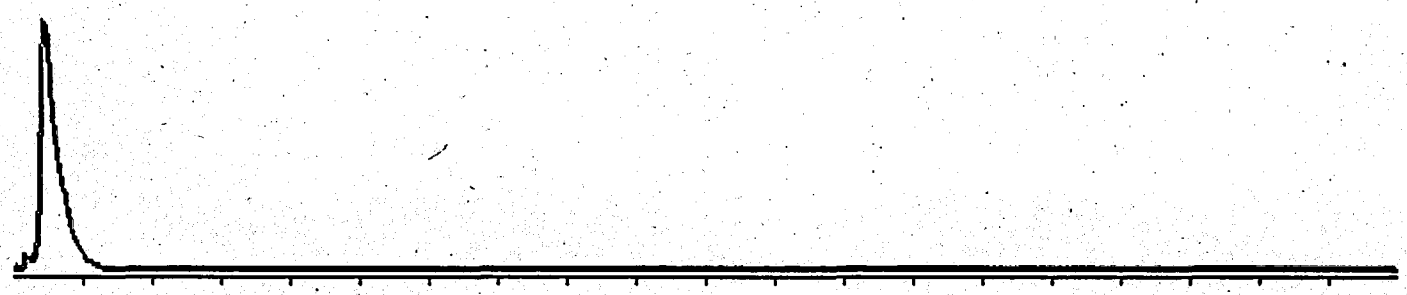
NAME:	SW-1 FS	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	34	453174	29.285 PPB

TOTAL AREA: 453174

NAME: SW-1 FS
UPPER TRACE #4 15.51% Jul 28,93 10:37
LOWER TRACE #2 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100313

TRACE PRINTOUT

TRACE #5 DATE: Wed Jul 28 10:53:35 1993

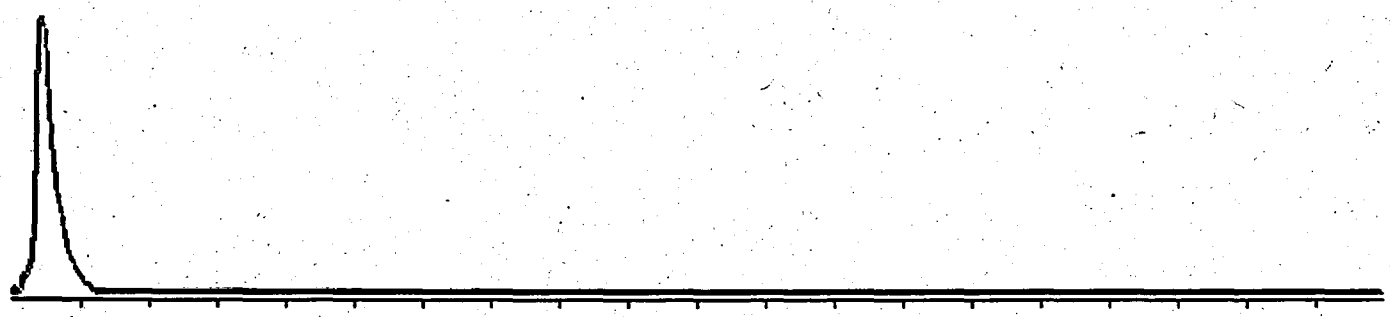
NAME:	SW-2 FS	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	33	545261	35.236 PPB

TOTAL AREA: 545261

NAME: SW-2 FS
UPPER TRACE #5 18.66% Jul 28,93 10:53
LOWER TRACE #2 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100314

TRACE PRINTOUT

TRACE #6 DATE: Wed Jul 28 11:06:27 1993

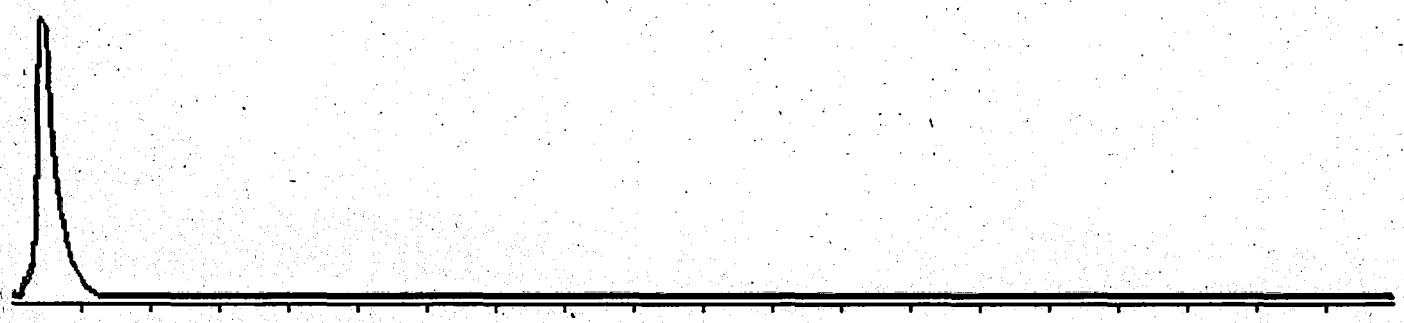
NAME: SW-3 FS
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	33	552184	35.684 PPB

TOTAL AREA: 552184

NAME: SW-3 FS
UPPER TRACE #6 18.90% Jul 28,93 11:06
LOWER TRACE #2 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4,000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #7 DATE: Wed Jul 28 11:26:51 1993

NAME: SW-3 FS (Dup CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

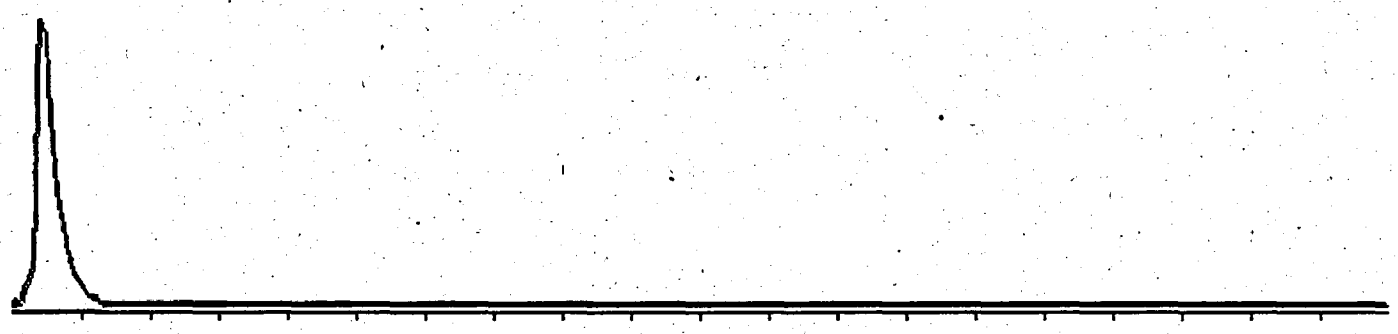
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	33	595941	38.511 PPB

TOTAL AREA: 595941

NAME: SW-3 FS (Dup
UPPER TRACE #2 20.39% Jul 28,93 11:26
LOWER TRACE #2 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 20
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100316

TRACE PRINTOUT

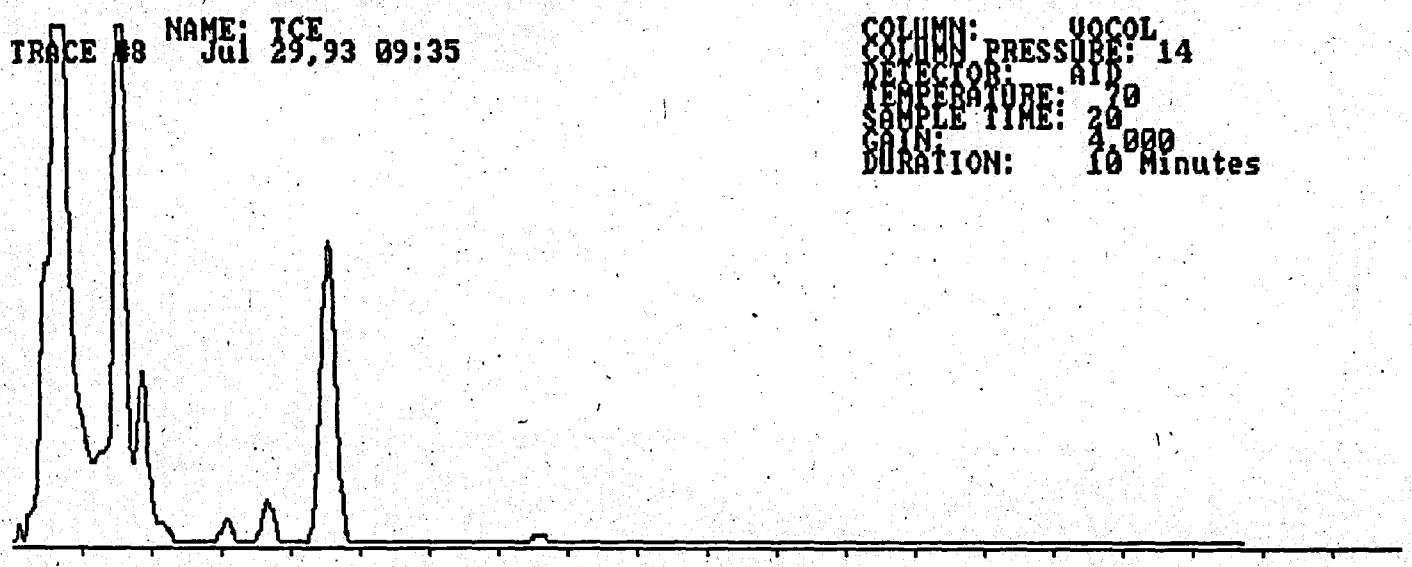
TRACE #8 DATE: Thu Jul 29 09:35:53 1993

NAME: TCE
COLUMN: VOCOL
COLUMN PRESSURE: 14
DELAY TIME: 20.0
CELL FILL TIME: 10
TEMPERATURE: 70

CHART DURATION: 10
DETECTOR: AID
SAMPLE TIME: 20
CELL EXHAUST TIME: 10
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	130	45558	1.400 PPM
2	TCE	156	403409	15.000 PPB
3	TOLUENE	248	39424	1.400 PPM

TOTAL AREA: 488391



TRACE PRINTOUT

TRACE #9 DATE: Thu Jul 29 09:47:44 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	#THF	35	533057	16.381 PPM
2	UNKNOWN	60	22108	0.679 PPM
3	#ACETNITRL	68	15362	0.472 PPM

TOTAL AREA: 570527

NAME: BLANK

UPPER TRACE #9 18.60% Jul 29,93 09:47

LOWER TRACE #8 100.00%

COLUMN: VOCOL

COLUMN PRESSURE: 14

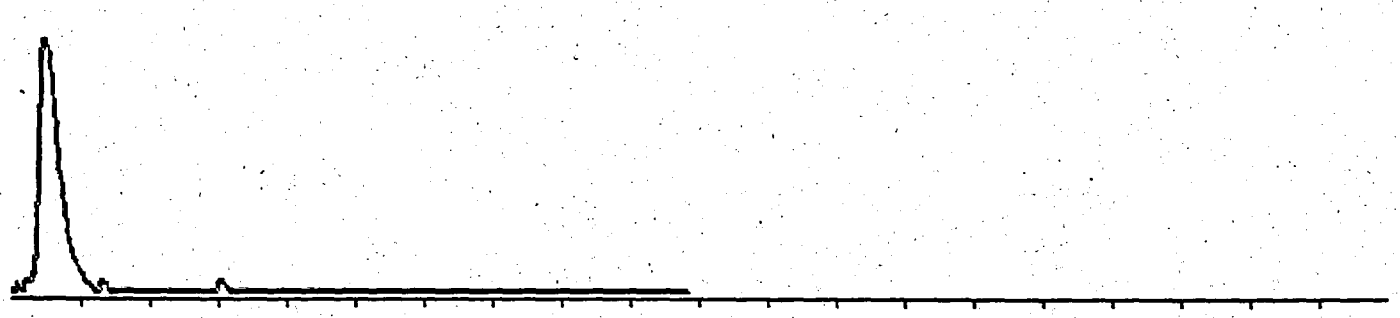
DETECTOR: AID

TEMPERATURE: 70

SAMPLE TIME: 20

GAIN: 4.000

DURATION: 10 Minutes



AR100318

TRACE PRINTOUT

TRACE #10 DATE: Thu Jul 29 10:02:36 1993

NAME: SW-5 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

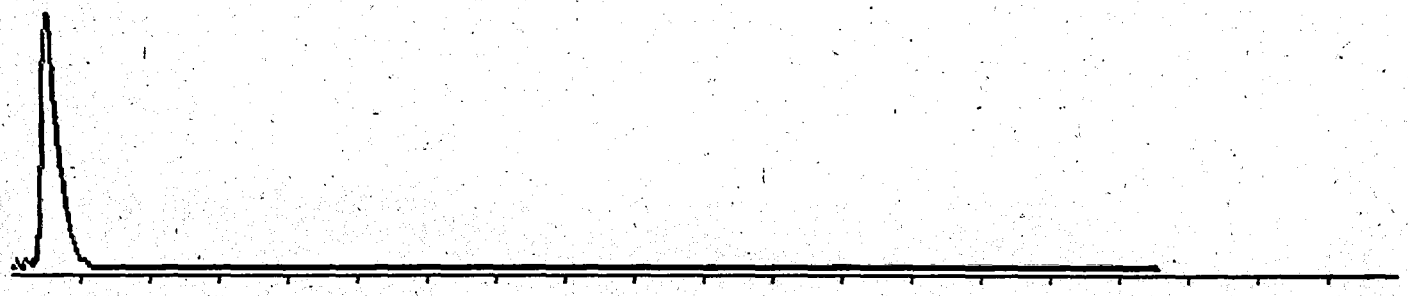
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	35	446000	13.706 PPM

TOTAL AREA: 446000

NAME: SW-5 FS
UPPER TRACE #10 13.80% Jul 29,93 10:02
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 20
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100319

TRACE PRINTOUT

TRACE #11 DATE: Thu Jul 29 10:12:24 1993

NAME: SW-6 FS
COLUMN: VOCOL
COLUMN PRESSURE: 14
DELAY TIME: 20.0
CELL FILL TIME: 10
TEMPERATURE: 70

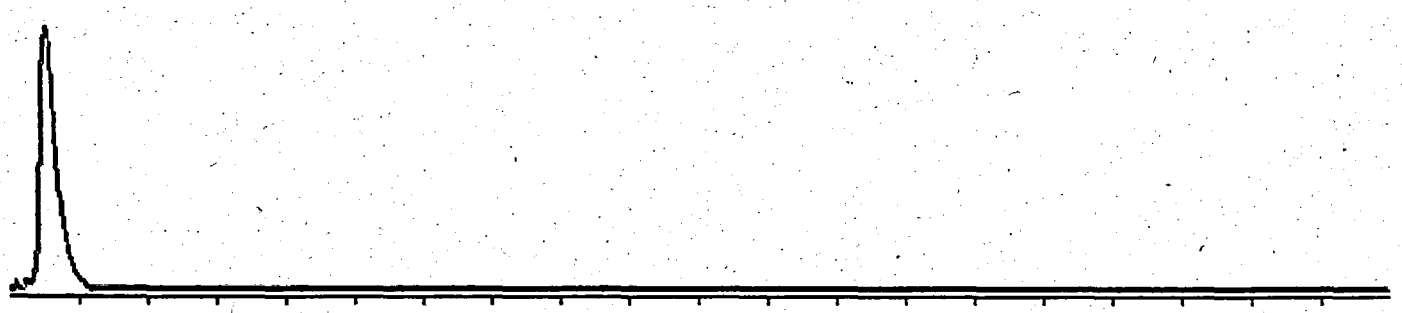
CHART DURATION: 10
DETECTOR: AID
SAMPLE TIME: 20
CELL EXHAUST TIME: 10
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	35	466263	14.328 PPM

TOTAL AREA: 466263

NAME: SW-6 FS
UPPER TRACE #11 14.42% Jul 29,93 10:12
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100320

TRACE PRINTOUT

TRACE #12 DATE: Thu Jul 29 10:30:46 1993

NAME: SW-7 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

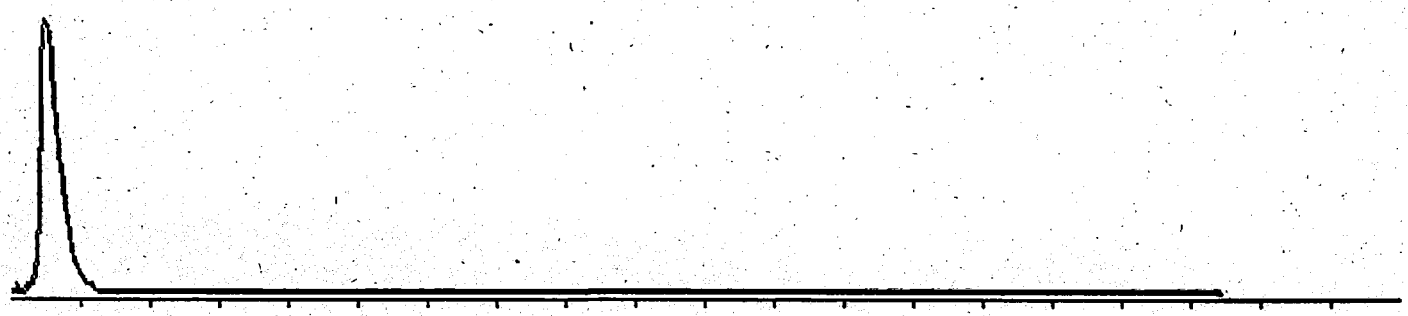
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	35	573474	17.623 PPM

TOTAL AREA: 573474

NAME: SW-7 FS
UPPER TRACE #12 17.74% Jul 29,93 10:30
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100321

TRACE PRINTOUT

TRACE #13 DATE: Thu Jul 29 10:41:18 1993

NAME: SW-8 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

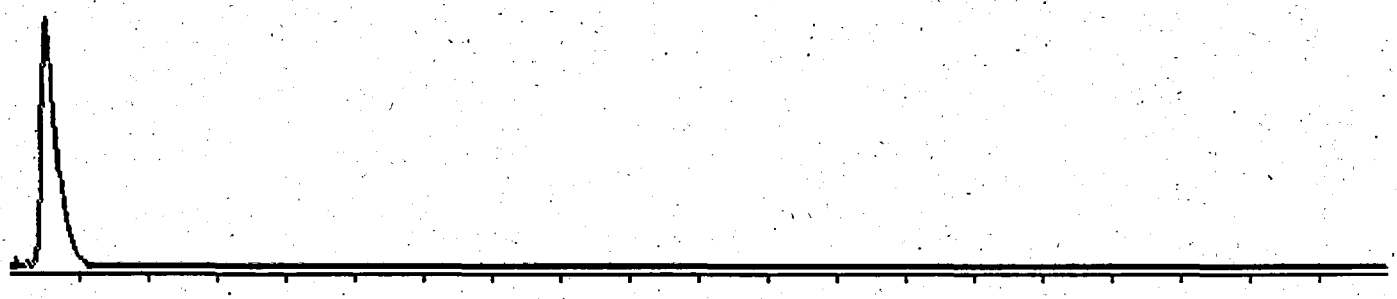
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	417023	12.815 PPM

TOTAL AREA: 417023

NAME: SW-8 FS
UPPER TRACE #13 12.80% Jul 29,93 10:41
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100322

TRACE PRINTOUT

TRACE #14 DATE: Thu Jul 29 10:54:43 1993

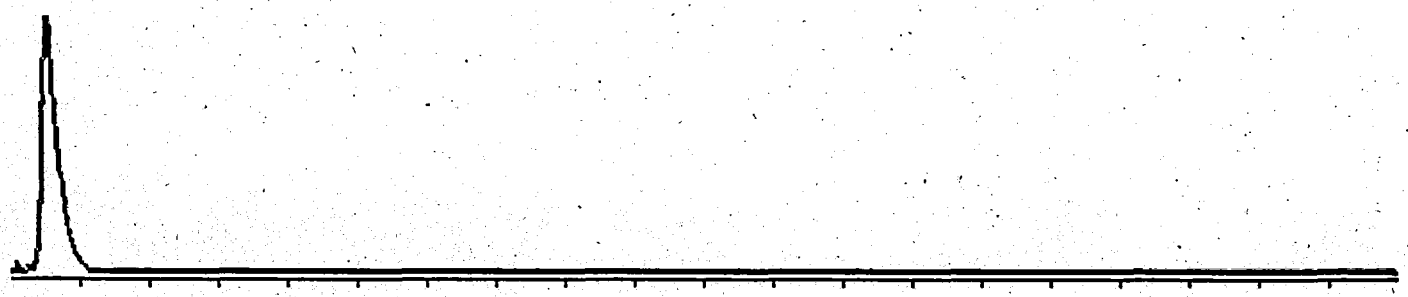
NAME: SW-9 FS
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	429547	13.200 PPM

TOTAL AREA: 429547

NAME: SW-9 FS
UPPER TRACE #14 13.29% Jul 29,93 10:54
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100323

TRACE PRINTOUT

TRACE #15 DATE: Thu Jul 29 11:09:31 1993

NAME: SW-7 FS (Dup CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

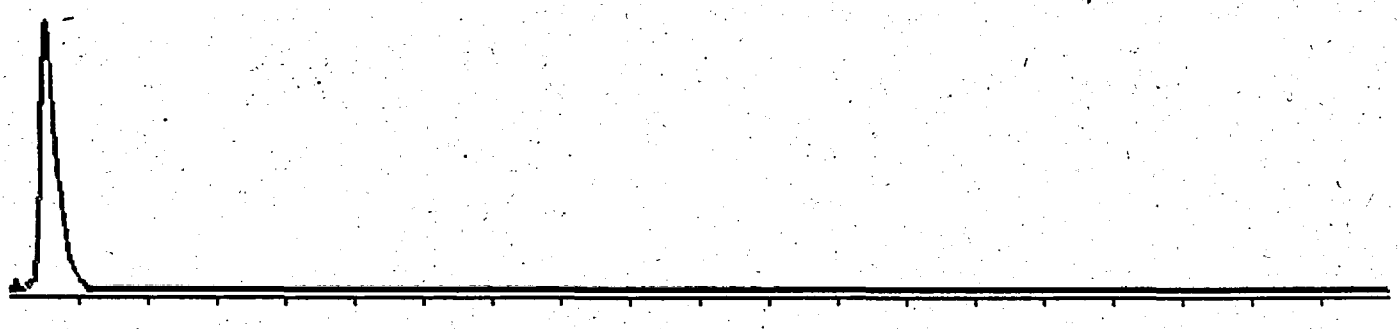
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	476147	14.632 PPM

TOTAL AREA: 476147

NAME: SW-7 FS (Dup
UPPER TRACE #15 14.73% Jul 29,93 11:09
LOWER TRACE #8 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100324

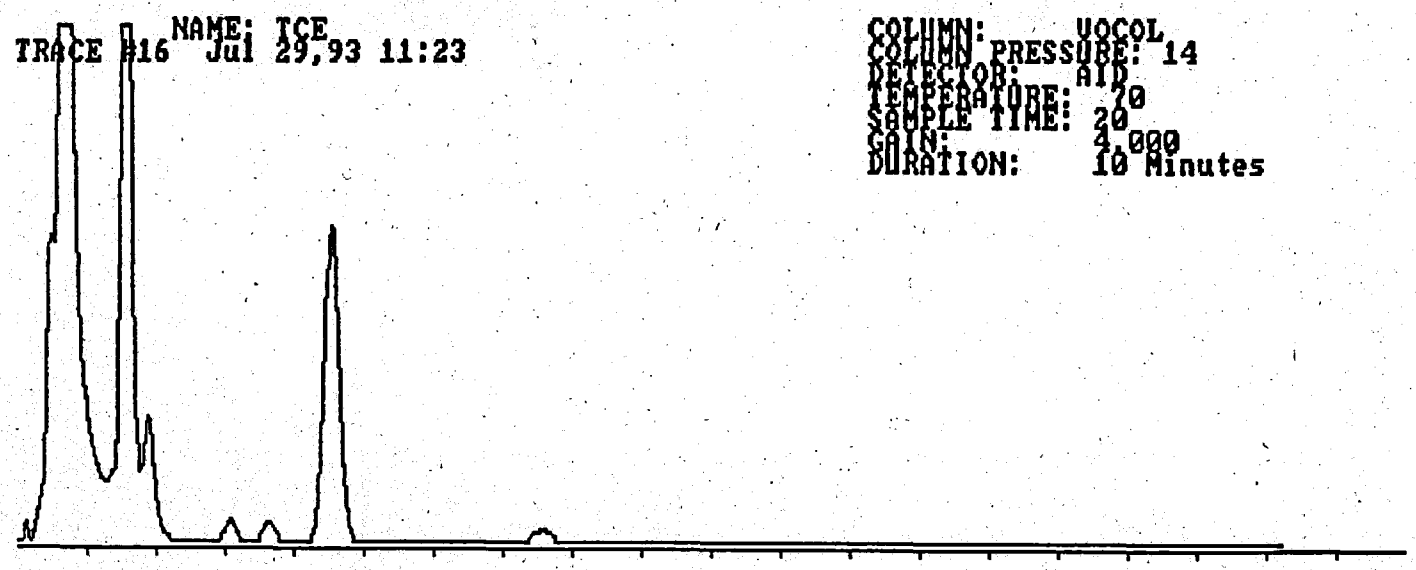
TRACE PRINTOUT

TRACE #16 DATE: Thu Jul 29 11:23:10 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	129	20621	1.400 PPM
2	TCE	156	430290	15.000 PPB
3	TOLUENE	247	37593	1.400 PPM

TOTAL AREA: 488504



TRACE PRINTOUT

TRACE #17 DATE: Thu Jul 29 11:33:58 1993

NAME: EFFLUENT 1 CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

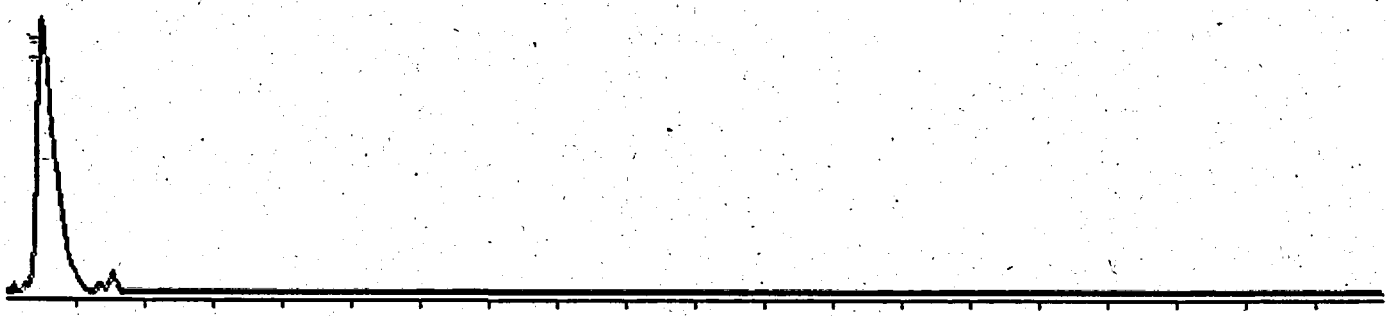
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	#THF	36	519373	35.261 PPM
2	#ACETNITRL	67	52967	3.596 PPM

TOTAL AREA: 572340

NAME: EFFLUENT 1
UPPER TRACE #17 15.53% Jul 29,93 11:33
LOWER TRACE #16 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 20
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100326

TRACE PRINTOUT

TRACE #18 DATE: Fri Jul 30 09:23:09 1993

NAME: TCE CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

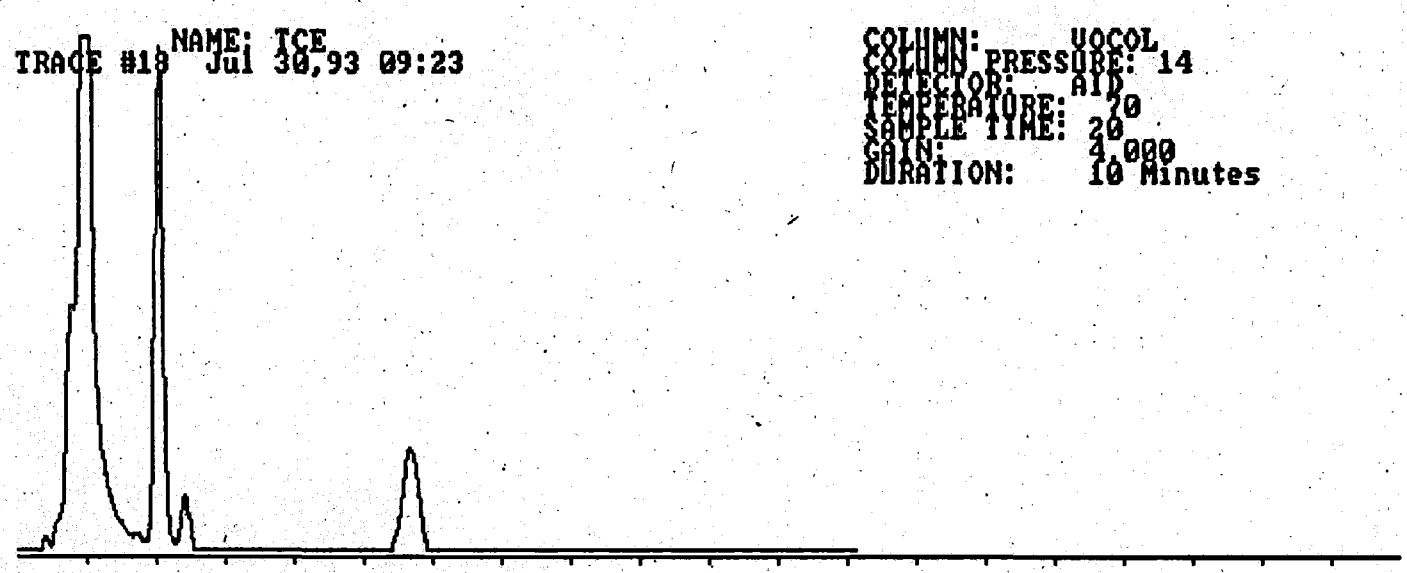
DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN 0	49	158419	0.000 PPB

TOTAL AREA: 158419



AR100327

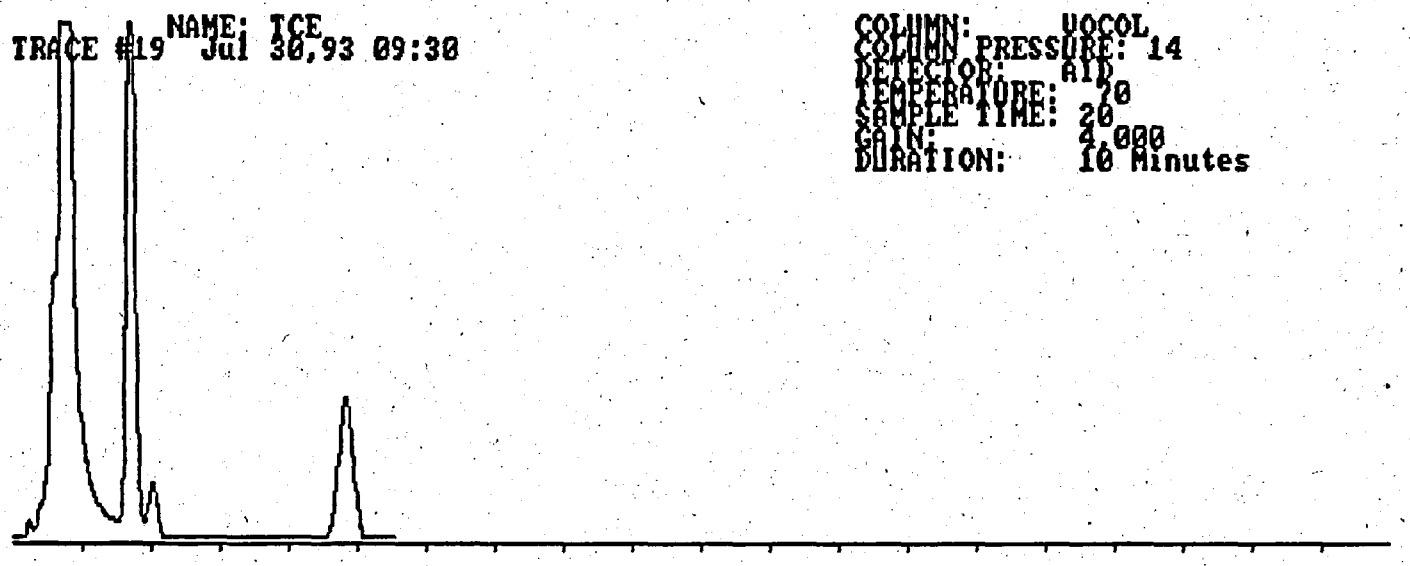
TRACE PRINTOUT

TRACE #19 DATE: Fri Jul 30 09:30:58 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN 0	42	197626	0.000 PPB

TOTAL AREA: 197626



AR100328

TRACE PRINTOUT

TRACE #20 DATE: Fri Jul 30 09:35:41 1993

NAME: TCE CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

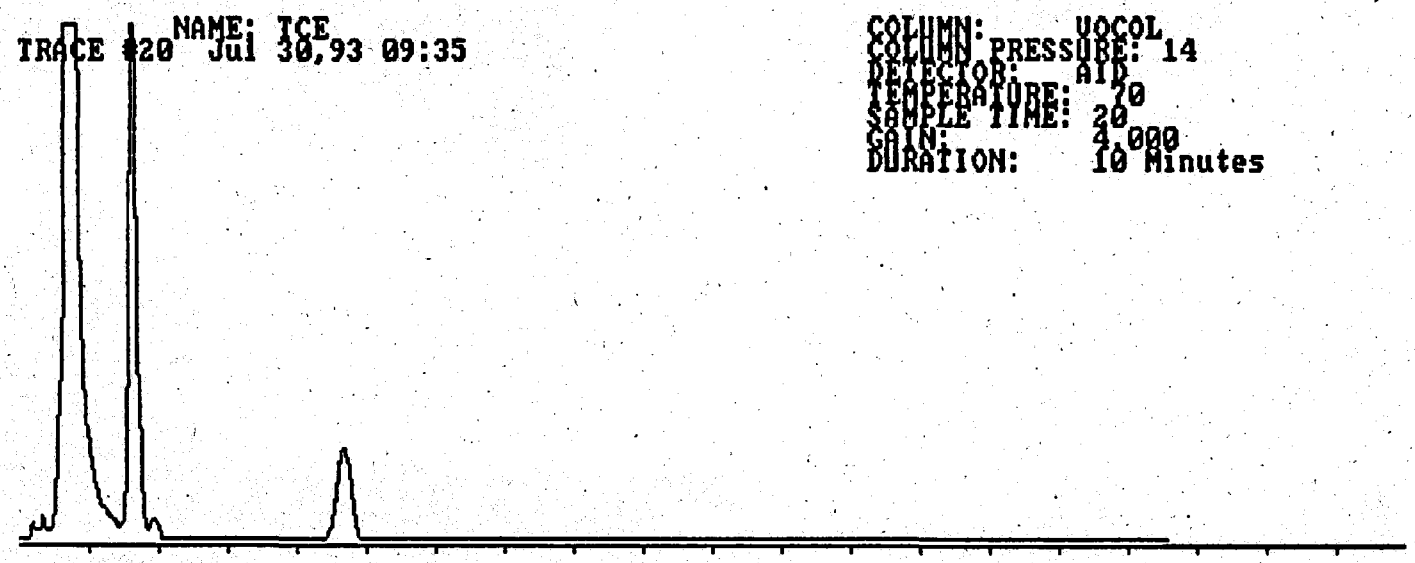
DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	160	134652	15.000 PPB

TOTAL AREA: 134652



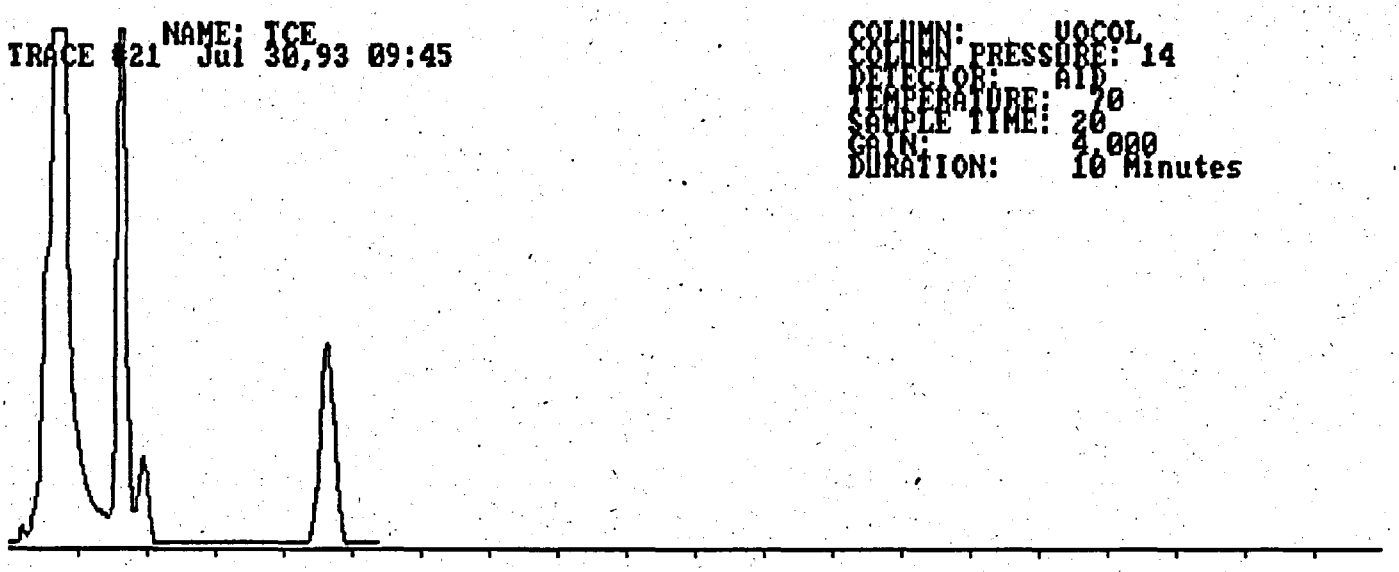
TRACE PRINTOUT

TRACE #21 DATE: Fri Jul 30 09:45:28 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	159	263669	15.000 PPB

TOTAL AREA: 263669



AR100330

TRACE PRINTOUT

TRACE #22 DATE: Fri Jul 30 09:50:10 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

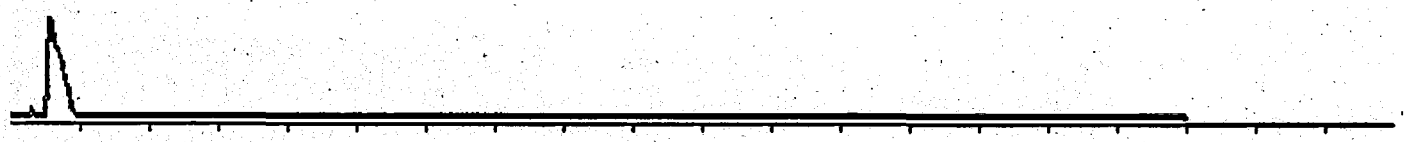
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	157879	8.982 PPB

TOTAL AREA: 157879

NAME: BLANK
UPPER TRACE #22 5.25% Jul 30,93 09:50
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100331

TRACE PRINTOUT

TRACE #23 DATE: Fri Jul 30 10:00:16 1993

NAME: SW-10 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

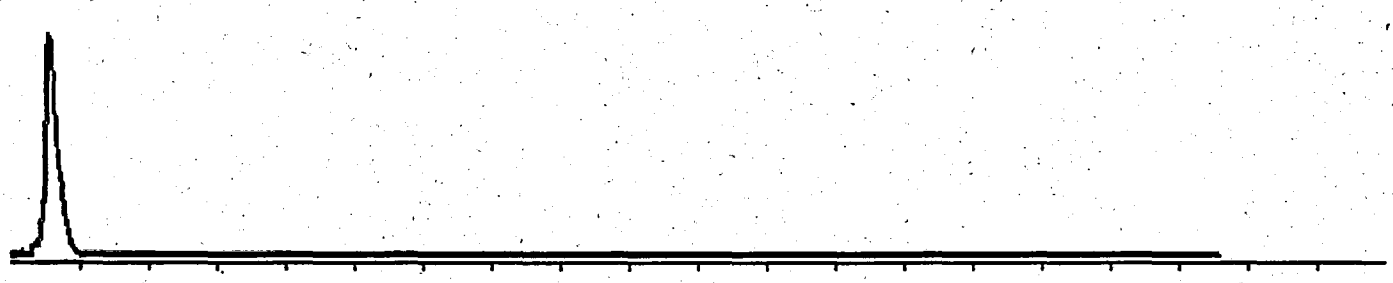
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	306491	17.436 PPB

TOTAL AREA: 306491

NAME: SW-10 FS
UPPER TRACE #23 10.19% Jul 30,93 10:00
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100332

TRACE PRINTOUT

TRACE #24 DATE: Fri Jul 30 10:10:35 1993

NAME: SW-11 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

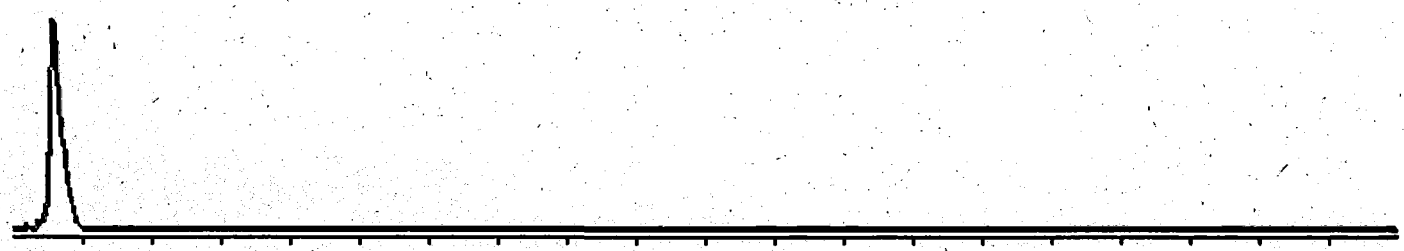
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	284244	16.171 PPB

TOTAL AREA: 284244

NAME: SW-11 FS
UPPER TRACE #24 3.45% Jul 30,93 10:10
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #25 DATE: Fri Jul 30 10:23:44 1993

NAME: SW-12 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

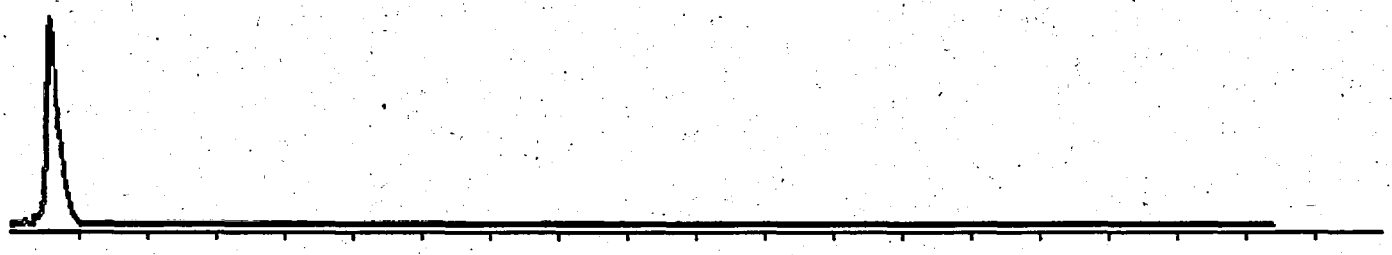
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	282364	16.064 PPB

TOTAL AREA: 282364

NAME: SW-12 FS
UPPER TRACE #25 9.39% Jul 30,93 10:23
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100334

TRACE PRINTOUT

TRACE #26 DATE: Fri Jul 30 10:34:26 1993

NAME: SW-15 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

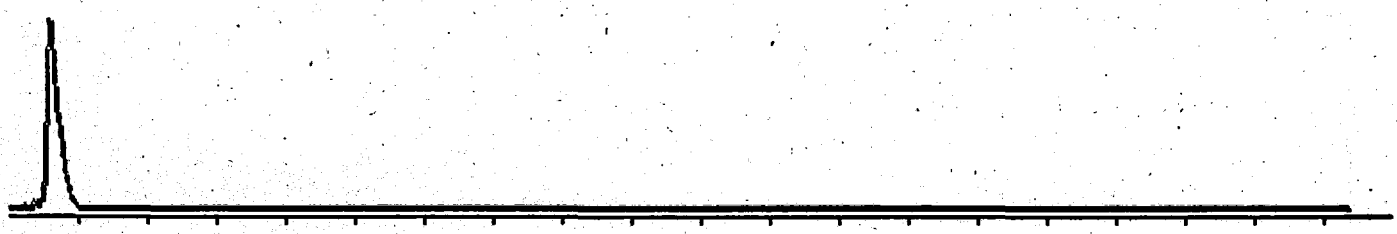
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	243348	13.844 PPB

TOTAL AREA: 243348

NAME: SW-15 FS
UPPER TRACE #26 8.09% Jul 30,93 10:34
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100335

TRACE PRINTOUT

TRACE #27 DATE: Fri Jul 30 10:45:42 1993

NAME: SW-15 FS Dup CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

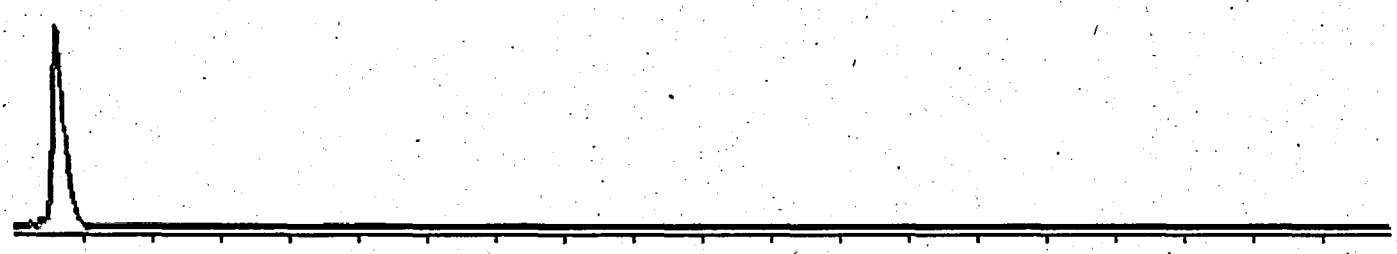
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	272735	15.516 PPB

TOTAL AREA: 272735

NAME: SW-15 FS Dup
UPPER TRACE #27 9.07% Jul 30,93 10:45
LOWER TRACE #21 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100336

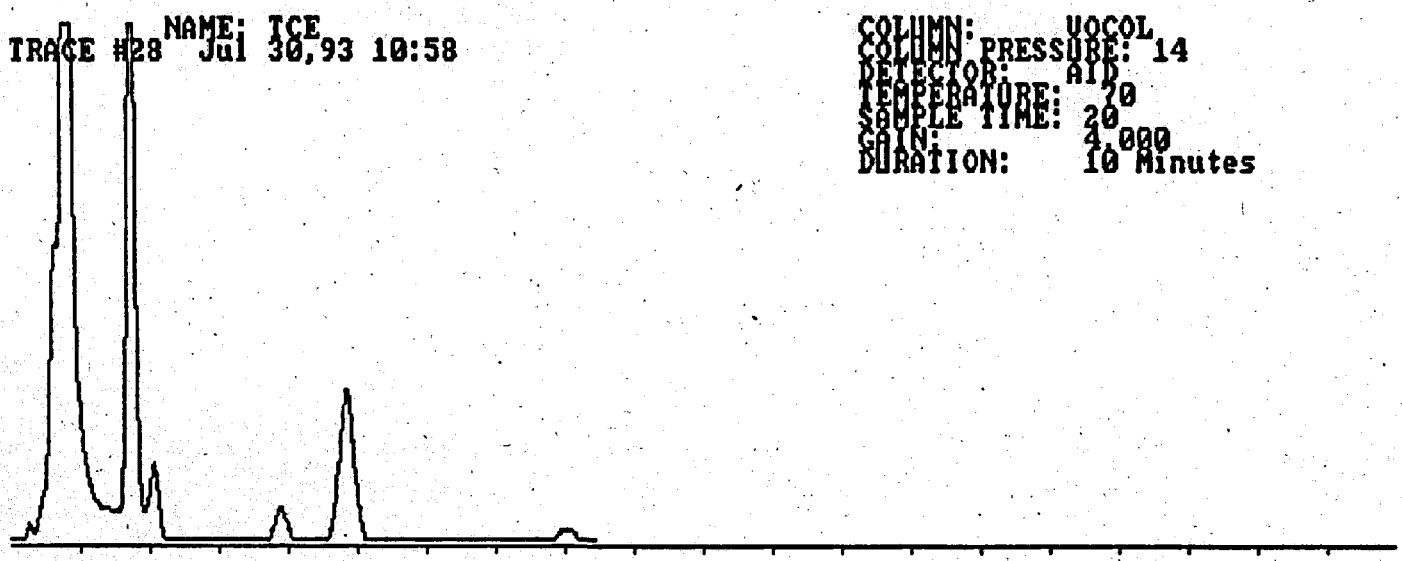
TRACE PRINTOUT

TRACE #28 DATE: Fri Jul 30 10:58:35 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	137	45243	1.400 PPM
2	TCE	165	198799	15.000 PPB
3	TOLUENE	261	17724	1.400 PPM

TOTAL AREA: 261766



AR100337

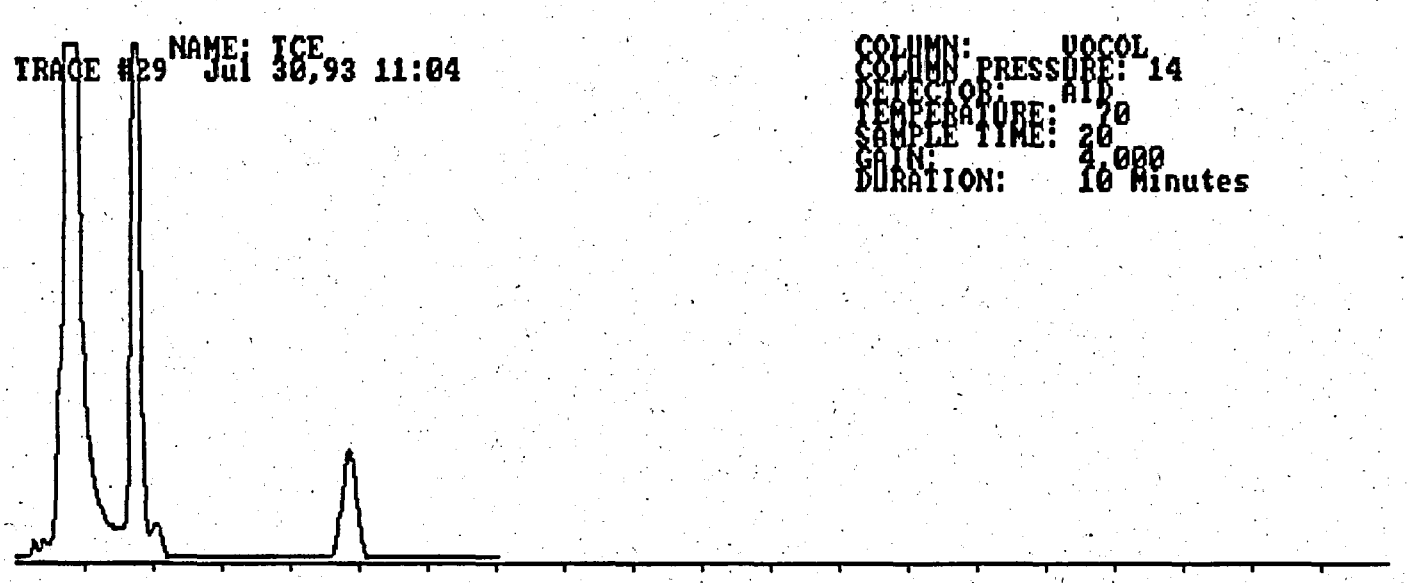
TRACE PRINTOUT

TRACE #29 DATE: Fri Jul 30 11:04:19 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	165	143821	15.000 PPB

TOTAL AREA: 143821



AR100338

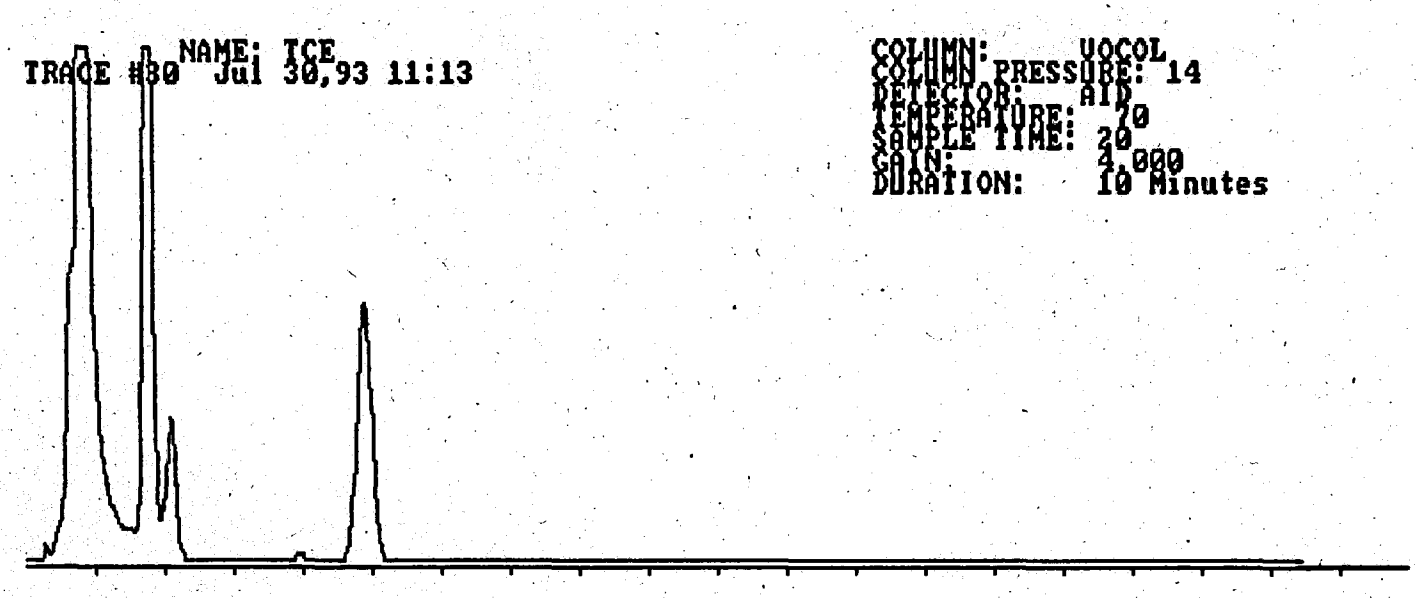
TRACE PRINTOUT

TRACE #30 DATE: Fri Jul 30 11:13:45 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	166	366743	15.000 PPB

TOTAL AREA: 366743



TRACE PRINTOUT

TRACE #31 DATE: Fri Jul 30 12:05:13 1993

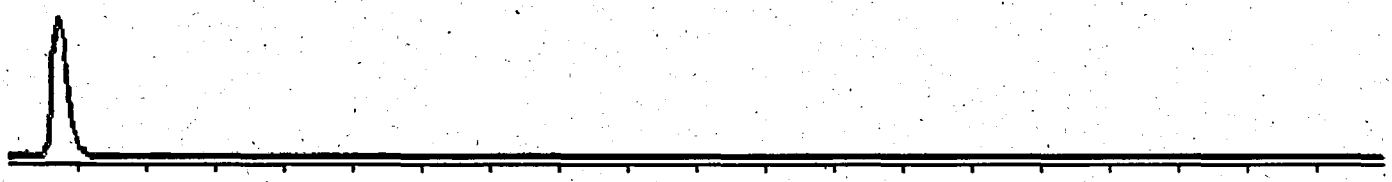
NAME: BLANK
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	42	253536	10.370 PPB
2	UNKNOWN	64	16897	0.691 PPB
3	UNKNOWN	75	7975	0.326 PPB

TOTAL AREA: 278408

NAME: BLANK
UPPER TRACE #31 8.62% Jul 30,93 12:05
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100340

TRACE PRINTOUT

TRACE #32 DATE: Fri Jul 30 16:22:18 1993

NAME: SW-16 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

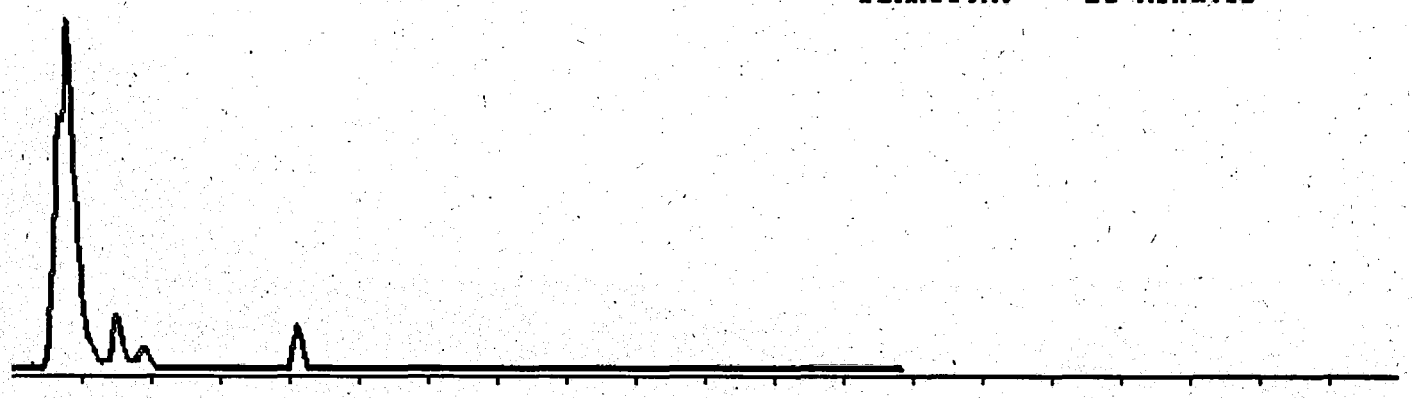
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	43	654211	26.758 PPB
2	UNKNOWN	65	71334	2.918 PPB
3	UNKNOWN	78	64961	2.657 PPB
4	UNKNOWN	94	11243	0.460 PPB
5	UNKNOWN	144	55073	2.253 PPB

TOTAL AREA: 856822

NAME: SW-16 FS
UPPER TRACE #32 26.52% Jul 30,93 16:22
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4,000
DURATION: 10 Minutes



7/30/93
SW-16, SW-16
SP-02, SP03,
SP- LESP 75

AR100341

TRACE PRINTOUT

TRACE #33 DATE: Fri Jul 30 16:37:42 1993

NAME: SW-16 FS (r) CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

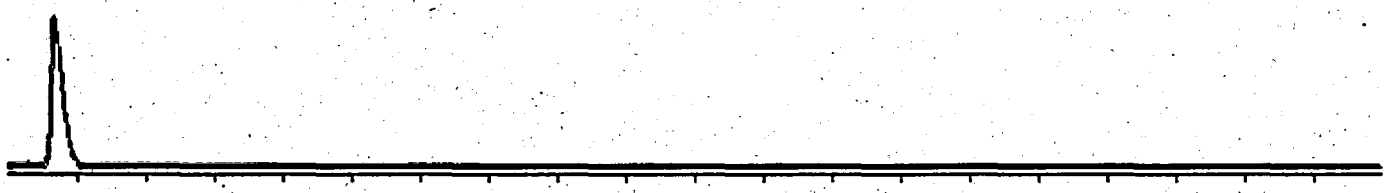
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	41	192092	7.857 PPB

TOTAL AREA: 192092

NAME: SW-16 FS (r)
UPPER TRACE #33 5.94% Jul 30,93 16:37
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100342

TRACE PRINTOUT

TRACE #34 DATE: Fri Jul 30 16:51:55 1993

NAME: SP-02 CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

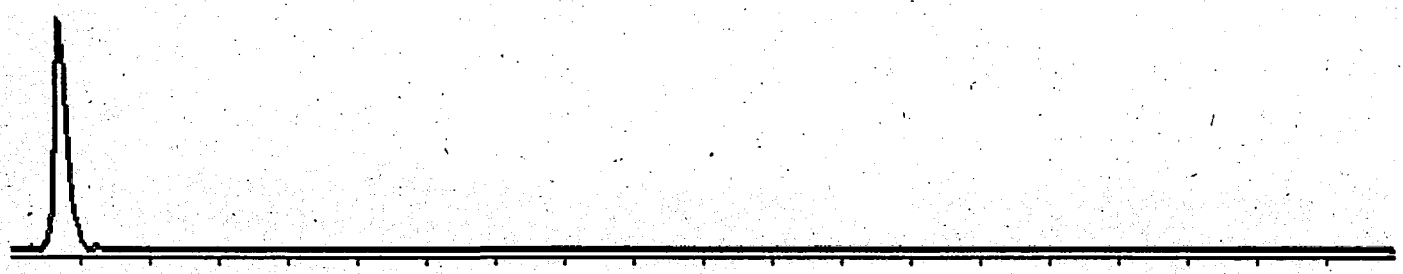
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	40	310258	12.690 PPB
2	UNKNOWN	58	16154	0.661 PPB

TOTAL AREA: 326412

NAME: SP-02
UPPER TRACE #34 10.10% Jul 30,93 16:51
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #35 DATE: Fri Jul 30 17:12:13 1993

SP-03 7/30/93

NAME: ~~SP-02~~ CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	40	325946	13.331 PPB
2	UNKNOWN	67	6075	0.248 PPB
3	UNKNOWN	172	260940	10.673 PPB — TCE
4	UNKNOWN	354	324638	13.278 PPB

TOTAL AREA: 917599

NAME: SP-02

UPPER TRACE #35 28.40% Jul 30,93 17:12

LOWER TRACE #30 100.00%

COLUMN: VOCOL

COLUMN PRESSURE: 14

DETECTOR: AID

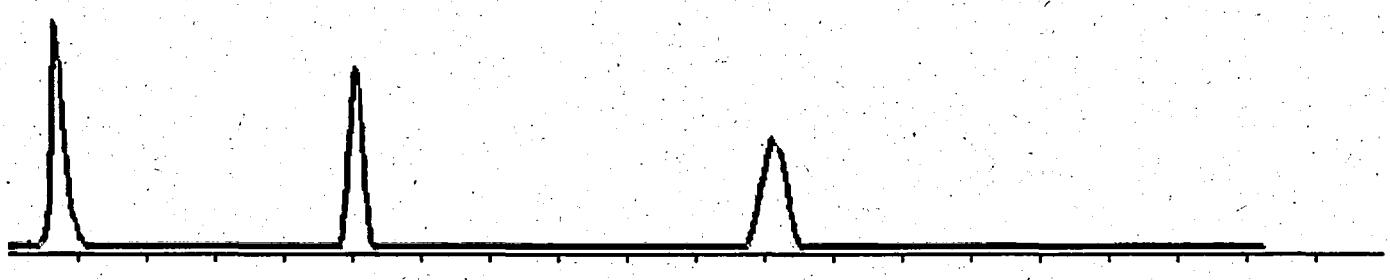
TEMPERATURE: 70

SAMPLE TIME: 20

GAIN: 4.000

DURATION: 10 Minutes

Column flow dropped to



AR100344

TRACE PRINTOUT

TRACE #36 DATE: Fri Jul 30 17:22:58 1993

NAME: SP-03 Dup CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

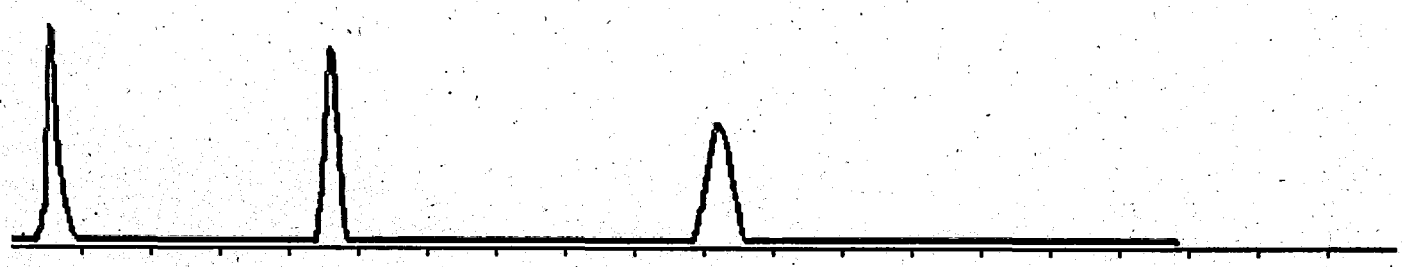
PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	279534	11.433 PPB
2	UNKNOWN	159	267774	10.952 PPB – TCE
3	UNKNOWN	327	327730	13.404 PPB

TOTAL AREA: 875038

NAME: SP-03 Dup
UPPER TRACE #36 27.08% Jul 30,93 17:22
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes

Raised col. pressure to 14+



TRACE PRINTOUT

TRACE #37 DATE: Fri Jul 30 17:33:10 1993

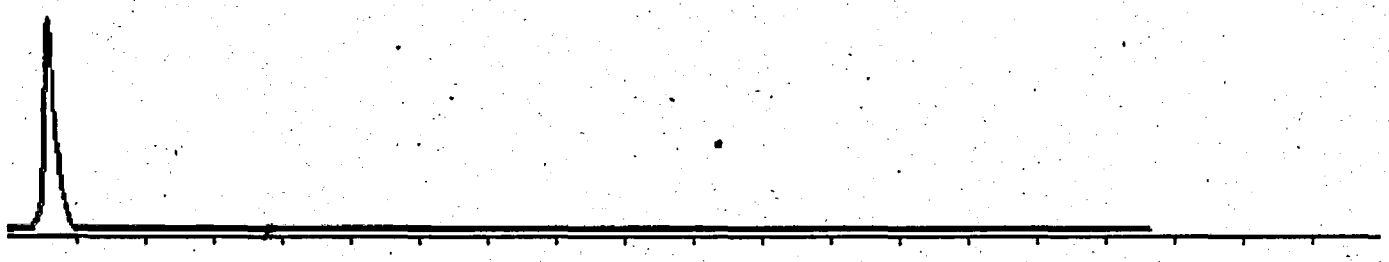
NAME:	SP-LESP73	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	275792	11.280 PPB

TOTAL AREA: 275792

NAME: SP-LESP73
UPPER TRACE #37 8.53% Jul 30,93 17:33
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #38 DATE: Fri Jul 30 17:43:07 1993

NAME: SP-LESP78 CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

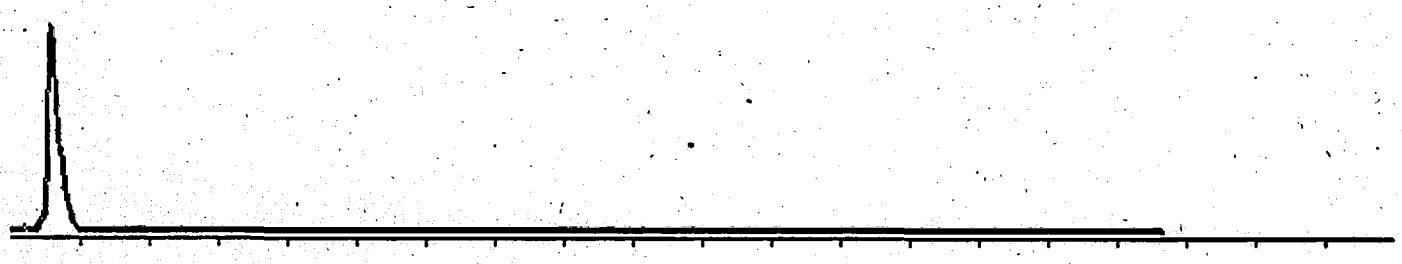
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	266026	10.881 PPB

TOTAL AREA: 266026

NAME: SP-LESP78
UPPER TRACE #38 8.23% Jul 30,93 17:43
LOWER TRACE #30 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



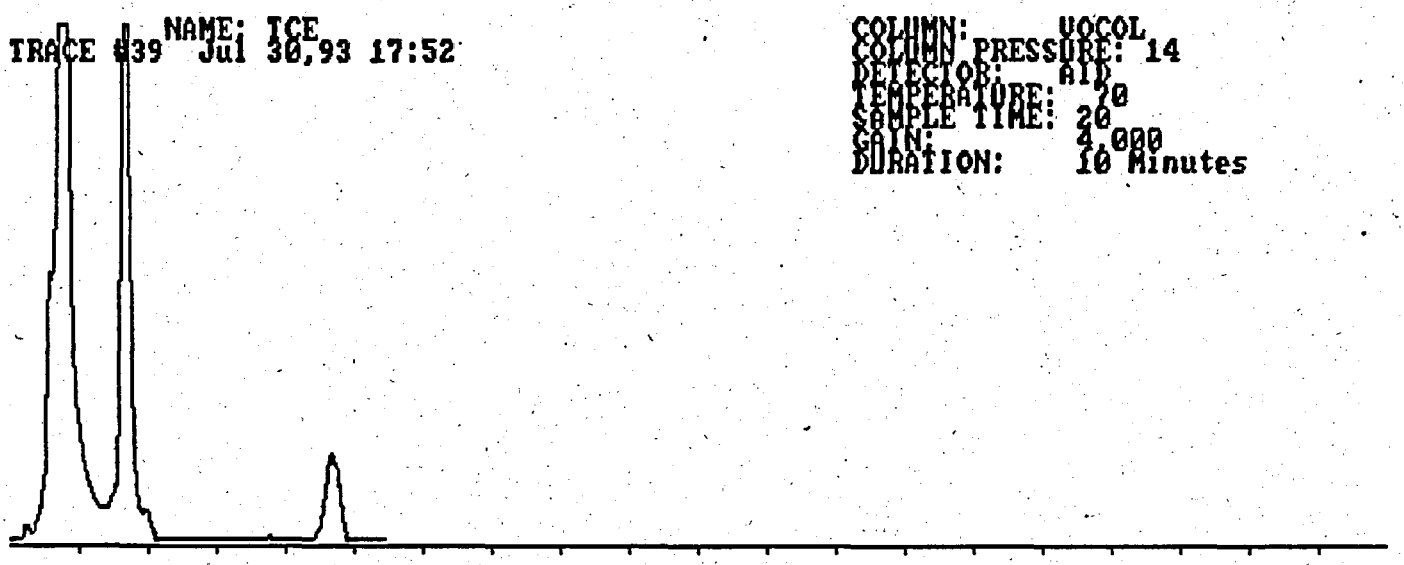
TRACE PRINTOUT

TRACE #39 DATE: Fri Jul 30 17:52:55 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	160	117878	15.000 PPB

