REMEDIAL INVESTIGATION REPORT

DOVATRON INTERNATIONAL
ORDER ON CONSENT INDEX # B7-0516-97-05
SITE CODE #704024

Former Binghamton Plastics Site
498 Conklin Avenue
Binghamton, New York

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1.0 INTRODUCTION

This Remedial Investigation Report has been prepared by Shield Environmental Associates, Inc. (Shield) to detail current conditions at the former Binghamton Plastics site in Binghamton, New York. The facility is located at 498 Conklin Avenue, Binghamton, Broome County, New York (Figure 1). The site, owned by the Dii Group and currently leased to McIntosh Laboratories, Inc., is on the New York State Department of Environmental Conservation (NYSDEC) Registry of Inactive Hazardous Waste Disposal Sites (Site Code 704024).

This report was prepared using available site data. Data collected by previous consultants were also reviewed and are summarized in this document.

1.1 PURPOSE

The purpose of this investigation is to satisfy the requirements set forth in the NYSDEC Order on Consent (Index # B7-0516-97-05) that was signed into effect on June 23, 1998. The remedial investigation (RI) was performed in accordance with the NYSDEC-approved Remedial Investigation/Feasibility Study Work Plan dated August 28, 1998. The Order on Consent states that the "Respondent shall prepare a Remedial Investigation Report that shall:

1. include all data generated and all other information obtained during the RI;
2. provide all of the assessments and evaluations set forth in CERCLA, the NCP, and the guidance documents identified in Subparagraph II.B.2;
3. identify any additional data that must be collected;
4. include a certification by the individual or firm with primary responsibility for the day to day performance of the RI that all activities that comprised the RI were performed in full accordance with the Department-approved RI/FS Work plan."

1.2 SITE BACKGROUND

1.2.1 Site Description

The facility, at 498 Conklin Avenue, Binghamton, Broome County, New York (Figure 1), is situated in an industrial/residential setting. The site is bounded by McIntosh Laboratories to the west, the Erie-Lakawanna Railroad, a public park and Susquehanna River to the north, and residential properties to the east and south (Figure 2).

The subject site consists of a large industrial building (44,800 square feet) with associated parking, landscape, and storage areas. Table 1 contains a chronology of significant site events. A complete list of chemical substances used at the plant is not available; however, the use of TCE and 1,1,1-TCA has been substantiated.

1.2.2 Topography

The site is situated at an elevation ranging from approximately 870 to 880 feet above Mean Sea Level (MSL). The site topography is relatively level sloping gently to the north in the area of the building. The parking area on the southern side of the building is approximately 4 feet higher than the rest of the property. The area north of Conklin Avenue slopes steeply towards the Susquehanna River. Figure 1 shows the regional topography of the area.

1.2.3 Geology

Regional Geology

The site lies in the southeastern portion of the Allegheny Plateau province of the Appalachian Mountains in New York. The rocks of the Allegheny Plateau are sedimentary, several types of which are exposed in outcrops of the plateau. The rock types are limestone, dolostone, sandstone, siltstone, shale, and salt. Three surficial lithologic groups are in the Binghamton, New York area; the West Falls Group, the Sonyea Group and the Genesee Group. These groups are Upper Devonian in age.

The uppermost bedrock group below the subject site is the Sonyea Group. This group consists of siltstone and shale beds. The Sonyea Group ranges in thickness from 200 to 1,000 feet.

Overlying the Sonyea Group is the West Falls Group. This group has eroded directly under the site. The West Falls Group is the predominant bedrock underling the Susquehanna River Valley in central New York State. It consists of eight formations that contain sandstones, siltstones and shales. The West Falls Group ranges in thickness from 1,100 to 1,600 feet.

The Genesee Group is the sedimentary lithologic group underlying the Sonyea Group. It consists of shale and limestone formations and outcrops north of the Binghamton area. This group consists of four separate identified formations. These formations range in thickness from 200 to 1,000 feet.

Area Glaciation

The surface topography in the vicinity of the site consists of glacial and glaciofluvial features common in this portion of the Allegheny Plateau. Erosion and glacial deposition originally formed these features. A preglacial river originally carved the Susquehanna River Valley. The valley was then deepened and widened by continental glacial erosion. During glacial advance, the ice deposited large volumes of unstratified sediments (glacial till) along the margins of the ice sheet.

The continental glacier began to retreat north approximately 21,000 years ago. As the ice

receded northward, meltwater streams eroded the till deposits. These high-energy meltwater streams produced well-sorted fluvial deposits in the valley floor. In addition, preglacial lakes supplied sedimentary deposits. According to the U.S. Geological Survey's (USGS) Open File Report No. 91-457, a lacustrine deposit underlies the Susquehanna Valley floor from Binghamton to Great Bend, reaching thicknesses of 70 feet. The Susquehanna River subsequently deposited fluvial deposits consisting of sand, silts and clays.

Site Geology

Fourteen ground water monitoring wells and one recovery well (DMW1) have been installed on-site. Additionally, numerous soil borings have been drilled on the western side of the property. Three of the monitoring wells and the recovery well were installed by previous consultants. To date, Shield has installed eleven monitoring wells, advanced four soil borings with a drill rig and nine soil borings with a Geoprobe® direct-push soil sampler. The following site geology is based on site research and observations from drilling operations.

The surficial sediments at the site consist of brown, poorly sorted, weathered, glacial till and is found at depths ranging from 0 to 25 feet below the ground surface. The weathered till is unstratified and contains clays, silts, sands, gravels and cobbles. The upper weathered till is a brown clay that contains poorly sorted, sub-rounded gravel.

Below the weathered brown till lies the unweathered till. These sediments are similar to the weathered till and consist of poorly sorted clay, silt, sand, gravel, and cobbles. However, the color grades from light-brown to olive-gray and contains fewer cobbles.

1.2.4 Hydrogeology

Regional Hydrogeology

The main ground water aquifer in the area is the Five Mile Point aquifer. The sediments that make up this aquifer are glacial outwash deposits. According to the USGS's Open File Report No. 91-457, the aquifer consists of 30- to 70-foot-thick beds of sand and gravel underlain by sand and silt. The aquifer is bounded laterally and partially beneath by glacial till. The potentiometric surface of the ground water in the Five Mile Point aquifer is approximately 830 ft above mean sea level.

Regional ground water in the study area is hydraulically connected to the Susquehanna River. The ground water in the area generally flows along the valley walls toward the river and is recharged from upland runoff. Pumping from well fields in the towns of Kirkwood and Conklin has altered the natural flow pattern. In well field areas, ground water that previously discharged to the river is now captured by production wells (USGS Open File Report No. 91-457).

Site Hydrogeology

According to the USGS report, the Binghamton Plastics Site is located approximately 2 miles downgradient of the westernmost boundary of Five Mile Point aquifer. Based on this information, the site should not present any threat to the aquifer.

The ground water underlying the site is separated into two water-bearing units. There is a shallow/perched water zone on the southwestern side of the property in the vicinity of the contaminated source area. This shallow water/perched zone was not encountered on the northern and eastern sides of the property.

Ground water on the southwest side of the property (MW1, MW4, MW5, MW8, MW9, MW10, and MW11) was encountered between approximately 3 and 5 feet below the ground surface. Due to the shallow depth of ground water in this area and the potential for cross-contamination into the deeper, regional aquifer, these wells were not installed below a depth of 20 feet. Based on the first three gauging events, the direction of ground water flow in the shallow ground water zone is to the west-northwest towards Chambers Street. Ground water on the northern and eastern side of the property (MW3, MW6, MW7, and MW12) was encountered between approximately 23 and 32 feet below the ground surface. These wells range from 40 to 48 feet in depth. Ground water flow in this deeper aquifer has been established to be to the east-northeast at a gradient of 0.076 ft/ft. A tight weathered till separates the perched/shallow water bearing unit from the deeper, regional aquifer. Contamination has not been detected in the deeper, regional aquifer to date. Furthermore, based on three ground water gauging events, the wells in the deeper aquifer and the wells completed within the shallow aquifer do not appear to be hydraulically connected. Shield's ground water elevation data are summarized in Table 2.

1.2.5 Soil Types

Based upon the U.S. Department of Agriculture, Soil Conservation Service (USDA SCS), *Soil Survey, Broome County, New York,* dated March 1971, the soil type at the site is the Mardin Channery silt loam (8 to 15 percent slopes). The Mardin Channery silt loam consists of deep, gently sloping to steep, well-drained and moderately well-drained soils that form in glacial till.

In addition, the local National Resource Conservation Service (NRCS) office was contacted for information related to hydric soils on site. According to NRCS personnel, hydric soils are not known to exist on the property.

1.2.6 Surface Water

No surface water features (e.g., ponds, streams, springs) are on the subject site. The surface water runoff is collected through a series of catch basins, pipes, and open ditches. The catch

basins consist of below ground concrete boxes with grates and curb inlets on the surface that allow water to enter the boxes. The water is transported from the catch basins below the ground to an outfall where the water is discharged to the surface. Catch basins and pipes are used to collect surface water runoff from paved areas. The roof drains discharge to the surface adjacent to the building.

1.2.7 Air Quality

The site is located in Broome County, New York, Air Quality Control Region 7, in an industrial area. The Region 7 air quality monitoring network consists of six locations where ambient air quality is measured for comparison to the National Ambient Air Quality Standards (NAAQS). The monitoring location in Broome County is in Binghamton. Particulate matter less than 10 microns in aerodynamic diameter (PM10) is measured. Other monitors located in Region 7 analyze for sulfur oxides, ozone, nitrous oxides and carbon monoxide. The location closest to the Binghamton site that measures for multiple parameters is Camp Georgetown, Chenago County, where sulfur oxides, ozone and acid deposition are measured.

The NAAQS are published in the Federal Register and in the 40 Series Code of Federal Regulations (CFR). New York also publishes standards in the state regulations. New York has not adopted the federal standard for PM10, but uses it currently to establish compliance. The primary and secondary NAAQS for PM10 are 50 ug/m^3 for a yearly arithmetic mean average, and 150 ug/m^3 for a maximum 24-hour concentration. According to information from the *New York State Air Quality Report Ambient Air Monitoring System, 1995 Annual Division of Air Resources Report*, the highest reported annual arithmetic mean for Binghamton was 26 ug/m^3 (1991). The 1995 data indicate an annual arithmetic mean of 19 ug/m^3, and a maximum 24- hour concentration of 49 ug/m^3 occurring on July 26, 1995. From a review of the Binghamton area data, no exceedences of PM10 were noted.

1.2.8 Meteorology

Data referenced in this subsection were obtained from the National Weather Service, Binghamton Airport office and the Soil Survey for Broome County. Broome County has a continental humid climate. The summers are warm, and the winters are long and cold with frequent periods of snowfall and stormy weather. The Great Lakes do not have a strong direct influence on the area. All climate data are obtained from the Binghamton airport, which is at an elevation of 1,590 feet above Mean Sea Level. Temperature ranges will vary according to location and are normally a function of diurnal valley breeze and local topographic influence.

The regional topography and location of the county favor a considerable amount of cloudiness, most often in late fall and winter. On average, there are 215 cloudy days per year. The prevailing cloudiness also decreases the percentage of possible sunshine from 60 to 70 percent in the summer to 30 percent in winter.

Mean annual precipitation in the area is 36.99 inches, with the greatest recorded 24-hour rainfall event being 3.88 inches (October 15-16, 1955). Showers and thunderstorms occur on 25 to 30 days a year, providing the greatest precipitation during the months of May through October. This is usually followed by a frontal passage bringing cold, dry, stable air behind the precipitation event. The area experiences snowfall for an extended season. Seasonal snowfall ranges from a record high of 134 inches to a low of 47.8 inches. The greatest 24-hour snowfall was 23 inches on February 3-4, 1961.

Prevailing winds in the area are generally westerly. However, regional topographic and man-made features such as ridges, water, buildings, and vehicles can alter local winds. The average wind speed is 9 mph in the late summer/early fall season and increases to 12 mph in the winter. The area experienced an all-time-record wind speed of 74 mph in July 1992. Dense fog will also occur about 50 days per year.

The annual average temperature is 45.5°F, with a yearly average maximum of 54°F and a yearly average minimum of 37°F. The summer months can be very hot, with a record high temperature of 98°F recorded on July 16, 1988. The average high temperature in the summer is 66.9°F, with an average low temperature in the winter of 23.5°F. Winter can be extremely cold, with a record low of -10°F recorded on January 19, 1994. The average relative humidity in the summer months ranges between 50 to 60 percent; with infrequent extended periods of high temperature and relative humidity.

The average annual atmospheric pressure is 28.26 inches of mercury, with high pressure predominating during the late summer/early fall and the lowest pressures occurring in the winter months.

1.2.9 Ecology

As indicated previously, the site is located in an industrial setting and has been developed and used for industrial purposes. A large portion of the site is covered with a structure and asphalt/concrete for parking and roadways. The western side of the property in the vicinity of the contaminated source area is covered with gravel.

Vegetation is limited to grassy areas directly around the building and parking areas. Some landscaped areas (shrubs and perennials) are also located at the site. No ponds, lagoons, or other surface water features are present at the site. No information is available indicating that a site-specific ecological survey has been conducted.

1.2.10 Site History

According to previous reports, Binghamton Plastics constructed the subject facility in 1956. Additions to the property were reportedly constructed in 1963, 1978, and 1980. Binghamton

Plastics operated the facility until the early 1980's when Universal Instruments Corporation purchased the property and converted the facility into a circuit board assembly plant. Universal Instruments operated the facility until they were taken over by Dover Electronics Corporation in the late 1980's. In 1993, Dover Electronics was separated from Dover as a stand-alone corporation named Dovatron, Inc. In 1996, Dovatron changed its name to the Dii Group. The building has been leased to and occupied by McIntosh Laboratories since the early 1990s. The facility is currently used as an electronics assembly and repair facility.

Shield reviewed a June 1990 letter to Hagopian Engineering Associates from the Broome County Health Department (Hagopian 1990). This letter indicated that there were three contaminated sites within a 1/2-mile radius of Conklin Avenue. One of those sites was identified as Binghamton Plastics Dump, which was listed as being located at 498 Conklin Avenue. Reportedly, waste plastics and oils were thought to have been disposed of there. However, this information has not been substantiated.

1.2.11 Previous Investigations

Starting in 1985, numerous environmental investigations have been conducted at the subject facility by several environmental consultants. These investigations were conducted by Hagopian Engineering Associates (Hagopian), Stetson-Harza, Harza Northeast and Shield Environmental Associates.

Tank Removal (1986)

A 1,000-gallon hydraulic oil tank was reportedly removed from the site in 1986. The name of the tank removal contractor is unknown, and a tank closure report was not available for review. However, the reports reviewed (*Environmental Site Investigation for Dover Electronics Company, DEM-East and Kirkwood North Locations* and *DEM-East, Phase III Investigation, Final Report*) indicated that the tank contained 650 gallons of hydraulic oil contaminated with 1,1,1-trichloroethane (1,1,1-TCA) and trichloroethene (TCE).

Hagopian Engineering Associates (July 1990)

In July 1990, Dover Electronics contracted Hagopian Engineering to conduct a site investigation at the facility for the purpose of establishing an environmental baseline. Concrete cores were collected from six locations inside the 1956 portion of the building to identify an oil staining problem related to the floor tiles. Several soil samples were also collected in this area. Exact locations of the samples collected were not identified in the copy of the report reviewed (Hagopian, 1990). Samples were analyzed by Upstate Laboratories, Inc. for volatile organic compounds (VOCs) using SW-846 Methods 8010, 8020, and/or 8240. A petroleum scan (FID 310-13) was used to fingerprint selected samples for the presence of petroleum products (gasoline, kerosene, fuel oil and lubricating oil). Concrete core data indicated no chemical contamination, with the exception of hydraulic oil that was detected in the top surface of one concrete core (Core #3), was found. No

contamination was found in the soil samples collected below the concrete cores.

Additional soil sampling outside the building indicated elevated chemical compounds in subsurface soils at two borings (B3C and B4C) in the vicinity of the removed UST. Boring B3C contained detectable concentrations of 1,1,1-TCA, TCE, carbon tetrachloride and lubricating oil. Boring B4C contained detectable concentrations of 1,1,1-TCA, TCE and lubricating oil.

Hagopian Engineering Associates (June 1991)

In May/June 1991, Hagopian conducted an expanded subsurface site investigation documented in a report entitled *Phase II Environmental Site Investigation for Dover Electronics*. During the investigation, ground water monitoring wells (MW1-MW4) were installed and soil gas, soil and ground water samples were collected. Stetson-Harza later renamed the monitoring wells DMW1-DMW4.

This investigation detected elevated VOCs in the soils and ground water. Elevated levels of 1,1,1-TCA and TCE were detected in a soil sample collected from 8-10 below the ground surface in DMW1. A soil sample collected from DMW2 also showed an elevated concentration of TCE. A ground water sample collected from DMW1 showed high concentrations of TCE and 1,1,1-TCA. Ground water in DMW2 also had an elevated level of TCE. Hagopian recommended removing the contaminated soil and treating the impacted ground water.

Stetson-Harza Investigation (July 1992)

In July 1992, four borings (D-1 through D-4) were drilled 4 to 6 feet below the ground surface. Two composite soil samples (D-1-2 and D-3-4) were analyzed for VOCs using EPA SW-846 Method 8240. One sample (D-1-2) was also analyzed for toxic characteristic leachate procedure (TCLP) metals, TCLP pesticides and herbicides and TCLP volatiles and base neutral acid compounds. Additionally, the ground water monitoring wells (DMW1-DMW4) were redeveloped, sampled and analyzed for VOCs. Ground water elevation data were also collected during this sampling event. The results of this investigation were documented in a report entitled *Dover Electronics Company DEM – East Phase III Investigation* dated December 1992.

Ground water samples collected indicated elevated concentrations of 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), trans- and cis-1,2-dichloroethene (1,2-DCE), 1,1,1-TCA, and TCE. Based upon these data, a pump and treat ground water treatment system was recommended.

Harza Northeast – Ground Water Treatment System (August 1993)

In August 1993, Stetson-Harza designed a pump and treat system using the existing well (DMW1) as the extraction well piped to a carbon treatment system (two carbon units placed in series). The proposed system was presented in a report entitled *On-Site Groundwater Treatment System Engineering Report* dated August 1993. Chemical constituents detected in DMW1 included TCE, PCE, 1,1,1-TCA, 1,1,2-trichloroethane (TCA), cis- and trans-1,2-DCE, 1,1-DCA, 1,1-DCE, vinyl chloride, chloromethane, methylene chloride, chloroform, and cis-1,1-dichloropropane. TCE, 1,1,1-TCA, cis-1,2-DCE, and 1,1-DCA have been detected at the highest concentrations in the influent samples.

The system consists of a positive displacement pump with a pneumatic controller, tanks, pressure gauges, and sampling ports. The system was also fitted with a bag filter prior to carbon treatment. Upon treatment, the system discharges to the Binghamton-Johnson City Sanitary Sewer System. An operational report for the ground water treatment system indicated that approximately 50,030 gallons had been pumped and treated over a 450-day period; however, Dii personnel have reported periods of much lower flow from the treatment well. The system has been shutdown periodically for maintenance and repair and has not run continuously. The system has also undergone some changes to reduce compressor overheating.

The treatment system at the subject site is operating on a Binghamton-Johnson City Joint Sewage Board permit dated September 2, 1993. The current discharge limits for specific parameters are as follows:

Parameter	**Discharge Limit**
Cadmium	0.30 mg/L
Chromium	5.36 mg/L
Copper	3.38 mg/L
Cyanide	2.31 mg/L
Lead	2.50 mg/L
Mercury	0.001 mg/L
Nickel	3.98 mg/L
Zinc	8.81 mg/L
Oil & Grease	100 mg/L
Total toxic organics	2.13 mg/L
PCBs, total	0.001 mg/L
Flow	1,500 gallons per day
pH	6.0 - 10.0
Flashpoint	140° F

Significant concentrations of TCE, 1,1,1-TCA, 1,2-DCE and 1,1-DCA have been removed from the ground water during the operation of the ground water treatment system. In March

1995, Harza Northeast prepared a report entitled *1993 and 1994 Operation Report for On-Site Groundwater Recovery and Treatment System.*

The system has been operated and maintained by Dovatron International for the past five years. Monthly discharge reports have been submitted to the Binghamton-Johnson City Joint Sewage Board during the periods of system operation. A summary of the discharge reports for 1999 is contained in Appendix A.

Shield Environmental Associates (October 1996)

In October 1996, Shield personnel sampled the ground water monitoring wells that were installed by Hagopian in 1991, with the exception of DMW2 that was removed during the widening of Chambers Street. Each well was purged of at least three well volumes of water with a disposable bailer prior to sampling. The ground water samples were submitted to Quanterra Environmental Services for VOC analysis using EPA SW-846 Method 8240 and semi-volatile organic compound (SVOC) analysis using EPA SW-846 Method 8270. Results of this sampling event are contained in the *Baseline Summary Report* dated May 8, 1998.

Shield Environmental Associates (October 1997)

During the period of October 7 to October 10, 1997, three soil borings that were converted into monitoring wells (MW5, MW6, and MW7) were advanced between 20 and 40 feet below the ground surface. The soil borings were drilled through glacial till using a drill rig equipped with 4.25-inch-inside-diameter (I.D.) hollow-stem augers. Continuous soil samples were collected from MW5 to a depth of 16 feet with a split-spoon sampler and field screened with a photoionization detector (PID). The field screening did not detect VOCs in any of the samples collected from MW5. One soil sample, collected from MW5 at a depth of 6 to 8 feet below the ground surface, was submitted to Quanterra Environmental Services for total VOC analysis. Due to their distances from the contamination source, soil samples were not collected from MW6 and MW7.

Water was encountered at approximately eight to ten feet below the ground surface during the drilling of MW5. MW5 was completed to a depth of 20 feet. Water was encountered approximately 30 feet below the surface during the drilling of MW6 and MW7. These wells were completed to a depth of 40 feet. The wells were constructed of 2-inch-diameter, Schedule 40 PVC pipe with 0.010-inch slotted well screen located at the bottom 10-foot interval of each well. A silica sand filter pack was placed to 2 feet above the screen in the annular space of each well. A 2-foot-thick bentonite seal was placed above the filter pack. The remaining annular space was filled with grout to approximately 1 foot below the ground surface. The wells were sealed in 8-inch manholes with locking, watertight caps inside 2-foot by 2-foot concrete well pads. Following installation, each well was developed until the discharge was free of sediment or until the well ran dry.

On October 15, 1997, all wells on site were purged of at least 3 well volumes of water with a disposable bailer prior to sampling. The samples were placed in an iced cooler and submitted to Quanterra Environmental Services for VOC analysis using EPA SW-846 Method 8260A. Results of this investigation are contained in the *Baseline Summary Report* dated May 8, 1998.

Shield Environmental Associates (January/February 1998)

During the period of January 27 to February 5, 1998, twelve soil borings (MW8 through MW13 and SB1 through SB6) were drilled through glacial till using a drill rig equipped with 4.25-inch I.D. hollow-stem augers. Soil samples were collected from each soil boring with a split-spoon sampler and field screened with a PID. VOCs were not detected in any of the samples that were field screened. At least one soil sample from each boring located in the vicinity of the source area was submitted to an EPA approved laboratory for analysis. MW8 through MW13 were converted into ground water monitoring wells and constructed in the same manner as MW5, MW6 and MW7 described above. Following installation, each well (with the exception of MW13, which was dry) was developed until the discharge was free of sediment or until the well ran dry.

On February 5, 1998, the water levels in all monitoring wells on site (DMW1 through MW13) were gauged with an electronic water level indicator accurate to 0.01 feet. DMW2 was removed during the widening of Chambers Street and could not be gauged; however, MW8 was placed in the general vicinity of the former location of DMW2. A perched aquifer appears to be present in the vicinity of the source area on the western side of the building. The water in this perched zone was encountered between approximately 2 to 3 feet below the ground surface. Based on this gauging event, movement within the perched aquifer appears to be to the west-northwest toward Chambers Street. The uppermost regional aquifer was encountered between approximately 22 to 28 feet below the ground surface in DMW3, MW6, MW7 and MW12. Ground water flow in the regional aquifer is to the northeast.

On February 5, 1998, all monitoring wells, with the exception of MW13 which was dry, were purged and sampled using a disposable bailer. Water samples from all wells were placed in an iced cooler and transported to an EPA approved laboratory for total VOC analysis using EPA SW-846 Method 8260A. Water samples collected from DMW1, MW5, and MW9 located within or in the vicinity of the source area were analyzed for the full Target Compound List/Target Analyte List (TCL/TAL). Results of this investigation are contained in the *Baseline Summary Report* dated May 8, 1998.

1.3 REPORT ORGANIZATION

This report is organized into the following sections:

1.0 – Introduction
2.0 – Study Area Investigation
3.0 – Study Area Results
4.0 – Nature and Extent of Contamination
5.0 – Contaminant Fate and Transport
6.0 – Baseline Risk Assessment
7.0 – Summary and Conclusions
8.0 – References

2.0 STUDY AREA INVESTIGATION

2.1 CONTAMINANT SOURCE INVESTIGATIONS

Three techniques were used to investigate the contaminant source area. These techniques included exploratory trenching, split spoon/direct push soil sampling and passive soil gas analysis. The following sections describe the source area investigation.

2.1.1 Trenching

During the period of November 16 through 18, 1998, eleven exploratory trenches were excavated at the locations shown on Plate 1. Trenches (T1-T11) were excavated adjacent to the southwest side of the facility in the area where chlorinated organics were detected in ground water samples. Trenches were located in areas where contaminant migration commonly occurs (i.e. building footers, utility conduits, etc.). On July 27, 1999, two additional trenches (T13 and T14) were excavated into the utility conduits under Chambers Street.

Soil and water samples were collected from the trenches in accordance with the *Remedial Investigation/Feasibility Study Work Plan* dated August 28, 1998. All samples were submitted to Quanterra Environmental Services (Quanterra) for analyses. Quanterra is a New York State Certified Lab Program (NYS CLP) laboratory and participates in the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP).

All samples collected at the site were analyzed for the Site Specific Parameter List (SSPL). Selected samples were analyzed for the full Target Analyte List/Target Compound List (TAL/TCL). The SSPL consists of the following compounds:

Trichloroethene (TCE)
1,1,1-Trichloroethane (1,1,1-TCA)
1,1-Dichloroethene (1,1-DCE)
cis-1,2-DCE
trans-1,2-DCE
1,1-Dichloroethane (1,1-DCA)
Tetrachloroethene (PCE)
Chloroethane
Vinyl Chloride

Physical descriptions of the trenches are provided below. Field Trenching Logs are contained in Appendix B.