TOTAL AREA: 117878



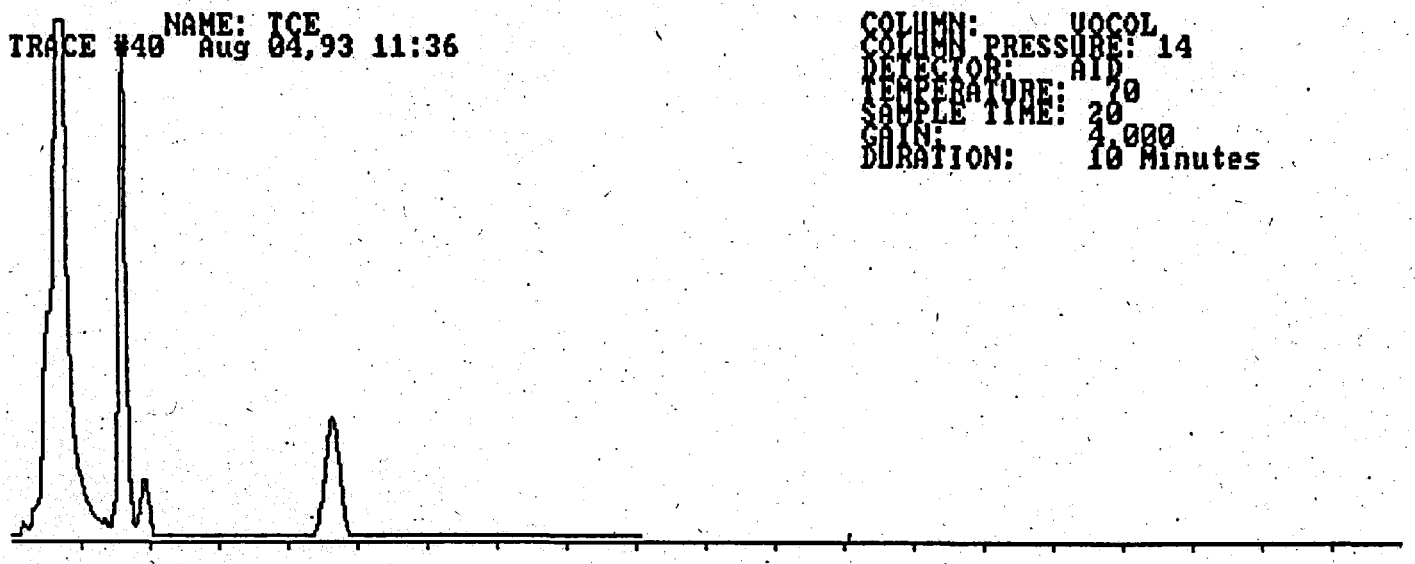
TRACE PRINTOUT

TRACE #40 DATE: Wed Aug 04 11:36:17 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	159	163165	15.000 PPB

TOTAL AREA: 163165



TRACE PRINTOUT

TRACE #41 DATE: Wed Aug 04 11:42:25 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

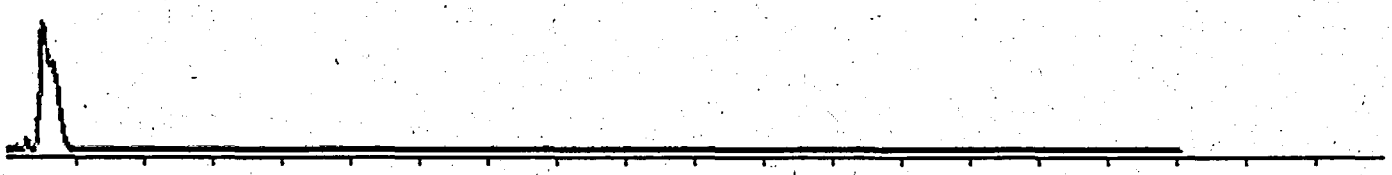
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	192203	17.670 PPB

TOTAL AREA: 192203

NAME: BLANK
UPPER TRACE #41 11.85% Aug 04,93 11:42
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100350

TRACE PRINTOUT

TRACE #42 DATE: Wed Aug 04 11:52:36 1993

NAME: PW-1501 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

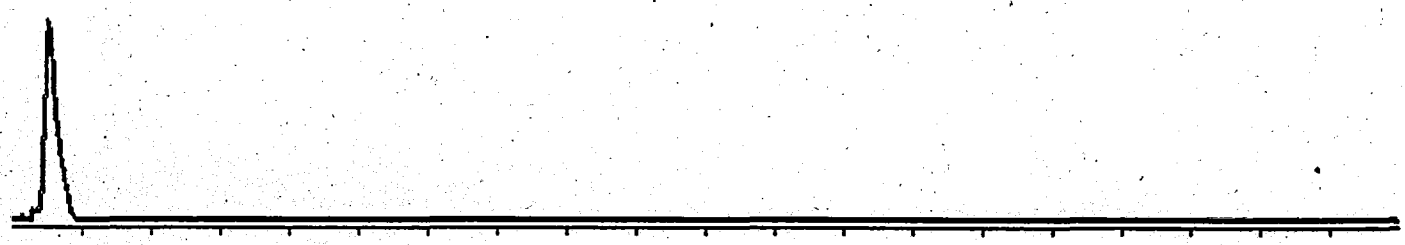
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	256099	23.544 PPB

TOTAL AREA: 256099

NAME: PW-1501 FS
UPPER TRACE #42 15.79% Aug 04,93 11:52
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100351

TRACE PRINTOUT

TRACE #43 DATE: Wed Aug 04 12:05:11 1993

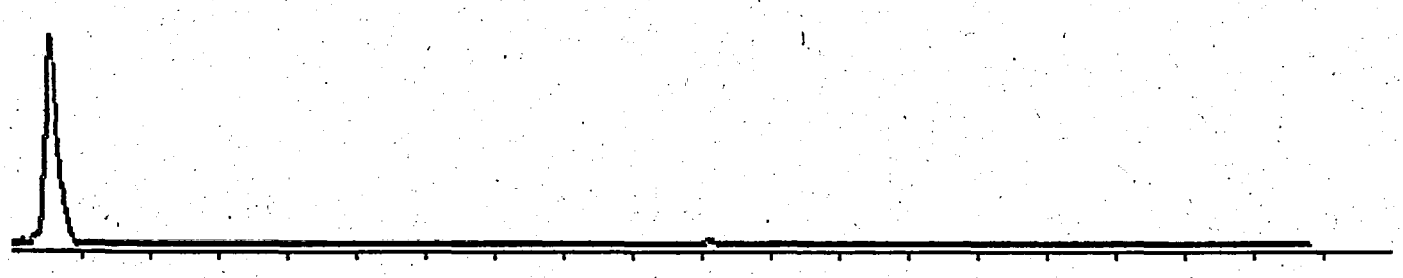
NAME: PW-LM10 FS CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	36	270274	24.847 PPB
2	UNKNOWN	325	37333	3.432 PPB

TOTAL AREA: 307607

NAME: PW-LM10 FS
UPPER TRACE #43 18.96% Aug 04,93 12:05
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100352

TRACE PRINTOUT

TRACE #44 DATE: Wed Aug 04 12:16:28 1993

NAME: PW-UM43 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

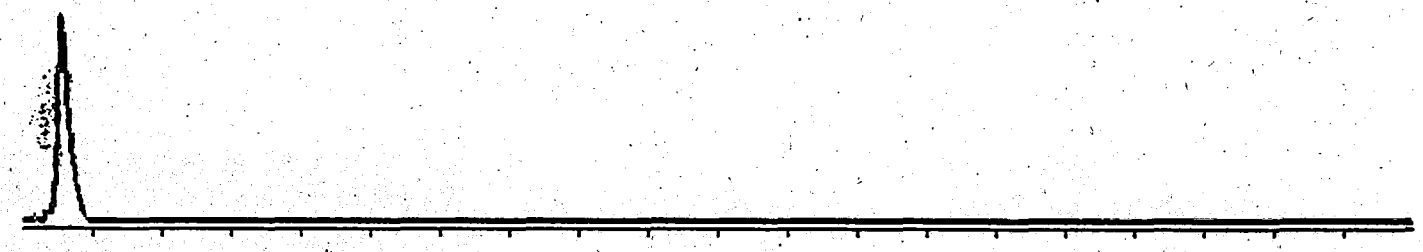
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	270941	24.908 PPB

TOTAL AREA: 270941

NAME: PW-UM43 FS
UPPER TRACE #44 16.20% Aug 04,93 12:16
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #45 DATE: Wed Aug 04 12:34:47 1993

NAME: PW-UM58 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

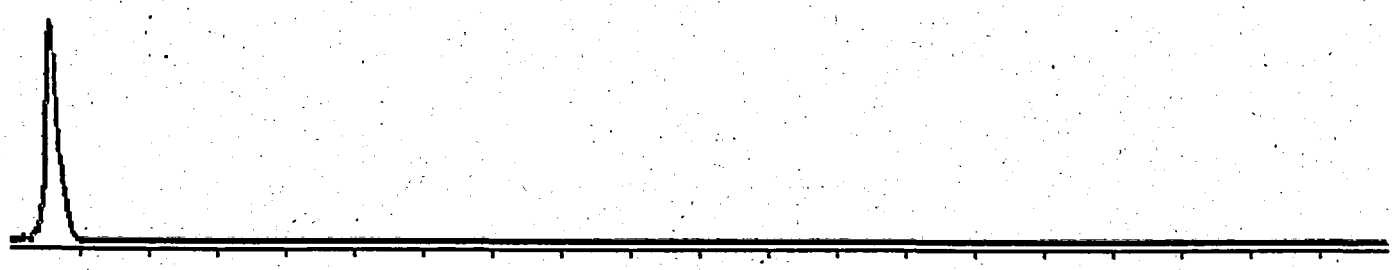
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	313870	28.855 PPB

TOTAL AREA: 313870

NAME: PW-UM58 FS
UPPER TRACE #45 19.35% Aug 04,93 12:34
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100354

TRACE PRINTOUT

TRACE #46 DATE: Wed Aug 04 12:50:50 1993

NAME: PW-LM10 FS D CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

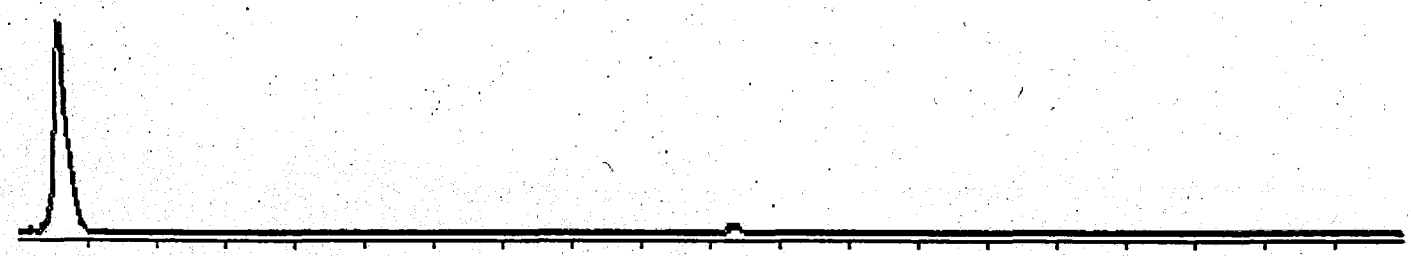
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	300877	27.660 PPB
2	UNKNOWN	331	43162	3.968 PPB

TOTAL AREA: 344039

NAME: PW-LM10 FS D
UPPER TRACE #46 21.21% Aug 04,93 12:50
LOWER TRACE #40 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100355

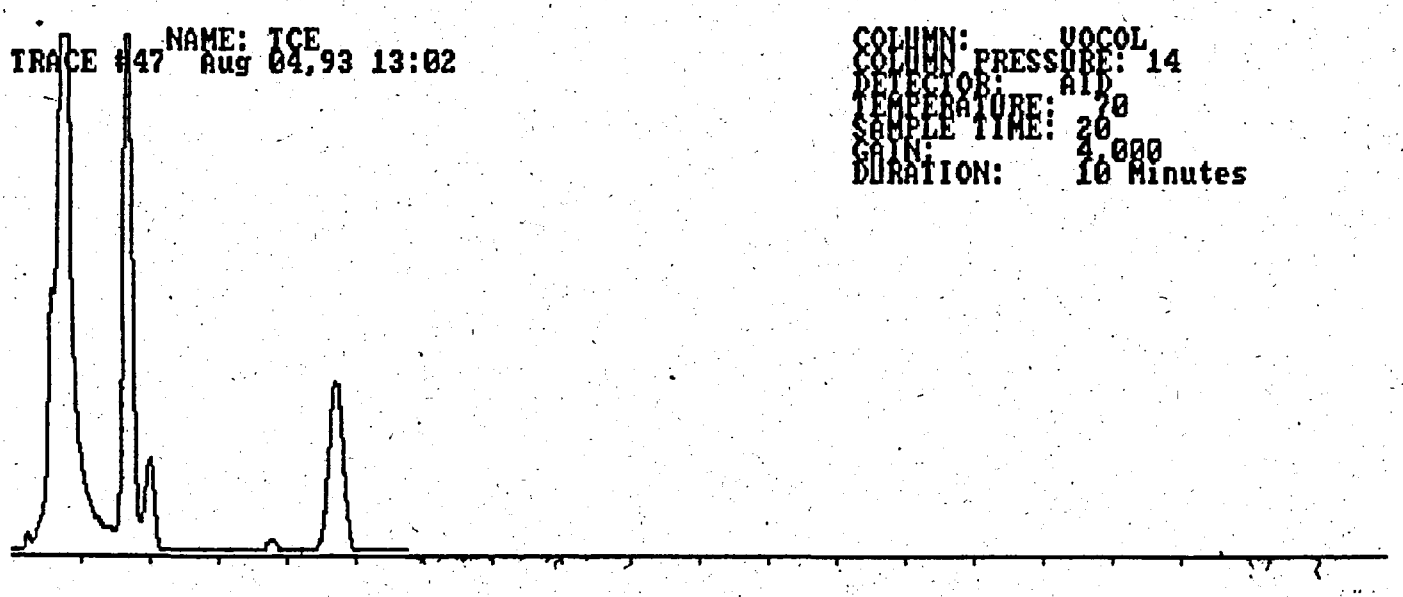
TRACE PRINTOUT

TRACE #47 DATE: Wed Aug 04 13:02:33 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	133	12676	1.400 PPM
2	TCE	161	222056	15.000 PPB

TOTAL AREA: 234732



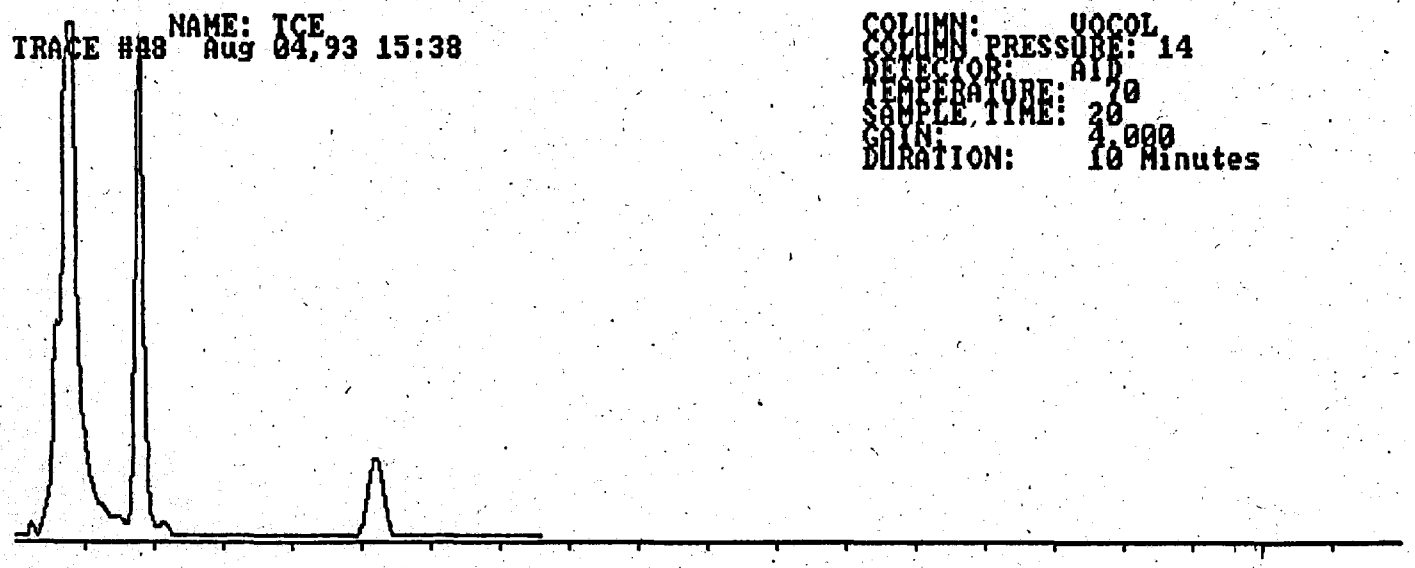
TRACE PRINTOUT

TRACE #48 DATE: Wed Aug 04 15:38:38 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN 0	43	108848	0.000 PPB

TOTAL AREA: 108848



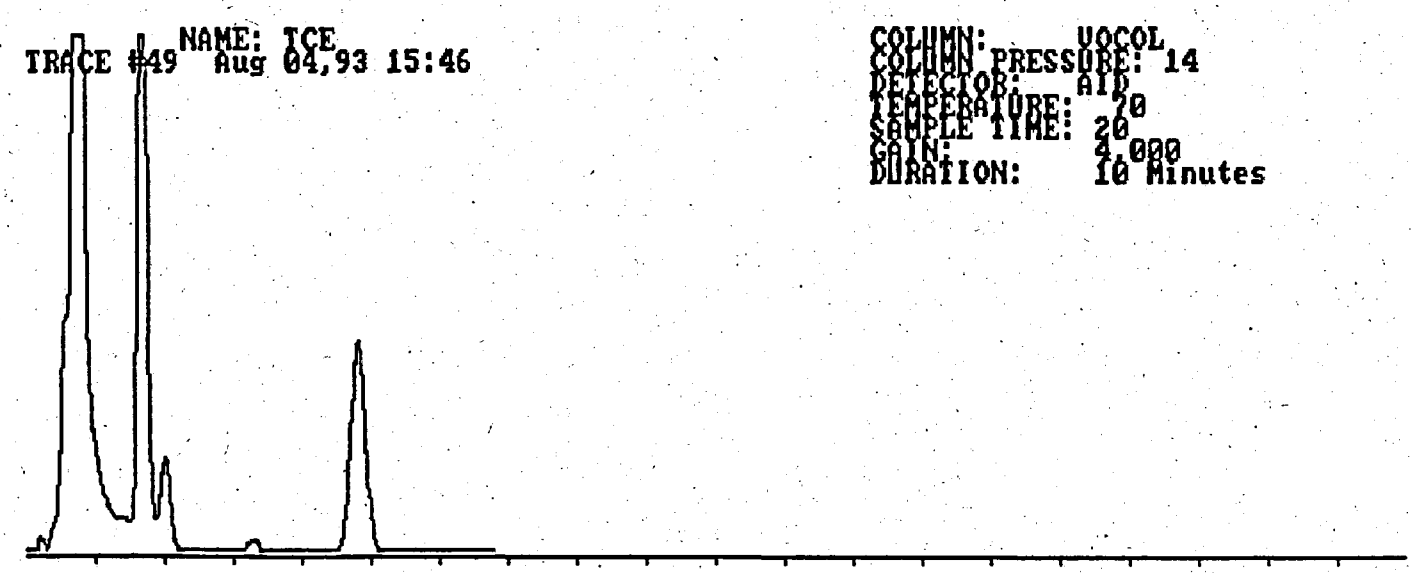
TRACE PRINTOUT

TRACE #49 DATE: Wed Aug 04 15:46:47 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	164	284006	15.000 PPB

TOTAL AREA: 284006



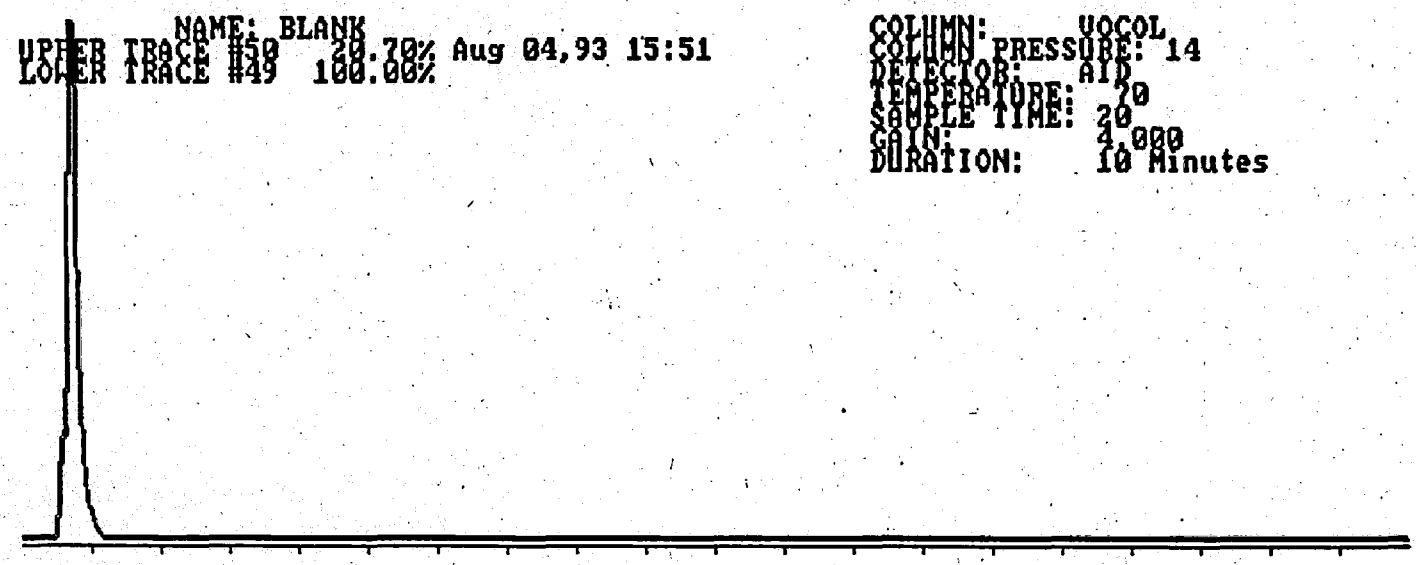
TRACE PRINTOUT

TRACE #50 DATE: Wed Aug 04 15:51:46 1993

NAME:	BLANK	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	42	580871	30.679 PPB

TOTAL AREA: 580871



AR100359

TRACE PRINTOUT

TRACE #51 DATE: Wed Aug 04 16:26:06 1993

NAME: PW-LE311 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

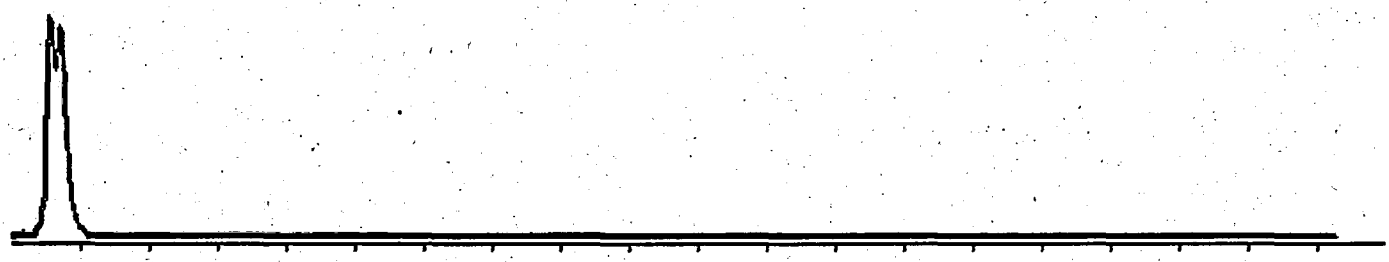
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	199071	10.514 PPB
2	UNKNOWN	42	234952	12.409 PPB

TOTAL AREA: 434023

NAME: PW-LE311 FS
UPPER TRACE #51 15.47% Aug 04,93 16:26
LOWER TRACE #49 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100360

TRACE PRINTOUT

TRACE #52 DATE: Wed Aug 04 16:37:30 1993

NAME: PW-UM59 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

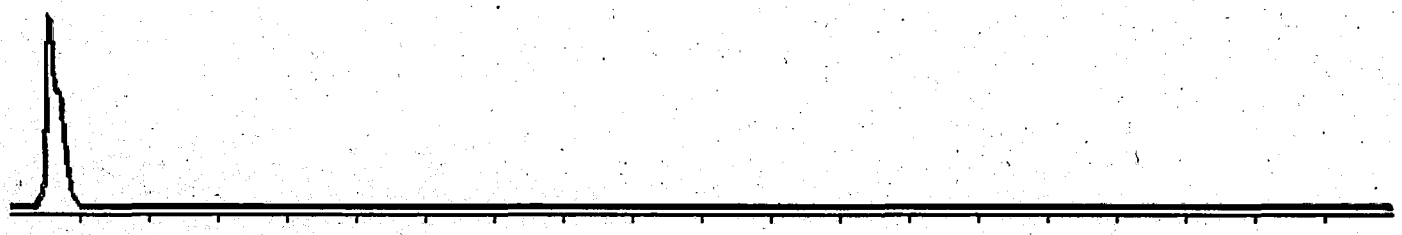
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	295458	15.605 PPB

TOTAL AREA: 295458

NAME: PW-UM59 FS
UPPER TRACE #52 10.53% Aug 04,93 16:37
LOWER TRACE #49 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100361

TRACE PRINTOUT

TRACE #53 DATE: Wed Aug 04 16:49:39 1993

NAME: PW-UM45 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

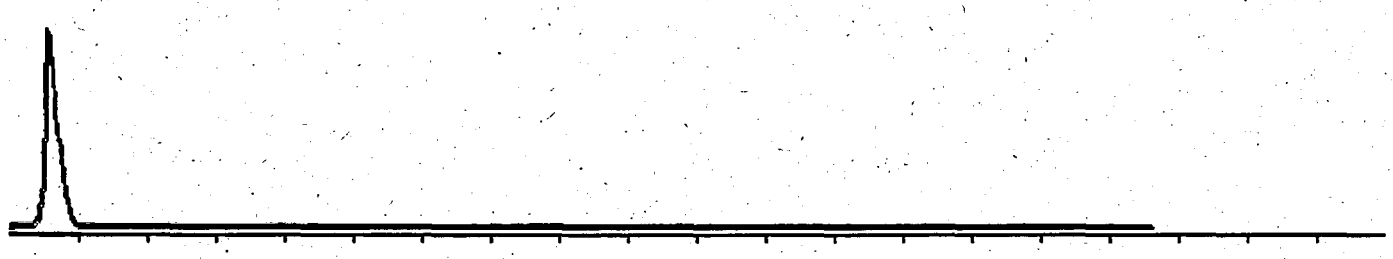
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	281262	14.855 PPB

TOTAL AREA: 281262

NAME: PW-UM45 FS
UPPER TRACE #53 10.03% Aug 04,93 16:49
LOWER TRACE #49 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100362

TRACE PRINTOUT

TRACE #54 DATE: Wed Aug 04 16:59:47 1993

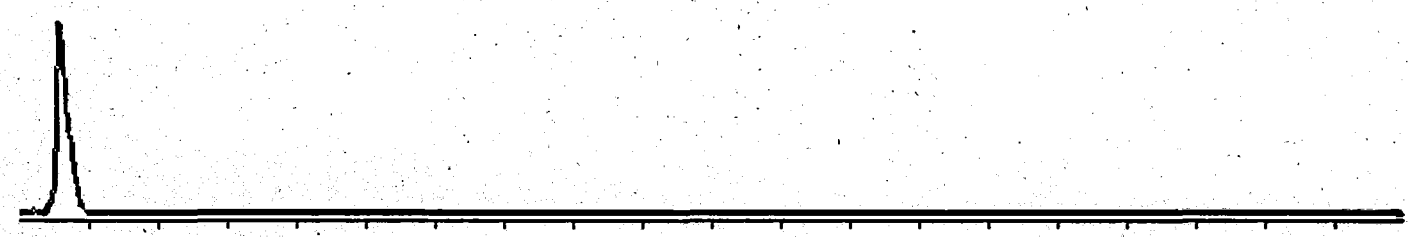
NAME:	PW-UM45 FS D	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	254463	13.440 PPB

TOTAL AREA: 254463

NAME: PW-UM45 FS D
UPPER TRACE #54 9.07% Aug 04,93 16:59
LOWER TRACE #49 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100363

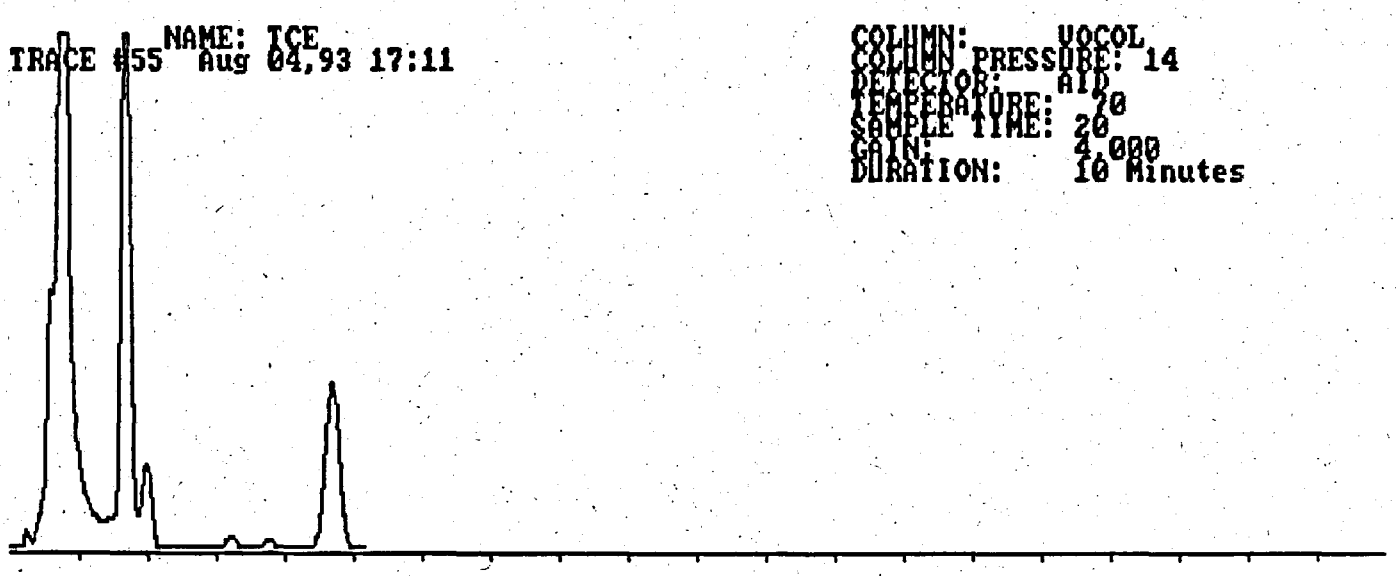
TRACE PRINTOUT

TRACE #55 DATE: Wed Aug 04 17:11:32 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	133	19635	1.400 PPM
2	TCE	160	222331	15.000 PPB

TOTAL AREA: 241966



AR100364

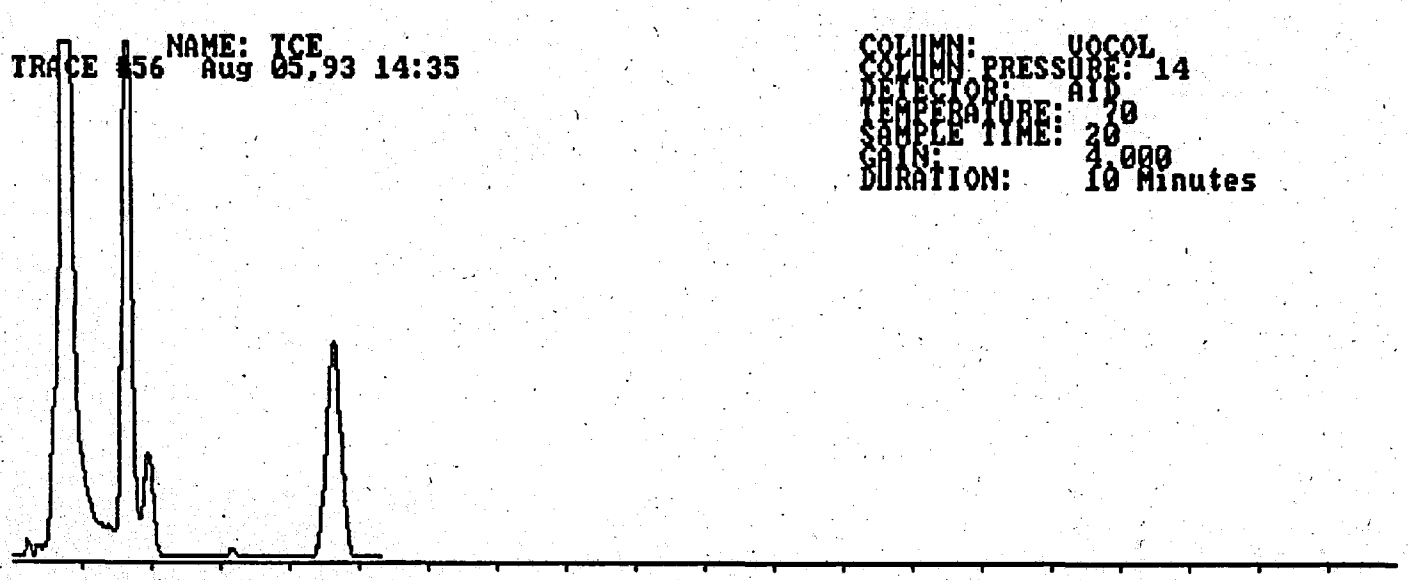
TRACE PRINTOUT

TRACE #56 DATE: Thu Aug 05 14:35:00 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	159	289714	15.000 PPB

TOTAL AREA: 289714



AR100365

TRACE PRINTOUT

TRACE #57 DATE: Thu Aug 05 14:39:13 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	42	358458	18.559 PPB

TOTAL AREA: 358458

NAME: BLANK

UPPER TRACE #57 14.95% Aug 05,93 14:39

LOWER TRACE #56 100.00%

COLUMN: VOCOL

COLUMN PRESSURE: 14

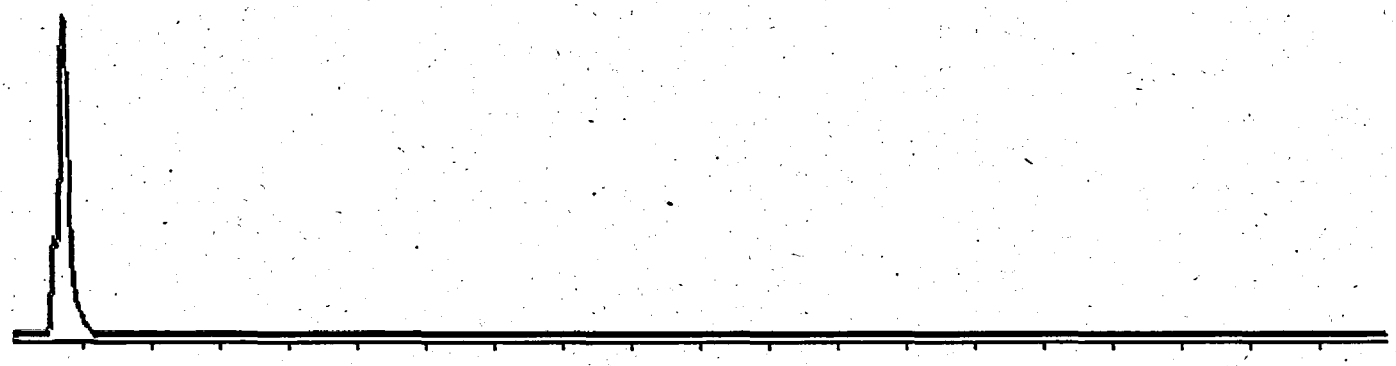
DETECTOR: AID

TEMPERATURE: 70

SAMPLE TIME: 20

GAIN: 4.000

DURATION: 10 Minutes



AR100366

TRACE PRINTOUT

TRACE #58 DATE: Thu Aug 05 15:44:47 1993

NAME: LE-1293 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

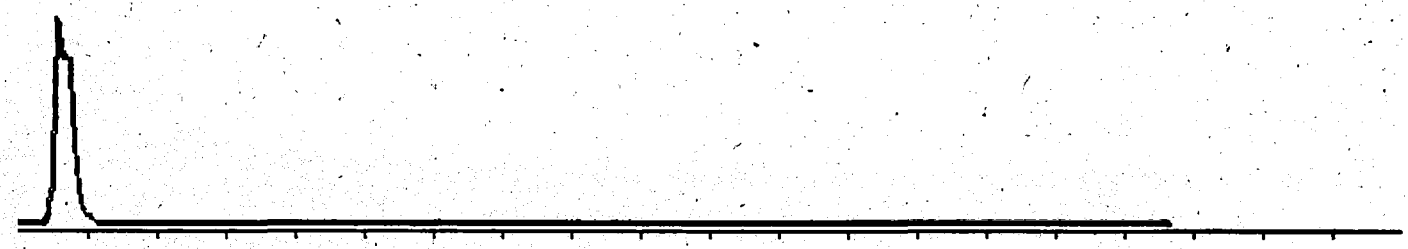
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	375170	19.425 PPB
2	UNKNOWN	61	15513	0.803 PPB

TOTAL AREA: 390683

NAME: LE-1293 FS
UPPER TRACE #58 16.30% Aug 05,93 15:44
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100367

TRACE PRINTOUT

TRACE #59 DATE: Thu Aug 05 15:54:56 1993

NAME: PW-SA05 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

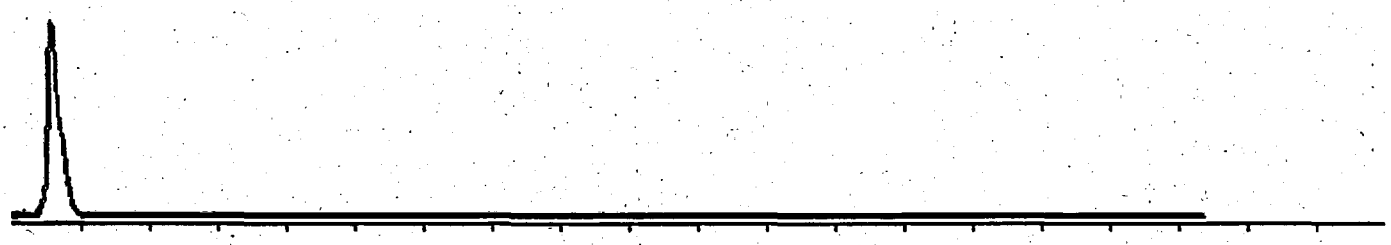
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	273163	14.143 PPB

TOTAL AREA: 273163

NAME: PW-SA05 FS
UPPER TRACE #59 11.40% Aug 05,93 15:54
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100368

TRACE PRINTOUT

TRACE #60 DATE: Thu Aug 05 16:05:25 1993

NAME: PW-UM40 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

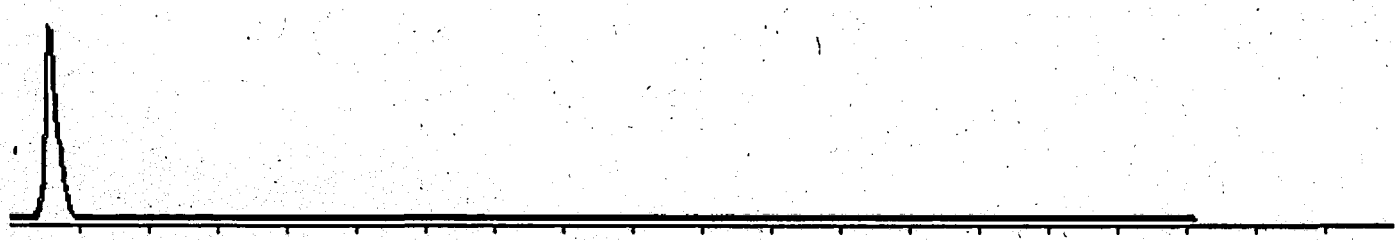
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	257505	13.332 PPB

TOTAL AREA: 257505

NAME: PW-UM40 FS
UPPER TRACE #60 10.74% Aug 05,93 16:05
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100369

TRACE PRINTOUT

TRACE #61 DATE: Thu Aug 05 16:15:48 1993

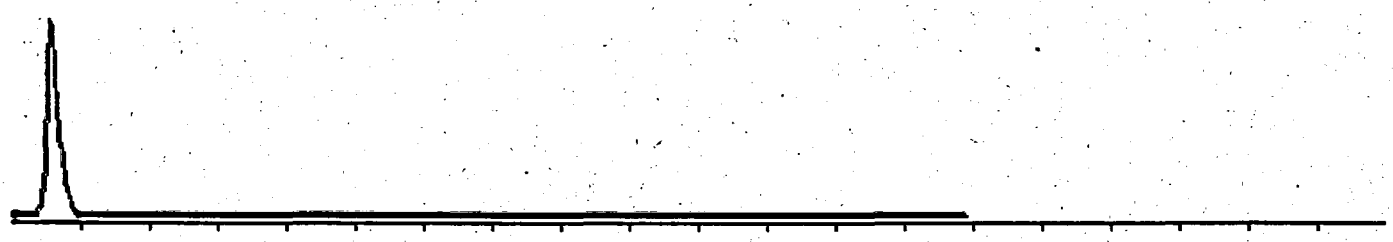
NAME: PW-1492 FS CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	262102	13.570 PPB

TOTAL AREA: 262102

NAME: PW-1492 FS
UPPER TRACE #61 10.93% Aug 05,93 16:15
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100370

TRACE PRINTOUT

TRACE #62 DATE: Thu Aug 05 16:24:23 1993

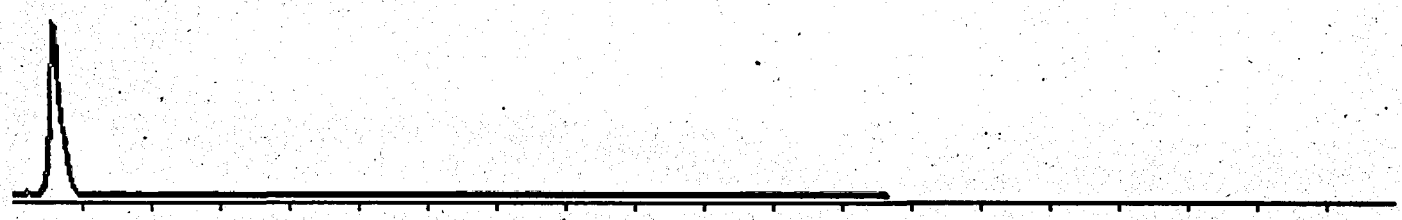
NAME:	PW-0351 FS	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	230759	11.948 PPB

TOTAL AREA: 230759

NAME: PW-0351 FS
UPPER TRACE #62 2.63% Aug 05,93 16:24
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100371

TRACE PRINTOUT

TRACE #63 DATE: Thu Aug 05 16:32:16 1993

NAME: PW-677 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

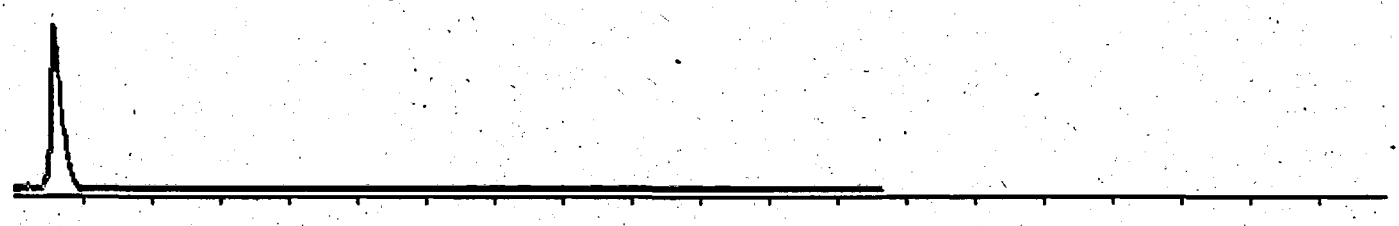
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	216625	11.216 PPB

TOTAL AREA: 216625

NAME: PW-677 FS
UPPER TRACE #63 9.04% Aug 05,93 16:32
LOWER TRACE #56 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100372

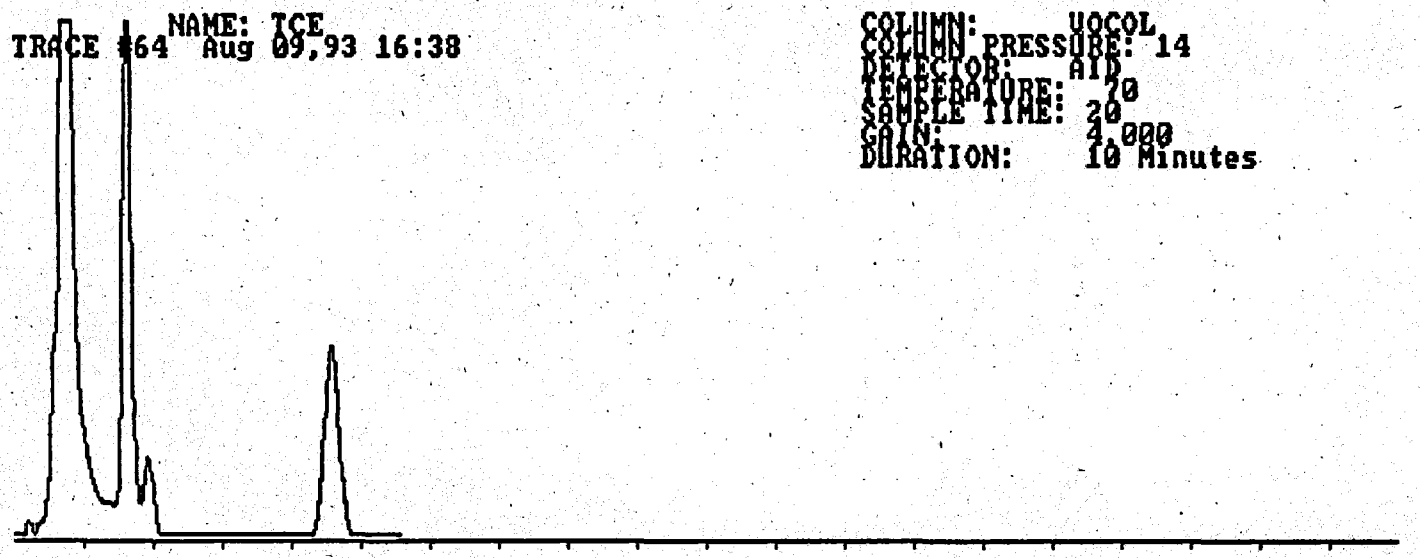
TRACE PRINTOUT

TRACE #64 DATE: Mon Aug 09 16:38:15 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	157	255698	15.000 PPB

TOTAL AREA: 255698



AR100373

TRACE PRINTOUT

TRACE #65 DATE: Mon Aug 09 16:42:41 1993

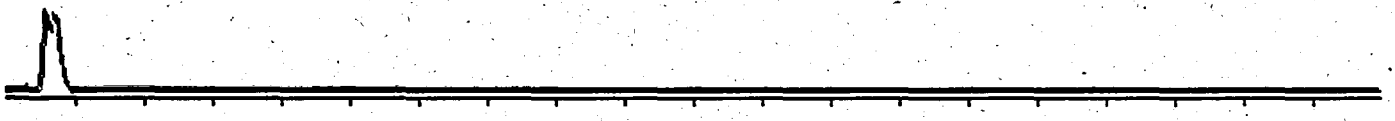
NAME:	BLANK	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	150625	8.836 PPB

TOTAL AREA: 150625

NAME: BLANK
UPPER TRACE #65 6.21% Aug 09,93 16:42
LOWER TRACE #64 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100374

TRACE PRINTOUT

TRACE #66 DATE: Mon Aug 09 17:15:31 1993

NAME: EM-08 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

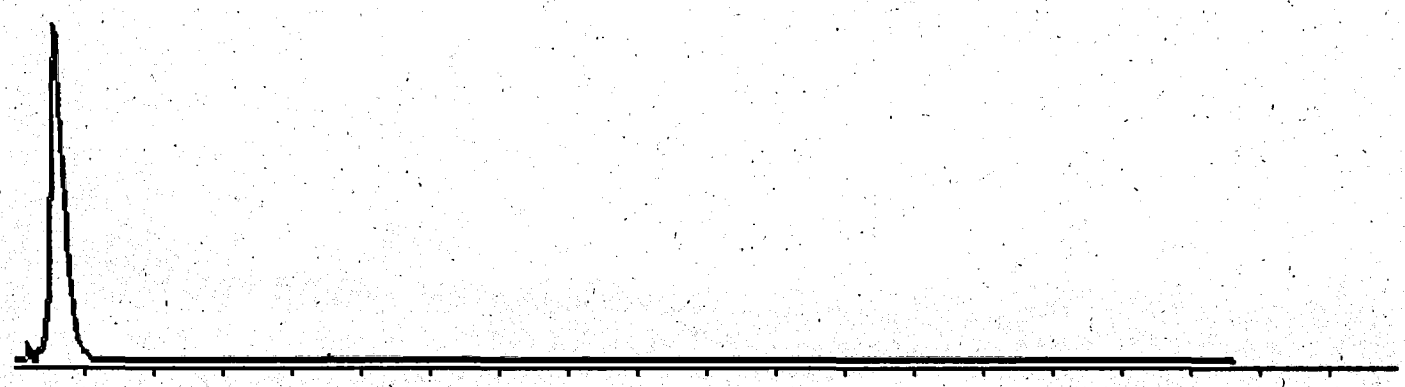
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	231273	13.567 PPB
2	TCE	157	5824	0.342 PPB

TOTAL AREA: 237097

NAME: EM-08 FS
UPPER TRACE #66 3.77% Aug 09,93 17:15
LOWER TRACE #64 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 7.812
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #67 DATE: Mon Aug 09 17:25:56 1993

NAME: EM-08 FS DUP CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

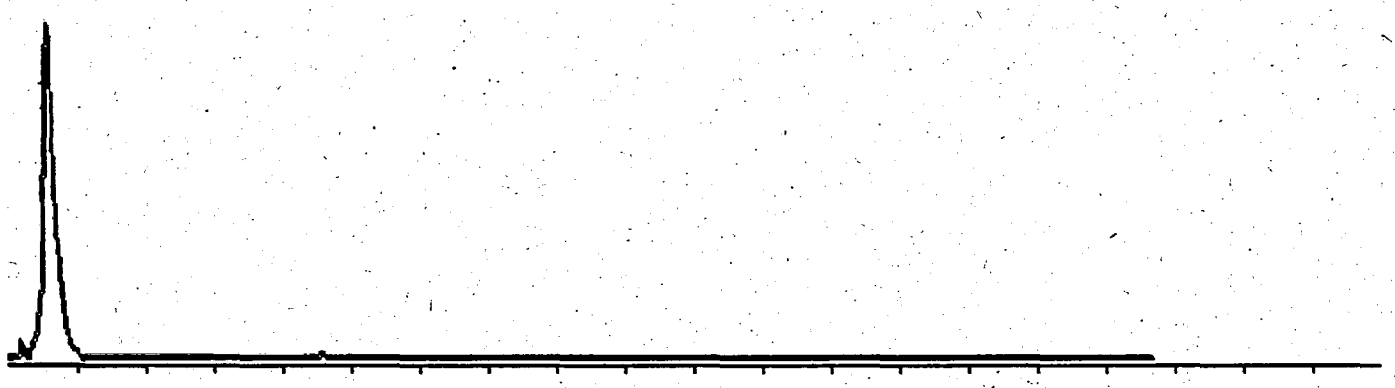
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	217992	12.788 PPB
2	TCE	158	7895	0.463 PPB

TOTAL AREA: 225887

NAME: EM-08 FS DUP
UPPER TRACE #67 9.31% Aug 09,93 17:25
LOWER TRACE #64 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 1.812
DURATION: 10 Minutes



AR100376

TRACE PRINTOUT

TRACE #68 DATE: Mon Aug 09 17:35:54 1993

NAME: EM-09 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

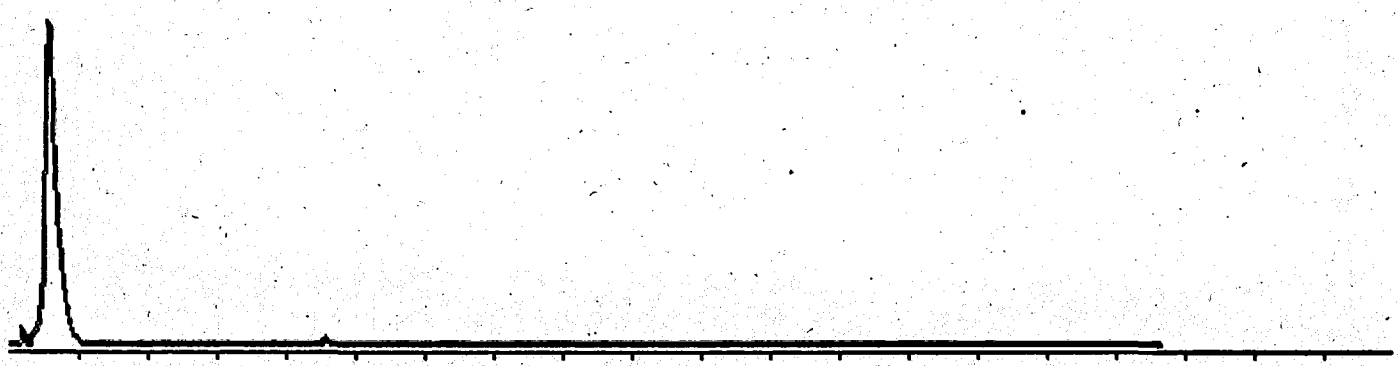
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	207653	12.182 PPB
2	TCE	158	8632	0.506 PPB

TOTAL AREA: 216285

NAME: EM-09 FS
UPPER TRACE #68 8.91% Aug 09,93 17:35
LOWER TRACE #64 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 20
SAMPLE TIME: 20
GAIN: 1.812
DURATION: 10 Minutes



AR100377

TRACE PRINTOUT

TRACE #69 DATE: Mon Aug 09 17:45:48 1993

NAME: LM-23 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

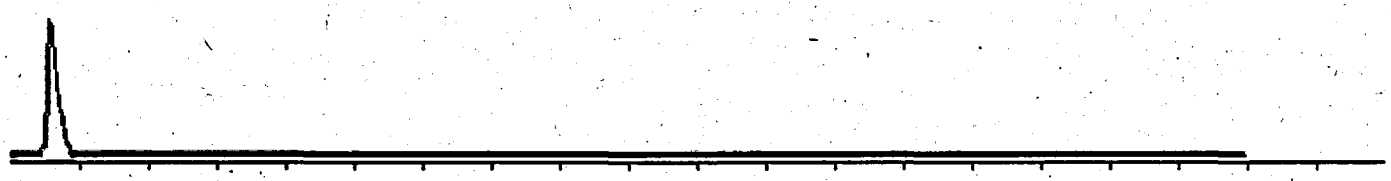
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	165085	9.684 PPB

TOTAL AREA: 165085

NAME: LM-23 FS
UPPER TRACE #69 6.80% Aug 09,93 17:45
LOWER TRACE #64 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100378

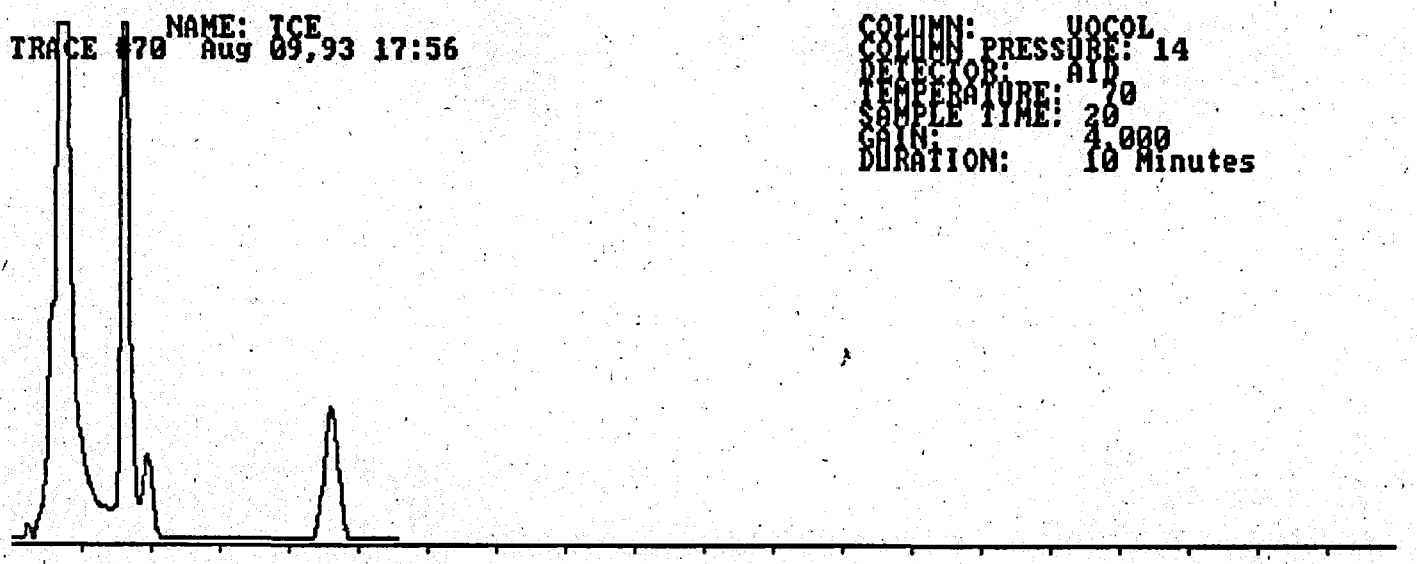
TRACE PRINTOUT

TRACE #70 DATE: Mon Aug 09 17:56:16 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	158	181503	15.000 PPB

TOTAL AREA: 181503



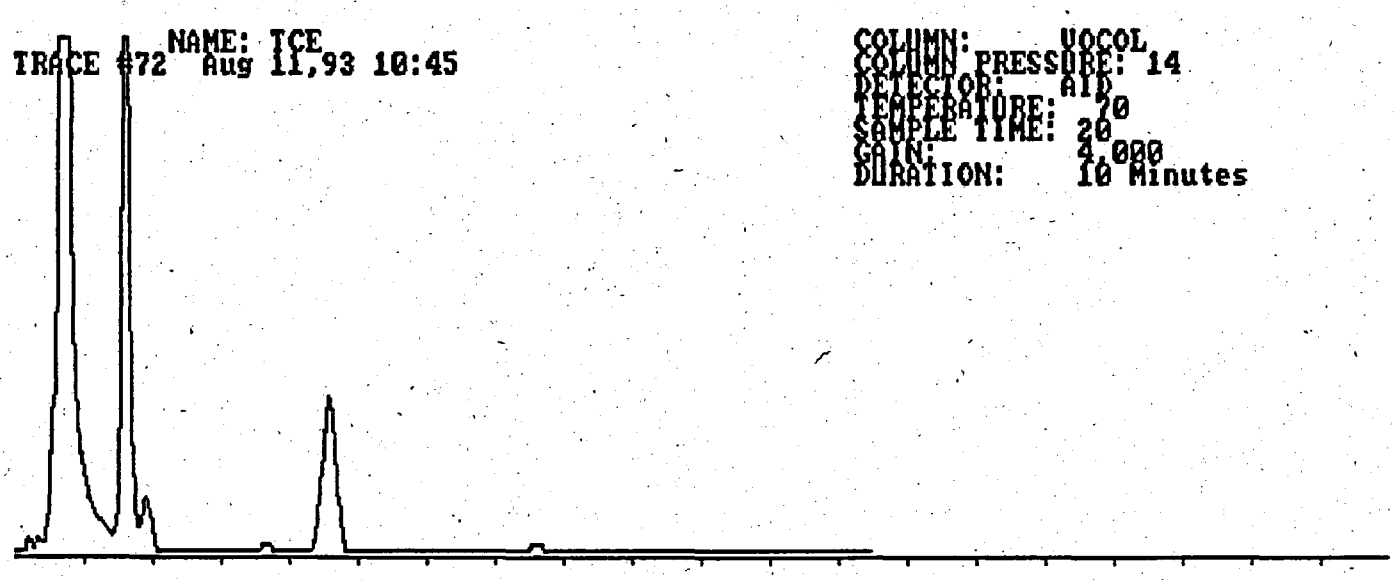
TRACE PRINTOUT

TRACE #72 DATE: Wed Aug 11 10:45:23 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	130	10383	1.400 PPM
2	TCE	157	197772	15.000 PPB
3	TOLUENE	249	17144	1.400 PPM

TOTAL AREA: 225299



AR100380

TRACE PRINTOUT

TRACE #73 DATE: Wed Aug 11 10:53:09 1993

NAME: BLANK
COLUMN: VOCOL
COLUMN PRESSURE: 14
DELAY TIME: 20.0
CELL FILL TIME: 10
TEMPERATURE: 70

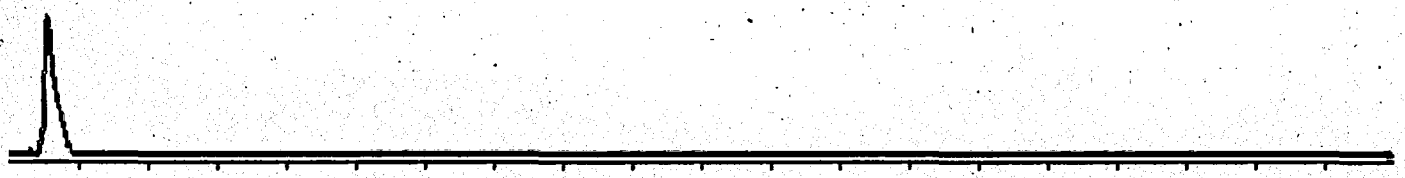
CHART DURATION: 10
DETECTOR: AID
SAMPLE TIME: 20
CELL EXHAUST TIME: 10
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	181171	24.428 PPM

TOTAL AREA: 181171

NAME: BLANK
UPPER TRACE #73 8.11% Aug 11,93 10:53
LOWER TRACE #72 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100381

TRACE PRINTOUT

TRACE #74 DATE: Wed Aug 11 11:13:39 1993

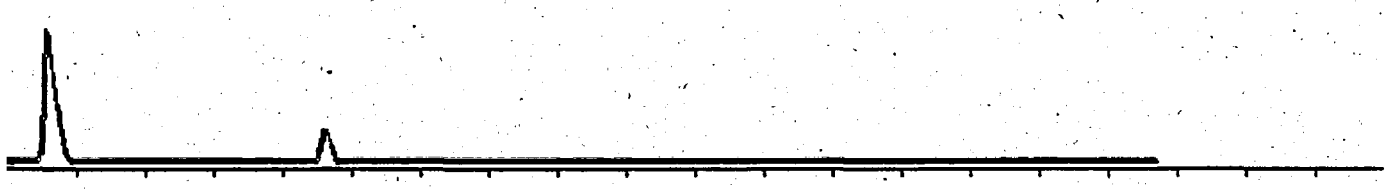
NAME:	PW-LM20 FS	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	169895	22.908 PPM
2	TCE	159	52984	4.019 PPB

TOTAL AREA: 222879

NAME: PW-LM20 FS
UPPER TRACE #74 9.98% Aug 11,93 11:13
LOWER TRACE #72 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100382

TRACE PRINTOUT

TRACE #75 DATE: Wed Aug 11 11:23:41 1993

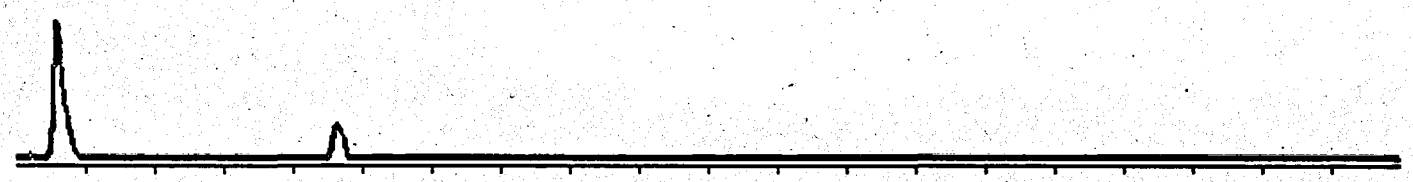
NAME: PW-LM20 FS D CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	163042	21.984 PPM
2	TCE	160	58859	4.464 PPB

TOTAL AREA: 221901

NAME: PW-LM20 FS D
UPPER TRACE #75 9.94% Aug 11,93 11:23
LOWER TRACE #72 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #76 DATE: Wed Aug 11 11:35:26 1993

NAME: LM-26 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

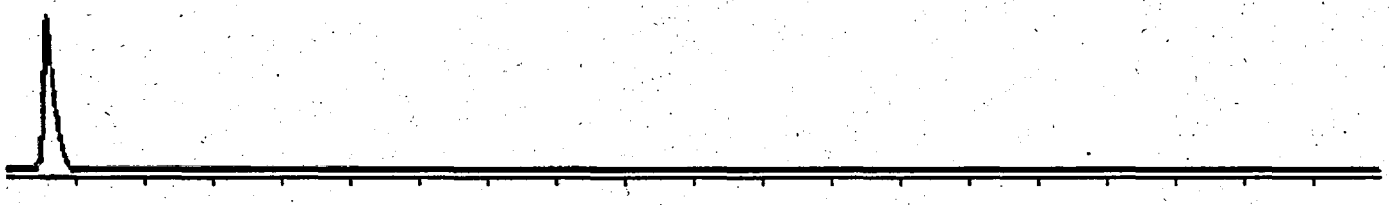
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	202162	27.259 PPM

TOTAL AREA: 202162

NAME: LM-26 FS
UPPER TRACE #76 8.05% Aug 11,93 11:35
LOWER TRACE #72 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #77 DATE: Wed Aug 11 13:23:24 1993

NAME: SA-07 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

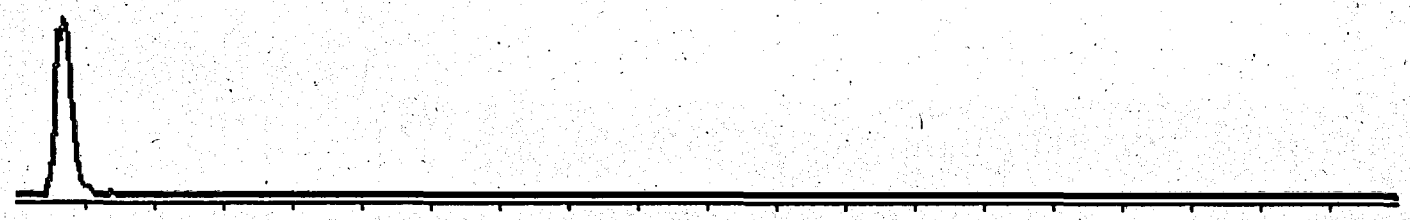
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	41	326102	43.970 PPM
2	UNKNOWN	62	17693	2.386 PPM
3	UNKNOWN	136	15073	2.032 PPM

TOTAL AREA: 358868

NAME: SA-07 FS
UPPER TRACE #77 16.07% Aug 11,93 13:23
LOWER TRACE #72 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #78 DATE: Wed Aug 11 14:19:23 1993

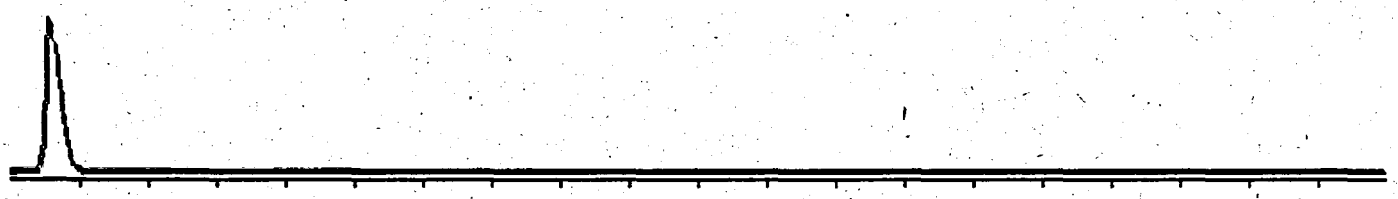
NAME: blank
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	39	260940	21.565 PPB
2	UNKNOWN	60	7798	0.644 PPB

TOTAL AREA: 268738

NAME: blank
UPPER TRACE #78 12.30% Aug 11,93 14:19
LOWER TRACE #70 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100386

TRACE PRINTOUT

TRACE #79 DATE: Wed Aug 11 14:44:06 1993

NAME: SA-07 FS DUP CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

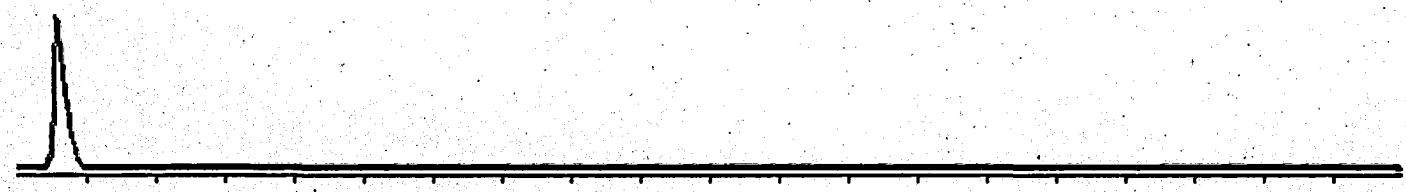
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	203384	16.808 PPB

TOTAL AREA: 203384

NAME: SA-07 FS DUP
UPPER TRACE #29 9.31% Aug 11,93 14:44
LOWER TRACE #70 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100387

TRACE PRINTOUT

TRACE #80 DATE: Wed Aug 11 14:57:31 1993

NAME: UM-60 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

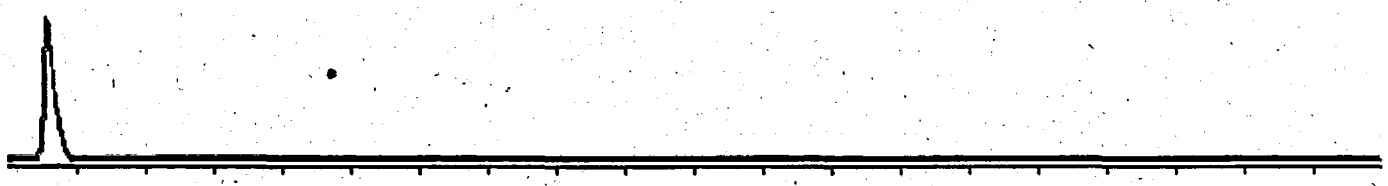
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	179216	14.811 PPB

TOTAL AREA: 179216

NAME: UM-60 FS
UPPER TRACE #80 8.21% Aug 11,93 14:57
LOWER TRACE #70 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100388

TRACE PRINTOUT

TRACE #81 DATE: Wed Aug 11 15:24:58 1993

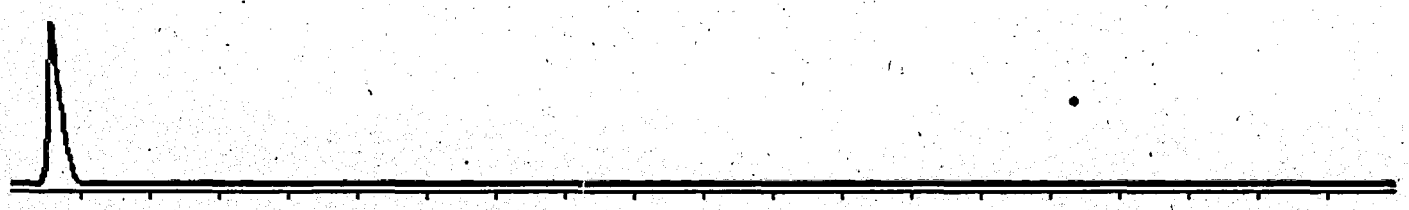
NAME:	PW-UM61 FS	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	239454	19.789 PPB

TOTAL AREA: 239454

NAME: PW-UM61 FS
UPPER TRACE #81 10.96% Aug 11,93 15:24
LOWER TRACE #70 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #82 DATE: Wed Aug 11 15:44:59 1993

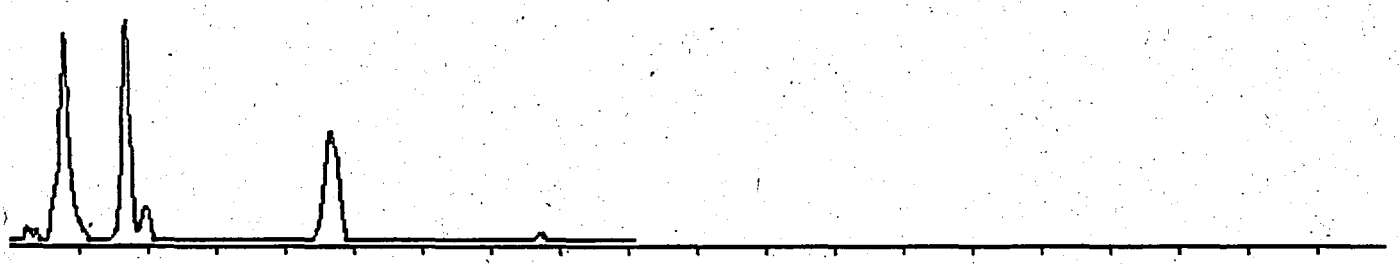
NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	160	142779	15.000 PPB