Trench 1 (T1)

T1 was excavated along the footer of the building at the southwest corner of the 1963 building addition. The trench measured 24 feet long, 4 feet wide and approximately 6 feet deep. The building footer was encountered at a depth of approximately 3 feet. Water that was perched in the fill material surrounding the footer entered the trench. A black, light, non-aqueous phase liquid (LNAPL) was observed within the perched water and the gravel fill material surrounding the footer below a depth

of approximately 2 feet. Black staining was noted on the footer between a depth of 2-4 feet below the ground surface. A hydrocarbon odor was noted during the excavation.

Composite soil samples were collected from the material surrounding the footer (T1 SS2 [2'-4']) and the native soil below the footer (T1 SS1 [4'-6']). Additionally, a ground water sample was collected from the perched water that entered the excavation (T1 GW). All samples were submitted to Quanterra for analysis. The samples were analyzed for the full TAL/TCL.

Trench 2 (T2)

T2 was excavated along the footer of the facility approximately 35 feet north of T1. The trench measured 25 feet long, 4 feet wide and approximately 6 feet deep. As described above in Trench 1, Trench 2 contained perched water and a black LNAPL at a depth of approximately 2 feet. A hydrocarbon odor was also noted in this excavation.

Composite soil samples were collected from the material surrounding the footer (T2 SS2 [2'-4']) and the native soil below the footer (T2 SS1 [4'-6']). Additionally, a ground water sample was collected from the perched water that entered the excavation (T2 GW). These samples were analyzed in the laboratory for the SSPL.

Trench 3 (T3)

T3 was excavated in an east-west direction from the footer of the facility approximately 50 feet north of T2. The trench extended away from the footer of the building and measured 8 feet long, 3 feet wide and approximately 5 feet deep. Black material (possibly organic) was observed in T3 at a depth of approximately 3 feet below the ground surface. The black material did not have a notable odor.

Composite soil samples were collected from the black material (T3 SS2 [2'-4']) and the native soil below the footer (T2 SS1 [4'-6']). Ground water did not enter the trench. The samples were analyzed for the full TAL/TCL.

Trench 4 (T4)

T4 was excavated in the area of the former UST pit in a north-south direction approximately 25 feet from the south-western corner of the facility. The trench measured 13 feet long, 3 feet wide and approximately 4 feet deep. Clay, poorly sorted gravel and till were encountered from 0-2 feet below the ground surface. Fill material composed of poorly sorted gravel was encountered from 2-4 feet below the ground surface. It appeared that T4 was excavated within the former UST pit. Perched water entered the excavation at a depth of approximately 3 feet below the ground surface. A caramel-colored oil, resembling lubricating oil, was observed floating on the perched water.

A composite soil sample (T4 SS2 [4'-6']) was collected from the native material below the fill at a depth of approximately 4 feet. A grab sample (T4 GW) of the perched water was also collected.

The samples were analyzed in the laboratory for the SSPL. T4 GW was also analyzed for total petroleum hydrocarbons (TPH).

Trench 5 (T5)

T5 was excavated in a north-south direction approximately 25 feet north of T4. The trench measured 10 feet long, 3 feet wide and 6 feet deep. Native till material consisting of clay and poorly sorted pebbles and cobbles were encountered within the trench. Soils in the trench did not show visual signs of contamination. Moisture was noted at a depth of approximately 6 feet below the ground surface.

Due to the absence of visually impacted material in T5, only one composite soil sample (T5 SS1 [4'-6']) was collected from a depth of 4-6 feet below the ground surface. The sample was analyzed in the laboratory for the SSPL. Ground water did not accumulate sufficiently in T5 for sampling.

Trench 6 (T6)

T6 was excavated in an east-west direction from the building along the sanitary sewer line. The trench measured 25 feet long, 3 feet wide and 6 feet deep. The sewer line was at a depth of approximately 2 feet below the ground surface. Native soils were encountered in T6, soils did not show visual signs of contamination.

One composite soil sample (T6 SS2 [2'-4']) was collected directly beneath the sewer line at a depth of approximately 2-3 feet below the ground surface. A second composite soil sample (T6 SS1 [4'-6']) was collected from the trench at a depth of approximately 6 feet. The samples were analyzed in the laboratory for the SSPL. Water did not enter the trench.

Trench 7 (T7)

T7 was excavated in an east-west direction from the building along the water line. The trench measured 10 feet long, 6 feet wide and 7 feet deep. The water line was at a depth of approximately 5 feet below the ground surface. Native soils were encountered in T7. Stained soils and an odor were noted at a depth of approximately 4 feet.

One composite soil sample (T7 SS2 [2'-4']) was collected near the water line at a depth of approximately 4 feet below the ground surface. A second composite soil sample (T7 SS1 [4'-6']) was collected from the trench at a depth of approximately 6 feet. The samples were analyzed in the laboratory for the SSPL. Water did not enter the trench.

Trench 8 (T8)

T8 was excavated in an east-west direction approximately 10 feet south of the 1963 addition to the building. T8 was excavated to investigate an area with irregular topography. The trench measured 11 feet long, 4 feet wide and 4.5 feet deep. No signs of dumping or contamination were observed

within the excavation. Soil and ground water samples were not collected from T8.

Trench 9 (T9)

T9 was excavated in a north-south direction on the western end of the "metal shed" addition to the building. The trench measured 8 feet long, 2.5 feet wide and 4.5 feet deep. Visual signs of contamination were not observed. Additionally, field screening did not detect VOCs in soil samples collected from the trench. Perched water entered the trench at a depth of approximately 4 feet.

One composite soil sample (T9 SS1 [2'-4']) was collected from T9 from 2 to 4 feet below the ground surface. One water sample (T9 GW) of the perched water was also collected. The samples were analyzed in the laboratory for the SSPL.

Trench 10 (T10)

T10 was excavated in an east-west direction approximately 25 feet west of the south-west corner of the building. The trench measured 9 feet long, 2.5 feet wide and 4 feet deep. Visual signs of contamination were not observed. Additionally, field screening did not detect VOCs in soil samples collected from the trench. Perched water entered the trench at a depth of approximately 4 feet.

One composite soil sample (T10 SS1 [2'-4']) was collected from T10 from 2 to 4 feet below the ground surface. One water sample (T10 GW) of the perched water was also collected. The samples were analyzed in the laboratory for the SSPL.

Trench 11 (T11)

T11 was excavated in an east-west direction approximately 5 feet west of Trench 2. The trench measured 23 feet long, 3 feet wide and 5 to seven feet deep. An odor was detected in soils collected from the eastern side of the trench at a depth of approximately 4 feet. Field screening detected VOCs at a concentration of 54 parts per million (ppm). Soils on the western side of the trench had no odor and did not show visual signs of contamination. Water did not enter the excavation.

One composite soil sample (T11 SS1 [4'-6']) was collected from T11 at a depth of 4 to 6 feet below the ground surface. The sample was analyzed in a laboratory for the SSPL.

Trench 12 (T12)

There was no Trench 12 excavated during the RI. A soil sample labeled as Trench 12 was a duplicate of the soil sample collected from Trench 11. The sample was collected for quality assurance (QA) purposes.

Trench 13 (T13)

T13 was excavated in a north-south direction within the utility trench located in Chambers Street.

The trench measured 7 feet long by 4 feet wide and was excavated to a depth of approximately 5 feet. The trench was located between the water and storm sewer lines near MW5. A 4-inch diameter sanitary sewer tie-in was broken during the excavation and immediately repaired. Field observations and soil screening did not detect VOCs in soil excavated from the trench.

One composite soil sample (T13 SS [4'-5']) was collected from T13 from 4 to 5 feet below the ground surface. One water sample (T13 GW) of the perched water was also collected. The samples were analyzed in the laboratory for the SSPL.

Trench 14 (T14)

T14 was excavated in a north-south direction in the utility trench located in Chambers Street. The trench measured 7 feet long by 6 feet wide and was excavated to a depth of approximately 5 feet. The trench was located between the water and storm sewer lines approximately 70 feet south of Conklin Avenue. Field observations and soil screening did not detect VOCs in soil excavated from the trench.

One composite soil sample (T14 SS [4'-5']) was collected from T14 from 4 to 5 feet below the ground surface. One water sample (T14 GW) of the perched water was also collected. The samples were analyzed in the laboratory for the SSPL.

The trackhoe bucket was decontaminated between trenches with a pressure washer. The decontamination water was containerized in 55-gallon drums and later pumped through the on-site water treatment system and discharged to the local sanitary sewer system. One rinsate sample was collected following the decontamination of the backhoe bucket. Deionized water provided by Quanterra was poured over the bucket, collected in sample containers and submitted to the laboratory for analysis.

2.1.2 Soil Borings (Outside)

During the period of November 17 through 18, 1998, four soil borings (SB7, SB8, MW14, and MW15) were advanced at the locations shown in Plate 1. MW14 and MW15 were converted to ground water monitoring wells. All soil borings were advanced using a drill rig equipped with 4 ¼ inch I.D., hollow-stem augers. The augers and sampling equipment were cleaned with a pressure washer between sampling locations. Soil boring logs are contained in Appendix B. Soil boring descriptions are as follows:

Soil Boring 7 (SB7)

SB7 was advanced in Chambers Street adjacent to Catch Basin 281 (CB-281). The purpose of SB7 was to collect soil samples adjacent to and below the utility trenches located under the street. The soil boring was advanced to a depth of 6 feet below the ground surface. Continuous split spoon soil samples were collected from the boring. The samples were described and field screened with a PID. Asphalt and gravel were encountered to a depth of approximately 2 feet below the ground surface.

An olive-brown till consisting of silt and clay with sub-rounded pebbles and cobbles was encountered from 2 to 6 feet below the ground surface. The soil samples did not have an odor or show visual signs of contamination.

One soil sample (SB7 SS[4'-6']) was submitted to the laboratory from SB7. The sample was analyzed for the SSPL.

Soil Boring 8 (SB8)

SB8 was advanced on the north side of the facility adjacent to CB-342. The purpose of SB8 was to collect soil samples adjacent to and below the storm drains that run under the facility. The soil boring was advanced to a depth of 6 feet below the ground surface. Continuous split spoon soil samples were collected from the boring. The samples were described and field screened with a PID. A silty loam and brown silt were encountered from 0 to 4 feet below the ground surface. An olive-brown till consisting of silt and clay with subrounded pebbles and cobbles was encountered from 4 to 6 feet below the surface. The soil samples did not have an odor or show visual signs of contamination.

One soil sample (SB8 SS[4'-6']) was submitted to the laboratory from SB8. The sample was analyzed for the SSPL.

Monitoring Well 14 (MW14)

MW14 was advanced approximately 10 feet east of Chambers Street and 170 feet south of Conklin Avenue. MW14 was placed to define the downgradient extent of contamination within the perched aquifer. The soil boring was advanced to a depth of 15 feet below the ground surface. Continuous split spoon soil samples were collected from the boring. The samples were described and field screened with a PID. Concrete and gravel were encountered from the surface to a depth of 0.5 feet. An olive-brown till consisting of silt and clay with subrounded pebbles and cobbles was encountered from 0.5 to 15 feet below the surface. The soil samples did not have an odor or show visual signs of contamination.

One soil sample (MW14 SS[10'-12']) was submitted to the laboratory from MW14. The sample was analyzed for the SSPL.

Monitoring Well 15 (MW15)

MW15 was advanced approximately 18 feet east of Chambers Street and 280 feet south of Conklin Avenue. MW15 was placed in the center of the ground water plume for the purpose of pump test monitoring. The soil boring was advanced to a depth of 15 feet below the ground surface. Continuous split spoon soil samples were collected from the boring. The samples were described and field screened with a PID. Gravel and silt were encountered from the surface to a depth of 2 feet. An olive-brown till consisting of silt and clay with subrounded pebbles and cobbles was encountered from 2 to 15 feet below the surface. The soil samples did not show visual signs of

contamination, however field screening showed detections of VOCs at over 38 ppm in a soil sample collected from 6 to 8 feet below the ground surface.

One soil sample (MW15 SS[6'-8']) was submitted to the laboratory from MW15. The sample was analyzed for the SSPL.

The split spoon samplers were decontaminated between samples with a pressure washer. The decontamination water was containerized in 55-gallon drums and later pumped through the on-site water treatment system and discharged to the local sanitary sewer system. One rinsate sample was collected following the decontamination of one split spoon sampler. Deionized water provided by Quanterra was poured over the sampler, collected in sample containers and submitted to the laboratory for analysis.

2.1.3 Passive Soil Gas Survey

The exploratory trenching and soil borings described above did not locate an obvious contaminant source area in the vadose zone. Therefore, a passive soil gas survey was proposed under the southwest section (1963 addition) of the building. An addendum to the RI/FS Work Plan proposing a passive soil gas survey was submitted to the NYSDEC in March 1999. The addendum was approved by the NYSDEC.

The soil gas technology selected for this site was the EMFLUX® system distributed by Beacon Environmental Services. This sampling technique uses an activated carbon filament inside an inverted glass vial. The carbon filament adsorbs VOCs from the ambient gas percolating through the subsurface soils. The retrieved sample cartridge is analyzed for VOCs using GC/MS equipment. The EMFLUX® system can detect some petroleum based compounds, chlorinated compounds, ketones, and compound mixtures such as aviation fuels, antifreezes, mineral spirits, solvents, and other fuels.

A total of 19 soil gas points were selected within the facility. Due to the location of the contaminated ground water, the soil gas points were predominantly placed under the 1963 addition to the building located on the southwestern side of the facility. The soil gas points were spaced at 25-foot intervals within the 1963 addition and along the footer on the eastern side of the original building. On May 8, 1999, T. J. Madison Construction Company was subcontracted to core 4-inch diameter holes through the concrete floor at each sample location. Figure 3 shows the locations of the soil gas collectors.

The carbon sample vials were received from Beacon Environmental with solid air-tight caps. Prior to deployment, the solid caps were replaced with a sample cap equipped with a screen meshing. The permeable screen allowed soil gases to collect in the glass vial and adsorb onto the activated carbon. A copper pipe was placed into each core hole and tapped slightly into the native soils underlying the concrete floor of the facility. One sample vial was placed into each pipe and covered with aluminum foil. Each core hole was then filled to the surface with hydrated granular bentonite to prevent surface gases from affecting the sample.

The sample vials were retrieved after approximately a 32-hour exposure period. At each location, the vial was removed from the core hole and wiped clean using a clean, lint-free cloth. The screened cap was then replaced with a solid cap and labeled with a sample number corresponding to the sample location. Following retrieval, the samples were placed in zip-lock bags and sealed in the original shipping container. The samples were shipped overnight via Federal Express to Maryland Spectral Services, Inc. (Beacon Environmental's subcontracted laboratory) in Baltimore, MD for analysis. All concrete core holes were backfilled with hydrated granular bentonite and filled to the surface with concrete.

A trip blank was analyzed as part of the QA/QC procedures. The blank contained an activated carbon insert identical to the standard sample vial. The unexposed trip blank was collected and analyzed to confirm laboratory data.

2.1.4 Geoprobe® Soil Borings (Inside)

Using the results of the passive soil gas survey as a guide, soil samples were collected under the facility with a track-mounted Geoprobe® direct-push soil sampler. On July 16, 1999, nine soil borings (GP1-GP9) were advanced below the facility to a depth of 8 feet at the locations shown in Figure 4. Continuous soil samples were collected using an open tube sampler measuring approximately 2" outside diameter by 44" long. The samplers were fitted with a removable cutting shoe and clear acetate liner.

Each soil sample was described, placed in the appropriate sample container, and stored in an iced cooler. Samples collected from 0.5 to 4 feet below the ground surface in each soil boring were analyzed in the laboratory for VOCs. Samples collected from 4 to 8 feet below the surface in GP1, GP2, GP4, and GP8 were also analyzed in the laboratory for VOCs. Soils under the facility were described as till, consisting of interbedded clays, silts and sands with sub-rounded pebbles and cobbles. Soil descriptions are provided in the Soil Boring Logs contained in Appendix C.

All sampling tools were cleaned with Alconox®, double rinsed with tap water and finally rinsed with distilled water between sampling points. A new acetate liner was placed in each sampling tube prior to sampling and was discarded after use.

Upon completion, each hole was filled with granular bentonite and capped with concrete. The floor tiles over each hole were later replaced.

2.2 SURFACE WATER INVESTIGATIONS

On February 2, 1999, surface water samples were collected from manhole 282 (MH282-SW), catch basin 342 (CB342-SW) and catch basin outfall 45 (CBO45-SW). Plate 1 shows the locations of the catch basins and manholes at the site.

A sample container was carefully lowered into each manhole or catch basin and filled with water. Each sample was labeled and placed in an iced cooler. The samples were shipped overnight via Federal Express to Quanterra for analysis. Each sample was analyzed for the SSPL.

2.3 GEOLOGICAL INVESTIGATIONS

The purpose of the geological investigation implemented during the RI activities was to establish the subsurface media type and to establish the potential routes of migration in the saturated and unsaturated zones. The principal techniques used for the geological investigation were split spoon sampling during hollow-stem augering with a drill rig, direct-push sampling with a Geoprobe® soil sampler and excavation using a track hoe.

Soil samples were collected using a split spoon sampler and hollow-stem auger, a direct push sampler, or an excavator. Samples were described on soil boring logs, monitoring well construction logs or trenching logs. Soil descriptions generally include color, grain size, moisture content, notable odors or staining, and degree of partical sorting. Samples were generally field screened with a photoionization detector (PID) and recorded on the soil boring or trenching logs. Soil boring logs are contained in Appendix C. Trenching logs are contained in Appendix B.

2.4 GROUND WATER INVESTIGATIONS

2.4.1 Monitoring Well Installations

On November 17-18, 1998, two monitoring wells (MW14 and MW15) were installed at the locations shown on Plate 1. The wells were drilled and installed by Nothnagle Drilling Company using 4 ¼ inch I.D. hollow-stem augers. Both wells were installed to a depth of 15 feet below the ground surface and were constructed with 2-inch diameter, schedule 40 PVC. Slotted PVC screen (0.010") was installed from 5 to 15 feet below the ground surface in both wells. A silica sand filter pack was placed around each screen to a level of 1 foot above the screened interval. A 2-foot thick hydrated bentonite seal was placed above the sand pack to a depth of approximately 2 feet below the ground surface. The remainder of the annular space was filled with concrete to the surface. A flush-mounted manhole cover was placed around the well inside of a 2-foot diameter concrete pad. Monitoring well construction logs are contained in Appendix C.

Following well installation, MW15 was developed using a submersible pump. The well was developed until the discharge was clear or until the well ran dry. At the time of installation MW14 was dry and did not require development.

2.4.2 Monitoring Well Gauging and Sampling

Following installation, the locations and elevations of all monitoring wells on site were determined by survey. The elevations of the tops of each PVC casing were established relative to mean sea level

(MSL). The depth to water in each well has been measured numerous times with a water-level indicator accurate to 0.01 feet.

During the period of December 7 through 10, 1998, all monitoring wells on site were sampled in accordance with the RI/FS Work Plan. The wells were purged and sampled using a low-flow (minimal drawdown) ground water sampling procedure as outlined in the USEPA Ground Water Issue publication EPA/540/S-95/504. The wells were purged using a variable speed Grundfos® submersible pump at a rate equal to the natural recharge rate of the well. Measurements of pH, specific conductance (SpCd), dissolved oxygen (DO), redox potential (ORP), turbidity, and temperature were collected every minute using a flow-through cell and electronic data logger. After the indicator parameters had stabilized and the turbidity was less than 50 nephelometric turbidity units (NTUs), ground water samples were collected at a rate of approximately 0.1 to 0.2 L/min. The ground water parameters collected by the data logger are contained in Appendix D.

The natural recharge rate of five wells (DMW3, MW6, MW7, MW8, and MW14) was less than the minimum purge rate of the pump. Therefore, these wells were purged dry and allowed to recharge for a minimum of 4 hours, but no more than 24 hours before sampling. The wells were sampled using a disposable bailer.

The samples were placed in the appropriate containers, labeled, placed in an iced cooler and shipped overnight via Federal Express to Quanterra for analyses. MW5 was analyzed for the full TAL/TCL. The remaining wells were analyzed for the SSPL. Ground water samples collected from wells in the perched zone were also analyzed for nitrates, sulfates and chlorides.

2.4.3 Pump Tests

During the period of February 1 through 8, 1999, Shield conducted two limited pump tests using MW5 and MW15. The purpose of the tests was to establish the approximate hydraulic conductivity, transmissivity, and storativity of the perched aquifer.

On February 1, 1999, a step-drawdown test was conducted on MW5. A variable speed submersible pump was placed at the bottom of MW5 at an approximate depth of 20 feet below the ground surface. Prior to pumping, the stabilized depth to water was 2.80 feet from the top of the casing (TOC). The initial pumping rate of 0.125 gallons per minute (gpm) for a period of 25 minutes produced a drawdown of 2.95 feet. An increased pumping rate of 0.33 gpm for a period of 75 minutes produced a stabilized drawdown of 13.5 feet.

On February 4, 1999, a 5-hour pump test and 2-hour recovery test was conducted on MW5. Pressure transducers with internal data loggers were placed at the bottom of the pumping well and in two observation wells (MW15 and MW8). The water levels in the pumping well and observation wells were allowed to stabilize for approximately 1 hour prior to the commencement of the pump test. The test began with an initial pumping rate of 0.35 gpm. As drawdown in the well occurred, the pumping rate naturally decreased to approximately 0.2 gpm. A drawdown of 6.37 feet was achieved in the pumping well after 5 hours of sustained pumping. Observation well MW15, located

approximately 20 feet southeast from the pumping well, showed a drawdown of 0.85 feet. A second observation well (MW8), located approximately 25 feet due north of the pumping well did not show any measurable drawdown.

Following the 5-hour pump test, a recovery test was conducted. The pump was turned off and the wells were allowed to recharge for a period of 2 hours. At the end of the 2-hour period the ground water level in the pumping well had recovered to within 0.08 feet of the initial water level. The ground water level in the observation well (MW15) had recovered to within 0.065 feet of the initial water level. Data collected by the pressure transducers is contained in Appendix E.

On February 5, 1999, a step-drawdown test was conducted on DMW1. A variable speed submersible pump was placed at the bottom of DMW1 at an approximate depth of 15 feet below the ground surface. Prior to pumping, the stabilized depth to water was 1.74 feet from the TOC. The initial pumping rate of 0.17 gpm for a period of 1 hour produced a drawdown of 4.46 feet. An increased pumping rate of 0.25 gpm for a period of 70 minutes produced a drawdown of 8.3 feet. Finally, an additional increased pumping rate of 0.29 gpm produced a stabilized drawdown of 9.2 feet for a period of 80 minutes.

On February 8, 1999, a 5-hour pump test and 2-hour recovery test was conducted on DMW1. Pressure transducers with internal data loggers were placed at the bottom of the pumping well and in two observation wells (MW15 and MW10). The water levels in the pumping well and observation wells were allowed to stabilize for approximately 1 hour prior to the commencement of the pump test. The test began with an initial pumping rate of 0.46 gpm. As drawdown in the well occurred the pumping rate decreased to approximately 0.3 gpm. A drawdown of 7.14 feet was achieved in the pumping well after 5 hours of sustained pumping. An observation well (MW15), located approximately 40 feet northwest from the pumping well, showed a drawdown of 0.35 feet. A second observation well (MW10), located approximately 40 feet due west of the pumping well did not show any measurable drawdown.

Following the 5-hour pump test, a recovery test was conducted. The pump was shut down and the wells were allowed to recharge for a period of 2 hours. At the end of the 2-hour period the ground water level in the pumping well had recovered to within 0.3 feet of the initial water level. The ground water level in the observation well (MW15) had recovered to within 0.04 feet of the initial water level. Data collected by the pressure transducers is contained in Appendix E.

Ground water from both pump tests was containerized in 55-gallon drums. The water was later treated in the on-site ground water treatment system and discharged to the sanitary sewer.

2.5 INDOOR AIR QUALITY

Indoor air monitoring activities were conducted in the building to document worker safety and potential exposure. Two air sampling events were conducted inside the facility on August 20 and 21, 1999. The indoor air monitoring was requested by the NYSDEC and the NYSDOH and was not part of the original RI/FS Work Plan.

The air study used Summa canisters for air sample collection. Summa canisters are stainless steel collection devices that are used to obtain qualitative and quantitative analysis of ambient air. Air enters the canisters through a regulator that controls the air flow. For each sampling event, five canisters were placed in various locations inside the facility for 8 hours. The analysis for each air sample represents an average VOC concentration in ambient air for each sample location over an 8-hour period.

The first sampling event was conducted during facility operating hours (Friday, 8:00 AM-5:00 PM). The second sampling event was conducted on the weekend (Saturday, 8:00 AM-5:00PM). The two events were conducted to distinguish between chemicals present due to normal facility operations and chemicals which may be emanating from a potential source area below the facility.

3.0 STUDY AREA RESULTS

The formal laboratory reports are not included in an appendix of this Draft Final RI Report. The reports include the US EPA full deliverable package for approximately 80 samples analyzed during the RI activities. The Final RI Report will include the laboratory reports as an appendix on laser disk. A hard copy of the laboratory reports are on file with the NYSDEC.

3.1 CONTAMINANT SOURCE INVESTIGATION RESULTS

The following sections discuss the field and analytical results of the source area investigation. Table 3 sumarizes the New York State Applicable Standards, Criteria and Guidance (SCG) Documents in effect for this site.

3.1.1 Trenching

During the period of November 16 through 18, 1998 eleven test trenches were excavated in the locations shown on Plate 1 as described in Section 2.1.2. Two additional test trenches were excavated in the utility trenches located on Chambers Street on July 27, 1999. All soil and ground water samples collected from the test trenches were submitted to Quanterra for SSPL analyses. Selected samples were also submitted for TAL/TCL analyses.

Field observations and head-space analyses did not detect high levels of volatile organic compounds in the soil samples collected from the test trenches. Some black staining was noted along the footer of the building in Trench 1 and Trench 2; however, strong odors were not noted.

Laboratory analysis detected concentrations of TCE, cis-1,2-DCE, and vinyl chloride at levels exceeding the *Soil Cleanup Objectives to Protect Ground Water Quality (TAGM 4046)* in soil samples collected from Trench 7. PCE was detected at a concentration exceeding cleanup objectives in a soil sample collected from Trench 4. Laboratory analyses of soil samples collected from the remaining test trenches did not detect VOCs at concentrations exceeding the cleanup objectives. Table 4 summarizes the results of VOC analyses conducted on all soil samples collected from test trenches at the site.

Soil samples collected from Trench 1 and Trench 3 were also analyzed for the TAL/TCL. Semi-volatile organic compounds (SVOCs) were not reported above the established detection limits. Metals were detected at concentrations consistent with normal background concentrations. Table 5 summarizes the results of the metals analyses.

Perched water was encountered along the building footer in Trenches 1, 2, and 9. Water was also encountered in the vicinity of the former UST pit in Trenches 4 and 10 and within the utility trenches under Chambers Street (Trench 13 and 14). One or more VOCs were detected above the levels specified in 6NYCRR Part 703, as compiled in the Division of Water's Technical and

Operational Guidance Series (TOGS) 1.1.1. in water samples collected from all trenches except Trench 2. Table 6 summarizes the analytical results of VOC analyses of all water samples collected from the test trenches.

Water samples from T1 and T2 were analyzed for the TAL/TCL. SVOCs were not reported above the established detection limits in either sample. Metals were detected in the water samples and are summarized in Table 7. Any elevated metals concentrations in water samples collected from T1 and T2 are most likely the result of sediment in the sample.

3.1.2 Soil Borings (Outside)

Four soil borings (SB7, SB8, MW14, and MW15) were advanced outside of the building at the locations shown on Plate 1 as described in Section 2.1.2. Soil samples collected from SB7, SB8 and MW14 did not show VOC concentrations above the established reporting limits. Although the soil sample collected from MW15 (MW15 SS [6'-8']) showed detections of TCE and cis-1,2-DCE above the established reporting limits, the detections were less than the TAGM 4046 level. Table 4 summarizes the analytical results from soil samples collected during trenching and outdoor drilling phases of the RI.

3.1.3 Passive Soil Gas Survey

During the period of May 8 through 9, 1999, a passive soil gas survey was conducted as described in Section 2.1.3. Nineteen soil gas detectors were placed under the concrete floor of the facility at the locations shown in Figure 3.

The soil gas samples were shipped overnight via Federal Express to Maryland Spectral Services, Inc. for SSPL analysis. 1,1,1-TCA was detected at concentrations exceeding 100 ng/L in SG10, SG11, and SG13. TCE was detected at concentrations exceeding 50 ng/L in SG02, SG03, SG07, and SG13. 112-Trichlorotrifluoroethane (Freon 113), which can be produced from the degradation of chlorinated organics, was detected in excess of 100 ng/L in SG01, SG05, SG10, SG13 and SG14. A contour map showing total soil gas concentrations of the SSPL and 112 trichlorotrifluoroethane is presented in Figure 5. Table 8 summarizes the analytical results from the soil gas survey.

3.1.4 Geoprobe® Soil Borings (Inside)

On July 16, 1999, nine soil borings (GP1-GP9) were advanced inside the building as described in Section 2.1.4. Figure 4 shows the locations of the soil borings. All soil samples were shipped overnight via Federal Express to Quanterra for SSPL analyses.

Although there were many detections of chlorinated organics in the soil samples collected below the building, only one sample (GP6 (0.5'-4')) exceeded the NYSDEC *Soil Cleanup Objectives to Protect Ground Water Quality (TAGM 4046)* for TCE. Table 9 summarizes the analytical data from soil samples collected during the Geoprobe® sampling event.

3.2 SURFACE WATER RESULTS

On February 2, 1999, three surface water samples were collected as described in Section 2.2. The samples were collected from manholes and catch basins shown on Plate 1. The samples were shipped overnight via Federal Express to Quanterra for SSPL analyses.

One sample (MH282-SW) was collected from the storm sewer system under Chambers Street. VOCs were not detected above the established detection limits. Samples were also collected from a catch basin (CB342-SW) and a catch basin outfall (CBO45-SW). 1,1,1-TCA was detected at a concentration above drinking water standards in CB342-SW and CBO45-SW. PCE was detected below the established reporting limit, however, it was detected at a concentration (J value) that exceeded drinking water standards. TCE was also detected at a concentration above drinking water standards in CBO45-SW. Table 10 summarizes the analytical results of the surface water samples collected at the site.

3.3 GEOLOGIC INVESTIGATION RESULTS

Soil samples collected during the drilling phases of the RI showed interbedded grayish brown and yellowish brown silty clays, silt, and sand to a depth of approximately 30 feet below the ground surface. The soil contained poorly sorted, sub-rounded pebbles and cobbles typical of a glacial till deposit. Samples collected on the southwest side of the facility were less compact and saturated below a depth of approximately 6 feet. Monitoring wells and soil borings in this area were not drilled below a depth of 20 feet to avoid the cross-contamination of the deeper aquifer. Appendix C contains soil boring logs and monitoring well construction logs.

3.4 GROUND WATER INVESTIGATION RESULTS

3.4.1 Field and Analytical Results

The location and elevation of each monitoring well on site has been determined by survey. The depth to ground water in each well has been measured with a water level indicator accurate to 0.01 feet. Some monitoring wells have been gauged numerous times during the past two years. All of the wells currently on site have been gauged at least once. The wells were most recently gauged on July 27, 1999. Ground water elevation data are summarized in Table 2.

Based on previous and current ground water elevation data, there are two distinct ground water zones on site. A shallow aquifer was encountered on the southern and western sides of the facility at a depth ranging from approximately 1.4 to 5.7 feet below the ground surface. Ground water flows in a west-northwesterly direction in the shallow aquifer. Figure 6 is a potentiometric surface map for ground water in the shallow aquifer. This aquifer was not encountered during drilling on the northern and eastern sides of the facility.

A deeper regional aquifer was encountered across the site at a depth ranging from approximately 22.6 to 32.0 feet below the ground surface in DMW3, MW6, MW7 and MW12. This aquifer flows in a northeasterly direction toward the Susquehanna River. Figure 7 is a potentiometric surface map for ground water in the deeper aquifer.

During the period of December 7-10, 1998, all monitoring wells on site were sampled as described in Section 2.4.2. Quanterra analyzed all ground water samples collected during the RI for the SSPL. Selected ground water samples were analyzed for the full TAL/TCL.

Ground water samples collected from the shallow aquifer on the southwestern side of the facility showed strong detections of chlorinated organics. TCE was detected at concentrations exceeding 1 mg/l in DMW1, MW5, MW11 and MW15. Chlorinated organics were detected at concentrations exceeding levels specified in 6NYCRR Part 703 (TOGS 1.1.1.) in DMW1, MW5, MW8, MW9, MW10, MW11 and MW15. Contaminants were not detected above the established reporting limits in ground water samples collected from one upgradient monitoring well (DMW4) and two downgradient monitoring wells (MW13 and MW14) that were installed within the shallow aquifer. The analytical results are summarized in Table 6. Figure 8 is an isopach map showing the total concentrations of the SSPL compounds in ground water at the site.

A water sample from MW5 was analyzed for the full TAL/TCL. Semi-volatiles, metals, PCBs, herbicides and pesticides were not detected above allowable TAGM 4046 concentrations. Metals concentrations are summarized in Table 7.

Selected ground water samples collected within the contaminant plume were also analyzed for total organic carbon (TOC), sulfates, nitrates and chlorides. These analyses results are used in conjunction with parameters measured during the low-flow sampling to evaluate natural biodegradation rates and contaminant persistence. Table 11 summarizes the general chemistry analyses performed in the laboratory as well as analysis conducted in the field during the low-flow sampling.

Contaminants were not detected above the established reporting limits in ground water samples collected from monitoring wells (DMW3, MW6, MW7, and MW12) that were installed within the deeper regional aquifer. The analytical results are summarized in Table 6.

3.4.2 Pump Test Results

Two limited pump tests were conducted using DMW1 and MW5 during the period of February 1-8, 1999 as described in Section 2.4.3. The purpose of these tests was to establish the approximate hydraulic conductivity, transmissivity, and storativity of the shallow aquifer in the area of the highest ground water contamination. These tests also established the approximate cone of depression.

Data from the pumping and observation wells were recorded using pressure transducers and data

loggers. This information, along with the physical characteristics of the pumping well and observation wells, was imported into AQTESOLV® for Windows®. AQTESOLV® is a computer program that features a suite of analytical solutions for determining aquifer properties from pumping tests. The program features an automatic curve-matching feature that provides greater objectivity and a detailed statistical evaluation of the results.

The *Theis (1935) Solution for a Pumping Test in an Unconfined Aquifer* was used for the evaluation of the pumping test results. The Theis Solution is applicable to unconfined aquifers by correcting water-level displacement data as follows:

$$s' = s - (s^2 / 2b)$$

where s' is corrected displacement, s is observed displacement and b is the saturated thickness of the aquifer. A saturated thickness of 20 feet was assumed for both pump tests. The corrected displacement (s') predicted by this equation reaches a maximum of one-half the aquifer saturated thickness (0.5b) when the observed displacement is equal to the aquifer saturated thickness (s=b).

Pump Test #1 was conducted using MW5 as the pumping well and MW15 as the observation well located approximately 16 feet from MW5. The transmissivity at MW5 was calculated at 0.617 ft^2/min; the storativity was 0.001679; and the hydraulic conductivity was 3.09×10^{-2} ft/min The radius of influence was at least 16 feet.

Pump Test #2 was conducted using DMW1 as the pumping well and MW15 as the observation well located approximately 40 feet from MW5. The transmissivity at DMW1 was calculated at 1.0 ft^2/min ; the storativity was 0.001039; and the hydraulic conductivity was 5.00×10^{-2} ft/min. The radius of influence was at least 40 feet. The AQTESOLV calculations are contained in Appendix E.

The aquifer properties calculated from these pump tests are much higher than what is normally expected in a tight till. However, as discussed earlier, the soils in the vicinity of DMW1 and MW5 were not as dense as in the surrounding area. Additionally, soils in this area were saturated below a depth of approximately 6 feet. During the low-flow sampling discussed in Section 2.4.2, many of the wells completed in the shallow aquifer produced less than 0.05 gallons per minute. DMW1 and MW5 produced as much as 0.5 gallons per minute during the pump test.

3.5 INDOOR AIR QUALITY RESULTS

Air monitoring activities were conducted inside the facility to document worker safety and their potential VOC exposure. Two air sampling events were conducted inside of the facility. Summa canisters were placed in areas that showed the highest passive soil gas concentrations and in one office area. The sampling events were conducted on August 20 and 21, 1999.

Concentrations of chlorinated organics in ambient air samples during both sampling events were

magnitudes lower than the 8-hour time weighted average exposure limits established by the Occupational Health and Safety Administration (OSHA) for industry workers. The indoor air quality results are summarized in Table 12.

3.6 DATA VALIDATION

Appendix A of the RI/FS Work Plan contains the Quality Assurance Project Plan (QAPP). In this section, sampling and field analysis activities are compared with QAPP requirements for duplicate samples, trip and rinsate blanks, instrument calibration, and field analyses.

3.6.1 Duplicate Sampling

A total of 56 samples were analyzed during RI, including 20 soil samples, 22 water samples, 8 trip blanks, 3 rinsate samples, and 3 duplicates. A duplicate sample was collected for approximately every 20 environmental samples throughout the sampling program as specified in QAPP. The duplicates were coded with a number and identifier different from the original sample, and were handled in the same manner as other field samples. Soil samples to be analyzed for VOCs were not homogenized; soil samples to be analyzed for other parameters were thoroughly mixed before placing in sample containers.

For comparison purposes, the results of the duplicate sampling program for detected VOCs is provided in Table 13 (Comparison of Detected VOCs...). VOCs are used for comparison, since all of the samples were analyzed for either the TCL or the SSPL list of VOCs. There are specific QA/QC limits for relative percent differences for laboratory duplicates or matrix spike duplicates, which were reviewed during the laboratory data validation process. However, there are no specified limits for field duplicates. Table 13 (Comparison of Detected VOCs...) shows that concentrations of detected VOCs were reasonably comparable but variable in the soil sample/duplicate pairs, which is not unexpected, since soil is a heterogeneous medium, and sample mixing was not allowed as part of the protocol. Results were more comparable between the water samples and duplicates, indicating that water is a more homogenous medium.

3.6.2 Trip Blanks

The QAPP specifies the analysis of one VOC trip blank for each cooler containing water samples to be analyzed for VOCs. The trip blank is a VOC container of laboratory-pure water, which is shipped to the field and then back to the laboratory without being opened. Eight trip blanks were analyzed during this program, listed below by sample number:

BP007 BP041
BP018 BP050
BP032 BP054
BP035 BP056

See the individual DUSRs (Appendix F) for detailed discussions of the results of the trip blanks. In summary, no target VOCs associated with the site were detected in the trip blanks. There were occasional detections of common laboratory contaminants such as methylene chloride, as in samples BP007 and BP018, but not in concentrations that resulted in the qualification of sample results. The results for trip blank 056 were rejected due to presence of bubbles in the sample container upon receipt of cooler in the analytical laboratory.

3.6.3 Rinsate Blanks

The QAPP specifies that rinsate or equipment blanks are to be collected once per matrix sampling event, upon completion of decontamination procedures. A rinsate blank is a sample of laboratory-pure water that has been passed through sampling equipment to test cleanliness. Three rinsate blanks were collected as part of this program, following various sampling activities:

- BP020, following soil sampling (split spoon)
- BP031, following excavation (bucket)
- BP046, following groundwater sampling (pump)

See the individual DUSRs (Appendix F) for detailed evaluations of the rinsate blank results. In summary, no analytical results were qualified, based on the results for the rinsate blanks. The rinsate blank 046 contained low concentration of chloroform, which is a common laboratory contaminant. The presence of this constituent in the rinsate sample is not indicative of contaminant carryover from field samples. The rinsate blank BP020 contained concentrations below detection limit of toluene, a target parameter in field samples, indicating the potential for constituent carryover on sampling equipment. However, the associated field samples were either not analyzed for toluene, or had concentrations greater than five times (sample BP027) the concentration in the rinsate, and thus were not qualified.

3.6.4 Calibration of Field Instruments

The QAPP specifies daily calibration or reference checks for field measurements of:

- VOCs in air using a PID or FID
- Particulates in air using a Miniram
- pH
- Dissolved oxygen (DO)
- Redox
- Turbidity
- Specific conductance

Calibrations or reference checks were conducted in accordance with the instrument manufacturer's instructions, and the results were recorded in a log book.

The ground water parameters pH, redox, DO, turbidity, and specific conductance were measured in groundwater using a YSI multi-parameter instrument during December 1998 sampling event

3.6.5 Field Analyses

The YSI multi-parameter meter was used during the December ground water monitoring episode, to measure temperature, pH, DO, redox, specific conductance, and turbidity in the field. The continuous output from the YSI instrument is stored electronically, and then is downloaded to a computer. These field measurements are used for two purposes. First, stabilization of the parameters during well purging indicates that enough water has been removed so that a sample representative of aquifer conditions can be collected. Collection of representative samples is critical to the quality of the ground water sampling program. Second, DO and redox are useful in evaluating natural attenuation trends in groundwater.

Appendix D presents the graphical outputs for the wells analyzed during the December ground water sampling event. The results document that multiple field measurements were taken during purging, and that well purging was conducted until field parameters stabilized, or until the well was pumped dry, so that representative samples could be collected for analysis.

4.0 NATURE AND EXTENT OF CONTAMINATION

4.1 SOURCES

The initial site investigations conducted by Hagopian Engineering suggested that an underground storage tank (UST), removed in 1986, was the source of the chlorinated organics found in the ground water. Soil and ground water samples collected during the RI do not support this claim. However, a hydrocarbon, most closely resembling lubricating oil, was detected in a water sample collected from Trench 4. This does support the report that the UST contained waste lubricating oil used by Binghamton Plastics.

Field and analytical data suggest that a source of the chlorinated organics in the ground water is not present outside of the building. Soil samples collected during the excavation of test trenches and the advancement of soil borings outside of the facility did not show significant levels of contamination within the vadose zone. Based on these results, a passive soil gas survey was conducted under the 1963 addition to the building.

The passive soil gas survey indicated high levels of 1,1,1-TCA and TCE. Soil samples were subsequently collected in the areas that showed high soil gas concentrations. Chlorinated organics were detected at higher concentrations in soil samples collected under the building than outside, however a highly concentrated source has not been identified. All field and analytical data collected to date suggest that the source for the ground water contamination exists under the 1963 addition to the building. An abandoned drain line found under the original building was investigated, however, due to corrosion or collapse of the pipe, the line could not be traced. A water sample collected from the drain line did not show concentrations of VOCs above the established detection limits.

4.2 GROUND WATER

Two distinct ground water zones have been identified on site. A shallow water-bearing zone has been identified on the southern and western sides of the facility. Pump test data and low-flow sampling data show high hydraulic conductivity values and saturated soils below a depth of approximately 5-6 feet below the ground surface in the area adjacent to the southwest corner of the facility. Analytical data presented in this report show contamination exceeding allowable ground water concentrations (TAGM 4046) in this area. Figure 8 is a contaminant concentration map showing total SSPL compound concentrations within the shallow ground water aquifer. Although not shown on Figure 8, preliminary analytical results, not included in this draft report, suggest that contamination is migrating from this area through the utility conduit located in Chambers Street.

A deeper aquifer has also been identified at the site. This aquifer was encountered at a depth of approximately 25-30 feet below the ground surface and flow is to the northeast. Four ground water

monitoring wells have been installed within this aquifer. To date, contamination has not been detected in the deeper aquifer above the established reporting limits.

4.3 SURFACE WATER

Surface water flows from the site into a series of catch basins surrounding the property. The catch basins are connected by a storm sewer system that drains to an outfall located on the north side of Conklin Avenue. The outfall flows on the surface for approximately 10 feet before draining into a catch basin that is piped to an intermittent stream located approximately 300 feet downgradient. The intermittent stream flows north into the Susquehanna River located approximately 600 feet from the site.

Low concentrations of 1,1,1-TCA and TCE were detected in the catch basin located on the northern side of the facility and in the outfall located on the north side of Conklin Avenue. The intermittent stream has not been sampled.

5.0 CONTAMINANT FATE AND TRANSPORT

5.1 POTENTIAL ROUTES OF MIGRATION

5.1.1 Soil

Passive soil gas and soil samples collected under the 1963 addition to the building suggest a potential source for the ground water contamination at the site. An abandoned sewer line inside the original building is suspected of having carried contaminants to the southwest corner of the existing structure. Concentrations of chlorinated organics exceeding TAGM 4046 levels were not found within the vadose zone outside of the building. Conductive soils on the southwest side of the facility may be facilitating the migration of contaminants from beneath the building into the shallow ground water on the southwest side of the facility.

5.1.2 Ground Water

Two distinct ground water zones have been identified at the site. A shallow aquifer is present on the southern and western sides of the facility. High concentrations of chlorinated organics have been detected in ground water samples collected from the shallow aquifer adjacent to the southwest side of the building (See Figure 8). The northwest movement of contaminants in the shallow aquifer appears to be facilitated by conductive soils under the southwest corner of the site. Less conductive soils located further to the north and west appear to have inhibited the migration of contamination. However, preliminary analytical data suggest that utility lines located in Chambers Street are acting as conduits for the movement of contaminants off site.

A deeper aquifer was encountered at a depth of 25 to 30 feet below the ground surface across the site. Ground water in this aquifer flows to the northeast. Ground water samples collected from wells installed in the deeper aquifer, adjacent to and downgradient of the contaminated shallow aquifer, have not shown contaminants above TAGM levels.

5.2 CONTAMINANT PERSISTENCE

Based on current and historical analytical data, natural attenuation does not appear to have had a substantial impact in the reduction contaminants at the site. Although degradation products such as vinyl chloride, 1,1-DCE, 1,2-DCE, and 1,1-DCA have consistently been detected in ground water samples collected from within the contaminant plume, TCE and 1,1,1-TCA concentrations have not significantly changed over the past two years. Furthermore, total organic carbon (TOC), sulfate and dissolved oxygen concentrations detected in ground water samples are not conducive to the degradation of chlorinated organics.

According to the USEPA *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water,* concentrations TOC greater than 20 mg/l provide a good carbon and

energy source that drives dechlorination. The average TOC concentration in ground water samples at the site is approximately 6 mg/l. Additionally, sulfate concentrations in ground water greater than 20 mg/L may complete with the reductive pathway. The average sulfate concentration at the site is approximately 40 mg/l.

The general chemistry of the ground water on site was analyzed in the field during the low-flow sampling and in the laboratory. The general chemistry analyses are summarized in Table 11.

6.0 BASELINE RISK ASSESSMENT

The Baseline Risk Assessment quantitatively establishes the magnitude and range of human health risks posed by a specific set of circumstances. The risk characterization combines information on the presence of contaminants in site-related media, the known toxicity of those chemicals and the appropriate site-specific exposure scenarios.

6.1 EVALUATION OF CHEMICALS OF CONCERN

The RI analytical data corresponding to each exposure area and to each environmental medium (e.g., surface soil, groundwater, surface water, etc.) were evaluated to establish media-specific lists of chemicals of concern for each exposure area under consideration (see Tables 14 and 15). Only chemicals that were detected at least once in a particular medium evaluated for a particular exposure area were included as chemicals of concern for the medium in that particular area. For chemicals that were detected at least once, but were not detected in all sample analyses for a particular medium in a specific exposure area, one-half the detection or reporting limit for the chemical was used in quantifying exposures. After providing one-half detection/reporting limit values for all chemicals of concern displaying nondetects, the 95th percent upper confidence limit (95th percent UCL) of the mean was calculated for each chemical for each appropriate environmental medium for each relevant exposure area. In accordance with USEPA Risk Assessment Guidance for Superfund, the maximum detected value or one-half detection/reporting limit for each chemical of concern in each environmental medium for each exposure area was compared with the corresponding 95th percent UCL. The lower of these two values was used as the concentration term for the chemical under consideration for the medium and exposure level.

Metal concentrations in the site soil were within the ranges reported by the USGS and below SCGs for the monitoring well analysis. Since products containing metals were not utilized by the plant, metals were eliminated as chemicals of concern.

After the chemicals of concern selection procedures described above were completed, eight VOC chemicals of concern were identified for all media in all source and exposure areas (Table 17). These known chemicals were considered to be of a potential concern to human health or the environment and were, therefore, selected for risk analysis.

The determination of chemicals of concern was performed in keeping with the primary objective of the baseline risk assessment. This objective was to establish if the site poses a hazard now or in the future from any pathway such that the "no action" remedial alternative would not be acceptable. This selection process included the following criteria: (1) the chemical had demonstrated significant toxicity to animal life in published reports, (2) USEPA health-based numbers can be obtained for the chemicals, and (3) its occurrence is potentially significant, based on frequency, concentration, and/or exposure potential with regard to total potential risk posed by the Site.

6.2 TOXICITY EVALUATION

The purpose of the toxicity evaluation is to summarize health effects that could potentially result from exposure to a particular chemical. Both carcinogenic and noncarcinogenic effects are included, and reference doses (RfDs) and cancer slope factors (CSFs) are presented if available. The RfD is defined as an estimate of the daily exposure to the human population that is likely to be without an appreciable risk of deleterious noncarcinogenic health effects. The RfD was derived to protect sensitive subpopulations and has an uncertainty spanning at least one order of magnitude (USEPA 1989a).

In assessing a chemical's potential for carcinogenic effects in humans, the USEPA places the chemical into one of several classes, known as the "weight-of-evidence class-identification" system (USEPA 1989a). Quantitative cancer risk assessments are performed for chemicals in Classes A (human carcinogens) and B (probable human carcinogens) and on a case-by-case basis for chemicals in Class C (possible human carcinogens) to establish CSFs. The CSF quantitatively defines the dose-response relationship for potential carcinogens (USEPA 1989a). CSFs are upper bound estimates of the carcinogenic risk to humans associated with exposure to a particular chemical. These slope factor values are estimated through the use of extrapolation models and are estimated such that true risk to humans is not expected to exceed the CSF (USEPA 1989a).

The toxicity assessment includes a range of effects that are associated with available human and animal data. Human health risks potentially associated with exposures to chemicals are best established by examining human data, such as epidemiological studies. However, human toxicity data adequate to serve as the sole basis of dose-response assessments are available for only a few chemicals (USEPA 1989a). Therefore, toxicological information for most chemicals must be inferred from animal experiments. Default values for RfDs and CSFs are available through the Integrated Risk Information Service (IRIS), an electronic database maintained by the USEPA, and the Health Effects Assessment Summary Tables (HEAST).

Four of the eight chemicals of concern identified at the former Binghamton Plastics Site have been observed to display the potential for carcinogenic effects via one or more of the relevant exposure pathways under consideration (Table 18). The USEPA has derived RfD and/or CSF values for the identified noncarcinogenic and carcinogenic chemicals of concern detected at the Site.

6.3 EXPOSURE EVALUATION

The most plausible current exposure scenarios for the existing conditions include the exposure of on-site workers through oral ingestion/dermal absorption and organic vapors of the on-site soil. Child residents (7-18 years old) trespassing and being exposed to on-site soil chemicals via oral ingestion, dermal absorption and inhalation was also included in the existing scenario assessment. These child residents could also be exposed by wading in off-site surface water containing VOCs. Storm water run-off drains to the manholes and catch basins around the site and is subsequently discharged off-site below Catch Basin Outfall 45 (CBO45) to a small wetland area (<0.25 acres). This drainage could also potentially

affect fish and wildlife associated with this wetland area. The exposure site model is depicted in Figure 9.

Although residential development at the Site is highly unlikely due to the current industrial/ commercial nature and zoning of the Site, a future residential scenario has been assessed only for comparative purposes. This scenario included potential future site residents exposed to surface soil VOCs via oral ingestion/dermal absorption and the inhalation pathway. It was also assumed that these future residents would be supplied water from on-site wells rather than city water. They would be exposed through drinking and bathing or showering in the water. Construction workers are also considered to be realistic potential current and future receptors for the Site experiencing exposure to soil chemicals via ingestion and dermal absorption. However, since the current on-site worker and future residents scenarios have much longer exposures, risks were not calculated for construction workers. For both the present and future scenarios, the possibility of trespasser exposures exists at the Site, however, no trespasser scenario has been quantitated for the future scenario due to the fact that the inherently more conservative exposure assumptions associated with the residential scenario (e.g., longer exposure duration and higher exposure frequency) would be protective of trespasser receptors. No off-site exposures were identified and, therefore, no off-site risk scenarios were included in the assessment.

6. 4 RISK CHARACTERIZATION

To characterize risks, exposure intake values were calculated for each relevant receptor for each chemical of concern via each significant pathway and environmental medium associated with each exposure area. Equations and exposure valves utilized for calculating the intake valves are included in Tables 19 through 25. HI (noncancer risk values) were calculated for all chemicals possessing noncarcinogenic risk criteria by dividing the intake value by a chemical-specific RfD value. Cancer risks were quantitated for all chemicals possessing CSFs by multiplying the calculated intake value by the chemical-specific CSF value. After calculation of cancer and noncancer risk values (Tables 26 through 33), cumulative cancer risks and HI values were calculated for each receptor for each relevant exposure pathway by summing all the calculated risk values for all chemicals associated with each pathway and receptor under consideration. If multiple pathways exist for a particular medium, the risks were summed across pathways as well, resulting in a cumulative total pathway HI or cancer risk value for each receptor. Cancer risk values greater than USEPA's acceptable risk range of 10^{-6} to 10^{-4}, indicating a 1 in 1,000,000 to 1 in 10,000 probability of developing cancer due to chemical exposures, and noncancer risks with HI values exceeding unity, present a cause for concern in the event that the modeled conditions in the various applicable exposure scenarios actually occur. The following risk results are listed by exposure area for the relevant receptors, pathways, media, and chemicals associated with each exposure area.