TOTAL AREA: 142779

TRACE #82 NAME: TCE
Aug 11,93 15:44

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100390

TRACE PRINTOUT

TRACE #83 DATE: Thu Aug 12 09:19:20 1993

NAME: TCE CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

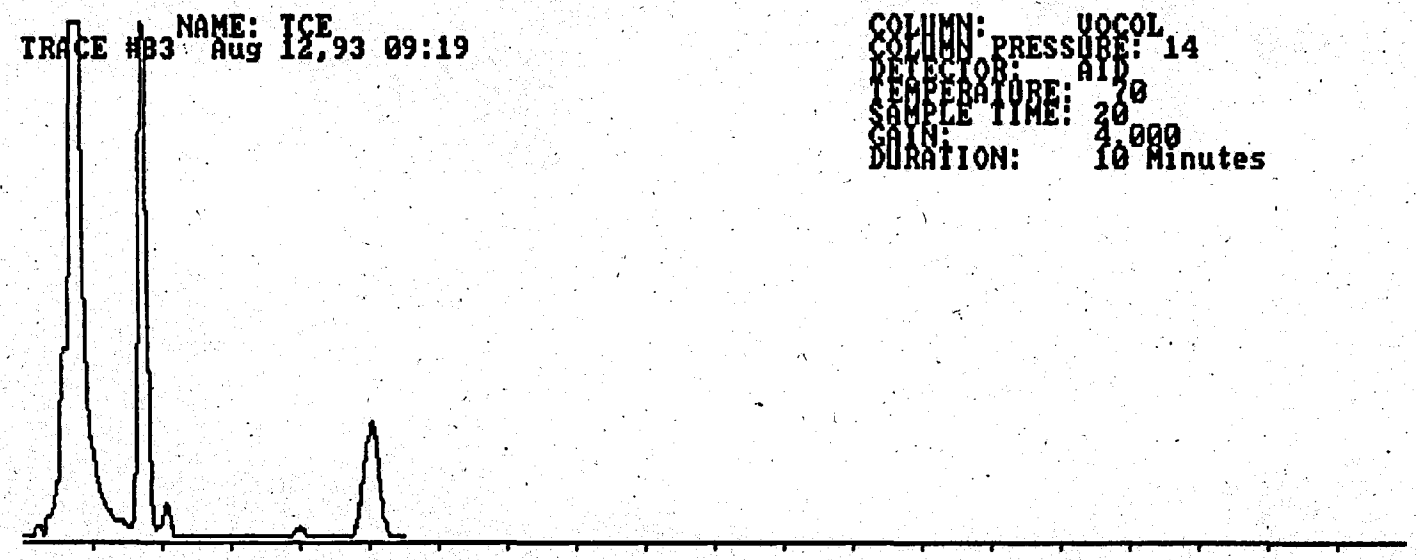
DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN 0	42	170786	0.000 PPB

TOTAL AREA: 170786



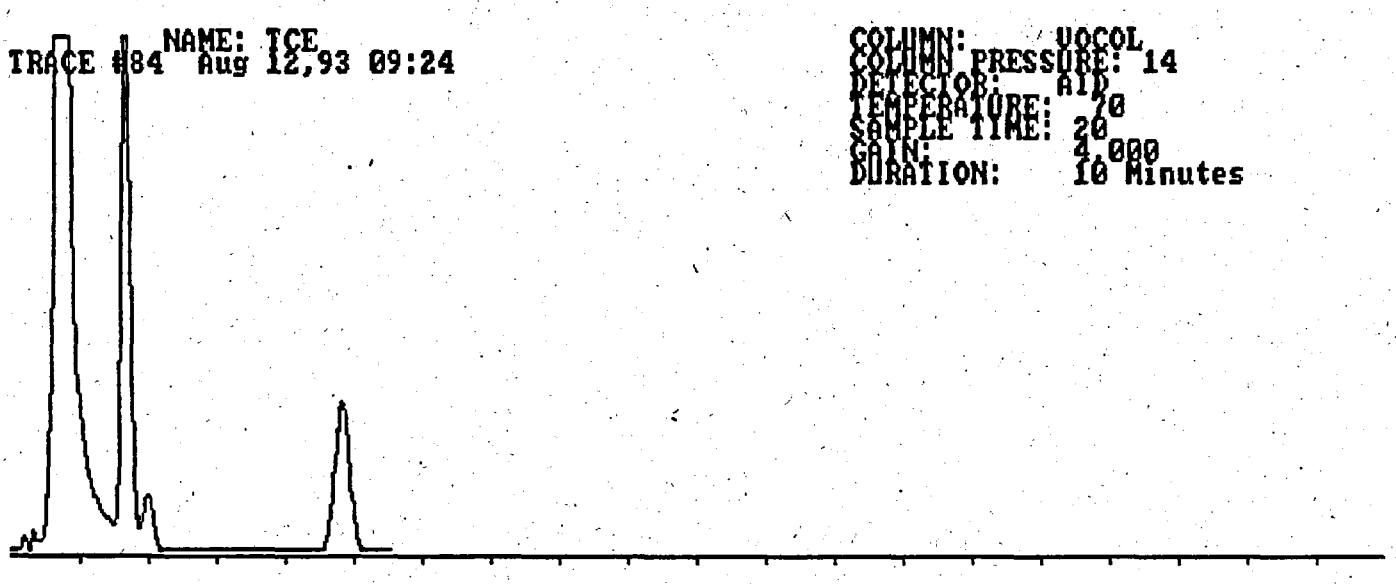
TRACE PRINTOUT

TRACE #84 DATE: Thu Aug 12 09:24:01 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	165	203107	15.000 PPB

TOTAL AREA: 203107



AR100392

TRACE PRINTOUT

TRACE #85 DATE: Thu Aug 12 09:28:20 1993

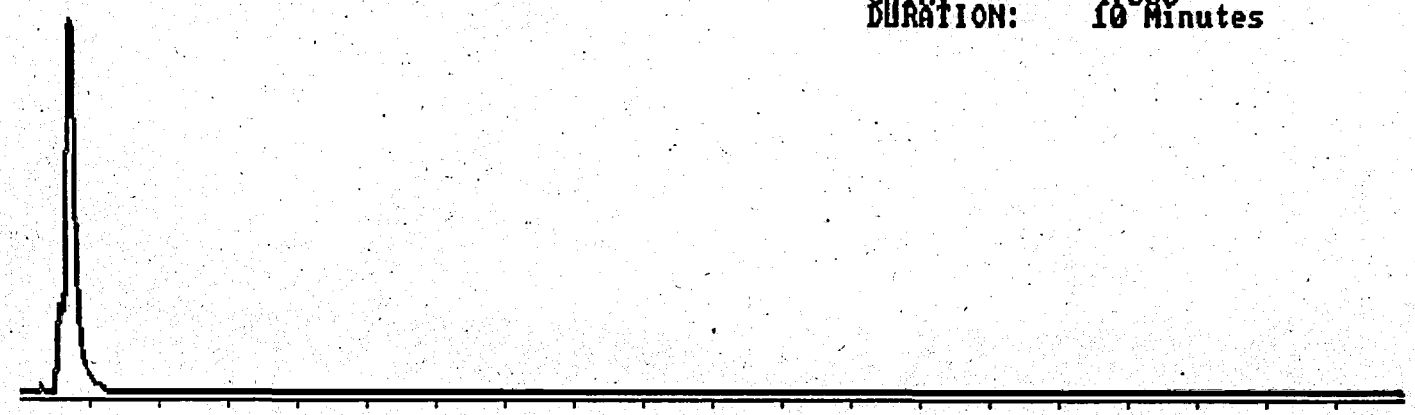
NAME:	BLANK	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	42	415923	30.717 PPB

TOTAL AREA: 415923

NAME: BLANK
UPPER TRACE #85 10.62% Aug 12,93 09:28
LOWER TRACE #84 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100393

TRACE PRINTOUT

TRACE #86 DATE: Thu Aug 12 09:41:20 1993

NAME: PW-LM27 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

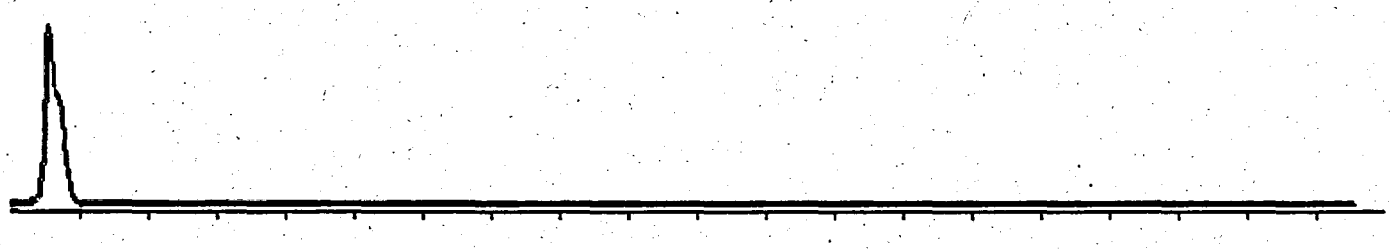
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	271132	20.024 PPB

TOTAL AREA: 271132

NAME: PW-LM27 FS
UPPER TRACE #86 6.92% Aug 12,93 09:41
LOWER TRACE #84 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100394

TRACE PRINTOUT

TRACE #87 DATE: Thu Aug 12 09:52:46 1993

NAME: LM28 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

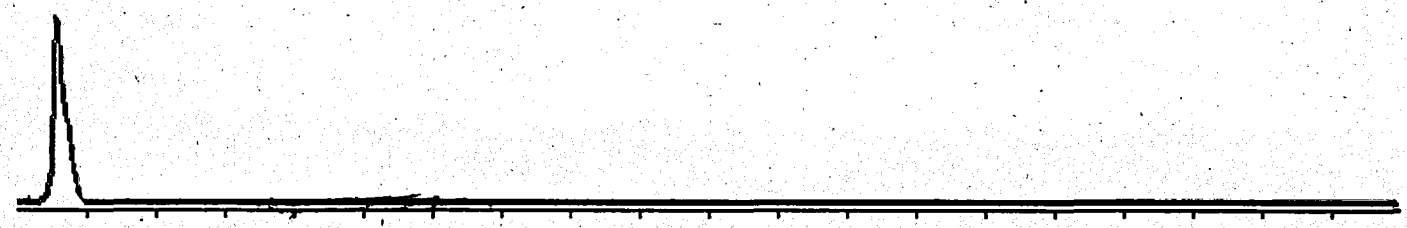
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	260376	19.229 PPB

TOTAL AREA: 260376

NAME: LM28 FS
UPPER TRACE #87 6.65% Aug 12,93 09:52
LOWER TRACE #84 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #88 DATE: Thu Aug 12 10:04:20 1993

NAME: SA-08 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

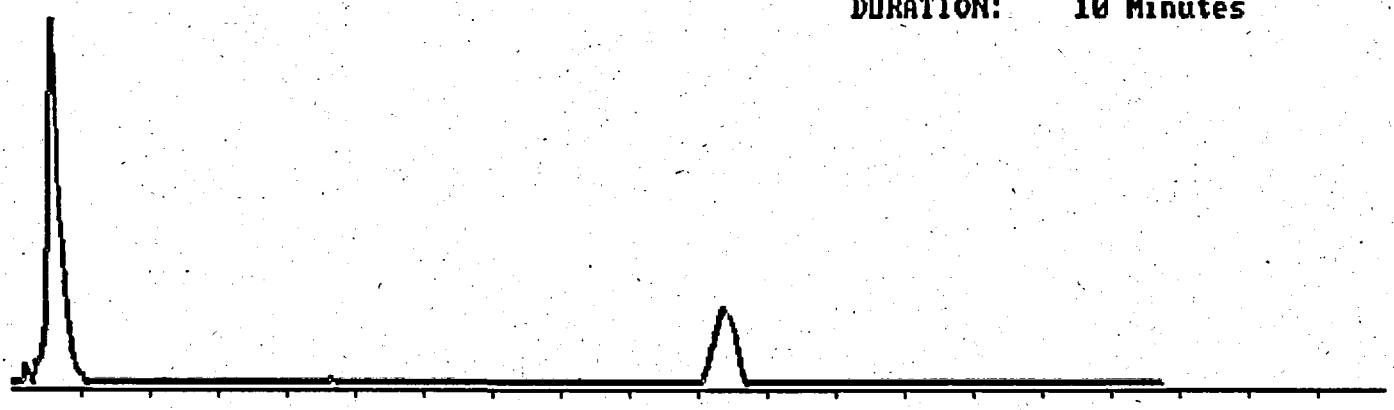
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	244534	18.059 PPB
2	TCE	161	8489	0.627 PPB
3	UNKNOWN	333	99230	7.328 PPB

TOTAL AREA: 352253

NAME: SA-08 FS
UPPER TRACE #88 8.99% Aug 12,93 10:04
LOWER TRACE #84 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 1.812
DURATION: 10 Minutes



AR100396

TRACE PRINTOUT

TRACE #89 DATE: Thu Aug 12 10:14:17 1993

NAME: SA-08 FS DUP CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

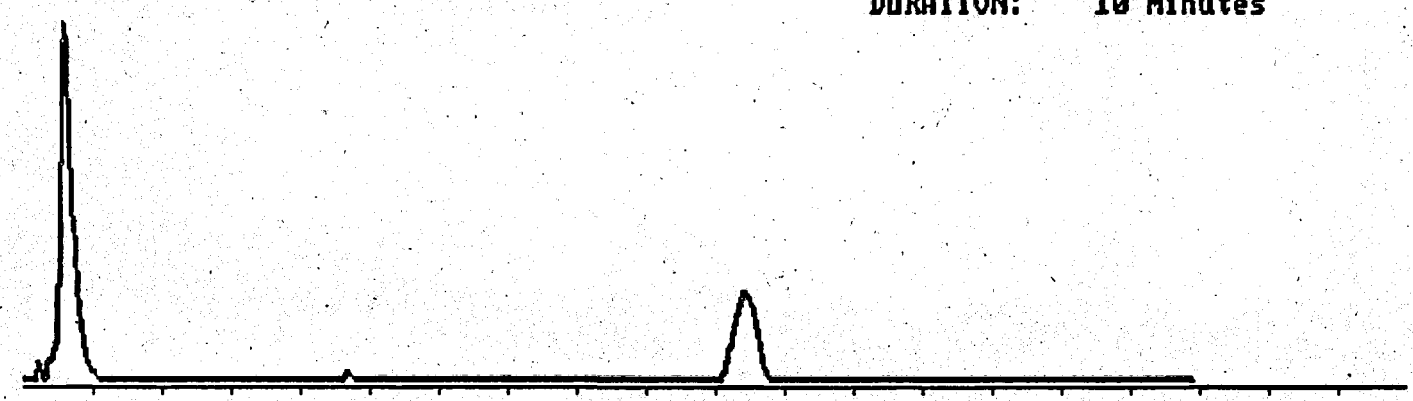
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	230324	17.010 PPB
2	TCE	162	10132	0.748 PPB
3	UNKNOWN	333	119716	8.841 PPB

TOTAL AREA: 360172

NAME: SA-08 FS DUP
UPPER TRACE #89 3.20% Aug 12,93 10:14
LOWER TRACE #84 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 7.812
DURATION: 10 Minutes



AR100397

TRACE PRINTOUT

TRACE #90 DATE: Thu Aug 12 10:33:42 1993

NAME: TCE CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 0

CELL FILL TIME: 0

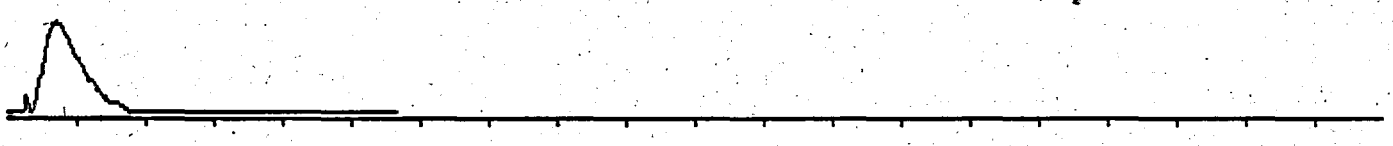
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN 0	41	311214	0.000 PPB

TOTAL AREA: 311214

TRACE #90 NAME: TCE Aug 12,93 10:33

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



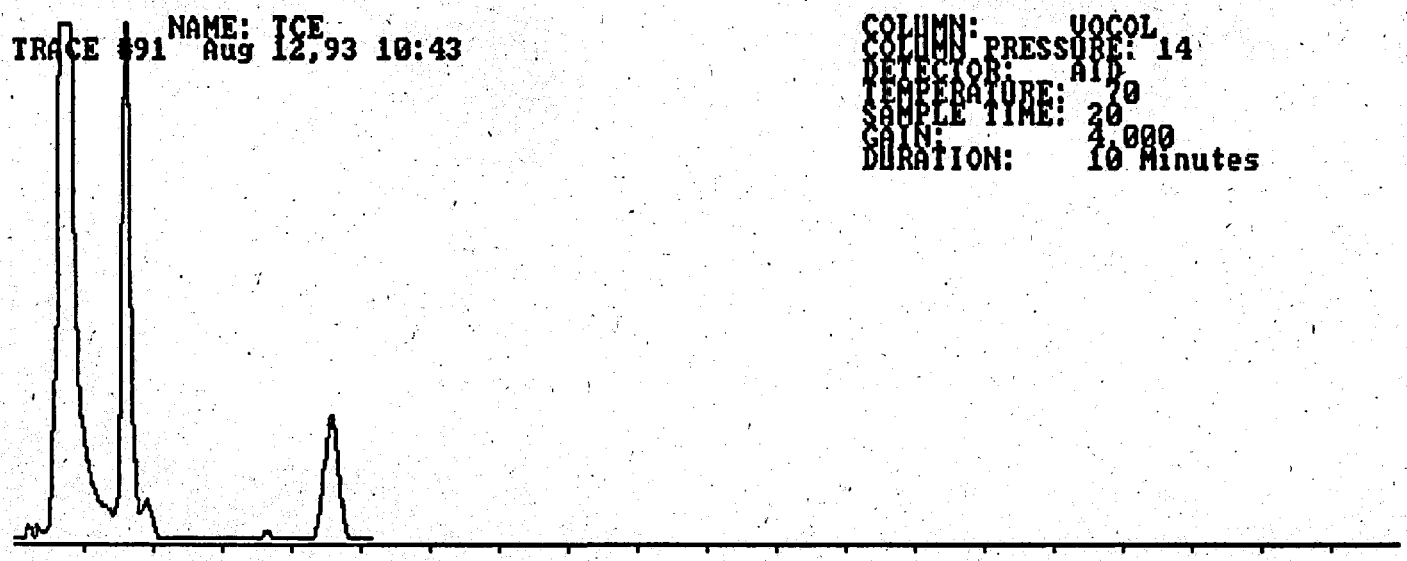
TRACE PRINTOUT

TRACE #91 DATE: Thu Aug 12 10:43:18 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME;	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	157	164154	15.000 PPB

TOTAL AREA: 164154



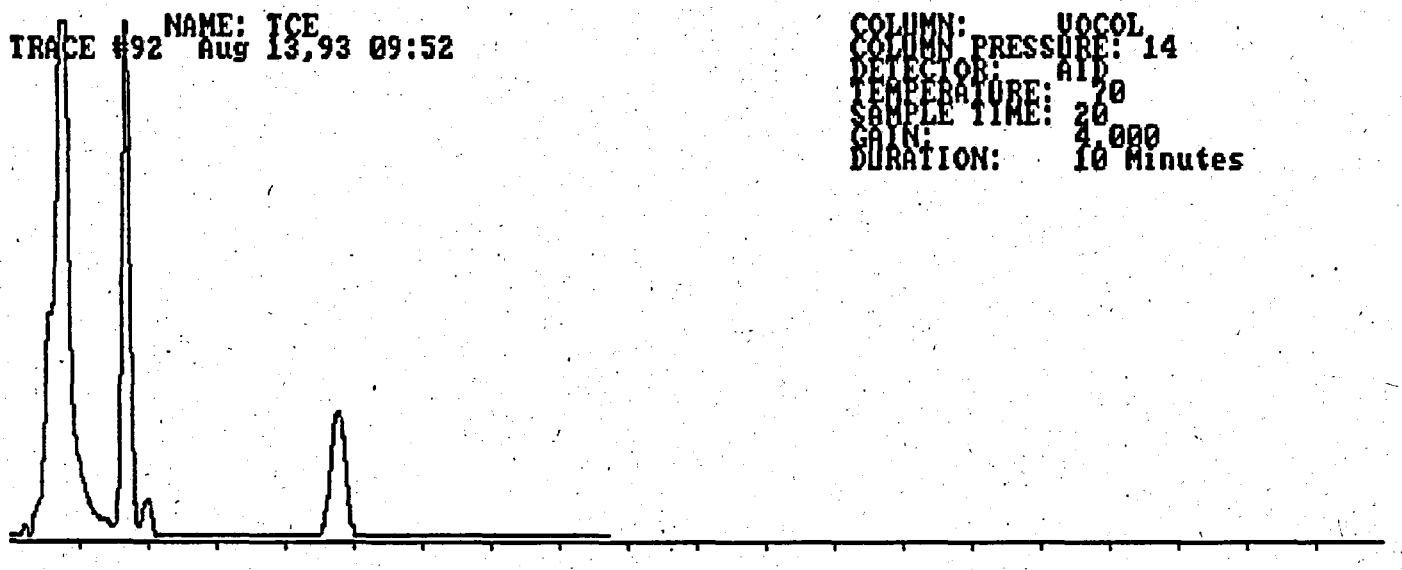
TRACE PRINTOUT

TRACE #92 DATE: Fri Aug 13 09:52:39 1993

NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	163	166389	15.000 PPB

TOTAL AREA: 166389



TRACE PRINTOUT

TRACE #93 DATE: Fri Aug 13 09:58:35 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	42	267693	24.133 PPB

TOTAL AREA: 267693

NAME: BLANK

UPPER TRACE #93 17.11% Aug 13,93 09:58

LOWER TRACE #92 100.00%

COLUMN: VOCOL

COLUMN PRESSURE: 14

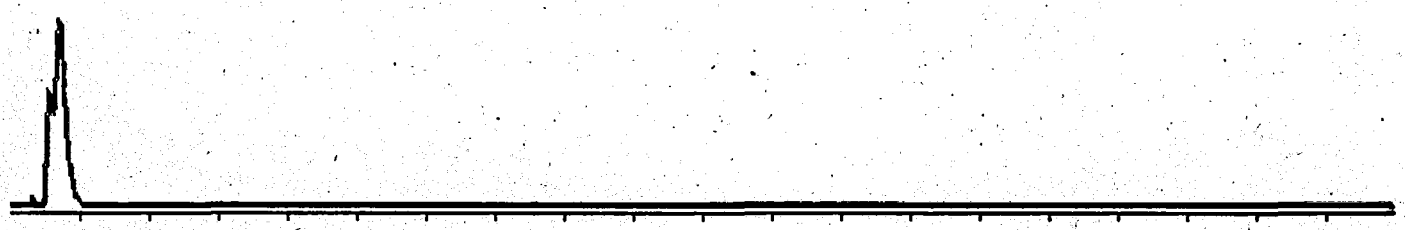
DETECTOR: AID

TEMPERATURE: 70

SAMPLE TIME: 20

GAIN: 4.000

DURATION: 10 Minutes



AR100401

TRACE PRINTOUT

TRACE #94 DATE: Fri Aug 13 10:32:23 1993

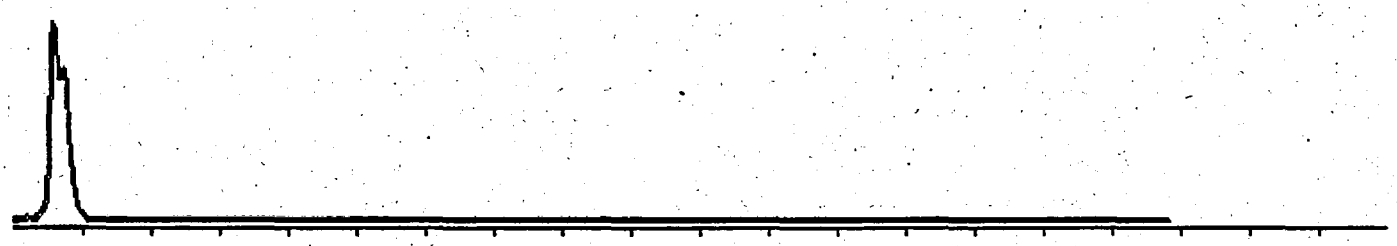
NAME: PW-LE312 FS CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	347898	31.363 PPB

TOTAL AREA: 347898

NAME: PW-LE312 FS
UPPER TRACE #94 22.24% Aug 13,93 10:32
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #95 DATE: Fri Aug 13 10:42:25 1993

NAME: PW-LE411 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

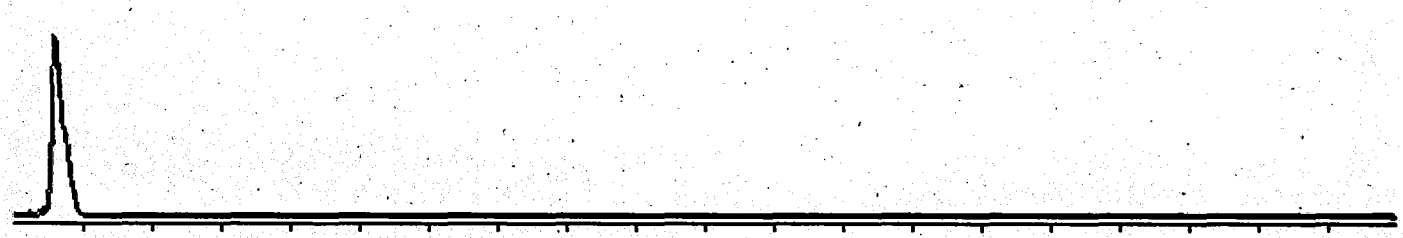
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	246654	22.236 PPB

TOTAL AREA: 246654

NAME: PW-LE411 FS
UPPER TRACE #95 15.77% Aug 13,93 10:42
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100403

TRACE PRINTOUT

TRACE #96 DATE: Fri Aug 13 10:56:26 1993

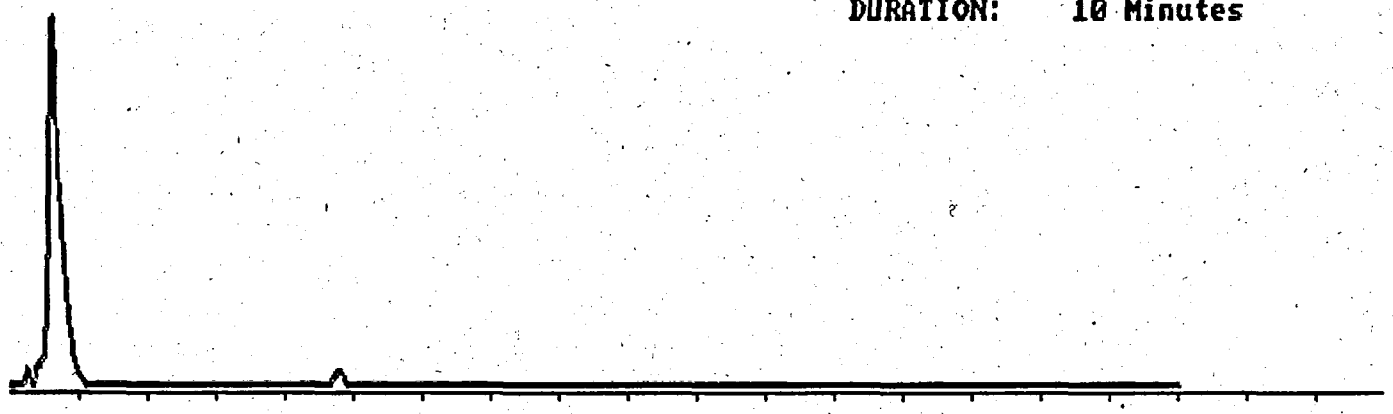
NAME: PW-LM21 FS CHART DURATION: 10
COLUMN: VOCOL DETECTOR: AID
COLUMN PRESSURE: 14 SAMPLE TIME: 20
DELAY TIME: 20.0 CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	39	243117	21.917 PPB
2	TCE	164	15926	1.436 PPB

TOTAL AREA: 259043

NAME: PW-LM21 FS
UPPER TRACE #96 16.56% Aug 13,93 10:56
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 7.812
DURATION: 10 Minutes



AR100404

TRACE PRINTOUT

TRACE #97 DATE: Fri Aug 13 11:06:32 1993

NAME: PW-LM21 FS D CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

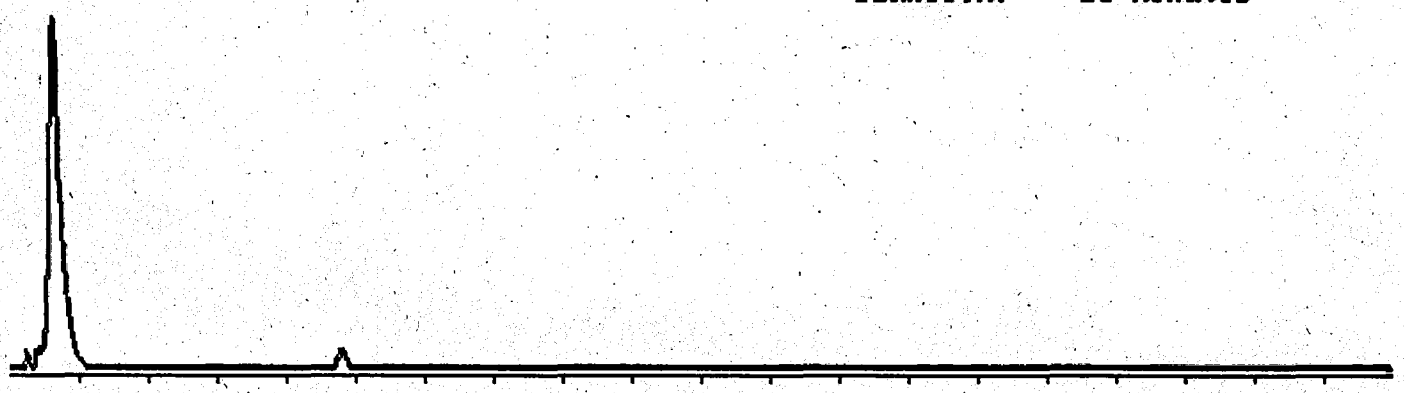
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	39	221792	19.995 PPB
2	TCE	165	17702	1.596 PPB

TOTAL AREA: 239494

NAME: PW-LM21 FS D
UPPER TRACE #97 15.31% Aug 13,93 11:06
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 7.812
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #98 DATE: Fri Aug 13 11:37:10 1993

NAME: PW-SA09 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

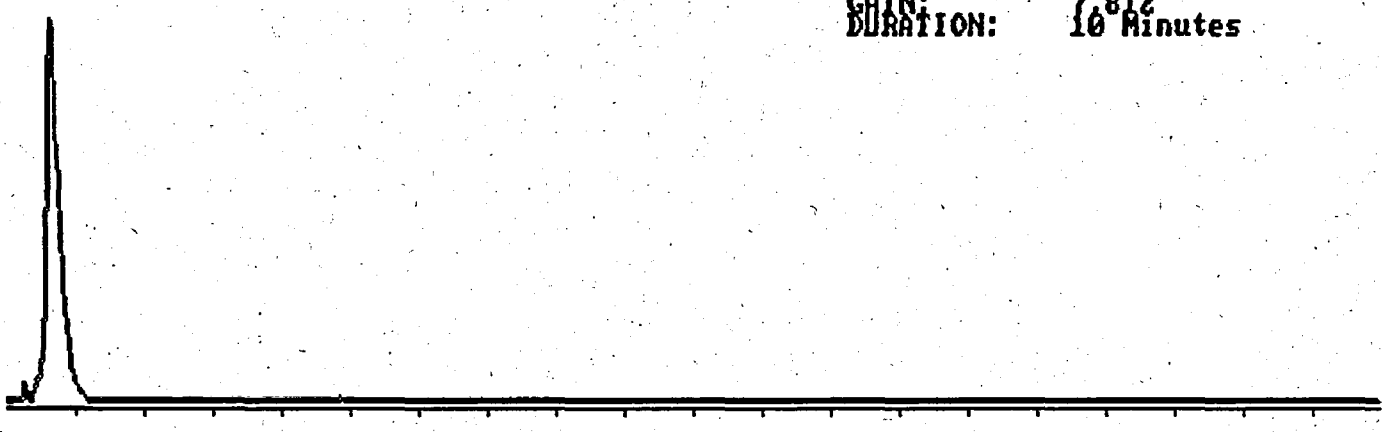
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	39	266410	24.017 PPB
2	TCE	166	6806	0.614 PPB

TOTAL AREA: 273216

NAME: PW-SA09 FS
UPPER TRACE #98 17.46% Aug 13,93 11:37
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 1.812
DURATION: 10 Minutes



AR100406

TRACE PRINTOUT

TRACE #99 DATE: Fri Aug 13 11:54:13 1993

NAME: PW-UM62 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

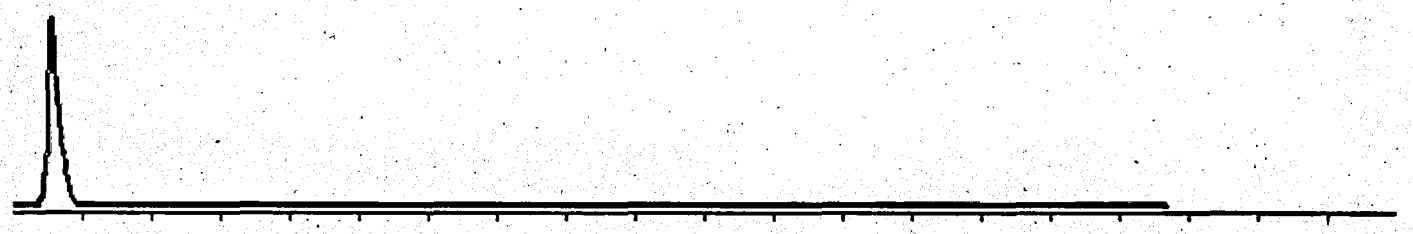
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	37	237952	21.451 PPB

TOTAL AREA: 237952

NAME: PW-UM62 FS
UPPER TRACE #99 15.21% Aug 13,93 11:54
LOWER TRACE #92 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100407

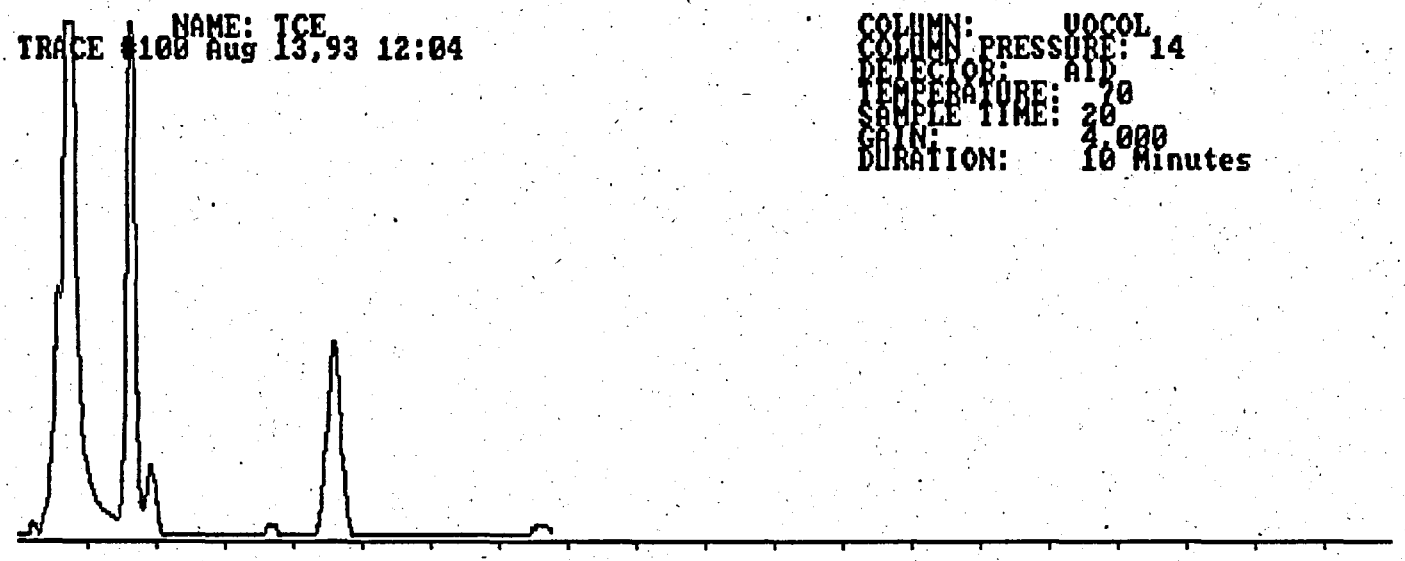
TRACE PRINTOUT

TRACE #100 DATE: Fri Aug 13 12:04:04 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	BENZENE	130	17222	1.400 PPM
2	TCE	158	252755	15.000 PPB
3	TOLUENE	249	15486	1.400 PPM

TOTAL AREA: 285463



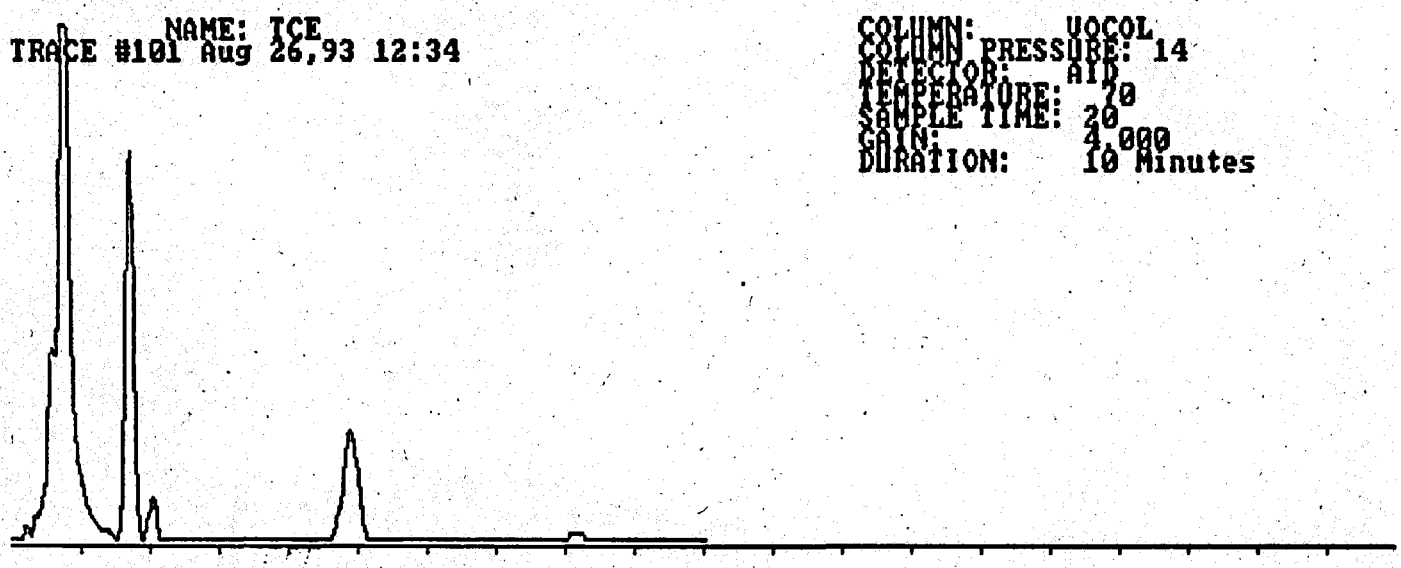
TRACE PRINTOUT

TRACE #101 DATE: Thu Aug 26 12:34:38 1993

NAME:	TCE	CHART DURATION:	10
COLUMN:	VOCOL	DETECTOR:	AID
COLUMN PRESSURE:	14	SAMPLE TIME:	20
DELAY TIME:	20.0	CELL EXHAUST TIME:	10
CELL FILL TIME:	10		
TEMPERATURE:	70	INHIBIT TIME:	20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	167	148157	15.000 PPB

TOTAL AREA: 148157



TRACE PRINTOUT

TRACE #102 DATE: Thu Aug 26 12:41:12 1993

NAME: BLANK CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

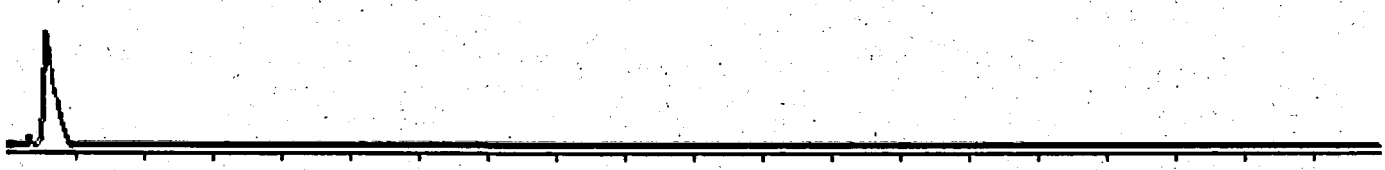
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	147234	14.907 PPB

TOTAL AREA: 147234

NAME: BLANK
UPPER TRACE #102 12.10% Aug 26,93 12:41
LOWER TRACE #101 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



TRACE PRINTOUT

TRACE #103 DATE: Thu Aug 26 12:58:59 1993

NAME: PW-UM63 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

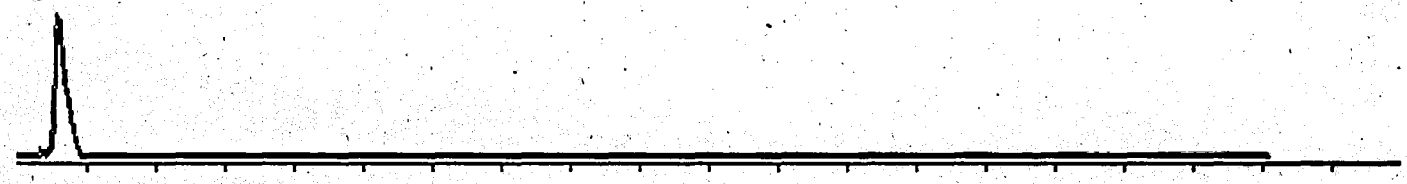
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	176574	17.877 PPB

TOTAL AREA: 176574

NAME: PW-UM63 FS
UPPER TRACE #103 14.51% Aug 26,93 12:58
LOWER TRACE #101 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100411

TRACE PRINTOUT

TRACE #104 DATE: Thu Aug 26 13:09:39 1993

NAME: PW-UM64 FS CHART DURATION: 10

COLUMN: VOCOL DETECTOR: AID

COLUMN PRESSURE: 14 SAMPLE TIME: 20

DELAY TIME: 20.0 CELL EXHAUST TIME: 10

CELL FILL TIME: 10

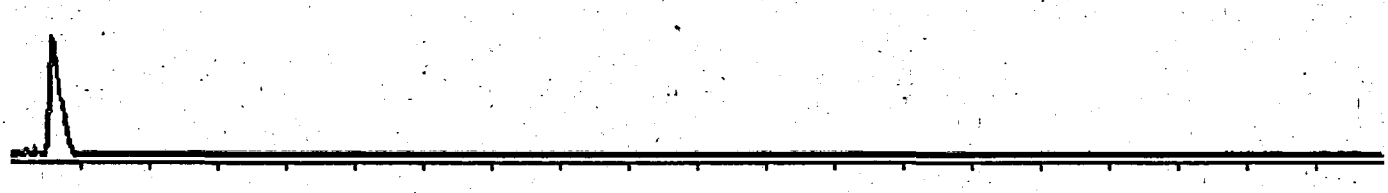
TEMPERATURE: 70 INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	UNKNOWN	38	144756	14.656 PPB

TOTAL AREA: 144756

NAME: PW-UM64 FS
UPPER TRACE #104 11.89% Aug 26,93 13:09
LOWER TRACE #101 100.00%

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100412

TRACE PRINTOUT

TRACE #105 DATE: Thu Aug 26 13:23:36 1993

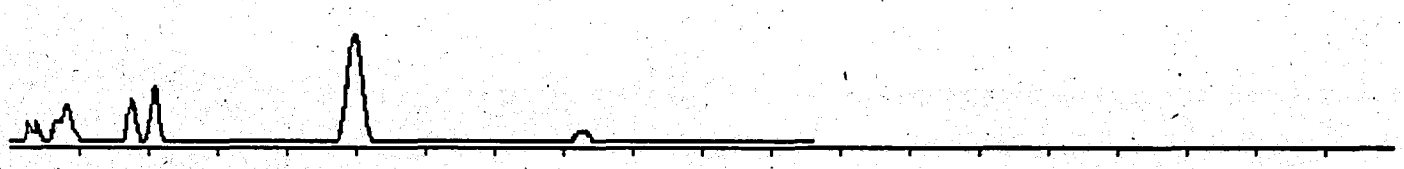
NAME: TCE
CHART DURATION: 10
COLUMN: VOCOL
DETECTOR: AID
COLUMN PRESSURE: 14
SAMPLE TIME: 20
DELAY TIME: 20.0
CELL EXHAUST TIME: 10
CELL FILL TIME: 10
TEMPERATURE: 70
INHIBIT TIME: 20

PEAK#	NAME	RT	AREA	CONCENTRATION
1	TCE	169	142490	15.000 PPB
2	UNKNOWN 1	269	28425	0.000 PPB

TOTAL AREA: 170915

NAME: TCE
TRACE #105 Aug 26,93 13:23

COLUMN: VOCOL
COLUMN PRESSURE: 14
DETECTOR: AID
TEMPERATURE: 70
SAMPLE TIME: 20
GAIN: 4.000
DURATION: 10 Minutes



AR100414

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APPENDIX 5

SURVEY DATA

TABLE 1: ELEVATIONS OF PRIVATE WELL SAMPLING LOCATIONS

EMMAUS, PENNSYLVANIA AREA

Table No.	Sample ID	Elevation	Name and Address	Description of Elevation Point
1	PW-EM08	323.83 322.60	Peter, Donald 3729 Orchid Lane	Top cast iron cap Ground
2	PW-LM28	322.55	Peter, Donald 3729 Orchid Lane	Top concrete pad between 3705 & 3729
3	PW-EM09	324.46 323.34	Leube, Helmut 3705 Orchid Place	Top cast iron cap Ground
4	PW-LM10	423.01 422.52	Lynn, Thomas (Mary Ellen) 4226 Indian Creek Road	Top well cap Ground
5	PW-LM20	317.41 316.52	Rader, C. Kermit 3612 Orchid Lane	Top well cap Ground
6	PW-LM21	317.02	Simonds, William & Rebekah 3465 Orchid Place	Top concrete pad
7	PW-LM23	390.42 389.52	Lee, Robert E. 3430 Orchid Place	Top well cap Ground
8	PW-SA09	467.68 466.67	Mazzeo, Steve 412 Mountain Drive	Top well cap Ground
9	PW-1492	516.79 515.87	Stauffer, David E. 4701 Mill Road	Top well cap Ground
10	PW-1501	676.66 675.90	Doney, Samuel 4832 Linda Lane, Emmaus	Top well cap Ground
11	PW-LE312	561.45 561.13 559.26	Schuster, Stephen 5202 Vera Cruz Road	Top PVC pipe, north side of house Ground Top cast iron cap, east side of house
12	PW-UM62	529.81 529.37	Domitrowits 600 S. 7th Street, Emmaus	Top well cap Ground
13	PW-UM40	421.68 421.08	Kline, Michael 3732 Allen Street	Top well cap Ground
14	PW-UM43	452.22 451.10	(Baumann, Lawrence A.) Brockhurst 4587 N. Vera Cruz Road	Top Well Cap Ground

AR100416

Table 1: (Elevations of Private Well Sampling Locations - Continued)

Table No.	Sample ID	Elevation	Name and Address	Description of Elevation Point
15	PW-UM59	493.01 492.61	Sherman Charlene 4819 Vera Cruz Road	Top well cap Ground
16	PW-SA08	309.07 308.01	Keim, Floyd (Owner) 348 Keystone Road (prop.)	Top well cap Ground
17	PW-UM63	506.80 505.07	Evans, Jerry 3331 S. Seventh Street	Top cast iron cap Ground

AR100417

TABLE 2: ELEVATIONS OF SURFACE WATER AND SPRING LOCATIONS

EMMAUS, PENNSYLVANIA AREA

Table No.	ID No.	Elevation	Location	Description of Elevation Point
			SPRING LOCATIONS	
1	LE-SP73	323.70	Camp Olympic	Top wall at spring house outlet chiseled to west side creek
		321.50		In house
		320.40		At screen
2	SP-03	298.88	Camp Olympic	Chiseled square on top concrete well at water exit
		296.39		Water level
			SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS	
3	SWG-1	559.69	Unnamed tributary to Liebert Creek at Vera Cruz Road in Vera Cruz	Chiseled square on west side of bridge
4	SWG-2	470.33	Liebert Creek, past Quarry Road	Mark on centerline at north side of bridge
5	SWG-3	389.43	S. intermittent tributary at Chestnut Street	Chiseled square on top of endwall at 16th Street
6	SWG-4	374.35	S. intermittent tributary prior to confluence with Liebert Creek	Chiseled square on Route 29 at Liebert Creek on east side of headwall
7	SWG-5	384.62	Liebert Creek prior to confluence with S. intermittent tributary	Chiseled square on north side of wall on Chestnut Street Bridge near Indian Creek Golf Course
8	SWG-6	328.59	Little Lehigh Creek near confluence with Liebert Creek (at Camp Olympic)	North side steel bridge center post; top grate paint mark
9	SWG-8	332.73	Little Lehigh Creek at Route 29 (Cedar Crest Blvd.) bridge	Chiseled square on west side of Route 29 bridge at Little Lehigh Creek

AR100418

Table 2: Elevations of Surface Water and Spring Locations (Continued)

Surface Water and Sediment Sample Locations (Continued)

Table No.	ID NO.	Elevation	Location	Description of Elevation Point
10	SWG-9	318.07	Little Lehigh Creek on Orchid Place at Pool Wildlife Sanctuary)	PK nail on west side of bridge west of center post
11	SWG-10	310.97	Little Lehigh Creek at Weidas Mill Bridge (on Riverbend Road)	Chiseled square in centerline of the west end of bridge over Little Lehigh Creek at Riverbend Road
12	SWG-11	308.79	Little Lehigh Creek at Kecks Bridge (Keystone Road)	Paint mark on west side of steel bridge at centerline of third hand rail in from south end of bridge
13	SWG-12	303.33	Little Lehigh Creek at Devonshire Road Bridge	Chiseled square on west side of Rathburn Bridge at the approximate centerline of bridge top wall
14	SWG-15	506.82	S. intermittent tributary at S. Seventh Street	Chiseled square on concrete at centerline of north end of bridge
15	SWG-16	500.61	Liebert Creek at Quarry Road	Paint mark at centerline at north end of bridge on top steel grate of bridge over Liebert Creek at Quarry Road

AR100419

OLD RODALE PRESS SITE
MONITOR WELL ELEVATIONS

Table No.	Well No.	Elevation	Description of Elevation Point
1	MW-1	466.84	Top PVC pipe
		466.17	Top concrete
2	RW-1	467.32	Top cast iron
		465.63	Top concrete
3	Well-1	467.68	Top cast iron
		468.45	Top concrete
4	RW-2	467.59	Top cast iron
		465.65	Top concrete
5	Well-2	466.10	Top cast iron
		465.28	Top concrete
6	MW-2	460.05	Top cast iron
		460.03	Top concrete
7	MW-3	459.55	Top cast iron
		459.49	Top concrete
8	Well-3	466.10	Top cast iron
		465.24	Top concrete
9	Well-4	466.08	Top cast iron
		464.95	Top concrete
10	MW-4	462.00	Top lid and concrete
11	Well-5	463.39	Top 4" metal sleeve
		465.43	Top concrete cistern
12	Well-6	462.76	Top cast iron (concrete box broken)
13	WW-8	461.62	Top concrete lip of well
		464.95	Top concrete

6

AR100421

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APPENDIX 6

CHAIN OF CUSTODY FORMS

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1988521-29
1988530-33

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Emmaus On-Site wells
PWSID #:
Project Manager: Kenn Murdock
P.O. #: 1001-02-12
Sampler: J. Goldsward, K. Murdock
Quote #: 1048906
State where sample was collected: PA

(2) (3) (4) (5) (6)

For LLI use only
FSC:
SCR #: 1048906

Sample Identification	Date	Time					Total # of Containers	TOC, NH3, TKN	NO2, NO3, TKN	DIS-Metals	Total Metals	Pes PCB TCL Sem	TAL CN	Diss Metals	Alk, T Alka	SO4, TDS	Cl-		
OW- MW-1	6/30/93	1130	✓			✓	14	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- MW-2	6/30/93	1530	✓				14	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- MW-2D	6/30/93	1530	✓				14	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- FB1	6/30/93	1735	✓				14	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- TB1	6/30/93								✓	✓							TCL VOA ONLY + metals		

AR100423

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8)
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete ? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	6/29/93	0330	Erma Dillman	6/29/93	7:45
Erma Dillman	6/29/93	10:50	Jean M. Murdock	6/29/93	1050
[signature]	6/30/93	1752	[signature]	6/30/93	1752
[signature]	6/30/93	1942			
Relinquished by:	Date	Time	Received for LLI by:	Date	Time
			Russell J. Blumenthal	6/30/93	1942

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1989613-20
1989625-27

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Emmaus on-site wells
PWSID #:
Project Manager: Kenn Murdock
P.O. #: 1001 02 12
Sampler: J. Goudsward, M. Rouse, K. Murdock
Quote #: 1048906
State where sample was collected: PA

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Matrix					Total # of Containers	TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals	Total metals	PCB's	TCL SEM	Alk, SO4, TDS	TKN, Cl-, Cn-	Dissolved Cn-	T Alk	Remarks
OW-MW3	7/1/93	1115	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	2 vials + one 1000 ml (amber) bottle broken upon receipt. DZ
OW-MW3D	7/1/93	1115	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
OW-FB2	7/1/93	1530	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	One 1000 ml amber bottle broken upon receipt. DZ ~~[illegible]~~ SG 7/2/93
OW-AB1	7/1/93	1500	✓			✓		5			✓	✓			✓					TOTAL METALS, Cn- ONLY
OW-TB2	7/1/93					✓		3			✓									

AR100424

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8)
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	6/29/93	0330	[redacted] (b) (4)	6/29/93	7:45
	6/29/93	10:50		6/29/93	1050
	7/1/93	1505		7/1/93	1505
	7/1/93	1730		7/1/93	17:30
	7/1/93	18:00		7/1/93	1000

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440
Sample # 1990518-26
19903329-32

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Project Name/#: Emmaus on-site wells
Project Manager: [redacted] (b)(4)
Sampler: J. Goutsward, Mary Rooney
State where sample was collected: PA
Acct. #: 7440
PWSID #:
P.O. #: 10010212
Quote #: 1049068

For LLI use only
FSC:
SCR #: 1049068

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Potable	NPDES	Other	Total # of Containers	TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved Metals, Total Metals	Pes PCB, TCL SEM	TAL CN	Alk, TALK	Cl, Sulfate, SOY	TDS	Remarks	Temperature of samples upon receipt
OW-MW4	7/6/93	1300	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW-MW4D	7/6/93	1300	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓				
OW-WELLS	7/6/93	1700	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓				
OW-FB3	7/6/93	1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓				
OW-TB3	7/6/93					✓		3			✓									

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested)
(8)
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete? Yes No

Relinquished by:	Date	Time	Received by:	Date	Time
[redacted] (b)(4)	7/6/93	1650	[redacted] (b)(4)	7/6/93	6:30 (9)
	7/6/93	9:25		7/6/93	0:25
	7/6/93	1730		7/6/93	1730
	7/6/93	1900			
				7/6/93	1900

C27001UE

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1990985-91
1990992-94

Please print. Instructions on reverse side correspond with circled numbers.

Client: GEC, Inc. Acct. #: 7440
Project Name/#: Emmaus-Onsite Wells PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12
Sampler: [redacted] (b) (4) Quote #: 1049068
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049068

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4)	Other	Total # of Containers	TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals Total metals (TAL)	Pes, PCBs, TCL Semi	TAL CN (diss, total)	Alk, Tal, CL, SO4	TDS	Remarks	Temperature of samples upon receipt (6)
OW-WELL6	7/7/93	1230	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
OW-WELL6D	7/7/93	1230	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	duplicate of above	
OW-FB4	7/7/93	1600	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
OW-TB4	7/7/93										✓							

AR100426

Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested)
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	7/7/93	1652	[redacted] (b) (4)	7/6/93	6:30
	7/6/93	9:25		7/6/93	0925
	7/7/93	1708		7/7/93	5:08
	7/7/93	737			
				7/7/93	1940

Analysis Request/Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440
Sample # 1993929-32
1993934-36

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Emmaus - onsite wells
PWSID #:
Project Manager: [redacted] (b) (4)
P.O. #: 1001-02-12
Sampler: JG, [redacted]
Quote #: 1049205
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049205

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Potable	NPDES	Water	Other	Total # of Containers	(5) TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals, Total metals (TAL)	Des. PCB, TCL Semi	TAL CN (Dissolved, Total)	Alk, TALK Cl	SO4, TDS	Remarks	(6) Temperature of sample upon receipt
OW - well 4	7/13/93	1230	✓					✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW - well 4D	7/13/93	1230	✓					✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
FB-5	7/13/93	1430	✓					✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
TB-5	7/13/93							✓		3			✓							

AR100427

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8) QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No Per CLP Requirements

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/13/93	2030	[redacted] (b) (4)	7/13/93	
	7/13/93	1540		7/13/93	3:39
	7/13	6:58			
Relinquished by:				7/13/93	

For LLI Use Only

Acct. # _____ Sample # 1994482-54 / 1994515-25

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC Acct. #: 7440

Project Name/#: Emmaus Onsite Wells PWSID #: _____

Project Manager: [redacted] (b)(4) P.O. #: 100-0212

Sampler: [redacted] (b)(4) Quote #: _____

State where sample was collected: PA

For LLI use only

FSC: _____

SCR #: 1049263

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals, Total metals (TAL), PCB, TCL semi	TAL CN, (Dissolved, Total)	Alk, TALK, CL	SO4, TDS	Remarks	(6) Temperature of samples upon receipt
OW-Well 2	7/14/93	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2D	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2MS	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2MSD	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-FBG	"	1430				✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-TBG	"					✓		1			✓						

(7)

Turnaround Time Requested (please circle) Normal Rush

(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed: _____

Rush results requested by (please circle): Phone Fax

Phone #: _____

Fax #: _____

(8)

Data Package Options (please circle if requested):

QC Summary Site-specific QC required? Yes No

Tier I (NJ)

Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)

EPA CLP Data Package Internal Chain of Custody required? Yes No Per CLP Req. w. Remarks

GLP

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
R [redacted] (b)(4)	7/12/93	2200	[redacted] (b)(4)	7/13/93	1545
R	7/14/93	1625		7/14/93	16.25
R	7/14/93	1820			
R					
R				7/14/93	1820

AR100428

[redacted]

For LLI Use Only

Acct. # 7440 Sample # 1995418-25

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC Acct. #: 7440

Project Name/#: EMMAUS : ONSITE WELLS PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12

Sampler: [redacted] (b) (4) Quote #:

State where sample was collected:

For LLI use only
FSC:
SCR #: 1049310

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	Total # of Containers	TOC, NH_3, TKN	NO_2, NO_3	TCL VOA	Diss. metals, total metals (TAL)	Pest/PCBs, TCL semi	TAL CN (diss, total)	Alk, T #, Cl	SO_4, TDS	Remarks	Temperature of samples upon receipt
OW-WELL1	7/15/93	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-WELL1D	"	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-FB7	"	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-AB2	"	1600	✓			✓		5			✓	✓		✓				
TB-7																		

(7) **Turnaround Time Requested** (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8) **Data Package Options** (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	7/15/93	2400	[redacted] (b) (4)	7/14/93	1700
[redacted]	7/16/93	1615	[redacted]	7/16/93	1615
[redacted]			[redacted]		
Relinquished by:			[redacted]		
Relinquished by:			[redacted]	7/16/93	1615

AR100429

Analysis Reque[redacted] Environmental Services Chain [redacted]

For LLI Use Only

Acct. # 7440 Sample # 1995939-45

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC Acct. #: 7440

Project Name/#: Emmaus: On-Site wells PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 1001 02 12

Sampler: [redacted] (b) (4) Quote #:

State where sample was collected: PA

For LLI use only
FSC: 1049205,
SCR #: 1049108

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Matrix					Total # of Containers	TOC, NH_3, TKN	NO_2, NO_3	TCL VOA	Diss. metals, Total metals (TAL)	Pest/PCB, TCL Semi	TAL Cn (diss, total)	Alk, TALK, Cl^-	SO4, TDS	Remarks
OW- Well 3	7/16/93	1530	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Samples contain
OW- Well 3D	"	1530	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Free Product
OW-FB8	"	1110	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Handle w/
TB-8	"					✓											Care. Did not
																	received TB-8
																	Trip Blank
																	DWH 7/16/93

AR100430

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No Per CLP Requirements

SDG Complete ? Yes No

(9)

Date	Time	R	Date	Time
7/9/93	1450	[redacted] (b) (4)	7/9/93	
7/16/93	1615	[redacted] (b) (4)	7/16/93	16:15
7/16/93	17:40	[redacted] (b) (4)		
		[redacted] (b) (4)		
		[redacted] (b) (4)	7/16/93	17:40 16:15

Analysis Requ[illegible]

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1997119-26
1997127-29

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Rudale: PSW PWSID #:
Project Manager [redacted] (b) (4) P.O. #: 10010212
Sampler: JE[redacted] Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049427

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water	Other	Total # of Containers	(5) Analyses Requested: TOC, NH3, NO3	NO2, TKN	TCL VOA	Dissolved Metals, Total Metals	TCL Semi	TAL Cn (dissolved, total)	Cl⁻, SO4, TDS	Alk, TALKA	Remarks	(6) Temperature of samples upon receipt
PSW-4	7/20/93	~~1530~~ 1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-4D	"	~~1530~~ 1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-6	"	~~1630~~ 1530	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
TB-PSW1	"	—				✓		1			✓						jcm	
~~GW-PRE~~ jcm	~~"~~	~~12-1400~~ jcm	✓			✓		4			✓*	✓*					~~*VOCs by 8240;~~	
~~GW-POST~~ jcm	~~"~~	~~1700~~	✓			✓		4			✓*	✓*					~~Pb + Hg only~~ jcm	

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary: Tier I (NJ) / Tier II (NJ) / EPA CLP / GLP
Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirement
SDG Complete? Yes No

(9)

Date	Time	Rec	Date	Time
7/16/93	2030	[redacted] (b) (4)	7/19/93	0735
7/19/93	0910		7/19/93	0910
7/20/93			7/20/93	5:16
7/20	710			
			7/20/93	1910

AR100431

For LLI Use Only

Acct. # 7440 Sample # 1330030-4

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEO, INC Acct. #: 7440

Project Name/#: Rudale : PSW PWSID #:

Project Manager: [redacted] (b)(4) P.O. #: 1001 02 12

Sampler: [redacted] (b)(4) Quote #: 13 132

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1044424

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Potable / NPDES	Water	Other	Total # of Containers	(5) TOC, NH_3, NO_3	NO_2, TKN	TCL VOA	Dissolved metals, Total metals	TCL Sem.	TAL CN, Dissolved, Total	Cl, SO_4, TDS	Alk, Tahka	Remarks	(6) Temperature of samples upon receipt
PSW-7	7/01/93	1545	✓				✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-2	"	1615	✓				✓		14	✓	✓	✓	✓	✓	✓	✓	✓	[illegible]	
TB-PSW2	"						✓		1			✓							

AR100432

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

Data Package Options (please circle if requested):

(8)

QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	7/16/93	2030	[redacted] (b)(4)	7/19/93	0725
	7/19/93	0910		7/19/93	0910
	7/21/93	1200		7/21/93	1700
	7/21/93	1830			

(9)

[redacted]

For LLI Use Only

Acct. # 7440 Sample # 1998861-5
1998866-7

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC. Acct. #: 7440
Project Name/#: Rodale : PSW PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001 0212
Sampler: [redacted] (b)(4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049441

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	Total # of Containers	TOC, NH_3, NO_3	NO_2, TKN	TCL VOA	Dissolved, Total TAL Metals	TCL Sem.	TAL Cn- (Dissolved, Total)	Cl^-, SO_4, TDS	Alk, Talky	Remarks	Temperature of samples upon receipt
PSW-1	7/22/93		✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-3	"		✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
TB-PSW3	"							1			✓							

AR100433

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b)(4)	7/20/93	2030	[redacted] (b)(4)	7/21/93	1515
[redacted]	7/21/93	1700	[redacted]	7/21/93	1700
[redacted]	7/22/93	1715	[redacted]	7/22	545
[redacted]	7/22	640	[redacted]		
[redacted]			[redacted]	7/22/93	1840

Analysis Reque[redacted]

For LLI Use Only 2000752-755
Acct. # 7440 Sample # 2000731-735
2000744-48

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, Inc. Acct. #: 7440
Project Name/#: Rodale SW/SD PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049621

(2) Sample Identification | Date Collected | Time Collected | (3) Matrix | (4) | Total # of Containers | (5) Analyses Requested: TAL total metals and CN | TAL dissolved metals and CN | TCL VOCs 3/90 SOW | TCL VOCs 6/91 SOW | (6) Remarks

Sample Identification	Date Collected	Time Collected						Total # of Containers	TAL total metals and CN	TAL dissolved metals and CN	TCL VOCs 3/90 SOW	TCL VOCs 6/91 SOW					Remarks
SW-1	~~1430~~ 7/27/93	1430	X			X		4	✓	✓							~~Set 54~~
SD-1	"	1435	X		X			2	✓		✓						
SW-2	"	1355	X			X		4	✓	✓							
SD-2	"	1400	X		X			2	✓		✓						
SW-3	"	1145	X		\	X		4	✓	✓							
SW-3D	"	1145	X			X		4	✓	✓							
SD-3	"	1155	X		X			2	✓		✓						
SD-3D	"	1155	X		X			2	✓		✓						
SD-4	"	1115	X		X			2	✓		✓						SW-4 not collected (bed was dry)
SW-TB1	"	—										✓					

(7) **Turnaround Time Requested** (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8) **Data Package Options** (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As per CLP requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
R[redacted] (b) (4)	2508	1159	[redacted] (b) (4)	7/26/93	0745
R[redacted]	7/26/93	0920	[redacted]	7/26/93	0920
R[redacted]	7/27/93	1640	[redacted]	7/27/93	1640
R[redacted]	7/27/93	1833	[redacted]		
Relinquished			[redacted]	7/27/93	1833

(9)

Analysis Reque[redacted]

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 2001155-60
Acct. # 7440 Sample # 2001164-70
2001172-77

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Rodale SW/SD PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001 02 12
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049657

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Matrix					Total # of Containers	TAL total metals & CN	TAL dissolved metals & CN	TCL VOC's 3/90 soil	TCL VOC's 6/91 soil					Remarks	
SW-9	7/28/93	1030	X			X		4	✓	✓								
SW-9D	"	1030	X			X		4	✓	✓								
SD-9	"	1035	X		X			2	✓		✓							
SD-9D	"	1035	X		X			2	✓		✓							
SW-8	"	1145	X			X		4	✓	✓								
SD-8	"	1150	X		X			2	✓		✓							
SW-7	"	1400	X			X		4	✓	✓								
SD-7	"	1405	X		X			2	✓		✓							
SW-6	"	1415	X			X		4	✓	✓								
SD-6	"	1420	X		X			2	✓		✓							

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirement

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/26/93	1800	[redacted] (b) (4)	[illegible]/93	1645
[redacted]	[illegible]8/93	1625	[redacted]	[illegible]/28/93	1625
[redacted]	[illegible]/28/93	1800	[redacted]		
Relinquished by:			[redacted]		
Relinquished by:			[redacted]	7/28/	1800

AR100435

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 2004011-15 2004818-21

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, Inc. Acct. #: 7440
Project Name/#: RODALE MFG: PW PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001-02-12
Sampler: [redacted] (b)(4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049814

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Comp	Soil	Water	Oil	Total # of Containers	TAL total and dissolved metals	TAL total and dissolved CN	TCL VOCs 6/91 soil w/ fib. sample					Remarks	Temperature of sample upon receipt
PW-UM59	8/4/93	1015	X			✓		7	✓	✓	✓						
PW-UM49	"	1315	X			✓		7	✓	✓	✓					Bottle labels describe samples as PW-UM45	
PW-UM49D	"	1315	X			✓		7	✓	✓	✓					Bottle labels describe samples as PW-UM45D	
PW-LE311	"	1415	X			✓		7	✓	✓	✓						
PW-TB2	"	—				✓		2			✓						

AR100436

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No as per CLP requirements

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b)(4)	8/2/93	2150	[redacted] (b)(4)	8/3/93	1615
	8/4/93	1600		8/4/93	1600
	8/4/93	1818			
Relinquished by:					
Relinquished by:				8/4/93	1818

Analysis Request Environmental Services Chain of Custody

For LLI Use Only 20[illegible]55-60

Acct. # 7440 Sample # 2001164-70
2001172-77

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEO, INC Acct. #: 7440

Project Name/#: Rodale SW/SD PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 10010212

Sampler: [redacted] (b) (4) Quote #:

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049637

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water ☐ Potable ☐ NPDES	Other	Total # of Containers	(5) Analyses Requested: TAL Total Metals and CN	TAL dissolved metals & CN	TCL VOC's 3/91 SOW	TCL VOC's 6/91 SOW					Remarks	(6) Temperature of samples upon receipt
SW-5	7/28/93	1510	✓			✓		4	✓	✓								
SD-5	"	1515	✓		✓			2	✓		✓							
SW-TB2	"	—				✓		3				✓						

AR100437

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AC Per CLP Requirements

SDG Complete? Yes No

(8)

	Date	Time		Date	Time
[redacted] (b) (4)	7/26/93	1820	[redacted] (b) (4)	7/27/93	1645
	8/93	1605		7/93	1625
	28/93	1800			
Relinquished by:					
Relinquished by:				7/28/93	1800

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 2002230-36, ~~2002237-44~~, 2002247-53

Please print. Instructions on reverse side correspond with circled numbers.