Existing Conditions	Cancer Risk	Non-Cancer Risk
Soil		
Adult Worker	6×10^{-9}	4×10^{-5}
Trespassers	4×10^{-9}	5×10^{-5}

Surface Water		
Trespassers – Child (7-18)	3×10^{-7}	3×10^{-2}

The calculations indicate that neither the adult worker nor trespasser is above EPA's acceptable cancer risk of 1×10^{-4}, or non-cancer risk of 1 under existing conditions.

Future Conditions	Cancer Risk	Non-Cancer Risk
Soil		
Residential Adult	7×10^{-9}	1×10^{-4}
Residential Child (7-18)	2×10^{-8}	4×10^{-4}
Residential Child (0-6)	3×10^{-8}	9×10^{-4}
Groundwater		
Residential Adult	4×10^{-3}	59
Residential Child (7-18)	6×10^{-3}	94
Residential Child (0-6)	4×10^{-3}	142

The future scenario, which assumes that the site would become a residence prior to any site cleanup, indicates that all residents would be exposed to cancer and non-cancer risks associated with using groundwater as their water source. The groundwater, therefore, would require remediation prior to the site becoming residential. Air concentration calculations are contained in Appendix G.

6.5 FISH AND WILDLIFE IMPACTS

A fish and wildlife impact analysis was conducted for the site. The analysis was conducted in accordance with a NYSDEC Division of Fish and Wildlife guidance document entitled *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA), October 1994.*

The site is located in an industrial setting and has been developed and used for industrial purposes. A large portion of the site is covered with a structure and asphalt/concrete for parking and roadways. The western side of the property in the vicinity of the contaminated source area is covered with gravel.

Vegetation is limited to grassy areas directly around the building and parking areas. Some landscaped areas (shrubs and perennials) are also located at the site. No ponds, lagoons, or other surface water features are present at the site.

Surface water flows from the site into a series of catch basins surrounding the property. The catch basins are connected by a storm sewer system that drains to an outfall located on the north side of Conklin Avenue. The outfall flows on the surface for approximately 10 feet before draining into a catch basin (CB045) that is piped to an intermittent stream located approximately 300 feet downgradient. A small pond (<0.5A) containing sedges and cattails lies between the pipe outfall

and the intermittent stream. The intermittent stream flows north into the Susquehanna River located approximately 600 feet from the site.

The only mapped wetland area within a mile of the site is a palustrine, temporarily flooded, broad-leaved deciduous forested area approximately 500 feet upstream and across the Susquehanna River. Due to its location, it would not be impacted by the site.

Although drainage from the site does reach an intermittent stream prior to draining to the Susquehanna River, the low concentrations detected would not be expected to impact fish and wildlife in this area. Even assuming that no dilution or degradation occurs from the monitored catch basin (CB045), the detected concentrations (1,1,1-trichloroethane 0.0055 ppm and trichloroethene 0.017 ppm) are approximately 100 times lower than U.S. EPA's freshwater screening levels for these compounds. U.S. EPA's water quality chronic criterion for trichloroethene is 21.9 ppm, which was the lowest observed adverse effect level (LOAEL). The NOAEL (no observed adverse effect level), therefore, would be 2.19 ppm compared to the catch basin concentration of 0.017 ppm. The New York State SCGs (TOGS 1.1.1.) specify a TCE concentration of 0.04 ppm for the human consumption of fish.

U.S. EPA does not provide water quality criteria for 1,1,1-trichloroethane, however, Region IV has a freshwater chronic screening level of 0.528 ppm for this compound. This level is about 100 times higher than the concentration detected in the catch basin (0.0055ppm). Therefore, no impacts to fish or wildlife would be anticipated from the site runoff. The New York State SCGs do not specify a maximum concentration of 1,1,1-TCA in water for the human consumption or protection of aquatic wildlife.

6.6 RISK UNCERTAINTY

There is a generally recognized uncertainty in human risk values developed from experimental data. This is primarily due to the uncertainty of data extrapolation in the areas of (1) high- to low-dose exposure, and (2) animal data to human experience.

In the presence of such uncertainty, the USEPA and the risk assessor can make very conservative assumptions such that the chance is very small for the actual health risk to be greater than that established through the risk process.

7.0 SUMMARY AND CONCLUSIONS

7.1 SUMMARY

7.1.1 Nature and Extent of Contamination

Soil (Vadose Zone)

Soil samples were collected across the site using an excavator (test trenches), a drill rig (outdoor soil borings) and a Geoprobe® (indoor soil borings). Soil samples collected outside of the building have not shown contaminant concentrations exceeding State cleanup objectives (TAGM 4046) within the vadose zone. TCE was detected above cleanup standards in a only soil sample collected under the building, however, a passive soil gas survey suggests that a significant source may exist under the southwest section of the building.

Ground Water

Concentrations of TCE and 1,1,1-TCA exceeding regulatory cleanup standards (TAGM 4046) have been detected in a shallow ground water zone located on the southwestern side of the property. Associated degradation products (1,1-DCE, 1,2-DCE, 1,1-DCA, vinyl chloride and chloroform) have also been detected at levels exceeding regulatory standards. The formal analytical results suggest that the shallow ground water contamination is isolated to an area measuring approximately 15,000 square feet. However, preliminary analytical results of soil and water samples collected from excavations within Chambers Street indicate that contamination may be migrating off-site through utility conduits.

A deeper aquifer flowing northeast at a depth of approximately 25-30 feet below the ground surface has not shown contamination above regulatory standards.

Surface Water

Surface water drains from the site into catch basins located on the property and in Chambers Street and Conklin Avenue. A storm water sample collected from a manhole located on Chambers Street did not detect contaminants above regulatory standards. Water samples collected from a catch basin on the north side of the building and the associated catch basin outfall located on the north side of Conklin Avenue had detections of TCE and 1,1,1-TCA slightly above regulatory standards. A drain line that runs through the center of the building feeds the catch basin on the north side of the facility. The outfall on the north side of Conklin Avenue flows on the surface to the north for approximately 15 feet before flowing into another catch basin that is piped to an intermittent stream located approximately 300 feet down gradient of the facility. The intermittent stream has not been sampled.

7.1.2 Fate and Transport

Data collected at the site shows an isolated area of shallow ground water contamination located on the southwestern side of the property. However, more recent, preliminary data suggest that ground water may be leaching from the shallow aquifer into the utility conduits located in Chambers Street. The extent of contamination within the utility conduits is unknown. Ground water samples collected to date from a deeper, more regional aquifer under the facility have not shown contamination above regulatory standards.

Concentrations of contaminants in ground water samples collected at the site have not shown a significant decline during the past two years. Degradation products have consistently been detected, however TCE and 1,1,1-TCA concentrations have remained consistent. Furthermore, general chemistry analyses (TOC, sulfates, nitrates, etc.) have indicated conditions that are not conducive to the natural attenuation of chlorinated organics.

7.1.3 Risk Assessment

Cancer risk values greater than USEPA's acceptable risk range of 10^{-6} to 10^{-4}, indicating a 1 in 1,000,000 to 1 in 10,000 probability of developing cancer due to chemical exposures, and noncancer risks with HI values exceeding unity, present a cause for concern. Calculations performed for this site indicated that neither the adult worker nor trespasser is above EPA's acceptable cancer risk of 1 x 10^{-4}, or non-cancer risk of 1under existing conditions. Only one scenario was studied that would present an unacceptable risk at the site. This scenario assumes that the site would become a residence prior to any site cleanup and that the residents would use the ground water as their drinking water source.

7.2 CONCLUSIONS

7.2.1 Data Limitations and Recommendations for Future Work

Passive soil gas data and ground water analyses suggest that a significant source of contamination exists under the facility. However, soil samples collected to date from test trenches and soil borings have not shown concentrations of chlorinated organics consistent with concentrations found in the ground water. An investigation of the abandoned drain line inside the facility was not successful due to corrosion or collapse of the line. Additionally, as-built plans of the facility could not be located. Therefore, as outlined in the Feasibility Study, pilot soil vapor extraction (SVE) tests will be conducted as part of the Remedial Design. These tests will help to establish the concentrations of chlorinated organics within the vadose zone under the facility. Furthermore the pilot tests will establish the efficiency and radius of influence of the proposed SVE system.

7.2.2 Recommended Remedial Action Objectives

Based on the risk assessment discussed in Section 6.0, the contaminants on site do not presently appear to pose a threat to human health and the environment. Therefore, the most important remedial action objective is to restrict or eliminate any migration of contaminants off site or into environmentally sensitive areas. Currently, there are two likely routes of off-site contaminant migration. One route is through surface drains that run under the facility. Very low levels of TCE and 1,1,1-TCA have been detected in samples collected from a storm water outfall located off site. Secondly, preliminary laboratory data suggest that contaminants are currently migrating off site through utility conduits located in Chambers Street. The extent of contamination within the utility conduits is currently unknown.

Following the elimination or restriction of any off-site contaminant migration, a remedial action chosen for the site should work towards the reduction of contaminants in the source area. Additional data collected in future investigations may help in further defining the source area under the building. Based on hydraulic conductivity data collected during the pump tests, the effective removal of contamination at the source should result in the rapid reduction of contaminants in the shallow ground water zone.

8.0 REFERENCES

Barai, A. and L.S. Hedges. 1985. *Movement of Water in Glacial Till*. International Associate of Hydrogeologists, Memoirs, Vol. XVII, Part 1 Proceedings, Hydrogeology of Rocks of Low Permeability, Tucson Arizona.

Brownlow. 1979. *Geochemistry*. Prentice-Hall, Inc.

Cohen, R.M. and J.W. Mercer. 1993. *DNAPL Site Evaluation*. CRC Press.

Cravens, S.J. and L.C. Ruedisili. 1987. *Water Movement in Till of East-Central South Dakota*. Ground Water, Vol. 25, No. 5. Dublin, Ohio.

Dove, G.D. and S.E. Norris. 1951. *Conditions Governing the Occurrence of Groundwater in the Fernald Area, Ohio with Reference to the Possibilities of Contamination by Disposal of Chemical Wastes*. U.S. Geologic Survey, Groundwater Branch.

Fetter. 1989. *Applied Hydrogeology*. Second Edition, Macmillan Publishing Company.

Freeze and Cherry. 1979. *Groundwater*. Prentice-Hall.

Grisak, G.E., J.A. Cherry, J.A. Vonhof, and J.P. Blumele. 1976. *Hydrogeologic and Hydrogeochemical Properties of Fractured Till in the Interior Plains Region: In Glacial Till, An Interdisciplinary Study*. The Royal Society of Canada, Special Publication No. 12, Robert F. Legget, editor, Ottawa, Ontario.

Morris, D.A. and A.I. Johnson. 1967. *Summary of Hydrologic and Physical Properties of Rock and Soil Materials as Analyzed by the Hydrologic Laboratory of the U.S. Geologic Survey*. USGS Water Supply Paper 1839-D.

Hagopian Engineering Associates. October 8, 1990. *Environmental Site Investigation for Dover Electronics Company, DEM-East and Kirkwood North Locations.*

Hagopian Engineering Associates. August 29, 1991. *Phase II Environmental Site Investigation for Dover Electronics.*

Harza Northeast. March 1995. *Dovatron International, Conklin Facility, 1993 and 1994 Operation Report For On-Site Groundwater Recovery and Treatment System*

Heath, R.C. 1983. *Basis Groundwater Hydrology*. U.S. Geological Survey Water Supply Paper 2220.

Hendry, M.J. 1988. *Hydrogeology of Clay Till in a Prairie Region of Canada.* Groundwater, Vol. 26, No. 5, Dublin, Ohio.

Newell, C.J. and R.R. Ross. 1992. *Estimating Potential for Occurrence of DNAPL at Superfund Sites.* USEPA Quick Reference Sheet.

NYSDEC. November 1996. *New York State Air Quality Report Ambient Air Monitoring System.* 1995 Annual DAR 96.1

NYSDEC. October 1994. *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA).*

Pankow, J.F., and J.A. Cherry. 1996. *Dense Chlorinated Solvents and Other DNAPLs in Groundwater.* University of Waterloo Press.

Stetson-Harza. Undated. *Project Workplan, Phase III Investigation, DEM-East and Kirkwood North.*

Stetson-Harza. December 1992. *DEM-East, Phase III Investigation, Final Report.*

Stetson-Harza. April 1993. *Dover Electronics Company, DEM-East Facility, On-Site Groundwater Treatment System Engineering Report, Preliminary Submittal.*

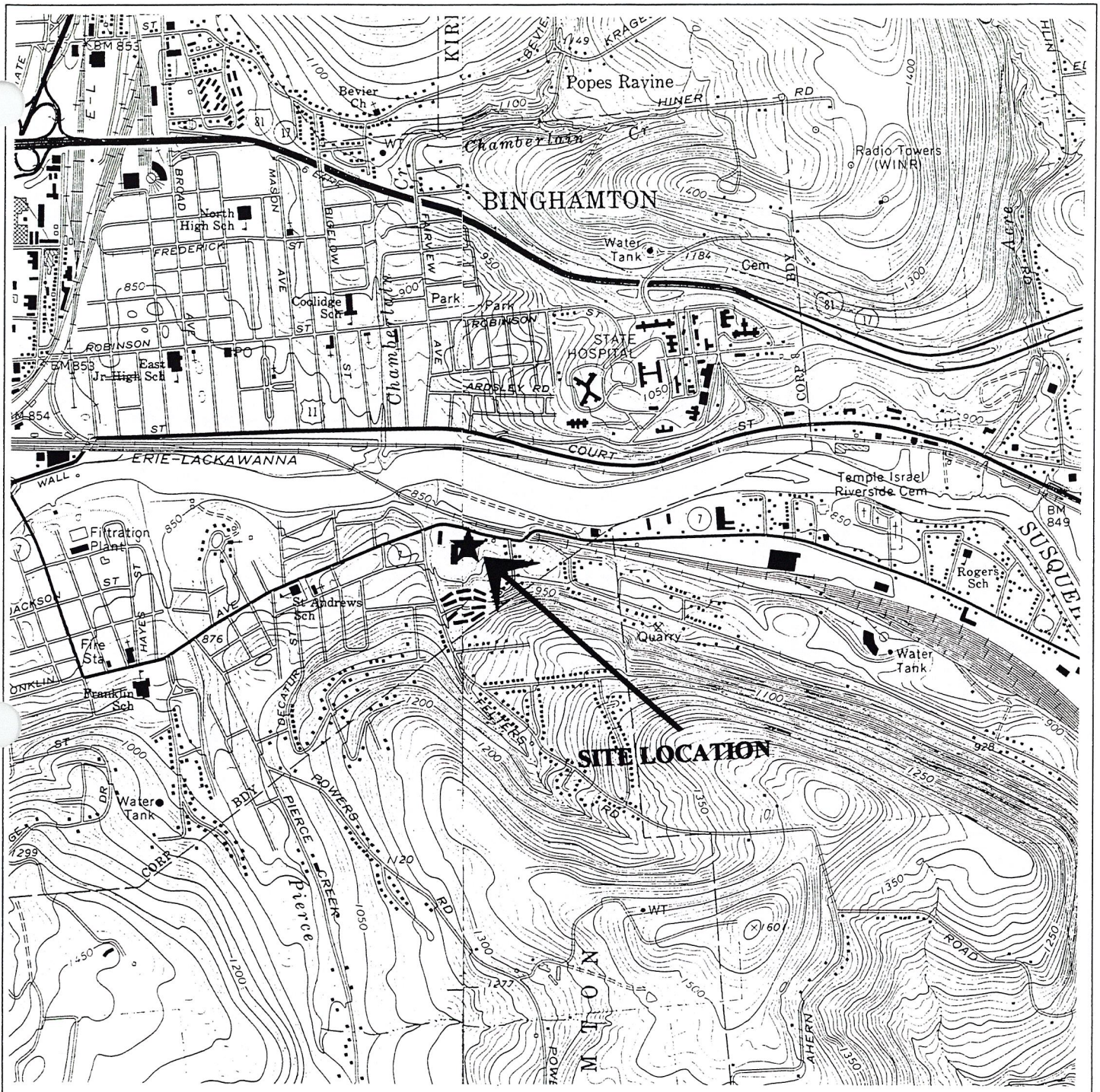
Stetson-Harza. August 1993. *Dovatron International, Conklin Avenue Facility, On-Site Groundwater Treatment System Engineering Report, Final Submittal.*

U.S. Department of Agriculture-Soil Conservation Service. March 1971. *Soil Survey, Broome County, New York.*

U.S. Environmental Protection Agency. 1989. *Superfund Record of Decision, BEC Trucking, Town of Vestal, Broome County, New York.*

U.S. Geological Survey. *Estimation of Hydraulic Conductivity of Riverbed and Aquifer System on the Susquehanna River in Broome County, New York.* Open File Report No. 91-457.

Walton, W.C. 1970. *Groundwater Resource Evaluation.* McGraw-Hill.



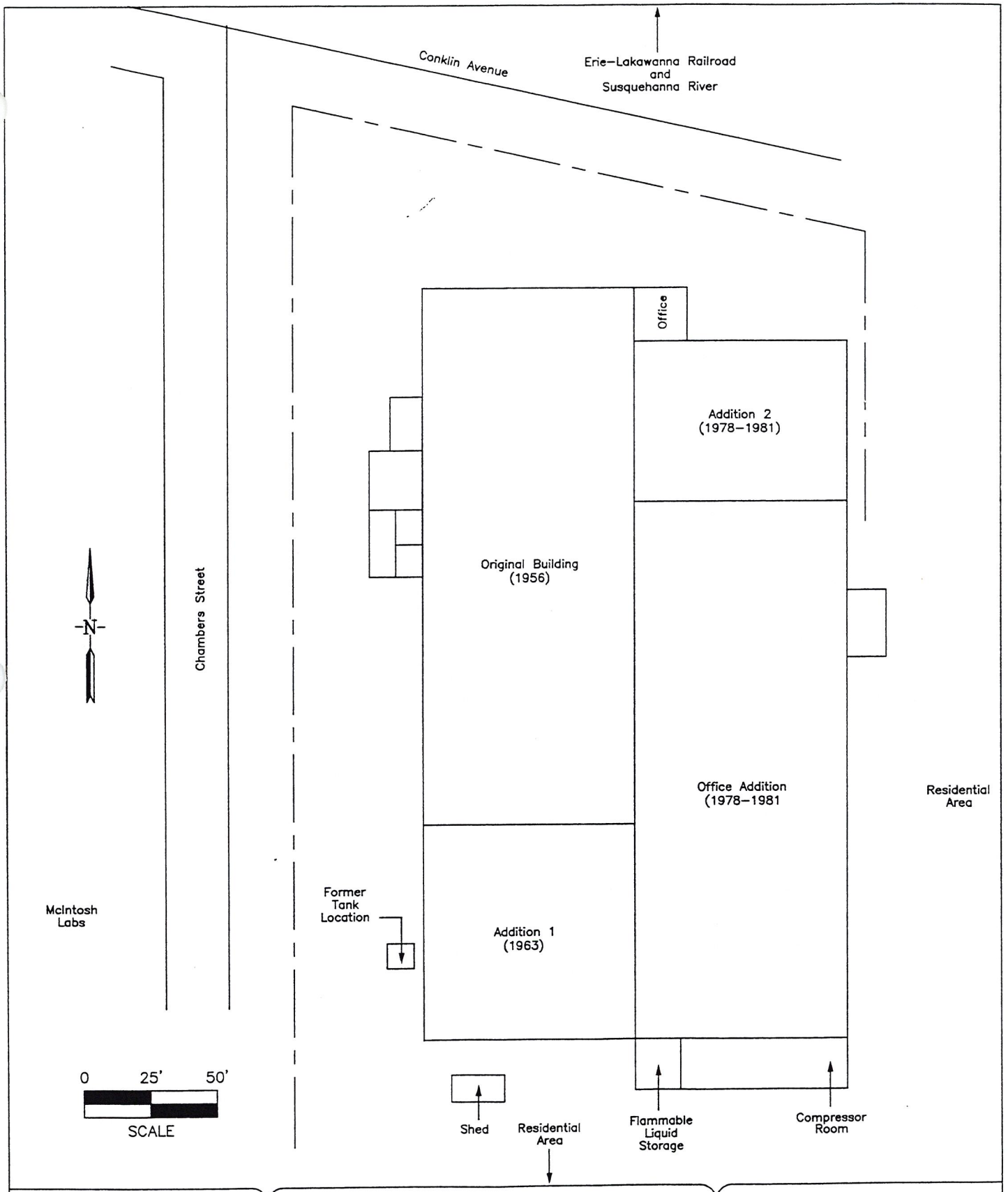
SOURCE: USGS Topographic Quadrangle Maps
Binghamton East, New York
1968 – Photoinspected 1976
Binghamton West, New York
1968 – Photoinspected 1976

-N-

0 1,000' 2,000'
SCALE

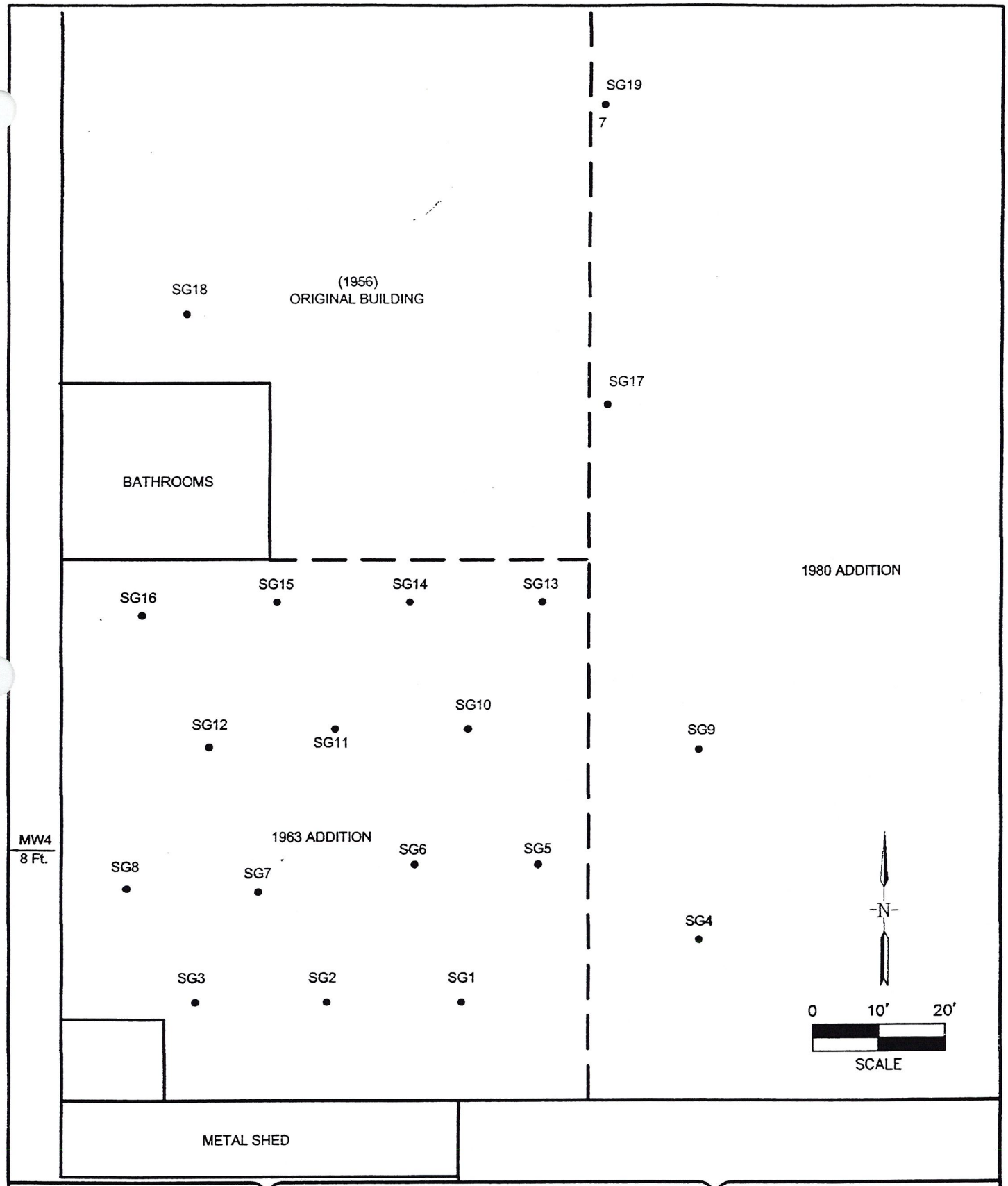
DATE: 8/11/99	FIGURE 1	SHIELD
DRAWN BY: P.D.H.	SITE LOCATION MAP	ENVIRONMENTAL ASSOCIATES, INC.
APPROVED BY: M.M.	DII – BINGHAMTON PLASTICS BINGHAMTON, NEW YORK	LEXINGTON, KY
CLIENT NO.: 396–0460		

60460



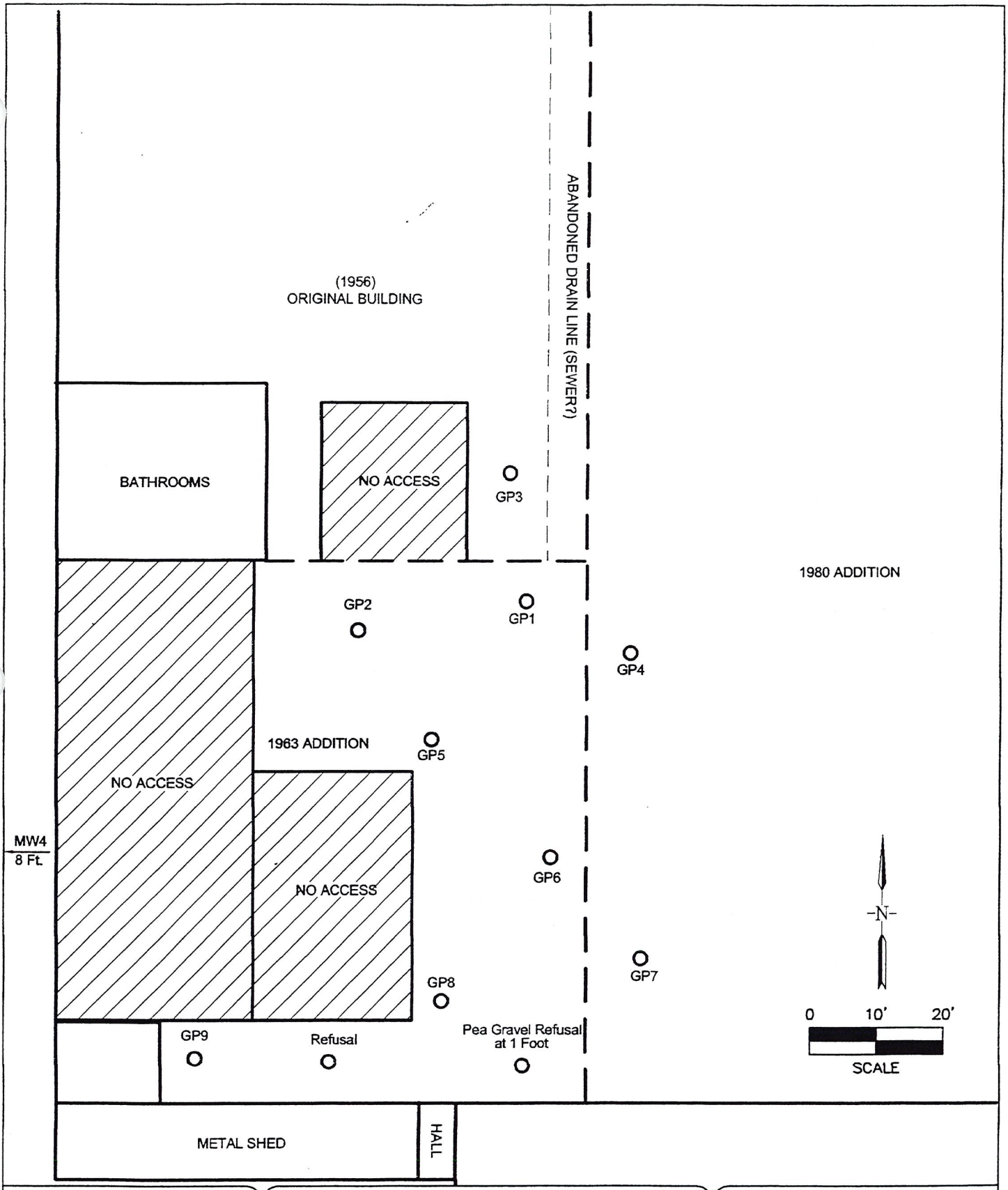
DATE: 8/11/99	FIGURE 2	SHIELD
DRAWN BY: P.D.H.	MAP SHOWING HISTORICAL SITE FEATURES AND SURROUNDING PROPERTIES DII – BINGHAMTON PLASTICS BINGHAMTON, NEW YORK	ENVIRONMENTAL ASSOCIATES, INC.
APPROVED BY: M.M.		LEXINGTON, KY
CLIENT NO.: 396–0460		

60460



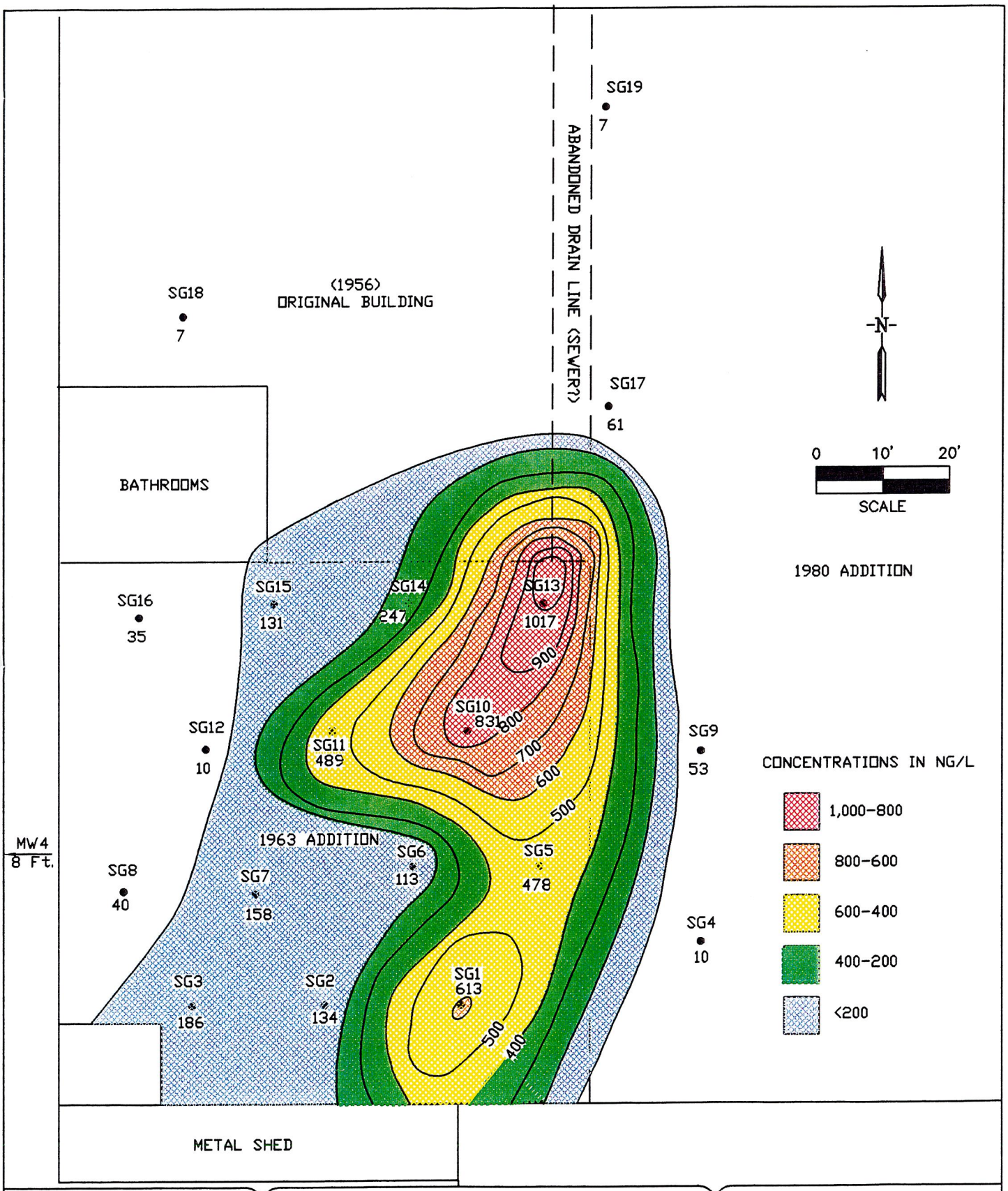
DATE: 8/11/99	FIGURE 3	SHIELD ENVIRONMENTAL ASSOCIATES, INC.
DRAWN BY: P.D.H.	PASSIVE SOIL GAS POINTS	
APPROVED BY: M.M.	DII – BINGHAMTON PLASTICS	LEXINGTON, KY
CLIENT NO.: 396–0460	BINGHAMTON, NEW YORK	

60460



DATE: 8/12/99	FIGURE 4	SHIELD ENVIRONMENTAL ASSOCIATES, INC.
DRAWN BY: P.D.H.	GEOPROBE BORING POINTS	
APPROVED BY: M.M.	DII – BINGHAMTON PLASTICS	
CLIENT NO.: 396-0460	BINGHAMTON, NEW YORK	LEXINGTON, KY

6046



DATE: 02/03/00	FIGURE 5	SHIELD ENVIRONMENTAL ASSOCIATES, INC.
DRAWN BY: P.D.H.	SOIL GAS CONCENTRATION MAP	
APPROVED BY: M.M.	DII – BINGHAMTON PLASTICS	
CLIENT NO.: 396-0460	BINGHAMTON, NEW YORK	LEXINGTON, KENTUCKY

60460

GRID NORTH

0 20' 40'
SCALE

MACINTOSH LABS

MACINTOSH LABS

(FORMER BINGHAMTON PLASTICS)

ADDITION 1 (1963)

ADDITION 2 (1975?)

ADDITION 3 (1982)

ORIGINAL BUILDING (1956)

METAL SHED

BATHROOMS

CHAMBERS STREET

869 869.19 870 870.5 871 871.5 872

MW14 869.19

MW13 868.96

MW8 869.24

MW11 870.28

MW5 870.33

MW15 870.46

MW10 870.33

MW9 871.33

DMW-1

DMW-3

DMW-4 871.17

MW12

BG1

BG2

BG3

BG4

SB8

MH-48

MH-49

MH-282

MH-277

CB-44

CB-45

CB-46

CB-47

CB-281

CB-282

CB-273

CB-276

CB-322

CB-325

CB-326

CB-327

MW6

MW7

CB-342

NYSEG 14243 1 NY

NYSEG 120 NYT 24

NYSEG 121 NYT 25

NYSEG 121 1

NYSEG 121 2

NYSEG 14243 5 1

NYSEG 5 NYT

NYSEG 424.5 3 5

18"PVC

15"PVC

12" VTP

6" VTP

8" VTP

12" PVC

6" PVC

10" PVC

10"CSP

15"CSP

UNDERGROUND TELEPHONE

5' O.F. TRANSFORMER ENCLOSURE

40N NYSEG 1424

50N NYSEG

Sanitary Sewer

Storm Sewer

Water

Gas

LEGEND

- UTILITY POLE
- UTILITY POLE W/LIGHT
- MONITORING WELL
- SOIL BORING
- STORM MANHOLE
- CATCH BASIN
- SANITARY MANHOLE
- POST INDICATOR VALVE
- HYDRANT
- WATER VALVE
- GAS VALVE
- GAS LINE
- OVERHEAD ELECTRIC

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
LEXINGTON, KENTUCKY

FIGURE 6

POTENTIOMETRIC MAP (SHALLOW AQUIFER)

DII-BINGHAMTON

BINGHAMTON, NEW YORK

DATE: 02/03/00

DRAWN BY: P.D.H.

APPROVED BY: M.M.

CLIENT NO.: 396-0460

GRID NORTH

0 20' 40'

SCALE

CB-43
BG4
MW6
844.38
NYSEG 120 NYT 24
12" VTP
18"PVC
CB-45
MH-49
CB-44
15"PVC
UNDERGROUND TELEPHONE
18"PVC
CB-47
MW7
837.53
CB-342
12" VTP
MH-48
6" VTP
15"CSP
SB8
NYSEG 121 NYT 25
CB-46
12" VTP
NYSEG 4243 1 NY
8" VTP
12" PVC
ORIGINAL BUILDING (1956)
ADDITION 2 (1975?)
NYSEG 121 1
MW14
40N NYSEG L424
50N NYSEG S 2-2
6' CLF TRANSFOMER ENCLOSURE
NYSEG 2 NYT 2
10"PVC CB-281
DMW3
849.18
ADDITION 3 (1982)
MW12
845.72
MW13
MH-280
SB7
BG3
6"PVC
CB-280
MW8
MW11
Sanitary Sewer
Storm Sewer
MACINTOSH LABS
(FORMER BINGHAMTON PLASTICS)
10"CSP
CB-326
6" PVC
CB-327
BATHROOMS
MW5
MW15
MH-279
6" VTP
CHAMBERS STREET
12" PVC
DMW-1
MW10
ADDITION 1 (1963)
NYSEG 4243 3 1
MH-277
10" PVC
MW9
CB-278
CB-276
NYSEG 3 NY1
MACINTOSH LABS
METAL SHED
CB-325
NYSEG 121 2
12" PVC
CB-322
BG1
NYSEG 3 2
NYSEG 4243 3 3
DMW-4
BG2
637
638
639
640
641
642
643
644
645
646
647
648
649

LEGEND

- UTILITY POLE
- UTILITY POLE W/LIGHT
- MONITORING WELL
- SOIL BORING
- STORM MANHOLE
- CATCH BASIN
- SANITARY MANHOLE
- POST INDICATOR VALVE
- HYDRANT
- WATER VALVE
- GAS VALVE
- GAS LINE
- OVERHEAD ELECTRIC

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
LEXINGTON, KENTUCKY

FIGURE 7

POTENTIOMETRIC MAP (DEEP AQUIFER)
DII-BINGHAMTON
BINGHAMTON, NEW YORK

DATE: 02/03/00
DRAWN BY: P.D.H.
APPROVED BY: M.M.
CLIENT NO.: 396-0460

60460-17

GRID NORTH

0 20' 40'
SCALE

S 1-1
S 1-2
NYSEG L4243 1 NY
NYSEG 2 NYT 2
NYSEG L4243 3-1
NYSEG 3 NYT
NYSEG 3-2
NYSEG 4243 3-3
NYSEG 120 NYT 24
NYSEG 121 NYT 25
NYSEG 121-1
NYSEG 121-2

CB-43
BG4
MW6
MW7
CB-342
MW13 (DRY)
MW14
MW12
DMW3
DMW-4
BG1
BG2
SB8
MH-49
MH-48
MH-282
MH-277
CB-45
CB-44
CB-47
CB-46
CB-280
CB-278
CB-276
CB-322
CB-326
CB-325
40N NYSEG L424
50N NYSEG S-2-2

18"PVC
15"PVC
12" VTP
6" VTP
8" VTP
15"CSP
10"PVC
12" PVC
6"PVC
10"CSP
6" PVC

UNDERGROUND TELEPHONE
Gas
Sewer
Sewer

TRENCH 14
TRENCH 3
TRENCH 2
TRENCH 9
TRENCH 10
TRENCH 8

6' CLF TRANSFOMER ENCLOSURE

ORIGINAL BUILDING (1956)
ADDITION 2 (1975?)
ADDITION 3 (1982)
ADDITION 1 (1963)
MACINTOSH LABS
(FORMER BINGHAMTON PLASTICS)
BATHROOMS
METAL SHED
MACINTOSH LABS

CHAMBERS STREET

15
10
5
1
0.1

LEGEND

- UTILITY POLE
- UTILITY POLE W/LIGHT
- MONITORING WELL
- SOIL BORING
- STORM MANHOLE
- CATCH BASIN
- SANITARY MANHOLE
- POST INDICATOR VALVE
- HYDRANT
- WATER VALVE
- GAS VALVE
- GAS LINE
- OVERHEAD ELECTRIC

TOTAL SSPL (mg/L)

- 15–20
- 10–15
- 5–10
- 1–5
- 0.1–1

SHIELD
ENVIRONMENTAL ASSOCIATES, INC.
LEXINGTON, KENTUCKY

FIGURE 8
TOTAL SITE-SPECIFIC PARAMETER LIST (SSPL) COMPOUNDS IN GROUNDWATER
DII – BINGHAMTON PLASTICS
BINGHAMTON, NEW YORK

DATE: 02/03/00
DRAWN BY: P.D.H.
APPROVED BY: M.M.
CLIENT NO.: 396-0460

60460-18

Figure 9
DII Binghamton Exposure Site Model

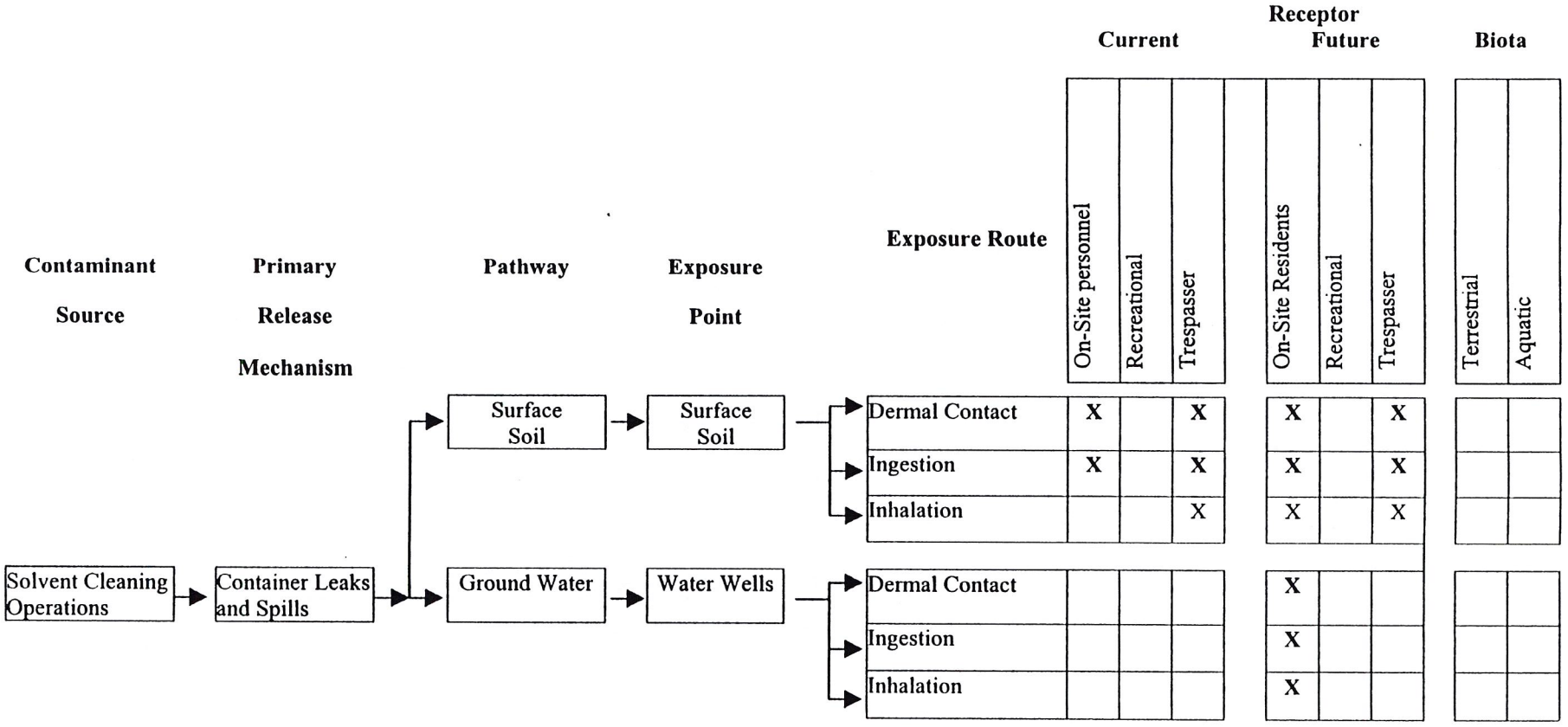


TABLE 1
CHRONOLOGY OF SIGNIFICANT SITE EVENTS
(Prior to Order on Consent)
Dii – Binghamton Plastics
Binghamton, New York

Date	Activity
1956	Original building constructed
1963	Addition 1 constructed
1978	Addition 2 constructed
1981	Office addition constructed
1986	1,000 gallon lubricating oil UST removed
07/90	Borings drilled in former UST area (Hagopian Engineering)
04/91	DMW1 through DMW4 installed (Hagopian Engineering)
07/92	Borings D-1 through D-4 drilled (Stetson-Harza)
09/93	Binghamton Johnson City Joint Sewage Board treated ground water discharge permit issued.
10/93	Start-up of ground water treatment system
12/93	Site included on New York State Registry of Inactive Hazardous Waste Disposal Sites
03/94	Ground water treatment system inspected by the Binghamton Johnson City Joint Sewage Board
03/95	Operation report for ground water treatment system
10/96	Well sampling of DMW1, DMW3, and DMW4 (Shield)
10/97	Installation and sampling of MW5, MW6, and MW7 (Shield)
12/97	Sampling of DMW1, DMW3, DMW4, MW5, MW6 and MW7 (Shield)

TABLE 2
GROUND WATER ELEVATION DATA
DII/Binghamton Plastics
Binghamton, New York

MW ID#	Depth of Well (ft)	Screened Interval (ft)	Surface Elev. (ft AMSL)	TOC Elev. (ft AMSL)	Date	Depth to Water (ft)	Ground Water Elevation (ft AMSL)
DMW1	15	5-15	876.19	874.21	10/15/97	3.08	871.13
					12/9/97	3.49	870.72
					2/5/98	1.89	872.32
					2/11/99	1.78	872.43
					7/27/99	3.34	870.87
DMW3	48	41-48	875.16	874.22	10/15/97	24.87	849.35
					12/9/97	23.08	851.14
					2/5/98	22.5	851.72
					2/11/99	22.38	851.84
					7/27/99	25.07	849.15
DMW4	15	5-15	878.32	877.91	10/15/97	5.11	872.8
					12/9/97	3.92	873.99
					2/5/98	3.84	874.07
					2/11/99	3.71	874.2
					7/27/99	5.74	872.17
MW5	20	10-20	874.18	873.83	10/15/97	3.03	870.8
					12/9/97	3.06	870.77
					2/5/98	2.75	871.08
					2/11/99	2.67	871.16
					7/27/99	3.5	870.33
MW6	40	30-40	869.62	869.37	10/15/97	24.5	844.87
					12/9/97	23.22	846.15
					2/5/98	22.63	846.74
					2/11/99	22.82	846.55
					7/27/99	24.99	844.38
MW7	40	30-40	869.96	869.6	10/15/97	31.89	837.71
					12/9/97	29.93	839.67
					2/5/98	28.62	840.98
					2/11/99	28.71	840.89
					7/27/99	32.07	837.53
MW8	15	5-15	873.22	872.83	2/5/98	1.98	870.85
					2/11/99	2.25	870.58
					7/27/99	3.59	869.24
MW9	15	5-15	875.02	874.76	2/5/98	1.77	872.99
					2/11/99	1.69	873.07
					7/27/99	3.24	871.52

MW - Monitoring Well
TOC - Top of PVC Casing
AMSL - Above Mean Sea Level

TABLE 2
GROUND WATER ELEVATION DATA
DII/Binghamton Plastics
Binghamton, New York

MW ID#	Depth of Well (ft)	Screened Interval (ft)	Surface Elev. (ft AMSL)	TOC Elev. (ft AMSL)	Date	Depth to Water (ft)	Ground Water Elevation (ft AMSL)
MW10	15	5-15	875.7	875.47	2/5/98	2.94	872.53
					2/11/99	2.88	872.59
					7/27/99	4.14	871.33
MW11	20	10-20	874.53	874.14	2/5/98	2.17	871.97
					2/11/99	1.87	872.27
					7/27/99	3.88	870.26
MW12	45	35-45	873.7	873.38	2/5/98	24.41	848.97
					2/11/99	24.93	848.45
					7/27/99	27.66	845.72
MW13	15	5-15	874.08	873.6	2/5/98	Dry	NA
					2/11/99	4.36	869.24
					7/27/99	4.64	868.96
MW14	15	5-15	871.06	870.57	7/27/99	1.38	869.19
MW15	15	5-15	874.06	873.69	2/11/99	2.13	871.56
					7/27/99	3.23	870.46

MW - Monitoring Well
TOC - Top of PVC Casing
AMSL - Above Mean Sea Level

TABLE 3
NEW YORK STATE STANDARDS, CRITERIA AND GUIDELINES (SCGs)

1. Division of Water Technical and Operational Guidance Services (1.1.1.) Ambient Water Quality Standards and Guidance Values (originator: Jon Zambruno)

2. Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Clean Levels (TAGM 4046) 1994

3. New York State Inactive Hazardous Waste Site, Citizen Participation Plan, August 30, 1988

4. Fresh Water Wetlands Mapping and Classification Regulations 6 NY CRR Part 664

5. NYSDEC Division of Environmental Remediation Guidance for the Development of Data Usability Summary Reports

6. NYSDEC – Division of Environmental Remediation, Spill Technology and Remediation Series (STARS) Memo #1: Petroleum-Contaminated Soil Guidance Policy.

7. NYSDEC – Division of Air Resources, Guidelines for the Control of Toxic Ambient Air Contaminants (Air Guide 1), November 12, 1997.