1 Client: GEO, INC Acct. #: 7440
Project Name/#: Rudolf SW/SD PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 10010212
Sampler: [redacted] (b)(4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049677

2

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Matrix (4): Water (☐ Potable ☐ NPDES)	Matrix (4): Other	Total # of Containers	Analyses Requested (5): TAL Total & Dissolved Cn	TAL Total & Dissolved Metals	TCL VOC 3/90 SOW	TCL VOC 6/91 SOW					Remarks	Temperature of samples upon receipt (6)
SW-12	7/29/93	1025	✓			✓		4	✓	✓								
SD-12	"	1030	✓		✓			2	✓		✓							
SW-11	"	1135	✓			✓		4	✓	✓								
SD-11	"	1200	✓		✓			2	✓		✓							
SW-11D	"	1135	✓			✓		4	✓	✓								
SD-11D	"	1200	✓		✓			2	✓		✓							
SW-11MS	"	1135	✓			✓		4	✓	✓								
SD-11MS	"	1200	✓		✓			2	✓		✓							
SW-11MSD	"	1135	✓			✓		4	✓	✓								
SD-11MSD	"	1200	✓		✓			2	✓		✓							

AR100438

7 **Turnaround Time Requested** (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

8 **Data Package Options** (please circle if requested)
QC Summary: Tier I (NJ) Tier II (NJ) EPA CLP GLP
Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AS Per CLP Requirements
SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	7/27/93	2300	[redacted] (b)(4)	7/28/93	1630
	7/29/93	1620		7/29/93	16:20
	7/29/93	17:45			
				7/29/93	1745

(9)

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only 20 39, 52-53, 57-68

Acct. # 7440 Sample # 2002904 2002896-900

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, Inc. Acct. #: 7440

Project Name/#: RODALE MFG SP PWSID #:

Project Manager: [redacted] (b)(4) P.O. #: 1001-02-12

Sampler: [redacted] (b)(4) Quote #: 113132

State where sample was collected: PA

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	TAL metals total & diss	TAL CN total & diss	TCL VOCs 6/91 soil	TCL VOCs 3/90 soil					Remarks	Temperature of samples upon receipt (6)
SP-LESP78	7/30/93	1130	✓			✓			✓	✓								
SP-03	"	1155	✓			✓			✓	✓	✓							
SP-LESP73	"	1330	✓			✓			✓	✓	✓							
SP-LESP73D	"	1330	✓			✓			✓	✓								
SP-02	"	1355	✓			✓			✓	✓								
SW-16	"	1500	✓			✓			✓	✓								
SD-16	"	1505	✓		✓				✓*			✓					* run TAL met/CN * TCL VOCs	
SW-3	7/27/93	1145	✓			✓					✓							
SW-3D	7/27/93	1145	✓			✓					✓							
SW-8	7/28/93	1145	✓			✓					✓							

(5) Analyses Requested

For LLI use only
FSC:
SCR #: 1049701

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

(8)

Data Package Options (please circle if requested)

QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

Relinquished by:	Date	Time	Relinquished by:	Date	Time
[redacted] (b)(4)	7/30/93	1130	[redacted] (b)(4)	7/30/93	1600 (9)
	7/30/93	1600		7/30	4:05
	7/30	6:05			
				7/30/93	1810
Relinquished by:	Date	Time		Date	Time

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 2002230-36
2002237-44
2002247-53

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC Acct. #: 7440
Project Name/#: Rodale SW/SD PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001 02 12
Sampler: [redacted] (b) (4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1047677

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water ☐ Potable ☐ NPDES	Other	Total # of Containers	(5) Analyses Requested: TAL Total & Dissolved Cn	TAL Total & Dissolved Metals	TCL VOC's 8/90 SOW	TCL VOC 6/91 SOW					Remarks	(6) Temperature of samples upon receipt
SW-10	7/29/93	1350	✓			✓		4	✓	✓								
SD-10	"	1355	✓		✓			2	✓		✓							
SW-15	"	1450	✓			✓		4	✓	✓								
SD-15	"	1455	✓		✓			2	✓		✓							
SW-TB3	"	—						2				✓						

AR100440

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No As Per LLP Requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
R[redacted] (b) (4)	7/29/93	2300	[redacted] (b) (4)	7/29/93	1630
R[redacted]	7/29/93	1620		7/29/93	16.20
R[redacted]	7/29/93	17:45			
Relinquished by:					
Relinquished by:				7/29/93	1745

(9)

Analysis Request Environmental Services Chain of Custody

For LLI Use Only 20[illegible]139
2002852-53
Acct. # 7440 Sample # ~~2002857-68~~
2002904
2002896-900

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC
Acct. #: 7440
Project Name/#: RODALE MFG SP
PWSID #:
Project Manager: [redacted] (b)(4)
P.O. #: 1001-02-12
Sampler: [redacted] (b)(4)
Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1045701

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water	Other	Total # of Containers	(5) Analyses Requested: TAL metals total + diss	TAL CN total + diss	TCL VOCs 6/91					Remarks	(6) Temperature of samples upon receipt
SW-10	7/29/93	1350	✓			✓					✓						
SW-11	"	1135	✓			✓					✓						
SW-11 MS	"	1135	✓			✓					✓						
SW-11 MSD	"	1135	✓			✓					✓						
SP-TB1	7/30/93	—									✓						

AR100441

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	7/28/93	1130	[redacted] (b)(4)	7/29/93	1600 (9)
	7/30/93	1600		7/30	4:05
	7/30	6:05			
Relinquished by:					
Relinquished by:				7/30/93	1810

Analysis Request - Environmental Services Chain of Custody

For LLI Use Only 200-191-96

Acct. # 7440 Sample # 2004197-201

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC

Project Name/#: Rodale : PW

Project Manager: [redacted] (4) (b)

Sampler: JG, [redacted] (4) (b)

State where sample was collected: PA

Acct. #: 7440

PWSID #:

P.O. #: 10010212

Quote #:

For LLI use only

FSC:

SCR #: 1049775

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Potable / NPDES	Water	Other	Total # of Containers	TAL Total & Dissolved Metals	TAL Total & Dissolved CN	TCL VOA 6/91 SOW						Remarks	Temperature of samples upon receipt (6)
PW - UM43	8/3/93	0915	✓				✓		7	✓	✓	✓							
PW - UM58	"	1100	✓				✓		7	✓	✓	✓							
PW - UM58D	"	1100	✓				✓		7	✓	✓	✓							
PW - 1501	"	1415	✓				✓		7	✓	✓	✓							
PW - LM10	"	1515	✓				✓		7	✓	✓	✓							
PW - TB1	"	—					✓		2			✓						vial lids broken upon receipt. DJ 8/3/93	

AR100442

(7)

Turnaround Time Requested (please circle): Normal Rush

(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

Data Package Options (please circle if requested):

(8)

QC Summary Site-specific QC required? Yes No

~~Tier I (NJ)~~

Tier II (NJ) (Yes, indicate QC sample and submit triplicate volume)

EPA CLP Data Package Internal Chain of Custody required? Yes No As Per CLP Requirement

GLP

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	8/3/93	1845	[redacted] (b) (4)	8/3/93	1000
	Date	Time		Date	Time
	8/3/93	1615		8/3/93	1615
	Date	Time		Date	Time
	8/3/93	1205			
Relinquished by:	Date	Time		Date	Time
Relinquished by:	Date	Time		Date	Time
				8/3/93	1805

Analysis Request Environmental Services Chain of Custody

For LLI Use Only 200[illegible]12-21

Acct. # 7440 Sample # 2005532-40

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC Acct. #: 7440

Project Name/#: PUDDLE: PLW PWSID #:

Project Manager: [redacted] (b)(4) P.O. #: 1001 0212

Sampler: [redacted] (b)(4) Quote #:

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049867

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4) ☐ Potable ☐ NPDES	Other	Total # of Containers	TAL Total & Dissolved Cn	TAL Total & Dissolved Metals	TCL VOC's 6/91 SOW						Remarks	Temperature of samples upon receipt (6)
PW-SA05	08/05/93	0745	✓			✓		7	✓	✓	✓							
PW-1492	8/5/93	1015	✓			✓		7	✓	✓	✓							
~~PW-LE-677~~ PW-LE677	8/5/93	1115	✓			✓		7	✓	✓	✓							
~~PW-LE-677D~~ PW-LE677D	8/5/93	1115	✓			✓		7	✓	✓	✓							
PW-0351	"	1200	✓			✓		7	✓	✓	✓							
PW-0351 MS	"	1200	✓			✓		7	✓	✓	✓							
PW-0351 MSD	"	1200	✓			✓		7	✓	✓	✓							
PW-LE1293	"	1315	✓			✓		7	✓	✓	✓							
PW-LM40	8/4/93	1715	✓			✓		7	✓	✓	✓							
PW-TB3	8/5/93					✓		2			✓							

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

(8)

Data Package Options (please circle if requested):

QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)

Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	8/5/93	2130	[redacted] (b)(4)	8/4/93	1600
	8/5/93	1415		8/5/93	14:15
	8/5/93	16.45			
Relinquished by:					
Relinquished by:				8/5/93	1645

(9)

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only 200..46

Acct. # 7440 Sample # 2007155-58 2007160-63

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

1

Client: GEC, INC Acct. #: 7440

Project Name/#: RODALE : PW PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 1001 02 12

Sampler: [redacted] (b) (4) Quote #:

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049955

2

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4) ☐ Potable ☐ NPDES	Other	Total # of Containers	TAL Total & Dissolved Metals	TAL Total & Dissolved Cn	TCL VOC 6/11 SOW						Remarks	Temperature of samples upon receipt (6)
PW-EM08	8/9/93	1045	✓			✓		7										
PW-EM09	"	1045	✓			✓		7										
PW-LM23	"	1315	✓			✓		7										
PW-LM23D	"	1315	✓			✓		7										
PW-TB4	"					✓		2									Only 1 vial submitted. [illegible] 8/9/93	

AR100444

7

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

8

Data Package Options (please circle if requested):
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required?
Yes No As Per CLP Requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	8/9/93	1555	[redacted] (b) (4)	8/9/93	0720
	8/9/93	0905		8/9/93	0905
	8/9/93	1555		8/9/93	1555
	8/9/93	1750			
				8/9/93	1750

9

Analysis Request Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 2007804-810 2007818-823

Please print. Instructions on reverse side correspond with circled numbers.

1

Client: GEC, INC
Acct. #: 7440
Project Name/#: Rodale : PW
PWSID #:
Project Manager: [redacted] (b) (4)
P.O. #: 100102 12
Sampler: [redacted] (b) (4)
Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1050009

2

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4) ☐ Potable ☐ NPDES	Other	Total # of Containers	TAL Total & Dissolve Metals	TAL Total & Dissolve Cn.	TCL VOC 6/91 SOW					Remarks	Temperature of samples upon receipt (6)
PW - SA07	8/10/93	0915	✓			✓		7	✓	✓	✓						
PW - LM20	"	1015	✓			✓		7	✓	✓	✓						
PW - LM26	"	1130	✓			✓		7	✓	✓	✓						
PW - UM60	"	1400	✓			✓		7	✓	✓	✓						
PW - UM61	"	1515	✓			✓		7	✓	✓	✓						
PW - UM61D	"	1515	✓			✓		7	✓	✓	✓						
PW - TB5	"					✓		2			✓						

AR100445

7

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

8

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	8/6/93	2220	[redacted] (b) (4)	8/9/93	0750
	8/9/93	[illegible]		8/9/93	0905
	8/9/93	1610		8/9/93	1610
	8/10/93	1805			
				8/10/93	1805

9

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440
Sample # 2000,10-16
2008517-22

Please print. **Instructions on reverse side correspond with circled numbers.**

1)
Client: GEC INC
Acct. #: 7440
Project Name/#: RUDALE : PW
PWSID #:
Project Manager: [redacted] (b) (4)
P.O. #: 10010212
Sampler: [redacted] (b) (4)
Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1050058

2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4) ☐ Potable ☐ NPDES	Other	Total # of Containers	Total & Dissolved TAL Metals	Total & Dissolved TAL CN-	TCL VOA 6/91 SOW					Remarks	Temperature of samples upon receipt (6)
PW-LM27	8/11/93	1015	✓			✓		7	✓	✓	✓						
PW-SAU8	"	1115						7	✓	✓	✓						
PW-SAU8 D	"	1115						7	✓	✓	✓						
PW-SAU8 MS	"	1115						4	✓	✓							
PW-SAU8 MSD	"							4	✓	✓							
PW-LM 28	"	1530	✓			✓		7	✓	✓	✓						
PW-TB6								2			✓						

AR100446

7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As per CLP Requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	10-93	1240	[redacted] (b) (4)	10/93	1600
	1/93	1615		8/11/93	1615
	8/11/93	1615			
Relinquished by					
Relinquished by				8/11/93	1800

(9)

Analysis Request Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 200 56-59
Acct. # 7440 Sample # 2009262-64
2009268-73

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC. Acct. #: 7440
Project Name/#: RODALE : PW PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 10010212
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1050061

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Soil	Water (4)	Other	Total # of Containers	Total & dissolved TAL Metals (5)	Total & dissolved TAL Cn-	TCL WC SOW 6/91					Remarks	Temperature of samples upon receipt (6)
PW-LE312	8/12/93	0915	✓			✓		7	✓	✓	✓						
PW-LE411	"	1015	✓			✓		7	✓	✓	✓						
PW-LM21	"	1130	✓			✓		7	✓	✓	✓						
PW-LM21D	"	1150	✓			✓		7	✓	✓	✓						
PW-SA09	"	1415	✓			✓		7	✓	✓	✓						
PW-UM62	"	1515	✓			✓		7	✓	✓	✓						
PW-TB7	"					✓		2			✓						

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AS Per CLP Requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	8/10/93	2100	[redacted] (b) (4)	8/11/93	1315
	8/11/93	1600		8/11/93	1600
	8/12/93	1600		8/12/93	1600
	8/12/93	1800			
Relinquished by:				8/12/93	1800

(9)

Analysis Request - Environmental Services Chain of Custody

For LLI Use Only

Acct. # 7440 Sample # 2016405-08 2016409-11

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC Acct. #: 7440

Project Name/#: RODALE MFG-PW PWSID #:

Project Manager: [redacted] (b)(4) P.O. #:

Sampler: [redacted] (b)(4) Quote #:

State where sample was collected:

For LLI use only

FSC:

SCR #: 1049955

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) VOCs by 6/91 SW	Total + dissolved TAL metals	Total and dissolved CN					Remarks	(6) Temperature of samples upon receipt
PW-UM63	8/25/93	1015	✓			✓		7	X	X	X						
PW-UM64	"	1415	✓			✓		7	X	X	X						
PW-UM64D	"	"	✓			✓		7	X	X	X						
PW-TB8	"	—						2	X								

AR100448

(7)

Turnaround Time Requested (please circle): Normal Rush

(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

(8)

Data Package Options (please circle if requested):

QC Summary Site-specific QC required? Yes No

Tier I (NJ)

Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)

EPA CLP

GLP

Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	8/26/93	1355	[redacted] (b)(4)	8/26/93	0720
[redacted]	8/26/93	0705	[redacted]	8/9/93	0905
[redacted]	8/26/93	1200	[redacted]	8/26/93	1200
[redacted]	8/26/93	190	[redacted]		
Relinquished by			[redacted]	8/26/93	1930

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1988521-29
1988530-33

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Emmons On-Site Wells PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001-02-12
Sampler: [redacted] (b)(4) Quote #: 1048906
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1048906

(2) (3) (4) (5) (6)

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water (Potable / NPDES)	Other	Total # of Containers	TOC, NH3, TKN	NO2, NO3, TKN	Dissolved metals	Total metals	Pes PCB	TCL SVM	TAL Cn	Dissolved	Alk, T Alk	SO4, TDS	Cl	Remarks	Temperature of samples upon receipt
OW- MW-1	6/30/93	1130	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- MW-2	6/30/93	1530	✓					14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- MW-2D	6/30/93	1530	✓					14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- FB1	6/30/93	1735	✓					14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OW- TB1	6/30/93									✓	✓									TCL VOA ONLY + METALS	

AR100449

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete ? Yes No

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[redacted] (b)(4)	6/29/93	0330	[redacted] (b)(4)	6/29/93	7:45
	6/29/93	10:50		6/29/93	10:50
	6/30/93	1752		6/30/93	1752
	6/30/93	1942		6/30/93	1942

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1989613-20
1989625-27

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Emmaus on-site wells PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 10010212
Sampler: [redacted] (b) (4) Quote #: 1048906
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1048906

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved Metals	Total Metals	Pes PCB, TCL SEM	ALK, SO4, TDS, Cl-	TAL Cn-	Dissolved Cn-	T Alkg	Remarks	(6) Temperature of samples upon receipt
OW-MW3	7/1/93	1115	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 vials + one 1,000 ml (2 H2SO4) bottle broken upon receipt. DZ	
OW-MW3D	7/1/93	1115	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
OW-FB2	7/1/93	1530	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	One 1000 ml amber bottle broken upon receipt. DZ	
OW-AB1	7/1/93	1500	✓			✓		5			✓	✓			✓				~~[illegible]~~ SG TOTAL METALS, Cn- ONLY 7/2/93	
OW-TB2	7/1/93					✓		3			✓									

AR100450

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	[illegible]/93	0330	[redacted] (b) (4)	[illegible]/29/93	7:45
	[illegible]/29/93	10:5[illegible]		[illegible]/29/93	1050
	[illegible]/1/93	150[illegible]		[illegible]/1/93	1505
	[illegible]/1/93	1730		[illegible]/1/93	17:30
	[illegible]/1/93	8:00		[illegible]/93	1000

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1990318-26
1990329-32

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Emmaus on-site wells PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 10010212
Sampler: [redacted] (b) (4) Quote #: 1049068
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049068

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals, Total metals	Pes PCB, TCL SEM	TAL Cn	Cn Dissolved	Alk, TALK, CL, SO4	TDS	Remarks	(6) Temperature of samples upon receipt
OW-MW4	7/6/93	1300	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓			
OW-MW4D	7/6/93	1300	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓			
OW-WELL5	7/6/93	1700	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓			
OW-FB3	7/6/93	1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓			
OW-TB3	7/6/93					✓		3			✓								

AR100451

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	2/93	1650	[redacted] (b) (4)	/6/93	6:30
[redacted]	/6/93	9:25	[redacted] (b) (4)	/6/93	0925
[redacted]	/6/93	1730	[redacted]	7/6/93	1730
[redacted]	7/6/93	1900	[redacted]		
[redacted]			[redacted]	7/6/93	1900

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1990985-91
1990992-94

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, Inc. Acct. #: 7440
Project Name/#: Emmaus-Onsite Wells PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001-02-12
Sampler: [redacted] (b)(4) Quote #: 1049068
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049068

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals, Total metals (TAL)	Pes PCBs, TCL Semi	TAL CN (diss, total)	Alk, Tal, CL, SO4	TDS	Remarks	(6) Temperature of samples upon receipt
OW-WELL6	7/7/93	1230	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
OW-WELL6D	7/7/93	1230	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	duplicate of above	
OW-FB4	7/7/93	1600	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
OW-TB4	7/7/93										✓							

AR100452

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete ? Yes No

Relinquished by:	Date	Time	Relinquished by:	Date	Time
[redacted] (b)(4)	7/93	1650	[redacted] (b)(4)	7/6/93	6:30
	7/6/93	9:25		6/93	0925
	7/93	1708		7/7/93	5:08
	7/93	737			
				7/7/93	1940

(9)

Analysis Request / Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440
Sample # 1993929-32
1993934-36

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Emmaus - Onsite wells
PWSID #:
Project M [redacted] (b)(4)
P.O. #: 1001-02-12
Sampler: [redacted]
Quote #: 1049205
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049205

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Potable / NPDES	Water	Other	Total # of Containers	(5) TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals / Total metals (TAL)	Pest, PCB, TCL Semi	TAL CN (Dissolved, Total)	Alk, TALK Cl	SO4, TDS	Remarks	(6) Temperature of samples upon receipt
OW - Well 4	7/13/93	1230	✓				✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW - Well 4D	7/13/93	1230	✓				✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
FB-5	7/13/93	1430	✓				✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
TB-5	7/13/93						✓		3			✓							

ARI-00453

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No Per CLP Requirements

SDG Complete ? Yes No

(9)

Relinquished by:	Date	Time	Relinquished by:	Date	Time
[redacted] (b)(4)	7/13/93	2030	[redacted] (b)(4)	7/13/93	
	7/13/93	1540		7/13/93	3:39
	7/13	6:35			
				7/13/93	

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only

Acct. # _____ Sample # 1994482-84 1994515-25

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEO, INC Acct. #: 7440

Project Name/#: Emmaus Onsite Wells PWSID #:

Project Manage[redacted] (b) (4) P.O. #: 10010212

Sampler: [redacted] Quote #:

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049263

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH3, TKN	NO2, NO3	TCL VOA	Dissolved metals, Total metals (TAL), Pes PCB, TCL semi	TAL CN (Dissolved Total)	Alk, TALK, CL	SO4, TDS	Remarks	(6) Temperature of samples upon receipt
OW-Well 2	7/14/93	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2D	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2MS	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-Well 2MSD	"	1300	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-FB6	"	1430				✓		16	✓	✓	✓	✓	✓	✓	✓	✓	
OW-TB6	"					✓		1			✓						

AR100454

(7)

Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No Per CLP Requirements

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	12/93	2200	[redacted] (b) (4)	13/93	1545
	14/93	1625		7/14/93	16.25
	14/93	18:20			
Relinquished by:					
Relinquished by:				14/93	1820

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only
Acct. # 7440 Sample # 1995418-25

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC Acct. #: 7440
Project Name/#: EMMAUS : ONSITE WELLS PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12
Sampler: [redacted] (b) (4) Quote #:
State where sample was collected:

For LLI use only
FSC:
SCR #: 1049310

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH_3, TKN	NO_2, NO_3	TCL VOA	Diss. metals, total metals (TAL)	Pest/PCBs, TCL semi	TAL CN (diss, total)	Alk, T #, Cl	SO_4, TDS	Remarks	(6) Temperature of samples upon receipt
OW-WELL1	7/15/93	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-WELL1D	"	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-FB7	"	1730	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓		
OW-AB2	"	1600	✓			✓		5			✓	✓		✓				
TB-7																		

AR100455

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No per CLP requirements

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/15/93	2400	[redacted] (b) (4)	7/14/93	1700
	7/16/93	1615		7/16/93	1615
Relinquished by:					
Relinquished by:				7/16/93	1615

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only
Acct. # 7440 Sample # 1995939-45

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC Acct. #: 7440
Project Name/#: Emmaus: On-Site Wells PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001 02 12
Sampler: [redacted] (b) (4) Quote #:
State where sample was collected: PA

For LLI use only
FSC: 1049205,
SCR #: 1049108

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH_3, TKN	NO_2, NO_3	TCL VOA	Diss metals, Total metals (TAL)	Pest/PCB, TCL Semi	TAL Cn (diss, total)	ALK, TALK, Cl^-	SO4, TDS	Remarks	(6) Temperature of samples upon receipt
OW- Well 3	7/16/93	1530	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Samples contain	
OW- Well 3D	"	1530	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Free Product	
OW- FB8	"	1110	✓			✓		16	✓	✓	✓	✓	✓	✓	✓	✓	Handle w/	
TB - 8	"					✓											Care. Did not	
																	received TB-8	
																	Trip Blank	
																	DWH 7/16/93	

AR100456

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No per CLP Requirements

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
R[redacted] (b) (4)	7/9/93	1450	[redacted] (b) (4)	7/9/93	
R[redacted]	7/16/93	1615	[redacted]	7/16/93	16:15
R[redacted]	7/16/93	17:40	[redacted]		
Relinquished by:			[redacted]		
Relinquished by:			[redacted]	7/16/93	17:40

Analysis Request Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1997119-26
1997127-29

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEO, INC Acct. #: 7440
Project Name/#: Rudale: PSW PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001 0212
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049429

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH3, NO3	NO, TKN	TCL VOA	Dissolved Metals, Total Metals	TCL Semi	TAL Cn (dissolved, total)	Cl⁻, SO4, TDS	Alk, TALKA	Remarks	(6) Temperature of samples upon receipt
PSW-4	7/20/93	~~1530~~ 1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-4D	"	~~1530~~ 1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-6	"	~~1630~~ 1530	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
TB-PSW1	"	—				✓		1			✓						JCM	
~~GW-PRE~~ JCM	~~"~~	~~12 1400~~ JCM	✓			✓		4			✓*	✓*					~~*VOCs by 8240;~~	
~~GW-POST~~ JCM	~~"~~	~~1700~~	✓			✓		4			✓*	✓*					~~Pb & Hg only~~ JCM	

AR100457

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary: Tier I (NJ) / Tier II (NJ) / EPA CLP / GLP
Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AS Per CLP Requirement
SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/16/93	2030	[redacted] (b) (4)	7/19/93	0735
	7/19/93	0910		7/19/93	0910
	7/20/93			7/20/93	5:16
	7/20	710			
				7/20/93	1910

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7442 Sample # 1998070-4
1998075-6

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEO, INC Acct. #: 7440
Project Name/#: Rodale : PSW PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001 02 12
Sampler: [redacted] (b)(4) Quote #: 13 132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049429

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	TOC, Nitrate, NO_3	NO_2, TKN	TCL VOA	Dissolved metals, Total metals	TCL Sem.	TAL CN- (Dissolved, Total)	Cl^-, SO_4, TDS	Alk, TAlka	Remarks	Temperature of Samples upon receipt (6)
PSW-7	7/21/93	1545	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-2	"	1615	✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓	1 VOA received broken RJS 7/21/93	
TB-PSW2	"					✓		1			✓							

R100458

(5) Analyses Requested

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ) (If yes, indicate QC sample and submit triplicate volume.)
Tier II (NJ)
EPA CLP Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements
GLP

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	7/16/93	2030	[redacted] (b)(4)	7/19/93	0725 (9)
	7/19/93	0510		7/19/93	0910
	7/21/93	1700		7/21/93	1700
	7/21/93	1830			
				7/21/93	1830

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 1998861-5
1998866-7

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: Rodale : PSW PWSID #:
Project Manager [redacted] (b) (4) P.O. #: 1001 0212
Sampler: [redacted] (b) (4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049441

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TOC, NH_3, NO_3	NO_2, TKN	TCL VOA	Dissolved, Total TAL Metals	TCL Sem.	TAL Cn- (dissolved, total)	Cl^-, SO_4, TDS	Alk, Talky	Remarks	(6) Temperature of samples upon receipt
PSW-1	7/22/93		✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
PSW-3	"		✓			✓		14	✓	✓	✓	✓	✓	✓	✓	✓		
TB-PSW3	"							1			✓							

AR100459

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete? Yes No

(9)

Relinqu	Date	Time	Relinqu	Date	Time
[redacted] (b) (4)	7/20/93	2030	[redacted] (b) (4)	7/21/93	1515
[redacted]	7/21/93	1700	[redacted]	7/21/93	1700
[redacted]	7/22/93	1715	[redacted]	7/22	545
[redacted]	7/22	640	[redacted]		
[redacted]			[redacted]	7/22/93	1840

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

Acct. # 7440 For LLI Use Only 2000732-735 Sample # 2000731-735 2000744-48

Please print. **Instructions on reverse side correspond with circled numbers.**

(1)

Client: GEC, Inc. Acct. #: 7440

Project Name/#: Rodale SW/SD

Project Manager: [redacted] (b)(4)

Sampler: [redacted] (b)(4)

State where sample was collected: PA

PWSID #:

P.O. #: 1001-02-12

Quote #: 113132

For LLI use only FSC: SCR #: 1049621

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) TAL total metals and CN	TAL dissolved metals and CN	TCL VOCs 3/90 SOW	TCL VOCs 6/91 SOW					Remarks	Temperature of samples upon receipt (6)
SW-1	~~7/27/93~~ 1430	1430	X			X		4	✓	✓							~~Set 84~~	
SD-1	"	1435	X		X			2	✓		✓							
SW-2	"	1355	X			X		4	✓	✓								
SD-2	"	1400	X		X			2	✓		✓							
SW-3	"	1145	X		X	X		4	✓	✓								
SW-3D	"	1145	X			X		4	✓	✓								
SD-3	"	1155	X		X			2	✓		✓							
SD-3D	"	1155	X		X			2	✓		✓							
SD-4	"	1115	X		X			2	✓		✓						SW-4 not collected (bed was dry)	
SW-TB1	"	—										✓						

(7)

Turnaround Time Requested (please circle): Normal Rush

(Rush TAT is subject to LLI approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax

Phone #:

Fax #:

Data Package Options (please circle if requested):

(8)

QC Summary Site-specific QC required? Yes No

Tier I (NJ)

Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)

EPA CLP Data Package Internal Chain of Custody required? Yes No As per CLP requirements

GLP

SDG Complete ? Yes No

(9)

[redacted] (b)(4)	Date	Time	[redacted] (b)(4)	Date	Time
	7/26/93	115		7/26/93	0745
	7/26/93	09		7/26/93	0920
	7/27/93	1640		7/27/93	1640
	7/27/93	1833		7/27/93	1833

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 2001155-60
Acct. # 7440
Sample # 2001164-70
2001172-77

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Rodale SW/SD
PWSID #:
Project Manager: [redacted] (b)(4)
P.O. #: 1001 02 12
Sampler: [redacted] (b)(4)
Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049657

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) TAL total metals & CN	TAL dissolved metals & CN	TCL VOC's 3/90 SOW	TCL VOC's 6/91 SOW					Remarks	(6) Temperature of samples upon receipt
SW-9	7/28/93	1030	X			X		4	✓	✓								
SW-9D	"	1030	X			X		4	✓	✓								
SD-9	"	1035	X		X			2	✓		✓							
SD-9D	"	1035	X		X			2	✓		✓							
SW-8	"	1145	X			X		4	✓	✓								
SD-8	"	1150	X		X			2	✓		✓							
SW-7	"	1400	X			X		4	✓	✓								
SD-7	"	1405	X		X			2	✓		✓							
SW-6	"	1415	X			X		4	✓	✓								
SD-6	"	1420	X		X			2	✓		✓							

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete? Yes No

	Date	Time		Date	Time
[redacted] (b)(4)	7/26/93	1800	[redacted] (b)(4)	7/27/93	1645
	8/93	1625		28/93	1625
	28/93	1800			
Relinquished by:					
Relinquished by:				7/28/93	1800

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

Acct. # 7440 For LLI Use Only Sample # 2004811-15 2004818-21

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, Inc. Acct. #: 7440
Project Name/#: RODALE MFG: PW PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001-02-12
Sampler: [redacted] (b)(4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049814

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL total and dissolved metals	TAL total and dissolved CN	TCL VOCs 6/91 solvent + tri-stand					Remarks	(6) Temperature of samples upon receipt
PW-UM59	8/4/93	1015	X			✓		7	✓	✓	✓						
PW-UM49	"	1315	X			✓		7	✓	✓	✓					Bottle labels describe samples as PW-UM45	
PW-UM49D	"	1315	X			✓		7	✓	✓	✓					Bottle labels describe samples as PW-UM45D	
PW-LE311	"	1415	X			✓		7	✓	✓	✓						
PW-TB2	"	—				✓		2			✓						

AR100462

(7)
Turnaround Time Requested (please circle) Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required?
Yes No → 5 per CLP requirements

SDG Complete ?
Yes No

(9)

	Date	Time		Date	Time
[redacted] (b)(4)	8/2/93	2150	[redacted] (b)(4)	8/3/93	1615
	8/4/93	1600		8/4/93	1600
	8/4/93	1818			
Relinquished by				8/4/93	1818

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only 2001155-60

Acct. # 7440 Sample # 2001164-70
2001172-77

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEO, INC Acct. #: 7440
Project Name/#: Rodale SW/SD PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 10010212
Sampler: [redacted] (b) (4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049637

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL Total Metals and CN	TAL dissolved metals & CN	TCL VOCs 3/92 SOW	TCL VOCs 6/91 SOW					Remarks	(6) Temperature of samples upon receipt
SW-5	7/28/93	1510	✓			✓		4	✓	✓								
SD-5	"	1515	✓		✓			2	✓		✓							
SW-TB2	"	—				✓		3				✓						

AR100463

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AC Per CLP Requirements

SDG Complete? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/26/93	1820	[redacted] (b) (4)	7/27/93	1645
	8/93	1605		7/93	1625
	28/93	1800			
				7/28/93	1800

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440
Sample # 2002230-36 ~~2002237-44~~ 2002247-53

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEO, INC
Acct. #: 7440
Project Name/#: Rodale SW/SD
PWSID #:
Project Man[redacted] (b) (4)
P.O. #: 10010212
Sampler: [redacted] (b) (4)
Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049677

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL Total & Dissolved Cn	TAL Total & Dissolved Metals	TCL VOC 3/90 SOW	TCL VOC 6/91 SOW					Remarks	(6) Temperature of samples upon receipt
SW-12	7/29/93	1025	✓			✓		4	✓	✓								
SD-12	"	1030	✓		✓			2	✓		✓							
SW-11	"	1135	✓			✓		4	✓	✓								
SD-11	"	1200	✓		✓			2	✓		✓							
SW-11D	"	1135	✓			✓		4	✓	✓								
SD-11D	"	1200	✓		✓			2	✓		✓							
SW-11MS	"	1135	✓			✓		4	✓	✓								
SD-11MS	"	1200	✓		✓			2	✓		✓							
SW-11MSD	"	1135	✓			✓		4	✓	✓								
SD-11MSD	"	1200	✓		✓			2	✓		✓							

AR100464

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AS Per CLP Requirements

SDG Complete ? Yes No

(9)

Relinquished by:	Date	Time	Date	Time
[redacted] (b) (4)	7/27/93	2300	7/28/93	1630
[redacted] (b) (4)	7/29/93	1620	7/29/93	16:20
[redacted] (b) (4)	7/29/93	17:45		
[redacted] (b) (4)				
[redacted] (b) (4)			7/29/93	1745

Analysis Request Environmental Services Chain of Custody

For LLI Use Only 20[illegible]39, 52-53, 57-68

Acct. # 7440 Sample # 2002904 2002896-900

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, Inc. Acct. #: 7440

Project Name/#: RODALE MFG SP PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12

Sampler: [redacted] (b) (4) Quote #: 113132

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049701

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL metals total & diss	TAL CN total & diss	TCL VOCs 6/91 SOW	TCL VOCs 3/90 SOW					Remarks	(6) Temperature of samples upon receipt
SP-LESP78	7/30/93	1130	✓			✓			✓	✓								
SP-03	"	1155	✓			✓			✓	✓	✓							
SP-LESP73	"	1330	✓			✓			✓	✓	✓							
SP-LESP73D	"	1330	✓			✓			✓	✓								
SP-02	"	1355	✓			✓			✓	✓								
SW-16	"	1500	✓			✓			✓	✓								
SD-16	"	1505	✓		✓				✓*			✓					* run TAL met/CN * TCL VOCs	
SW-3	7/27/93	1145	✓			✓					✓							
SW-3D	7/27/93	1145	✓			✓					✓							
SW-8	7/28/93	1145	✓			✓					✓							

AR100465

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

	Date	Time		Date	Time
[redacted] (b) (4)	7/30/93	1130	[redacted] (b) (4)	7/29/93	1600
	7/30/93	1600		7/30	4:05
	7/30	6:05			
Relinquished by:					
Relinquished by:				7/30/93	1810

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 2002230-36
2002237-44
2002247-53

Please print. **Instructions on reverse side correspond with circled numbers.**

(1)
Client: GEC
Acct. #: 7440
Project Name/#: Rodale SW/SD
PWSID #:
Project Manager: [redacted] (b)(4)
P.O. #: 1001 02 12
Sampler: [redacted] (b)(4)
Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1047677

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Water	Other	Total # of Containers	(5) Analyses Requested: TAL Total & Dissolved CN	TAL Total & Dissolved Metals	TCL VOC's 8260 SOW	TCL VOC 8151 SOW					Remarks	(6) Temperature of samples upon receipt
SW-10	7/29/93	1350	✓			✓		4	✓	✓								
SD-10	"	1355	✓		✓			2	✓		✓							
SW-15	"	1450	✓			✓		4	✓	✓								
SD-15	"	1455	✓		✓			2	✓		✓							
SW-TB3	"	—						2				✓						

AR100466

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8)
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP Data Package Internal Chain of Custody required?
GLP Yes No As Per LLP Requirements

SDG Complete ?
Yes No

(9)

	Date	Time		Date	Time
[redacted] (b)(4)	7/29/93	2300	[redacted] (b)(4)	7/29/93	1630
	7/29/93	1620		7/29/93	16.20
	7/29/93	17:45			
				7/29/93	1745

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 20[illegible].839
Acct. # 7440 Sample # 2002852-53 ~~2002857-68~~
2002904
2002896-900

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC Acct. #: 7440
Project Name/#: RODALE MFG SP PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 1001-02-12
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049701

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL metals total & diss	TAL CN total & diss	TCL VOCs 6/91					Remarks	(6) Temperature of samples upon receipt
SW-10	7/29/93	1350	✓			✓					✓						
SW-11	"	1135	✓			✓					✓						
SW-11 MS	"	1135	✓			✓					✓						
SW-11 MSD	"	1135	✓			✓					✓						
SP-TB1	7/30/93	—									✓						

AR100467

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	7/28/93	1130	[redacted] (b) (4)	7/29/93	1600
	7/30/93	1600		7/30	4:05
	7/30	6:05			
				7/30/93	1810

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only 2004191-96
Acct. # 7440 Sample # 2004197-201

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC
Acct. #: 7440
Project Name/#: Rodale : PW
PWSID #:
Project Manager: [redacted] (b)(4)
P.O. #: 10010212
Sampler: [redacted] (b)(4)
Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 049775

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Water (Potable / NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL Total & Dissolved Metals	TAL Total & Dissolved CN	TCL VOA 8/91 SW					Remarks	(6) Temperature of samples upon receipt:
PW - UM43	8/3/93	0915	✓			✓		7	✓	✓	✓						
PW - UM58	"	1100	✓			✓		7	✓	✓	✓						
PW - UM58D	"	1100	✓			✓		7	✓	✓	✓						
PW - 1501	"	1415	✓			✓		7	✓	✓	✓						
PW - LM10	"	1515	✓			✓		7	✓	✓	✓						
PW - TB1	"	—				✓		2			✓					vial lids broken upon receipt. DJ 8/3/93	

AR100468

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
~~Tier I (NJ)~~
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements
GLP

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
R [redacted] (b)(4)	3/93	1845	[redacted] (b)(4)	3/93	1000
R [redacted]	3/93	1615		3/93	1615
R [redacted]	3/93	1805			
Relinquished by:					
Relinquished by:				3/93	1805

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 2005512-21
Acct. # 7440 Sample # 2005532-40

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC Acct. #: 7440
Project Name/#: RUDALE: PLV PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 1001 02 12
Sampler: [redacted] (b)(4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049867

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (Potable / NPDES)	Other	Total # of Containers	TAL Total & Dissolved Cn	TAL Total & Dissolved Metals	TCL VOC's 6/91 SOW	Remarks	Temperature of samples upon receipt (6)
PW-SA05	08/05/93	0745	✓			✓		7	✓	✓	✓		
PW-1492	8/5/93	1615	✓			✓		7	✓	✓	✓		
~~PW-LE-677~~ PW-LE677	8/5/93	1115	✓			✓		7	✓	✓	✓		
~~PW-LE-677D~~ PW-LE677D	8/5/93	1115	✓			✓		7	✓	✓	✓		
PW-0351	"	1200	✓			✓		7	✓	✓	✓		
PW-0351 MS	"	1200	✓			✓		7	✓	✓	✓		
PW-0351 MSD	"	1200	✓			✓		7	✓	✓	✓		
PW-LE1293	"	1315	✓			✓		7	✓	✓	✓		
PW-LM40	8/4/93	1715	✓			✓		7	✓	✓	✓		
PW-TB3	8/5/93					✓		2			✓		

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP Data Package Internal Chain of Custody required?
GLP Yes No As per CLP Requirements

SDG Complete ? Yes No

(9)

Relinquished by:	Date	Time	Relinquished by:	Date	Time
[redacted] (b)(4)	8/5/93	2130	[redacted] (b)(4)	8/4/93	1600
[redacted]	8/5/93	1415	[redacted]	8/5/93	1415
[redacted]	8/5/93	1645	[redacted]		
Relinquished by:	Date	Time	Relinquished by:	Date	Time
			[redacted]		
Relinquished by:	Date	Time	[redacted]	Date	Time
				8/5/93	1645

Analysis Request/Environmental Services Chain of Custody

For LLI Use Only 200+146

Acct. # 7440 Sample # ~~2007155-58~~ 2007160-63

Lancaster Laboratories
Where quality is a science.

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC Acct. #: 7440

Project Name/#: RODALE : PW PWSID #:

Project Manager: [redacted] (b) (4) P.O. #: 10010212

Sampler: [redacted] (b) (4) Quote #:

State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1049955

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: TAL Total & Dissolved Metals	TAL Total & Dissolved Cn-	TCL VOC 6/11 SW						Remarks	(6) Temperature of Samples upon receipt
PW-EM08	8/9/93	1045	✓			✓		7										
PW-EM09	"	1045	✓			✓		7										
PW-LM23	"	1315	✓			✓		7										
PW-LM23D	"	1315	✓			✓		7										
PW-TB4	"					✓		2									Only 1 vial submitted. [illegible] 8/9/93	

AR100470

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary Site-specific QC required? Yes No
Tier I (NJ)
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP
GLP
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete ? Yes No

(9)

	Date	Time		Date	Time
[redacted] (b) (4)	8/6/93	1555	[redacted] (b) (4)	8/9/93	0720
	[illegible]	[illegible]		8/9/93	0905
	8/9/93	1555		8/9/93	1555
	8/9/93	1750			
				8/9/93	1750

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

Acct. # 7440 For LLI Use Only Sample # 2007804-810 2007818-823

Please print. Instructions on reverse side correspond with circled numbers.

(1)

Client: GEC, INC
Project Name/#: Rodale : PW
Project Manager: [redacted] (b)(4)
Sampler: [redacted] (b)(4)
State where sample was collected: PA

Acct. #: 7440
PWSID #:
P.O. #: 100100 12
Quote #:

For LLI use only
FSC:
SCR #: 1050009

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Potable NPDES	Water	Other	Total # of Containers	TAL Total & Dissolved Metals	TAL Total & Dissolved Cn.	TCL VOC 624/8260						Remarks	Temperature of samples upon receipt (6)
PW- SA07	8/10/93	0915	✓				✓		7	✓	✓	✓							
PW- LM20	"	1015	✓				✓		7	✓	✓	✓							
PW- LM26	"	1130	✓				✓		7	✓	✓	✓							
PW- UM60	"	1400	✓				✓		7	✓	✓	✓							
PW- UM61	"	1515	✓				✓		7	✓	✓	✓							
PW- UM61D	"	1515	✓				✓		7	✓	✓	✓							
PW- TB5	"						✓		2			✓							

AR100471

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)

Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No As Per CLP Requirements

SDG Complete ? Yes No

(9)

[redacted] (b)(4)	Date	Time	[redacted] (b)(4)	Date	Time
	8/6/93	2220		8/9/93	0730
	Date	Time		Date	Time
	8/9/93	[illegible]		8/93	0905
	Date	Time		Date	Time
	8/93	1610		8/9/93	1610
	Date	Time		Date	Time
	8/10/93	1805			
	Date	Time		Date	Time
				8/10/93	1805

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

Acct. # 7440 For LLI Use Only Sample # 2008510-16 2008517-22

Please print. **Instructions on reverse side correspond with circled numbers.**

(1)

Client: GEC INC Acct. #: 7440
Project Name/#: RODALE : PW PWSID #:
Project Manager: [redacted] (b)(4) P.O. #: 10010212
Sampler: [redacted] (b)(4) Quote #:
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1050058

(2)

Sample Identification	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Total & Dissolved TAL Metals	Total & Dissolved TAL CN-	TCL VOA 6/91 SOW						Remarks	Temperature of samples upon receipt (6)
PW-LM27	8/11/93	1015	✓			✓		7	✓	✓	✓							
PW-SA08	"	1115						7	✓	✓	✓							
PW-SA08 D	"	1115						7	✓	✓	✓							
PW-SA08 MS	"	1115						4	✓	✓								
PW-SA08 MSD	"							4	✓	✓								
PW-LM 28	"	1530	✓			✓		7	✓	✓	✓							
PW-TB6								2			✓							

AR100472

(7)

Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8)
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP Data Package Internal Chain of Custody required?
GLP Yes No As Per CLP Requirements

SDG Complete?
Yes No

(9)

	Date	Time		Date	Time
[redacted] (b)(4)	10-93	1240	[redacted] (b)(4)	8/93	1600
	8/93	1615		8/11/93	1615
	8/11/93	1615			
				8/11/93	1800

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only 200[illegible]256-59
Acct. # 7440 Sample # 2009262-64
2009268-73

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC, INC. Acct. #: 7440
Project Name/#: RODALE : PW PWSID #:
Project Manager: [redacted] (b) (4) P.O. #: 10010212
Sampler: [redacted] (b) (4) Quote #: 113132
State where sample was collected: PA

For LLI use only
FSC:
SCR #: 1050061

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4) Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	(5) Analyses Requested: Total & dissolved TAL Metals	Total & dissolved TAL Cn-	TCL WC SDW 6/91						Remarks	(6) Temperature of samples upon receipt
PW-LE312	8/12/93	0915	✓			✓		7	✓	✓	✓							
PW-LE411	"	1015	✓			✓		7	✓	✓	✓							
PW-LM21	"	1130	✓			✓		7	✓	✓	✓							
PW-LM21D	"	1130	✓			✓		7	✓	✓	✓							
PW-SA09	"	1415	✓			✓		7	✓	✓	✓							
PW-UM62	"	1515	✓			✓		7	✓	✓	✓							
PW-TB7	"					✓		2			✓							

AR100473

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

(8)
Data Package Options (please circle if requested):
QC Summary
Tier I (NJ)
Tier II (NJ)
EPA CLP
GLP

Site-specific QC required? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Data Package Internal Chain of Custody required? Yes No AS Per CLP Requirements

SDG Complete ? Yes No

	Date	Time
[redacted] (b) (4)	8/10/93	2100
	8/11/93	1600
	8/12/93	1600
	8/12/93	1800

	Date	Time
[redacted] (b) (4)	8/11/93	1315
	8/11/93	1600
	8/12/93	1600
	8/12/93	1800

(9)

Analysis Request/Environmental Services Chain of Custody

Lancaster Laboratories
Where quality is a science.

For LLI Use Only
Acct. # 7440 Sample # 20166405-08
20166409-11

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: GEC
Project Name/#: RODALE MFG-PW [redacted] (b)(4)
Project Manager: [redacted] (b)(4)
Sampler: [redacted] (b)(4)
State where sample was collected:

Acct. #: 7440
PWSID #:
P.O. #:
Quote #:

For LLI use only
FSC:
SCR #: 1049955

(2)

Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Potable / NPDES	Water	Other	Total # of Containers	(5) VOCs by 624	Total + dissolved Fe, Mn, Pb, Cu	Total and CN assolved	Remarks	(6) Temperature of Samples upon receipt
PW-UM63	8/25/93	1015	✓				✓		7	X	X	X		
PW-UM64	"	1415	✓				✓		7	X	X	X		
PW-UM64D	"	"	✓				✓		7	X	X	X		
PW-TB8	"	—							2	X				

AR100474

(7)
Turnaround Time Requested (please circle): Normal Rush
(Rush TAT is subject to LLI approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax
Phone #:
Fax #:

Data Package Options (please circle if requested):
(8)
QC Summary Site-specific QC required?
Tier I (NJ) Yes No
Tier II (NJ) (If yes, indicate QC sample and submit triplicate volume.)
EPA CLP Data Package Internal Chain of Custody required?
GLP Yes No per CLP requirements

SDG Complete ?
Yes No

[redacted] (b)(4)	Date	Time
	8/26/93	1555
	Date	Time
	8/27/93	0345
	Date	Time
	8/26/93	1200
	Date	Time
	8/26/93	1900
	Date	Time

[redacted] (b)(4)	Date	Time
	8/26/93	2320
	Date	Time
	8/9/93	0905
	Date	Time
	8/26/93	1200
	Date	Time
	Date	Time
	8/26/93	1930

(9)

7

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AR100475

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APPENDIX 7

LABORATORY DATA AND DATA VALIDATION

7-1: CLP ORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., OCTOBER 28, 1993)

7-2: CLP ORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., OCTOBER 29, 1993)

7-3: CLP INORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., NOVEMBER 11, 1993)

7-4 GENERAL WATER QUALITY PARAMETER DATA WITH VALIDATION MEMO PREPARED BY GEC

7-1: CLP ORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., OCTOBER 28, 1993)

Environmental Standards, Inc.

Specialists in Environmental Risk Assessment, Hydrogeology and Data Validation

The Commons at Valley Forge, Unit 4, 1220 Valley Forge Rd.
P.O. Box 911, Valley Forge, PA 19482 (215) 935-55[illegible]

QUALITY ASSURANCE REVIEW

OF THE RODALE MANUFACTURING SITE

IN EMMAUS, PENNSYLVANIA

October 28, 1993

Prepared for:

GEO-ENVIRONMENTAL CONSULTANTS, INC.
55 Valley Stream Parkway
Suite 140
Malvern, PA 19355

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1220 Valley Forge Road
P.O. Box 911
Valley Forge, PA 19482

Introduction

This quality assurance review is based upon a rigorous examination of all data generated for the samples which were collected from June 30 to July 30, 1993 from the Rodale Manufacturing site in Emmaus, Pennsylvania. The samples included in this quality assurance review are presented on Table 1.

This review has been performed in accordance with the "Region III Modifications to National Functional Guidelines for Organic Data Review" (June 1992).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and also to determine compliance relative to the analytical requirements specified in the analytical method. Qualifier codes have been placed next to the results so that the data user can quickly assess the qualitative and/or quantitative reliability of any result. Details of this quality assurance review are presented in the narrative section of this report. This report was prepared to provide a critical review of the laboratory analyses and reported analytical results. Rigorous quality assurance reviews of laboratory-generated data routinely identify various problems associated with analytical measurements, even from the most experienced and capable laboratories. The nature and extent of problems identified in this critical review should not be interpreted to mean that those results that do not have qualifier codes are less than valid.

TABLE 1

SAMPLES INCLUDED IN THIS QUALITY ASSURANCE REVIEW

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
OW-MW-1	1988521	6/30/93	GEC09	V, S, P
OW-MW-2	1988523	6/30/93	GEC09	V, S, P
OW-MW-2D (Duplicate of OW-MW-2)	1988525	6/30/93	GEC09	V, S, P
OW-FB1 (Field Blank)	1988527	6/30/93	GEC09	V, S, P
OW-TB1 (Trip Blank)	1988529	6/30/93	GEC09	V
OW-MW3	1989613	7/1/93	GEC09	V, S, P
OW-MW3D (Duplicate of OW-MW3)	1989615	7/1/93	GEC09	V, S, P
OW-FB2 (Field Blank)	1989617	7/1/93	GEC09	V, S, P
OW-AB1 (Air Blank)	1989619	7/1/93	GEC09	V
OW-TB2 (Trip Blank)	1989620	7/1/93	GEC09	V
OW-MW4	1990318	7/6/93	GEC09	V, S, P
OW-MW4D (Duplicate of OW-MW4)	1990320	7/6/93	GEC09	V, S, P
OW-WELL5	1990322	7/6/93	GEC09	V, S, P
OW-FB3 (Field Blank)	1990324	7/6/93	GEC09	V, S, P
OW-TB3 (Trip Blank)	1990326	7/6/93	GEC09	V
OW-WELL6	1990985	7/7/93	GEC09	V, S, P
OW-WELL6D (Duplicate of OW-WELL6)	1990987	7/7/93	GEC09	V, S, P

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
OW-FB4 (Field Blank)	1990989	7/7/93	GEC09	V, S, P
OW-TB4 (Trip Blank)	1990991	7/7/93	GEC09	V
OW-WELL6MS (Matrix Spike)	1990985	7/7/93	GEC09	V
OW-WELL6MSD (Matrix Spike Duplicate)	1990985	7/7/93	GEC09	V
PSW-4	1997119	7/20/93	PSW01	V*, S
PSW-4D (Duplicate of PSW-4)	1997121	7/20/93	PSW01	V*, S
PSW-6	1997123	7/20/93	PSW01	V*, S
TB-PSW1 (Trip Blank)	1997125	7/20/93	PSW01	V*
PSW-7	1998070	7/21/93	PSW01	V*, S
PSW-2	1998072	7/21/93	PSW01	V*, S
TB-PSW2 (Trip Blank)	1998074	7/21/93	PSW01	V*
PSW-1	1998861	7/22/93	PSW01	V*, S
PSW-3	1998863	7/22/93	PSW01	V*, S
TB-PSW3 (Trip Blank)	1998865	7/22/93	PSW01	V*
SP-LESP73	2002857	7/30/93	ROD04	V*
SW-3	2002861	7/27/93	ROD04	V*
SW-3D (Duplicate of SW-3)	2002862	7/27/93	ROD04	V*
SW-8	2002863	7/28/93	ROD04	V*
SW-10	2002864	7/29/93	ROD04	V*
SW-11	2002865	7/29/93	ROD04	V*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
SW-TB1 (Trip Blank)	2002868	7/30/93	ROD04	V*
SW-TB1 (Trip Blank)	2000748	7/27/93	ROD02	V*
SW-TB2 (Trip Blank)	2001170	7/28/93	ROD02	V*
SW-TB3 (Trip Blank)	2002244	7/29/93	ROD02	V*
SP-03	2002853	7/30/93	ROD02	V*
SD-1	2000731	7/27/93	ROD01	V
SD-2	2000732	7/27/93	ROD01	V
SD-3	2000733	7/27/93	ROD01	V
SD-3D (Duplicate of SD-3)	2000734	7/27/93	ROD01	V
SD-4	2000735	7/27/93	ROD01	V
SD-9	2001155	7/28/93	ROD01	V
SD-9D (Duplicate of SD-9)	2001156	7/28/93	ROD01	V
SD-8	2001157	7/28/93	ROD01	V
SD-7	2001158	7/28/93	ROD01	V
SD-6	2001159	7/28/93	ROD01	V
SD-5	2001160	7/28/93	ROD01	V
SD-12	2002230	7/29/93	ROD01	V
SD-11	2002231	7/29/93	ROD01	V
SD-11D (Duplicate of SD-11)	2002232	7/29/93	ROD01	V
SD-11MS (Matrix Spike)	2002233	7/29/93	ROD01	V

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
SD-11MSD (Matrix Spike Duplicate)	2002234	7/29/93	ROD01	V
SD-10	2002235	7/29/93	ROD01	V
SD-15	2002236	7/29/93	ROD01	V
SD-16	2002839	7/30/93	ROD01	V

NOTES:

V TCL Volatiles by CLP SOW390
V* TCL Low Concentration Volatiles by CLP SOW691
S TCL Semivolatiles by CLP SOW390
P TCL Aroclors by CLP SOW390

Section 1 Quality Assurance Review

A. Data Evaluation

The organic analyses of 61 samples (including five field blanks and 11 trip blanks) were performed by Lancaster Laboratories in Lancaster, Pennsylvania. The samples were collectively analyzed by Contract Laboratory Program (CLP) protocol for the Target Compound List (TCL) volatiles, semivolatiles, and Aroclors in accordance with SOW390, Document OLM01.8 as specified in Table 1. In addition, some samples were analyzed for TCL volatiles by the CLP Superfund Analytical Methods for Low Concentration Water for Organics Analysis (SOW691). Furthermore, mass spectral library searches have been performed on up to 25 extraneous chromatographic peaks for the volatile and semivolatile fractions combined.

The findings offered in this report are based upon a review of holding times, blank analysis results, surrogate recoveries, matrix spike/matrix spike duplicate results, field duplicate results, laboratory control sample recoveries, qualitative identification, GC/MS tuning and system performance, calibrations, quantitation of positive results, 4,4'-DDD and endrin breakdown, retention times, internal standards performance, resolution check standard results, analytical sequence, GC column agreement, Florisil cartridge check results and tentatively identified compounds. The analytical results are provided in Section 2 of this report.

Method criteria and reporting requirements were met with the exception of the following. It should be emphasized that the following items are contractual in nature and may not necessarily affect data usability. Data usability is addressed in a separate section.

Correctable Deficiencies

1. There is a peak in the volatile chromatogram of almost every sample that elutes within the first four minutes of the analytical run that appears to be greater than 10% in height of the nearest internal standard. The laboratory provided a library search for this peak identifying it as carbon dioxide but did not report the presence of this peak on the Tentatively Identified Compound (TIC) Form I as required (SOW390, B-10 and SOW691, B-32).

2. The laboratory did not use the Geo-Environmental Consultants, Inc. sample numbers exactly as they appear on the Chains-of-Custody to complete all of the laboratory QC forms as required (SOW390, B-27 and SOW691, B-27). Instead, the laboratory used abbreviated sample numbers. It should be noted, however, that for ease of cross reference, the data tables contain both the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody and the abbreviated sample numbers used by the laboratory. The data reviewer has elected to reference in this report the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody.

3. The laboratory did not provide TIC Form I's or provide mass spectral library searches as required (SOW390, B-10 and SOW691, B-32) for reanalyzed samples and diluted samples.

4. The laboratory did not complete all of the header information on most of the laboratory QC forms as specified in the protocol (SOW390, B-35-36 and SOW691, B-26-27). Specifically, the laboratory did not include the Sample Delivery Group (SDG) number on any of the laboratory QC forms with the exception of the Form IIs (Surrogate Recovery Forms).

5. The laboratory included non-project samples on many of the QC summary forms for the volatile and semivolatile fractions.

6. The TIC Form I for the semivolatile method blank in SDG GEC09 was not included in the data package provided. The data reviewer was able to evaluate the TIC results for the method blank from the raw data provided.

7. The laboratory calculated relative percent differences (RPDs) instead of percent differences (%Ds) between the calculated amount and nominal amount of all pesticides for all pesticide continuing calibration forms (SOW390, D-46/PEST). It should be noted that the SOW390 uses "RPD" but the required equation actually calculates %D.

8. The Form VI (Initial Calibration Summary Form) and raw data associated with the semivolatile initial calibration performed on 7/27/93 on instrument HPO2861 were not included in the data package provided. In addition, the Form VIIs (Continuing Calibration Summary Forms) and raw data associated with the semivolatile continuing calibration performed on instrument HPO2861 on 7/27/93 at 08:34 and associated with the volatile continuing calibration performed on instrument HPO3459 on 8/24/93 at 15:08 were not included in the data package provided.

9. Non-TCL compounds were reported on the Initial Calibration Summary Forms (Form VIs) for the volatile and/or semivolatile fractions of SDG GEC09, PSW01, and ROD01.

10. The laboratory inappropriately flagged several unknown TICs with an "N" code, indicating that the TIC is a tentative identification. Only compounds with a qualitatively confident library search should be flagged with an "N." TICs identified as unknowns should not be flagged with an "N."

Noncorrectable Deficiencies

1. According to the raw data, the laboratory did not prepare the calibration standard solutions with the specified concentration of 1,2-dibromo-3-chloropropane (SOW691, D-11). The laboratory prepared the standard calibration solutions with 2.5 times the

specified concentration. Furthermore, for the low-concentration volatile fraction, the laboratory incorrectly prepared the calibration standard solutions for *trans*-1,3-dichloropropene at approximately 1/5th of the specified concentration. Data usability does not appear to be impacted since the laboratory method detection limits are less than the quantitation limit.

2. The laboratory did not perform the matrix spike/matrix spike duplicate (MS/MSD) analyses on a project sample for the semivolatile and Aroclor fractions of SDG GEC09 and the semivolatile fractions of SDG PSW01. According to the Aroclor case narrative, the laboratory was not able to perform the MS/MSD analysis on a project sample due to the limited sample volume. It should be noted that the laboratory provided semivolatile and Aroclor blank spike and blank spike duplicate results in the absence of a MS/MSD analysis.

3. A high percent difference (defined as RPD - see Correctable Deficiency 7) was obtained between the calculated amount and nominal amount for 4,4'-DDT in PEM3Q analyzed on the DB1701 column at 7/22/93 at 08:32. Per CLP protocol, sample data are not acceptable unless bracketed by an acceptable PEM. One criterion for an acceptable PEM is that the percent difference between the calculated amount and the nominal amount (true amount) must be less than or equal to 25% for each pesticide in the standard (SOW390, D-46/PEST). There is no impact on data usability, however, since pesticides were not target compounds for this project.

4. An unacceptable lot of Florisil cartridges was used for the analysis of samples OW-MW-1, OW-MW-2, OW-MW-2D and OW-FB1 as demonstrated by the low recovery obtained for heptachlor (<80% as per SOW390, D-30/PEST). There is no impact on data usability, however, since pesticides are not target compounds for this project.

5. The date of sample collection for samples SW-10 and SW-11 were misreported as 7/19/93 instead of 7/29/93 on the Chains-of-Custody.

Comments

1. The volatile analyses of the following samples were performed at an initial dilution due to the high concentration of target compounds in these samples. Consequently, the quantitation limits for all volatile compounds have been raised in these samples.

Sample	Dilution Factor
OW-MW1	100
OW-MW4	1000

Sample	Dilution Factor
OW-MW4D	500
OW-MW4DDL	1000
OW-WELL6	10
OW-WELL6DL	20
OW-WELL6D	10
OW-WELL6DDL	20
SW-9	2
SW-9D	2

2. The laboratory appropriately reanalyzed the semivolatile fraction of sample OW-WELL5 due to low internal standard areas for d_{12}-chrysene and d_{12}-perylene. The laboratory performed a two-fold dilution on this sample due to the high concentration of phenol in the sample. Both the reanalysis and dilution analyses of this sample also exhibited low internal standard areas, confirming a matrix effect.

3. Benzo(b)fluoranthene and benzo(k)fluoranthene exhibit identical mass spectra and could not be resolved (separated) under the gas chromatography conditions during the semivolatile analysis of samples OW-WELL5, OW-WELL5RE, and OW-WELL5DL. The laboratory appropriately indicated the results may actually represent the sum of both benzofluoranthene isomers and reported the positive results as the benzo(b)fluoranthene isomer. The reviewer has chosen to report the positive result as both benzo(b)fluoranthene and benzo(k)fluoranthene.

4. The laboratory appropriately reanalyzed the semivolatile fraction of OW-MW4D due to low internal standard areas observed for d_{12}-chrysene and d_{12}-perylene. Low internal standard areas were observed for the reanalysis of this sample, confirming a sample matrix effect.

5. As per the case narrative, semivolatile target compounds with concentrations less than 1 ng/μl in the extract were not reported due to the poor quality of the mass spectral data at this level.

6. As noted in the case narrative, conflicts exist between the analytical software and the forms generation software, making it impossible to report the internal diameter of the column ID on the pesticide sample chromatograms as required. According to the laboratory, the internal diameter of the column is 0.53 mm for all data.

7. The laboratory did not provide the Form I and associated raw data for the volatile storage blank required by the low-concentration protocol (SOW691, D-39/VOA); therefore, the data reviewer was not able to confirm that this blank was prepared and analyzed by the laboratory or to assess the results of the blank to the associated data. It should be noted that the protocol does not require raw data deliverables for the storage blank.

8. The Chains-of-Custody did not indicate whether the samples were temperature preserved and/or chemically preserved with HCl for aqueous samples collected for volatile analysis. According to project management at Geo-Environmental Consultants, Inc., all samples were kept cool (4°±2°C) and were chemically preserved with HCl for aqueous volatile samples.

9. As noted in the case narrative, the laboratory used the nearest internal standard to quantitate volatile sample results instead of following the assigned internal standards as listed in Table 5 of SOW390 and SOW691. It should be noted that the laboratory received permission from U.S. EPA Region III to quantitate volatile sample results from the nearest internal standard.

With respect to data usability, the principal areas of concern include blank contamination, calibrations, surrogate recoveries, results exceeding the calibration range, and internal standard areas. It should be noted that the following data usability issues represent an interpretation of the quality control results obtained from project samples and associated standards. Quite often, data qualifications address issues relating to sample matrix problems. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Due to the trace-level presence of acetone, methylene chloride, 2-butanone, carbon disulfide, chloromethane, trichloroethene, chloroform, and bis(2-ethylhexyl)phthalate in laboratory method blanks, field blanks, and/or trip blanks, the positive results for the compounds in the following samples should be considered qualitatively questionable and have been flagged "B" on the data tables.

Compound	Applicable Samples
acetone	All investigative samples with positive results in SDG GEC09 and all investigative samples with positive results in SDG ROD01 except sample SD-9D
methylene chloride	Sample SP-03 and all investigative samples with positive results in SDGs PSW01, ROD04, and ROD01
trichloroethene	OW-WELL5

Compound	Applicable Samples
carbon disulfide	All investigative samples with positive results in SDG PSW01
2-butanone	SD-10
chloroform	Sample SP-03 and all investigative samples with positive results in SDG PSW01
chloromethane	SD-3D and SD-6
bis(2-ethylhexyl)phthalate	All investigative samples with positive results

- Although there is no direct reason to qualitatively question the presence of acetone in samples PSW-4, PSW-3, SP-LESP73, and SW-11, the reported results should be used with caution. Acetone is a common laboratory contaminant.

- Although the results for trichloroethene in samples OW-MW4 and OW-MW4DDL can be qualitatively questioned by the presence of trichloroethene in the associated field blank, the reviewer has not qualified the results. In sample OW-MW4D (Duplicate of OW-MW4), which was analyzed at a two-fold less dilution than samples OW-MW4 and OW-MW4DDL, trichloroethene could not be qualitatively questioned by the quantity of trichloroethene in the associated field blank. Therefore, the reviewer believes that trichloroethene is native to the sample and that it is due to the large analysis dilution factor that samples OW-MW4 and OW-MW4DDL could be qualitatively questioned.

- The analyses for the compounds in the following samples are unreliable and the "not-detected" results have been flagged "R" on the data tables. In addition, the positive results for acetone in samples PSW-4, PSW-3 SP-LESP73, and SW-11 should be considered biased low estimates and have been flagged "L" on the data tables. Very low relative response factors (<0.05) were obtained for these compounds in the associated calibration standards.

Compound	Applicable Samples
acetone	All samples in SDGs PSW01, ROD04 and ROD02 with "not-detected" results
2-butanone	All samples in SDGs PSW01, ROD04, and ROD02 with "not-detected" results
4-methyl-2-pentanone	All samples in SDG PSW01 with "not-detected" results, and samples SW-11, SW-TB1 (SDG ROD04), SW-TB1 (SDG ROD02), SW-TB2, and SW-TB3

Compound	Applicable Samples
2-hexanone	All samples in SDGs PSW01 and ROD04 with "not-detected" results and samples SW-TB1 (SDG ROD02), SW-TB2, and SW-TB3
1,2-dibromo-3-chloropropane	All samples in SDG PSW01 with "not-detected" results, and samples SW-TB1 (SDG ROD02), SW-TB2, and SW-TB3

- The positive results for trichloroethene in samples OW-MW4D, OW-WELL6, and OW-WELL6D and for phenol in sample OW-WELL5 should be considered estimated and have been flagged "J" on the data tables. The instrument levels of these compounds in the aforementioned samples exceeded the calibration range of the instrument.

- The positive results for compounds quantitated using the semivolatile internal standard compounds d_{12}-chrysene and d_{12}-perylene in samples OW-MW4D, OW-WELL5, OW-WELL5DL and OW-WELL5RE should be considered estimated and have been flagged "J" on the data tables. In addition, the quantitation limits for the compounds quantitated using the semivolatile internal standards in the aforementioned samples should be considered estimated and the "not-detected" results have been flagged "UJ" on the data tables. Low areas were obtained for the internal standard compounds d_{12}-chrysene and d_{12}-perylene in these samples.

- The quantitation limits for all Aroclor compounds in samples OW-MW3D, OW-MW4D, OW-WELL6 and OW-WELL6D may be higher than reported and the "not-detected" results have been flagged "UL" on the data tables. Low recoveries were obtained for the pesticide/Aroclor surrogate compound decachlorobiphenyl on both columns used for sample analysis.

- The positive results for benzo(b)fluoranthene and benzo(k)fluoranthene in samples OW-WELL5, OW-WELL5RE, and OW-WELL5DL should be considered estimated and have been flagged "J" on the data tables. Benzo(b)fluoranthene and benzo(k)fluoranthene are indistinguishable isomers by mass spectroscopy and could not be resolved by the gas chromatography conditions used for the analysis of these samples. The reported results for each compound may represent the sum total of both isomers.

- The positive result for acetone in sample SD-9D should be considered estimated and has been flagged "J" on the data tables. A high percent relative standard deviation (>30%) was obtained between the relative response factors for acetone in the associated initial multipoint calibration.

- Nine field duplicate pairs were submitted with this data set as follows:

SDG	Sample Identification	Duplicate Sample Identification	Date of Sample Collection
GEC09	OW-MW-2	OW-MW-2D	6/30/93
GEC09	OW-MW3	OW-MW3D	7/1/93
GEC09	OW-MW4	OW-MW4D	7/6/93
GEC09	OW-WELL6	OW-WELL6D	7/7/93
PSW01	PSW-4	PSW-4D	7/20/93
ROD04	SW-3	SW-3D	7/27/93
ROD01	SD-3	SD-3D	7/27/93
ROD01	SD-9	SD-9D	7/28/93
ROD01	SD-11	SD-11D	7/29/93

- Good precision was demonstrated between the results for the majority of the field duplicate pairs. Qualitatively confident results greater than the quantitation limits are summarized below. The positive results for total xylenes in sample PSW-4D and for acetone in samples SD-9D and SW-3 should be considered estimated and have been flagged "J" on the data tables. Poor precision as defined below was obtained between the results for these compounds in the aforementioned field duplicate pairs.

Compound	Sample OW-MW-2	Duplicate Sample OW-MW-2D	RPD
trichloroethene	35 µg/L	35 µg/L	0.0%

Compound	Sample OW-MW4	Duplicate Sample OW-MW4D	RPD
trichloroethene	140,000 µg/L	170,000 µg/L[1]	19.4%

Compound	Sample OW-WELL6	Duplicate Sample OW-WELL6D	RPD
vinyl chloride	150 µg/L	160 µg/L	6.5%
1,2-dichloroethene (total)	1300 µg/L	1400 µg/L	7.4%
trichloroethene	2900 µg/L	3200 µg/L	9.8%

Compound	Sample PSW-4	Duplicate Sample PSW-4D	RPD
trichloroethene	4.5 μg/L	4.4 μg/L	1.1%
tetrachloroethene	21 μg/L	19 μg/L	10.0%
total xylenes	1.0 U μg/L	3.3 μg/L	NC[2]

Compound	Sample SW-3	Duplicate Sample SW-3D	RPD
acetone	10 μg/L	5.0 U μg/L	NC[2]

Compound	Sample SD-9	Duplicate Sample SD-9D	RPD
acetone	140 B μg/Kg	290 μg/Kg	69.8%

NOTES:

B - Not detected substantially above the level reported in laboratory field and/or trip blanks.
U - Not detected.
NC - Not calculated.
[1] - This result was reported from the secondary dilution analysis.
[2] - Unacceptable duplicate precision; results are >20% RPD for aqueous samples and 40% RPD for solid samples for results >5× CRQL or the difference is >CRQL for aqueous samples or >2× CRQL for solid samples for results <5× CRQL.

- All positive results less than the quantitation limit should be considered estimated and have been flagged "J" on the data tables.

- Tentatively Identified Compounds (TICs) have been evaluated and are presented in Section 2. The majority of the TICs appear to be laboratory artifacts, blank contaminants, and unknowns. TICs that are present in the blanks or are known laboratory artifacts have been flagged "R" on the TIC Form I's. All other TICs should be considered estimated and have been flagged "J" on the data tables since the calculation is based on an assumed response factor of 1.0.

A complete support documentation of this quality assurance review is provided in Section 3 of this report.

B. Conclusions

This quality assurance review has identified some aspects of the data that have required qualification. In order to use any of the analytical results, the data user should understand the limitations and qualifications stated in this quality assurance review. The Laboratory Case Narratives and Project Chains-of-Custody are presented in Section 4 of this report.

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SECTION 2

ANALYTICAL RESULTS

QUALIFIER NOTES

U	-	Not detected. The associated number indicates approximate sample concentration necessary to be detected.
B	-	Not detected substantially above the level reported in laboratory or field blanks.
R	-	Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
J	-	Analyte present. Reported value may not be accurate or precise.
L	-	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
UJ	-	Not detected. Quantitation limit may be inaccurate or imprecise.
UL	-	Not detected. Quantitation limit is probably higher.

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-1)
VOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 9/23/93)

Location ID:	MW-1	MW-2	MW-2	Field Blank 1
GEC Sample ID:	OW-MW-1	OW-MW-2	OW-MW-2D	OW-FB1
EPA Sample No:	OWMW1	OWMW2	WMW2D	OWFBL
Laboratory ID No:	1988521	1988523	1988525	1988527
Sample Type:	Investigative	Investigative	Duplicate	QA/QC
Sample Date:	6/30/93	6/30/93	6/30/93	6/30/93
Identified Compounds:				
Chloromethane	1000 U	10 U	10 U	10 U
Vinyl chloride	1000 U	10 U	10 U	10 U
Bromomethane	1000 U	10 U	10 U	10 U
Chloroethane	1000 U	10 U	10 U	10 U
1,1-Dichloroethene	1000 U	10 U	10 U	10 U
Acetone	760 B	7 B	5 B	2 J
Carbon Disulfide	1000 U	10 U	10 U	10 U
Methylene Chloride	1000 U	10 U	10 U	3 J
1,1-Dichloroethane	1000 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	310 J	10 U	10 U	10 U
2-Butanone	1000 U	10 U	10 U	10 U
Chloroform	1000 U	10 U	10 U	10 U
1,1,1-Trichloroethane	1000 U	10 U	10 U	10 U
Carbon Tetrachloride	1000 U	10 U	10 U	10 U
Benzene	1000 U	10 U	10 U	10 U
1,2-Dichloroethane	1000 U	10 U	10 U	10 U
Trichloroethene	18000	21	22	10 U
1,2-Dichloropropane	1000 U	10 U	10 U	10 U
Bromodichloromethane	1000 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	1000 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	1000 U	10 U	10 U	10 U
Toluene	1000 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	1000 U	10 U	10 U	10 U
1,1,2-Trichloroethane	1000 U	10 U	10 U	10 U
Tetrachloroethene	1000 U	10 U	10 U	10 U
2-Hexanone	1000 U	10 U	10 U	10 U
Dibromochloromethane	1000 U	10 U	10 U	10 U
Chlorobenzene	1000 U	10 U	10 U	10 U
Ethylbenzene	1000 U	10 U	10 U	10 U
Xylene (total)	1000 U	10 U	10 U	10 U
Styrene	1000 U	10 U	10 U	10 U
Bromoform	1000 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	1000 U	10 U	10 U	10 U
Number of TICs:	0	2	1	0

Location ID:	Trip Blank 1	MW-3	MW-3	Field Blank 2	Air Blank 1
GEC Sample ID:	OW-TB1	OW-MW3	OW-MW3D	OW-FB2	OW-AB1
EPA Sample No:	OWTBL	OWMW3	MW3D-	OWFB2	OWAB1
Laboratory ID No:	1988529	1989613	1989615	1989617	1989619
Sample Type:	QA/QC	Investigative	Duplicate	QA/QC	QA/QC
Sample Date:	6/30/93	34151	34151	34151	34151
Identified Compounds:					
Chloromethane	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U
Acetone	8 J	8 B	3 B	5 J	6 J
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	2 J	10 U	10 U	1 J	1 J
1,1-Dichloroethane	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	35	35	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	3 J	3 J	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U
Number of TICs:	0	0	0	0	0

Location ID:	Trip Blank 2	MW-4	MW-4	MW-4	WELL 5
GEC Sample ID:	OW-TB2	OW-MW4	OW-MW4D	OW-MW4D	OW-WELL5
EPA Sample No:	OWTB2	OWMW4	MW4D-	MW-4D-DL	WEL5-
Laboratory ID No:	1989620	1990318	1990320	1990320	1990322
Sample Type:	QA/QC	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	34151	34156	34156	34156	34156
Identified Compounds:					
Chloromethane	10 U	10000 U	5000 U	10000 U	10 U
Vinyl chloride	10 U	10000 U	5000 U	10000 U	10 U
Bromomethane	10 U	10000 U	5000 U	10000 U	10 U
Chloroethane	10 U	10000 U	5000 U	10000 U	10 U
1,1-Dichloroethene	10 U	10000 U	5000 U	10000 U	10 U
Acetone	10 U	10000 U	5000 U	10000 U	37 B
Carbon Disulfide	10 U	10000 U	5000 U	10000 U	10 U
Methylene Chloride	10 U	10000 U	5000 U	10000 U	10 U
1,1-Dichloroethane	10 U	10000 U	5000 U	10000 U	10 U
1,2-Dichloroethene (total)	10 U	2600 J	3300 J	4100 J	10 U
2-Butanone	10 U	10000 U	5000 U	10000 U	13
Chloroform	10 U	10000 U	5000 U	10000 U	10 U
1,1,1-Trichloroethane	10 U	10000 U	5000 U	10000 U	10 U
Carbon Tetrachloride	10 U	10000 U	5000 U	10000 U	10 U
Benzene	10 U	10000 U	5000 U	10000 U	10 U
1,2-Dichloroethane	10 U	10000 U	5000 U	10000 U	10 U
Trichloroethene	10 U	140000	130000 J	170000	4 B
1,2-Dichloropropane	10 U	10000 U	5000 U	10000 U	10 U
Bromodichloromethane	10 U	10000 U	5000 U	10000 U	10 U
cis-1,3-Dichloropropene	10 U	10000 U	5000 U	10000 U	10 U
4-Methyl-2-Pentanone	10 U	10000 U	5000 U	10000 U	10 U
Toluene	10 U	10000 U	5000 U	10000 U	10 U
trans-1,3-Dichloropropene	10 U	10000 U	5000 U	10000 U	10 U
1,1,2-Trichloroethane	10 U	10000 U	5000 U	10000 U	10 U
Tetrachloroethene	10 U	1300 J	1200 J	1400 J	10 J
2-Hexanone	10 U	10000 U	5000 U	10000 U	10 U
Dibromochloromethane	10 U	10000 U	5000 U	10000 U	10 U
Chlorobenzene	10 U	10000 U	5000 U	10000 U	10 U
Ethylbenzene	10 U	10000 U	5000 U	10000 U	10 U
Xylene (total)	10 U	10000 U	5000 U	10000 U	10 U
Styrene	10 U	10000 U	5000 U	10000 U	10 U
Bromoform	10 U	10000 U	5000 U	10000 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10000 U	5000 U	10000 U	10 U
Number of TICs:	0	1	0	0	1

Location ID:	Field Blank	Trip Blank 3	Well 6	Well 6	Well 6
GEC Sample ID:	OW-FB3	OW-TB3	OW-WELL6	OW-WELL6	OW-WELL6D
EPA Sample No:	OWFB3	OWTB3	WELL6-	WELL6-DL	WELL6D
Laboratory ID No:	1990324	1990326	1990985	1990985	19909987
Sample Type:	QA/QC	QA/QC	Investigative	QA/QC	Duplicate
Sample Date:	34156	34156	7/7/93	7/7/93	7/7/93
Identified Compounds:					
Chloromethane	10 U	10 U	100 U	200 U	100 U
Vinyl chloride	10 U	10 U	150	130 J	160
Bromomethane	10 U	10 U	100 U	200 U	100 U
Chloroethane	10 U	10 U	100 U	200 U	100 U
1,1-Dichloroethene	10 U	10 U	100 U	200 U	100 U
Acetone	10 U	10 U	100 U	200 U	100 U
Carbon Disulfide	10 U	10 U	100 U	200 U	100 U
Methylene Chloride	1 J	10 U	100 U	200 U	100 U
1,1-Dichloroethane	10 U	10 U	100 U	200 U	100 U
1,2-Dichloroethene (total)	1 J	10 U	1300	1300	1400
2-Butanone	10 U	10 U	100 U	200 U	100 U
Chloroform	10 U	10 U	100 U	200 U	100 U
1,1,1-Trichloroethane	10 U	10 U	100 U	200 U	100 U
Carbon Tetrachloride	10 U	10 U	100 U	200 U	100 U
Benzene	10 U	10 U	100 U	200 U	100 U
1,2-Dichloroethane	10 U	10 U	100 U	200 U	100 U
Trichloroethene	39	10 U	2800 J	2900	3000 J
1,2-Dichloropropane	10 U	10 U	100 U	200 U	100 U
Bromodichloromethane	10 U	10 U	100 U	200 U	100 U
cis-1,3-Dichloropropene	10 U	10 U	100 U	200 U	100 U
4-Methyl-2-Pentanone	10 U	10 U	100 U	200 U	100 U
Toluene	10 U	10 U	100 U	200 U	100 U
trans-1,3-Dichloropropene	10 U	10 U	100 U	200 U	100 U
1,1,2-Trichloroethane	10 U	10 U	100 U	200 U	100 U
Tetrachloroethene	10 U	10 U	11 J	200 U	11 J
2-Hexanone	10 U	10 U	100 U	200 U	100 U
Dibromochloromethane	10 U	10 U	100 U	200 U	100 U
Chlorobenzene	10 U	10 U	100 U	200 U	100 U
Ethylbenzene	10 U	10 U	100 U	200 U	100 U
Xylene (total)	10 U	10 U	100 U	200 U	100 U
Styrene	10 U	10 U	100 U	200 U	100 U
Bromoform	10 U	10 U	100 U	200 U	100 U
1,1,2,2-Tetrachloroethane	10 U	10 U	100 U	200 U	100 U
Number of TICs:	0	1	0	-	0

Location ID:	Well 6	Field Blank 4	Trip Blank 4
GEC Sample ID:	OW-WELL6D	OW-FB4	OW-TB4
EPA Sample No:	WELL6D-DL	OWFB4	OWTB4
Laboratory ID No:	19909987	1990989	1990991
Sample Type:	QA/QC	QA/QC	QA/QC
Sample Date:	7/7/93	7/7/93	7/7/93
Identified Compounds:			
Chloromethane	200 U	10 U	10 U
Vinyl chloride	160 J	10 U	10 U
Bromomethane	200 U	10 U	10 U
Chloroethane	200 U	10 U	10 U
1,1-Dichloroethene	200 U	10 U	10 U
Acetone	24 B	3 J	10 U
Carbon Disulfide	200 U	10 U	10 U
Methylene Chloride	200 U	2 J	10 U
1,1-Dichloroethane	200 U	10 U	10 U
1,2-Dichloroethene (total)	1400	10 U	10 U
2-Butanone	200 U	10 U	10 U
Chloroform	200 U	10 U	10 U
1,1,1-Trichloroethane	200 U	10 U	10 U
Carbon Tetrachloride	200 U	10 U	10 U
Benzene	200 U	10 U	10 U
1,2-Dichloroethane	200 U	10 U	10 U
Trichloroethene	3200	10 U	10 U
1,2-Dichloropropane	200 U	10 U	10 U
Bromodichloromethane	200 U	10 U	10 U
cis-1,3-Dichloropropene	200 U	10 U	10 U
4-Methyl-2-Pentanone	200 U	10 U	10 U
Toluene	200 U	10 U	10 U
trans-1,3-Dichloropropene	200 U	10 U	10 U
1,1,2-Trichloroethane	200 U	10 U	10 U
Tetrachloroethene	200 U	10 U	10 U
2-Hexanone	200 U	10 U	10 U
Dibromochloromethane	200 U	10 U	10 U
Chlorobenzene	200 U	10 U	10 U
Ethylbenzene	200 U	10 U	10 U
Xylene (total)	200 U	10 U	10 U
Styrene	200 U	10 U	10 U
Bromoform	200 U	10 U	10 U
1,1,2,2-Tetrachloroethane	200 U	10 U	10 U
Number of TICs:	-	0	0

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-1)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 9/23/93)

Location ID:	MW-1	MW-2	MW-2	Field Blank 1
GEC Sample ID:	OW-MW-1	OW-MW-2	OW-MW-2D	OW-FB1
EPA Sample No:	OWMW1	OWMW2	WMW2D	OWFB1
Laboratory ID:	1988521	1988523	1988525	1988527
Sample Type:	Investigative	Investigative	Duplicate	QA/QC
Sample Date:	6/30/93	6/30/93	6/30/93	6/30/93
Identified Compounds:				
Phenol	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
4-Chloroanilene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroanilene	25 U	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroanilene	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U
Dibenzofuran	10 U	10 U	10 U	10 U

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RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-1)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 9/23/93)

Location ID:	MW-1	MW-2	MW-2	Field Blank 1
GEC Sample ID:	OW-MW-1	OW-MW-2	OW-MW-2D	OW-FB1
EPA Sample No:	OWMW1	OWMW2	WMW2D	OWFB1
Laboratory ID:	1988521	1988523	1988525	1988527
Sample Type:	Investigative	Investigative	Duplicate	QA/QC
Sample Date:	6/30/93	6/30/93	6/30/93	6/30/93
Identified Compounds:				
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	1 B	2 B	10 U	1 J
Chrysene	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Dibenz(a,h) anthracene	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U
Number of TICs found:	5	4	5	4

Location ID:	MW-3	MW-3	Field Blank 2	MW-4
GEC Sample ID:	OW-MW3	OW-MW3D	OW-FB2	OW-MW4
EPA Sample No:	OWMW3	MW3D-	OWFB2	OWMW4
Laboratory ID:	1989613	1989615	1989617	1990318
Sample Type:	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	7/1/93	7/1/93	7/1/93	7/6/93
Identified Compounds:				
Phenol	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
4-Chloroanilene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroanilene	25 U	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroanilene	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U
Dibenzofuran	10 U	10 U	10 U	10 U

Location ID:	MW-3	MW-3	Field Blank 2	MW-4
GEC Sample ID:	OW-MW3	OW-MW3D	OW-FB2	OW-MW4
EPA Sample No:	OWMW3	MW3D-	OWFB2	OWMW4
Laboratory ID:	1989613	1989615	1989617	1990318
Sample Type:	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	7/1/93	7/1/93	7/1/93	7/6/93
Identified Compounds:				
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	2 B	2 B	10 U	2 B
Chrysene	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Dibenz(a,h) anthracene	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U
Number of TICs found:	1	5	3	12

Location ID:	MW-4	MW-4	Well 5	Well 5
GEC Sample ID:	OW-MW4D	OW-MW4D	OW-WELL5	OW-WELL5
EPA Sample No:	MW4D-	MW4D-RE	WEL5-	WEL5-DL
Laboratory ID:	1990320	1990320	1990322	1990322
Sample Type:	Duplicate	QA/QC	Investigative	QA/QC
Sample Date:	7/6/93	7/6/93	7/6/93	7/6/93
Identified Compounds:				
Phenol	10 U	10 U	84 J	92
bis(2-Chloroethyl)ether	10 U	10 U	10 U	20 U
2-Chlorophenol	10 U	10 U	10 U	20 U
1,3-Dichlorobenzene	10 U	10 U	10 U	20 U
1,4-Dichlorobenzene	10 U	10 U	10 U	20 U
1,2-Dichlorobenzene	10 U	10 U	10 U	20 U
2-Methylphenol	10 U	10 U	10 U	20 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	20 U
4-Methylphenol	10 U	10 U	39	43
N-Notroso-di-n-propylamine	10 U	10 U	10 U	20 U
Hexachloroethane	10 U	10 U	10 U	20 U
Nitrobenzene	10 U	10 U	10 U	20 U
Isophorone	10 U	10 U	10 U	20 U
2-Nitrophenol	10 U	10 U	10 U	20 U
2,4-Dimethylphenol	10 U	10 U	10 U	20 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	20 U
2,4-Dichlorophenol	10 U	10 U	10 U	20 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	20 U
Naphthalene	10 U	10 U	4 J	4 J
4-Chloroanilene	10 U	10 U	10 U	20 U
Hexachlorobutadiene	10 U	10 U	10 U	20 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	20 U
2-Methylnaphthalene	10 U	10 U	10 U	20 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	20 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	20 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	20 U
2-Chloronaphthalene	10 U	10 U	10 U	20 U
2-Nitroanilene	25 U	25 U	25 U	50 U
Dimethylphthalate	10 U	10 U	10 U	20 U
2,6-Dinitrotoluene	10 U	10 U	10 U	20 U
Acenaphthylene	10 U	10 U	10 U	20 U
3-Nitroanilene	25 U	25 U	25 U	50 U
Acenaphthene	10 U	10 U	2 J	2 J
2,4-Dinitrophenol	25 U	25 U	25 U	50 U
4-Nitrophenol	25 U	25 U	25 U	50 U
Dibenzofuran	10 U	10 U	1 J	1 J

Location ID:	MW-4	MW-4	Well 5	Well 5
GEC Sample ID:	OW-MW4D	OW-MW4D	OW-WELL5	OW-WELL5
EPA Sample No:	MW4D-	MW4D-RE	WEL5-	WEL5-DL
Laboratory ID:	1990320	1990320	1990322	1990322
Sample Type:	Duplicate	QA/QC	Investigative	QA/QC
Sample Date:	7/6/93	7/6/93	7/6/93	7/6/93
Identified Compounds:				
2,4-Dinitrotoluene	10 U	10 U	10 U	20 U
Diethylphthalate	10 U	10 U	10 U	20 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	20 U
Fluorene	10 U	10 U	2 J	2 J
4-Nitroaniline	25 U	25 U	25 U	50 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	50 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	20 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	20 U
Hexachlorobenzene	10 U	10 U	10 U	20 U
Pentachlorophenol	25 U	25 U	25 U	50 U
Phenanthrene	10 U	10 U	10	10 J
Anthracene	10 U	10 U	2 J	2 J
Carbazole	10 U	10 U	2 J	2 J
Di-n-butylphthalate	10 U	10 U	14	14 J
Fluoranthene	10 U	10 U	11	12 J
Pyrene	10 UJ	10 UJ	14 J	12 J
Butylbenzylphthalate	10 UJ	10 UJ	10 UJ	20 UJ
3,3'-Dichlorobenzidine	10 UJ	10 UJ	10 UJ	20 UJ
Benzo(a)anthracene	10 UJ	10 UJ	6 J	6 J
bis(2-Ethylhexyl)phthalate	2 B	2 B	3 B	3 B
Chrysene	10 UJ	10 UJ	7 J	7 J
Di-n-octylphthalate	10 UJ	10 UJ	10 UJ	20 UJ
Benzo(b)fluoranthene	10 UJ	10 UJ	10 J	11 J
Benzo(k)fluoranthene	10 UJ	10 UJ	10 J	11 J
Benzo(a)pyrene	10 UJ	10 UJ	6 J	6 J
Indeno(1,2,3-cd)pyrene	10 UJ	10 UJ	6 J	4 J
Dibenz(a,h) anthracene	10 UJ	10 UJ	1 J	20 UJ
Benzo(g,h,i)perylene	10 UJ	10 UJ	5 J	4 J
Number of TICs found:	6	-	6	20

Location ID:	Well 5	Field Blank 3	Well 6	Well 6
GEC Sample ID:	OW-WELL5	OW-FB3	OW-WELL6	OW-WELL6D
EPA Sample No:	WEL5-RE	OWFB3	WEL6-	WEL6D
Laboratory ID:	1990322	1990324	1990985	1990987
Sample Type:	QA/QC	QA/QC	Investigative	Duplicate
Sample Date:	7/6/93	7/6/93	7/7/93	7/7/93
Identified Compounds:				
Phenol	78	10 U	2 J	1 J
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	1 J	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
4-Methylphenol	38	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	4 J	10 U	10 U	10 U
4-Chloroanilene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	25 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroanilene	10 U	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroanilene	10 U	25 U	25 U	25 U
Acenaphthene	2 J	10 U	10 U	10 U
2,4-Dinitrophenol	10 U	25 U	25 U	25 U
4-Nitrophenol	10 U	25 U	25 U	25 U
Dibenzofuran	1 J	10 U	10 U	10 U

Location ID:	Well 5	Field Blank 3	Well 6	Well 6
GEC Sample ID:	OW-WELL5	OW-FB3	OW-WELL6	OW-WELL6D
EPA Sample No:	WEL5-RE	OWFB3	WEL6-	WEL6D
Laboratory ID:	1990322	1990324	1990985	1990987
Sample Type:	QA/QC	QA/QC	Investigative	Duplicate
Sample Date:	7/6/93	7/6/93	7/7/93	7/7/93
Identified Compounds:				
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	1 J	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U
Fluorene	2 J	10 U	10 U	10 U
4-Nitroaniline	10 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	10 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	10 U	25 U	25 U	25 U
Phenanthrene	9 J	10 U	10 U	10 U
Anthracene	2 J	10 U	10 U	10 U
Carbazole	2 J	10 U	10 U	10 U
Di-n-butylphthalate	12	10 U	10 U	10 U
Fluoranthene	11	10 U	10 U	10 U
Pyrene	12 J	10 U	10 U	10 U
Butylbenzylphthalate	10 UJ	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 UJ	10 U	10 U	10 U
Benzo(a)anthracene	6 J	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	2 B	10 U	3 B	2 B
Chrysene	6 J	10 U	10 U	10 U
Di-n-octylphthalate	10 UJ	10 U	10 U	10 U
Benzo(b)fluoranthene	11 J	10 U	10 U	10 U
Benzo(k)fluoranthene	11 J	10 U	10 U	10 U
Benzo(a)pyrene	6 J	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	4 J	10 U	10 U	10 U
Dibenz(a,h) anthracene	1 J	10 U	10 U	10 U
Benzo(g,h,i)perylene	3 J	10 U	10 U	10 U
Number of TICs found:	--	2	16	14

AR100508

Location ID:	Field Blank 4
GEC Sample ID:	OW-FB4
EPA Sample No:	OWFB4
Laboratory ID:	1990989
Sample Type:	QA/QC
Sample Date:	7/7/93

Identified Compounds:	
Phenol	10 U
bis(2-Chloroethyl)ether	10 U
2-Chlorophenol	10 U
1,3-Dichlorobenzene	10 U
1,4-Dichlorobenzene	10 U
1,2-Dichlorobenzene	10 U
2-Methylphenol	10 U
2,2'-oxybis(1-Chloropropane)	10 U
4-Methylphenol	10 U
N-Notroso-di-n-propylamine	10 U
Hexachloroethane	10 U
Nitrobenzene	10 U
Isophorone	10 U
2-Nitrophenol	10 U
2,4-Dimethylphenol	10 U
bis(2-Chloroethoxy)methane	10 U
2,4-Dichlorophenol	10 U
1,2,4-Trichlorobenzene	10 U
Naphthalene	10 U
4-Chloroanilene	10 U
Hexachlorobutadiene	10 U
4-Chloro-3-methylphenol	10 U
2-Methylnaphthalene	10 U
Hexachlorocyclopentadiene	10 U
2,4,6-Trichlorophenol	10 U
2,4,5-Trichlorophenol	25 U
2-Chloronaphthalene	10 U
2-Nitroanilene	25 U
Dimethylphthalate	10 U
2,6-Dinitrotoluene	10 U
Acenaphthylene	10 U
3-Nitroanilene	25 U
Acenaphthene	10 U
2,4-Dinitrophenol	25 U
4-Nitrophenol	25 U
Dibenzofuran	10 U

Location ID:	Field Blank 4
GEC Sample ID:	OW-FB4
EPA Sample No:	OWFB4
Laboratory ID:	1990989
Sample Type:	QA/QC
Sample Date:	7/7/93

Identified Compounds:	
2,4-Dinitrotoluene	10 U
Diethylphthalate	10 U
4-Chlorophenol-phenylether	10 U
Fluorene	10 U
4-Nitroaniline	25 U
4,6-Dinitro-2-methylphenol	25 U
N-Nitrosodiphenylamine (1)	10 U
4-Bromophenyl-phenylether	10 U
Hexachlorobenzene	10 U
Pentachlorophenol	25 U
Phenanthrene	10 U
Anthracene	10 U
Carbazole	10 U
Di-n-butylphthalate	10 U
Fluoranthene	10 U
Pyrene	10 U
Butylbenzylphthalate	10 U
3,3'-Dichlorobenzidine	10 U
Benzo(a)anthracene	10 U
bis(2-Ethylhexyl)phthalate	2 J
Chrysene	10 U
Di-n-octylphthalate	10 U
Benzo(b)fluoranthene	10 U
Benzo(k)fluoranthene	10 U
Benzo(a)pyrene	10 U
Indeno(1,2,3-cd)pyrene	10 U
Dibenz(a,h) anthracene	10 U
Benzo(g,h,i)perylene	10 U
Number of TICs found:	2

AR100510

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-1)
PCBs
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	MW-3	MW-4	Field Blank 2	Field Blank 3	Field Blank 4
GEC Sample ID:	OW-MW3D	OW-MW4D	OW-FB2	OW-FB3	OW-FB4
EPA Sample No:	MW3D-	MW4D-	OWFB2	OWFB3	OWFB4
Laboratory ID:	1989615	1990320	1989617	1990324	1990989
Sample Type:	Duplicate	Duplicate	QA/QC	QA/QC	QA/QC
Sample Date:	7/1/93	7/6/93	7/1/93	7/6/93	7/7/93
Identified Compounds:					
Aroclor-1016	1 UJ	1 UJ	1 U	1 U	1 U
Aroclor-1221	2 UJ	2 UJ	2 U	2 U	2 U
Aroclor-1232	1 UJ	1 UJ	1 U	1 U	1 U
Aroclor-1242	1 UJ	1 UJ	1 U	1 U	1 U
Aroclor-1248	1 UJ	1 UJ	1 U	1 U	1 U
Aroclor-1254	1 UJ	1 UJ	1 U	1 U	1 U
Aroclor-1260	1 UJ	1 UJ	1 U	1 U	1 U

AR100511

Location ID:	Field Blank 1	MW-1	MW-2	MW-3	MW-4
GEC Sample ID:	OW-FB1	OW-MW-1	OW-MW-2	OW-MW3	OW-MW4
EPA Sample No:	OWFBL	OWMW1	OWMW2	OWMW3	OWMW4
Laboratory ID:	1988527	1988521	1988523	1989613	1990318
Sample Type:	QA/QC	Investigative	Investigative	Investigative	Investigative
Sample Date:	6/30/93	6/30/93	6/30/93	7/1/93	7/6/93
Identified Compounds:					
Aroclor-1016	1 U	1 U	1 U	1 U	1 U
Aroclor-1221	2 U	2 U	2 U	2 U	2 U
Aroclor-1232	1 U	1 U	1 U	1 U	1 U
Aroclor-1242	1 U	1 U	1 U	1 U	1 U
Aroclor-1248	1 U	1 U	1 U	1 U	1 U
Aroclor-1254	1 U	1 U	1 U	1 U	1 U
Aroclor-1260	1 U	1 U	1 U	1 U	1 U

AR100512

Location ID:	Well 5	Well 6	Well 6	MW-2
GEC Sample ID:	OW-WELL5	OW-WELL6	OW-WELL6D	OW-MW-2D
EPA Sample No:	WEL5-	WEL6-	WEL6D	WMW2D
Laboratory ID:	1990322	1990985	1990987	1988525
Sample Type:	Investigative	Investigative	Duplicate	Duplicate
Sample Date:	7/6/93	7/7/93	7/7/93	6/30/93
Identified Compounds:				
Aroclor-1016	1 U	1 UJ	1 UJ	1 U
Aroclor-1221	2 U	2 UJ	2 UJ	2 U
Aroclor-1232	1 U	1 UJ	1 UJ	1 U
Aroclor-1242	1 U	1 UJ	1 UJ	1 U
Aroclor-1248	1 U	1 UJ	1 UJ	1 U
Aroclor-1254	1 U	1 UJ	1 UJ	1 U
Aroclor-1260	1 U	1 UJ	1 UJ	1 U

OP2-VOC.XLS

RODALE MANUFACTURING SITE
WELL SURVEY
PUBLIC SUPPLY WELLS - GROUNDWATER (OP-2)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	PSW-4	PSW-4D	PSW-6	Trip Blank 1
GEC Sample ID:	PSW-4	PSW-4D	PSW-6	TB-PSW1
EPA Sample No:	PSW-4	PSW4D	PSW-6	TBPS1
Laboratory ID:	1997119	1997121	1997123	1997125
Sample Type:	Investigative	Duplicate	Investigative	QA/QC
Sample Date:	7/20/93	7/20/93	7/20/93	7/20/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	3.4 L	5.0 UR	5.0 UR	5.0 UR
Carbon disulfide	0.2 B	0.2 B	0.2 B	0.2 J
Methylene chloride	0.4 B	0.4 B	0.5 B	1.3 J
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	0.7 J	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	0.1 B	0.1 B	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	0.7 J	1.0 U
Carbon tetrachloride	0.2 J	0.2 J	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	4.5	4.4	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Toluene	1.0 U	0.2 J	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	21	19	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	0.2 J	1.0 U	1.0 U
Xylene (total)	1.0 U	3.3 J	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 UR	1.0 UR	1.0 UR	1.0 UR

AR100514

Location ID:	PSW-1	PSW-3	Trip Blank 3	PSW-7
GEC Sample ID:	PSW-1	PSW-3	TB-PSW3	PSW-7
EPA Sample No:	PSW-1	PSW-3	TBSW3	PSW-7
Laboratory ID:	1998070	1998863	1998865	1998070
Sample Type:	Investigative	Investigative	QA/QC	Investigative
Sample Date:	7/20/93	7/22/93	7/22/93	7/21/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	9.5 L	5.0 UR	5.0 UR
Carbon disulfide	0.2 B	0.1 B	0.2 J	0.2 B
Methylene chloride	0.5 B	0.6 B	1.2 J	0.2 B
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	2.0	0.1 J	1.0 U	0.1 J
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	0.1 B	0.2 B	0.1 J	0.5 B
1,1,1-Trichloroethane	0.2 J	1.0 U	1.0 U	0.1 J
Carbon tetrachloride	1.0 U	0.4 J	1.0 U	0.2 J
Benzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	10	6.7	1.0 U	14
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Toluene	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.4
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 UR	1.0 UR	1.0 UR	1.0 UR

Location ID:	PSW-2	Trip Blank 2
GEC Sample ID:	PSW-2	TB-PSW2
EPA Sample No:	PSW-2	TBSW2
Laboratory ID:	1998072	1998074
Sample Type:	Investigative	QA/QC
Sample Date:	7/21/93	7/21/93
Identified Compounds:		
Chloromethane	1.0 U	1.0 U
Vinyl chloride	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR
Carbon disulfide	0.2 B	0.2 J
Methylene chloride	0.4 B	1.0 J
trans-1,2-Dichloroethane	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U
cis-1,2-Dichloroethene	0.8 J	1.0 U
2-Butanone	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U
1,1,1-Trichloroethane	0.1 J	1.0 U
Carbon tetrachloride	1.0 U	1.0 U
Benzene	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U
Trichloroethene	5.9	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 UR	5.0 UR
Toluene	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U
1,2-Dibromochloromethane	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U
Styrene	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 UR	1.0 UR

RODALE MANUFACTURING SITE
WELL SURVEY
SURFACE WATER (OP-3)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	LE-SP73	SW-3	SW-3	SW-8
GEC Sample ID:	SP-LESP73	SW-3	SW-3D	SW-8
EPA Sample No:	LESP7	SW3--	SW3D-	SW8--
Laboratory ID:	2002857	2002861	2002862	2002863
Sample Type:	Investigative	Investigative	Duplicate	Investigative
Sample Date:	7/30/93	7/27/93	7/27/93	7/28/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	1.4 L	10 J	5.0 UR	5.0 UR
Carbon disulfide	1.0 U	1.0 U	0.4 J	1.0 U
Methylene chloride	0.5 B	0.5 B	1.5 B	0.2 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 U	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	0.1 J	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	0.2 J	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	0.1 J	0.2 J	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	0.2 J	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 U	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U

AR100517

Location ID:	SW-10	SW-11	Trip Blank 1
GEC Sample ID:	SW-10	SW-11	SW-TB1
EPA Sample No:	SW10-	SW11-	SPTB1
Laboratory ID:	2002864	2002865	2002868
Sample Type:	Investigative	Investigative	QA/QC
Sample Date:	7/29/93	7/29/93	7/30/93
Identified Compounds:			
Chloromethane	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	1.2 L	5.0 UR
Carbon disulfide	1.0 U	1.0 U	1.0 U
Methylene chloride	0.2 B	2.0 U	0.7 J
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 J	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U
Trichloroethene	0.2 J	0.2 J	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 UR	5.0 UR
Toluene	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 J	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U

RODALE MANUFACTURING SITE
WELL SURVEY
STREAM SEDIMENT SAMPLES (OP-4)
VOLATILE ORGANIC COMPOUNDS
(Units: ug/Kg = ppb) (Prepared: 9/27/93)

Location ID:	SW-1	SW-2	SW-3	SW-3
GEC Sample ID:	SD-1	SD-2	SD-3	SD-3D
EPA Sample No:	SD-1-	SD-2-	SD-3-	SD-3D
Laboratory ID:	2000731	2000732	2000733	2000734
Sample Type:	Investigative	Investigative	Investigative	Duplicate
Sample Date:	7/27/93	7/27/93	7/27/93	7/27/93
Identified Compounds:				
Chloromethane	11 U	12 U	11 U	6 B
Vinyl Chloride	11 U	12 U	11 U	11 U
Bromomethane	11 U	12 U	11 U	11 U
Chloroethane	11 U	12 U	11 U	11 U
1,1-Dichloroethene	11 U	12 U	11 U	11 U
Acetone	8 B	10 B	8 B	12 B
Carbon Disulfide	11 U	12 U	11 U	11 U
Methylene Chloride	2 B	3 B	3 B	2 B
1,1-Dichloroethane	11 U	12 U	11 U	11 U
1,2-Dichloroethene (total)	11 U	12 U	11 U	11 U
2-Butanone	11 U	12 U	11 U	11 U
Chloroform	11 U	12 U	11 U	11 U
1,1,1-Trichloroethane	11 U	12 U	11 U	11 U
Carbon tetrachloride	11 U	12 U	11 U	11 U
Benzene	11 U	12 U	11 U	11 U
1,2-Dichloroethane	11 U	12 U	11 U	11 U
Trichloroethene	11 U	12 U	11 U	11 U
1,2-Dichloropropane	11 U	12 U	11 U	11 U
Bromodichloromethane	11 U	12 U	11 U	11 U
cis-1,3-Dichloropropene	11 U	12 U	11 U	11 U
4-Methyl-2-Pentanone	11 U	4 J	11 U	11 U
Toluene	11 U	12 U	11 U	11 U
trans-1,3-Dichloropropene	11 U	12 U	11 U	11 U
1,1,2-Trichloroethane	11 U	12 U	11 U	11 U
Tetrachloroethene	11 U	12 U	11 U	11 U
2-Hexanone	11 U	12 U	11 U	11 U
Dibromochloromethane	11 U	12 U	11 U	11 U
Chlorobenzene	11 U	12 U	11 U	11 U
Ethylbenzene	11 U	12 U	11 U	11 U
Xylene (total)	11 U	12 U	11 U	11 U
Styrene	11 U	12 U	11 U	11 U
Bromoform	11 U	12 U	11 U	11 U
1,1,2,2-Tetrachloroethane	11 U	12 U	11 U	11 U

AR100519

Location ID:	SW-4	SW-9	SW-9	SW-8	SW-7
GEC Sample ID:	SD-4	SD-9	SD-9D	SD-8	SD-7
EPA Sample No:	SD-4-	SD-9-	SD-9D	SD-8-	SD-7-
Laboratory ID:	2000735	2001155	2001156	2001157	2001158
Sample Type:	Investigative	Investigative	Duplicate	Investigative	Investigative
Sample Date:	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93
Identified Compounds:					
Chloromethane	12 U	22 U	22 U	12 U	12 U
Vinyl Chloride	12 U	22 U	22 U	12 U	12 U
Bromomethane	12 U	22 U	22 U	12 U	12 U
Chloroethane	12 U	22 U	22 U	12 U	12 U
1,1-Dichloroethene	12 U	22 U	22 U	12 U	12 U
Acetone	10 B	140 B	290 J	5 B	11 B
Carbon Disulfide	12 U	22 U	22 U	12 U	12 U
Methylene Chloride	3 B	6 B	6 B	2 B	3 B
1,1-Dichloroethane	12 U	22 U	22 U	12 U	12 U
1,2-Dichloroethene (total)	12 U	22 U	22 U	12 U	12 U
2-Butanone	12 U	32 B	67 B	12 U	12 U
Chloroform	12 U	22 U	22 U	12 U	12 U
1,1,1-Trichloroethane	12 U	22 U	22 U	12 U	12 U
Carbon tetrachloride	12 U	22 U	22 U	12 U	12 U
Benzene	12 U	22 U	22 U	12 U	12 U
1,2-Dichloroethane	12 U	22 U	22 U	12 U	12 U
Trichloroethene	12 U	22 U	22 U	12 U	12 U
1,2-Dichloropropane	12 U	22 U	22 U	12 U	12 U
Bromodichloromethane	12 U	22 U	22 U	12 U	12 U
cis-1,3-Dichloropropene	12 U	22 U	22 U	12 U	12 U
4-Methyl-2-Pentanone	12 U	22 U	22 U	12 U	12 U
Toluene	12 U	22 U	8 J	12 U	12 U
trans-1,3-Dichloropropene	12 U	22 U	22 U	12 U	12 U
1,1,2-Trichloroethane	12 U	22 U	22 U	12 U	12 U
Tetrachloroethene	12 U	22 U	22 U	12 U	12 U
2-Hexanone	12 U	22 U	22 U	12 U	12 U
Dibromochloromethane	12 U	22 U	22 U	12 U	12 U
Chlorobenzene	12 U	22 U	22 U	12 U	12 U
Ethylbenzene	12 U	22 U	22 U	12 U	12 U
Xylene (total)	12 U	22 U	22 U	12 U	12 U
Styrene	12 U	22 U	22 U	12 U	12 U
Bromoform	12 U	22 U	22 U	12 U	12 U
1,1,2,2-Tetrachloroethane	12 U	22 U	22 U	12 U	12 U

Location ID:	SW-6	SW-5	SW-12	SW-11	SW-11
GEC Sample ID:	SD-6	SD-5	SD-12	SD-11	SD-11D
EPA Sample No:	SD-6-	SD-5-	SD-12	SD-11	SD11D
Laboratory ID:	2001159	2001160	2002230	2002231	2002232
Sample Type:	Investigative	Investigative	Investigative	Investigative	Duplicate
Sample Date:	7/28/93	7/28/93	7/29/93	7/29/93	7/29/93
Identified Compounds:					
Chloromethane	5 B	12 U	13 U	13 U	12 U
Vinyl Chloride	13 U	12 U	13 U	13 U	12 U
Bromomethane	13 U	12 U	13 U	13 U	12 U
Chloroethane	13 U	12 U	13 U	13 U	12 U
1,1-Dichloroethene	13 U	12 U	13 U	13 U	12 U
Acetone	6 B	10 B	3 B	5 B	7 B
Carbon Disulfide	13 U	12 U	13 U	13 U	12 U
Methylene Chloride	6 B	3 B	13 U	2 J	2 B
1,1-Dichloroethane	13 U	12 U	13 U	13 U	12 U
1,2-Dichloroethene (total)	13 U	12 U	13 U	13 U	12 U
2-Butanone	13 U	12 U	13 U	13 U	12 U
Chloroform	13 U	12 U	13 U	13 U	12 U
1,1,1-Trichloroethane	13 U	12 U	13 U	13 U	12 U
Carbon tetrachloride	13 U	12 U	13 U	13 U	12 U
Benzene	13 U	12 U	13 U	13 U	12 U
1,2-Dichloroethane	13 U	12 U	13 U	13 U	12 U
Trichloroethene	13 U	12 U	13 U	13 U	12 U
1,2-Dichloropropane	13 U	12 U	13 U	13 U	12 U
Bromodichloromethane	13 U	12 U	13 U	13 U	12 U
cis-1,3-Dichloropropene	13 U	12 U	13 U	13 U	12 U
4-Methyl-2-Pentanone	13 U	12 U	13 U	13 U	12 U
Toluene	13 U	12 U	13 U	13 U	12 U
trans-1,3-Dichloropropene	13 U	12 U	13 U	13 U	12 U
1,1,2-Trichloroethane	13 U	12 U	13 U	13 U	12 U
Tetrachloroethene	13 U	12 U	13 U	13 U	12 U
2-Hexanone	13 U	12 U	13 U	13 U	12 U
Dibromochloromethane	13 U	12 U	13 U	13 U	12 U
Chlorobenzene	13 U	12 U	13 U	13 U	12 U
Ethylbenzene	13 U	12 U	13 U	13 U	12 U
Xylene (total)	13 U	12 U	13 U	13 U	12 U
Styrene	13 U	12 U	13 U	13 U	12 U
Bromoform	13 U	12 U	13 U	13 U	12 U
1,1,2,2-Tetrachloroethane	13 U	12 U	13 U	13 U	12 U

Location ID:	SW-10	SW-15	SW-16
GEC Sample ID:	SD-10	SD-15	SD-16
EPA Sample No:	SD-10	SD-15	SD-16
Laboratory ID:	2002235	2002236	2002839
Sample Type:	Investigative	Investigative	Investigative
Sample Date:	7/29/93	7/29/93	7/30/93
Identified Compounds:			
Chloromethane	12 U	14 U	12 U
Vinyl Chloride	12 U	14 U	12 U
Bromomethane	12 U	14 U	12 U
Chloroethane	12 U	14 U	12 U
1,1-Dichloroethene	12 U	14 U	12 U
Acetone	16 B	7 B	3 B
Carbon Disulfide	12 U	14 U	12 U
Methylene Chloride	12 U	1 B	2 B
1,1-Dichloroethane	12 U	14 U	12 U
1,2-Dichloroethene (total)	12 U	14 U	12 U
2-Butanone	6 B	14 U	12 U
Chloroform	12 U	14 U	12 U
1,1,1-Trichloroethane	12 U	14 U	12 U
Carbon tetrachloride	12 U	14 U	12 U
Benzene	12 U	14 U	12 U
1,2-Dichloroethane	12 U	14 U	12 U
Trichloroethene	12 U	14 U	12 U
1,2-Dichloropropane	12 U	14 U	12 U
Bromodichloromethane	12 U	14 U	12 U
cis-1,3-Dichloropropene	12 U	14 U	12 U
4-Methyl-2-Pentanone	12 U	14 U	12 U
Toluene	12 U	14 U	12 U
trans-1,3-Dichloropropene	12 U	14 U	12 U
1,1,2-Trichloroethane	12 U	14 U	12 U
Tetrachloroethene	12 U	14 U	12 U
2-Hexanone	12 U	14 U	12 U
Dibromochloromethane	12 U	14 U	12 U
Chlorobenzene	12 U	14 U	12 U
Ethylbenzene	12 U	14 U	12 U
Xylene (total)	12 U	14 U	12 U
Styrene	12 U	14 U	12 U
Bromoform	12 U	14 U	12 U
1,1,2,2-Tetrachloroethane	12 U	14 U	12 U

RODALE MANUFACTURING SITE
WELL SURVEY
SURFACE WATER (OP-5)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	Trip Blank 1	Trip Blank 2	Trip Blank 3	Spring SP-03
GEC Sample ID:	SW-TB1	SW-TB2	SW-TB3	SP-03
EPA Sample No:	SWTB1	SWTB2	SWTB3	SP-03
Laboratory ID:	2000748	2001170	2002244	2002853
Sample Type:	QA/QC	QA/QC	QA/QC	Investigative
Sample Date:	7/27/93	7/28/93	7/29/93	7/30/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Carbon disulfide	1.0 U	1.0 U	1.0 J	1.0 U
Methylene chloride	2.0 U	1.1 J	1.2 J	0.4 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	0.1 J
2-BURtanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	0.1 J	0.2 J	0.9 B
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	0.1 J
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	0.5 J
Benzene	1.0 U	1.0 U	1.0 U	0.1 J
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	14
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 UR	5.0 UR	5.0 UR	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	0.1 J	8.7
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropan	1.0 UR	1.0 UR	1.0 UR	1.0 U

RODALE MANUFACTURING SITE
WELL SURVEY
PUBLIC SUPPLY WELLS - GROUNDWATER (OP-2)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	PSW-4	PSW-4D	PSW-6	PSW-7
GEC Sample ID:	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:	PSW-4	PSW4D	PSW-6	PSW-7
Laboratory ID:	1997119	1997121	1997123	1998070
Sample Type:	Investigative	Duplicate	Investigative	Investigative
Sample Date:	7/20/93	7/20/93	7/20/93	7/21/93
Identified Compounds:				
Phenol	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
4-Chloroanilene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroanilene	25 U	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroanilene	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U

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RODALE MANUFACTURING SITE
WELL SURVEY
PUBLIC SUPPLY WELLS - GROUNDWATER (OP-2)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 9/27/93)

Location ID:	PSW-4	PSW-4D	PSW-6	PSW-7
GEC Sample ID:	PSW-4	PSW-4D	PSW-6	PSW-7
EPA Sample No:	PSW-4	PSW4D	PSW-6	PSW-7
Laboratory ID:	1997119	1997121	1997123	1998070
Sample Type:	Investigative	Duplicate	Investigative	Investigative
Sample Date:	7/20/93	7/20/93	7/20/93	7/21/93
Identified Compounds:				
Dibenzofuran	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	2 B	4 B	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Dibenz(a,h) anthracene	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U

Location ID:	PSW-2	PSW-1	PSW-3
GEC Sample ID:	PSW-2	PSW-1	PSW-3
EPA Sample No:	PSW-2	PSW-1	PSW-3
Laboratory ID:	1998072	1998861	1998863
Sample Type:	Investigative	Investigative	Investigative
Sample Date:	34171	34172	34172
Identified Compounds:			
Phenol	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U
4-Chloroanilene	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U
2-Chloronaphthalene	10 U	10 U	10 U
2-Nitroanilene	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U
3-Nitroanilene	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U

Location ID:	PSW-2	PSW-1	PSW-3
GEC Sample ID:	PSW-2	PSW-1	PSW-3
EPA Sample No:	PSW-2	PSW-1	PSW-3
Laboratory ID:	1998072	1998861	1998863
Sample Type:	Investigative	Investigative	Investigative
Sample Date:	34171	34172	34172
Identified Compounds:			
Dibenzofuran	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U
4-Nitroaniline	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U
Dibenz(a,h) anthracene	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U

AR100527

7-2: CLP ORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., OCTOBER 29, 1993)

Environmental Standards, Inc.

Specialists in Environmental Risk Assessment, Hydrogeology and Data Validation

The Commons at Valley Forge, Unit 4, 1220 Valley Forge Rd.
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QUALITY ASSURANCE REVIEW

OF THE RODALE MANUFACTURING SITE

IN EMMAUS, PENNSYLVANIA

October 29, 1993

Prepared for:

GEO-ENVIRONMENTAL CONSULTANTS, INC.
55 Valley Stream Parkway
Suite 140
Malvern, PA 19355

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
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P.O. Box 911
Valley Forge, PA 19482

TABLE 1

SAMPLES INCLUDED IN THIS QUALITY ASSURANCE REVIEW

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
OW-WELL4	1993929	7/13/93	GEC11	V, S, P
OW-WELL4D (Duplicate of OW-WELL4)	1993930	7/13/93	GEC11	V, S, P
FB-5 (Field Blank)	1993931	7/13/93	GEC11	V, S, P
TB-5 (Trip Blank)	1993932	7/13/93	GEC11	V
OW-WELL2	1994515	7/14/93	GEC11	V, S, P
OW-WELL2MS (Matrix Spike)	1994519	7/14/93	GEC11	V, S, P
OW-WELL2MSD (Matrix Spike Duplicate)	1994521	7/14/93	GEC11	V, S, P
OW-FB6 (Field Blank)	1994523	7/14/93	GEC11	V, S
OW-TB6 (Trip Blank)	1994525	7/14/93	GEC11	V
OW-WELL1	1995418	7/15/93	GEC11	V, S, P
OW-WELL1D (Duplicate of OW-WELL1)	1995420	7/15/93	GEC11	V, S, P
OW-FB7 (Field Blank)	1995422	7/15/93	GEC11	V, S, P
OW-AB2 (Field Blank)	1995424	7/15/93	GEC11	V
TB-7 (Trip Blank)	1995425	7/15/93	GEC11	V
OW-WELL3	1995939	7/16/93	GEC11	V, S, P
OW-WELL3D (Duplicate of OW-WELL3)	1995941	7/16/93	GEC11	V, S, P
OW-FB8 (Field Blank)	1995943	7/16/93	GEC11	V, S, P

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
PW-EM09	2007155	8/9/93	EMM03	V*
PW-LM23	2007156	8/9/93	EMM03	V*
PW-LM23D (Duplicate of PW-LM23)	2007157	8/9/93	EMM03	V*
PW-TB4 (Trip Blank)	2007158	8/9/93	EMM03	V*
PW-SA07	2007804	8/10/93	EMM03	V*
PW-LM20	2007805	8/10/93	EMM03	V*
PW-LM26	2007806	8/10/93	EMM03	V*
PW-UM60	2007807	8/10/93	EMM03	V*
PW-UM61	2007808	8/10/93	EMM03	V*
PW-UM61D (Duplicate of PW-UM61)	2007809	8/10/93	EMM03	V*
PW-TB5 (Trip Blank)	2007810	8/10/93	EMM03	V*
PW-LM27	2008510	8/11/93	EMM03	V*
PW-SA08D (Duplicate of PW-SA08D)	2008511	8/11/93	EMM03	V*
PW-SA08	2008512	8/11/93	EMM03	V*
PW-LM28	2008515	8/11/93	EMM03	V*
PW-TB6 (Trip Blank)	2008516	8/11/93	EMM03	V*
PW-LE312	2009256	8/12/93	EMM03	V*
PW-LE411	2009257	8/12/93	EMM03	V*
PW-LM21	2009258	8/12/93	EMM03	V*
PW-LM21D (Duplicate of PW-LM21)	2009259	8/12/93	EMM03	V*
PW-SA09	2009262	8/12/93	EMM03	V*
PW-UM62	2009263	8/12/93	EMM03	V*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
PW-TB7 (Trip Blank)	2009264	8/12/93	EMM03	V*
PW-UM63	2016405	8/25/93	EMM06	V*
PW-UM64	2016406	8/25/93	EMM06	V*
PW-UM64D (Duplicate of PW-UM64)	2016407	8/25/93	EMM06	V*
PW-TB8 (Trip Blank)	2016408	8/25/93	EMM06	V*
PW-UM43	2004191	8/3/93	EMM01	V*
PW-UM58	2004192	8/3/93	EMM01	V*
PW-UM58D (Duplicate of PW-UM58)	2004193	8/3/93	EMM01	V*
PW-1501	2004194	8/3/93	EMM01	V*
PW-LM10	2004195	8/3/93	EMM01	V*
PW-LE311	2004814	8/4/93	EMM01	V*
PW-UM45	2004812	8/4/93	EMM01	V*
PW-UM45D (Duplicate of PW-UM45)	2004813	8/4/93	EMM01	V*
PW-UM59	2004811	8/4/93	EMM01	V*
PW-TB1 (Trip Blank)	2004196	8/4/93	EMM01	V*
PW-LE677	2005514	8/5/93	EMM01	V*
PW-LE677D (Duplicate of PW-LE677)	2005515	8/5/93	EMM01	V*
PW-1492	2005513	8/5/93	EMM01	V*
PW-SA05	2005512	8/5/93	EMM01	V*
PW-TB2 (Trip Blank)	2004815	8/4/93	EMM01	V*
PW-0351	2005516	8/5/93	EMM01	V*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Date of Sample Collection	SDG	Parameter(s) Examined
PW-LE1293	2005519	8/5/93	EMM01	V*
PW-UM40	2005520	8/4/93	EMM01	V*
PW-EM08	2007146	8/9/93	EMM01	V*
PW-TB3 (Trip Blank)	2005521	8/5/93	EMM01	V*

NOTES:

V TCL Volatiles by CLP SOW390
V* TCL Low Concentration Volatiles by CLP SOW691
S TCL Semivolatiles by CLP SOW390
P TCL Aroclors by CLP SOW390

Introduction

This quality assurance review is based upon a rigorous examination of all data generated for the samples which were collected from July 13 through August 25, 1993 from the Rodale Manufacturing site in Emmaus, Pennsylvania. The samples included in this quality assurance review are presented on Table 1.

This review has been performed in accordance with the "Region III Modifications to National Functional Guidelines for Organic Data Review" (June 1992).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and also to determine compliance relative to the analytical requirements specified in the analytical method. Qualifier codes have been placed next to the results so that the data user can quickly assess the qualitative and/or quantitative reliability of any result. Details of this quality assurance review are presented in the narrative section of this report. This report was prepared to provide a critical review of the laboratory analyses and reported analytical results. Rigorous quality assurance reviews of laboratory-generated data routinely identify various problems associated with analytical measurements, even from the most experienced and capable laboratories. The nature and extent of problems identified in this critical review should not be interpreted to mean that those results that do not have qualifier codes are less than valid.

Section 1 Quality Assurance Review

A. Data Evaluation

The organic analyses of 63 samples (including five field blanks and 11 trip blanks) were performed by Lancaster Laboratories in Lancaster, Pennsylvania. The samples were collectively analyzed by Contract Laboratory Program (CLP) protocol for the Target Compound List (TCL) volatiles, semivolatiles, and Aroclors in accordance with SOW390, Document OLM01.8 as specified in Table 1. In addition, some samples were analyzed for TCL volatiles by the CLP Superfund Analytical Methods for Low Concentration Water for Organics Analysis (SOW691). Furthermore, mass spectral library searches have been performed on up to 25 extraneous chromatographic peaks for the volatile and semivolatile fractions combined.

The findings offered in this report are based upon a review of holding times, blank analysis results, surrogate recoveries, matrix spike/matrix spike duplicate results, field duplicate results, laboratory control sample recoveries, qualitative identification, GC/MS tuning and system performance, calibrations, quantitation of positive results, 4,4'-DDD and endrin breakdown, retention times, internal standards performance, resolution check standard results, analytical sequence, GC column agreement, Florisil cartridge check results and tentatively identified compounds. The analytical results are provided in Section 2 of this report.

Method criteria and reporting requirements were met with the exception of the following. It should be emphasized that the following items are contractual in nature and may not necessarily affect data usability. Data usability is addressed in a separate section.

Correctable Deficiencies

1. There is a peak in the volatile chromatogram of almost every sample that elutes within the first four minutes of the analytical run that appears to be greater than 10% in height of the nearest internal standard. The laboratory provided a library search for this peak identifying it as carbon dioxide for some of the samples but did not report the presence of this peak on the Tentatively Identified Compound (TIC) Form I as required (SOW390, B-10 and SOW691, B-32).

2. The laboratory did not use the Geo-Environmental Consultants, Inc. sample numbers exactly as they appear on the Chains-of-Custody to complete all of the laboratory QC forms as required (SOW390, B-27 and SOW691, B-27). Instead, the laboratory used abbreviated sample numbers. It should be noted, however, that for ease of cross reference, the data tables contain both the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody and the abbreviated sample numbers used by the laboratory. The data reviewer has elected to reference in this report the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody.

3. The laboratory did not provide TIC Form I's or provide mass spectral library searches as required (SOW390, B-10 and SOW691, B-32) for reanalyzed samples and diluted samples.

4. The laboratory did not complete all of the header information on most of the laboratory QC forms as specified in the protocol (SOW390, B-35-36 and SOW691, B-26-27). Specifically, the laboratory did not include the Sample Delivery Group (SDG) number on any of the laboratory QC forms with the exception of the Form IIs (Surrogate Recovery Forms).

5. The laboratory included non-project samples on many of the QC summary forms for the volatile and semivolatile fractions.

6. The Form I's for the volatile fraction of samples OW-WELL4DL, OW-WELL1DL, and laboratory method blank sample VBLK56 (SDG GEC11)were not included in the data package provided. The data reviewer was able to evaluate the reported results for these samples from the raw data provided.

7. The laboratory calculated relative percent differences (RPDs) instead of percent differences (%Ds) between the calculated amount and nominal amount of all pesticides for all pesticide continuing calibration forms (SOW390, D-46/PEST). It should be noted that the SOW390 uses "RPD" but the required equation actually calculates %D.

8. The TIC Form I's for the volatile fraction of samples PW-1293, laboratory method blank VBLKJ45, and laboratory method blank VBLKJ41 were not included in the data packages provided.

9. Non-TCL compounds were reported on the Initial Calibration Summary Forms (Form VIs) for the volatile and/or semivolatile fractions of SDGs EMM03, EMM06 and EMM01.

10. The laboratory inappropriately flagged several unknown TICs with an "N" code, indicating that the TIC is a tentative identification. Only compounds with a qualitatively confident library search should be flagged with an "N." TICs identified as unknowns should not be flagged with an "N."

11. The library searches for the TICs that eluted at 13.74 minutes in the volatile fraction of sample OW-WELL4 and at 8.13 minutes in the volatile fraction of sample TB-5 were not included in the data package provided.

12. The mass spectra for benzene and trichloroethene in sample FB-5 and ethylbenzene in sample OW-WELL1DL were not included in the data package provided.

13. The quantitation report for sample OW-WELL1 was not included in the data package provided.

14. The raw data for the volatile laboratory method blank sample VBLKJ41 were not included in the data package provided. The reviewer assumed that the results for the method blank are correct as reported on the Form I.

15. The laboratory did not include a Form I for the volatile Laboratory Control Sample for all of the low-concentration SDGs in this data set as required by CLP protocol. (SOW691, B-29)

Noncorrectable Deficiencies

1. According to the raw data, the laboratory did not prepare the calibration standard solutions with the specified concentration of 1,2-dibromo-3-chloropropane (SOW691, D-11). The laboratory prepared the standard calibration solutions with 2.5 times the specified concentration. Furthermore, for the low-concentration volatile fraction, the laboratory incorrectly prepared the calibration standard solutions for *trans*-1,3-dichloropropene at approximately 1/5th of the specified concentration. Data usability does not appear to be impacted since the laboratory method detection limits are less than the quantitation limit.

2. High percent differences (defined as RPD - see Correctable Deficiency 7) were obtained between the calculated amount and nominal amount for beta-BHC in PEM3Q analyzed on the DB1701 column on 7/22/93 at 08:32 and for beta-BHC in PEM4Q analyzed on the DB1701 column on 8/1/93 at 15:32. In addition, high percent differences were obtained for *gamma*-BHC in IND Mix Standard INDAM4R analyzed on the DB1701 column on 8/2/93 at 02:47 and for *delta*-BHC in IND Mix Standard INDBM4R analyzed on the DB1701 column on 8/2/93 at 03:41. Per CLP protocol, sample data are not acceptable unless bracketed by an acceptable PEMs and IND Mix Standards. One criterion for acceptable PEMs and IND Mix Standards is that the percent difference between the calculated amount and the nominal amount (true amount) must be less than or equal to 25% for each pesticide in the standard (SOW390, D-46/PEST). There is no impact on data usability, however, since pesticides were not target compounds for this project.

3. As specified in a letter to Geo-Environmental Consultants, Inc. from Lancaster Laboratories (9/22/93), samples PW-UM45 and PW-UM45D were received by Lancaster Laboratories with these samples identified as PW-UM49 and PW-UM49D, respectively, on the Chains-of-Custody and identified as PW-UM45 and PW-UM45D on the sample bottles. In this letter, Lancaster Laboratories was informed that the identifications on the sample bottles were the correct sample identifications.

Comments

1. The volatile analyses of the following samples were performed at an initial dilution due to the high concentration of target compounds in these samples. Consequently, the quantitation limits for all volatile compounds have been raised in these samples.

Sample	Dilution Factor
OW-WELL4DL	200
OW-WELL4DDL	10
OW-WELL4DDL2	400
OW-WELL2	100
OW-WELL2DL	5000
OW-WELL1DL	5
OW-WELL1DDL	5
OW-WELL3	10
OW-WELL3DL	50
OW-WELL3D	10
OW-WELL3DDL	50

2. The laboratory appropriately reanalyzed the semivolatile fraction of sample OW-WELL3 due to low internal standard areas for d_{12}-chrysene and d_{12}-perylene. The reanalysis of this sample also exhibited low internal standard areas, confirming a matrix effect.

3. The laboratory performed a 20-fold dilution on the semivolatile fraction of sample OW-WELL3 and a 10-fold dilution on the semivolatile fraction of sample OW-WELL3D due to the high concentration of bis(2-ethylhexyl)phthalate in these samples.

4. As per the case narrative, semivolatile target compounds with concentrations less than 1 ng/μl in the extract were not reported due to the poor quality of the mass spectral data at this level.

5. As noted in the case narrative, conflicts exist between the analytical software and the forms generation software, making it impossible to report the internal diameter of the column ID on the pesticide sample chromatograms as required. According to the laboratory, the internal diameter of the column is 0.53 mm for all data.

6. The laboratory did not provide the Form I and associated raw data for the volatile storage blank required by the low-concentration protocol (SOW691, D-39/VOA); therefore, the data reviewer was not able to confirm that this blank was prepared and analyzed by the laboratory or to assess the results of the blank to the associated data. It should be noted that the protocol does not require raw data deliverables for the storage blank.

7. The Chains-of-Custody did not indicate whether the samples were temperature preserved and/or chemically preserved with HCl for aqueous samples collected for volatile analysis. According to project management at Geo-Environmental Consultants, Inc., all samples were kept cool (4°±2°C) and were chemically preserved with HCl for aqueous volatile samples.

8. As noted in the case narrative, the laboratory used the nearest internal standard to quantitate volatile sample results instead of following the assigned internal standards as listed in Table 5 of SOW390 and SOW691. It should be noted that the laboratory received permission from U.S. EPA Region III to quantitate volatile sample results from the nearest internal standard.

9. As noted in the case narrative, the laboratory used the secondary quantitation ions for quantitate d8-toluene and bromofluorobenzene in samples OW-WELL3D and OW-WELL3DDL.

10. As noted in the case narrative, a reduced aliquot of samples OW-WELL1 was used to extract the Aroclor fraction of this sample. The quantitation limits for all Aroclors in this sample have been raised accordingly.

With respect to data usability, the principal areas of concern include blank contamination, calibrations, surrogate recoveries, matrix spike recoveries, results exceeding the calibration range, field duplicate imprecision and internal standard areas. It should be noted that the following data usability issues represent an interpretation of the quality control results obtained from project samples and associated standards. Quite often, data qualifications address issues relating to sample matrix problems. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Due to the trace-level presence of acetone, methylene chloride, carbon disulfide, chloroform, benzene, and bis(2-ethylhexyl)phthalate in laboratory method blanks, field blanks, and/or trip blanks, the positive results for the compounds in the following samples should be considered qualitatively questionable and have been flagged "B" on the data tables.

Compound	Applicable Samples
acetone	PW-SA09, PW-UM62, PW-EM09, PW-LM23, PW-LE312, and PW-UM58D
methylene chloride	All positive investigative samples
carbon disulfide	PW-SA09, PW-UM62, PW-SA07, PW-LM20, PW-UM40, PW-UM63, PW-UM64, and PW-UM64D
benzene	OW-WELL4, OW-WELL4D, OW-WELL4DDL, OW-WELL4DL2, OW-WELL2, OW-WELL2DL, OW-WELL3, and OW-WELL3D
chloroform	PW-SA09, PW-EM09, PW-LM20, PW-UM60, PW-LM21, and PW-LM21D
bis(2-ethylhexyl)phthalate	All positive investigative samples except samples OW-WELL3, OW-WELL3DL, and OW-WELL3D

- Although there is no direct reason to qualitatively question the presence of acetone in samples OW-WELL4, OW-WELL1, OW-WELL1D, and OW-WELL3D, for di-*n*-octylphthalate in samples Ow-WELL3, OW-WELL3DL, and OW-WELL3D, and for di-*n*-butylphthalate in samples OW-WELL4 and OW-WELL4D the reported results for these compounds should be used with caution. Acetone and phthalate esters are common laboratory and/or field contaminants.

- Although the results for benzene in samples OW-WELL4DDL and OW-WELL4DDL2 appear to be substantial, these results actually represent trace instrument levels multiplied by large dilution factors.

- The analyses for acetone, 2-butanone, and 2-hexanone in all low-concentration samples and for 4-methyl-2-pentanone in samples PW-UM63, PW-UM64, PW-UM64D, and PW-TB8 are unreliable and the "not-detected" results have been flagged "R" on the data tables. In addition, the positive results for acetone in samples PW-LM20, PW-UM59, PW-UM40, and PW-UM63, and for 2-butanone in samples PW-LM27, PW-SA08, PW-LM28, PW-LM21D, and PW-UM63 should be considered biased low estimates and have been flagged "L" on the data tables. Very low relative response factors (<0.05) were obtained for these compounds in the associated calibration standards.

- The positive results for toluene and pentachlorophenol in sample OW-WELL2 should be considered estimated and have been flagged "J" on the data tables. High recoveries were obtained for these compounds in the associated matrix spike and/or matrix spike duplicate analyses.

- The positive results for acetone in sample OW-WELL4 and pentachlorophenol in sample OW-WELL2 should be considered estimated and have been flagged "J" on the data tables. A high percent relative standard deviation (>30%) was obtained between the relative response factors for acetone in the associated initial multipoint calibration. In addition, high percent differences (>25%) were obtained between the average relative response factor for acetone and pentachlorophenol in the associated initial multipoint calibration and the relative response factor for acetone and pentachlorophenol in the associated continuing calibration.

- The positive results for trichloroethene in samples OW-WELL4, OW-WELL4D, OW-WELL4DDL, and OW-WELL2, for 1,2-dichloroethene (total) in samples OW-WELL4, OW-WELL4D, OW-WELL4DDL, OW-WELL2, OW-WELL1, OW-WELL1D, OW-WELL3, and OW-WELL3D for vinyl chloride in samples OW-WELL1, OW-WELL1D, OW-WELL3, OW-WELL3D, and OW-WELL4 and for bis(2-ethylhexy)phthalate in sample OW-WELL3 should be considered estimated and have been flagged "J" on the data tables. The instrument levels of these compounds in the aforementioned samples exceeded the calibration range of the instrument.

- The positive results for compounds quantitated using the semivolatile internal standard compounds d_{12}-chrysene and d_{12}-perylene in samples OW-WELL3 and OW-WELL3RE should be considered estimated and have been flagged "J" on the data tables. In addition, the quantitation limits for the compounds quantitated using the semivolatile internal standards in the aforementioned samples should be considered estimated and the "not-detected" results have been flagged "UJ" on the data tables. Low areas were obtained for the internal standard compounds d_{12}-chrysene and d_{12}-perylene in these samples.

- The analyses for all Aroclor compounds in samples OW-WELL3 and OW-WELL3D may be higher than reported and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries were obtained for the pesticide/Aroclor surrogate compound decachlorobiphenyl on one or both columns used for sample analysis.

- Eleven field duplicate sets were submitted with the samples of SDGs EMM03, EMM06 and EMM01, as specified below.

SDG	Sample Identification	Duplicate Sample Identification	Date of Sample Collection
GEC11	OW-WELL4	OW-WELL4D	7/13/93
GEC11	OW-WELL1	OW-WELL1D	7/15/93
GEC11	OW-WELL3	OW-WELL3D	7/16/93
EMM03	PW-LM23	PW-LM23D	8/9/93

SDG	Sample Identification	Duplicate Sample Identification	Date of Sample Collection
EMM03	PW-UM61	PW-UM61D	8/10/93
EMM03	PW-SA08	PW-SA08D	8/11/93
EMM03	PW-LM21	PW-LM21D	8/12/93
EMM06	PW-UM64	PW-UM64D	8/25/93
EMM01	PW-UM58	PW-UM58D	8/3/93
EMM01	PW-UM45	PW-UM45D	8/4/93
EMM01	PW-LE677	PW-LE677D	8/5/93

- Good precision was demonstrated between the results for the majority of the field duplicate pairs. Qualitatively confident results greater than the quantitation limits are summarized below. The positive results for vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene (total), trichloroethene, and tetrachloroethene in samples OW-WELL4 and OW-WELL4D and for ethylbenzene, total xylenes, naphthalene, and bis(2-ethylhexyl)phthalate in samples OW-WELL3 and OW-WELL3D should be considered estimated and have been flagged "J" on the data tables. Poor precision as defined below was obtained between the results for these compounds in the aforementioned field duplicate pairs.

Compound	Sample PW-SA08	Duplicate Sample PW-SA08D	RPD
trichloroethene	1.2 μg/L	1.2 μg/L	NC
tetrachloroethene	4.9 μg/L	5.3 μg/L	NC

Compound	Sample PW-LM21	Duplicate Sample PW-LM21D	RPD
trichloroethene	2.0 μg/L	1.8 μg/L	NC

Compound	Sample OW-WELL4	Duplicate Sample OW-WELL4D	RPD/RSD
vinyl chloride	180 μg/L	400[1] μg/L	75.9%[2]
1,1-dichloroethene	14 μg/L	27 μg/L	63.4%[2]
1,2-dichloroethene (total)	5100[1] μg/L	9300[1] μg/L	58.3%[2]
trichloroethene	38,000[1] μg/L	70,000[1] μg/L	59.3%[2]
1,1,2-trichloroethene	9 J μg/L	15 μg/L	50.0%
tetrachloroethene	48 μg/L	91 μg/L; 120[1] μg/L	42.0%[2]
xylene (total)	11 μg/L	20 μg/L	58.1%

Compound	Sample OW-WELL1	Duplicate Sample OW-WELL1D	RPD
vinyl chloride	880[1] µg/L	860[1] µg/L	2.3%
1,2-dichloroethene (total)	620[1] µg/L	620[1] µg/L	0.0%
trichloroethene	97 µg/L	99 µg/L	2.0%
ethylbenzene	10 µg/L	9 J µg/L	10.5%
xylene (total)	64 µg/L	61 µg/L	4.8%

Compound	Sample OW-WELL3	Duplicate Sample OW-WELL3D	RPD/RSD
vinyl chloride	3000[1] µg/L	3400[1] µg/L	12.5%
1,2-dichloroethene (total)	7000 µg/L	7900 µg/L	12.1%
trichloroethene	1000 µg/L; 1100[1] µg/L	1200 µg/L; 1700[1] µg/L	24.9%
toluene	440 µg/L; 450[1] µg/L	530 µg/L; 880[1] µg/L	36.0%
ethylbenzene	340 µg/L; 340[1] J µg/L	540 µg/L; 1600[1] µg/L	85.7%[2]
xylene (total)	3100 µg/L; 3300[1] µg/L	4600 µg/L; 14,000[1] µg/L	83.3%[2]
naphthalene	2000 µg/L; 2000[1] µg/L	1200 µg/L	26.6%[2]
2-methylnaphthalene	540 µg/L	300 J µg/L	57.1%
bis(2-ethylhexyl)phthalate	6100[1] µg/L	3800 µg/L	46.5%[2]

NOTES:

U - Not detected.

NC - Not calculated.

[1] - This result was reported from the secondary dilution analysis.

[2] - Unacceptable duplicate precision; results are >20% RPD or RSD for aqueous samples for results >5× CRQL or the difference is >CRQL for aqueous samples for results <5× CRQL.

- All positive results less than the quantitation limit should be considered estimated and have been flagged "J" on the data tables.

- Tentatively Identified Compounds (TICs) have been evaluated and are presented in Section 2. The majority of the TICs appear to be laboratory artifacts, alkanes, hydrocarbons, polyaromatic hydrocarbons, alkylbenzenes, and unknowns. TICs that are present in the blanks or are known laboratory artifacts have been flagged "R" on the TIC Form I's. All other TICs should be considered estimated and have been flagged "J" on the data tables since the calculation is based on an assumed response factor of 1.0.

A complete support documentation of this quality assurance review is provided in Section 3 of this report.

B. Conclusions

This quality assurance review has identified some aspects of the data that have required qualification. In order to use any of the analytical results, the data user should understand the limitations and qualifications stated in this quality assurance review. The Laboratory Case Narratives and Project Chains-of-Custody are presented in Section 4 of this report.

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SECTION 2

ANALYTICAL RESULTS

QUALIFIER NOTES

U	-	Not detected. The associated number indicates approximate sample concentration necessary to be detected.
B	-	Not detected substantially above the level reported in laboratory or field blanks.
R	-	Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
J	-	Analyte present. Reported value may not be accurate or precise.
L	-	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
UJ	-	Not detected. Quantitation limit may be inaccurate or imprecise.
UL	-	Not detected. Quantitation limit is probably higher.