Table 4
Analytical Results- Soil - VOCs (mg/kg)
DII - Binghamton Plastics

Sample ID	T1 SS2 (2'-4')	T1 SS1 (4'-6)	T4 SS2 (2'-4')	T5 SS1 (4'-6')	T2 SS2 (2'-4')	T2 SS1 (4'-6')	T6 SS2 (2'-4)
Sample No.	BP001	BP002	BP005	BP006	BP008	BP010	BP011
Date Collected	11/16/1998	11/16/1998	11/16/1998	11/16/1998	11/17/1998	11/17/1998	11/17/1998
1,1,1-TCA	0.02	< 0.005	< 0.05	< 0.005	0.00056 J	0.0022 J	< 0.005
1,1-DCA	0.0095	< 0.005	< 0.05	< 0.005	0.0022 J	< 0.005	< 0.005
cis-1,2-DCE	0.0043	0.0099	< 0.025	0.0023 J	0.0053	0.0066	< 0.0025
trans-1,2-DCE	< 0.0025	< 0.0025	< 0.025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Ethylbenzene	0.0034 J	< 0.005	NA	NA	NA	NA	NA
Methylene Chloride	0.0013 J	0.00093 J	NA	NA	NA	NA	NA
PCE	0.007	0.00048 J	**0.21**	0.0031 J	0.0033 J	0.007	0.0006 J
Toluene	0.008	0.0015 J	NA	NA	NA	NA	NA
TCE	0.0015 J	< 0.005	< 0.05	0.0061	0.01	0.027	0.0012 J
Vinyl Chloride	< 0.01	< 0.01	< 0.1	< 0.1	< 0.01	< 0.01	< 0.01
Xylenes	0.015	< 0.005	NA	NA	NA	NA	NA

Bold - level exceeds *TAGM 4046*
TCA-trichloroethane
DCE-dichloroethene
DCA-dichloroethane
PCE-Tetrachloroethene
J-Estimated result. Less than reporting limit
NA-Not Analyzed

Table 4
Analytical Results- Soil - VOCs (mg/kg)
DII - Binghamton Plastics

Sample ID	T6 SS1 (4'-6')	T7 SS2 (4'-6')	T7 SS1 (6'-8')	T3 SS2 (2'-4')	T3 SS1 (4'-6')	T9 SS1 (2'-4')	T10 SS1 (2'-4')
Sample No.	BP012	BP013	BP014	BP015	BP016	BP023	BP025
Date Collected	11/17/1998	11/17/1998	11/17/1998	11/17/1998	11/17/1998	11/18/1998	11/18/1998
1,1,1-TCA	< 0.005	0.0016 J	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005
1,1-DCA	< 0.005	0.0049 J	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-DCE	< 0.0025	0.15	**0.31**	< 0.0025	< 0.0025	< 0.0025	< 0.0025
trans-1,2-DCE	< 0.0025	0.011	< 0.025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Ethylbenzene	NA	NA	NA	< 0.005	< 0.005	NA	NA
Methylene Chloride	NA	NA	NA	< 0.005	< 0.005	NA	NA
PCE	< 0.005	< 0.005	0.0058 J	< 0.005	0.00073 J	< 0.005	< 0.005
Toluene	NA	NA	NA	< 0.005	< 0.005	NA	NA
TCE	0.0016 J	0.041	**1.3**	< 0.005	< 0.005	< 0.005	0.0042 J
Vinyl Chloride	< 0.01	**0.14**	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01
Xylenes	NA	NA	NA	< 0.005	< 0.005	NA	NA

Bold - level exceeds *TAGM 4046*
TCA-trichloroethane
DCE-dichloroethene
DCA-dichloroethane
PCE-Tetrachloroethene
J-Estimated result. Less than reporting limit
NA-Not Analyzed

Table 4
Analytical Results- Soil - VOCs (mg/kg)
DII - Binghamton Plastics

Sample ID	T11 SS1 (4'-6')	T13 SS (4'-5')	T14 SS (4'-5')	MW14 (10'-12')	SB8 SS (4'-6')	SB7 SS (4'-6')	MW15 SS (6'-8')
Sample No.	BP028	BPO74	BP076	BP017	BP019	BP021	BP026
Date Collected	11/18/1998	7/26/1999	7/26/1999	11/17/1998	11/18/1998	11/18/1998	11/18/1998
1,1,1-TCA	0.0082 J	0.0054	<0.005	< 0.005	< 0.005	< 0.005	0.0081 J
1,1-DCA	< 0.017	0.0026 J	< 0.005	< 0.005	< 0.005	< 0.005	< 0.0083
cis-1,2-DCE	0.038	0.0019 J	< 0.0025	< 0.0025	< 0.0025	< 0.0025	0.015
trans-1,2-DCE	< 0.0083	< 0.0025	<0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0042
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA
PCE	< 0.017	< 0.005	< 0.005	0.002 J	0.00038 J	< 0.005	< 0.0083
Toluene	NA	NA	NA	NA	NA	NA	NA
TCE	0.23	0.0029 J	0.00093	< 0.005	0.0035 J	< 0.005	0.075
Vinyl Chloride	< 0.033	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.017
Xylenes	NA	NA	NA	NA	NA	NA	NA

Bold - level exceeds *TAGM 4046*
TCA-trichloroethane
DCE-dichloroethene
DCA-dichloroethane
PCE-Tetrachloroethene
J-Estimated result. Less than reporting limit
NA-Not Analyzed

Table 5
Analytical Results-Soil-Metals (mg/kg)
DII - Binghamton Plastics

Sample ID	T1 SS2 (2'-4')	T1 SS1 (4'-6')	T3 SS2 (2'-4")	T3 SS1 (4'-6')
Sample No.	BP001	BP002	BP015	BP016
Date Collected	11/16/1998	11/16/1998	11/17/1998	11/17/1998
Arsenic	7.2	5.7	6.1	8.3
Lead	12.5	9.0	23.8	9.8
Selenium	< 0.5	< 0.5	< 0.5	< 0.5
Thallium	< 1.0	< 1.0	< 1.0	< 1.0
Silver	< 1.0	< 1.0	< 1.0	< 1.0
Aluminum	8950	8240	12500	10900
Barium	60.8	34.7	64.3	54.9
Beryllium	< 0.5	< 0.5	< 0.5	< 0.5
Calcium	18400	8880	902	22400
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	7.5	6.6	8.4	8.3
Chromium	10.9	9.4	13.1	12.2
Copper	19.4	17.5	23.1	15.2
Iron	19300	17800	20700	21000
Potassium	975	681	1170	1320
Magnesium	7890	3170	2780	4020
Manganese	785	316	394	399
Sodium	< 500	< 500	< 500	< 500
Nickel	17.8	15.8	19.6	19.9
Antimony	< 6.0	< 6.0	< 6.0	< 6.0
Vanadium	10.4	10	15.1	12.9
Zinc	70.1	43.1	64.0	52.2
Mercury	< 0.1	< 0.1	< 0.1	< 0.1

Table 6
Analytical Results - Ground Water - VOCs (mg/l)
DII - Binghamton Plastics

Sample ID	T1 GW	T4 GW	T2 GW	T9 GW	T10 GW	T13 GW
Sample No.	BP003	BP004	BP009	BP022	BP024	BP073
Date Collected	11/16/1998	11/16/1998	11/17/1998	11/18/1998	11/18/1998	7/26/1999
Vinyl Chloride	**0.029**	**0.0032 J**	< 0.01	< 0.01	< 0.01	< 0.033
Chloroethane	**0.065**	< 0.020	< 0.01	< 0.01	< 0.01	< 0.033
1,1,1-TCA	**0.17**	**0.0087 J**	< 0.005	**0.037**	< 0.005	**0.067**
1,1-DCE	**0.0038 J**	< 0.01	< 0.005	< 0.005	< 0.005	**0.019**
1,1-DCA	**0.22**	**0.011**	< 0.005	< 0.005	< 0.005	**0.026**
cis 1,2-DCE	**0.24**	**0.027**	< 0.0025	**0.043**	< 0.0025	**0.067**
trans 1,2-DCE	0.0032 J	< 0.005	< 0.0025	< 0.0025	< 0.0025	< 0.0083
PCE	0.0048 J	**0.011**	< 0.005	0.0042 J	< 0.005	< 0.017
TCE	**0.063**	**0.0097 J**	< 0.005	**0.18**	**0.0089**	**0.37**
TPH	NA	**1,200**	NA	NA	NA	NA

Bold - Level exceeds *TOGS 1.1.1*
TCA - Trichloroethane
DCE - Dichloroethene
DCA - Dichloroethane
PCE - Tetrachloroethene
TPH - Total Petroleum Hydrocarbons
J - Estimated result less than RL

Table 6
Analytical Results - Ground Water - VOCs (mg/l)
DII - Binghamton Plastics

Sample ID	T14 GW	MW12 GW	MW7 GW	MW13 GW	DMW4 GW	MW6 GW	MW11 GW
Sample No.	BP075	BP033	BP034	BP036	BP037	BP038	BP039
Date Collected	7/26/1999	12/7/1998	12/8/1998	12/9/1998	12/9/1998	12/9/1998	12/9/1998
Vinyl Chloride	< 0.033	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.14**
Chloroethane	< 0.033	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-TCA	**0.037**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.012**
1,1-DCE	**0.0055 J**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	**0.013**
1,1-DCA	**0.018**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0089
cis 1,2-DCE	**0.034**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**1.1**
trans 1,2-DCE	< 0.0083	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.011**
PCE	< 0.017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TCE	**0.44**	< 0.005	< 0.005	< 0.005	0.0012 J	< 0.005	**1.4**
TPH	NA	NA	NA	NA	NA	NA	NA

Bold - Level exceeds *TOGS 1.1.1*
TCA - Trichloroethane
DCE - Dichloroethene
DCA - Dichloroethane
PCE - Tetrachloroethene
TPH - Total Petroleum Hydrocarbons
J - Estimated result less than RL

Table 6
Analytical Results - Ground Water - VOCs (mg/l)
DII - Binghamton Plastics

Sample ID	MW14 GW	MW10 GW	MW8 GW	DMW3 GW	MW5 GW	MW9 GW	MW15 GW	DMW1 GW
Sample No.	BP040	BP042	BP043	BP044	BP047	BP048	BP045	BP055
Date Collected	12/9/1998	12/10/1998	12/10/1998	12/10/1998	12/10/1998	12/10/1998	12/10/1998	2/8/1999
Vinyl Chloride	< 0.01	**0.0023 J**	< 0.02	< 0.01	**0.02**	< 0.01	**0.023**	< 0.71
Chloroethane	< 0.01	< 0.01	< 0.02	< 0.01	0.0062 J	< 0.01	**0.012**	< 0.71
1,1,1-TCA	< 0.005	**0.025**	< 0.01	< 0.005	**1.1**	0.0044 J	**1.6**	**0.62**
1,1-DCE	< 0.005	< 0.005	< 0.01	< 0.005	**0.5**	< 0.005	**0.56**	**0.085 J**
1,1-DCA	< 0.005	**0.014**	0.0028 J	< 0.005	**0.17**	< 0.005	**0.22 J**	**0.15 J**
cis 1,2-DCE	< 0.0025	**0.018**	**0.25**	< 0.0025	**0.48**	**0.0073**	**0.96**	**1**
trans 1,2-DCE	< 0.0025	< 0.0025	< 0.005	< 0.0025	**0.011**	< 0.0025	**0.011**	< 0.18
PCE	< 0.005	**0.0054**	< 0.01	< 0.005	**0.01**	0.0012 J	**0.014**	< 0.36
TCE	< 0.005	**0.064**	**0.35**	0.0011 J	**17**	**0.077**	**6.9**	**8.2**
TPH	NA	NA	NA	NA	NA	NA	NA	NA

Bold - Level exceeds *TOGS 1.1.1*
TCA - Trichloroethane
DCE - Dichloroethene
DCA - Dichloroethane
PCE - Tetrachloroethene
TPH - Total Petroleum Hydrocarbons
J - Estimated result less than RL

Table 7
Analytical Results - Ground Water - Metals (mg/l)
DII - Binghamton Plastics

Sample ID	T1 GW	T2 GW	MW5 GW
Sample No.	BP003	BP009	BP047
Date Collected	11/16/98	11/17/98	12/10/98
Arsenic	0.021	0.014	< 0.01
Lead	0.053	0.094	< 0.003
Selenium	0.0063	< 0.005	< 0.005
Thallium	< 0.010	< 0.010	< 0.01
Silver	< 0.010	< 0.010	< 0.01
Aluminum	6.8	25.3	< 0.2
Barium	1.2	0.56	< 0.2
Beryllium	< 0.005	< 0.005	< 0.005
Calcium	161	57.4	110
Cadmium	0.0063	< 0.005	< 0.005
Cobalt	< 0.050	< 0.050	< 0.05
Chromium	< 0.010	0.027	0.011
Copper	0.033	0.12	< 0.025
Iron	35.6	38.5	0.19
Potassium	< 5.0	< 5.0	< 5.0
Magnesium	19.3	10.7	19.0
Manganese	17.6	4.6	0.19
Sodium	92.8	< 5.0	61.3
Nickel	< 0.040	0.046	< 0.04
Antimony	< 0.060	< 0.060	< 0.06
Vanadium	< 0.050	< 0.050	< 0.05
Zinc	0.42	0.55	< 0.02
Mercury	< 0.0002	< 0.0002	< 0.0002

Table 8
Analytical Results-Soil Gas-VOCs (ng/L)
DII - Binghamton Plastics

Sample ID	SG01	SG02	SG03	SG04	SG05	SG06	SG07	SG08	SG09	SG10
Date Collected	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999
Chloroethane	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38
Chloroform	0.49	1.16	1	<0.36	0.57	<0.36	0.51	<0.36	1.02	1.06
1,1-Dichloroethane	10.84	6.49	10.03	<0.43	10.77	4.37	8.9	5.33	2.18	40.55
1,2-Dichloroethane	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
1,1-Dichloroethene	6.58	1.12	3.19	<0.65	2.81	1.3	0.78	<0.65	1.01	1.07
1,2-Dichloroethene (cis)	22.64	13.35	22.71	0.53	23.19	1.27	8.12	9.91	<0.39	1.2
1,2-Dichloroethene (trans)	<0.44	<0.44	<0.44	<0.44	0.49	<0.44	<0.44	<0.44	<0.44	<0.44
Dichloroflouromethane	17.97	3.82	3.94	<1.30	48.4	9.85	4.05	<1.30	2.65	129.78
Tetrachloroethene	1.63	1.89	1.62	0.77	6.72	1.74	5.64	0.4	0.68	19.06
1,1,1-Trichloroethane	57.2	22.78	42.22	0.49	84.45	47.79	57.13	15.28	7.97	149.76
Trichloroethene	36.35	69.19	96.13	0.35	32.61	11.02	52.25	9.6	2.38	27.25
112-Trichlorotriflouroethane	459.89	14.82	7.85	8.49	268.64	36.47	20.53	<0.76	35.39	461.36
Total	**613.59**	**134.62**	**188.69**	**10.63**	**478.65**	**113.81**	**157.91**	**40.52**	**53.28**	**831.09**

Table 8
Analytical Results-Soil Gas-VOCs (ng/L)
DII - Binghamton Plastics

Sample ID	SG11	SG12	SG13	SG14	SG15	SG16	SG17	SG18	SG19
Date Collected	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999	5/8/1999
Chloroethane	<1.38	<1.38	33.11	<1.38	<1.38	<1.38	<1.38	<1.38	<1.38
Chloroform	0.39	0.53	<0.36	<0.36	0.54	0.46	0.76	0.52	1.11
1,1-Dichloroethane	64.58	<0.43	91.6	1.65	5.61	<0.43	0.53	<0.43	<0.43
1,2-Dichloroethane	<0.33	<0.33	1.49	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
1,1-Dichloroethene	1.12	<0.65	64.15	2.1	<0.65	<0.65	<0.65	<0.65	<0.65
1,2-Dichloroethene (cis)	3.4	<0.39	27.8	0.42	24.8	<0.39	<0.39	<0.39	<0.39
1,2-Dichloroethene (trans)	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
Dichloroflouromethane	39.61	<1.3	36.4	16.74	6.68	<1.3	2.58	<1.3	<1.3
Tetrachloroethene	11.64	0.48	14.6	26.77	2.31	0.99	0.46	0.32	0.73
1,1,1-Trichloroethane	257.08	1.47	294.68	68.49	9.01	11.19	3.37	1	1.51
Trichloroethene	17.28	0.97	60.65	22.08	45.85	0.91	1.69	1.3	1.16
112-Trichlorotriflouroethane	94.41	6.81	392.97	108.6	36.09	21.35	52.19	3.53	2.45
Total	**489.51**	**10.26**	**1017.45**	**246.85**	**130.89**	**34.9**	**61.58**	**6.67**	**6.96**

Table 9
Analytical Results - VOCs - Geoprobe Borings (mg/kg)
DII Binghamton Plastics

Sample ID	GP1 SS (0.5'-4')	GP1 SS (4'-5')	GP2 SS (0.5'-4')	GP2 SS (4'-8')	GP3 SS (0.5'-4')	GP4 SS (0.5'-4')	GP4 SS (4'-8')
Sample No.	BP057	BP058	BP059	BP060	BP061	BP062	BP063
Date Collected	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999
1,1,1-TCA	0.065	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0016 J
1,1-DCA	0.026	0.022	< 0.005	< 0.005	< 0.005	< 0.005	0.0093
cis 1,2-DCE	0.00084 J	0.089	0.0063	< 0.0025	< 0.0025	0.0026	0.033
trans 1,2-DCE	< 0.0025	0.00048 J	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA
PCE	0.19	0.00071	0.027	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	NA	NA	NA	NA	NA	NA	NA
TCE	0.0033 J	0.0019 J	0.015	< 0.005	0.0015 J	0.0044 J	0.0074
Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylenes	NA	NA	NA	NA	NA	NA	NA

Bold - Level Exceeds *Soil Cleanup Objectives to Protect Ground Water Quality (TAGM 4046)*

TCA - trichloroethane

DCE - dichloroethene

DCA - dichloroethane

PCE - tetrachloroethene

J - Estimated result less than reporting limit

Table 9

Analytical Results - VOCs - Geoprobe Borings (mg/kg)

DII Binghamton Plastics

Sample ID	GP5 SS (0.5'-4')	GP6 SS (0.5'-4')	GP7 SS (0.5'-4')	GP8 SS (0.5'-4')	GP8 SS (4'-8')	GP9 SS (0.5'-4')
Sample No.	BP064	BP065	BP066	BP067	BP068	BP069
Date Collected	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999
1,1,1-TCA	< 0.005	0.2 J	< 0.005	0.0031 J	0.0011 J	< 0.005
1,1-DCA	< 0.005	< 0.62	< 0.005	< 0.01	< 0.005	< 0.005
cis 1,2-DCE	0.004	0.35	< 0.0025	0.061	< 0.0025	0.00072 J
trans 1,2-DCE	< 0.0025	< 0.31	< 0.0025	< 0.005	< 0.0025	< 0.0025
Ethylbenzene	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA
PCE	< 0.005	0.22 J	< 0.005	0.0011 J	< 0.005	< 0.005
Toluene	NA	NA	NA	NA	NA	NA
TCE	0.027	**2.9**	0.00035 J	0.14	0.024	0.022
Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylenes	NA	NA	NA	NA	NA	NA

Bold - Level Exceeds *Soil Cleanup Objectives to Protect Ground Water Quality (TAGM 4046)*

TCA - trichloroethane

DCE - dichloroethene

DCA - dichloroethane

PCE - tetrachloroethene

J - Estimated result less than reporting limit

Table 10
Analytical Results-Surface Water-VOCs (mg/l)
DII - Binghamton Plastics

Sample ID	MH282 SW	CB342 SW	CBO45 SW
Sample No.	BP051	BP052	BP053
Date Collected	2/2/1999	2/2/1999	2/2/1999
1,1,1-TCA	0.0035 J	**0.0063**	**0.0055**
1,1-DCA	< 0.005	< 0.005	0.0015 J
cis-1,2-DCE	< 0.0025	< 0.0025	0.0013 J
PCE	< 0.005	**0.0027 J**	< 0.005
TCE	< 0.005	0.0017 J	**0.017**

Bold - Level exceeds TOGS 1.1.1.
J - Estimated result less than reporting limit.
TCA - Trichloroethane
DCA - Dichloroethane
DCE - Dichloroethene
PCE - Tetrachloroethene
TCE - Trichloroethene

Table 11
Analytical Results-Ground Water-General Chemistry
Binghamton Plastics

Sample ID	T1 GW	T4 GW	T2 GW	DMW4 GW	MW11 GW	MW14 GW	MW10 GW	MW8 GW	DMW3 GW	MW15 GW	MW5 GW	MW9 GW
Sample No.	BP003	BP004	BP009	BP037	BP039	BP040	BP042	BP043	BP044	BP045	BP047	BP048
Date Collected	11/16/98	11/16/98	11/17/98	12/9/98	12/9/98	12/9/98	12/10/98	12/10/98	12/10/98	12/10/98	12/10/98	12/10/98
Chloride (mg/l)	170	250	2	350	18	14	250	150	3	250	230	270
Nitrate (mg/l)	< 0.1	< 0.1	1.1	1.4	< 0.1	< 0.1	0.3	< 0.1	0.2	< 0.1	< 0.1	0.9
Sulfate (mg/l)	< 120	< 50	< 100	28	55	110	18	53	21	25	23	27
TOC (mg/l)	15	9	7	< 1	8	9	5	10	1	5	4	1
Spec. Cond. (ms/cm)	NA	NA	NA	1.67	0.58	NA	1.26	NA	NA	1.21	1.04	1.3
Redox Pot. (mV)	NA	NA	NA	58	-210	NA	-100	NA	NA	-198	-37	25
Dissolved Ox (mg/l)	NA	NA	NA	4.08	0.68	NA	1	NA	NA	0.8	3.12	4.35
pH	NA	NA	NA	6.6	7.28	NA	6.53	NA	NA	7.31	7.47	6.66

TOC - Total Organic Carbon
NA - Not Analyzed

TABLE 12
INDOOR AIR QUALITY RESULTS
DII - Binghamton Plastics

Sample ID	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	OSHA 8-Hour
Sample Location	SC1	SC2	SC3	SC4	SC5	SC1	SC2	SC3	SC4	SC5	Time Weighted Average
Date	8/20/99	8/20/99	8/20/99	8/20/99	8/20/99	8/21/99	8/21/99	8/21/99	8/21/99	8/21/99	Exposure Limit*
Dichlorodifluoromethane	0.9	0.97	1.1	1.2	1.4	< 1.5	0.77	0.83	0.83	0.97	1,000,000
Trichlorofluoromethane	< 0.61	0.46	0.52	0.61	0.53	< 1.5	0.46	0.44	0.5	0.53	1,000,000
Methylene Chloride	2.7	2.1	3.9	2.7	5.4	3.6	0.88	1.3	1.4	4.5	25,000
cis-1,2-Dichloroethene	2.1	< 0.42	< 0.39	< 0.5	< 0.5	< 1.5	< 0.39	< 0.4	< 0.39	< 0.4	200,000
1,1,1-Trichloroethane	< 0.61	< 0.42	0.49	0.57	0.55	1.7	0.57	0.71	0.5	0.62	350,000
Benzene	< 0.61	< 0.42	0.4	< 0.5	< 0.5	< 1.5	< 0.39	< 0.4	0.5	< 0.4	1,000
Trichloroethene	5.8	0.45	0.64	0.52	0.54	3.1	< 0.39	< 0.4	0.42	0.41	100,000
Toluene	23	16	24	13	0.2	5	4.2	7.1	5.3	14	200,000
Tetrachloroethene	<0.61	< 0.42	< 0.39	< 0.5	< 0.5	< 1.5	< 0.39	< 0.4	< 0.39	0.8	100,000
Ethylbenzene	0.96	0.74	0.78	1.1	0.82	< 1.5	0.39	< 0.4	0.54	0.6	100,000
m-Xylene and p-Xylene	3	2.3	2.2	2.6	2.2	< 1.5	0.95	0.98	1.4	1.6	100,000
o-Xylene	0.79	0.61	0.66	0.74	0.68	< 1.5	< 0.39	< 0.4	0.48	0.54	100,000
1,3,5-Trimethylbenzene	< 0.61	< 0.42	< 0.39	0.71	< 0.5	< 1.5	< 0.39	< 0.4	< 0.39	< 0.4	None
1,2,4-Trimethylbenzene	< 0.61	< 0.42	0.39	1.1	0.5	< 1.5	< 0.39	< 0.4	< 0.39	0.59	None
1,4-Dichlorobenzene	0.94	0.93	0.86	0.92	0.76	< 1.5	0.43	0.41	2.3	0.57	75,000
1,2-Dichlorobenzene	< 0.61	< 0.42	< 0.39	< 0.5	< 0.5	< 1.5	< 0.39	< 0.4	7.4	< 0.4	50,000

All Values Reported in parts per billion (ppb).

* According to 29 CFR 1910.1000

TABLE 13
COMPARISON OF DETECTED VOCs IN FIELD DUPLICATE SAMPLES
Dii- Binghamton Plastics

Sample	Matrix	Unit	cis-1,2-Ddichloroethene	1,1,1-Trichloroethane	Chlorobenzene	Trichloroethene	Tetrachloroethene	1,1-Dichloroethane
BP028	Soil	ug/kg	5.3	0.56J	2.1J	10	3.3J	2.2J
BP029 (Dup)	Soil	ug/kg	ND	ND	ND	ND	ND	ND
BP022	Water	ug/L	43	37	-	180	4.2J	ND
BP030 (Dup)	Water	ug/L	41	35	-	170	4.3J	1.3J
BP048	Water	ug/L	7.9	5.5	-	86	1.3J	-
BP049 (Dup)	Water	ug/L	7.3	4.4J	-	77	1.2J	-

ug/kg - micrograms per kilogram
ug/L - micrograms per liter
– - sample was not analyzed for this constitutent
ND - constitutent was not detected at the reported detection level

TABLE 14
VOLATILE ORGANIC COMPOUND RESULTS - TRENCHING SOIL (mg/kg)
Dii - Binghamton Plastics

Sample Location	1,1,1-Trichloroethane	1,1-Dichloroethane	cis-1,1-Dichloroethene	Tetrachloroethene	Trichloroethene
T1 SS2 (2'-4')	0.02	0.0095	0.0043	0.007	0.0015J
T4 SS2 (2'-4')	<0.05	<0.05	<0.025	0.21	<0.050
T2 SS2 (2'-4')	0.00056J	0.0022J	0.0053	0.0033J	0.01
T6 SS2 (2'-4')	<0.005	<0.005	<0.0025	0.0006J	0.0012J
T3 SS2 (2'-4')	<0.005	<0.005	<0.0025	<0.005	<0.005
T9 SS1 (2'-4')	<0.005	<0.005	<0.0025	<0.005	<0.005
T10 SS1 (2'-4')	<0.005	<0.005	<0.0025	<0.005	0.0042J
MEAN	0.008	0.007	0.004	0.033	0.007
MAX	0.025	0.025	0.012	0.21	0.025
95% UCL	0.028	0.024	0.012	0.185	0.024

TABLE 15
VOLATILE ORGANIC COMPOUND RESULTS - GROUNDWATER (mg/L)
Dii - Binghamton Plastics

Sample Location	Vinyl Chloride	1,1,1-Trichloroethane	1,1-Dichloroethene	1,1-Dichloroethane	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
MW12 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	<0.005
MW7 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	<0.005
MW13 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	<0.005
DMW4 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	0.0012J
MW6 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	<0.005
MW11 GW	0.14	0.012	0.013	0.0089	1.1	0.011	<0.005	1.4
MW14 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	<0.005
MW10 GW	0.0023J	0.025	<0.005	0.014	0.018	<0.0025	0.0054	0.064
MW8 GW	<0.02	<0.01	<0.01	0.0028J	0.25	<0.005	<0.01	0.35
DMW3 GW	<0.01	<0.005	<0.005	<0.005	<0.0025	<0.0025	<0.005	0.0011J
MW5 GW	0.02	1.1	0.5	0.17	0.48	0.011	0.01	17
MW9 GW	<0.01	0.0044J	<0.005	<0.005	0.0073	<0.0025	0.0012J	0.077
MW2 GW	<0.01	0.0055	<0.005	<0.005	0.0079	<0.0025	0.0013J	0.086
MW15 GW	0.023	1.6	0.56	0.22J	0.96	0.011	0.014	6.9
DMW1 GW	<0.71	0.62	0.085J	0.15J	1	<0.18	<0.36	8.2
MEAN	0.040	0.226	0.079	0.039	0.255	0.009	0.015	2.273
MAX	0.36	1.6	0.56	0.22	1.1	0.09	0.18	17
95% UCL	0.207	1.092	0.404	0.170	0.991	0.049	0.095	10.80

TABLE 16
VOLATILE ORGANIC COMPOUND RESULTS - SURFACE WATER (mg/L)
Dii - Binghamton Plastics

Sample Location	1,1,1-TCA	1,1-DCA	cis-1,1-DCE	PCE	TCE
MH282 SW	0.0035J	< 0.005	< 0.0025	< 0.005	< 0.005
CB342 SW	0.0063	< 0.005	< 0.0025	0.0027	0.0017
CBO45 SW	0.0055	0.0015J	0.0013J	< 0.005	0.017
MEAN	0.0051	0.0022	0.0013	0.0026	0.0071
MAX	0.0063	< 0.005	< 0.0025	< 0.005	0.017
95% UCL	0.0093	0.0039	0.0014	0.0029	0.032

TCA - Trichloroethane
DCA - Dichloroethane
DCE - Dichloroethene
PCE - Tetrachloroethene
TCE - Trichloroethene

TABLE 17
MEDIA SPECIFIC CHEMICALS OF CONCERN
Dii - Binghamton Plastics

Pathway/Chemical	Air	Surface Soil	Ground Water	Surface Water
Tetrachloroethene	X	X	X	X
Trichloroethene	X	X	X	X
cis-1,2-Dichloroethene	X	X	X	X
trans-1,2-Dichloroethene			X	
1,1-Dichloroethene			X	
1,1,1-Trichloroethane	X	X	X	X
1,1-Dichloroethane	X	X	X	X
Vinyl Chloride			X	

TABLE 18
CHEMICALS OF CONCERN TOXICITY DATA
Dii-BINGHAMTON, NEW YORK

Chemical	RfD (mg/kg-day)	Source	SF $(mg/kg\text{-}day)^{-1}$	Weight Of Evidence	Source
INGESTION/DERMAL CONTACT					
Tetrachloroethene	1.0×10^{-2}	IRIS*	$5.2 \times 10^{-2*}$	B*	NCEA
Trichloroethene	6.0×10^{-3}	IRIS*	$1.1 \times 10^{-2*}$	B*	NCEA
Cis-1,2- Dichloroethene	1.0×10^{-2}	HEAST	-	-	-
Trans-1,2-Dichloroethene	2.0×10^{-2}	IRIS	-	-	-
1,1-Dichloroethene	9.0×10^{-3}	IRIS	6.0×10^{-1}	C	IRIS
1,1,1-Trichloroethane	3.5×10^{-2}	NCEA	-	-	-
1,1-Dichloroethane	1.0×10^{-1}	HEAST	-	-	-
Vinyl Chloride	-	-	1.9×10^{0}	A	HEAST
INHALATION					
Tetrachloroethene	1.1×10^{-2}	NCEA	2.0×10^{-3}	B*	NCEA
Trichloroethene	6.0×10^{-3}	(oral)**	6.0×10^{-3}	B*	NCEA
Cis-1,2-Dichloroethene	1.0×10^{2}	(oral)**	-	-	-
Trans-1,2-Dichloroethene	2.0×10^{-2}	(oral)**	-	-	-
1,1-Dichloroethene	9.0×10^{-3}	(oral)**	1.8×10^{-1}	C	IRIS
1,1,1-Trichloroethane	2.9×10^{-1}	NCEA	-	-	-
1,1-Dichloroethane	1.4×10^{-1}	HEAST	-	-	-
Vinyl Chloride	-	-	3.0×10^{-1}	A	HEAST

* Under Agency Review
** Adopted from oral RfD

TABLE 19
EQUATIONS FOR CALCULATING ORAL AND DERMAL CHRONIC EXPOSURE LEVELS FOR SOIL[a] EXPOSURE

ORAL

$$Intake\ (mg/kg/day) = \frac{CS \times IR \times CF \times EF \times ED}{BW \times AT}$$

DERMAL

$$Absorbed\ dose\ (mg/kg/day) = \frac{CS \times CF \times SA \times AF \times ABS \times ET \times EF \times ED}{BW \times AT}$$

CS = Chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (10^{-6} kg/mg)
FI = Fraction ingested from contaminated source (unitless)
EF = Exposure frequency (days/years)
ET = Exposure of time (fraction of a day)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Average time (period over which exposure is averaged – days)
SA = Skin surface area available for contact (cm^2/event)
AF = Soil to skin adherence factor (mg/cm^2)
ABS = Absorption factor (unitless)

[a] Ref: USEPA, 1989, Risk Assessment Guidelines for Superfund

NOTE: For calculation of hazard indices (HI), calculated exposure intake valves are divided by a federally-established Reference Dose value (RfD). For calculation of cancer risks, exposure estimates are multiplied by a federally-established cancer slope factor (CSF).