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-6)
VOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb)

Location ID:	Well 4	Well 4	Well 4	Well 4
GEC Sample ID:	OW-WELL 4	OW-WELL 4	OW-WELL 4D	OW-WELL 4D
EPA Sample No.:	OWEL4	OWEL4DL	OWL4D	OWL4DDL
Laboratory ID No.:	1993929	1993929	1993930	1993930
Sample Type:	Investigative	QA/QC	Duplicate	QA/QC
Sample Date:	7/13/93	7/13/93	7/13/93	7/13/93
Identified Compounds:				
Chloromethane	10 U	2000 U	10 U	100 U
Vinyl chloride	180 J	2000 U	310 J	400 J
Bromomethane	10 U	2000 U	10 U	100 U
Chloroethane	10 U	2000 U	10 U	100 U
1,1-Dichloroethene	14 J	2000 U	27 J	35 J
Acetone	2 J	2000 U	10 U	100 U
Carbon disulfide	10 U	2000 U	10 U	100 U
Methylene chloride	5 B	2000 U	8 B	100 U
1,1-Dichloroethane	10 U	2000 U	2 J	100 U
1,2-Dichloroethene (total)	2000 J	5100 J	2800 J	8400 J
2-Butanone	10 U	200 U	10 U	100 U
Chloroform	4 J	200 U	6 J	100 U
1,1,1-Trichloroethane	10 U	200 U	10 U	100 U
Carbon tetrachloride	10 U	200 U	10 U	100 U
Benzene	9 B	200 U	17 B	38 B
1,2-Dichloroethane	1 J	200 U	3 J	100 U
Trichloroethene	3000 J	38000 J	4200 J	20000 J
1,2-Dichloropropane	10 U	200 U	10 U	100 U
Bromodichloromethane	10 U	200 U	10 U	100 U
cis-1,3-Dichloromethane	10 U	200 U	10 U	100 U
4-Methyl-2-Pentanone	10 U	200 U	10 U	100 U
Toluene	1 J	200 U	2 J	100 U
trans-1,3-Dichloropropene	10 U	200 U	10 U	100 U
1,1,2-Trichloroethane	9 J	200 U	15	100 U
Tetrachloroethene	48 J	200 U	91 J	120 J
2-Hexanone	10 U	200 U	10 U	100 U
Dibromochloromethane	10 U	200 U	10 U	100 U
Chlorobenzene	10 U	200 U	10 U	100 U
Ethylbenzene	10 U	200 U	10 U	100 U
Xylene (total)	11	200 U	20	21 J
Styrene	10 U	200 U	10 U	100 U
Bromoform	10 U	200 U	10 U	100 U
1,1,2,2-Tetrachloroethane	10 U	200 U	10 U	100 U

Location ID:	Well 4	Well 2	Well 2	Field Blank 5
GEC Sample ID:	OW-WELL 4D	OW-WELL 2	OW-WELL 2	FB-5
EPA Sample No.:	OWL4DDL2	OWW2E	OWW2EDL	FBL05
Laboratory ID No.:	1993930	1994515	1994515	1993931
Sample Type:	QA/QC	Investigative	QA/QC	QA/QC
Sample Date:	7/13/93	7/14/93	7/14/93	7/13/93
Identified Compounds:				
Chloromethane	4000 U	1000 U	50000 U	10 U
Vinyl chloride	4000 U	1000	50000 U	10 U
Bromomethane	4000 U	1000 U	50000 U	10 U
Chloroethane	4000 U	1000 U	50000 U	10 U
1,1-Dichloroethene	4000 U	1000 U	50000 U	10 U
Acetone	4000 U	1000 U	50000 U	10 U
Carbon disulfide	4000 U	1000 U	50000 U	10 U
Methylene chloride	4000 U	1000 U	50000 U	5 J
1,1-Dichloroethane	4000 U	1000 U	50000 U	10 U
1,2-Dichloroethene (total)	9300 J	43000 J	47000 J	10 U
2-Butanone	4000 U	1000 U	50000 U	10 U
Chloroform	4000 U	1000 U	50000 U	10 U
1,1,1-Trichloroethane	4000 U	1000 U	50000 U	10 U
Carbon tetrachloride	4000 U	1000 U	50000 U	10 U
Benzene	750 B	160 B	8500 B	1 J
1,2-Dichloroethane	4000 U	1000 U	50000 U	10 U
Trichloroethene	70000 J	180000 J	630000	9 J
1,2-Dichloropropane	4000 U	1000 U	50000 U	10 U
Bromodichloromethane	4000 U	1000 U	50000 U	10 U
cis-1,3-Dichloromethane	4000 U	1000 U	50000 U	10 U
4-Methyl-2-Pentanone	4000 U	1000 U	50000 U	10 U
Toluene	4000 U	480 J	50000 U	10 U
trans-1,3-Dichloropropene	4000 U	1000 U	50000 U	10 U
1,1,2-Trichloroethane	4000 U	270 J	50000 U	10 U
Tetrachloroethene	4000 U	3900	50000 U	10 U
2-Hexanone	4000 U	1000 U	50000 U	10 U
Dibromochloromethane	4000 U	1000 U	50000 U	10 U
Chlorobenzene	4000 U	1000 U	50000 U	10 U
Ethylbenzene	4000 U	1000 U	50000 U	10 U
Xylene (total)	4000 U	360 J	50000 U	10 U
Styrene	4000 U	1000 U	50000 U	10 U
Bromoform	4000 U	1000 U	50000 U	10 U
1,1,2,2-Tetrachloroethane	4000 U	1000 U	50000 U	10 U

Location ID:	Trip Blank 5		Well 1		Well 1		Well 1	
GEC Sample ID:	TB-5		OW-WELL 1		OW-WELL 1		OW-WELL 1D	
EPA Sample No.:	TRPPP		OW-1-		OW-1-DL		OW-1D	
Laboratory ID No.:	1993932		1995418		1995418		1995420	
Sample Type:	QA/QC		Investigative		QA/QC		Duplicate	
Sample Date:	7/13/93		7/15/93		7/15/93		7/15/93	
Identified Compounds:								
Chloromethane	10	U	10	U	50	U	10	U
Vinyl chloride	10	U	810	J	880		800	J
Bromomethane	10	U	10	U	50	U	10	U
Chloroethane	10	U	10	U	50	U	10	U
1,1-Dichloroethene	10	U	10	U	50	U	10	U
Acetone	10	U	6	J	50	U	7	J
Carbon disulfide	10	U	10	U	50	U	10	U
Methylene chloride	2	J	10	U	50	U	10	U
1,1-Dichloroethane	10	U	10	U	50	U	10	U
1,2-Dichloroethene (total)	10	U	560	J	620		560	J
2-Butanone	10	U	10	U	50	U	10	U
Chloroform	10	U	10	U	50	U	10	U
1,1,1-Trichloroethane	10	U	10	U	50	U	10	U
Carbon tetrachloride	10	U	10	U	50	U	10	U
Benzene	1	J	10	U	50	U	10	U
1,2-Dichloroethane	10	U	10	U	50	U	10	U
Trichloroethene	10	U	97		100		99	
1,2-Dichloropropane	10	U	10	U	50	U	10	U
Bromodichloromethane	10	U	10	U	50	U	10	U
cis-1,3-Dichloromethane	10	U	10	U	50	U	10	U
4-Methyl-2-Pentanone	10	U	10	U	50	U	10	U
Toluene	10	U	9	J	9	J	8	J
trans-1,3-Dichloropropene	10	U	10	U	50	U	10	U
1,1,2-Trichloroethane	10	U	10	U	50	U	10	U
Tetrachloroethene	10	U	10	U	50	U	10	U
2-Hexanone	10	U	10	U	50	U	10	U
Dibromochloromethane	10	U	10	U	50	U	10	U
Chlorobenzene	10	U	10	U	50	U	10	U
Ethylbenzene	10	U	10		10	J	9	J
Xylene (total)	10	U	64		65		61	
Styrene	10	U	10	U	50	U	10	U
Bromoform	10	U	10	U	50	U	10	U
1,1,2,2-Tetrachloroethane	10	U	10	U	50	U	10	U

Location ID:	Well 1	Field Blank 6	Trip Blank 6	Field Blank 7
GEC Sample ID:	OW-WELL 1D	OW-FB6	OW-TB6	OW-FB7
EPA Sample No.:	OW-1DDL	OWFBG	OWTBG	OWFB7
Laboratory ID No.:	1995420	1994523	1994525	1995422
Sample Type:	QA/QC	QA/QC	QA/QC	Investigative
Sample Date:	7/15/93	7/14/93	7/14/93	7/15/93
Identified Compounds:				
Chloromethane	50 U	10 U	10 U	10 U
Vinyl chloride	860	10 U	10 U	10 U
Bromomethane	50 U	10 U	10 U	10 U
Chloroethane	50 U	10 U	10 U	10 U
1,1-Dichloroethene	50 U	10 U	10 U	10 U
Acetone	50 U	10 U	10 U	10 U
Carbon disulfide	50 U	10 U	10 U	10 U
Methylene chloride	50 U	10 U	10 U	4 J
1,1-Dichloroethane	50 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	620	10 U	10 U	10 U
2-Butanone	50 U	10 U	10 U	10 U
Chloroform	50 U	10 U	10 U	10 U
1,1,1-Trichloroethane	50 U	10 U	10 U	10 U
Carbon tetrachloride	50 U	10 U	10 U	10 U
Benzene	50 U	10 U	10 U	10 U
1,2-Dichloroethane	50 U	10 U	10 U	10 U
Trichloroethene	110	30	10 U	10 U
1,2-Dichloropropane	50 U	10 U	10 U	10 U
Bromodichloromethane	50 U	10 U	10 U	10 U
cis-1,3-Dichloromethane	50 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	50 U	10 U	10 U	10 U
Toluene	9 J	10 U	10 U	10 U
trans-1,3-Dichloropropene	50 U	10 U	10 U	10 U
1,1,2-Trichloroethane	50 U	10 U	10 U	10 U
Tetrachloroethene	50 U	10 U	10 U	10 U
2-Hexanone	50 U	10 U	10 U	10 U
Dibromochloromethane	50 U	10 U	10 U	10 U
Chlorobenzene	50 U	10 U	10 U	10 U
Ethylbenzene	11 J	10 U	10 U	10 U
Xylene (total)	64	10 U	10 U	10 U
Styrene	50 U	10 U	10 U	10 U
Bromoform	50 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	50 U	10 U	10 U	10 U

Location ID:	Well 3		Well 3		Well 3		Well 3	
GEC Sample ID:	OW-WELL3		OW-WELL3		OW-WELL3D		OW-WELL3D	
EPA Sample No.:	OW-3-		OW-3DL		OW-3D		OW-3DDL	
Laboratory ID No.:	1995939		1995939		1995941		1995941	
Sample Type:	Investigative		QA/QC		Duplicate		QA/QC	
Sample Date:	7/16/93		7/16/93		7/16/93		7/16/93	
Identified Compounds:								
Chloromethane	100	U	500	U	100	U	500	U
Vinyl chloride	3200	J	3000		3200	J	3400	
Bromomethane	100	U	500	U	100	U	500	U
Chloroethane	100	U	500	U	100	U	500	U
1,1-Dichloroethene	100	U	500	U	100	U	500	U
Acetone	100	U	500	U	37	J	500	U
Carbon disulfide	100	U	500	U	100	U	500	U
Methylene chloride	100	U	500	U	10	B	500	U
1,1-Dichloroethane	100	U	500	U	100	U	500	U
1,2-Dichloroethene (total)	6400	J	7000		6500	J	7900	
2-Butanone	100	U	500	U	100	U	500	U
Chloroform	100	U	500	U	100	U	500	U
1,1,1-Trichloroethane	100	U	500	U	100	U	500	U
Carbon tetrachloride	100	U	500	U	100	U	500	U
Benzene	24	B	500	U	30	B	500	U
1,2-Dichloroethane	100	U	500	U	100	U	500	U
Trichloroethene	1000	J	1100	J	1200	J	1700	J
1,2-Dichloropropane	100	U	500	U	100	U	500	U
Bromodichloromethane	100	U	500	U	100	U	500	U
cis-1,3-Dichloromethane	100	U	500	U	100	U	500	U
4-Methyl-2-Pentanone	100	U	500	U	100	U	500	U
Toluene	440		450	J	530		880	
trans-1,3-Dichloropropene	100	U	500	U	100	U	500	U
1,1,2-Trichloroethane	100	U	500	U	100	U	500	U
Tetrachloroethene	100	U	500	U	100	U	500	U
2-Hexanone	100	U	500	U	100	U	500	U
Dibromochloromethane	100	U	500	U	100	U	500	U
Chlorobenzene	100	U	500	U	100	U	500	U
Ethylbenzene	340	J	340	J	540	J	1600	J
Xylene (total)	3100	J	3300	J	4600	J	14000	J
Styrene	100	U	500	U	100	U	500	U
Bromoform	100	U	500	U	100	U	500	U
1,1,2,2-Tetrachloroethane	100	U	500	U	100	U	500	U

Location ID:	Air Blank 2		Trip Blank 7		Field Blank 8	
GEC Sample ID:	OW-AB2		TB7		OW-FB8	
EPA Sample No.:	OWAB2		OWTB7		OWFB8	
Laboratory ID No.:	1995424		1995425		1995943	
Sample Type:	QA/QC		QA/QC		QA/QC	
Sample Date:	7/15/93		7/15/93		7/16/93	
Identified Compounds:						
Chloromethane	10	U	10	U	10	U
Vinyl chloride	10	U	10	U	10	U
Bromomethane	10	U	10	U	10	U
Chloroethane	10	U	10	U	10	U
1,1-Dichloroethene	10	U	10	U	10	U
Acetone	10	U	10	U	10	U
Carbon disulfide	10	U	10	U	10	U
Methylene chloride	1	J	2	J	10	U
1,1-Dichloroethane	10	U	10	U	10	U
1,2-Dichloroethene (total)	10	U	10	U	10	U
2-Butanone	10	U	10	U	10	U
Chloroform	10	U	10	U	10	U
1,1,1-Trichloroethane	10	U	10	U	10	U
Carbon tetrachloride	10	U	10	U	10	U
Benzene	10	U	10	U	10	U
1,2-Dichloroethane	10	U	10	U	10	U
Trichloroethene	10	U	10	U	2	J
1,2-Dichloropropane	10	U	10	U	10	U
Bromodichloromethane	10	U	10	U	10	U
cis-1,3-Dichloromethane	10	U	10	U	10	U
4-Methyl-2-Pentanone	10	U	10	U	10	U
Toluene	10	U	10	U	10	U
trans-1,3-Dichloropropene	10	U	10	U	10	U
1,1,2-Trichloroethane	10	U	10	U	10	U
Tetrachloroethene	10	U	10	U	10	U
2-Hexanone	10	U	10	U	10	U
Dibromochloromethane	10	U	10	U	10	U
Chlorobenzene	10	U	10	U	10	U
Ethylbenzene	10	U	10	U	10	U
Xylene (total)	10	U	10	U	10	U
Styrene	10	U	10	U	10	U
Bromoform	10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	10	U	10	U	10	U

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-6)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	Well 4	Well 4	Well 2	Field Blank 5
GEC Sample ID:	OW-WELL4	OW-WELL4D	OW-WELL2	OW-FB5
EPA Sample No.:	OWEL4	OWL4D	OWW2E	FBL05
Laboratory ID No.:	1993929	1993930	1994515	1993931
Sample Type:	Investigative	Duplicate	Investigative	QA/QC
Sample Date:	7/13/93	7/13/93	7/14/93	7/13/93
Identified				
Phenol	1 J	2 J	11	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	3 J	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	3 J	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	6 J	6 J	22	10 U
4-Chloroanilene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	2 J	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	8 J	25 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroanilene	25 U	25 U	25 U	25 U
Dimethylphthalate	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroanilene	25 U	25 U	25 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U
Dibenzofuran	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-6)
SEMIVOLATILE ORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	Well 4	Well 4	Well 2	Field Blank 5
GEC Sample ID:	OW-WELL4	OW-WELL4D	OW-WELL2	OW-FB5
EPA Sample No.:	OWEL4	OWL4D	OWW2E	FBL05
Laboratory ID No.:	1993929	1993930	1994515	1993931
Sample Type:	Investigative	Duplicate	Investigative	QA/QC
Sample Date:	7/13/93	7/13/93	7/14/93	7/13/93
Identified				
4-Nitroaniline	25 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	5 J	25 U
Phenanthrene	10 U	10 U	2 J	10 U
Anthracene	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Di-n-butylphthalate	1 J	1 J	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	3 B	3 B	10 U	5 J
Chrysene	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Dibenz(a,h) anthracene	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U

Location ID:	Field Blank 6	Well 1	Well 1	Field Blank 7	Well 3
GEC Sample ID:	OW-FB6	OW-WELL1	OW-WELL1D	OW-FB7	OW-WELL3
EPA Sample No.:	OWFBG	OW-1-	OW-1D	OWFB7	OW-3-
Laboratory ID No.:	1994523	1995418	1995420	1995422	1995939
Sample Type:	QA/QC	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	7/14/93	7/15/93	7/15/93	7/15/93	7/16/93
Identified					
Phenol	10 U	10 U	10 U	10 U	500 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U	500 U
2-Chlorophenol	10 U	10 U	10 U	10 U	500 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	500 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	500 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	500 U
2-Methylphenol	10 U	10 U	10 U	10 U	500 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U	500 U
4-Methylphenol	10 U	7 J	6 J	10 U	500 U
N-Notroso-di-n-propylamine	10 U	10 U	10 U	10 U	500 U
Hexachloroethane	10 U	10 U	10 U	10 U	500 U
Nitrobenzene	10 U	10 U	10 U	10 U	500 U
Isophorone	10 U	10 U	10 U	10 U	500 U
2-Nitrophenol	10 U	10 U	10 U	10 U	500 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	500 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U	500 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	500 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	500 U
Naphthalene	10 U	4 J	4 J	10 U	2000 J
4-Chloroanilene	10 U	10 U	10 U	10 U	500 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	500 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	500 U
2-Methylnaphthalene	10 U	1 J	1 J	10 U	540
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	500 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	500 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U	1200 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	500 U
2-Nitroanilene	25 U	25 U	25 U	25 U	1200 U
Dimethylphthalate	10 U	10 U	10 U	10 U	500 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	500 U
Acenaphthylene	10 U	10 U	10 U	10 U	500 U
3-Nitroanilene	25 U	25 U	25 U	25 U	1200 U
Acenaphthene	10 U	10 U	10 U	10 U	500 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	1200 U
4-Nitrophenol	25 U	25 U	25 U	25 U	1200 U
Dibenzofuran	10 U	10 U	10 U	10 U	500 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	500 U
Diethylphthalate	10 U	10 U	10 U	10 U	500 U
4-Chlorophenol-phenylether	10 U	10 U	10 U	10 U	500 U
Fluorene	10 U	10 U	10 U	10 U	500 U

Location ID:	Field Blank 6	Well 1	Well 1	Field Blank 7	Well 3
GEC Sample ID:	OW-FB6	OW-WELL1	OW-WELL1D	OW-FB7	OW-WELL3
EPA Sample No.:	OWFBG	OW-1-	OW-1D	OWFB7	OW-3-
Laboratory ID No.:	1994523	1995418	1995420	1995422	1995939
Sample Type:	QA/QC	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	7/14/93	7/15/93	7/15/93	7/15/93	7/16/93
Identified					
4-Nitroaniline	25 U	25 U	25 U	25 U	1200 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U	1200 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U	77 J
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	500 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	500 U
Pentachlorophenol	25 U	25 U	25 U	25 U	1200 U
Phenanthrene	10 U	10 U	10 U	10 U	130 J
Anthracene	10 U	10 U	10 U	10 U	500 U
Carbazole	10 U	10 U	10 U	10 U	500 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	500 U
Fluoranthene	10 U	10 U	10 U	10 U	500 U
Pyrene	10 U	10 U	10 U	10 U	500 UJ
Butylbenzylphthalate	10 U	10 U	10 U	10 U	500 UJ
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U	500 UJ
Benzo(a)anthracene	10 U	10 U	10 U	10 U	500 UJ
bis(2-Ethylhexyl)phthalate	1 J	3 B	4 B	10 U	6000 J
Chrysene	10 U	10 U	10 U	10 U	500 UJ
Di-n-octylphthalate	10 U	10 U	10 U	10 U	160 J
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	500 UJ
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	500 UJ
Benzo(a)pyrene	10 U	10 U	10 U	10 U	500 UJ
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	500 UJ
Dibenz(a,h) anthracene	10 U	10 U	10 U	10 U	500 UJ
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	500 UJ

Location ID:	Well 3	Well 3	Well 3	Field Blank 8
GEC Sample ID:	OW-WELL3	OW-WELL3	OW-WELL3D	
EPA Sample No.:	OW-3-RE	OW-3-DL	OW-3D	OW-FB8
Laboratory ID No.:	1995939	1995939	1995941	1995943
Sample Type:	QA/QC	QA/QC	Duplicate	QA/QC
Sample Date:	7/16/93	7/16/93	7/16/93	7/16/93
Identified				
Phenol	500 U	1000 U	500 U	10 U
bis(2-Chloroethyl)ether	500 U	1000 U	500 U	10 U
2-Chlorophenol	500 U	1000 U	500 U	10 U
1,3-Dichlorobenzene	500 U	1000 U	500 U	10 U
1,4-Dichlorobenzene	500 U	1000 U	500 U	10 U
1,2-Dichlorobenzene	500 U	1000 U	500 U	10 U
2-Methylphenol	500 U	1000 U	500 U	10 U
2,2'-oxybis(1-Chloropropane)	500 U	1000 U	500 U	10 U
4-Methylphenol	500 U	1000 U	500 U	10 U
N-Notroso-di-n-propylamine	500 U	1000 U	500 U	10 U
Hexachloroethane	500 U	1000 U	500 U	10 U
Nitrobenzene	500 U	1000 U	500 U	10 U
Isophorone	500 U	1000 U	500 U	10 U
2-Nitrophenol	500 U	1000 U	500 U	10 U
2,4-Dimethylphenol	500 U	1000 U	500 U	10 U
bis(2-Chloroethoxy)methane	500 U	1000 U	500 U	10 U
2,4-Dichlorophenol	500 U	1000 U	500 U	10 U
1,2,4-Trichlorobenzene	500 U	1000 U	500 U	10 U
Naphthalene	2000 J	2000	1200 J	10 U
4-Chloroanilene	500 U	1000 U	500 U	10 U
Hexachlorobutadiene	500 U	1000 U	500 U	10 U
4-Chloro-3-methylphenol	500 U	1000 U	500 U	10 U
2-Methylnaphthalene	520	510 J	300 J	10 U
Hexachlorocyclopentadiene	500 U	1000 U	500 U	10 U
2,4,6-Trichlorophenol	500 U	1000 U	500 U	10 U
2,4,5-Trichlorophenol	1200 U	2400 U	1200 U	25 U
2-Chloronaphthalene	500 U	1000 U	500 U	10 U
2-Nitroanilene	1200 U	2400 U	1200 U	25 U
Dimethylphthalate	500 U	1000 U	500 U	10 U
2,6-Dinitrotoluene	500 U	1000 U	500 U	10 U
Acenaphthylene	500 U	1000 U	500 U	10 U
3-Nitroanilene	1200 U	2400 U	1200 U	25 U
Acenaphthene	500 U	1000 U	500 U	10 U
2,4-Dinitrophenol	1200 U	2400 U	1200 U	25 U
4-Nitrophenol	1200 U	2400 U	1200 U	25 U
Dibenzofuran	500 U	1000 U	500 U	10 U
2,4-Dinitrotoluene	500 U	1000 U	500 U	10 U
Diethylphthalate	500 U	1000 U	500 U	10 U
4-Chlorophenol-phenylether	500 U	1000 U	500 U	10 U
Fluorene	500 U	1000 U	500 U	10 U

Location ID:	Well 3	Well 3	Well 3	Field Blank 8
GEC Sample ID:	OW-WELL3	OW-WELL3	OW-WELL3D	
EPA Sample No.:	OW-3-RE	OW-3-DL	OW-3D	OW-FB8
Laboratory ID No.:	1995939	1995939	1995941	1995943
Sample Type:	QA/QC	QA/QC	Duplicate	QA/QC
Sample Date:	7/16/93	7/16/93	7/16/93	7/16/93
Identified				
4-Nitroaniline	1200 U	2400 U	1200 U	25 U
4,6-Dinitro-2-methylphenol	1200 U	2400 U	1200 U	25 U
N-Nitrosodiphenylamine (1)	78 J	1000 U	66 J	10 U
4-Bromophenyl-phenylether	500 U	1000 U	500 U	10 U
Hexachlorobenzene	500 U	1000 U	500 U	10 U
Pentachlorophenol	1200 U	2400 U	1200 U	25 U
Phenanthrene	120 J	120 J	100 J	10 U
Anthracene	500 U	1000 U	500 U	10 U
Carbazole	500 U	1000 U	500 U	10 U
Di-n-butylphthalate	500 U	1000 U	500 U	10 U
Fluoranthene	500 U	1000 U	500 U	10 U
Pyrene	500 UJ	1000 U	71 J	10 U
Butylbenzylphthalate	500 UJ	1000 U	500 U	10 U
3,3'-Dichlorobenzidine	500 UJ	1000 U	500 U	10 U
Benzo(a)anthracene	500 UJ	1000 U	500 U	10 U
bis(2-Ethylhexyl)phthalate	6000 J	6100 J	3800 J	10 U
Chrysene	500 UJ	1000 U	500 U	10 U
Di-n-octylphthalate	140 J	110 J	110 J	10 U
Benzo(b)fluoranthene	500 UJ	1000 U	500 U	10 U
Benzo(k)fluoranthene	500 UJ	1000 U	500 U	10 U
Benzo(a)pyrene	500 UJ	1000 U	500 U	10 U
Indeno(1,2,3-cd)pyrene	500 UJ	1000 U	500 U	10 U
Dibenz(a,h) anthracene	500 UJ	1000 U	500 U	10 U
Benzo(g,h,i)perylene	500 UJ	1000 U	500 U	10 U

RODALE MANUFACTURING SITE
WELL SURVEY
ON-SITE WELLS - GROUNDWATER (OP-6)
PCBs
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	Field Blank 8	Field Blank 5	Well 1	Well 1	Well 3
GEC Sample ID:	OW-FB8	OW-FB5	OW-WELL1	OW-WELL1D	OW-WELL3
EPA Sample No:	OWFB8	FBL05	OW-1-	OW-1D	OW-3-
Laboratory ID:	1995943	1993931	1995418	1995420	1995939
Sample Type:	QA/QC	QA/QC	Investigative	Duplicate	Investigative
Sample Date:	7/16/93	7/13/93	7/15/93	7/15/93	7/16/93
Identified Compounds:					
Aroclor-1016	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR
Aroclor-1221	2.0 U	2.0 U	2.5 U	2.0 U	2.0 UR
Aroclor-1232	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR
Aroclor-1242	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR
Aroclor-1248	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR
Aroclor-1254	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR
Aroclor-1260	1.0 U	1.0 U	1.2 U	1.0 U	1.0 UR

Location ID:	Well 3	Well 4	Field Blank 7	Well 4	Well 2
GEC Sample ID:	OW-WELL3D	OW-WELL4	OW-FB7	OW-WELL4D	OW-WELL2
EPA Sample No:	OW-3D	OWEL4	OWFB7	OWL4D	OWW2E
Laboratory ID:	1995941	1993929	1995422	1993930	1994515
Sample Type:	Duplicate	Investigative	QA/QC	Duplicate	Investigative
Sample Date:	7/16/93	7/13/93	7/15/93	7/13/93	7/14/93
Identified Compounds:					
Aroclor-1016	1 UR	1 U	1 U	1 U	1 U
Aroclor-1221	2 UR	2 U	2 U	2 U	2 U
Aroclor-1232	1 UR	1 U	1 U	1 U	1 U
Aroclor-1242	1 UR	1 U	1 U	1 U	1 U
Aroclor-1248	1 UR	1 U	1 U	1 U	1 U
Aroclor-1254	1 UR	1 U	1 U	1 U	1 U
Aroclor-1260	1 UR	1 U	1 U	1 U	1 U

Location ID:	Field Blank 6
GEC Sample ID:	OW-FB6
EPA Sample No:	OWFBG
Laboratory ID:	1994523
Sample Type:	QA/QC
Sample Date:	7/14/93

Identified Compounds:	
Aroclor-1016	1 U
Aroclor-1221	2 U
Aroclor-1232	1 U
Aroclor-1242	1 U
Aroclor-1248	1 U
Aroclor-1254	1 U
Aroclor-1260	1 U

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELLS - GROUNDWATER (OP-7)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	UM-43	UM-58	UM-58	1501
GEC Sample ID:	PW-UM43	PW-UM58	PW-UM58D	PW-1501
EPA Sample No:	UM43-	UM58-	UM58D	1501-
Laboratory ID:	2004191	2004192	2004193	2004194
Sample Type:	Investigative	Investigative	Duplicate	Investigative
Sample Date:	8/3/93	8/3/93	8/3/93	8/3/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR	0.6 B	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	0.5 B	0.6 B	0.7 B	0.7 B
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	0.2 J	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	LM-10	LE-311	UM-45	UM-45
GEC Sample ID:	PW-LM10	PW-LE311	PW-UM45	PW-UM45D
EPA Sample No:	LM10-	LE311	UM49-	UM49D
Laboratory ID:	2004195	2004814	2004812	2004813
Sample Type:	Investigative	Investigative	Investigative	Duplicate
Sample Date:	8/3/93	8/4/93	8/4/93	8/4/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	2.0 U	0.4 B	0.6 B	0.5 B
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	0.1 J	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	2.0	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	UM-59	Trip Blank 1	LE-677	LE-677	Well 1492
GEC Sample ID:	PW-UM59	TB-PSW1	LE677	LE677D	PW-1492
EPA Sample No:	UM59-	TB1PW	LE677	LE67D	1492-
Laboratory ID:	2004811	2004196	2005514	2005515	2005513
Sample Type:	Investigative	QA/QC	Investigative	Duplicate	Investigative
Sample Date:	8/4/93	8/4/93	8/5/93	8/5/93	8/5/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	8.9 L	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	1.5 B	1.3	0.5 B	0.4 B	0.4 B
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	0.4 J	0.4 J	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	0.2 J	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	SA-05	Trip Blank 2	Well 0351	LE-1293	UM-40
GEC Sample ID:	PW-SA05-	PW-TB2	PW-0351	PW-LE1293	PW-UM40
EPA Sample No:	SA05-	PWTB2	0351-	1293-	UM40-
Laboratory ID:	2005512	2004815	2005516	2005519	2005520
Sample Type:	Investigative	QA/QC	Investigative	Investigative	Investigative
Sample Date:	8/5/93	8/4/93	08/05/93	08/05/93	08/04/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	9.6 L
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	0.2 B
Methylene Chloride	0.4 B	0.5 J	0.3 B	0.8 B	0.8 B
trans-1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	0.5 J	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	0.4 J	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	0.3 J
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	0.2 J	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	EM-08	Trip Blank 3
GEC Sample ID:	PW-EM08	PW-TB3
EPA Sample No:	EM08-	PWTB3
Laboratory ID:	2007146	2005521
Sample Type:	Investigative	QA/QC
Sample Date:	8/9/93	08/05/93
Identified Compounds:		
Chloromethane	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U
Methylene Chloride	0.4 B	0.7 J
trans-1,2-Dichloroethane	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U
Chloroform	0.2 J	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U
Benzene	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U
Trichloroethene	1.1	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U
Toluene	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U
Tetrachloroethene	0.3 J	1.0 U
2-Hexanone	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U
1,2-Dibromomethane	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U
Styrene	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U

OP8-VOC.XLS

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELLS - GROUNDWATER (OP-8)
VOLATILE ORGANIC COMPOUNDS (6/91 SO
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	EM-09	LM-23	LM-23	Trip Blank 4	SA-07
GEC Sample ID:	PW-EM09	PW-LM23	PW-LM23D	PW-TB4	PW-SA07
EPA Sample No:	EM09-	LM23-	LM23D	PWTB4	SA07-
Laboratory ID:	2007155	2007156	2007157	2007158	2007804
Sample Type:	Investigative	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	8/9/93	8/9/93	8/9/93	8/9/93	8/10/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	0.6 B	1.6 B	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	0.1 B
Methylene Chloride	0.3 B	0.4 B	0.4 B	0.8 J	0.2 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	0.1 B	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	0.1 J	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.1	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	0.2 J	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropa	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	LM-20	LM-26	UM-60	UM-61	UM-61
GEC Sample ID:	PW-LM20	PW-LM26	PW-UM60	PW-UM61	PW-UM61D
EPA Sample No:	LM20-	LM26-	UM60-	UM61-	UM61D
Laboratory ID:	2007805	2007806	2007807	2007808	2007809
Sample Type:	Investigative	Investigative	Investigative	Investigative	Duplicate
Sample Date:	8/10/93	8/10/93	8/10/93	8/10/93	8/10/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	12 L	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	0.4 B	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	1.0 B	2.0 U	0.4 B	0.6 B	0.2 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	0.3 B	1.0 U	0.5 B	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	0.2 J	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5.2	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	0.5 J	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	0.7 J	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropa	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	Trip Blank 5	LM-27	SA-08	SA-08	LM-28
GEC Sample ID:	PW-TB5	PW-LM27	PW-SA08D	PW-SA08	PW-LM28
EPA Sample No:	PWTB5	LM27-	SA08D	SA08-	LM28-
Laboratory ID:	2007810	2008510	2008511	2008512	2008515
Sample Type:	QA/QC	Investigative	Duplicate	Investigative	Investigative
Sample Date:	8/10/93	8/11/93	8/11/93	8/11/93	8/11/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	1.1	0.9 B	0.3 B	0.9 B	0.5 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	12 L	5.0 UR	9.8 L	8.7 L
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	0.2 J	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.2	1.2	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	5.3	4.9	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropa	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Location ID:	Trip Blank 6	LE-312	LE-411	LM-21	LM-21
GEC Sample ID:	PW-TB6	PW-LE312	PW-LE411	PW-LM21	PW-LM21D
EPA Sample No:	PWTB6	LE312	LE411	LM21-	LM21D
Laboratory ID:	2008516	2009256	2009257	2009258	2009259
Sample Type:	QA/QC	Investigative	Investigative	Investigative	Duplicate
Sample Date:	8/11/93	8/12/93	8/12/93	8/12/93	8/12/93
Identified Compounds:					
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	5.0 UR	0.7 B	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene Chloride	1.4	0.6 B	1.6 B	0.5 B	1.6 B
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	8.1 L
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	0.2 J	1.0 U	1.0 U	0.2 B	0.1 B
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	2.0	1.8
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	0.2 J	0.2 J
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropa	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

OP9-VOC.XLS

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELLS - GROUNDWATER (OP-9)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	SA-09	UM-62	Trip Blank 7
GEC Sample ID:	PW-SA09	PW-UM62	PW-TB7
EPA Sample No:	SA09-	UM62-	PWTB7
Laboratory ID:	2009262	2009263	2009264
Sample Type:	Investigative	Investigative	QA/QC
Sample Date:	8/12/93	8/12/93	8/12/93
Identified Compounds:			
Chloromethane	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U
Acetone	1.9 B	2.8 B	0.5 J
Carbon Disulfide	0.4 B	0.1 B	0.2 J
Methylene Chloride	0.7 B	2.0 U	2.8
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	0.2 J	1.0 U	1.0 U
2-Butanone	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U
Chloroform	0.1 B	1.0 U	0.2 J
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U
Trichloroethene	1.4	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 U	5.0 U	5.0 U
Toluene	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U
Tetrachloroethene	0.3 J	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U

OP10-VOC.XLS

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELLS - GROUNDWATER (OP-10)
VOLATILE ORGANIC COMPOUNDS (6/91 SOW)
(Units: ug/l = ppb) (Prepared: 10/1/93)

Location ID:	UM-63	UM-64	UM-64	Trip Blank 8
GEC Sample ID:	PW-UM63	PW-UM64	PW-UM64D	PW-TB8
EPA Sample No:	UM63-	UM64-	UM64D	PWTB8
Laboratory ID:	2016405	2016406	2016407	2016408
Sample Type:	Investigative	Investigative	Duplicate	QA/QC
Sample Date:	8/25/93	8/25/93	8/25/93	8/25/93
Identified Compounds:				
Chloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
Acetone	1.2 L	5.0 UR	5.0 UR	5.0 UR
Carbon Disulfide	0.1 B	0.2 B	0.2 B	0.2 J
Methylene Chloride	0.1 B	0.3 B	0.2 B	0.2 J
trans-1,2-dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone	15 L	5.0 UR	5.0 UR	5.0 UR
Bromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U
Benzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloromethane	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-Pentanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Toluene	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	5.0 UR	5.0 UR	5.0 UR	5.0 UR
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-Chloropropane	1.0 U	1.0 U	1.0 U	1.0 U

7-3: CLP INORGANICS DATA WITH APPROPRIATE DATA QUALIFIERS (ENVIRONMENTAL STANDARDS, INC., NOVEMBER 11, 1993)

Environmental Standards, Inc.

Specialists in Environmental Risk Assessment, Hydrogeology and Data Validation

The Commons at Valley Forge, Unit 4, 1220 Valley Forge Rd.
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QUALITY ASSURANCE REVIEW OF THE SAMPLES COLLECTED FOR THE RODALE MANUFACTURING SITE IN EMMAUS, PENNSYLVANIA

VOLUME I

November 11, 1993

Prepared for:

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Introduction

This quality assurance review is based upon a rigorous review of all data generated from the samples that were collected from June 30 through August 25, 1993, from the Rodale Manufacturing site in Emmaus, Pennsylvania. The samples that have undergone a rigorous quality assurance review are listed on Table 1.

This review has been performed in accordance with the Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (U.S. EPA Region III, 493).

The analytical results are presented as a summary of the data in Section 2. All of the analytical data were examined to determine the usability of the analytical results and also to determine contractual compliance relative to requirements and deliverables under EPA's Contract Laboratory Program (CLP). Qualifier codes have been placed next to results so that the data user can quickly assess the qualitative and/or quantitative reliability of any result. Details of this quality assurance review are presented in the narrative section of this report. This report was prepared to provide a critical review of the laboratory analyses and reported analytical results. Rigorous quality assurance reviews of laboratory-generated data routinely identify various problems associated with analytical measurements, even from the most experienced and capable laboratories. The nature and extent of problems identified in this critical review should not be interpreted to mean that those results that do not have qualifier codes are less than valid.

TABLE 1

SAMPLES INCLUDED IN THIS QUALITY ASSURANCE REVIEW

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
OW-MW1	1988522 1988530	GEC09 GEC10	6/30/93 6/30/93	M, CN M*, CN*
OW-MW1S (Matrix Spike)	1988522S 1988530S	GEC09 GEC10	6/30/93 6/30/93	I, G I*
OW-MW1D (Laboratory Duplicate)	1988522D 1988530D	GEC09 GEC10	6/30/93 6/30/93	I, G I*
OW-MW2	1988524 1988531	GEC09 GEC10	6/30/93 6/30/93	M, CN M*, CN*
OW-MW2D (Field Duplicate of OW-MW2)	1988526 1988532	GEC09 GEC10	6/30/93 6/30/93	M, CN M*, CN*
OW-FB1 (Field Blank)	1988528 1988533	GEC09 GEC10	6/30/93 6/30/93	M, CN M*, CN*
OW-FB1S (Matrix Spike)	1988528S 1988533S	GEC09 GEC10	6/30/93 6/30/93	CN Hg*
OW-FB1D (Laboratory Duplicate)	1988533D	GEC10	6/30/93	Hg*
OW-TB1 (Trip Blank)	1988529	GEC09	6/30/93	I, G, Hg
OW-MW3	1989614 1989625	GEC09 GEC10	7/1/93 7/1/93	M, CN M*, CN*
OW-MW3D (Field Duplicate of OW-MW3)	1989616 1989626	GEC09 GEC10	7/1/93 7/1/93	M, CN M*, CN*
OW-FB2 (Field Blank)	1989618 1989627	GEC09 GEC10	7/1/93 7/1/93	M, CN M*, CN*
OW-AB1 (Air Blank)	1989619	GEC09	7/1/93	M, CN
OW-AB1S (Matrix Spike)	1989619S	GEC09	7/1/93	Hg
OW-AB1D (Laboratory Duplicate)	1989619D	GEC09	7/1/93	Hg

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
OW-MW4	1990319 1990329	GEC09 GEC10	7/6/93 7/6/93	M, CN M*, CN*
OW-MW4D (Field Duplicate of OW-MW4)	1990321 1990330	GEC09 GEC10	7/6/93 7/6/93	M, CN M*, CN*
OW-WELL5	1990323 1990331	GEC09 GEC10	7/6/93 7/6/93	M, CN M*, CN*
OW-WELL5S (Matrix Spike)	1990331S	GEC10	7/6/93	G*
OW-WELL5D (Laboratory Duplicate)	1990331D	GEC10	7/6/93	G*
OW-FB3 (Field Blank)	1990325 1990332	GEC09 GEC10	7/6/93 7/6/93	M, CN M*, CN*
OW-WELL6	1990986 1990992	GEC09 GEC10	7/7/93 7/7/93	M, CN M*, CN*
OW-WELL6D (Field Duplicate of OW-WELL6)	1990988 1990993	GEC09 GEC10	7/7/93 7/7/93	M, CN M*, CN*
OW-FB4 (Field Blank)	1990990 1990994	GEC09 GEC10	7/7/93 7/7/93	M, CN M*, CN*
OW-WELL4	1994584 1993934	GEC11 GEC12	7/13/93 7/13/93	M, CN M*, CN*
OW-WELL4D (Field Duplicate of OW-WELL4)	1994585 1993935	GEC11 GEC12	7/13/93 7/13/93	M, CN M*, CN*
OW-FB5 (Field Blank)	1994586 1993936	GEC11 GEC12	7/13/93 7/13/93	M, CN M*, CN*
OW-WELL2	1994516 1994482	GEC11 GEC12	7/14/93 7/14/93	M, CN M*, CN*
OW-WELL2D (Field Duplicate of OW-WELL2)				NA
OW-WELL2S (Matrix Spike)	1994520 1994484	GEC11 GEC12	7/14/93 7/14/93	M, CN M*, CN*
OW-WELL2D (Laboratory Duplicate)	1994522 1994483	GEC11 GEC12	7/14/93 7/14/93	M, CN M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
OW-FB6 (Field Blank)	1994524	GEC11	7/14/93	M, CN
OW-WELL1	1995419 1995412	GEC11 GEC12	7/15/93 7/15/93	M, CN M*, CN*
OW-WELL1D (Field Duplicate of OW-WELL1)	1995421 1995413	GEC11 GEC12	7/15/93 7/15/93	M, CN M*, CN*
OW-FB7 (Field Blank)	1995423 1995414	GEC11 GEC12	7/15/93 7/15/93	M, CN M*, CN*
OW-AB2 (Air Blank)	1995424	GEC11	7/15/93	M, CN
OW-WELL3	1995940 1995946	GEC11 GEC12	7/16/93 7/16/93	M, CN M*, CN*
OW-WELL3D (Field Duplicate of OW-WELL3)	1995942 1995947	GEC11 GEC12	7/16/93 7/16/93	M, CN M*, CN*
OW-FB8 (Field Blank)	1995944 1995948	GEC11 GEC12	7/16/96 7/16/93	M, CN M*, CN*
PSW-4	1997120 1997127	PSW01 PSW02	7/20/93 7/20/93	M, CN M*, CN*
PSW-4S (Matrix Spike)	1997120S	PSW01	7/20/93	I
PSW-4D (Laboratory Duplicate)	1997120D	PSW01	7/20/93	I, Hg, CN
PSW-4D (Field Duplicate of PSW-4)	1997122 1997128	PSW01 PSW02	7/20/93 7/20/93	M, CN M*, CN*
PSW-4DS (Matrix Spike)	1997122S	PSW01	7/20/93	G, Hg, CN
PSW-4DD (Laboratory Duplicate)	1997122S	PSW01	7/20/93	G
PSW-6	1997124 1997129	PSW01 PSW02	7/20/93 7/20/93	M, CN M*, CN*
PSW-7	1998071 1998075	PSW01 PSW02	7/21/93 7/21/93	M, CN M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
PSW-2	1998073	PSW01	7/21/93	M, CN
	1998076	PSW02	7/21/93	M*, CN*
PSW-1	1998862	PSW01	7/22/93	M, CN
	1998866	PSW02	7/22/93	M*, CN*
PSW-3	1998864	PSW01	7/22/93	M, CN
	1998867	PSW02	7/22/93	M*, CN*
SW-1	2000744	ROD02	7/27/93	M, CN
	2000752	ROD03	7/27/93	M*, CN*
SW-2	2000745	ROD02	7/27/93	M, CN
	2000753	ROD03	7/27/93	M*, CN*
SW-3	2000746	ROD02	7/27/93	M, CN
	2000754	ROD03	7/27/93	M*, CN*
SW-3D (Field Duplicate of SW-3)	2000747	ROD02	7/28/93	M, CN
	2000755	ROD03	7/28/93	M*, CN*
SW-9	2001164	ROD02	7/28/93	M, CN
	2001172	ROD03	7/28/93	M*, CN*
SW-9D (Field Duplicate of SW-9)	2001165	ROD02	7/28/93	M, CN
	2001173	ROD03	7/28/93	M*, CN*
SW-8	2001166	ROD02	7/28/93	M, CN
	2001174	ROD03	7/28/93	M*, CN*
SW-7	2001167	ROD02	7/28/93	M, CN
	2001175	ROD03	7/28/93	M*, CN*
SW-6	2001168	ROD02	7/28/93	M, CN
	2001176	ROD03	7/28/93	M*, CN*
SW-5	2001169	ROD02	7/28/93	M, CN
	2001177	ROD03	7/28/93	M*, CN*
SW-12	2002237	ROD02	7/29/93	M, CN
	2002247	ROD03	7/29/93	M*, CN*
SW-11	2002238	ROD02	7/29/93	M, CN
	2002248	ROD03	7/29/93	M*, CN*
SW-11D (Field Duplicate of SW-11)	2002239	ROD02	7/29/93	M, CN
	2002249	ROD03	7/29/93	M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
SW-11S (Matrix Spike)	2002240 2002250	ROD02 ROD03	7/29/93 7/29/93	M, CN M*, CN*
SW-11D (Laboratory Duplicate)	2002241 2002251	ROD02 ROD03	7/29/93 7/29/93	M, CN M*, CN*
SW-10	2002242 2002252	ROD02 ROD03	7/29/93 7/29/93	M, CN M*, CN*
SW-15	2002243 2002253	ROD03 ROD03	7/29/93 7/29/93	M, CN M*, CN*
SP-LESP78	2002852 2002896	ROD02 ROD03	7/30/93 7/30/93	M, CN M*, CN*
SP-03	2002853 2002897	ROD02 ROD03	7/30/93 7/30/93	M, CN M*, CN*
SP-LESP73	2002857 2002898	ROD04 ROD03	7/30/93 7/30/93	M, CN M*, CN*
SP-LESP73S (Matrix Spike)	2002857S	ROD04	7/30/93	I, Hg
SP-LESP73D (Laboratory Duplicate)	2002857D	ROD04	7/30/93	I, Hg
SP-LESP73D (Field Duplicate of SP-LESP73)	2002858 2002899	ROD04 ROD03	7/30/93 7/30/93	M, CN M*, CN*
SP-LESP73DS (Matrix Spike)	2002858S	ROD04	7/30/93	G
SP-LESP73DD (Laboratory Duplicate)	2002858D	ROD04	7/30/93	G
SP-02	2002859 2002900	ROD04 ROD03	7/30/93 7/30/93	M, CN M*, CN*
SW-16	2002860 2002904	ROD04 ROD05	7/30/93 7/30/93	M, CN M*, CN*
SD-1	2000731	ROD01	7/27/93	M, CN
SD-2	2000732	ROD01	7/27/93	M, CN
SD-3	2000733	ROD01	7/27/93	M, CN

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
SD-3D (Field Duplicate of SD-3)	2000734	ROD01	7/27/93	M, CN
SD-4	2000735	ROD01	7/27/93	M, CN
SD-9	2001155	ROD01	7/28/93	M, CN
SD-9D (Field Duplicate of SD-9)	2001156	ROD01	7/28/93	M, CN
SD-8	2001157	ROD01	7/28/93	M, CN
SD-7	2001158	ROD01	7/28/93	M, CN
SD-6	2001159	ROD01	7/28/93	M, CN
SD-5	2001160	ROD01	7/28/93	M, CN
SD-12	2002230	ROD01	7/29/93	M, CN
SD-11	2002231	ROD01	7/29/93	M, CN
SD-11S (Matrix Spike)	2002233	ROD01	7/29/93	M, CN
SD-11D (Laboratory Duplicate)	2002234	ROD01	7/29/93	M, CN
SD-11D (Field Duplicate of SD-11)	2002232	ROD01	7/29/93	M, CN
SD-10	2002235	ROD01	7/29/93	M, CN
SD-15	2002236	ROD01	7/29/93	M, CN
SD-16	2002839	ROD01	7/30/93	M, CN
PW-UM43	2004191 2004197	EMM01 EMM02	8/3/93 8/3/93	M, CN M*, CN*
PW-UM58	2004192 2004198	EMM01 EMM02	8/3/93 8/3/93	M, CN M*, CN*
PW-UM58D (Field Duplicate of PW-UM58)	2004193 2004199	EMM01 EMM02	8/3/93 8/3/93	M, CN M*, CN*
PW-1501	2004194 2004200	EMM01 EMM02	8/3/93 8/3/93	M, CN M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
PW-LM10	2004195	EMM01	8/3/93	M, CN
	2004201	EMM02	8/3/93	M*, CN*
PW-UM59	2004811	EMM01	8/4/93	M, CN
	2004818	EMM02	8/4/93	M*, CN*
PW-UM45	2004812	EMM01	8/4/93	M, CN
	2004819	EMM02	8/4/93	M*, CN*
PW-UM45D	2004813	EMM01	8/4/93	M, CN
(Field Duplicate of PW-UM45)	2004820	EMM02	8/4/93	M*, CN*
PW-LE311	2004184	EMM01	8/4/93	M, CN
	2004821	EMM02	8/4/93	M*, CN*
PW-SA05	2005512	EMM01	8/5/93	M, CN
	2005532	EMM02	8/5/93	M*, CN*
PW-1492	2005513	EMM01	8/5/93	M, CN
	2005533	EMM02	8/5/93	M*, CN*
PW-LE677	2005514	EMM01	8/5/93	M, CN
	2005534	EMM02	8/5/93	M*, CN*
PW-LE677D	2005515	EMM01	8/5/93	M, CN
(Field Duplicate of PW-LE677)	2005535	EMM02	8/5/93	M*, CN*
PW-0351	2005516	EMM01	8/5/93	M, CN
	2005536	EMM02	8/5/93	M*, CN*
PW-0351S	2005517	EMM01	8/5/93	M, CN
(Matrix Spike)	2005537	EMM02	8/5/93	M*, CN*
PW-0351D	2005518	EMM01	8/5/93	M, CN
(Laboratory Duplicate)	2005538	EMM02	8/5/93	M*, CN*
PW-LE1293	2005519	EMM01	8/5/93	M, CN
	2005539	EMM02	8/5/93	M*, CN*
PW-UM40	2005520	EMM01	8/4/93	M, CN
	2005540	EMM02	8/4/93	M*, CN*
PW-EM08	2007146	EMM01	8/9/93	M, CN
	2007160	EMM02	8/9/93	M*, CN*
PW-EM09	2007155	EMM03	8/9/93	M, CN
	2007161	EMM02	8/9/93	M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
PW-LM23	2007156	EMM03	8/9/93	M, CN
	2007162	EMM02	8/9/93	M*, CN*
PW-LM23D	2007157	EMM03	8/9/93	M, CN
(Field Duplicate of PW-LM23)	2007163	EMM02	8/9/93	M*, CN*
PW-SA07	2007804	EMM03	8/10/93	M, CN
	2007818	EMM04	8/10/93	M*, CN*
PW-LM20	2007805	EMM03	8/10/93	M, CN
	2007819	EMM04	8/10/93	M*, CN*
PW-LM26	2007806	EMM03	8/10/93	M, CN
	2007820	EMM04	8/10/93	M*, CN*
PW-UM60	2007807	EMM03	8/10/93	M, CN
	2007821	EMM04	8/10/93	M*, CN*
PW-UM61	2007808	EMM03	8/10/93	M, CN
	2007822	EMM04	8/10/93	M*, CN*
PW-UM61D	2007809	EMM03	8/10/93	M, CN
(Field Duplicate of PW-UM61)	2007823	EMM04	8/10/93	M*, CN*
PW-LM27	2008510	EMM03	8/11/93	M, CN
	2008517	EMM04	8/11/93	M*, CN*
PW-SA08	2008512	EMM03	8/11/93	M, CN
	2008519	EMM04	8/11/93	M*, CN*
PW-SA08D	2008511	EMM03	8/11/93	M, CN
(Field Duplicate of PW-SA08)	2008518	EMM04	8/11/93	M*, CN*
PW-SA08S	2008513	EMM03	8/11/93	M, CN
(Matrix Spike)	2008520	EMM04	8/11/93	M*, CN*
PW-SA08D	2008514	EMM03	8/11/93	M, CN
(Laboratory Duplicate)	2008521	EMM04	8/11/93	M*, CN*
PW-LM28	2008515	EMM03	8/11/93	M, CN
	2008522	EMM04	8/11/93	M*, CN*
PW-LE312	2009256	EMM03	8/12/93	M, CN
	2009268	EMM04	8/12/93	M*, CN*
PW-LE411	2009257	EMM03	8/12/93	M, CN
	2009269	EMM04	8/12/93	M*, CN*

TABLE 1 (Cont.)

Geo-Environmental Sample Number	Laboratory Sample Number	Sample Delivery Group	Date of Collection	Fraction(s) Analyzed
PW-LM21	2009258 2009270	EMM03 EMM04	8/12/93 8/12/93	M, CN M*, CN*
PW-LM21D (Field Duplicate of PW-LM21)	2009259 2009271	EMM03 EMM04	8/12/93 8/12/93	M, CN M*, CN*
PW-SA09	2009262 2009272	EMM05 EMM04	8/12/93 8/12/93	M, CN M*, CN*
PW-SA09S (Matrix Spike)	2009262S	EMM05	8/12/93	G
PW-SA09D (Laboratory Duplicate)	2009262D	EMM05	8/12/93	G
PW-UM62	2009263 2009273	EMM05 EMM04	8/12/93 8/12/93	M, CN M*, CN*
PW-UM62S (Matrix Spike)	2009263S	EMM05	8/12/93	Zn
PW-UM62D (Laboratory Duplicate)	2009263D	EMM05	8/12/93	Zn
PW-UM63	2016405 2016409	EMM06 EMM07	8/25/93 8/25/93	M, CN M*, CN*
PW-UM63D (Laboratory Duplicate)		EMM06	8/25/93	CN
PW-UM64	2016406 2016410	EMM06 EMM07	8/25/93 8/25/93	M, CN M*, CN*
PW-UM64S (Matrix Spike)		EMM06	8/25/93	CN
PW-UM64D (Field Duplicate of PW-UM64)	2016407 2016411	EMM06 EMM07	8/25/93 8/25/93	M, CN M*, CN*

TABLE 1 (Cont.)

NOTES:

M	-	Total Target Analyte List (TAL) Metals
M*	-	Dissolved TAL Metals
I	-	Total ICP Metals
I*	-	Dissolved ICP Metals
G	-	Total GFAA Metals
G*	-	Dissolved GFAA Metals
Hg	-	Total Mercury
Hg*	-	Dissolved Mercury
CN	-	Total Cyanide
CN*	-	Dissolved Cyanide
Zn	-	Total Zinc
NA	-	Not Analyzed

Samples analyzed for total versus dissolved metals and cyanide have been distinguished with (t) and (d) suffixes, respectively, throughout this report.

Section 1 Quality Assurance Review

A. Inorganic Data

The inorganic analyses of 246 aqueous samples (including 18 aqueous field, trip, and air blanks) were performed by Lancaster Laboratories of Lancaster, Pennsylvania. These samples were collectively analyzed for total and dissolved Target Analyte List (TAL) inorganics by CLP protocols (SOW390, Document Number ILM02.1) as specified on Table 1. Data for this sample set were received in 18 distinct Sample Delivery Groups (SDGs) as specified on Table 1.

The findings offered in this report are based upon an examination of the reported holding times, blank analysis results, pre- and post-digestion matrix spike recoveries, laboratory duplicate results, calibrations, ICP interference standards, laboratory control standards, Contract Required Detection Limit (CRDL) standard recoveries, standard addition results, ICP serial dilutions, instrument detection limits, ICP interelement correction factors, ICP linear ranges, analytical sequence, field duplicate results, total versus dissolved metals results, the quantitation of positive results and overall system performance.

With regard to the CLP protocols, all analytical requirements and data package deliverables were met for this data package with the exception of the following. It should be emphasized that the following items do not necessarily impact data usability. Usability is addressed in a subsequent section.

Correctable Deficiencies

1. The laboratory did not use the Geo-Environmental Consultants, Inc. sample numbers exactly as they appear on the Chains-of-Custody to complete all of the laboratory QC forms as required (ILM02.1, B-15). Instead, the laboratory used abbreviated sample numbers. It should be noted, however, that for ease of cross-reference, the data tables contain both the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody and the abbreviated sample numbers used by the laboratory. The data reviewer has elected to reference in this report the Geo-Environmental Consultants, Inc. sample numbers as they appear on the Chains-of-Custody.

2. In SDGs GEC09 and GEC10, the recovery for cyanide in the fifth continuing calibration verification (CCV) during the analytical sequence beginning 7/6/93 was misreported as 5.00 μg/L (3.3% recovery) on the Initial and Continuing Calibration Verification forms (Form II [PART 1]-INs). According to the associated raw data, cyanide was not detected in this CCV and a 0.0% recovery was obtained.

3. The laboratory did not report the results for antimony, potassium, and sodium in the ICP interference check samples (ICSs) on the ICP Interference Check Sample summary forms (Form IV-INs) as required. Per protocol, the ICS analysis consists of analyzing both

solutions (ICSA and ICSAB) consecutively for all wavelengths used for each analyte reported by ICP (ILM02.1, E-18) and each analyte found should be reported on the Form IV-INs (ILM02.1, B-23). In addition, it should be noted that although the laboratory did not report the results for these analytes on the Form IV-INs, the laboratory entered "X" in some of the boxes for antimony, potassium, and sodium in the ICSA and ICSAB solutions on the Analysis Run Logs (Form XIV-INs) to indicate that the analyte values from these analyses were used to report data in some of the SDGs. The data reviewer has manually recorded the results for these analytes on the Form IV-INs. The edited Form IV-INs have been included in the Inorganic Data Support Documentation (Section 3).

4. The laboratory misreported the Spiked Sample Result, the Spike Added, and the percent recovery (%R) for cyanide in the matrix spike analysis of sample OW-FB1(t) as 47.5145 µg/L, 40.00 µg/L, and 118.8%, respectively, on the Spike Sample Recovery summary form (Form V [PART 1]-IN) in SDG GEC09. According to the associated raw data, the Spiked Sample Result, the Spike Added, and the percent recovery (%R) for cyanide in the matrix spike analysis of sample OW-FB1(t) are 95.0290 µg/L, 100.00 µg/L, and 95.0%, respectively. The data reviewer has manually corrected the associated Form V (PART 1)-IN and has included the edited Form V (PART 1)-IN and the associated raw data in the Inorganic Data Support Documentation (Section 3).

5. The laboratory misreported the Aqueous True and Found concentrations in the Laboratory Control Samples (LCSs) for cyanide as the true and found concentrations at the instrument level (after preparation) on the Laboratory Control Sample summary forms (Form VII-INs) in all SDGs. Per protocol, the Aqueous True and Found concentrations should be reported as the concentration of cyanide in the Aqueous LCS Standard Source (before preparation) and the concentration of cyanide found in the Aqueous LCS solution, respectively. Therefore, all of the reported Aqueous True and Found concentration values should be divided by a factor of two to account for the 500-mL initial sample volumes which were brought down to 250-mL final sample volumes during distillation. It should be noted that the percent recoveries for cyanide in the LCSs did not change due to this deficiency.

6. In SDG GEC09, the laboratory misreported the percent recovery for arsenic in the post-digestion spike analysis of sample OW-WELL5(t) as 195.5% on the associated Analysis Run Log (Form XIV-IN). According to the associated raw data, the correct recovery for arsenic is 152.0%. The laboratory did not subtract the positive result for arsenic, which was above the IDL in sample OW-WELL5(t), from the associated post-digestion spike result before calculating the percent recovery. The data reviewer has manually corrected the associated Form XIV-IN and has included the updated Form XIV-IN and the associated raw data in the Inorganic Data Support Documentation (Section 3).

7. The laboratory misreported the percent recoveries for the graphite furnace atomic absorption (GFAA) post-digestion spike analyses for the analytes in the following samples on the associated Analysis Run Logs (Form XIV-INs). The laboratory subtracted the results for the analytes in the initial analyses of the samples from the post-digestion spike results before calculating the percent recoveries although the initial sample results were below the associated IDLs. The data reviewer has manually corrected the associated Form XIV-INs and has included the updated Form XIV-INs and the associated raw data in the Inorganic Data Support Documentation (Section 3).

Analyte	SDG	Sample(s)
lead	PSW01	PSW-1(t)
	PSW02	PSW-7(d)
	ROD03	SP-03(d)
	EMM02	PW-LE311(d)
	EMM04	PW-LM61D(d)
selenium	GEC09	OW-WELL5(t) and OW-WELL6D(t)
	PSW02	PSW-2(d)
	ROD01	SD-4 and SD-11D
	ROD03	SP-03(d)*
	EMM02	PW-LE311(d)
thallium	GEC11	OW-1(t)
	GEC12	OW-WELL4D(d)
	EMM01	PW-LE677(t)

Note:

* The percent recovery reported by the laboratory was outside QC limits (85.0-115%) while the correct percent recovery is inside QC limits. Therefore, the laboratory also incorrectly flagged the result on the associated Form I with a "W." The data reviewer has also included the manually edited Form I in the Inorganic Data Support Documentation (Section 3).

8. The laboratory did not flag the results for selenium in samples OW-MW1(d) (SDG GEC10) and PSW-6(t) (SDG PSW01) and for thallium in sample SD-10 (SDG ROD01) with "W's" on the associated Form I-INs although the post-digestion spike recoveries were outside the control limits of 85-115%. Per protocol, the "W" qualifier must be used to indicate that the post-digestion spike for GFAA analysis is out of control limits while the absorbance is less than 50% of the spike absorbance (ILM02.1, B-18). The data reviewer has manually corrected the associated Form I's and has included the edited Form I's in the Inorganic Data Support Documentation (Section 3).

9. The laboratory misreported the found concentration and percent recovery in the first continuing calibration for cyanide in SDG GEC12 as 152.28 μg/L and 101.5%, respectively, on the associated Form II (PART 1)-IN. According to the raw data, the found concentration is actually 152.58 μg/L and therefore the correct percent recovery is 101.7%. The data reviewer has manually corrected the associated Form II (PART1)-IN and has included the edited Form II (PART 1)-IN and the associated raw data in the Inorganic Data Support Documentation (Section 3).

10. The laboratory did not include cyanide distillation logs in the data package provided for SDG GEC12 as required by CLP protocol (ILM02.1, B-9).

11. The laboratory mislabelled samples SW-10(d) and SW-15(d) with the abbreviated sample identifications "SW-1F" and "SW-2F," respectively, in the ICP raw data in SDG ROD03. However, these abbreviated sample identifications are actually those for samples SW-1(d) and SW-2(d), respectively. The data reviewer has included the associated raw data in the Inorganic Data Support Documentation (Section 3).

12. The laboratory did not label the mercury raw data for samples SD-9D, SD-8, SD-7, SD-6, SD-5 or SD-12 (page 248 of the data package for SDG ROD01), the GFAA selenium raw data for samples SW-2(d) or SW-3(d) and the post-digestion spike analyses of samples SW-1(d) or SW-2(d) (page 184 of the data package for SDG ROD03) or the ICP raw data for sample PW-LE411(d) (page 117 of the data package for SDG EMM04) with the EPA Sample Number as required by protocol (ILM02.1, B-8).

13. The laboratory misidentified sample OW-FB6 as sample OW-FBG on the "Sample Reference List for SDG # GEC11 with a Package Type of IV-I" form included with the data package for SDG GEC11.

14. The laboratory misidentified the matrix spike and laboratory duplicate of samples SD-11 and SW-11 as the matrix spike and laboratory duplicate of samples SD-11D and SW-11D, respectively (field duplicate of samples SD-11 and SW-11), on the Sample Reference Lists included with the data packages for SDGs ROD01, ROD02, and ROD03.

15. The laboratory misreported the percent recovery for arsenic in the CRDL standard in SDG EMM04 as 1022% on the associated CRDL Standard for AA and ICP summary form (Form II [PART 2]-IN). The correct percent recovery based on the true and found concentrations for arsenic is 102.2%. The data reviewer has manually corrected the Form II (PART 2)-IN and has included the edited form in the Inorganic Data Support Documentation (Section 3).

16. The laboratory did not include the fourth continuing calibration verification (CCV) for potassium from the ICP analytical run of 8/17/93 on the list of CCVs which were outside of QC limits in the Case Narrative for SDG EMM03 although the fourth CCV for potassium was also outside of limits in addition to the aforementioned CCV. It should be noted that all of the reported analyses for potassium in samples in SDG EMM04 were bracketed by compliant CCVs.

17. The laboratory incorrectly stated that the Interference Check Samples ICSA and ICSAB and the ICP CRDL standard do not require analysis for sodium and antimony in the Case Narrative of SDG EMM03 and that they do not require analysis for antimony in the Case Narrative of SDG PSW01. Per protocol, the ICS analysis consists of analyzing both solutions (ICSA and ICSAB) consecutively for all wavelengths used for each analyte reported by ICP (ILM02.1, E-18). In addition, per protocol, the CRDL standard must be run by ICP for every wavelength used for analysis, except those for aluminum, barium, calcium, iron, magnesium, sodium, and potassium. Therefore, the CRDL standard must be analyzed for antimony.

18. The laboratory flagged the results for arsenic in sample PW-UM59(t) and for selenium in sample PW-SA07(t) with "W's" on the associated Form I-INs in SDGs EMM01 and EMM04, respectively, although the post-digestion spike recoveries were <u>not</u> outside the control limits of 85-115%. Per protocol, the "W" qualifier must be used to indicate that the recovery for the post-digestion spike for GFAA analysis <u>is</u> out of control limits while the absorbance is less than 50% of the spike absorbance (ILM02.1, B-18). The data reviewer has manually corrected the associated Form I's and has included the edited Form I's in the Inorganic Data Support Documentation (Section 3).

19. For SDG EMM02, the laboratory incorrectly reported the potassium result for the preparation blank (PBW) as 166.000 U μg/L on the Form III instead of -184.820 B μg/L as observed in the raw data. SOW390 (ILM02.1, B-23) states that for all blanks, the laboratory must report the concentration of each analyte (positive or negative) measured above the instrument detection limit (IDL) or below the negative value of the IDL. The data reviewer has edited the Form III to report the correct value for potassium and has included it in the Inorganic Data Support Documentation (Section 3).

20. For SDG ROD01, the laboratory incorrectly reported on the Form XIV that the diluted analysis of iron in sample SD-10 was performed on 8/3/93 at 13:58 instead of 8/3/93 at 13:54 as indicated by the raw data. Additionally, the laboratory did not report the undiluted analysis of sample SD-10 performed on 8/3/93 at 13:58 on the associated Form XIV. The data reviewer has edited the Form XIV supplied in the Inorganic Data Support Documentation (Section 3) to report the undiluted analysis and the correct time of analysis of the diluted analysis for iron in sample SD-10.

21. For SDG ROD01, the laboratory incorrectly reported the true concentration value and found concentration for the cyanide initial calibration verification standard on the Form II in solid units (mg/Kg) instead of aqueous units (μg/L) as required (ILM02.1, B-19). The data reviewer has calculated the true and found concentrations in the correct units and has edited the Form II supplied in the support documentation.

Noncorrectable Deficiencies

1. In SDGs GEC09 and GEC10, the recovery (140.2%) for cyanide in the initial calibration verification (ICV) analyzed on 7/6/93 at 10:50 on instrument 1797-CN TAA was outside the required limits of 85-115% (ILM02.1, E-14). Per protocol, the analysis should have been terminated, the problem corrected, the instrument recalibrated and the calibration reverified. However, it should be noted that according to the case narratives and the raw data, a solid laboratory control sample (LCS) was analyzed as the ICV for this analytical sequence. The data reviewer is of the opinion that this high percent recovery has no impact on data usability because all samples in this data set are aqueous samples and a 98.8% recovery was obtained for cyanide in the associated aqueous LCS.

2. The laboratory performed matrix spike and/or laboratory duplicate analyses on air or field blanks for the analytes in the following SDGs. Per protocol, samples identified as field blanks cannot be used for the spiked sample and the duplicate analyses (ILM02.1, E-19, and E-21). It is not apparent whether the laboratory was informed that the following samples were air or field blanks:

SDG	Analysis	Analyte	Blank
GEC09	Matrix Spike	cyanide	OW-FB1(t)
GEC09	Laboratory Duplicate	mercury	OW-AB1(t)
GEC10	Matrix Spike	mercury	OW-FB1(d)
GEC10	Laboratory Duplicate	mercury	OW-FB1(d)

3. The laboratory performed the laboratory duplicate, matrix spike, and/or ICP serial dilution analyses for the analytes in the following SDGs on non-SDG samples designated as "MATRIX" or "MATRIC." Per protocol, laboratory duplicate, matrix spike, and ICP serial dilution analyses should be performed for each SDG (ILM02.1, E-19, E-21, and E-23).

SDG	Analyses	Analyte(s)
GEC09	laboratory duplicate	cyanide
GEC10	matrix spike and laboratory duplicate	cyanide
PSW02	matrix spike, laboratory duplicate and ICP serial dilution	All analytes
ROD04	matrix spike and laboratory duplicate	cyanide
ROD05	matrix spike, laboratory duplicate and ICP serial dilution	All analytes
EMM05	matrix spike, laboratory duplicate and ICP serial dilution	All analytes except arsenic, lead, selenium, thallium and zinc
EMM06	matrix spike, laboratory duplicate and ICP serial dilution	All analytes except cyanide
EMM07	matrix spike, laboratory duplicate and ICP serial dilution	All analytes

4. The laboratory did not analyze sample OW-WELL2D for total and dissolved metals and cyanide as requested on the associated Chain-of-Custody. This sample is the field duplicate of sample OW-WELL2. It should be noted that sample OW-WELL2 was also designated for the laboratory duplicate analyses for SDGs GEC11 and GEC12. According to the laboratory, the bottles of the field duplicate sample were mistaken as extra bottles of the laboratory duplicate sample and, therefore, were not analyzed.

5. The laboratory did not analyze sample OW-TB1 for dissolved metals and sample OW-FB6 for dissolved metals and dissolved cyanide as requested on the associated Chains-of-Custody.

6. In the ICP analytical sequences for potassium, sodium, and/or antimony in some of the SDGs of this data set, the recoveries for some of the continuing calibration verification (CCV) standards were outside of the control limits of 90-110%. Per protocol, the analysis should have been stopped, the problem corrected, the instrument recalibrated, the calibration verified, and the reanalysis of the preceding 10 analytical samples or all

analytical samples analyzed since the last compliant CCV should have been performed (ILM02.1, E-16). However, the laboratory reanalyzed all analytical samples since the last compliant CCV except the final interference check samples (ICSA and ICSAB) and the final CRDL standard. Per protocol, the ICSA, ICSAB, and CRDL standard are analytical samples (ILM02.1, G-1). The ICSA and ICSAB must be analyzed for all wavelengths used for each analyte reported by ICP which includes potassium, sodium, and antimony (ILM02.1, E-18). The CRDL standard must be run by ICP for every wavelength used for analysis, except those for aluminum, barium, calcium, iron, magnesium, sodium and potassium. Therefore, the CRDL standard must be analyzed for antimony. Although the protocol does not give limits for potassium, sodium, and antimony results in the ICSA and ICSAB or for the recovery of antimony in the CRDL standard, these analyses are required for a reason (to verify interelement correction factors and background corrections with the ICSA and ICSAB results and to verify linearity at the CRDL for the CRDL standard). Whenever there is an analytical bias (as demonstrated by poor CCV recoveries), the ICSA, ICSAB and CRDL standard cannot be properly evaluated. However, since all environmental sample analyses were bracketed by compliant CCVs, the data reviewer is of the opinion that there is no impact on data usability.

7. According to a letter supplied by the laboratory in the data packages for SDGs EMM01 (total) and EMM02 (dissolved), the Chains-of-Custody were inconsistent with the sample bottle labels for samples PW-UM45 and PW-UM45D. The Chains-of-Custody identified the samples as PW-UM49 and PW-UM49D although the sample bottle labels identified the samples as PW-UM45 and PW-UM45D. The laboratory contacted Geo-Environmental Consultants to confirm that the correct sample identifiers are PW-UM45 and PW-UM45D. The laboratory utilized abbreviated the sample identifier "UM49" for sample PW-UM45(t) and "UM49D" for sample PW-UM45D(t) in SDG EMM01. The laboratory also used the sample identifier "UM49F" for sample PW-UM45(d) and "U49DF" for sample PW-UM45D(d) in SDG EMM02. The letter of explanation has been included with the Laboratory Case Narratives and project Chains-of-Custody (Section 5).

8. In SDG ROD01, the recovery for cyanide in the initial calibration verification (ICV) was outside of the control limits of 85-115% (ILM02.1, E-15) and the laboratory did not stop the analysis and recalibrate. According to SOW390 (ILM02.1, E-14), when the ICV exceeds the control limits, the analysis must be terminated, the problem corrected, the instrument recalibrated and the calibration reverified. The cyanide ICV is also considered the Laboratory Control Sample (LCS) as indicated in SOW390 (ILM02.1, E-14). The out-of-control cyanide ICV impacts the data usability of the project data, as indicated in the Inorganic Data Qualifier Section.

Comments

1. As stated in the Case Narratives for SDGs GEC09 and GEC10, the fifth continuing calibration verification (CCV) was outside control limits during the cyanide analytical sequence beginning 7/6/93. Per protocol, the analysis should have been stopped, the problem corrected, the instrument recalibrated, the calibration verified, and a reanalysis of the preceding 10 analytical samples or all analytical samples since the last compliant CCV should have been performed (ILM02.1, E-16). The laboratory did not terminate the analysis as required but did reanalyze all samples associated with this noncompliant CCV. Additionally, according to the raw data, "air" was analyzed and a 0.0% recovery was obtained. It appears that the CCV was missed, and therefore, recalibration was not necessary. All of the data for the samples in this analytical run are bracketed by compliant CCVs, and therefore, there was no impact on data usability.

2. As stated in some of the case narratives for this data set, due to limitations of the data package generating software, the laboratory reported the instrument detection limit (IDL) for mercury as 0.1 μg/L on the Instrument Detection Limit forms (Form X-INs). The actual IDL, which the laboratory used for all calculations, was either 0.06 μg/L or 0.04 μg/L (depending on the instrument used) although it is reported differently throughout the data packages due to rounding.

3. In ICP analytical sequences which were being run for select analytes, the laboratory did not report the true and found values for the interferents (aluminum, calcium, iron and magnesium) in the Interference Check Sample ICSA and ICSAB solutions on the Form IVs unless the interferent was one of the select analytes of the particular ICP analytical sequence. The purpose of the ICSA and ICSAB analyses is to verify the accuracy of the interelement and background correction factors. The interelement correction factors are used to correct for spectral interference due to aluminum, calcium, iron and magnesium. Although the protocol is ambiguous as to whether the results for the interferents must be reported on the Form IVs at all times, it is the data reviewer's opinion that the recoveries of the interferents should be evaluated since corrections of the results of other analytes are being made for the interferents' presence in the samples, standards, and blanks. It should be noted that the data reviewer observed that all recoveries of the interferents were within the 80-120% control limits, even when the results were not reported.

4. It should be noted that the reported IDLs for all analytes in this data set were determined on 7/15/93 although some of the analyses for SDG GEC09 were performed as early as 7/6/93. Per protocol, IDLs must be determined quarterly and the quarterly determined IDL for an instrument must always be used as the IDL for that instrument during that quarter (ILM02.1, E-24).

5. Very high negative values for antimony (<20× the negative IDL) were observed in the ICSA and ICSAB solutions in the ICP analyses on instrument 3144-ICP61. It appears that this interference is due to the presence of high levels of the interferents, because high negative values for antimony were not observed in any of the associated calibration blanks or preparation blanks. It should be noted that although interferents comparable to the levels in the interference check samples (>50.0% of the ICSA solution) were not observed in any of the samples analyzed on instrument 3144-ICP61, the high negative values indicate that the interelement correction factors were not set correctly. The data reviewer has qualified data as noted in the Inorganic Data Qualifiers.

6. The laboratory analyzed contract required detection limit (CRDL) standards for cyanide but did not report the results for the cyanide CRDL standards since the standards are not required by protocol. The data reviewer observed acceptable recoveries (within 85-115%) for all cyanide CRDL standards in the associated raw data.

7. According to the Case Narrative for SDG GEC12, Lancaster Laboratories, Inc. sample numbers 1994483 (laboratory duplicate of sample OW-WELL2) and 1994484 (matrix spike of sample OW-WELL2) were inadvertently switched for all analytes except cyanide throughout the preparation, analysis, and data package assembly process. In other words, sample 1994484 was treated as the laboratory duplicate and sample 1994483 was treated as the matrix spike. The laboratory did not redigest the samples; the data were accepted by the laboratory because the background, laboratory duplicate, and matrix spike were taken from the same container. The data for sample 1994483 were reported on the Spike Sample Recovery summary form (Form V [PART 1]-IN) and the data for sample 1994484 were reported on the Duplicates summary form (Form VI-IN) as per client request.

8. As stated in the Case Narrative for SDG EMM03, samples PW-LM26(t), PW-UM60(t), PW-LM28(t), PW-LE411(t), PW-LM21(t), and PW-LM21D(t) were redigested because a concentration greater than the CRDL of zinc was observed in the preparation blank associated with the original digestion of the samples.

9. As stated in the Case Narratives for SDGs ROD04 and ROD05, the laboratory control samples associated with the original digestion of quality control samples MATRIX, MATRIXD, MATRIC and MATRICS were not within the required control limits of 80-120%. These samples were redigested as required.

10. Field blank samples were not associated with any of the SDGs except SDGs GEC09 and GEC10.

11. For SDG ROD01, the data package received by ESI was missing pages 34-41. ESI contacted the laboratory and the laboratory supplied the missing pages on October 27, 1993.

12. For SDG ROD01, the Case Narrative states that due to a software incompatibility problem between the standard used and the CLP-generating software, the reported true values for aluminum, arsenic, beryllium, chromium, copper, iron, manganese, mercury, nickel, selenium, silver, sodium, vanadium and zinc for the first LCS and for mercury for the second LCS were incorrect on the associated Form VIIs. The laboratory presented the correct true values and percent recoveries in the Case Narrative.

13. The concentration of silver observed in the preparation blank (PBW) associated with SDG EMM05 exceeded the CRDL for silver. No positive silver results were observed in the samples associated with the PBW of SDG EMM05.

14. The concentration of zinc observed in the preparation blank (PBW) associated with SDGs PSW01 and PSW02 exceeded the CRDL for zinc. No positive zinc results were observed in the samples associated with the PBW of SDG PSW01. The positive results for zinc in SDG PSW02 samples PSW-1 and PSW-6 were less than the CRDL. The positive results for zinc in SDG PSW02 sample PSW-2 exceeded the CRDL; the sample was redigested and reanalyzed, as required (ILM02.1, E-17).

15. The concentration of zinc observed in the preparation blank (PBS) associated with SDG ROD01 sample SD-16 exceeded the CRDL for zinc. The positive result for zinc in the sample exceeded the concentration of zinc in the PBS by more than ten times, which is acceptable, according to SOW390 (ILM02.1, E-17).

16. The laboratory misidentified the matrix spike and laboratory duplicate of samples SD-11 and SW-11 as the matrix spike and laboratory duplicate of SD-11D and SW-11D, respectively (field duplicates of samples SD-11 and SW-11, respectively), throughout the original data packages provided for SDGs ROD01, ROD02, and ROD03. As a result, the laboratory inappropriately used the samples SD-11D and SW-11D, instead of the correct samples SD-11 and SW-11, as the unspiked sample on the matrix spike forms (Form V's) and as the original sample on the laboratory duplicate forms (Form VIs). Additionally, the associated raw data, cover page, and Form XIIIs and Form XIVs reported the incorrect sample identifiers for matrix spike and laboratory duplicate analyses. ESI contacted the laboratory on 11/1/93 and requested that the forms be resubmitted. ESI received the requested information from the laboratory on 11/9/93. The resubmitted forms have been included in the Inorganic Data Support Documentation (Section 3) and have been labeled as "resubmitted."

With regard to data usability, principal areas of concern include trace-level blank contamination, ICP interference, pre- and post-digestion matrix spike recoveries, laboratory and field duplicate results, serial dilution results, CRDL standard recoveries and total versus dissolved results. Based upon an evaluation of the data provided by the laboratory, the following inorganic data qualifiers are offered. It should be noted that data usability issues represent an interpretation of the quality control results obtained for the project samples. Quite often, data qualification

addresses issues relating to the sample matrix problems. Similarly, the validation guidelines specify areas of the data that require qualification, yet the methods used for analysis do not require any corrective action by the laboratory. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic Data Qualifiers

- Due to the trace-level presence of the following analytes in various laboratory, trip, air, and/or field blanks, the positive results for these analytes in the samples listed below should be considered qualitatively questionable and have been flagged "B" on the data tables.

Analyte	SDG	Sample(s)
aluminum	GEC10	OW-MW1(d), OW-MW2(d), OW-MW2D(d), and OW-MW4D(d)
	EMM01	PW-SA05(t) and PW-1501(t)
antimony	GEC11	OW-WELL2(t) and OW-WELL3(t)
	EMM01	PW-EM08(t), PW-LE677D(t), PW-LE677(t), PW-LM10(t), PW-SA05(t), PW-UM40(t), PW-UM43(t), PW-UM45D(t), PW-UM58(t), PW-UM59(t), PW-0351(t), PW-LE1293(t), PW-1492(t), and PW-1501(t)
	ROD01	SD-3 and SD-4
	EMM05	PW-UM62(t)
arsenic	EMM06	All Samples
	EMM02	PW-UM43(d), PW-UM58(d), PW-UM58D(d), PW-1501(d), PW-UM59(d), PW-UM45(d), PW-UM45D(d), PW-0351(d), PW-LE1293(d), PW-LM23(d) and PW-LM23D(d)
	EMM07	PW-UM63(d), PW-UM64(d), and PW-UM64D(d)
barium	ROD04	SP-LES73D(t), SP-02(t), and SW-16(t)
	EMM03	PW-EM09(t), PW-LM20(t), PW-SA07(t), PW-SA08(t), PW-SA08D(t), PW-UM61(t), and PW-UM61D(t)

Analyte	SDG	Sample(s)
barium (cont.)	EMM01	PW-UM45(t), PW-UM45D(t), and PW-1501(t)
	ROD05	SW-16(d)
beryllium	EMM02	PW-1501(d), PW-SA05(d), PW-EM09(d), PW-LM23(d) and PW-LM23D(d)
	ROD02	SP-03(t), SW-12(t), SW-3D(t), and SW-9(t)
	EMM01	PW-SA05(t)
	PSW01	PSW-1(t), PSW-2(t), PSW-6(t), and PSW-7(t)
	PSW02	PSW-1(d) and PSW-2(d)
	EMM05	PW-UM62(t)
cadmium	EMM05	PW-UM62(t)
chromium	GEC09	OW-MW2(t), OW-WELL6(t), OW-WELL6D(t), and OW-MW2D(t)
cobalt	GEC11	OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	ROD01	SD-1, SD-16, SD-2, SD-5, and SD-7
copper	GEC11	OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	GEC12	OW-WELL3D(d)
	ROD04	SW-16(t)
	EMM04	PW-LE312(d), PW-LM20(d), PW-LM21(d), PW-LM26(d), PW-LM21D(d), and PW-SA07(d)
	EMM02	PW-UM58(d), PW-LM10(d), PW-UM59(d), PW-1492(d) and PW-EM09(d)
	PSW02	PSW-6(d)
	ROD01	SD-1, SD-11, SD-12, SD-16, SD-2, SD-5, SD-6, SD-7, SD-9, SD-9D, and SD-11D
	EMM05	PW-SA09(t)
	ROD05	SW-16(d)

Analyte	SDG	Sample(s)
iron	GEC10	OW-MW1(d), OW-MW2D(d), OW-MW4(d), OW-MW4D(d), and OW-WELL5(d)
	GEC12	OW-WELL1D(d)
	ROD03	All Samples Except SP-LESP78(d), SP-LESP73D(d), and SP-02(d)
	ROD04	SP-LES73D(t) and SP-LESP73(t)
	EMM03	PW-LM20(t), PW-LM23(t), PW-LM26(t), PW-SA07(t), PW-SA08(t), PW-SA08D(t), and PW-UM60(t)
	EMM04	PW-LM21(d), PW-UM61D(d), PW-SA09(d), PW-UM60(d), PW-UM61(d) and PW-UM62(d)
	EMM02	PW-UM58(d), PW-LM10(d), PW-UM45D(d), PW-LE311(d), PW-SA05(d), PW-LE1293(d), and PW-UM40(d)
	ROD02	SP-03(t) and SP-LESP78(t)
	PSW01	PSW-1(t), PSW-2(t), PSW-4(t), PSW-4D(t), and PSW-7(t)
	PSW02	PSW-4(d)
	ROD05	SW-16(d)
lead	GEC09	OW-MW3D(t), OW-MW1(t), OW-MW3(t), and OW-MW4(t)
	GEC10	OW-MW1(d), OW-MW2(d), OW-MW2D(d), OW-MW3(d), OW-MW3D(d), OW-MW4D(d), and OW-WELL6(d)
	GEC12	OW-WELL4(d), OW-WELL4D(d), OW-WELL2(d), OW-WELL1(d), OW-WELL3(d), and OW-WELL3D(d)
	ROD03	SP-LESP78(d)*, SP-LESP73D(d), SP-LESP73(d), SP-02(d), SW-1(d), SW-5(d), SW-8(d), SW-9(d), SW-10(d)*, SW-11(d)*, SW-12(d)*, SW-15(d)*, SW-3D(d), and SW-11D(d)*
	ROD04	All Samples

Analyte	SDG	Sample(s)
lead (cont.)	EMM03	PW-EM09(t), PW-LE312(t), PW-LE411(t), PW-LM21(t), PW-LM26(t), PW-LM27(t), PW-SA08(t), and PW-SA08D(t)
	EMM02	PW-1501(d), PW-0351(d), PW-UM40(d), PW-EM08(d), PW-EM09(d), PW-LM23(d), and PW-LM23D(d)
	ROD02	SW-1(t), SW-10(t), SW-11(t), SW-12(t), SW-15(t), SW-2(t), SW-3(t), SW-3D(t), SW-5(t), SW-6(t), SW-7(t), SW-8(t), SW-9(t), SW-9D(t), and SW-11D(t)
	PSW01	PSW-2(t), PSW-3(t), PSW-4(t), PSW-6(t), and PSW-7(t)
	PSW02	PSW-2(d), PSW-3(d), PSW-4(d), and PSW-6(d)
	ROD05	SW-16(d)
magnesium	EMM04	PW-LE312(d) and PW-LM27(d)
manganese	EMM03	All Samples Except PW-LM27(t), PW-LM28(t), PW-UM61(t), and PW-UM61D(t)
	GEC10	OW-WELL5
	EMM06	All Samples
	PSW01	PSW-1(t) and PSW-7(t)
	PSW02	PSW-6(d) and PSW-7(d)
	EMM07	PW-UM63(d), PW-UM64(d), and PW-UM64D(d)
mercury	EMM07	PW-UM64(d)
	GEC10	OW-MW1(d), OW-MW2(d), OW-MW3(d), OW-MW3D(d), OW-MW4(d), OW-MW4D(d), OW-WELL5(d), OW-WELL6(d) and OW-WELL6D(d)
	EMM04	All Samples Except PW-LM20(d), PW-LM26(d), PW-SA08(d) and PW-UM60(d)
	EMM06	PW-UM64(t) and PW-UM64D(t)
	ROD01	SD-16, SD-4, and SD-9D
	EMM05	PW-SA09(t) and PW-UM62(t)

Analyte	SDG	Sample(s)
nickel	GEC11	OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
silver	GEC09	OW-MW2D(t)
	GEC10	OW-MW2(d)
sodium	ROD01	SD-1, SD-11, SD-12, SD-15, SD-16, SD-2, SD-5, SD-6, SD-7, SD-8, SD-9, SD-9D, and SD-11D
thallium	GEC12	OW-WELL4(d), OW-WELL2(d), OW-WELL1D(d), OW-WELL3(d), and OW-WELL3D(d)
	EMM03	PW-EM09(t), PW-LM23(t), PW-LM23D(t), PW-LM27(t), PW-SA07(t), and PW-SA08D(t)
	EMM04	All Samples
	EMM01	PW-UM40(t), PW-UM43(t), PW-UM58(t), and PW-UM58D(t)
vanadium	EMM03	PW-LM28(t)
zinc	GEC09	OW-MW3D(t), OW-MW4D(t), OW-MW1(t), OW-MW2(t), OW-MW3(t), OW-MW4(t), and OW-MW2D(t)
	PSW02	PSW-1(d), PSW-2(d), and PSW-6(d)
	GEC10	OW-MW1(d), OW-MW2(d), OW-MW2D(d), OW-MW3(d), OW-MW3D(d), OW-MW4(d), OW-MW4D(d), OW-WELL5(d), and OW-WELL6D(d)
	GEC12	OW-WELL2(d), OW-WELL1(d), OW-WELL1D(d), OW-WELL3(d), and OW-WELL3D(d)
	ROD03	All Samples
	EMM03	All Samples Except PW-LM28(t)
	EMM04	All Samples Except PW-SA08D(d) and PW-LE411(d)
	EMM06	PW-UM64(t) and PW-UM64D(t)

Analyte	SDG	Sample(s)
zinc (cont.)	EMM02	PW-UM43(d), PW-UM58(d), PW-UM58D(d), PW-1501(d), PW-LM10(d), PW-UM59(d), PW-UM45(d), PW-UM45D(d), PW-SA05(d), PW-1492(d), PW-LE677(d), PW-LE677D(d), PW-LE1293(d), PW-UM40(d), PW-EM08(d), PW-EM09(d), PW-LM23(d), and PW-LM23D(d)
	ROD02	SP-LESP78(t), SW-1(t), SW-10(t), SW-11(t), SW-12(t), SW-2(t), SW-3(t), SW-3D(t), SW-5(t), SW-6(t), SW-7(t), SW-8(t), and SW-9D(t)
	EMM05	PW-SA09(t) and PW-UM62(t)
	EMM07	PW-UM64(d) and PW-UM64D(d)

Note:

* The blank action level for these samples was multiplied by a factor of 10 since these samples were analyzed at a ten fold dilution. Dilution factors are not usually taken into account in determining inorganic blank action levels. However, in this case, the data reviewer determined that it was appropriate to apply the dilution factors when evaluating blank contamination for lead. These samples were originally analyzed undiluted but the associated lead post-digestion spikes were not recovered in any of the samples, and therefore, the laboratory reanalyzed the samples at ten fold dilutions in a separate analytical run. There was no other indication of a severe matrix interference which would result in 0% post-digestion spike recoveries. The undiluted samples analyzed were performed consecutively at the end of the analysis run. The samples of this SDG analyzed previous to the undiluted analyses of these samples all demonstrated acceptable post-digestion spike recoveries. Acceptable post-digestion spike recoveries were also obtained in all other GFAA analyses (arsenic, selenium and thallium) of these samples and no other QC sample result for any other analyte was outside of QC limits in this SDG. It is the opinion of the data reviewer that lead was not spiked into the post-digestion spike analyses of these samples. Furthermore, all continuing calibration blanks in the analytical run, including the ten fold dilution analyses, contained trace-level contamination of lead (0.5-1.0 μg/L), and all samples analyzed undiluted in this second analytical run were also contaminated with similar levels of lead. The instrument levels of the samples analyzed at ten fold dilutions are similar to the continuing calibration blank results and the sample results of the samples analyzed undiluted in the same analytical run. Only not-detected results or trace-level positive results (which would also be flagged "B") were obtained in the original undiluted analyses of these samples. Therefore, it is the opinion of the data reviewer that the positive results for lead in these samples represent blank contamination.

- The analyses for the analytes in the samples listed below should be considered unreliable and the "not-detected" results have been flagged "R" on the data tables. In addition, the reported positive results for the following analytes in the samples listed below should be considered biased low estimated and have been flagged "L" on the data tables. Very low recoveries (<30.0%) were observed for these analytes in the associated matrix spike analyses.

Analyte	SDG	Sample(s) With Unreliable Detection Limits ("R")	Sample(s) With Estimated Positive Results ("L")
arsenic	GEC09	All Samples Except OW-WELL5	OW-WELL5
iron	GEC09**	OW-FB1(t), OW-FB4(t), and OW-TB1(t)	All Samples* Except OW-FB1(t), OW-FB4(t), and OW-TB1(t)
cyanide	EMM07**	All Samples	-

Notes:

* Samples OW-MW2(t) and OW-MW2D(t) have been flagged estimated ("J") instead of biased low estimated ("L") because another associated QC result was outside of limits and a direction of bias could not be identified for this other QC result.

** It should be noted that a low post-digestion/post-distillation spike recovery was also obtained for this analyte in this SDG.

- The detection limits for the following analytes in the samples listed below should be considered biased low and the "not-detected" results have been flagged "UL" on the data tables. Similarly, the positive results for the following analytes in the samples listed below should be considered biased low estimated and have been flagged "L" on the data tables. Low recoveries (<85.0%) were observed for the analytes in the associated CRDL standard analyses.

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Sample(s) With Estimated Positive Results ("L")
antimony	EMM04	All Samples	-
	ROD02	All Samples	-
	EMM02	All Samples	-

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Sample(s) With Estimated Positive Results ("L")
arsenic	GEC12	OW-WELL4(d), OW-WELL4D(d), OW-WELL2(d)*, OW-FB5(d), OW-WELL1(d), OW-WELL1D(d), OW-FB7(d), OW-FB8(d), OW-WELL3(d)*, and OW-WELL3D(d)*	-
	PSW01	PSW-1(t), PSW-2(t), PSW-4(t), PSW-4D(t), PSW-6(t), and PSW-7(t)	-
	ROD01	SD-1**, SD-2**, SD-7**, SD-6**, and SD-5**	-
	ROD03	All Samples	-
	ROD04	All Samples	-
	ROD05	SW-16(d)	-
copper	EMM04	PW-SA08D(d), PW-LE411(d), PW-LM27(d), PW-LM28(d), PW-UM61D(d), PW-SA08(d), PW-SA09(d), PW-UM60(d), and PW-UM61(d)	-
cadmium	PSW01	All Samples	-
	PSW02	All Samples	-
chromium	ROD02	All Samples	-
lead	EMM05	PSW-SA09(t)	PW-UM62(t)
manganese	EMM02	PW-EM08(d), PW-EM09(d), PW-LE677(d), PW-LM10(d), PW-LM23(d), PW-LE677D(d), PW-LM23D(d), PW-UM40(d), PW-UM58(d), PW-UM59(d), PW-UM58D(d), PW-LE1293(d) and PW-1492	PW-UM43(d), PW-UM45(d), PW-UM45D(d), PW-0351(d), and PW-1501(d)
mercury	ROD02	All samples except SW-12(t)	SW-12(t)
selenium	GEC12	All Samples	-
	PSW01	All Samples	-

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Sample(s) With Estimated Positive Results ("L")
selenium (cont.)	PSW02	All Samples	-
	ROD01	SD-1 and SD-2	SD-3
	ROD04	All Samples	-
	ROD05	SW-16(d)	-
	EMM03	All Samples	-
	EMM04	All Samples	-
	EMM06	PW-UM64(t) and PW-UM64D(t)	PW-UM63(t)
	EMM07	PW-UM64(d) and PW-UM64D(d)	PW-UM63(d)
thallium	GEC09	All Samples	-

Notes:

* The reported detection limit has been flagged estimated ("UJ") instead of biased low estimated ("UL") because another associated QC result was outside of limits in the direction of a high bias.

** The positive result has been flagged estimated ("J") instead of biased low estimated ("L") because another associated QC result was outside of limits and a direction of bias could not be identified for this QC result.

\- The positive results for the following analytes in the samples listed below should be considered biased high estimated and have been flagged "K" on the data tables. High recoveries (>115%) were observed for the analytes in the associated CRDL standard analyses.

Analyte	SDG	Sample(s) With Estimated Positive Results ("K")
cadmium	ROD02	SW-3(t)
mercury	GEC11	OW-WELL1D(t)*, OW-WELL3(t)*, and OW-WELL3D(t)*
silver	GEC09	OW-FB2(t)
	GEC10	OW-FB2(d)

silver (cont.)	ROD01	SD-3D
	EMM03	PW-LM21D(t) and PW-LM26(t)
	EMM04	PW-SA08D(d)* and PW-LE411(d)

Note:

* The positive result has been flagged estimated ("J") instead of biased high estimated ("K") because another associated QC result was outside of limits and a direction of bias could not be identified for this QC result.

\- The positive results for the analytes in the samples listed below should be considered biased low estimated and have been flagged "L" on the data tables. Similarly, the reported detection limits for the analytes in the samples listed below should be considered biased low and the "not-detected" results have been flagged "UL" on the data tables. A low bias was observed for the analyses of the analytes in the following samples as demonstrated by negative results <2× the negative IDL for the analytes in both the associated continuing calibration blanks and preparation blanks. The following positive results were observed at levels less than 10× the absolute value of the highest associated blank result.

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Samples With Estimated Positive Results ("L")
aluminum	EMM06	All Samples	-
	PSW01	All Samples	-
	PSW02	All Samples	-
	EMM07	All Samples	-
antimony	EMM04	PW-SA07(d), PW-SA08(d), PW-LM20(d), and PW-LM26(d)	-
iron	EMM06	-	PW-UM63(t)
	EMM07	PW-UM63(d) and PW-UM64(d)	PW-UM64D(d)
potassium	EMM04	-	PW-SA08(d), PW-LM20(d), and PW-LM26(d)
vanadium	EMM04	All Samples	-

- The positive result for zinc in sample SD-8 (SDG ROD01) should be considered biased high estimated and has been flagged "K" on the data tables. A large positive interference (demonstrated by a result >2×IDL) was observed for zinc in the ICSAs associated with the aforementioned sample that contained the interferent iron at a concentration greater than 50% of the concentration of iron in the ICS solutions. The positive result for zinc in sample SD-8 was observed at a level similar to that observed in the ICSA (<5× the result in the ICSA).

- The reported detection limits for antimony in samples OW-WELL3(d) and OW-WELL3D(d) of SDG GEC12 and in sample SD-16 of SDG ROD01 should be considered biased low and the "not-detected" results have been flagged "UL" on the data tables. As noted in Comment #5, very high negative values for antimony (<10× the negative IDL) were observed in the ICSA and ICSAB solutions in the ICP analyses on instrument 3144-ICP61, which was used for the antimony analyses of the aforementioned samples. It appears that this interference is due to the presence of high levels of interferents because high negative values for antimony were not observed in any of the associated calibration blanks or preparation blanks. According to the "Example of Analyte Concentration Equivalents (mg/L) Arising From Interferents at the 100 mg/L Level" given in the protocol (ILM02.1, D-26), one study demonstrated interference effects for antimony from high levels of the interferents aluminum and iron. Of the samples analyzed for antimony on this instrument, only samples OW-WELL3(d) and OW-WELL3D(d) of SDG GEC12 and sample SD-16 of SDG ROD01 contained iron at a level greater than 10.0% of the ICSA solution and no samples contained aluminum at a level greater than 10.0% of the ICSA solution. It should be noted that high negative values of -56.4 μg/L, -55.0 μg/L and -113 μg/L were observed for antimony in samples OW-WELL3(d), OW-WELL3D(d) and SD-16, respectively.

- The detection limits for the following analytes in the samples listed below should be considered biased low and the "not-detected" results have been flagged "UL" on the data tables. In addition, the reported positive results for the following analytes in the samples listed below should be considered biased low estimated and have been flagged "L" on the data tables. Low recoveries (30% ≤ %R <75%) were observed for these analytes in the associated pre-digestion/pre-distillation matrix spike analyses.

Analyte	SDG	Samples With Biased Detection Limits ("UL")	Samples With Estimated Positive Results ("L")
barium	GEC11	OW-FB6(t)*, OW-FB5(t)*, OW-FB7(t)*, OW-AB2(t)*, and OW-FB8(t)*	OW-WELL2(t)*, OW-WELL4(t)*, OW-WELL4D(t)*, OW-WELL1(t)*, OW-WELL1D(t)*, OW-WELL3(t)*, and OW-WELL3D(t)*

Analyte	SDG	Samples With Biased Detection Limits ("UL")	Samples With Estimated Positive Results ("L")
cadmium	GEC11	OW-FB6(t)*, OW-FB5(t)*, OW-FB7(t)*, OW-AB2(t)*, and OW-FB8(t)*	OW-WELL2(t)*, OW-WELL4(t)*, OW-WELL4D(t)*, OW-WELL1(t)*, OW-WELL1D(t)*, OW-WELL3(t)*, and OW-WELL3D(t)*
cobalt	GEC11	OW-FB6(t)*, OW-FB7(t)*, OW-AB2(t)*, and OW-FB8(t)*	OW-WELL2(t)* and OW-FB5(t)*
lead	GEC12	OW-WELL1D(d)	OW-FB5(d), OW-FB7(d), and OW-FB8(d)
mercury	GEC11	OW-FB6(t)*, OW-WELL1(t)*, OW-FB5(t)*, OW-FB7(t)*, OW-AB2(t)*, and OW-FB8(t)*	OW-WELL2(t)*, OW-WELL4(t)*, OW-WELL4D(t)*, OW-WELL1D(t)*, OW-WELL3(t)*, and OW-WELL3D(t)*
selenium	GEC09	All Samples	-
-	GEC11	OW-WELL2(t), OW-FB6(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t)**, OW-FB5(t), OW-FB7(t)**, OW-WELL3(t), OW-WELL3D(t), OW-AB2(t)**, and OW-FB8(t)	-
	GEC12	All Samples	-
	ROD04	All Samples	-
	ROD05	SW-16(d)	-
thallium	GEC11	All Samples Except OW-WELL2(t)	OW-WELL2(t)
	GEC12	OW-WELL4D(d), OW-FB5(d), OW-WELL1(d), OW-FB7(d), and OW-FB8(d)	-
cyanide	GEC11	OW-FB6(t)*, OW-WELL4(t)*, OW-WELL4D(t)*, OW-FB5(t)*, OW-FB7(t)*, OW-AB2(t)*, and OW-FB8(t)*	OW-WELL2(t)*, OW-WELL1(t)*, OW-WELL1D(t)*, OW-WELL3(t)*, and OW-WELL3D(t)*

Notes:

* The positive result/reported detection limit has been flagged estimated ("J"/"UJ") instead of biased low estimated ("L"/"UL") because another associated QC result was outside of limits and a direction of bias could not be identified for this QC result.

** The reported detection limit has been flagged estimated ("UJ") instead of biased low estimated ("UL") because another associated QC result was outside of limits in the direction of a high bias.

- The positive results for the following analytes in the samples listed below should be considered biased high estimated ("K"). High recoveries (>125%) were observed for these analytes in the associated pre-digestion matrix spike analyses. The positive results have been flagged estimated ("J") instead of biased high estimated ("K") because other associated QC results were outside of limits and a direction of bias could not be identified for these other QC results.

Analyte	SDG	Sample(s) With Estimated Positive Results ("K")
arsenic	ROD01	All Samples
copper	GEC11	OW-WELL2(t)
zinc	GEC12	OW-WELL4(d), OW-WELL4D(d), OW-FB5(d), OW-FB7(d), and OW-FB8(d)

- The positive results for the following analytes in the samples listed below should be considered estimated and have been flagged "J" on the data tables. Poor agreement was observed between the results for the following analytes in the associated laboratory duplicate analyses. High relative percent differences (>20.0%) were obtained between results for the following analytes that were greater than five-times the contract required detection limit (CRDL) in the associated laboratory duplicate analysis or differences greater than the CRDL were observed between results for the following analytes that were less than five-times the CRDL in the associated laboratory duplicate analysis.

Analyte	SDG	Sample(s) With Estimated Positive Results ("J")
aluminum	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
arsenic	ROD01	All Samples
barium	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	PSW01	All Samples
	PSW02	All Samples
beryllium	GEC11	OW-WELL2(t)
calcium	ROD01	All Samples
cadmium	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
chromium	GEC11	OW-WELL2(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	ROD01	All Samples
cobalt	GEC11	OW-WELL2(t) and OW-FB5(t)
copper	GEC11	OW-WELL2(t)
iron	GEC11	All Samples Except OW-AB2(t)
lead	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	ROD01	All Samples
magnesium	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	ROD01	All Samples
manganese	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	ROD01	All Samples

Analyte	SDG	Sample(s) With Estimated Positive Results ("J")
mercury	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
nickel	GEC11	OW-WELL2(t), OW-FB5(t), and OW-AB2(t)
potassium	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
vanadium	GEC11	OW-WELL2(t)
zinc	GEC11	OW-WELL2(t), OW-WELL4(t), OW-WELL4D(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	GEC12	OW-WELL4(d), OW-WELL4D(d), OW-FB5(d), OW-FB7(d), and OW-FB8(d)
cyanide	GEC11	OW-WELL2(t), OW-WELL1(t), OW-WELL1D(t), OW-WELL3(t), and OW-WELL3D(t)
	GEC12	OW-WELL2(d), OW-WELL1(d), OW-WELL1D(d), OW-WELL3(d), and OW-WELL3D(d)

- The positive result for cyanide in sample SD-3D should be considered biased high estimated and has been flagged "K" on the data tables. A high percent recovery (>130%) was observed for cyanide in the associated solid laboratory control sample.

- The positive results for the following analytes in the samples listed below should be considered estimated and have been flagged "J" on the data tables. Poor agreement was observed between the results for the following analytes in the associated serial dilution analyses. High percent differences (>10.0%) were obtained between results for the following analytes which were greater than 50-times the instrument detection limit (IDL) in the associated serial dilution analyses.

Analyte	SDG	Sample(s) With Estimated Positive Results ("J")
calcium	GEC11	All Samples Except OW-FB6(t)

- The actual detection limits for the following analytes in the samples listed below may be higher than reported and the "not-detected" results have been flagged "UL" on the data tables. Similarly, the positive results for the following analytes should be considered biased low estimated and have been flagged "L" on the data tables. Low recoveries (<85.0%) were observed for these analytes in the associated post-digestion spike analyses.

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Sample(s) With Estimated Positive Results ("L")
lead	GEC10	OW-WELL6D(d)	-
	GEC12	OW-WELL1D(d)	-
	EMM04	PW-LE411(d), PW-LM27(d), PW-LM28(d), and PW-UM61(d)	PW-LM20(d), PW-LM26(d), PW-SA07(d), and PW-UM60(d)
selenium	GEC09	OW-WELL5(t)	-
	GEC11	OW-WELL2(t)	-
	GEC12	OW-WELL2(d)	-
	PSW01	PSW-7(t)	-
	ROD01	-	SD-3D and SD-16
	ROD02	SW-15(t)	-
	ROD04	SP-LESP73D(t), SP-LESP73(t), and SP-02(t)	-
	EMM01	PW-UM58D(t), PW-0351(t), PW-LE1293(t), PW-UM40(t), and PW-EM08(t)	PW-UM43(t) and PW-UM58(t)
	EMM02	PW-EM08(d), PW-EM09(d), PW-LM10(d), PW-UM40(d), PW-UM43(d), PW-UM58(d), PW-UM58D(d), PW-0351(d), and PW-LE1293(d)	PW-UM59(d)
	EMM03	PW-EM09(t), PW-LE411(t), PW-LM20(t), PW-LM21(t), PW-LM21D(t), PW-LM23(t), PW-LM23D(t), PW-LM26(t), PW-LM28(t), and PW-SA07(t)	-

Analyte	SDG	Sample(s) With Biased Detection Limits ("UL")	Sample(s) With Estimated Positive Results ("L")
selenium (cont.)	EMM04	PW-LE411(d), PW-LM20(d), PW-LM21(d), PW-LM27(d), PW-LM28(d), PWLM21D(d), PW-UM61D(d), PW-SA07(d), and PW-UM61(d)	-
thallium	GEC09	OW-MW3D(t), OW-MW4D(t), OW-AB1(t), OW-FB2(t), OW-FB4(t), OW-MW3(t), OW-MW4(t), OW-TB1(t), OW-WELL5(t), OW-WELL6(t), OW-WELL6D(t), and OW-MW2D(t)	-
	GEC11	All Samples Except OW-WELL2(t)	OW-WELL2(t)
	GEC12	OW-WELL4D(d)	-
	ROD01	SD-10	-

- The positive results for the analytes listed below in the associated sample should be considered biased high estimated and have been flagged "K" on the sample data tables. High post-digestion matrix spike recoveries (>115.0%) were observed.

Analyte	SDG	Sample(s) Flagged "K"
arsenic	ROD02	SW-15(t), SW-2(t) and SW-9D(t)

- Fifty-four sets of field duplicates (identified as "Field Duplicates" on Table 1 and as "Duplicate" on the data tables) were submitted with the data set validated. In general, good precision (<20.0% relative percent difference (RPD) for aqueous results and <40.0% RPD for soil results >5× the CRDL or < the CRDL difference for aqueous results and <2× the CRDL for soil results <5× the CRDL) and sample representativeness were demonstrated by the correlation observed between the results in the field duplicate sets with the exception of the results listed below. The data reviewer has included a comparison of all field duplicate results in the Evaluation of Field Duplicate Analysis Precision Forms section (Section 4).

Analyte	SDG	Sample OW-MW2(t)	Duplicate Sample OW-MW2D(t)	RPD[1]
aluminum	GEC09	8460 µg/L	13,000 µg/L	42.3 %[2]
iron	GEC09	35,600 µg/L	52,300 µg/L	38.0 %[2]

Analyte	SDG	Sample OW-MW3(t)	Duplicate Sample OW-MW3D(t)	RPD[1]
aluminum	GEC09	3670 µg/L	2860 µg/L	24.8 %[2]

Analyte	SDG	Sample OW-WELL6(t)	Duplicate Sample OW-WELL6D(t)	RPD[1]
mercury	GEC09	0.93 µg/L	1.2 µg/L	25.4 %[2]

Analyte	SDG	Sample OW-MW2(d)	Duplicate Sample OW-MW2D(d)	RPD[1]
chromium	GEC10	29.4 µg/L	3.3 U µg/L	NC[3]
iron	GEC10	289 µg/L	131 B µg/L	75.2 %[3,4]

Analyte	SDG	Sample OW-MW3(d)	Duplicate Sample OW-MW3D(d)	RPD[1]
iron	GEC10	876 µg/L	642 µg/L	30.8 %[3]

Analyte	SDG	Sample OW-WELL1(t)	Duplicate Sample OW-WELL1(t)	RPD[1]
cyanide	GEC11	313 µg/L	402 µg/L	24.9 %[2]

Analyte	SDG	Sample OW-WELL1(d)	Duplicate Sample OW-WELL1D(d)	RPD[1]
iron	GEC12	382 µg/L	341 B µg/L	11.3 %[4]

Analyte	SDG	Sample SW-9(d)	Duplicate Sample SW-9D(d)	RPD[1]
barium	ROD03	27.5 µg/L	241 µg/L	159.0 %[5]

Analyte	SDG	Sample PW-LM21(t)	Duplicate Sample PW-LM21D(t)	RPD[1]
lead	EMM03	7.3 B µg/L	8.6 µg/L	16.4 %[4]

Analyte	SDG	Sample PW-LM23(t)	Duplicate Sample PW-LM23D(t)	RPD[1]
iron	EMM03	26.3 B µg/L	33.9 µg/L	25.2 %[3,4]

Analyte	SDG	Sample PW-UM61(t)	Duplicate Sample PW-UM61D(t)	RPD[1]
copper	EMM03	72.0 µg/L	13.3 µg/L	137.6 %[3]
lead	EMM03	231 µg/L	25.8 µg/L	159.8 %[2]

Analyte	SDG	Sample PW-LM21(d)	Duplicate Sample PW-LM21D(d)	RPD[1]
aluminum	EMM04	32.5 U µg/L	233 µg/L	NC[3]
iron	EMM04	16.7 B µg/L	298 µg/L	178.8 %[3,4]

Analyte	SDG	Sample PW-UM64(t)	Duplicate Sample PW-UM64D(t)	RPD[1]
iron	EMM06	697 µg/L	543 µg/L	24.8 %[2]

Analyte	SDG	Sample SW-9(t)	Duplicate Sample SW-9D(t)	RPD[1]
aluminum	ROD02	902 µg/L	131 µg/L	251 %[3]
iron	ROD02	1280 µg/L	203 µg/L	145 %[3]
manganese	ROD02	35.6 µg/L	8.8 µg/L	121 %[3]
zinc	ROD02	27.5 µg/L	8.6 B µg/L	105 %[4]

Analyte	SDG	Sample SW-11(t)	Duplicate Sample SW-11D(t)	RPD[1]
zinc	ROD01	12.8 B µg/L	18.8 µg/L	37.9%[4]

Analyte	SDG	Sample PW-LE677(t)	Duplicate Sample PW-LE667D(t)	RPD[1]
zinc	EMM01	60.2 µg/L	83.6 µg/L	32.5%[3]

Analyte	SDG	Sample PSW-4(t)	Duplicate Sample PSW-4D(t)	RPD[1]
barium	PSW01	23100 µg/L	27.9 µg/L	200%[3]

Analyte	SDG	Sample PW-UM64(d)	Duplicate Sample PW-UM64D(d)	RPD[1]
lead	EMM07	9.3 µg/L	4.6 µg/L	67.6%[3]

Analyte	SDG	Sample SD-11	Duplicate Sample SD-11D	RPD[1]
iron	ROD01	22900 mg/Kg	36700 mg/Kg	46.3%[2]

Analyte	SDG	Sample SD-3	Duplicate Sample SD-3D	RPD[1]
antimony	ROD01	4.1 B mg/Kg	210 mg/Kg	192%[3,4]
chromium	ROD01	52.4 mg/Kg	140 mg/Kg	91.1%[2]
copper	ROD01	823 mg/Kg	260 mg/Kg	104%[2]
lead	ROD01	273 mg/Kg	126 mg/Kg	73.7%[2]
manganese	ROD01	496 mg/Kg	2910 mg/Kg	142%[2]

Notes:

U Analyte was not detected at or above the associated numerical value. The associated numerical value (which is the instrument detection limit) has been used as the sample result for field duplicate comparison.

B This result was previously qualified due to blank contamination at a similar level. It should be noted that this result was still used for field duplicate comparison.

1 Relative Percent Difference.

2 The positive results, which were both greater than 5× the CRDL, should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "B") because a high RPD (>20.0% for aqueous samples and >40.0% for soil samples) was obtained between the field duplicate results.

3 The positive results, at least one of which was less than 5× the CRDL, should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "B") because a difference > the CRDL for aqueous samples or 2× the CRDL for soil samples was obtained between the field duplicate results.

4 One positive result was at a level below the blank action limit and therefore was previously flagged "B" but the other result was at a level above the blank action limit and was not previously flagged "B." The results may or may not have been qualified due to field duplicate precision as noted above. However, it should be noted that it is questionable whether or not both results are attributable to contamination.

5 Although a high difference (> the CRDL) was obtained between the barium results (one of which was less than 5× the CRDL) in this field duplicate pair, the results were not qualified as estimated. The dissolved barium result in field duplicate SW-9D has been subsequently qualified (see next qualifier) as unreliable ("R") due to the fact that the total barium content was much less than the dissolved barium content in this sample. It should be noted that the dissolved barium content in sample SW-9 is very comparable to the total barium content of both samples SW-9 and SW-9D.

- Almost all aqueous samples in this data set were analyzed for both total and dissolved TAL inorganics. In general, most of the results for the total analytes were greater than the results for the dissolved analytes in the samples. When the results for the dissolved analyses were greater than the results for the total analytes, the following acceptance criteria were applied. When both results exceed 10× IDL, the relative percent difference (%RSD) must be less than 20% or when at least one of the results is less than 10× IDL, the difference between the results must be less than 2× IDL. The analytes which exceed the acceptance criteria and analytes where the total result was qualified due

to blank contamination ("B") although the dissolved was not qualified due to blank contamination are listed in the following table. Qualifications of the data are explained in the footnotes following the table.

Sample	SDGs	Analyte	Total Metal Concentration	Dissolved Metal Concentration	RPD	Note
OW-WELL6	GEC09 & GEC10	potassium	26,100 µg/L	32,400 µg/L	21.5%	2
SW-10	ROD02 & ROD03	silver	3.1 U µg/L	36.4 µg/L	N.C.	2
SW-9D	ROD02 & ROD03	barium	26.8 µg/L	241 µg/L	799%	1
SW-11D	ROD02 & ROD03	copper	4.4 U µg/L	14.5 µg/L	N.C.	4
UM-45	EMM01 & EMM02	barium	6.7 B µg/L	6.2 µg/L	7.7%	4
EM-09	EMM02 & EMM03	barium	28.2 B µg/L	24.0 µg/L	16.1%	4
SP-LESP73D	ROD04 & ROD03	barium	25.1 B µg/L	27.0 µg/L	7.3%	4
PW-LM20	EMM03 & EMM04	barium silver	28.8 B µg/L 3.1 U µg/L	29.3 µg/L 181 µg/L	1.7% N.C.	4 1
PW-LE411	EMM03 & EMM04	zinc	47.4 B µg/L	56.2 µg/L	16.9%	4
PW-LM21	EMM03 & EMM04	manganese	7.0 B µg/L	7.9 µg/L	12.1%	4
PW-LM21D	EMM03 & EMM04	manganese	7.1 B µg/L	7.2 µg/L	1.4%	4
PW-SA07	EMM03 & EMM04	barium	10.7 B µg/L	10.2 µg/L	4.8%	4
PW-SA08	EMM03 & EMM04	barium	24.9 B µg/L	43.9 µg/L	56.0%	1
PW-SA08D	EMM03 & EMM04	barium silver	24.9 B µg/L 3.1 U µg/L	23.4 µg/L 9.6 µg/L	6.2% N.C.	4 3

Sample	SDGs	Analyte	Total Metal Concentration	Dissolved Metal Concentration	RPD	Note
PW-UM61	EMM03 & EMM04	barium	4.5 B µg/L	5.4 µg/L	18.2%	4
PW-UM61D	EMM03 & EMM04	barium	4.8 B µg/L	6.3 µg/L	27.0%	4
UM-63	EMM06 & EMM07	lead	2.5 B µg/L	0.87 µg/L	96.7%	3,4

Notes:

U Analyte was not detected at or above the associated numerical value. The associated numerical value (which is the instrument detection limit) has been used as the sample result for total versus dissolved analyte comparison.

B This result was previously qualified due to blank contamination at a similar level. It should be noted that this result was still used for total versus dissolved analyte comparison.

1 The positive results, at least one of which was less than 10× the IDL, should be considered unreliable and have been flagged "R" on the data tables (unless previously flagged "B") because a difference >5× the IDL for aqueous samples was obtained between the total and dissolved analyte results.

2 The positive results, which were both greater than 10× the IDL, should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "B") because a high RPD (>20.0% for aqueous samples) was obtained between the total and dissolved analyte results.

3 The positive results, at least one of which was less than 10× the IDL, should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "B") because a difference >2× the IDL for aqueous samples was obtained between the total and dissolved analyte results.

4 The total analyte result was at a level below the blank action limit and therefore was previously flagged "B," but the dissolved analyte result was a level above the blank action limit and was not previously flagged "B." The results may or may not have been qualified due to total versus dissolved metals comparison as noted above; however, it should be noted that it is questionable whether or not both results are attributable to contamination.

A complete support documentation for the inorganic quality assurance review is presented in Section 3 of this report.

B. Conclusions

This quality assurance review has identified several aspects of the analytical data that have required qualification. Overall, the data quality was good and the majority of the data is acceptable for use even though a portion of the results have been either rejected or qualified. In order to use any of the data within this data set, the data user should understand the qualifications and limitations of the results stated in this quality assurance review. The Laboratory Case Narratives and Project Chains-of-Custody are presented in Section 5 of this report. Project correspondence has been included in Section 6 of this report.

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SECTION 2

ANALYTICAL RESULTS

RODALE MANUFACTURING SITE
WELL SURVEY
ONSITE WELLS- TOTAL UNFILTERED (IP-1)
INORGANIC COMPOUNDS
(Units: μg/l = ppb) (Prepared: 10/4/93)

Location ID:	MW-3	MW-4	Air Blank 1	Field Blank 1
GEC Sample ID:	OW-MW3D	OW-MW4D	OW-AB1	OW-FB1
EPA Sample No.:	MW3D-	MW4D-	OWAB1	OWFBL
Laboratory ID No.:	1989616	1990321	1989619	1988528
Sample Type:	Duplicate	Duplicate	QA/QC	QA/QC
Sample Date:	7/1/93	7/6/93	7/1/93	6/30/93
Identified Compounds:				
Aluminum	2860 J	3260	14.3	13.6 U
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.2 UR	1.2 UR	1.2 UR	1.2 UR
Barium	80.6	30.4	1.8 U	1.8 U
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	7500	1700	13.6 U	13.9
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	3.8	4.9	2.8 U	2.8 U
Copper	9.8	6.3	6.2 U	6.2 U
Iron	5220 L	4510 L	17.2 L	9.7 UR
Lead	3.4 B	0.60 U	0.60 U	0.60 U
Magnesium	7920	2880	24.5 U	24.5 U
Manganese	60.7	33.7	1.9 U	1.9 U
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	6.8	4.4 U	4.4 U	4.4 U
Potassium	6540	7640	166 U	166 U
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	13700	9840	80.0 U	80.0 U
Thallium	1.9 UL	1.9 UL	1.9 UL	1.9 UL
Vanadium	3.7 U	7.4	3.7 U	3.7 U
Zinc	47.2 B	24.7 B	6.5 U	6.5 U
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

AR100623

Location ID:	Field Blank 2	Field Blank 3	Field Blank 4	MW-1
GEC Sample ID:	OW-FB2	OW-FB3	OW-FB4	OW-MW1
EPA Sample No.:	OWFB2	OWFB3	OWFB4	OWMW1
Laboratory ID No.:	1989618	1990325	1990990	1988522
Sample Type:	QA/QC	QA/QC	QA/QC	Investigative
Sample Date:	7/1/93	7/6/93	7/7/93	6/30/93
Identified Compounds:				
Aluminum	13.6 U	13.6 U	13.6 U	1120
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.2 UR	1.2 UR	1.2 UR	1.2 UR
Barium	1.8 U	1.8 U	1.8 U	73.0
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	66.8	41.4	24.6	6390
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	5.3
Copper	6.2 U	6.2 U	6.2 U	6.2 U
Iron	13.9 L	15.9 L	9.7 UR	2520 L
Lead	0.60 U	2.2	0.60 U	2.3 B
Magnesium	24.5 U	24.5 U	24.5 U	7980
Manganese	1.9 U	1.9 U	1.9 U	353
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	166	166 U	166 U	7650
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	4.6 K	3.1 U	3.1 U	3.1 U
Sodium	123	80.0 U	80.0 U	16400
Thallium	1.9 UL	1.9 UL	1.9 UL	1.9 UL
Vanadium	3.7 U	3.7 U	3.7 U	4.4
Zinc	43.2	6.5 U	6.5 U	27.0 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	MW-2	MW-3	MW-4	Trip Blank 1
GEC Sample ID:	OW-MW2	OW-MW3	OW-MW4	OW-TB1
EPA Sample No.:	OWMW2	OWMW3	OWMW4	OWTBL
Laboratory ID No.:	1988524	1989614	1990319	1988529
Sample Type:	Investigative	Investigative	Investigative	QA/QC
Sample Date:	6/30/93	7/1/93	7/6/93	6/30/93
Identified Compounds:				
Aluminum	8460 J	3670 J	2780	13.6 U
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.2 UR	1.2 UR	1.2 UR	1.2 UR
Barium	136	79.7	27.9	1.8 U
Beryllium	1.8	0.60 U	0.60 U	0.60 U
Cadmium	3.8	2.0 U	2.0 U	2.0 U
Calcium	6460	7310	1780	20.7
Chromium	17.8 B	5.5 U	5.5 U	5.5 U
Cobalt	39.7	3.8	4.9	2.8 U
Copper	44.3	7.7	7.6	6.2 U
Iron	35600 J	5120 L	4260 L	9.7 UR
Lead	22.1	3.3 B	0.88 B	0.60 U
Magnesium	13700	7840	2730	24.5 U
Manganese	1220	60.0	37.2	2.7
Mercury	0.16	0.06 U	0.06 U	0.06 U
Nickel	40.5	5.7	5.1	4.4 U
Potassium	12300	6700	7290	166 U
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	17600	13500	9490	80.0 U
Thallium	1.9 UL	1.9 UL	1.9 UL	1.9 UL
Vanadium	24.4	3.9	5.5	3.7 U
Zinc	160 B	48.0 B	32.5 B	13.0
Cyanide	2.5 U	2.5 U	2.5 U	NR

Location ID:	Well 5	Well 6	Well 6	MW-2
GEC Sample ID:	OW-WELL5	OW-WELL6	OW-WELL6D	OW-MW2D
EPA Sample No.:	WEL5-	WEL6-	WEL6D	WMW2D
Laboratory ID No.:	1990323	1990986	1990988	1988526
Sample Type:	Investigative	Investigative	Duplicate	Duplicate
Sample Date:	7/6/93	7/7/93	7/7/93	6/30/93
Identified Compounds:				
Aluminum	20400	85.1	95.7	13000 J
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	8.7 L	1.2 UR	1.2 UR	1.2 UR
Barium	271	213	207	165
Beryllium	0.82	0.60 U	0.60 U	2.3
Cadmium	13.0	3.5	3.7	5.0
Calcium	192000	26000	25300	6530
Chromium	81.8	7.0 B	10.2 B	21.3 B
Cobalt	40.0	6.7	7.2	41.8
Copper	709	32.4	38.4	54.9
Iron	80800 L	25800 L	27600 L	52300 J
Lead	555	23.9	28.3	26.4
Magnesium	27000	13800	13200	17000
Manganese	1720	1800	2020	1480
Mercury	0.49	0.93 J	1.2 J	0.10
Nickel	45.3	16.5	18.8	49.6
Potassium	8440	26100 J	28400	15100
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	24.6 B
Sodium	3140	17400	17600	18000
Thallium	1.9 UL	1.9 UL	1.9 UL	1.9 UL
Vanadium	40.8	3.7 U	3.7 U	33.7
Zinc	1620	374	405	212 B
Cyanide	126	2.5 U	2.5 U	2.5 U

B. SDG GEC10

RODALE MANUFACTURING SITE
WELL SURVEY
ONSITE WELLS- FILTERED (IP-2)
INORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 10/4/93)

Location ID:	MW-1	MW-2	MW-2	MW-3
GEC Sample ID:	OW-MW1	OW-MW2	OW-MW2D	OW-MW3
EPA Sample No:	WMW1F	WMW2F	MW2DF	MW3FL
Laboratory ID:	1988530	1988531	1988532	1989625
Sample Type:	Investigative	Investigative	Duplicate	Investigative
Sample Date:	6/30/93	6/30/93	6/30/93	7/1/93
Identified Compounds:				
Aluminum	38.1 B	42.5 B	46.1 B	601
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	61.2	37.5	33.2	28.8
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	6380	3820	3460	3280
Chromium	3.3 U	29.4 J	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U
Iron	11.2 B	289 J	131 B	876 J
Lead	0.75 B	1.0 B	0.59 B	1.2 B
Magnesium	7640	4980	4420	3240
Manganese	300	36.6	34.0	14.2
Mercury	0.08 B	0.08 B	0.06 U	0.09 B
Nickel	4.3 U	4.9	4.3 U	5.4
Potassium	7080	4140	3770	2780
Selenium	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	6.5 B	3.1 U	3.1 U
Sodium	17100	11400	10100	6300
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	24.1 B	51.2 B	44.5 B	29.8 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	Field Blank 1	MW-3	MW-4	MW-4
GEC Sample ID:	OW-FB1	OW-MW3D	OW-MW4	OW-MW4D
EPA Sample No:	OWFBF	MW3DF	WMW4F	MW4DF
Laboratory ID:	1988533	1989626	1990329	1990330
Sample Type:	QA/QC	Duplicate	Investigative	Duplicate
Sample Date:	6/30/93	7/1/93	7/6/93	7/6/93
Identified Compounds:				
Aluminum	32.5 U	496	32.5 U	35.3 B
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	1.4 U	24.4	15.1	16.2
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	45.2	2840	1990	1920
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U
Iron	30.5	642 J	28.2 B	32 B
Lead	0.72	0.80 B	0.50 U	0.79 B
Magnesium	22.8 U	2770	1170	1140
Manganese	1.5	13.4	26.9	26.6
Mercury	0.06 U	0.08 B	0.21 B	0.16 B
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	127 U	2430	5980	5840
Selenium	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	77.1	5470	9970	9740
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	4.2	20.9 B	23.9 B	19.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	Well 5	Field Blank 2	Well 6	Well 6	Field Blank 3
GEC Sample ID:	OW-WELL5	OW-FB2	OW-WELL6	OW-WELL6D	OW-FB3
EPA Sample No:	WEL5F	FB2FL	FWEL6	FWELD	FB3FL
Laboratory ID:	1990331	1989627	1990992	1990993	1990332
Sample Type:	Investigative	QA/QC	Investigative	Duplicate	QA/QC
Sample Date:	7/6/93	7/1/93	7/7/93	7/7/93	7/6/93
Identified Compounds:					
Aluminum	211	32.5 U	32.5 U	32.5 U	40.3
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	12.6	1.4 U	145	143	1.4 U
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	38900	58.8	22400	21600	43.4
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	18.2	4.4 U	4.4 U	4.4 U	4.4 U
Iron	58.3 B	15.7	1320	1190	46.8
Lead	0.50 U	0.50 U	0.50 B	0.50 UL	0.53
Magnesium	2080	22.8 U	11700	11500	22.8 U
Manganese	2.8 B	1.2 U	746	692	1.2 U
Mercury	0.09 B	0.11	0.15 B	0.13 B	0.10
Nickel	4.9	4.3 U	4.3 U	5.7	4.3 U
Potassium	6980	127 U	32400 J	34500	127 U
Selenium	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	7.2 K	3.1 U	3.1 U	3.1 U
Sodium	2710	66.6	18300	19000	188
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	4.9	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	3.7 B	10.6	64.2	48.4 B	6.3
Cyanide	34.8	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	Field Blank 4
GEC Sample ID:	OW-FB4
EPA Sample No:	FFB4-
Laboratory ID:	1990994
Sample Type:	QA/QC
Sample Date:	7/7/93

Identified Compounds:	
Aluminum	32.5 U
Antimony	14.1 U
Arsenic	1.2 U
Barium	1.4 U
Beryllium	0.30 U
Cadmium	2.8 U
Calcium	94.6
Chromium	3.3 U
Cobalt	2.6 U
Copper	4.4 U
Iron	4.9 U
Lead	1.4
Magnesium	22.8 U
Manganese	1.2 U
Mercury	0.13
Nickel	4.3 U
Potassium	127 U
Selenium	0.90 U
Silver	3.1 U
Sodium	46.8 U
Thallium	1.9 U
Vanadium	2.0 U
Zinc	3.0
Cyanide	2.5 U

AR100631

C. SDG GEC11

RODALE MANUFACTURING SITE
WELL SURVEY
ONSITE WELLS- TOTAL UNFILTERED (IP-4)
INORGANIC COMPOUNDS
(Units: μg/l = ppb) (Prepared: 10/4/93)

Location ID:	Well 2	OW-WELL 2D	Field Blank 6	Well 4
GEC Sample ID:	OW-WELL2	OW-WELL2D	OW-FB6	OW-WELL4
EPA Sample No:	OWW2E		OWFBG	OWEL4
Laboratory ID:	1994516		1994524	1994584
Sample Type:	Investigative	Duplicate	QA/QC	Investigative
Sample Date:	7/14/93	7/14/93	7/14/93	7/13/93
Identified Compounds:				
Aluminum	27300 J	NO DATA !	32.5 U	200 J
Antimony	12.4 B		9.2 U	9.2 U
Arsenic	3.6		1.0 U	1.0 U
Barium	817 J		1.8 UJ	76.4 J
Beryllium	6.0 J		0.60 U	0.60 U
Cadmium	35.8 J		2.0 UJ	2.6 J
Calcium	72900 J		13.6 U	7270 J
Chromium	56.2 J		5.5 U	5.5 U
Cobalt	186 J		2.8 UJ	10.8 B
Copper	249 J		6.2 U	11.5 B
Iron	87400 J		53.6 J	24500 J
Lead	120 J		0.60 U	28.2 J
Magnesium	40500 J		22.8 U	4500 J
Manganese	6230 J		1.9 U	526 J
Mercury	0.80 J		0.06 UJ	0.10 J
Nickel	115 J		4.4 U	18.5 B
Potassium	28600 J		166 U	12100 J
Selenium	0.90 UL		0.90 UL	0.90 UL
Silver	3.1 U		311	3.1 U
Sodium	51000		46.8 U	41900
Thallium	1.6 L		0.80 UL	0.80 UL
Vanadium	97.6 J		3.7 U	3.7 U
Zinc	2260 J		6.5 U	2080 J
Cyanide	61.0 J		2.5 UJ	2.5 UJ

Location ID:	Well 4	Well 1	Well 1	Field Blank 5
GEC Sample ID:	OW-WELL4D	OW-WELL1	OW-WELL1D	OW-FB5
EPA Sample No:	OWL4D	OW-1-	OW-1D	FBL05
Laboratory ID:	1994585	1995419	1995421	1994586
Sample Type:	Duplicate	Investigative	Duplicate	QA/QC
Sample Date:	7/13/93	7/15/93	7/15/93	7/13/93
Identified Compounds:				
Aluminum	231 J	32.5 U	33.6 J	32.5 U
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.0 U	1.9	1.0 U	1.0 U
Barium	72.3 J	1140 J	1040 J	1.8 UJ
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	3.9 J	6.1 J	6.0 J	2.0 UJ
Calcium	7890 J	43500 J	41700 J	17.8 J
Chromium	5.5 U	14.5 J	11.9 J	5.5 U
Cobalt	8.3 B	10.3 B	7.4 B	3.1 J
Copper	11.5 B	103 B	100 B	6.2 U
Iron	24900 J	13800 J	12000 J	11.0 J
Lead	29.6 J	4.6 J	3.8 J	0.60 U
Magnesium	4440 J	23300 J	23000 J	22.8 U
Manganese	550 J	6320 J	5680 J	1.9 U
Mercury	0.13 J	0.06 UJ	0.07 J	0.06 UJ
Nickel	15.8 B	16.5 B	14.1 B	4.8 J
Potassium	12500 J	4600 J	4400 J	166 U
Selenium	0.90 UL	0.90 UL	0.90 UJ	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	41000	10300	10200	46.8 U
Thallium	0.80 UL	0.80 UL	0.80 UL	0.80 UL
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	2040 J	1520 J	1400 J	6.5 U
Cyanide	2.5 UJ	313 J	402 J	2.5 UJ

Location ID:	Field Blank 7	Well 3	Well 3	Air Blank 2	Field Blank 8
GEC Sample ID:	OW-FB7	OW-WELL3	OW-WELL3D	OW-AB2	OW-FB8
EPA Sample No:	OWFB7	OW-3-	OW-3D	OWAB2	OWFB8
Laboratory ID:	1995423	1995940	1995942	1995424	1995944
Sample Type:	QA/QC	Investigative	Duplicate	QA/QC	QA/QC
Sample Date:	7/15/93	7/16/93	7/16/93	7/16/93	7/16/93
Identified Compounds:					
Aluminum	32.5 U	201 J	175 J	32.5 U	32.5 U
Antimony	9.2 U	15.2 B	9.2 U	9.2 U	9.2 U
Arsenic	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Barium	1.8 UJ	137 J	139 J	1.8 UJ	1.8 UJ
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	2.0 UJ	4.6 J	4.8 J	2.0 UJ	2.0 UJ
Calcium	31.3 J	17900 J	18200 J	26.9 J	24.5 J
Chromium	5.5 U	10.3 J	8.1 J	5.5 U	5.5 U
Cobalt	2.8 UJ	11.2 B	10.2 B	2.8 UJ	2.8 UJ
Copper	6.2 U	63.2 B	45.0 B	6.2 U	6.2 U
Iron	38.1 J	35700 J	36000 J	9.7 U	10.5 J
Lead	0.60 U	37.3 J	34.2 J	0.60 U	0.60 U
Magnesium	22.8 U	11400 J	11300 J	22.8 U	22.8 U
Manganese	1.9 U	1190 J	1210 J	1.9 U	1.9 U
Mercury	0.06 UJ	0.24 J	0.33 J	0.06 UJ	0.06 UJ
Nickel	4.4 U	9.6 B	10.0 B	4.5 J	4.4 U
Potassium	166 U	7590 J	7780 J	166 U	166 U
Selenium	0.90 UJ	0.90 UL	0.90 UL	0.90 UJ	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	46.8 U	35300	34700	46.8 U	46.8 U
Thallium	0.80 UL	0.80 UL	0.80 UL	0.80 UL	0.80 UL
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	6.5 U	164 J	152 J	6.5 U	6.5 U
Cyanide	2.5 UJ	17.6 J	12.5 J	2.5 UJ	2.5 UJ

D. SDG GEC12

RODALE MANUFACTURING SITE
WELL SURVEY
ONSITE WELLS- FILTERED (IP-3)
INORGANIC COMPOUNDS
(Units: μg/l = ppb) (Prepared: 10/4/93)

Location ID:	WELL 4	WELL 4	WELL 2	Field Blank 5
GEC Sample ID:	OW-WELL4	OW-WELL4D	OW-WELL2	OW-FB5
EPA Sample No.:	4OWEL	4DWEL	OWW2-	FEI05
Laboratory ID:	1993934	1993935	1994482	1993936
Sample Type:	Investigative	Duplicate	Investigative	QA/QC
Sample Date:	7/13/93	7/13/93	7/14/93	7/13/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.0 UL	1.0 UL	1.0 UJ	1.0 UL
Barium	53.8	55.5	82.3	1.4 U
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	6810	7100	70700	34.0
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	4.8	3.5	7.9	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U
Iron	2380	2480	10500	74.9
Lead	1.2 B	1.1 B	0.99 B	0.76 L
Magnesium	3900	4070	26600	22.8 U
Manganese	301	316	2420	1.7
Mercury	0.10	0.06 U	0.06 U	0.06 U
Nickel	5.3	4.9	4.3 U	4.3 U
Potassium	12000	12500	12000	127 U
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	38000	39700	46600	56.5
Thallium	0.80 B	0.80 UL	0.90 B	0.80 UL
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	383 J	403 J	29.1 B	4.2 J
Cyanide	2.5 U	2.5 U	21.4 J	2.5 U

Location ID:	Well 2	Well 1	Well 1	Well 3
GEC Sample ID:	OW-WELL2D	OW-WELL1	OW-WELL1D	OW-WELL3
EPA Sample No.:		OW1-D	OW1DD	OW3D-
Laboratory ID:		1995412	1995413	1995946
Sample Type:	Duplicate	Investigative	Duplicate	Investigative
Sample Date:	7/14/93	7/15/93	7/15/93	7/16/93
Identified Compounds:				
Aluminum	NO DATA !!	32.5 U	32.5 U	32.5 U
Antimony		14.1 U	14.1 U	14.1 UL
Arsenic		1.0 UL	1.0 UL	1.0 UJ
Barium		831	747	101
Beryllium		0.30 U	0.30 U	0.30 U
Cadmium		2.8 U	2.8 U	2.8 U
Calcium		42300	40900	16700
Chromium		3.3 U	3.3 U	3.3 U
Cobalt		2.7	2.6 U	7.1
Copper		4.4 U	4.4 U	4.4 U
Iron		382	341 B	26700
Lead		0.94 B	0.50 UL	0.62 B
Magnesium		22200	21800	10100
Manganese		1140	1100	1040
Mercury		0.06 U	0.06 U	0.06 U
Nickel		4.3 U	4.3 U	4.3 U
Potassium		4490	4430	7330
Selenium		0.90 UL	0.90 UL	0.90 UL
Silver		3.1 U	3.1 U	3.1 U
Sodium		9510	9470	32400
Thallium		0.80 UL	1.2 B	1.2 B
Vanadium		2.0 U	2.0 U	2.0 U
Zinc		13.7 B	19.9 B	17.5 B
Cyanide		16.9 J	18.7 J	10.5 J

Location ID:	Well 3	Field Blank 7	Field Blank 8
GEC Sample ID:	OW-WELL3D	OW-FB7	OW-FB8
EPA Sample No.:	OW3DD	7FBOW	FB8-D
Laboratory ID:	1995947	1995414	1995948
Sample Type:	Duplicate	QA/QC	QA/QC
Sample Date:	7/16/93	7/15/93	7/16/93
Identified Compounds:			
Aluminum	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 U	14.1 U
Arsenic	1.0 UJ	1.0 UL	1.0 UL
Barium	104	1.4 U	1.4 U
Beryllium	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U
Calcium	17600	80.5	39.4
Chromium	3.4	3.3 U	3.3 U
Cobalt	7.1	2.6 U	2.6 U
Copper	9.0 B	16.8	4.4 U
Iron	23800	12.9	17.0
Lead	0.72 B	0.53 L	0.55 L
Magnesium	10700	23.6	22.8 U
Manganese	1130	4.3	1.7
Mercury	0.06 U	0.06 U	0.06 U
Nickel	8.4	4.3 U	4.3 U
Potassium	7610	127 U	127 U
Selenium	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U
Sodium	33700	76.6	64.6
Thallium	0.90 B	0.80 UL	0.80 UL
Vanadium	2.0 U	2.0 U	2.0 U
Zinc	8.1 B	84.9 J	26.6 J
Cyanide	6.6 J	2.5 U	2.5 U

E. SDG PSW01

RODALE MANUFACTURING SITE
WELL SURVEY
PUBLIC SUPPLY WELLS- TOTAL UNFILTERED (IP-5)
INORGANIC COMPOUNDS
(Units: µg/l = ppb) (Prepared: 10/4/93)

Location ID:	PSW-1	PSW-2	PSW-3	PSW-4
GEC Sample ID:	PSW-1	PSW-2	PSW-3	PSW-4
EPA Sample No:	PSW-1	PSW-2	PSW-3	PSW-4
Laboratory ID:	1998862	1998073	1998864	1997120
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/22/93	7/21/93	7/22/93	7/20/93
Identified Compounds:				
Aluminum	32.5 UL	32.5 UL	32.5 UL	32.5 UL
Antimony	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.2 UL	1.2 UL	1.2 U	1.2 UL
Barium	35.7 J	39.2 J	27.0 J	23100 J
Beryllium	0.63 B	0.63 B	0.60 U	0.60 U
Cadmium	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Calcium	41300	41900	26800	30200
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.8 U	2.8 U	2.8 U	3.5
Copper	6.2 U	6.2 U	6.2 U	6.2 U
Iron	20.4 B	7.5 B	4.9 U	13.2 B
Lead	0.50 U	0.65 B	0.70 B	0.62 B
Magnesium	23700	22900	19700	17700
Manganese	1.4 B	1.2 U	1.2 U	1.2 U
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	2780	2500	2160	2330
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	9950	18300	4790	4960
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	6.5 U	6.5 U	6.5 U	6.5 U
Cyanide	2.5 U	3.9	2.5 U	2.5 U

Location ID:	PSW-4	PSW-6	PSW-7
GEC Sample ID:	PSW-4D	PSW-6	PSW-7
EPA Sample No:	PSW4D	PSW-6	PSW-7
Laboratory ID:	1997122	1997124	1998071
Sample Type:	Duplicate	Investigative	Investigative
Sample Date:	7/20/93	7/20/93	7/21/93
Identified Compounds:			
Aluminum	32.5 UL	32.5 UL	32.5 UL
Antimony	9.2 U	9.2 U	9.2 U
Arsenic	1.2 UL	1.2 UL	1.2 UL
Barium	27.9 J	360 J	42.2 J
Beryllium	0.60 U	0.64 B	0.63 B
Cadmium	2.0 UL	2.0 UL	2.0 UL
Calcium	30700	20800	54000
Chromium	3.3 U	3.3 U	3.3 U
Cobalt	2.8 U	2.8 U	2.8 U
Copper	4.4 U	4.4 U	6.2 U
Iron	11.5 B	4.9 U	17.7 B
Lead	0.50 U	2.2 B	0.75 B
Magnesium	17300	13900	31400
Manganese	1.2 U	1.2 U	4.1 B
Mercury	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U
Potassium	2200	2240	2380
Selenium	0.90 UL	0.90 UL	0.90 UL
Silver	6.9 U	6.9 U	6.9 U
Sodium	4920	7160	13700
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U
Zinc	6.5 U	6.5 U	6.5 U
Cyanide	2.5 U	2.5 U	2.5 U

F. SDG PSW02

RODALE MANUFACTURING SITE
WELL SURVEY
PUBLIC SUPPLY WELLS- FILTERED (IP-6)
INORGANIC COMPOUNDS
(Units: ug/l = ppb) (Prepared: 10/4/93)

Location ID:	PSW-1	PSW-2	PSW-3	PSW-4	PSW-4
GEC Sample ID:	PSW-1	PSW-2	PSW-3	PSW-4	PSW-4D
EPA Sample No:	PSW1F	PSW2F	PSW3F	PSW4F	PSW4DF
Laboratory ID:	1998866	1998076	1998867	1997127	1997128
Sample Type:	Investigative	Investigative	Investigative	Investigative	Duplicate
Sample Date:	7/22/93	7/21/93	7/22/93	7/20/93	7/20/93
Identified Compounds:					
Aluminum	32.5 UL	32.5 UL	32.5 UL	32.5 UL	32.5 UL
Antimony	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	36.9 J	39.4 J	28.4 J	26.0 J	28.1 J
Beryllium	0.64 B	0.63 B	0.60 U	0.60 U	0.60 U
Cadmium	2.0 UL	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Calcium	41800	42600	27800	29800	31200
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	4.9 U	4.9 U	4.9 U	5.4 B	4.9 U
Lead	0.50 U	0.81 B	0.72 B	0.56 B	0.5 U
Magnesium	23500	23900	19400	18400	17900
Manganese	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	2920	2600	2230	2400	2310
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	9710	18900	4620	5140	5010
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	7.4 B	22.6 B	6.5 U	6.5 U	6.5 U
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	PSW-6	PSW-7
GEC Sample ID:	PSW-6	PSW-7
EPA Sample No:	PSW6F	PSW7F
Laboratory ID:	1997129	1998075
Sample Type:	Investigative	Investigative
Sample Date:	7/20/93	7/21/93
Identified Compounds:		
Aluminum	32.5 UL	32.5 UL
Antimony	9.2 U	9.2 U
Arsenic	1.2 U	1.2 U
Barium	362 J	42.2 J
Beryllium	0.60 U	0.60 U
Cadmium	2.0 UL	2.0 UL
Calcium	21100	55000
Chromium	3.3 U	3.3 U
Cobalt	2.8 U	2.8 U
Copper	4.5 B	4.4 U
Iron	4.9 U	4.9 U
Lead	2.3 B	0.5 U
Magnesium	14300	31600
Manganese	2.2 B	1.6 B
Mercury	0.06 U	0.06 U
Nickel	4.4 U	4.4 U
Potassium	2400	2490
Selenium	0.90 UL	0.90 UL
Silver	6.9 U	6.9 U
Sodium	7450	13800
Thallium	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U
Zinc	7.8 B	6.5 U
Cyanide	2.5 U	2.5 U