TABLE 20
EQUATIONS FOR CALCULATING ORAL AND DERMAL EXPOSURE CONCENTRATIONS FOR WATER EXPOSURES[a]

ORAL

[a] $$Intake\ (mg/kg\text{-}day) = \frac{CW \times IR \times EF \times ED}{BW \times AT}$$

DERMAL

$$Intake\ (mg/kg\text{-}day) = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

CW = Containment concentration in water (mg/L)
IR = Ingestion rate (L/day)
SA = Skin surface area available for contact (cm^2)
PC = Chemical-specific dermal permeability constant (cm/hr)*
ET = Exposure time (hours/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF = Volumetric conversion factor for water (1 L/1000 cm^3)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged – days)

[a] USEPA, 1989, Risk Assessment Guidance for Superfund

* Tetrachloroethene	4.8×10^{-2}
Trichloroethene	1.6×10^{-2}
Cis-1,2-Dichloroethene	1.0×10^{-2} (trans)
Trans-1,2-Dichloroethene	1.0×10^{-2}
1,1,1- Trichloroethane	1.7×10^{-2}
1,1-Dichloroethane	8.9×10^{-3}
Vinyl Chloride	7.3×10^{-3}

NOTE: For calculation of hazard indices (HI), calculated exposure intake values are divided by a federally-established Reference Dose value (RfD). For calculation of cancer risks, exposure estimates are multiplied by a federally-established cancer slope factor (CSF).

TABLE 21
EQUATION FOR THE INHALATION OF AIRBORNE (VAPOR PHASE) CHEMICALS [a]

$$\text{Intake (mg/kg/day)} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

CA = Contaminant Concentration in Air (mg/m^3)*
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged—days)

[a] USEPA, 1989, Risk assessment Guidelines for Superfund
* See Appendix A for air concentration calculations.

NOTE: For calculation of hazard indices (HI), calculated exposure intake values are divided by a federally-established Reference Dose value (RfD). For calculation of cancer risks, exposure estimates are multiplied by a federally-established cancer slope factor (CSF).

TABLE 22
ASSUMPTIONS FOR OCCUPATIONAL EXPOSURE TO SOIL CONTAMINANTS OF CONCERN (EXISTING SCENARIO)

Exposure[a]	Adult Worker	Trespasser
ORAL		
Daily soil ingestion level	50 mg	100 mg
Portion of ingested contaminant absorbed	100%	100%
Days per year on-site	250 days	140 days
Years on-site	25 years	12 years
Body weight	70 kg	43 kg
Lifetime	70 years	70 years
DERMAL		
Skin area contaminated	3500 cm^2	7400 cm^2
Portion of contaminant absorbed	10%[b]	10%[b]
Days per year on-site	250 days	140 days
Exposure time	8/24 = .333 day	5/24 = .208 day
Years on-site	25 years	12 years
Body weight	70 kg	43 kg
Lifetime	70 years	70 years
INHALATION OF VOLATILES		
Daily inhalation level	20 m^3/day	4.2 m^3/day
Portion of contaminant absorbed	100%	100%
Days per year on-site		
Years on-site	25 years	12 years
Body weight	70 kg	43 kg
Lifetime	70 years	70 years

[a] All non-site-specific assumptions from KYDEP Risk Assessment Guidance 6/95, USEPA/RAGS 12/89, or OSWER Dir. Supplement or USEPA, DEA 12/92

[b] USEPA, Region IX, (PRGs) Preliminary Remediation Goals

TABLE 23
ASSUMPTIONS FOR TRESPASSER EXPOSURE TO WATER CHEMICALS OF CONCERN (EXISTING SCENARIO)
Dii - Binghamton Plastics

Exposure[3]	**Trespasser (Wading)** **Child (7-18)**
Dermal	
Skin surface area	7400 cm^2
Exposure time	2.6 hrs/day
Dermal permeabilikty constant (Kp)	chemical specific
Exposure frequency	140 days
Exposure duration	12 years
Body weight	43 kg
Lifetime	70 years

3 All non-site-specific assumptions from KYDEP Risk Assessment Guidance 6/95, USEPA/RAGS 12/89, OSWER Dir. Supplement, USEPA SEAM 1988, or USEPA/DEA 1/92.

TABLE 24
ASSUMPTIONS FOR RESIDENTIAL EXPOSURE TO SOIL
CONTAMINANTS OF CONCERN (FUTURE SCENERIO)

Exposure[a]		Future Resident	
	Adult	Child (7-18)	Child (0-6)
ORAL			
Daily soil ingestion level	100 mg	100 mg	200 mg
Portion of ingested contaminant absorbed	100 %	100%	100 %
Days per year on-site	350 days	350 days	350 days
Years on-site	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years
DERMAL			
Skin area contaminated	3500 cm^2	7400 cm^2	3730 cm^2
Soil adherence per cm^2	1 mg	1 mg	1 mg
Portion of contaminated absorbed	10 %[b]	10 %[b]	10 %[b]
Days per year on-site	350 days	350 days	350 days
Exposure Time	16/24 = .667 day	16/24 = .667 day	24/24 = 1 day
Years on-site	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years
INHALATION			
Inhalation rate	13.33 m^3/day	13.33 m^3/day	20 m^3/day
Days per year on-site	350 days	350 days	350 days
Years on-site	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years

[a] All non-site-specific assumptions from KYDEP Risk Assessment Guidance 6/95, USEPA/RAGS 12/89, OSWER Dir. Supplement, USEPA SEAM 1988, or USEPA/DEA 1/92.

[b] USEPA, Region IX, Preliminary Remediation Goals (PRGs).

TABLE 25
ASSUMPTIONS FOR RESIDENTIAL EXPOSURE TO WATER CHEMICALS OF CONCERN (FUTURE SCENERIO)

Exposure[a]		Future Resident	
	Adult	**Child (7-18)**	**Child (0-6)**
ORAL			
Ingestion rate	2 L/day	2 L/day	1 L/day
Exposure frequency	350 days	350 days	350 days
Exposure duration	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years
DERMAL			
Skin surface area	18,150 cm^2	13,500 cm^2	7200 cm^2
Exposure time	0.2 hrs/day	0.2 hrs/day	0.2 hrs/day
Dermal permeability constant (K_p)		Chemical Specific	
Exposure frequency	350 days	350 days	350 days
Exposure duration	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years
INHALATION (showering)			
Inhalation rate	0.6 m^3/hr	0.6 m^3/hr	0.6 m^3/hr
Exposure time	0.2 hrs/day	0.2 hrs/day	0.2 hrs/day
Exposure frequency	350 days	350 days	350 days
Exposure duration	12 years	12 years	6 years
Body weight	70 kg	43 kg	14.5 kg
Lifetime	70 years	70 years	70 years

[a] All non-site-specific assumptions from KYDEP Risk Assessment Guidance 6/95, USEPA/RAGS 12/89, OSWER Dir. Supplement, USEPA SEAM 1988, or USEPA/DEA 1/92.

TABLE 26
CARCINOGENIC SOIL RISKS (EXISTING SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Trespassers		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA
Tetrachloroethene	1.68×10^{-9}	3.92×10^{-9}	8.14×10^{-12}	1.47×10^{-9}	2.26×10^{-9}	7.47×10^{-13}
Trichloroethene	4.62×10^{-11}	1.08×10^{-10}	3.32×10^{-12}	4.04×10^{-11}	6.62×10^{-11}	3.05×10^{-13}
TOTAL CANCER RISK	1.73×10^{-9} 2×10^{-9}	4.03×10^{-9} 4×10^{-9}	1.15×10^{-11} 1×10^{-11}	1.51×10^{-9} 2×10^{-9}	2.32×10^{-9} 2×10^{-9}	1.05×10^{-12} 1×10^{-12}
Cumulative Risk	6×10^{-9}			4×10^{-9}		

NA - not analyzed

TABLE 27
NONCARCINOGENIC SOIL RISKS (EXISTING SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Trespassers		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
1,1,1-Trichloroethane	3.49×10^{-7}	8.14×10^{-7}	5.71×10^{-9}	6.37×10^{-7}	9.79×10^{-7}	1.09×10^{-9}
1,1-Dichloroethane	1.17×10^{-7}	2.74×10^{-7}	1.11×10^{-8}	2.14×10^{-7}	3.30×10^{-7}	2.12×10^{-9}
cis-1,2-Dichloroethene	5.87×10^{-7}	1.37×10^{-6}	7.88×10^{-8}	1.07×10^{-6}	1.65×10^{-6}	1.51×10^{-8}
Tetrachloroethene	9.05×10^{-6}	2.11×10^{-5}	1.04×10^{-7}	1.65×10^{-5}	2.54×10^{-5}	1.98×10^{-8}
Trichloroethene	1.96×10^{-6}	4.56×10^{-6}	2.59×10^{-7}	3.57×10^{-6}	5.48×10^{-6}	4.95×10^{-8}
TOTAL NONCANCER RISK	1.21×10^{-5} 1×10^{-5}	2.81×10^{-5} 3×10^{-5}	4.59×10^{-7} 5×10^{-7}	2.20×10^{-5} 2×10^{-5}	3.38×10^{-5} 3×10^{-5}	8.76×10^{-8} 9×10^{-8}
Cumulative Risk	4×10^{-5}			$5x\ 10^{-5}$		

TABLE 28
CARCINOGENIC SURFACE WATER RISKS (EXISTING SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Trespassers
	Dermal
1,1,1-Trichloroethane	NA
1,1-Dichloroethane	NA
cis-1,2-Dichloroethene	NA
Tetrachloroethene	1.98×10^{-7}
Trichloroethene	8.80×10^{-8}
TOTAL CANCER RISK	2.86×10^{-7}

TABLE 29
NONCARCINOGENIC SURFACE WATER RISKS (EXISTING SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Trespassers
	Dermal
1,1,1-Trichloroethane	2.82×10^{-3}
1,1-Dichloroethane	5.97×10^{-5}
cis-1,2-Dichloroethene	5.82×10^{-4}
Tetrachloroethene	5.79×10^{-3}
Trichloroethene	2.03×10^{-2}
TOTAL NONCANCER RISK	3.0×10^{-2}

TABLE 30
CARCINOGENIC SOIL RISKS (FUTURE SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Child (7-18)			Child (0-6)		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	2.26×10^{-9}	5.27×10^{-9}	3.64×10^{-12}	3.68×10^{-9}	1.82×10^{-8}	5.94×10^{-12}	1.09×10^{-8}	2.03×10^{-8}	1.32×10^{-11}
Trichloroethene	6.20×10^{-11}	1.45×10^{-10}	1.49×10^{-12}	1.01×10^{-10}	5.00×10^{-10}	2.42×10^{-12}	2.99×10^{-10}	5.57×10^{-10}	5.37×10^{-12}
TOTAL CANCER RISK	2.32×10^{-9} 2×10^{-9}	5.42×10^{-9} 5×10^{-9}	5.13×10^{-12} 5×10^{-12}	3.78×10^{-9} 4×10^{-9}	1.87×10^{-8} 2×10^{-8}	8.36×10^{-12} 8×10^{-12}	1.12×10^{-8} 1×10^{-8}	2.09×10^{-8} 2×10^{-8}	1.86×10^{-11} 2×10^{-11}
Cumulative Risk	7×10^{-9}			2×10^{-8}			3×10^{-8}		

NA - not analyzed

TABLE 31
NONCARCINOGENIC SOIL RISKS (FUTURE SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Child (7-18)			Child (0-6)		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
1,1,1-Trichloroethane	9.79×10^{-7}	2.29×10^{-6}	5.33×10^{-9}	1.59×10^{-6}	7.86×10^{-6}	8.68×10^{-9}	9.43×10^{-6}	1.76×10^{-5}	3.84×10^{-8}
1,1-Dichloroethane	3.29×10^{-7}	7.68×10^{-7}	1.03×10^{-8}	5.34×10^{-7}	2.64×10^{-6}	1.68×10^{-8}	3.17×10^{-6}	5.91×10^{-6}	7.46×10^{-8}
cis-1,2-Dichloroethene	1.64×10^{-6}	3.85×10^{-6}	7.36×10^{-8}	2.67×10^{-6}	1.32×10^{-5}	1.20×10^{-7}	1.58×10^{-5}	2.96×10^{-5}	5.31×10^{-7}
Tetrachloroethene	2.53×10^{-5}	5.93×10^{-5}	9.68×10^{-8}	4.12×10^{-5}	2.03×10^{-4}	1.58×10^{-7}	2.44×10^{-4}	4.56×10^{-4}	6.98×10^{-7}
Trichloroethene	5.48×10^{-6}	1.28×10^{-5}	2.42×10^{-7}	8.90×10^{-6}	4.40×10^{-5}	3.93×10^{-7}	5.28×10^{-5}	9.85×10^{-5}	1.74×10^{-6}
TOTAL NONCANCER RISK	3.37×10^{-5} 3×10^{-5}	7.90×10^{-5} 8×10^{-5}	4.28×10^{-7} 4×10^{-7}	5.49×10^{-5} 5×10^{-5}	2.71×10^{-4} 3×10^{-4}	6.96×10^{-7} 7×10^{-7}	3.25×10^{-4} 3×10^{-4}	6.08×10^{-4} 6×10^{-4}	3.08×10^{-6} 3×10^{-6}
Cumulative Risk	1×10^{-4}			4×10^{-4}			9×10^{-4}		

TABLE 32
CARCINOGENIC GROUNDWATER RISKS (FUTURE SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Child (7-18)			Child (0-6)		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
Vinyl Chloride	1.85×10^{-3}	2.45×10^{-5}	8.80×10^{-6}	3.01×10^{-3}	2.90×10^{-5}	1.43×10^{-5}	2.23×10^{-3}	2.34×10^{-5}	2.12×10^{-5}
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	1.14×10^{-3}	3.30×10^{-5}	1.03×10^{-5}	1.85×10^{-3}	3.99×10^{-5}	1.67×10^{-5}	1.37×10^{-3}	3.16×10^{-5}	2.47×10^{-5}
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	2.32×10^{-5}	2.02×10^{-6}	2.71×10^{-8}	3.78×10^{-5}	2.44×10^{-6}	4.41×10^{-8}	2.80×10^{-5}	1.93×10^{-6}	6.53×10^{-7}
Trichloroethene	5.58×10^{-4}	1.62×10^{-5}	9.14×10^{-6}	9.09×10^{-4}	1.95×10^{-5}	1.48×10^{-5}	6.74×10^{-4}	1.55×10^{-5}	2.20×10^{-5}
TOTAL CANCER RISK	3.37×10^{-3} 4×10^{-3}	7.57×10^{-5} 8×10^{-5}	3.10×10^{-5} 3×10^{-5}	5.81×10^{-3} 6×10^{-3}	9.08×10^{-5} 9×10^{-5}	4.58×10^{-5} 5×10^{-5}	4.30×10^{-3} 4×10^{-3}	7.24×10^{-5} 7×10^{-5}	6.86×10^{-5} 7×10^{-5}
Cumulative Risk	4×10^{-3}			6×10^{-3}			4×10^{-3}		

NA - not analyzed

TABLE 33
NONCARCINOGENIC GROUNDWATER RISKS (FUTURE SCENARIO)
Dii - Binghamton Plastics

Pathway/Chemical	Adult Workers			Child (7-18)			Child (0-6)		
	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation	Oral	Dermal	Inhalation
Vinyl Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	8.85×10^{-1}	2.64×10^{-2}	3.09×10^{-3}	1.39×10^{0}	3.19×10^{-2}	5.03×10^{-3}	2.06×10^{0}	5.05×10^{-2}	1.49×10^{-2}
1,1-Dichloroethene	1.23×10^{0}	3.57×10^{-2}	3.68×10^{-2}	2.00×10^{0}	4.32×10^{-2}	5.99×10^{-2}	2.97×10^{0}	6.84×10^{-2}	1.78×10^{-1}
1,1-Dichloroethane	4.66×10^{-2}	7.52×10^{-4}	9.96×10^{-4}	7.58×10^{-2}	9.11×10^{-4}	1.62×10^{-3}	1.12×10^{-1}	1.44×10^{-3}	4.82×10^{-3}
cis-1,2-Dichloroethene	2.72×10^{0}	4.93×10^{-2}	8.13×10^{-2}	4.42×10^{0}	5.97×10^{-2}	1.32×10^{-1}	6.55×10^{0}	9.43×10^{-2}	3.90×10^{-1}
trans-1,2-Dichloroethene	6.71×10^{-2}	1.22×10^{-2}	2.05×10^{-3}	1.09×10^{-1}	1.47×10^{-3}	3.34×10^{-3}	1.62×10^{-1}	2.33×10^{-3}	9.93×10^{-3}
Tetrachloroethene	2.60×10^{-1}	2.27×10^{-2}	7.16×10^{-4}	4.24×10^{-1}	2.75×10^{-2}	1.17×10^{-3}	6.28×10^{-1}	4.34×10^{-2}	3.46×10^{-3}
Trichloroethene	4.93×10^{1}	1.43×10^{0}	1.48×10^{0}	8.03×10^{1}	1.73×10^{0}	2.40×10^{0}	1.19×10^{2}	2.74×10^{0}	7.15×10^{0}
TOTAL NONCANCER RISK	5.45×10^{1} 55	1.58×10^{0} 2	1.61×10^{0} 2	8.87×10^{1} 89	1.89×10^{0} 2	2.60×10^{0} 3	1.31×10^{2} 131	3.00×10^{0} 3	7.75×10^{0} 8
Cumulative Risk	59			94			142		

NA - not analyzed

APPENDIX A

GROUND WATER RECOVERY
AND
TREATMENT SYSTEM DISCHARGE REPORT

From: Pete Rundell Upstate Laboratories Inc. Fax: 607-771-0673 Voice: 607-724-0478 To: Mike Moms at: Shield Environmental

Dovatron Kirkwood Facility

Parameter	Daily Average Conc. Limit / mg/L	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results
	n/a	April	May	June	July	August	September	October
Date	n/a	4/23/99	5/26/99	6/17/99	7/20/99	8/6/99	9/2/99	10/7/99
Flow (Gallons)	1,500 gpd	6,966	4,714	2,220	2,710	2,050	6,610	10,570
Oil And Grease	100	<5	<5	<5	<5	<5	<5	<5
PCB's, Total	0.001	< .00005	< .00005	< .00005	< .00005	< .00005	< .00005	< .00005
Total Toxic Organics	2.13	0.017	<.010	0.33	0.163	0.057	0.209	0.042
Copper, Total	3.38	n/a	n/a	n/a	<0.02	n/a	n/a	<0.02
Lead, Total	2.5	n/a	n/a	n/a	<0.01	n/a	n/a	<0.01
Iron, Total	n/a	n/a	n/a	n/a	<0.03	n/a	n/a	0.24
Meter Reading	n/a	72,166	76,880	79,100	81810	83860	90470	101040
Field pH	>6 and < 12	6.9	7.3	6.9	6.9	6.3	7.1	7.1

Dovatron Conklin Ave Facility

Parameter	Daily Average Conc. Limit / mg/L	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results	Monthly Sample Results
	n/a	January	May	June	July	August	September	October
Date	n/a	1/22/99	5/26/99	6/17/99	7/20/99	8/11/99	9/2/99	10/7/99
Meter Reading	n/a	134580	136000	143390	151330	151,340	158010	166880
Field pH	>6 and < 12	7.2	6.6	7.3	7.3	7.3	7	6.9
Flow	1,500 gpd		1420	7390	7940	10	6670	8870
Total Lead	2.5	< 0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Oil And Grease	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
PCB's, Total	0.001	< .00005	< .00005	< .00005	< .00005	< .00005	< .00005	< .00005
Total Toxic Organics	2.13	0.068	0.14	0.205	0.016	0.005	0	0.004
Total Iron	n/a	n/a	n/a	n/a	0.06	n/a	n/a	n/a

From: Pete Rundell Upstate Laboratories Inc. Fax: 607-771-0673 Voice: 607-724-0478 To: Mike Moms at: Shield Environmental

Dovatron Kirkwood Facility

Parameter	Daily Average Conc. Limit / mg/L	Monthly Sample Results	Monl Sample ults
Month		November	Dece ıer
Date		11/19/99	12/2 '9
Flow (Gallons)	1,500 gpd	12,300	8,9(
Oil And Grease	100	6	<
PCB's, Total	0.001	< .00005	< .005
Total Toxic Organics	2.13	0.057	0.4
Copper, Total	3.38	n/a	<0.2
Lead, Total	2.5	n/a	<0.
Iron, Total	n/a	n/a	0.0
Meter Reading	n/a	113340	122 1
Field pH	>6 and < 12	7	7.

Dovatron Conklin Ave Facility

Parameter	Daily Average Conc. Limit / mg/L	Monthly Sample Results	Monl Sample ults
		November	Decemb
Date	n/a	11/19/99	12/2 '9
Meter Reading	n/a	177590	184 1
Field pH	>6 and <12	6.8	6.
Flow	1,500 gpd	10710	64
Total Lead	2.5	<0.1	<0
Oil And Grease	100	< 5	<
PCB's, Total	0.001	< .00005	< .005
Total Toxic Organics	2.13	0	<.0(
Total Iron	n/a	n/a	0.(

APPENDIX B

SITE INVESTIGATION TRENCHING LOGS

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T1 Location: BINGHAMTON PLASTICS

Date 11-16-98

Start Time: 8:45 Complete Time: 10:00 am

Dimensions

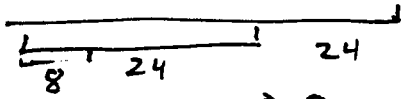
Trench Length (ft) 24 (1st 8 deep) Depth to Contaminants 2ft

Trench Width (ft) 4 Depth to Bottom of Cont. 6ft.

Northside - 6ft.

Trench Depth (ft) Southside - 3ft. Depth to Water 6ft.

Depth to top of footer 4ft.



Field Screening (PID)*

Ambient Air (Max) 0.0 Soil (Max) 1.2

Contamination (Max) 1.2

* Note - PID not reading vapors. Visual evidence of contamination; however no readings. Possibly due to cold temperatures.

Trench Description

- NORTH END OF TRENCH EXCAVATED TO 6 FT
- CONTAMINATION OBSERVED IN DGA ADJACENT TO FOOTER (2-6 FT)
- NATIVE SOIL (TILL) AND GROUND WATER UNDER FOOTER
- BLACK STAINING ON WALL ABOVE FOOTER (2-4 FT)
- WATER SAMPLE COLLECTED WITH BAILER.

Photograph Numbers 20-23

Sampling

X Soil Sample (0) ____ Water Sample X Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T2

Location: along footer of building

Date 11-17-98

Start Time: 7:45

Complete Time: 9:00

Dimensions

Trench Length (ft) ~~5~~ 2 ft.

Depth to Contaminants 2ft

Trench Width (ft) 4 ft

Depth to Bottom of Cont. unknown

Trench Depth (ft) 6 ft.
depth to footer - 4ft.

Depth to Water 4ft.

Field Screening (PID)

Ambient Air (Max) 0.00

Soil (Max) 0.06

Contamination (Max) 0.00

Trench Description

Contamination seen and smelled approx 2 ft. BGS. Water Below footer. Contamination was seen pooling in the water. Two soil samples were taken. One approximately 3 ft. BGS (SS2) & one at the bottom of the footer (SS1) at approx. 6 feet. A water sample was also taken.

Photograph Numbers 28-31

Sampling

X Soil Sample X Water Sample ____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T3

Location: near decon pile

Date 11-17-98

Start Time: 1:45

Complete Time: 2:30

Dimensions

Trench Length (ft) 8

Depth to Contaminants 3 ft.

Trench Width (ft) 3

Depth to Bottom of Cont. unknown

Trench Depth (ft) 5

Depth to Water NA.