G. SDG ROD01

RODALE MANUFACTURING SITE
WELL SURVEY
STREAM SEDIMENT SAMPLES (IP7)
INORGANIC COMPOUNDS
(Units: mg/kg or ppm) (Prepared: 10/4/93)

Location ID:	SW-1	SW-10	SW-11	SW-12
GEC Sample ID:	SD-1	SD-10	SD-11	SD-12
EPA Sample No:	SD-1-	SD-10	SD-11	SD-12
Laboratory ID:	2000731	2002235	2002231	2002230
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/27/93	7/29/93	7/29/93	7/29/93
Identified Compounds:				
Aluminum	2330	8710	5010	3530
Antimony	2.9 U	3.3 U	3.6 U	3.5 U
Arsenic	0.76 J	6.9 J	7.0 J	6.8 J
Barium	22.7	93.7	39.4	49.7
Beryllium	0.12 U	9.4	0.60	0.28
Cadmium	0.58 U	13.2	2.9	1.8
Calcium	4170 J	32800 J	9840 J	28300 J
Chromium	11.0 J	221 J	18.7 J	12.1 J
Cobalt	5.0 B	43.5	17.4	8.1
Copper	5.5 B	588	10.5 B	3.8 B
Iron	6380	124000	22900	14400
Lead	12.4 J	402 J	20.3 J	19.9 J
Magnesium	1200 J	14300 J	5580 J	11000 J
Manganese	169 J	2640 J	679 J	646 J
Mercury	0.03 U	0.03 U	0.04 U	0.03 U
Nickel	2.5	145	13.6	6.1
Potassium	265	1250	733	499
Selenium	0.20 UL	0.26	0.26	0.22 U
Silver	1.4 U	1.6 U	1.7 U	1.7 U
Sodium	84.3 B	600	75.3 B	61.1 B
Thallium	0.42 U	0.45 UL	0.48 U	0.47 U
Vanadium	14.2	94.6	17.7	10.8
Zinc	28.8	3230	60.1	53.9
Cyanide	0.27 U	0.30 U	0.32 U	0.31 U

AR100647

Location ID:	SW-15	SW-16	SW-2	SW-3	SW-3
GEC Sample ID:	SD-15	SD-16	SD-2	SD-3	SD-3D
EPA Sample No:	SD-15	SD-16	SD-2-	SD-3-	SD-3D
Laboratory ID:	2002236	2002839	2000732	2000733	2000734
Sample Type:	Investigative	Investigative	Investigative	Investigative	Duplicate
Sample Date:	7/29/93	7/30/93	7/27/93	7/27/93	7/27/93
Identified Compounds:					
Aluminum	12100	3060	2920	6700	8100
Antimony	4.0 U	3.4 UL	3.4 U	4.1 B	210 J
Arsenic	4.2 J	1.5 J	1.0 J	4.7 J	10.5 J
Barium	121	57.5	26.3	88.3	128
Beryllium	0.22	0.73	0.34	2.2	2.1
Cadmium	3.5	0.67 U	1.1	5.5	5.4
Calcium	8530 J	8880 J	4150 J	67300 J	52400 J
Chromium	24.4 J	21.2 J	12.2 J	52.4 J	140 J
Cobalt	27.6	4.5 B	5.4 B	28.6	22.3
Copper	44.2	6.7 B	5.8 B	823 J	260 J
Iron	28900	14400	11400	41000	40600
Lead	19.3 J	13.2 J	4.8 J	273 J	126 J
Magnesium	2040 J	5050 J	1590 J	22500 J	17400 J
Manganese	1550 J	727 J	218 J	496 J	2910 J
Mercury	0.04 U	0.04 B	0.03 U	0.02 U	0.03 U
Nickel	13.4	4.2	4.7	137	94.6
Potassium	443	471	232	476	681
Selenium	0.29	0.24 L	0.21 UL	0.91 L	0.54 L
Silver	2.0 U	1.6 U	1.7 U	1.6 U	3.0 K
Sodium	107 B	47.1 B	51.1 B	283	336
Thallium	0.54 U	0.43 U	0.44 U	0.42 U	0.42 U
Vanadium	49.1	19.5	18.9	29.0	68.8
Zinc	87.3	52.8	31.4	1260	985
Cyanide	0.36 U	0.30 U	0.30 U	0.29 U	0.35 K

Location ID:	SW-4	SW-5	SW-6	SW-7	SW-8
GEC Sample ID:	SD-4	SD-5	SD-6	SD-7	SD-8
EPA Sample No:	SD-4-	SD-5-	SD-6-	SD-7-	SD-8-
Laboratory ID:	2000735	2001160	2001159	2001158	2001157
Sample Type:	Investigative	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93
Identified Compounds:					
Aluminum	17400	1920	4140	2520	3620
Antimony	4.4 B	3.1 U	3.5 U	3.3 U	3.5 U
Arsenic	7.9 J	1.9 J	4.3 J	3.0 J	9.7 J
Barium	118	19.3	24.6	27.2	49.9
Beryllium	1.2	0.13 U	0.73	0.66	0.96
Cadmium	2.5	0.97	2.3	1.8	4.2
Calcium	3550 J	28200 J	6800 J	4600 J	11800 J
Chromium	35.2 J	5.3 J	14.8 J	17.1 J	28.6 J
Cobalt	23.4	4.3 B	10.6	5.3 B	15.2
Copper	48.5	2.1 B	5.4 B	8.4 B	29.9
Iron	26600	8190	19000	14800	35800
Lead	20.1 J	3.6 J	16.2 J	16 J	3.7 J
Magnesium	7200 J	3660 J	4610 J	2270 J	6870 J
Manganese	615 J	481 J	536 J	235 J	715 J
Mercury	0.14 B	0.03 U	0.03 U	0.03 U	0.04 U
Nickel	33.7	3.7	8.2	6.2	15.7
Potassium	2310	591	1060	371	772
Selenium	0.21 U	0.20 U	0.22 U	0.21 U	0.22 U
Silver	1.7 U	1.5 U	1.7 U	1.6 U	1.7 U
Sodium	134	41.6 B	54.8 B	57.4 B	72.4 B
Thallium	0.45 U	0.43 U	0.47 U	0.44 U	0.47 U
Vanadium	49.8	8.0	12.9	11.7	25.6
Zinc	142	27.8	49.1	53.1	54.6 K
Cyanide	0.30 U	0.29 U	0.32 U	0.30 U	0.31 U

Location ID:	SW-9	SW-9	SW-11
GEC Sample ID:	SD-9	SD-9D	SD-11D
EPA Sample No:	SD-9-	SD-9D	SD11D
Laboratory ID:	2001155	2001156	2002232
Sample Type:	Investigative	Duplicate	Duplicate
Sample Date:	7/28/93	7/28/93	7/29/93
Identified Compounds:			
Aluminum	12300	12100	4920
Antimony	6.1 U	5.9 U	3.3 U
Arsenic	6.2 J	5.8 J	4.9 J
Barium	88.6	81.0	40.0
Beryllium	0.70	1.0	1.9
Cadmium	2.4	2.8	5.0
Calcium	7500 J	7700 J	5110 J
Chromium	24.2 J	23.0 J	17.8 J
Cobalt	18.8	21.0	19.8
Copper	29.6 B	27.6 B	14.4 B
Iron	22100	24100	36700
Lead	41.1 J	35.7 J	21.6 J
Magnesium	5940 J	6110 J	4460 J
Manganese	311 J	289 J	1010 J
Mercury	0.06 U	0.06 B	0.03 U
Nickel	18.5	18.4	13.4
Potassium	1250	1070	1060
Selenium	0.60	0.62	0.24
Silver	3.0 U	2.9 U	1.6 U
Sodium	90.6 B	102 B	40.7 B
Thallium	0.81 U	0.79 U	0.47 U
Vanadium	30.4	30.3	17.0
Zinc	148	125	69.8
Cyanide	0.55 U	0.54 U	0.31 U

H. SDG ROD02

RODALE MANUFACTURING SITE
WELL SURVEY
SURFACE WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP8)
(Units: µg/L or ppb) (Prepared: 10/4/93)

Location ID:	Spring 3	Spring LE-SP78	SW-1	SW-10
GEC Sample ID:	SP-03	SP-LESP78	SW-1	SW-10
EPA Sample No:	SP-03	SPLES	SW-1-	SW-10
Laboratory ID:	2002853	2002852	2000744	2002242
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/30/93	7/30/93	7/27/93	7/29/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	122	86.0
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	30.2	23.8	29.5	25.7
Beryllium	0.30 B	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	43000	41700	19500	41800
Chromium	3.3 UL	3.3 UL	3.3 UL	3.3 UL
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U
Iron	8.8 B	9.6 B	149	157
Lead	0.50 U	0.50 U	1.9 B	0.83 B
Magnesium	27200	24300	7440	18500
Manganese	1.3	1.2 U	11.3	11.3
Mercury	0.06 UL	0.06 UL	0.06 UL	0.06 UL
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2690	2220	1670	1970
Selenium	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	9920	8530	10200	6700
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	2.1 U	7.0 B	9.6 B	4.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SW-11	SW-12	SW-15	SW-2	SW-3
GEC Sample ID:	SW-11	SW-12	SW-15	SW-2	SW-3
EPA Sample No:	SW-11	SW-12	SW-15	SW-2-	SW-3-
Laboratory ID:	2002238	2002237	2002243	2000745	2000746
Sample Type:	Investigative	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/29/93	7/29/93	7/29/93	7/27/93	7/27/93
Identified Compounds:					
Aluminum	121	46.5	422	134	48.6
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.8 K	1.5 K	1.2 U
Barium	24.6	25.5	72.5	28.7	43.4
Beryllium	0.30 U	0.30 B	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	3.3 K
Calcium	40700	41700	35200	25400	29800
Chromium	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	200	84.5	697	187	134
Lead	0.95 B	0.62 B	1.6 B	0.51 B	1.4 B
Magnesium	18200	19700	12200	9820	8990
Manganese	12.6	7.2	39.3	9.5	10.4
Mercury	0.06 UL	0.10 L	0.06 UL	0.06 UL	0.06 UL
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2010	1890	1800	1570	1710
Selenium	0.90 U	0.90 U	0.90 UL	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	6930	6910	11500	8820	9400
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	12.8 B	5.4 B	40.5	8.2 B	7.0 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SW-3	SW-5	SW-6	SW-7	SW-8
GEC Sample ID:	SW-3D	SW-5	SW-6	SW-7	SW-8
EPA Sample No:	SW-3D	SW-5-	SW-6-	SW-7-	SW-8-
Laboratory ID:	2000747	2001169	2001168	2001167	2001166
Sample Type:	Duplicate	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/27/93	7/28/93	7/28/93	7/28/93	7/28/93
Identified Compounds:					
Aluminum	56.4	64.8	106	81.2	73.1
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	41.9	28.9	25.1	34.4	24.9
Beryllium	0.30 B	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	29100	26500	44500	31600	44200
Chromium	3.3 UL	3.3 UL	3.3 UL	3.3 UL	3.3 UL
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	143	104	170	135	102
Lead	1.7 B	0.65 B	1.0 B	0.56 B	1.8 B
Magnesium	8790	10200	18700	14400	19200
Manganese	10.1	6.4	8.8	6.6	6.9
Mercury	0.06 UL	0.06 UL	0.06 UL	0.06 UL	0.06 UL
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	1720	1850	1920	1990	1870
Selenium	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	9110	12600	6310	10900	6890
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	15.2 B	10.9 B	6.5 B	7.0 B	2.7 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SW-9	SW-9	SW-11
GEC Sample ID:	SW-9	SW-9D	SW-11D
EPA Sample No:	SW-9-	SW-9D	SW11D
Laboratory ID:	2001164	2001165	2002239
Sample Type:	Investigative	Duplicate	Duplicate
Sample Date:	7/28/93	7/28/93	7/29/93
Identified Compounds:			
Aluminum	902 J	131 J	208
Antimony	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 K	1.2 U
Barium	31.0	25.7 R	26.8
Beryllium	0.43 B	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U
Calcium	43800	43100	41700
Chromium	3.3 UL	3.3 UL	3.3 UL
Cobalt	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U
Iron	1280 J	203 J	262
Lead	3.2 B	1.8 B	0.97 B
Magnesium	19200	18800	18700
Manganese	35.6 J	8.8 J	15.2
Mercury	0.06 UL	0.06 UL	0.06 UL
Nickel	4.3 U	4.3 U	4.3 U
Potassium	2000	1930	2100
Selenium	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U
Sodium	6710	6680	7090
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U
Zinc	27.5	8.6 B	18.8
Cyanide	2.5 U	2.5 U	2.5 U

I. SDG ROD03

RODALE MANUFACTURING SITE
WELL SURVEY
SURFACE WATER SAMPLES
INORGANIC COMPOUNDS, DISSOLVED (IP9)
(Units: ug/l or ppb) (Prepared: 10/4/93)

Location ID:	Spring LE-SP78	Spring LE-SP73	Spring LE-SP73	Spring SP-02
GEC Sample ID:	SP-LESP78	SP-LESP73D	SP-LESP73	SP-02
EPA Sample No:	LESPF	LP7DF	LSP7F	SP02F
Laboratory ID:	2002896	2002899	2002898	2002900
Sample Type:	Investigative	Duplicate	Investigative	Investigative
Sample Date:	7/30/93	7/30/93	7/30/93	7/30/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	24.8	27.0	27.0	30.3
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	41900	41700	41500	43400
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U
Iron	4.9 U	4.9 U	8.3 B	4.9 U
Lead	8.7 B	0.68 B	0.53 B	0.73 B
Magnesium	24500	24800	24700	24000
Manganese	1.2 U	1.2 U	1.2 U	1.2 U
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2160	2340	2340	2470
Selenium	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	8550	5910	5920	11500
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	6.1 B	4.5 B	8.0 B	8.7 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	Spring SP-03	SW-1	SW-2	SW-3	SW-5
GEC Sample ID:	SP-03	SW-1	SW-2	SW-3	SW-5
EPA Sample No:	SP03F	SW-1F	SW-2F	SW-3F	SW-5F
Laboratory ID:	2002897	2000752	2000753	2000754	2001177
Sample Type:	Investigative	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/30/93	7/27/93	7/27/93	7/27/93	7/28/93
Identified Compounds:					
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	31.0	29.3	27.5	43.4	29.3
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	42900	19500	25200	29700	27600
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.9	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	5.9	4.4 U	4.4 U
Iron	7.2 B	52.0 B	32.2 B	52.4 B	29.1 B
Lead	0.50 U	0.90 B	0.50 U	0.50 U	0.52 B
Magnesium	27200	7430	9730	8980	10700
Manganese	1.2 U	6.2	2.1	3.0	4.0
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2820	1880	1640	1660	2000
Selenium	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	9960	10100	8810	9440	13200
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U	2.2
Zinc	12.6 B	6.1 B	5.5 B	5.6 B	4.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SW-6	SW-7	SW-8	SW-9	SW-10
GEC Sample ID:	SW-6	SW-7	SW-8	SW-9	SW-10
EPA Sample No:	SW-6F	SW-7F	SW-8F	SW-9F	SW10F
Laboratory ID:	2001176	2001175	2001174	2001172	2002252
Sample Type:	Investigative	Investigative	Investigative	Investigative	Investigative
Sample Date:	7/28/93	7/28/93	7/28/93	7/28/93	7/29/93
Identified Compounds:					
Aluminum	32.5 U	47.9	32.5 U	32.5 U	32.5 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	26.0	34.3	27.5	27.5	26.3
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	46600	32300	46200	45200	42200
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	26.7 B	59.9 B	37.1 B	22.6 B	24.2 B
Lead	0.50 U	0.50 U	0.61 B	0.55 B	9.10 B
Magnesium	19600	14700	20100	19700	18700
Manganese	6.3	2.7	3.9	6.9	8.1
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2190	2060	2040	2130	2200
Selenium	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U	36.4 R
Sodium	6630	11300	7310	7020	6740
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	2.8 B	11.4 B	5.6 B	4.4 B	9.5 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SW-11	SW-12	SW-15	SW-3	SW-9
GEC Sample ID:	SW-11	SW-12	SW-15	SW-3D	SW-9D
EPA Sample No:	SW11F	SW12F	SW15F	SW3DF	SW9DF
Laboratory ID:	2002248	2002247	2002253	2000755	2001173
Sample Type:	Investigative	Investigative	Investigative	Duplicate	Duplicate
Sample Date:	7/29/93	7/29/93	7/29/93	7/27/93	7/28/93
Identified Compounds:					
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 UL	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	25.8	26.8	67.8	43.2	241 R
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	42400	43700	35300	29800	44900
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Iron	26.8 B	18.2 B	76.6 B	55.7 B	28.4 B
Lead	5.10 B	7.70 B	7.10 B	0.64 B	0.50 U
Magnesium	18900	20600	12200	9010	19600
Manganese	6.9	5.2	2.5	2.6	7.5
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2020	2160	1890	1770	2120
Selenium	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	7020	7320	11400	9270	7020
Thallium	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.1	2.0 U
Zinc	4.9 B	15.3 B	17.3 B	3.6 B	12.5 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

J. SDG ROD04

RODALE MANUFACTURING SITE
WELL SURVEY
SPRING WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP10)
(Units: µg/l or ppb) (Prepared: 10/4/93)

Location ID:	Spring LE-SP73	Spring LE-SP73	Spring SP-02	SW-16
EC Sample ID:	SP-LESP73D	SP-LESP73	SP-02	SW-16
A Sample No:	LEP73	LESP7	SP-02	SP-16
Laboratory ID:	2002858	2002857	2002859	2002860
Sample Type:	Duplicate	Investigative	Investigative	Investigative
Sample Date:	7/30/93	7/30/93	7/30/93	7/30/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	134	126
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Barium	25.1 B	35.2	28.3 B	25.4 B
Beryllium	0.30 U	0.30 U	0.37	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	42000	42400	43100	25400
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	4.4 U	4.4 U	6.7 B
Iron	7.4 B	26.7 B	213	195
Lead	0.73 B	0.95 B	1.6 B	1.5 B
Magnesium	25000	25100	23800	9150
Manganese	1.2 U	1.2 U	5.9	6.2
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2270	2230	2400	1680
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	5950	5950	11200	9410
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.1
Zinc	2.1 U	6.9	8.0	2.9
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

K. SDG ROD05

RODALE MANUFACTURING SITE
WELL SURVEY
STREAM WATER SAMPLE
INORGANIC COMPOUNDS, DISSOLVED (IP11)
(Units: ug/l or ppm) (Prepared 10/4/93)

Location ID:	SW-16
GEC Sample ID:	SW-16
EPA Sample No:	SW16F
Laboratory ID:	2002904
Sample Type:	Investigative
Sample Date:	7/30/93

Identified Compounds:	
Aluminum	32.5 U
Antimony	14.1 U
Arsenic	1.2 UL
Barium	25.2 B
Beryllium	0.30 U
Cadmium	2.8 U
Calcium	25900
Chromium	3.3 U
Cobalt	2.6 U
Copper	4.5 B
Iron	36.1 B
Lead	1.6 B
Magnesium	9310
Manganese	1.2 U
Mercury	0.06 U
Nickel	4.3 U
Potassium	1680
Selenium	0.90 UL
Silver	6.9 U
Sodium	10100
Thallium	1.9 U
Vanadium	2.0 U
Zinc	2.1 U
Cyanide	2.5 U

AR100664

L. SDG EMM01

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP12)
(Units: ug/l or ppb) (Prepared: 10/4/93)

Location ID:	EM-08	LE-311	LE-677	LE-677
GEC Sample ID:	PW-EM08	PW-LE311	PW-LE677D	PW-LE677
EPA Sample No:	EM08-	LE311	LE67D	LE677
Laboratory ID:	2007146	2004814	2005515	2005514
Sample Type:	Investigative	Investigative	Duplicate	Investigative
Sample Date:	8/9/93	8/4/93	8/5/93	8/5/93
Identified Compounds:				
Aluminum	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	13.4 B	9.2 U	12.4 B	15.5 B
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	22.6	217	21.7	24.2
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	65900	17700	35600	38200
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	11.9	75.1	6.2 U	6.2 U
Iron	23.2	165	32.3	19.3
Lead	0.50 U	2.6	1.9	1.3
Magnesium	31900	8440	20000	21300
Manganese	11.2	78.9	3.4	5.2
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	8.1	4.4 U	4.4 U
Potassium	2310	4510	1840	1970
Selenium	0.90 UL	0.90 U	0.90 U	0.90 U
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	12100	10500	5470	6000
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	25.1	4870	83.6 J	60.2 J
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LM-10	SA-05	UM-40	UM-43	UM-45
GEC Sample ID:	PW-LM10	PW-SA05	PW-UM40	PW-UM43	PW-UM45
EPA Sample No:	LM10-	SA05-	UM40-	UM43-	UM49-
Laboratory ID:	2004195	2005512	2005520	2004191	2004812
Sample Type:	Investigative	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/3/93	8/5/93	8/4/93	8/3/93	8/4/93
Identified Compounds:					
Aluminum	13.6 U	15.3 B	13.6 U	13.6 U	13.6 U
Antimony	14.6 B	11.2 B	21.8 B	13.3 B	9.2 U
Arsenic	1.2 U	1.2 U	1.2 U	1.6	1.2 U
Barium	26.8	67.7	19.2	169	6.7 B
Beryllium	0.60 U	0.99 B	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	30300	10400	40800	41000	25400
Chromium	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	17.2	8	10.5	6.2 U	6.4
Iron	38.1	1630	66.2	307	15.9
Lead	0.50 U	1.6	0.50 U	0.50 U	0.50 U
Magnesium	18500	4550	27600	13000	16900
Manganese	4.4	281	9.7	37.4	13.8
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	2110	1370	2190	2910	1880
Selenium	0.97	0.90 U	0.90 UL	2.0 L	0.90 U
Silver	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	5920	15300	3090	8740	4100
Thallium	1.9 U	1.9 U	1.9 B	3.8 B	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	9.1	36.0	6.6	6.5 U	9.9
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	UM-45	UM-58	UM-58	UM-59	0351
GEC Sample ID:	PW-UM45D	PW-UM58	PW-UM58D	PW-UM59	PW-0351
EPA Sample No:	UM49D	UM58-	UM58D	UM59-	0351-
Laboratory ID:	2004813	2004192	2004193	2004811	2005516
Sample Type:	Duplicate	Investigative	Duplicate	Investigative	Investigative
Sample Date:	8/4/93	8/3/93	8/3/93	8/4/93	8/5/93
Identified Compounds:					
Aluminum	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	20.5 B	12.4 B	9.2 U	9.7 B	11.0 B
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	6.7 B	27.6	29.3	36.0	22.6
Beryllium	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	25100	46000	46400	33200	35200
Chromium	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Copper	6.2 U	12.7	8.7	41.7	6.2 U
Iron	13.0	15.3	14.6	36.6	16.7
Lead	0.50 U	0.50 U	0.50 U	0.53	2.1
Magnesium	16700	26300	26500	19400	19600
Manganese	12.2	3.4	5.3	3.5	8.7
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	1850	2660	2580	1850	1820
Selenium	0.90 U	1.10 L	0.90 UL	2.1	0.90 UL
Silver	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	3990	20900	21000	5100	5520
Thallium	1.9 U	4.0 B	4.5 B	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	11.8	34.5	34.5	14.9	365
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LE-1293	1492	1501
GEC Sample ID:	PW-LE1293	PW-1492	PW-1501
EPA Sample No:	1293-	1492-	1501-
Laboratory ID:	2005519	2005513	2004194
Sample Type:	Investigative	Investigative	Investigative
Sample Date:	8/5/93	8/5/93	8/3/93
Identified Compounds:			
Aluminum	13.6 U	153	14.1 B
Antimony	20.7 B	14.1 B	11.2 B
Arsenic	1.2 U	1.2 U	1.2 U
Barium	25.1	97.0	9.2 B
Beryllium	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U
Calcium	43900	15200	10100
Chromium	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U
Copper	6.2 U	32.9	137
Iron	15.3	775	112
Lead	0.50 U	0.65	0.50 U
Magnesium	25100	9600	7900
Manganese	5.8	11.6	25.5
Mercury	0.06 U	0.06 U	0.06 U
Nickel	4.4 U	4.4 U	4.4 U
Potassium	2120	1550	1620
Selenium	0.90 UL	0.90 U	1.10
Silver	6.9 U	6.9 U	6.9 U
Sodium	4310	9470	9530
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U
Zinc	20.8	12.0	16.4
Cyanide	2.5 U	2.5 U	2.5 U

M. SDG EMM02

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, DISSOLVED (IP13)
(Units: ug/l or ppb) (Prepared: 10/4/93)

Location ID:	EM-08	EM-09	LE-311	LE-677
GEC Sample ID:	PW-EM08	PW-EM09	PW-LE311	PW-LE677
EPA Sample No:	EM08F	EM09F	E311F	LE67F
Laboratory ID:	2007160	2007161	2004821	2005534
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/9/93	8/9/93	8/4/93	8/5/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	20.0	24.0	198	21.7
Beryllium	0.30 U	0.36 B	0.30 U	0.30 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	58700	52500	17000	33800
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	6.2 U	11.4 B	61.4	6.2 U
Iron	9.7 U	9.7 U	38.6 B	9.7 U
Lead	0.84 B	0.74 B	0.50 U	0.50 U
Magnesium	28800	25900	8240	19200
Manganese	1.2 UL	1.2 UL	69.7	1.2 UL
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	8.3	4.3 U
Potassium	2270	2230	4390	1720
Selenium	0.90 UL	0.90 UL	0.90 U	0.90 U
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	11500	10700	10700	5500
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	28.3 B	20.6 B	4390	17.3 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

AR100671

Location ID:	LM-10	LM-23	LE-677	LM-23
GEC Sample ID:	PW-LM10	PW-LM23	PW-LE677D	PW-LM23D
EPA Sample No:	LM10F	LM23F	L67DF	M23DF
Laboratory ID:	2004201	2007162	2005535	2007163
Sample Type:	Investigative	Investigative	Duplicate	Duplicate
Sample Date:	8/3/93	8/9/93	8/5/93	8/9/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.4 B	1.2 U	1.7 B
Barium	23.1	29.3	21.3	30.2
Beryllium	0.30 U	0.36 B	0.3 U	0.48 B
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	30000	65400	34500	64100
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	12.7 B	6.2 U	6.2 U	6.2 U
Iron	11.0 B	9.7 U	9.7 U	9.7 U
Lead	0.50 U	0.86 B	0.5 U	1.1 B
Magnesium	18300	39400	19500	38400
Manganese	1.2 UL	1.2 UL	1.2 UL	1.2 UL
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2050	1340	1750	1450
Selenium	0.90 UL	4.5 U	0.9 U	4.5 U
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	5980	27800	5630	27500
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	8.2 B	16.4 B	18.0 B	19.8 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	SA-05	UM-40	UM-43	UM-45
GEC Sample ID:	PW-SA05	PW-UM40	PW-UM43	PW-UM45
EPA Sample No:	SA05F	UM40F	UM43F	UM49F
Laboratory ID:	2005532	2005540	2004197	2004819
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/5/93	8/4/93	8/3/93	8/4/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	2.6 B	3.5 B
Barium	62.1	18.6	165	6.2
Beryllium	0.96 B	0.3 U	0.3 U	0.3 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	9830	36700	41400	23400
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	6.2 U	6.2 U	6.2 U	6.2 U
Iron	20.4 B	22.6 B	118	9.7 U
Lead	0.5 U	0.65 B	0.5 U	0.5 U
Magnesium	4320	25100	13200	15700
Manganese	269	1.2 UL	27.5 L	4.5 L
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	1190	2020	2840	1660
Selenium	0.9 U	0.9 UL	0.9 UL	0.9 U
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	14700	2960	8920	3910
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	30.6 B	13.5 B	6.0 B	9.8 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	UM-58	UM-59	UM-45	UM-58
GEC Sample ID:	PW-UM58	PW-UM59	PW-UM45D	PW-UM58D
EPA Sample No:	UM58F	UM59F	U49DF	U58DF
Laboratory ID:	2004198	2004818	2004820	2004199
Sample Type:	Investigative	Investigative	Duplicate	Duplicate
Sample Date:	8/3/93	8/4/93	8/4/93	8/3/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	3.2 B	1.7 B	1.5 B	2.0 B
Barium	26.6	32.8	7.1	27.1
Beryllium	0.3 U	0.3 U	0.3 U	0.3 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	45500	32300	23400	47200
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	6.7 B	14.8 B	6.2 U	6.2 U
Iron	12.8 B	9.7 U	19.4 B	9.7 U
Lead	0.5 U	0.5 U	0.5 U	0.5 U
Magnesium	26100	18900	15600	27000
Manganese	1.2 UL	1.2 UL	4.2 L	1.2 UL
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2580	1780	1650	2550
Selenium	0.9 UL	1.2 L	0.9 U	0.9 UL
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	20900	5080	4010	21700
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	37.5 B	8.0 B	24.8 B	37.0 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	0351	LE-1293	1492	1501
GEC Sample ID:	PW-0351	PW-LE1293	PW-1492	PW-1501
EPA Sample No:	0351F	1293F	1492F	1501F
Laboratory ID:	2005536	2005539	2005533	2004200
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/5/93	8/5/93	8/5/93	8/3/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.6 B	1.4 B	1.2 U	2.4 B
Barium	23.5	21.3	87.4	7.1
Beryllium	0.3 U	0.3 U	0.3 U	0.48 B
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	36600	39700	13900	9620
Chromium	5.5 U	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U	2.8 U
Copper	6.2 U	6.2 U	16.2 B	105
Iron	9.7 U	18.7 B	9.7 U	9.7 U
Lead	1.4 B	0.5 U	0.5 U	0.5 B
Magnesium	20500	22900	8860	7550
Manganese	1.3 L	1.2 UL	1.2 UL	20.7 L
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	1680	1870	1260	1440
Selenium	0.9 UL	0.9 UL	0.9 U	0.92
Silver	6.9 U	6.9 U	6.9 U	6.9 U
Sodium	5960	4280	9130	9240
Thallium	1.9 U	1.9 U	1.9 U	1.9 U
Vanadium	3.7 U	3.7 U	3.7 U	3.7 U
Zinc	355	23.5 B	19.5 B	19.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

N. SDG EMM03

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP14)
(Units: µg/l or ppb) (Prepared: 10/5/93)

Location ID:	EM-09	LE-312	LE-411	LM-20
GEC Sample ID:	PW-EM09	PW-LE312	PW-LE411	PW-LM20
EPA Sample No:	EM09-	LE312	LE411	LM20-
Laboratory ID:	2007155	2009256	2009257	2007805
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/9/93	8/12/93	8/12/93	8/10/93
Identified Compounds:				
Aluminum	13.6 U	27.6	13.6 U	15.6
Antimony	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	28.2 B	81.2	77.4	28.8 B
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	53800	2700	55300	48300
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	18.9	169	4.4 U	19.9
Iron	107	58.3	66.9	15.2 B
Lead	0.79 B	2.0 B	2.0 B	0.50 U
Magnesium	29000	542	39000	31800
Manganese	9.2 B	1.2 B	4.2 B	3.2 B
Mercury	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2380	2410	5260	1790
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	12400	7880	89200	8420
Thallium	1.9 B	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	11.8 B	11.8 B	47.4 B	5.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LM-21	LM-21	LM-23	LM-23D	LM-26
GEC Sample ID:	PW-LM21	PW-LM21D	PW-LM23	PW-LM23D	PW-LM26
EPA Sample No:	LM21-	LM21D	LM23-	LM23D	LM26-
Laboratory ID:	2009258	2009259	2007156	2007157	2007806
Sample Type:	Investigative	Duplicate	Investigative	Duplicate	Investigative
Sample Date:	8/12/93	8/12/93	8/9/93	8/9/93	8/10/93
Identified Compounds:					
Aluminum	13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.3	1.2 U
Barium	39.0	40.3	34.6	34.6	46.0
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	62500	62200	67300	66900	31700
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	28.9	30.3	9.5	12.8	27.9
Iron	37.9	49.8	26.3 B	33.9 J	5.0 B
Lead	7.3 B	8.6	0.5 U	0.5 U	1.4 B
Magnesium	39800	40800	44100	43900	22300
Manganese	7.0 B	7.1 B	3.4 B	3.5 B	1.8 B
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	2200	2380	1670	1690	3450
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	10.6 K	3.1 U	3.1 U	25.5 K
Sodium	29800	32500	32000	32700	5790
Thallium	1.9 U	1.9 U	1.9 B	2.0 B	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Zinc	19.0 B	21.1 B	8.4 B	12.3 B	15.2 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LM-27	LM-28	SA-07	SA-08	SA-08
GEC Sample ID:	PW-LM27	PW-LM28	PW-SA07	PW-SA08	PW-SA08D
EPA Sample No:	LM27-	LM28-	SA07-	SA08-	SA08D
Laboratory ID:	2008510	2008515	2007804	2008512	2008511
Sample Type:	Investigative	Investigative	Investigative	Investigative	Duplicate
Sample Date:	8/11/93	8/11/93	8/10/93	8/11/93	8/11/93
Identified Compounds:					
Aluminum	13.6 U	1070	13.6 U	13.6 U	13.6 U
Antimony	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	1.4 U	48.1	10.7 B	24.9 B	24.9 B
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	682	76800	9460	34200	34500
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 U	8.5	11.4	6.9	6.4
Iron	4.9 U	1910	19.3 B	10.2 B	5.7 B
Lead	1.8 B	129	0.50 U	1.8 B	1.6 B
Magnesium	413	34200	20900	21900	22400
Manganese	1.2 U	188	2.1 B	2.5 B	2.5 B
Mercury	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Potassium	392	4970	17100	2140	2100
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	99700	33500	118000	6930	6920
Thallium	2.2 B	1.9 U	2.0 B	1.9 U	2.2 B
Vanadium	2.0 U	2.0 B	2.0 U	2.0 U	2.0 U
Zinc	7.0 B	83.1	17.1 B	5.3 B	5.6 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	UM-60	UM-61	UM-61D
GEC Sample ID:	PW-UM60	PW-UM61	PW-UM61D
EPA Sample No:	UM60-	UM61-	UM61D
Laboratory ID:	2007807	2007808	2007809
Sample Type:	Investigative	Investigative	Duplicate
Sample Date:	8/10/93	8/10/93	8/10/93
Identified Compounds:			
Aluminum	13.6 U	13.6 U	13.6 U
Antimony	14.1 U	14.1 U	14.1 U
Arsenic	1.2 U	1.2 U	1.2 U
Barium	42.6	4.5 B	4.8 B
Beryllium	0.30 U	0.30 U	0.30 U
Cadmium	2.8 U	2.8 U	2.8 U
Calcium	47000	23600	25300
Chromium	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U
Copper	6.6	72.0 J	13.3 J
Iron	9.8 B	89.4	56.1
Lead	14.0	231 J	25.8 J
Magnesium	29900	17500	17900
Manganese	3.0 B	19.4	19.5
Mercury	0.06 U	0.06 U	0.06 U
Nickel	4.3 U	4.3 U	4.3 U
Potassium	2470	1680	1760
Selenium	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U
Sodium	11200	4290	4360
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U
Zinc	19.4 B	13.1 B	4.9 B
Cyanide	2.5 U	2.5 U	2.5 U

O. SDG EMM04

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, DISSOLVED (IP15)
(Units: µg/l or ppb) (Prepared: 10/5/93)

Location ID:	SA-08	LE-312	LE-411	LM-20
GEC Sample ID:	PW-SA08D	PW-LE312	PW-LE411	PW-LM20
EPA Sample No:	A08DF	E312F	E411F	LM20F
Laboratory ID:	2008518	2009268	2009269	2007819
Sample Type:	Duplicate	Investigative	Investigative	Investigative
Sample Date:	8/11/93	8/12/93	8/12/93	8/10/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	23.4	79.6	87.8	29.3
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	34600	2860	60400	49800
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	4.4 UL	76.8 B	4.4 UL	10.0 B
Iron	4.9 U	4.9 U	4.9 U	4.9 U
Lead	0.50 U	0.57	0.50 UL	0.52 L
Magnesium	22200	538 B	42400	33100
Manganese	1.9 U	1.9 U	8.2	3.6
Mercury	0.06 B	0.08 B	0.10 B	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	1960	2350	5180	1430 L
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	9.6 J	3.1 U	24.1 K	181 R
Sodium	6470	8060	97400	9040
Thallium	3.7 B	3.0 B	4.7 B	3.9 B
Vanadium	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Zinc	6.5 U	14.5 B	56.2	9.7 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LM-21	LM-26	LM-27	LM-28
GEC Sample ID:	PW-LM21	PW-LM26	PW-LM27	PW-LM28
EPA Sample No:	LM21F	LM26F	LM27F	LM28F
Laboratory ID:	2009270	2007820	2008517	2008522
Sample Type:	Investigative	Investigative	Investigative	Investigative
Sample Date:	8/12/93	8/10/93	8/11/93	8/11/93
Identified Compounds:				
Aluminum	32.5 U	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.2 U	1.2 U	1.2 U
Barium	44.4	46.8	1.8 U	32.2
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	66700	35000	754	72800
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	18.7 B	14.6 B	4.4 UL	4.4 UL
Iron	16.7 B	4.9 U	4.9 U	4.9 U
Lead	10.1	1.4 L	0.50 UL	0.50 UL
Magnesium	43400	22800	369 B	31700
Manganese	7.9	2.9	1.9 U	6.2
Mercury	0.10 B	0.06 U	0.06 B	0.10 B
Nickel	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	2310	2970 L	365	4460
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	33300	6190	99600	31900
Thallium	3.9 B	4.0 B	3.7 B	4.1 B
Vanadium	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Zinc	19.9 B	17.7 B	10.0 B	12.0 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

Location ID:	LM-21	UM-61	SA-07	SA-08
GEC Sample ID:	PW-LM21D	PW-UM61D	PW-SA07	PW-SA08
EPA Sample No:	M21DF	M61DF	SA07F	SA08F
Laboratory ID:	2009271	2007823	2007818	2008519
Sample Type:	Duplicate	Duplicate	Investigative	Investigative
Sample Date:	8/12/93	8/10/93	8/10/93	8/11/93
Identified Compounds:				
Aluminum	233 J	32.5 U	32.5 U	32.5 U
Antimony	14.1 UL	14.1 UL	14.1 UL	14.1 UL
Arsenic	1.2 U	1.9	1.2 U	1.2 U
Barium	43.4	6.3	10.2	43.9 R
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	65700	25100	10400	35400
Chromium	3.3 U	3.3 U	3.3 U	3.3 U
Cobalt	2.6 U	2.6 U	2.6 U	2.6 U
Copper	18.2 B	4.4 UL	17.2 B	4.4 UL
Iron	298 J	15.4 B	4.9 U	4.9 U
Lead	8.2	0.50 U	0.71 L	0.50 U
Magnesium	43200	17200	22700	22200
Manganese	7.2	18.3	1.9 U	2.8
Mercury	0.13 B	0.06 B	0.06 B	0.06 U
Nickel	4.4 U	4.4 U	4.4 U	4.4 U
Potassium	2290	1590	14700	1830 L
Selenium	0.90 UL	0.90 UL	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U	3.1 U
Sodium	32800	4160	117000	7070
Thallium	4.4 B	3.4 B	4.8 B	3.5 B
Vanadium	2.0 UL	2.0 UL	2.0 UL	2.0 UL
Zinc	20.1 B	13.4 B	22.1 B	6.5 B
Cyanide	2.5 U	2.5 U	2.5 U	2.5 U

P. SDG EMM05

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP16)
(Units: ug/l or ppb) (Prepared: 10/5/93)

Location ID:	SA-09	UM-62
GEC Sample ID:	PW-SA09	PW-UM62
EPA Sample No:	SA09-	UM62-
Laboratory ID:	2009262	2009263
Sample Type:	Investigative	Investigative
Sample Date:	8/12/93	8/12/93
Identified Compounds:		
Aluminum	13.6 U	13.6 U
Antimony	9.2 U	9.6 B
Arsenic	1.2 U	1.2 U
Barium	19.3	11.2
Beryllium	0.60 U	0.78 B
Cadmium	2.0 U	2.3 B
Calcium	25000	5680
Chromium	5.5 U	5.5 U
Cobalt	2.6 U	2.6 U
Copper	12.2 B	196
Iron	36.0	387
Lead	0.50 UL	1.7 L
Magnesium	14500	4450
Manganese	3.5	18.0
Mercury	0.11 B	0.09 B
Nickel	4.5	6.8
Potassium	1840	637
Selenium	0.90 U	0.90 U
Silver	6.9 U	6.9 U
Sodium	3500	5430
Thallium	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U
Zinc	12.2 B	15.0 B
Cyanide	2.5 U	2.5 U

Q. SDG EMM06

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, TOTAL (IP17)
(Units: µg/l or ppb) (Prepared: 10/29/93)

Location ID:	UM-63	UM-64	UM-64
GEC Sample ID:	PW-UM63	PW-UM64	PW-UM64D
EPA Sample No:	UM-63	UM-64	UM64D
Laboratory ID:	2016405	2016406	2016407
Sample Type:	Investigative	Investigative	Duplicate
Sample Date:	8/25/93	8/25/93	8/25/93
Identified Compounds:			
Aluminum	13.6 UL	13.6 UL	13.6 UL
Antimony	9.2 U	9.2 U	9.2 U
Arsenic	2.1 B	3.2 B	2.0 B
arium	63.0	47.3	47.3
Beryllium	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U
Calcium	13000	33700	33500
Chromium	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U
Copper	25.3	32.5	33.5
Iron	196 L	697 J	543 J
Lead	2.5 B	7.5	9.0
Magnesium	6910	18800	18700
Manganese	8.8 B	12.5 B	11.3 B
Mercury	0.06 U	0.08 B	0.07 B
Nickel	4.4 U	4.4 U	4.4 U
Potassium	2140	2110	2110
Selenium	1.2 L	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U
Sodium	7980	9620	9560
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U
Zinc	132	14.8 B	12.1 B
Cyanide	2.5 U	2.5 U	2.5 U

R. SDG EMM07

RODALE MANUFACTURING SITE
WELL SURVEY
PRIVATE WELL WATER SAMPLES
INORGANIC COMPOUNDS, FILTERED (IP18)
(Units: ug/l or ppb) (Prepared: 10/29/93)

Location ID:	UM-63	UM-64	UM-64
GEC Sample ID:	PW-UM63	PW-UM64	PW-UM64D
EPA Sample No:	UMF63	UMF64	UMF4D
Laboratory ID:	2016409	2016410	2016411
Sample Type:	Investigative	Investigative	Duplicate
Sample Date:	8/25/93	8/25/93	8/25/93
Identified Compounds:			
Aluminum	13.6 UL	13.6 UL	13.6 UL
Antimony	9.2 U	9.2 U	9.2 U
Arsenic	2.6 B	2.5 B	2.8 B
Barium	63.0	47.3	47.3
Beryllium	0.60 U	0.60 U	0.60 U
Cadmium	2.0 U	2.0 U	2.0 U
Calcium	12900	33900	34200
Chromium	5.5 U	5.5 U	5.5 U
Cobalt	2.8 U	2.8 U	2.8 U
Copper	27.2	41.3	28.1
Iron	9.7 UL	9.7 UL	12.9 L
Lead	0.87 J	9.3 J	4.6 J
Magnesium	6840	18900	19000
Manganese	8.9 B	11.1 B	11.1 B
Mercury	0.06 U	0.08 B	0.06 U
Nickel	4.4 U	4.4 U	4.4 U
Potassium	2080	2150	2290
Selenium	1.6 L	0.90 UL	0.90 UL
Silver	3.1 U	3.1 U	3.1 U
Sodium	7890	9680	10100
Thallium	1.9 U	1.9 U	1.9 U
Vanadium	2.0 U	2.0 U	2.0 U
Zinc	145	21.3 B	15.6 B
Cyanide	2.5 UR	2.5 UR	2.5 UR

AR100690

Location ID:	SW-11
GEC Sample ID:	SW11D
EPA Sample No:	S11DF
Laboratory ID:	2002249
Sample Type:	Duplicate
Sample Date:	7/29/93

Identified Compounds:		
Aluminum	32.5	U
Antimony	14.1	U
Arsenic	1.2	UL
Barium	26.7	
Beryllium	0.30	U
Cadmium	2.8	U
Calcium	41400	
Chromium	3.3	U
Cobalt	2.6	U
Copper	14.5	J
Iron	21.0	B
Lead	6.80	B
Magnesium	18500	
Manganese	8.1	
Mercury	0.06	U
Nickel	4.3	U
Potassium	2180	
Selenium	0.90	U
Silver	3.1	U
Sodium	6870	
Thallium	1.9	U
Vanadium	2.0	U
Zinc	12.5	B
Cyanide	2.5	U

AR100691

7-4 GENERAL WATER QUALITY PARAMETER DATA WITH VALIDATION MEMO PREPARED BY GEC

TECHNICAL MEMORANDUM

TO: Jahan Tavangar, Ph.D., P.E.
Project Director

Kevin N. Murdock
Senior Hydrogeologist

FROM: Mary Daly. P.E.
Senior Chemical Engineer

DATE: December 13, 1993

SUBJECT: Data Validation Memorandum
General Water Quality Parameters
Well Survey Activity
Rodale Manufacturing Site, Emmaus, Pennsylvania

INTRODUCTION

As per agreement with EPA, detailed data validation for general water quality parameters, in the same manner as conducted for CLP parameters, was not conducted for samples from the well survey activity. These analytical parameters are non-CLP parameters and do not represent contaminants of concern. Instead, a general assessment of the data for these parameters was conducted by GEC. This assessment consisted of a review of the analytical method, an examination of compliance with holding times, blank analysis results, field duplicate results, and laboratory control sample recoveries. The following is a brief, qualitative report describing this assessment.

Samples from onsite wells and the Borough of Emmaus production wells were sampled for general water quality parameters during the period of June 30 through July 22, 1993. Analyses were performed for alkalinity, total dissolved solids, total Kjeldahl nitrogen, nitrite nitrogen, nitrate nitrogen, ammonia nitrogen, sulfate, total organic carbon, and chloride. The raw data packages, submitted by Lancaster Laboratories, Inc., are in three sets. Two sets contain data from onsite wells and will be discussed together. The third set contains data from the Borough production wells, and will be discussed separately.

RESULTS

1. Onsite Wells

Analysis Method

All analyses were conducted in accordance with the laboratory method specified in the QAPP.

Holding Times

All holding time requirements were met.

Blank Analysis Results

Field Blank OW-FB1 showed a positive result for TOC at 0.8 mg/l.

One Method Blank showed a positive result for TOC at 0.06 mg/l. This affected the TOC analysis of samples OW-Well 5, OW-Well 6, and OW-Well 6D.

Field Duplicate Results

Good precision was demonstrated between the results for the majority of the field duplicate pairs. Poor precision is defined as a relative percent difference (RPD) of greater than 20% for aqueous samples. The following samples demonstrated poor precision in field duplicate pairs:

Sample	Analysis	RPD
Well 1	Kjeldahl Nitrogen	28.6%
	Nitrate Nitrogen	88.9%
Well 4	Nitrate Nitrogen	30.3%
MW-2	TOC	28.6%
MW-3	TOC	44.4%
MW-4	Ammonia Nitrogen	66.7%
	TOC	45.3%

Laboratory Control Sample Recoveries

Laboratory precision is evaluated by determining the relative percent difference of two duplicate spike samples. A Matrix Spike Analysis was performed on sample OW-FB4. The RPD was within range for nitrate nitrogen, nitrite nitrogen, sulfate and Kjeldahl nitrogen. The analysis for TOC was less than the required recovery control limit (the spike for TOC was out of specifications). The Laboratory Control Sample for the analysis was within specifications.

The laboratory performed two types of Instrumental analysis. A Duplicate Analysis on OW-FB4 showed all parameters within the control limits, and a Laboratory Control Standard showed that the required recovery range was achieved for Kjeldahl nitrogen, nitrite nitrogen, nitrate nitrogen, sulfate and TOC.

Quantitation Limits

All nitrate nitrogen samples were run at a dilution factor of 10.

The quantitation limit for total Kjeldahl nitrogen was increased due to the nature of the sample matrix for the following samples: OW-MW1, OW-MW2, OW-MW2D, OW-MW-3, OW-MW-3D, OW-MW-4, OW-MW-4D, OW-Well 2, OW-Well 3, OW-Well 3D, OW-Well 5, OW-Well 6, and OW-Well 6D.

The above samples also required the sulfate analyses to be run at a dilution factor of 5, due to the sample values reporting greater than the linear range of the instrument.

The limit of quantitation for chloride (titrimetric) was increased due to insufficient sample volume for the following samples: OW-MW-1, OW-MW-2, OW-MW-2D, and OW-FB1.

Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased for the following samples: OW-Well 5, OW- Well 2, OW-Well 3, OW-Well 3D.

2. Borough Of Emmaus Production Wells

Analysis Method

All analyses were conducted in accordance with the laboratory method specified in the QAPP.

Holding Times

All holding time requirements were met.

Blank Analysis Results

No positive results were detected in field blanks.

Field Duplicate Results

Good precision was demonstrated between the results for all of the field duplicate pairs.

Laboratory Control Sample Recoveries

Laboratory precision is evaluated by determining the relative percent difference of two duplicate spike samples. A Matrix Spike Analysis was satisfactorily performed.

The laboratory performed two types of Instrumental Analysis. A Duplicate Analysis showed all parameters within the control limits, and a Laboratory Control Standard showed that the required recovery range was achieved for Kjeldahl nitrogen, nitrite nitrogen, nitrate nitrogen, sulfate and TOC.

Quantitation Limits

No discussion of quantitation limits was provided by the laboratory.

Analysis Report

Lancaster Laboratories
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10:15:29 383769 REP
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW-1 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1988521
Date Reported 7/27/93
Date Submitted 6/30/93
Discard Date 8/ 4/93
Collected 6/30/93 by JG
Time Collected 1130
P.O. 1001-02-12
Rel.

OWMW1 SDG# GEC09-01 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	11.	mg/l	1.	020200850
Total Dissolved Solids	150.	mg/l	30.	021201500
Kjeldahl Nitrogen	3.	mg/l	1.	021702000
The quantitation limit for total kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	16.	mg/l	0.5	022000700
Ammonia Nitrogen	3.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	1.3	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	20.	mg/l	10.	112402100
The limit of quantitation for chloride (titrimetric) was increased due to insufficient sample volume.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

See reverse side for explanation of symbols and abbreviations

2216
5 13 90

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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12:07:30 383769
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW-2 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1988523
Date Reported 7/26/93
Date Submitted 6/30/93
Discard Date 8/ 3/93
Collected 6/30/93 by JG
Time Collected 1530
P.O. 1001-02-12
Rel.

OWMW2 SDG# GEC09-02 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	17.	mg/l	1.	020200850
Total Dissolved Solids	140.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for total kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	12.	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	1.2	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
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The limit of quantitation for chloride (titrimetric) was increased due to insufficient sample volume.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

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Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100699

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:07:49 383769
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW-2D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1988525
Date Reported 7/26/93
Date Submitted 6/30/93
Discard Date 8/ 3/93
Collected 6/30/93 by JG
Time Collected 1530
P.O. 1001-02-12
Rel.

WMW2D SDG# GEC09-03

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	17.	mg/l	1.	020200850
Total Dissolved Solids	140.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for total kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	13.	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	1.6	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	21.	mg/l	4.	112402100
The limit of quantitation for chloride (titrimetric) was increased due to insufficient sample volume.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100701

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg). or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l). because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITATION OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. We disclaim any other warranties. express or implied. including a Warranty of Fitness for Particular Purpose and Warranty of Merchantability. We accept no responsibility for the purpose for which the client uses the test results. No purchase order or other order for work shall be accepted by the company with any conditions that vary from our Standard Terms and Conditions. If Lancaster Laboratories performs work requested by the client. conditions at variance to our Standard Terms and Conditions are not part of the contract.

Analysis Report

Lancaster Laboratories
Where quality is a science.

12:05:55 384024
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW3 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1989613
Date Reported 7/26/93
Date Submitted 7/ 2/93
Discard Date 8/ 3/93
Collected 7/ 1/93 by JG
Time Collected 1115
P.O. 1001-02-12
Rel.

OWMW3 SDG# GEC09-06

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	24.	mg/l	1.	020200850
Total Dissolved Solids	120.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	8.9	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	1.1	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	14.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100703

See reverse side for explanation of symbols and abbreviations.

*2216
9 13 90

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Lancaster Laboratories
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12:06:13 384024
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW3D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1989615
Date Reported 7/26/93
Date Submitted 7/ 2/93
Discard Date 8/ 3/93
Collected 7/ 1/93 by JG
Time Collected 1115
P.O. 1001-02-12
Rel.

MW3D- SDG# GEC09-07 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	23.	mg/l	1.	020200850
Total Dissolved Solids	120.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	9.5	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	0.7	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	14.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100705

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:04:23 384251
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW4 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1990318
Date Reported 7/26/93
Date Submitted 7/ 6/93
Discard Date 8/ 3/93
Collected 7/ 6/93 by JG
Time Collected 1300
P.O. 1001-02-12
Rel.

OWMW4 SDG# GEC09-11

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	24.	mg/l	1.	020200850
Total Dissolved Solids	60.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 10.	mg/l	10.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.7	mg/l	0.5	022000700
Ammonia Nitrogen	1.	mg/l	1.	022102800
Sulfate	7.	mg/l	3.	022801900
Total Organic Carbon	4.6	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	5.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100707

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

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N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
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IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:04:42 384251
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-MW4D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1990320
Date Reported 7/26/93
Date Submitted 7/ 6/93
Discard Date 8/ 3/93
Collected 7/ 6/93 by JG
Time Collected 1300
P.O. 1001-02-12
Rel.

MW4D- SDG# GEC09-12 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	22.	mg/l	1.	020200850
Total Dissolved Solids	60.	mg/l	30.	021201500
Kjeldahl Nitrogen	2.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.7	mg/l	0.5	022000700
Ammonia Nitrogen	2.	mg/l	1.	022102800
Sulfate	7.	mg/l	3.	022801900
Total Organic Carbon	2.9	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
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Chloride (titrimetric)	5.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100709

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITATION OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. We disclaim any other warranties, express or implied, including a Warranty of Fitness for Particular Purpose and Warranty of Merchantability. We accept no responsibility for the purpose for which the client uses the test results. No purchase order or other order for work shall be accepted by the company with any conditions that vary from our Standard Terms and Conditions. If Lancaster Laboratories performs work requested by the client, conditions at variance to our Standard Terms and Conditions are not part of the contract.

Analysis Report

Lancaster Laboratories
Where quality is a science.

12:05:04 384251
ASR000 D 3 9
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 5 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1990322
Date Reported 7/26/93
Date Submitted 7/ 6/93
Discard Date 8/ 3/93
Collected 7/ 6/93 by JG
Time Collected 1700
P.O. 1001-02-12
Rel.

VEL5- SDG# GEC09-13 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	56.	mg/l	1.	020100850
Alkalinity to pH 4.5	337.	mg/l	1.	020200850
Total Dissolved Solids	170.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 10.	mg/l	10.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	< 0.5	mg/l	0.5	022000700
Ammonia Nitrogen	2.	mg/l	1.	022102800
Sulfate	20.	mg/l	3.	022801900
Total Organic Carbon	38.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	8.	mg/l	4.	112402100
Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100711

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg). or one gram per million grams. For aqueous liquids. ppm is usually taken to be equivalent to milligrams per liter (mg/l). because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL. but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full. without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:02:58 384428
ASR000 D 3 7
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 6 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1990985
Date Reported 7/26/93
Date Submitted 7/ 7/93
Discard Date 8/ 3/93
Collected 7/ 7/93 by JG
Time Collected 1230
P.O. 1001-02-12
Rel.

WEL6- SDG# GEC09-16

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	102.	mg/l	1.	020200850
Total Dissolved Solids	220.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	0.10	mg/l	0.02	021900800
Nitrate Nitrogen	1.5	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	44.	mg/l	3.	022801900
Total Organic Carbon	13.	mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	15.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100713

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:03:26 384428
ASR000 D 3 7
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 6D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1990987
Date Reported 7/26/93
Date Submitted 7/ 7/93
Discard Date 8/ 3/93
Collected 7/ 7/93 by JG
Time Collected 1230
P.O. 1001-02-12
Rel.

WEL6D SDG# GEC09-17 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	108.	mg/l	1.	020200850
Total Dissolved Solids	230.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 1.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	0.08	mg/l	0.02	021900800
Nitrate Nitrogen	1.5	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	39.	mg/l	3.	022801900
Total Organic Carbon	12.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	16.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100715

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg). or one gram per million grams. For aqueous liquids. ppm is usually taken to be equivalent to milligrams per liter (mg/l). because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL. but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:00:14 385104
ASR000 D 3 4
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 4 Grab Water Sample
Emmaus-On Site Wells

LLI Sample No. WW 1993929
Date Reported 8/ 2/93
Date Submitted 7/13/93
Discard Date 8/10/93
Collected 7/13/93 by GEC
Time Collected 1230
P.O. 1001-02-12
Rel.

OWEL4 SDG# GEC11-01 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	63.	mg/l	1.	020200850
Total Dissolved Solids	170.	mg/l	30.	021201500
Kjeldahl Nitrogen	2.5	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.9	mg/l	0.5	022000700
Ammonia Nitrogen	3.	mg/l	1.	022102800
Sulfate	21.	mg/l	3.	022801900
Total Organic Carbon	3.3	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search — attached — 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search — attached — 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	41.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
560 07440 20.00 139000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100717

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

12:00:30 385104
ASR000 D 3 4
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 4D Grab Water Sample
Emmaus-On Site Wells

LLI Sample No. WW 1993930
Date Reported 8/ 2/93
Date Submitted 7/13/93
Discard Date 8/10/93
Collected 7/13/93 by GEC
Time Collected 1230
P.O. 1001-02-12
Rel.

OWL4D SDG# GEC11-02 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	64.	mg/l	1.	020200850
Total Dissolved Solids	180.	mg/l	30.	021201500
Kjeldahl Nitrogen	2.5	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.4	mg/l	0.5	022000700
Ammonia Nitrogen	3.	mg/l	1.	022102800
Sulfate	21.	mg/l	3.	022801900
Total Organic Carbon	3.2	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search		attached	089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search		attached	089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	41.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
560 07440 20.00 139000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100719

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

03:15:23 385260
ASR000 D 3 11
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 2 Unspiked Grab Water Sample
Emmaus On-Site Wells

LLI Sample No. WW 1994515
Date Reported 8/ 5/93
Date Submitted 7/14/93
Discard Date 8/13/93
Collected 7/14/93 by JG
Time Collected 1300
P.O. 1001-02-12
Rel.

OWW2E SDG# GEC11-05BK

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	231.	mg/l	1.	020200850
Total Dissolved Solids	470.	mg/l	30.	021201500
Kjeldahl Nitrogen	19.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	< 0.5	mg/l	0.5	022000700
Ammonia Nitrogen	17.	mg/l	1.	022102800
Sulfate	83.	mg/l	5.	022801900
Total Organic Carbon	16.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
OA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	90.	mg/l	10.	112402100
Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100721

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg). or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full. without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

03:15:39 385260
ASR000 D 3 11
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 2 Matrix Spike Grab Water Sample
Emmaus On-Site Wells

LLI Sample No. WW 1994519
Date Reported 8/ 5/93
Date Submitted 7/14/93
Discard Date 8/13/93
Collected 7/14/93 by JG
Time Collected 1300
P.O. 1001-02-12
Rel.

OWW2E SDG# GEC11-05MS ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	417.	mg/l	1.	020200850
Total Dissolved Solids	580.	mg/l	30.	021201500
Kjeldahl Nitrogen	47.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	0.07	mg/l	0.02	021900800
Nitrate Nitrogen	1.3	mg/l	0.5	022000700
Ammonia Nitrogen	26.	mg/l	1.	022102800
Sulfate	133.	mg/l	5.	022801900
Total Organic Carbon	41.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
Chloride (titrimetric)	180.	mg/l	2.	112402100
Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

The concentration of pentachlorophenol ia tentative since it fell above the calibration range in the initial analysis of the sample.

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
377 07440 20.00 128000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100723

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l). because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full. without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

05:19:27 385495
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 1 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1995418
Date Reported 8/ 3/93
Date Submitted 7/16/93
Discard Date 8/11/93
Collected 7/15/93 by GEC
Time Collected 1730
P.O. 1001-02-12
Rel.

OW-1- SDG# GEC11-08 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	186.	mg/l	1.	020200850
Total Dissolved Solids	220.	mg/l	30.	021201500
Kjeldahl Nitrogen	2.4	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	< 0.5	mg/l	0.5	022000700
Ammonia Nitrogen	1.	mg/l	1.	022102800
Sulfate	7.	mg/l	3.	022801900
Total Organic Carbon	14.	mg/l	1.	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search — attached — 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search — attached — 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	14.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
560 07440 20.00 139000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100725

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

05:19:41 385495
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 1D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1995420
Date Reported 8/ 3/93
Date Submitted 7/16/93
Discard Date 8/11/93
Collected 7/15/93 by GEC
Time Collected 1730
P.O. 1001-02-12
Rel.

OW-1D SDG# GEC11-09 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	189.	mg/l	1.	020200850
Total Dissolved Solids	220.	mg/l	30.	021201500
Kjeldahl Nitrogen	1.8	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.3	mg/l	0.5	022000700
Ammonia Nitrogen	1.	mg/l	1.	022102800
Sulfate	6.	mg/l	3.	022801900
Total Organic Carbon	15.	mg/l	1.	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search attached 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search attached 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	16.	mg/l	1.	112402100
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
Pesticides/PCBs (EPA 3/90 SOW)		attached		453329000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
560 07440 20.00 139000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100727

See reverse side for explanation of symbols and abbreviations.

*2216
9 13 90

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nepheiometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

11:58:52 385638
ASR000 D 3 7
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 3 Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1995939
Date Reported 8/ 2/93
Date Submitted 7/16/93
Discard Date 8/10/93
Collected 7/16/93 by JG
Time Collected 1530
P.O. 1001-02-12
Rel.

OW-3- SDG# GEC11-13 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	122.	mg/l	1.	020200850
Total Dissolved Solids	200.	mg/l	30.	021201500
Kjeldahl Nitrogen	5.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	< 0.5	mg/l	0.5	022000700
Ammonia Nitrogen	4.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	12.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	40.	mg/l	2.	112402100
Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

AR 10/20

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis - Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

11:59:17 385638
ASR000 D 3 7
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
OW-Well 3D Grab Water Sample
Emmaus - On Site Wells

LLI Sample No. WW 1995941
Date Reported 8/ 2/93
Date Submitted 7/16/93
Discard Date 8/10/93
Collected 7/16/93 by JG
Time Collected 1530
P.O. 1001-02-12
Rel.

OW-3D SDG# GEC11-14 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	124.	mg/l	1.	020200850
Total Dissolved Solids	210.	mg/l	30.	021201500
Kjeldahl Nitrogen	5.	mg/l	1.	021702000
The quantitation limit for kjeldahl nitrogen was increased due to the nature of the sample matrix.				
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	< 0.5	mg/l	0.5	022000700
Ammonia Nitrogen	5.	mg/l	1.	022102800
Sulfate	< 3.	mg/l	3.	022801900
Total Organic Carbon	11.	mg/l	1.	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".				
VOA GC/MS Library Search		attached		089004000
The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are: B - detected in method blank; D - determined in diluted sample; J - estimated value; N - presumptive evidence of a compound				
Semivolatile Library Search		attached		089307000
The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are: A - aldol condensate; B - detected in method blank; D - determined in diluted sample; X - an isomer of the listed compound; J - estimated value; N - presumptive evidence of a compound				
Chloride (titrimetric)	40.	mg/l	2.	112402100
Due to interferences from the sample matrix, the limit of quantitation for the chloride (titrimetric) determination was increased.				
TCL Volatiles (EPA 3/90 SOW)		attached		427527000
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000

Questions? Contact Environmental Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100731

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation. the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg). or one gram per million grams. For aqueous liquids. ppm is usually taken to be equivalent to milligrams per liter (mg/l). because one liter of water has a weight very close to a kilogram. For gases or vapors. one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL. but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved. the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples. please contact us. We cannot be held responsible for sample integrity. however. unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full. without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

04:21:32 385939
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-4 Grab Water Sample
Rodale

LLI Sample No. WW 1997119
Date Reported 8/ 4/93
Date Submitted 7/20/93
Discard Date 8/12/93
Collected 7/20/93 by JEG
Time Collected 1615
P.O. 1001-02-12
Rel.

PSW-4 SDG# PSW01-01 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	125.	mg/l	1.	020200850
Total Dissolved Solids	170.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	2.6	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	16.	mg/l	3.	022801900
Total Organic Carbon	< 0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search		attached	089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search		attached	089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	8.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
652 07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100733

See reverse side for explanation of symbols and abbreviations.

221E
9/13/90

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	*Concentration exceeds the calibration range of* the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	*Method of standard additions (MSA) used* for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

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Analysis Report

Lancaster Laboratories
Where quality is a science.

04:21:42 385939
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-4D Grab Water Sample
Rodale

LLI Sample No. WW 1997121
Date Reported 8/ 4/93
Date Submitted 7/20/93
Discard Date 8/12/93
Collected 7/20/93 by JEG
Time Collected 1615
P.O. 1001-02-12
Rel.

PSW4D SDG# PSW01-02 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	125.	mg/l	1.	020200850
Total Dissolved Solids	170.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	2.6	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	16.	mg/l	3.	022801900
Total Organic Carbon	< 0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search — attached — 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search — attached — 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	8.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
652 07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100735

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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04:21:52 385939
ASR000 D 3 8
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-6 Grab Water Sample
Rodale

LLI Sample No. WW 1997123
Date Reported 8/ 4/93
Date Submitted 7/20/93
Discard Date 8/12/93
Collected 7/20/93 by JEG
Time Collected 1530
P.O. 1001-02-12
Rel.

PSW-6 SDG# PSW01-03 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	78.	mg/l	1.	020200850
Total Dissolved Solids	150.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	2.5	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	10.	mg/l	3.	022801900
Total Organic Carbon	< 0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search attached 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search attached 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	22.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
652 07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100737

See reverse side for explanation of symbols and abbreviations

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

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Analysis Report

Lancaster Laboratories
Where quality is a science.

04:20:50 386169
ASR000 D 3 5
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-2 Grab Water Sample
Rodale

LLI Sample No. WW 1998072
Date Reported 8/ 4/93
Date Submitted 7/21/93
Discard Date 8/12/93
Collected 7/21/93 by JEG
Time Collected 1615
P.O. 1001-02-12
Rel.

PSW-2 SDG# PSW01-06

ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	162.	mg/l	1.	020200850
Total Dissolved Solids	320.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.9	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	23.	mg/l	3.	022801900
Total Organic Carbon	< 0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search — attached — 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search — attached — 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	32.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
665 07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100739

See reverse side for explanation of symbols and abbreviations.

*2216
9 13 93

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
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04:20:39 386169
ASR000 D 3 5
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-7 Grab Water Sample
Rodale

LLI Sample No. WW 1998070
Date Reported 8/ 4/93
Date Submitted 7/21/93
Discard Date 8/12/93
Collected 7/21/93 by JEG
Time Collected 1545
P.O. 1001-02-12
Rel.

PSW-7 SDG# PSW01-05 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	206.	mg/l	1.	020200850
Total Dissolved Solids	270.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	5.9	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	33.	mg/l	3.	022801900
Total Organic Carbon	0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search — attached — 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search — attached — 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	26.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
665 07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100741

See reverse side for explanation of symbols and abbreviations

*2210
6 13 93

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Analysis Report

Lancaster Laboratories
Where quality is a science.

11:19:08 386338
ASR000 D 3 5
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-1 Grab Water Sample
Rodale

LLI Sample No. WW 1998861
Date Reported 8/ 6/93
Date Submitted 7/22/93
Discard Date 8/14/93
Collected 7/22/93 by JW
Time Collected 1545
P.O. 1001-02-12
Rel.

PSW-1 SDG# PSW01-08 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	165.	mg/l	1.	020200850
Total Dissolved Solids	240.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	2.2	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	22.	mg/l	3.	022801900
Total Organic Carbon	0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search		attached	089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search		attached	089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	18.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
07440 20.00 113000

Respectfully Submitted
Lancaster Laboratories, Inc.

Ramona V. Layman, Group Leader
Instrumental Water Chemistry

Lancaster Laboratories, Inc.
2425 New Holland Pike
Lancaster, PA 17601-5994
717-656-2301

AR100743

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

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Analysis Report

Lancaster Laboratories
Where quality is a science.

11:20:39 386338
ASR000 D 3 5
07440 0

Geo-Environmental Consultants
Great Valley Corporate Center
55 Valley Stream Pkwy. Ste 140
Malvern, PA 19355
PSW-3 Grab Water Sample
Rodale

LLI Sample No. WW 1998863
Date Reported 8/ 6/93
Date Submitted 7/22/93
Discard Date 8/14/93
Collected 7/22/93 by JW
Time Collected 1515
P.O. 1001-02-12
Rel.

PSW-3 SDG# PSW01-09 ANALYSIS	RESULT AS RECEIVED		LIMIT OF QUANTITATION	LAB CODE
Alkalinity to pH 8.3	< 1.	mg/l	1.	020100850
Alkalinity to pH 4.5	119.	mg/l	1.	020200850
Total Dissolved Solids	170.	mg/l	30.	021201500
Kjeldahl Nitrogen	< 0.2	mg/l	0.2	021702000
Nitrite Nitrogen	< 0.02	mg/l	0.02	021900800
Nitrate Nitrogen	1.9	mg/l	0.5	022000700
Ammonia Nitrogen	< 1.	mg/l	1.	022102800
Sulfate	15.	mg/l	3.	022801900
Total Organic Carbon	< 0.5	mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

VOA GC/MS Library Search attached 089004000

The results from the volatile library search are listed on the attached FORM 1E - VOA-TIC. The qualifiers appearing in the "Q" column are:

- B - detected in method blank
- D - determined in diluted sample
- J - estimated value
- N - presumptive evidence of a compound

Semivolatile Library Search attached 089307000

The results from the semivolatile library search are listed on the attached FORM 1F - SV-TIC. The qualifiers appearing in the "Q" column are:

- A - aldol condensate
- B - detected in method blank
- D - determined in diluted sample
- X - an isomer of the listed compound
- J - estimated value
- N - presumptive evidence of a compound

Chloride (titrimetric)	11.	mg/l	1.	112402100
TCL Semi-Volatiles (3/90 SOW)		attached		437254000
TCL Semi-Volatiles 3/90 (cont)		attached		437300000
TCL Volatiles (6/91 SOW)		attached		491430000

1 COPY TO Geo-Environmental Consultants ATTN: Mr. Kevin Murdock
2 COPIES TO Data Package Group

Questions? Contact Environmental Client Services at (717) 656-2301
07440 20.00 113000

Respectfully Submitted
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AR100745

See reverse side for explanation of symbols and abbreviations.

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

N.D.	none detected	**BMQL**	Below Minimum Quantitation Level
TNTC	Too Numerous To Count	**MPN**	Most Probable Number
IU	International Units	**CP Units**	cobalt-chloroplatinate units
umhos/cm	micromhos/cm	**NTU**	nephelometric turbidity units
C	degrees Celsius	**F**	degrees Fahrenheit
Cal	(diet) calories	**lb.**	pound(s)
meq	milliequivalents	**kg**	kilogram(s)
g	gram(s)	**mg**	milligram(s)
ug	microgram(s)	**l**	liter(s)
ml	milliliter(s)	**ul**	microliter(s)
m3	cubic meter(s)	**fib > 5 um/ml**	fibers greater than 5 microns in length per ml

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte concentration to approximate the value present in a similar sample without moisture.

U.S. EPA data qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
J	Estimated value
N	Presumptive evidence of a compound (TIC's only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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