To footer 4

Field Screening (PID)

Ambient Air (Max) 0.00

Soil (Max) 0.0

Contamination (Max) 0.00

Trench Description

1st Soil Sample taken in apparent contamination (black, however no odor). Area is near a possible remnant transformer pad. Apparent Contamination was 1st seen approximately 3 ft. BGS. 2nd soil sample taken below footer at approximately 5 ft BGS. No water in trench. (possibly organic material)

Photograph Numbers Roll 6 1-2

Sampling

X Soil Sample 2 ____ Water Sample ____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T4

Location: _____

Date 11/16/98

Start Time: 2:00

Complete Time: 3:00

Dimensions

Trench Length (ft) 13 FT

Depth to Contaminants 2-3 FT

Trench Width (ft) 3 FT

Depth to Bottom of Cont. -

Trench Depth (ft) 4 FT

Depth to Water 3 FT

Field Screening (PID)

Ambient Air (Max) NIR

Soil (Max) NIR

Contamination (Max) NIR

Trench Description

- 0-2 FT CLAY / POORLY SORTED GRAVEL / TILL
- 2-4 FT POORLY SORTED GRAVEL (FILL)
- PERCHED WATER @ 3 FT - STRONG CARMEL COLORED OILY SHEEN; HEAVY OIL

Photograph Numbers 24-26

Sampling

✓ Soil Sample ✓ Water Sample _____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T5

Location: _____

Date 11/16/98

Start Time: 3:30

Complete Time: 4:10

Dimensions

Trench Length (ft) 10 FT

Depth to Contaminants —

Trench Width (ft) 3 FT

Depth to Bottom of Cont. —

Trench Depth (ft) 6 FT

Depth to Water ~6 FT

Field Screening (PID)

Ambient Air (Max) —

Soil (Max) —

Contamination (Max) —

Trench Description

- NATIVE TILL MATERIAL - CLAY AND POORLY SORTED GRAVEL & COBBLES

Photograph Numbers 27

Sampling

✓ Soil Sample _____ Water Sample _____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T6

Location: _____

Date 11/17/98

Start Time: 10:10 A

Complete Time: 10:50

Dimensions

Trench Length (ft) 25 FT

Depth to ~~Contaminants~~ SEWER PIPE 2 FT

Trench Width (ft) 3 FT

Depth to Bottom of Cont. -

Trench Depth (ft) 6 FT

Depth to Water -

Field Screening (PID)

Ambient Air (Max) -

Soil (Max) -

Contamination (Max) -

Trench Description

- TRENCHED ALONG SANITARY SEWER LINE (TIE-IN)
- CONTAMINATION NOT OBSERVED
- SEWER LINE BROKEN IN TWO PLACES
- SAMPLE COLLECTED UNDERNEATH SEWER LINE (SOIL)
- SAMPLE COLLECTED AT APPROX 6 FT (SOIL)
- NO WATER ENCOUNTERED IN TRENCH

Photograph Numbers 32-35

Sampling

✓ Soil Sample ____ Water Sample ✓ Waste Sample ?

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T7

Location: _____

Date 11/17

Start Time: 11:00

Complete Time: 11:50

Dimensions

Trench Length (ft) 10 FT

Depth to Contaminants 4 FT

Trench Width (ft) 6 FT

Depth to Bottom of ~~Cont.~~ PIPE 5 FT

Trench Depth (ft) 7 FT

Depth to Water —

Field Screening (PID)

Ambient Air (Max) —

Soil (Max) —

Contamination (Max) 17

Trench Description

- TRENCHED TO WATER LINE @ A DEPTH OF 5 FT
- CONTAMINATION OBSERVED @ A DEPTH OF APPROX 4 FT
- NO WATER IN TRENCH

Photograph Numbers 36-37

Sampling

✓ Soil Sample ____ Water Sample ✓ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T8 Location: _____

Date 11/17/98

Start Time: 3:20 Complete Time: 3:45

Dimensions

Trench Length (ft) 11 Depth to Contaminants —

Trench Width (ft) 4 Depth to Bottom of Cont. —

Trench Depth (ft) 4.5 FT Depth to Water 4 FT

Field Screening (PID)

Ambient Air (Max) 0 Soil (Max) 0

Contamination (Max) 0

Trench Description

- NO CONTAMINATION OBSERVED
- WATER IN EXCAVATION AT 4 FT
- NO SAMPLES COLLECTED

Photograph Numbers _____

Sampling

____ Soil Sample ____ Water Sample ____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T9

Location: _____

Date 11/18/98

Start Time: 10:10

Complete Time: 10:30

Dimensions

Trench Length (ft) 8 FT

Depth to Contaminants –

Trench Width (ft) 2.5 FT

Depth to Bottom of Cont. –

Trench Depth (ft) 4.5 FT

Depth to Water 4 FT

Field Screening (PID)

Ambient Air (Max) 0

Soil (Max) 0

Contamination (Max) 0

Trench Description

- TRENCH @ SOUTH WEST CORNER OF BLDG.
- NO CONTAMINATION OBSERVED.
- WATER IN TRENCH @ 4 FT

Photograph Numbers Roll 6 - 10, 11

Sampling

✓ Soil Sample ✓ Water Sample ____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T 10 Location: _____

Date 11/18/98

Start Time: 10:50 Complete Time: 11:10

Dimensions

Trench Length (ft) 9 FT Depth to Contaminants -

Trench Width (ft) 2.5 FT Depth to Bottom of Cont. -

Trench Depth (ft) 4 FT Depth to Water 4 FT

Field Screening (PID)

Ambient Air (Max) 0 Soil (Max) 0

Contamination (Max) 0

Trench Description

- NATIVE SOIL
- WATER @ 4 FT
- SHEEN ON WATER, NO NOTABLE ODOR
- SOIL & WATER SAMPLE COLLECTED

Photograph Numbers ROLL 6 PHOTO 12

Sampling

✓ Soil Sample ✓ Water Sample _____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number ~~SS~~ T11 Location: _____

Date 11-18-98

Start Time: _____ Complete Time: 2 pm.

Dimensions

Trench Length (ft) 23 A/B Depth to Contaminants A / B 4 / NA

Trench Width (ft) 3 ~~3.5~~ 7.0 ft. (A)

Trench Depth (ft) 5.0 ft. (B) Depth to Bottom of Cont. UNKNOWN / NA

Depth to Water NA / NA

Field Screening (PID)

A/B

Ambient Air (Max) 0 / 0 Soil (Max) 54 / 0.

Contamination (Max) 54 / ~~0~~ NA

Trench Description

duplicate soil sample taken (called ss 12). Trench dug in two parts: A was closer to building. Contaminated smelled in Part A of trench 11. Part B of the Trench had no odor or visual signs of contamination.

Photograph Numbers _____

Sampling

X Soil Sample _____ Water Sample _____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T13

Location: CHAMBERS STREET ROAD CUT - UTILITY TRENCH

Date 7/27/99

Start Time: 10:25

Complete Time: 11:00

Dimensions

Trench Length (ft) 7

Depth to Contaminants NA

Trench Width (ft) 4

Depth to Bottom of Cont. NA

Trench Depth (ft) 5

Depth to Water 4.5-5 FT

Field Screening (PID)

Ambient Air (Max) 0

Soil (Max) 0

Contamination (Max) 0

Trench Description

TRENCH 13 - EXCAVATED IN CHAMBERS STREET ADJACENT TO WATER AND STORM SEWER LINES. SEWER TIE IN BROKEN DURING TRENCHING ACTIVITY. LINE REPAIRED.

SOIL & WATER SAMPLES COLLECTED AT A DEPTH OF 4.5-5 FT BGS.

Photograph Numbers _____

Sampling

✓ Soil Sample ✓ Water Sample _____ Waste Sample

SITE INVESTIGATION TRENCHING LOG
Dovatron International/McIntosh Facility
498 Conklin Ave
Binghamton, New York

Trench Number T14

Location: Chambers St. Road Cut - Utility Trench

Date 7/27/99

Start Time: 12:45

Complete Time: 1:20

Dimensions

Trench Length (ft) 7

Depth to Contaminants NA

Trench Width (ft) 6

Depth to Bottom of Cont. NA

Trench Depth (ft) 5

Depth to Water 4.5-5 FT

Field Screening (PID)

Ambient Air (Max) 0

Soil (Max) 0

Contamination (Max) 0

Trench Description

Trench 14 - Excavated in Chambers Street near intersection with Conklin Avenue.

Trench excavated between storm sewer and water lines.

Soil & water samples collected @ 4.5-5 ft bgs.

Photograph Numbers _____

Sampling

✓ Soil Sample ✓ Water Sample ____ Waste Sample

APPENDIX C

SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

SHIELD ENVIRONMENTAL ASSOCIATES, INC.	SOIL BORING #7	Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 11/18/98	SURFACE ELEVATION:
DATE COMPLETED: 11/18/98	TOP OF CASING:
DRILLING METHOD: 4.25" HSA	CASING DIAMETER:
DRILLING COMPANY: Nothnagle	TOTAL DEPTH: 6 Ft.
SAMPLING METHOD: 2' SS w/ 150# Hammer	GEOLOGIST: Kreg Mills

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
		-/15 18/12	19.1	Asphalt and gravel. Fill – subrounded pebbles, rock fragments and sand.		
2		11/7 9/9	9.8			2
4	BP021	13/10 10/10	12.3	(Till) Olive–brown silt w/ clay. Mod. stiff, moist, subrounded gravel and rock fragments (10%).		4
6						6
8				SB7 is located in Chambers Street next to CB 281 on the west side of 498 Conklin Ave.		8
10						10
12				Backfilled w/concrete 0–6'.		12
14						14
16						16

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SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #8

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 11/18/98	SURFACE ELEVATION:
DATE COMPLETED: 11/18/98	TOP OF CASING:
DRILLING METHOD: 4.25" HSA	CASING DIAMETER:
DRILLING COMPANY: Nothnagle	TOTAL DEPTH: 6 Ft.
SAMPLING METHOD: 2' SS w/ 150# Hammer	GEOLOGIST: Kreg Mills

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
2		4/26 14/14	8.2	Topsoil. Brown loose silt and organic matter. Moist. Brown silt with very little clay, subrounded pebbles, moist, moderate to stiff, Rock at approx. 2.5'		2
		21/90 92/69	11.7 No jar			
4	BP019	42/62 79/100 5	9.9	Olive–brown silt with clay, 20%, subrounded gravel and rock fragments, dry–moist, very stiff.		4
6						6
8				SB8 is located in front of building, east half, between drainage pipes leading to catch basin. Backfilled w/bentonite chips.		8
10						10
12						12
14						14
16						16

80620–B1

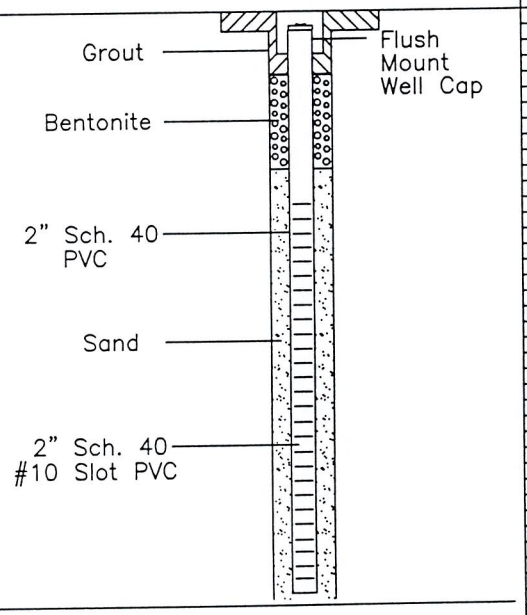
SHIELD ENVIRONMENTAL ASSOCIATES, INC.

MONITORING WELL #14

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 11/17/98	SURFACE ELEVATION:
DATE COMPLETED: 11/17/98	TOP OF CASING:
DRILLING METHOD: 4.25 HSA	CASING DIAMETER: 2" Sch. 40 PVC
DRILLING COMPANY: Nothnagle	TOTAL DEPTH: 15 Ft.
SAMPLING METHOD: 2' SS w/ 150# Hammer	GEOLOGIST: Kreg Mills

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION
				Concrete pad and gravel.
2		-17 19/65	5.1 No jar	(Till) Olive-brown silt w/clay. Mod.-very stiff, 30% rock; rock frags and gravel. Dry.
4		23/77 40/86	5.1	
6		30/46 36/38	5.3	
8		35/70 100/4	-	No samples; rock in _____.
10		19/100 5	5.5	
12	BP017	20/100 6	4.6	Slightly moist.
14		27/100 6	5.9	
		30/55	4.8	
16				(PID Ambient 1.1)



80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

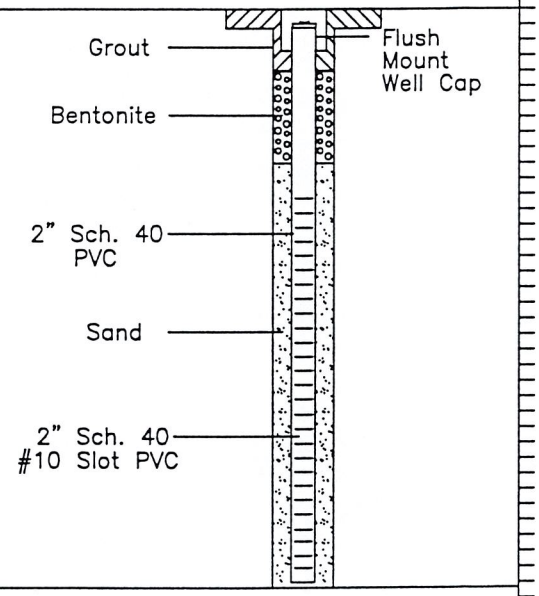
MONITORING WELL #15

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 11/18/98	SURFACE ELEVATION:
DATE COMPLETED: 11/18/98	TOP OF CASING:
DRILLING METHOD: 4.25" HSA	CASING DIAMETER: 2" Sch. 40 PVC
DRILLING COMPANY: Nothnagle	TOTAL DEPTH: 15 Ft.
SAMPLING METHOD: 2' SS w/ 150# Hammer	GEOLOGIST: Kreg Mills

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION
2				No sample – averaged through gravel and silt.
4		17/44 38/30	9.9	(Till) Olive–brown silt with some clay, subrounded gravel and rock fragments (70%), moist, moderately stiff to stiff, grades to sand and silt. Very sandy, very damp.
6		39/18 20/20	16.1	
8		7/27 20/100 7	38.6	Wet at approx. 7.6.
10				No samples taken below 8'.
12				
14				
16				MW15 is located in gravel area between building and Chambers St. about 2/3 back from front of building.

WELL DIAGRAM



DEPTH feet

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SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP1

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 5 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete Slab		
2			13.8	Gray and yellowish brown silty clay with subrounded pebbles; strong odor; moist.		2
4			18.5			4
6				Refusal at 5' Ft.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP2

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete Slab		
2			13.8	Olive brown clayey silt with subrounded pebbles. (Top 3" stained and odorous.)		2
4						4
6			9.9	Olive/gray brown clayey silt with subrounded pebbles. No staining or odors noted – moist/wet below approx. 7 ft.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP3

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete		
2			13.8	Reddish brown clayey silt with subrounded pebbles moist; no odor or staining.		2
4						4
6			NIR	Reddish brown clayey silt with subrounded pebbles moist; no odor or staining.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP4

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete Slab		
2				Reddish brown clayey sand and silt. No staining or odor.		2
4						4
6				Reddish brown clayey sand and silt. No staining or odor. Wet from 7 to 8 feet.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.	SOIL BORING #GP5	Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete		
2				Reddish brown clayey sand and silt. Dry, black product in top 2–3 inches – odor.		2
4						4
6				Reddish brown sand/silt, very wet. No staining or odor.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP6

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
0				Concrete		0
2				Olive grayish brown clayey sand and silt. Moist, soft, subrounded pebbles. No staining or odors.		2
4				Olive grayish brown clayey sand and silt. Moist, soft, subrounded pebbles. No staining or odors. Wet.		4
6						6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP7

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete		
2				Yellowish brown clayey sand and silt, dry. No staining or odors.		2
4						4
6				Yellowish brown clayey sand and silt, dry. No staining or odors. Wet from 6–8 feet.		6
8						8
10						10
12						12
14						14
16						16

80620-B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.

SOIL BORING #GP8

Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete		
2				Gray–olive brown clayey silt and sand. Dry – no staining or odors.		2
4						4
6				Gray–olive brown clayey silt and sand. Dry – no staining or odors.		6
8						8
10						10
12						12
14						14
16						16

80620–B1

SHIELD ENVIRONMENTAL ASSOCIATES, INC.	SOIL BORING #GP9	Page 1 of 1

PROJECT: DII Binghamton Plastics	LOCATION: 498 Conklin Ave., Binghamton, NY
DATE DRILLED: 7/16/99	SURFACE ELEVATION:
DATE COMPLETED: 7/16/99	TOP OF CASING:
DRILLING METHOD: Geoprobe	CASING DIAMETER:
DRILLING COMPANY: Zebra	TOTAL DEPTH: 8 Ft.
SAMPLING METHOD: Direct Push	GEOLOGIST: M. Morris

DEPTH feet	SAMPLE NUMBER	BLOW COUNT	PID ppm	GEOLOGIC DESCRIPTION	WELL DIAGRAM	DEPTH feet
				Concrete		
2				Reddish brown—loam, clayey silt—sand, subrounded pebbles. Dry, no odors or staining.		2
4						4
6				Gray/grayish brown clayey silt and silt. Very wet. No odors or staining.		6
8						8
10						10
12						12
14						14
16						16

80620—B1

APPENDIX D

LOW-FLOW SAMPLING DATA

DMW-3
Well Pumped Dry
-- Statistical Report --

From 12/09/98 12:14 to 12/09/98 12:50
Number of samples: 37

Parameter	Min	Max	Mean	Std
Temp (C)	14.00	25.12	20.44	2.95
SpCond (mS/cm)	0.002	2.457	1.135	1.002
ORP (mV)	-186	46	-103	71
DO Conc (mg/L)	0.98	10.69	4.03	3.60
Turbidity (NTU)	30.8	1638.9	400.4	576.1
pH ()	10.65	12.08	11.75	0.34

DMW-4
-- Statistical Report --

From 12/09/98 10:19 to 12/09/98 11:08
Number of samples: 50

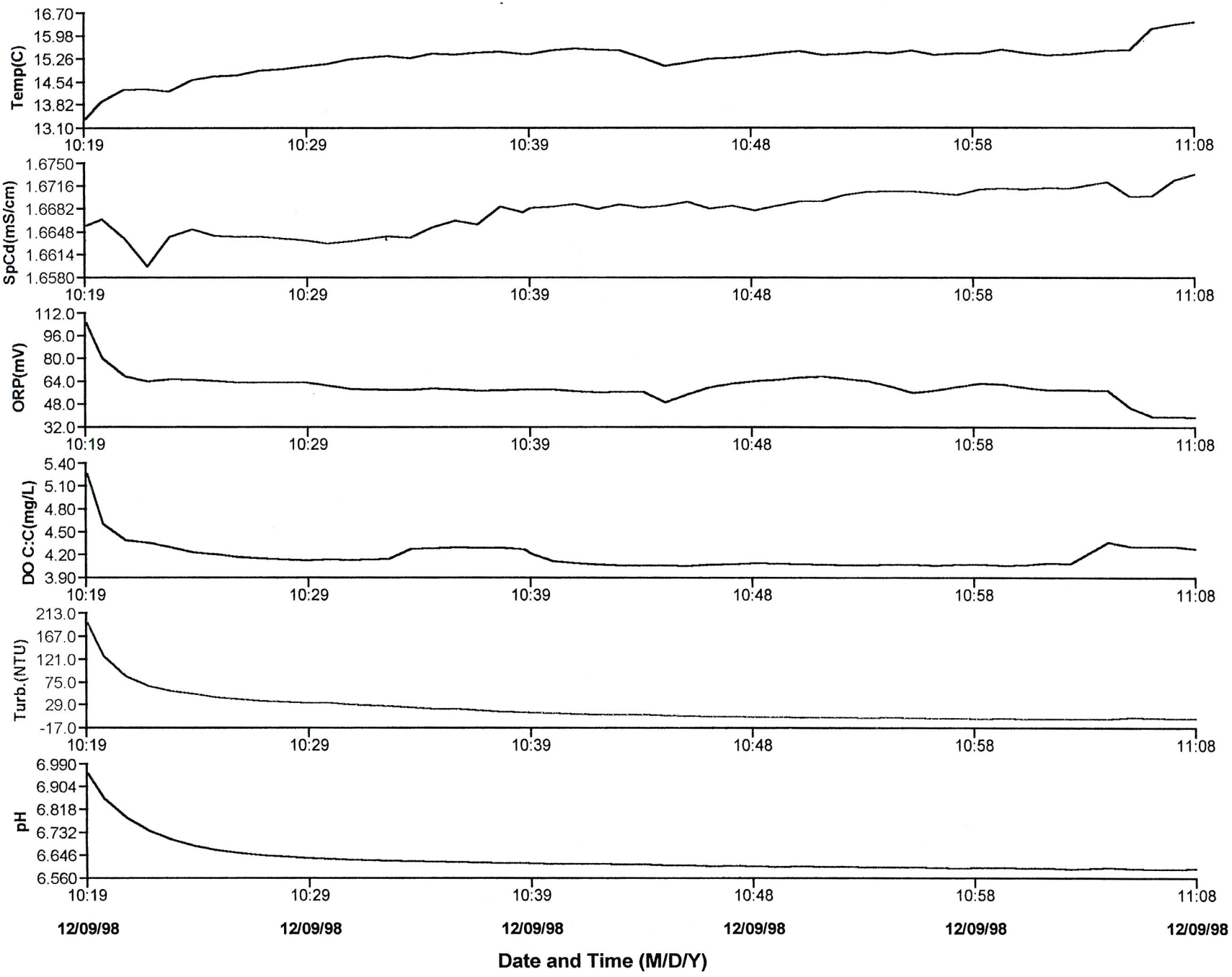
Parameter	Min	Max	Mean	Std
Temp (C)	13.40	16.38	15.24	0.52
SpCd (mS/cm)	1.660	1.673	1.668	0.003
ORP (mV)	39	105	60	9
DO C:C (mg/L)	4.06	5.26	4.20	0.19
Turb. (NTU)	2.3	193.1	23.5	34.1
pH ()	6.60	6.95	6.64	0.07

DMW-4
-- Data Report --

From 12/09/98 10:19 to 12/09/98 11:08
Number of samples: 50

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/09/98 10:19	13.40	1.666	105	5.26	193.1	6.95
12/09/98 10:20	13.92	1.667	80	4.60	126.9	6.86
12/09/98 10:21	14.31	1.664	68	4.39	86.7	6.79
12/09/98 10:22	14.33	1.660	64	4.36	67.2	6.74
12/09/98 10:23	14.26	1.664	66	4.30	57.5	6.71
12/09/98 10:24	14.61	1.665	65	4.24	52.0	6.68
12/09/98 10:25	14.73	1.664	64	4.21	44.6	6.67
12/09/98 10:26	14.76	1.664	63	4.18	41.1	6.66
12/09/98 10:27	14.90	1.664	63	4.16	37.4	6.65
12/09/98 10:28	14.94	1.664	63	4.14	35.5	6.64
12/09/98 10:29	15.03	1.664	63	4.14	34.1	6.64
12/09/98 10:30	15.09	1.663	61	4.15	33.8	6.64
12/09/98 10:31	15.25	1.663	59	4.14	30.2	6.63
12/09/98 10:32	15.34	1.664	58	4.15	27.6	6.63
12/09/98 10:33	15.27	1.664	58	4.29	24.8	6.63
12/09/98 10:34	15.41	1.665	59	4.29	22.3	6.62
12/09/98 10:35	15.38	1.666	59	4.30	21.8	6.62
12/09/98 10:36	15.44	1.666	58	4.30	18.9	6.62
12/09/98 10:37	15.46	1.668	58	4.29	16.4	6.62
12/09/98 10:38	15.40	1.668	58	4.28	15.3	6.62
12/09/98 10:39	15.39	1.668	59	4.22	14.5	6.62
12/09/98 10:40	15.51	1.668	59	4.12	13.6	6.62
12/09/98 10:41	15.57	1.669	57	4.10	12.2	6.62
12/09/98 10:42	15.53	1.668	57	4.08	11.1	6.62
12/09/98 10:43	15.51	1.669	57	4.07	10.6	6.61
12/09/98 10:44	15.28	1.668	57	4.07	11.1	6.61
12/09/98 10:45	15.04	1.669	50	4.07	8.7	6.61
12/09/98 10:46	15.13	1.669	55	4.06	8.0	6.61
12/09/98 10:47	15.26	1.668	60	4.08	7.5	6.61
12/09/98 10:48	15.28	1.669	63	4.09	6.9	6.61
12/09/98 10:49	15.34	1.668	64	4.10	6.4	6.61
12/09/98 10:50	15.42	1.669	65	4.09	6.3	6.61
12/09/98 10:51	15.48	1.669	67	4.09	5.9	6.61
12/09/98 10:52	15.37	1.669	68	4.08	5.2	6.61
12/09/98 10:53	15.39	1.670	66	4.08	5.3	6.61
12/09/98 10:54	15.46	1.671	64	4.08	4.9	6.60
12/09/98 10:55	15.41	1.671	61	4.08	5.0	6.60
12/09/98 10:56	15.50	1.671	56	4.08	4.5	6.60
12/09/98 10:57	15.37	1.670	58	4.07	4.0	6.60
12/09/98 10:58	15.41	1.670	60	4.08	4.0	6.60
12/09/98 10:59	15.41	1.671	63	4.08	3.1	6.60
12/09/98 11:00	15.53	1.671	62	4.07	3.5	6.60
12/09/98 11:01	15.43	1.671	60	4.08	2.9	6.60
12/09/98 11:02	15.35	1.671	58	4.10	2.8	6.60
12/09/98 11:03	15.38	1.671	58	4.09	2.5	6.60
12/09/98 11:04	15.49	1.672	58	4.37	2.3	6.60
12/09/98 11:05	15.51	1.670	46	4.32	5.5	6.60
12/09/98 11:06	16.17	1.670	40	4.31	4.2	6.60
12/09/98 11:07	16.30	1.672	40	4.31	4.0	6.60
12/09/98 11:08	16.38	1.673	39	4.28	3.7	6.60

DMW-4


Temp(C)
16.70
15.98
15.26
14.54
13.82
13.10
SpCd(mS/cm)
1.6750
1.6716
1.6682
1.6648
1.6614
1.6580
ORP(mV)
112.0
96.0
80.0
64.0
48.0
32.0
DO C:C(mg/L)
5.40
5.10
4.80
4.50
4.20
3.90
Turb.(NTU)
213.0
167.0
121.0
75.0
29.0
-17.0
pH
6.990
6.904
6.818
6.732
6.646
6.560
10:19
10:29
10:39
10:48
10:58
11:08
12/09/98
Date and Time (M/D/Y)

MW-5
-- Statistical Report --

From 12/10/98 13:21 to 12/10/98 14:36
Number of samples: 76

Parameter	Min	Max	Mean	Std
Temp (C)	15.33	17.67	15.88	0.43
SpCd (mS/cm)	0.962	1.066	1.018	0.029
ORP (mV)	-103	-20	-51	23
DO C:C (mg/L)	1.21	3.62	2.47	0.78
Turb. (NTU)	18.9	972.0	224.6	228.0
pH ()	7.41	7.55	7.47	0.02

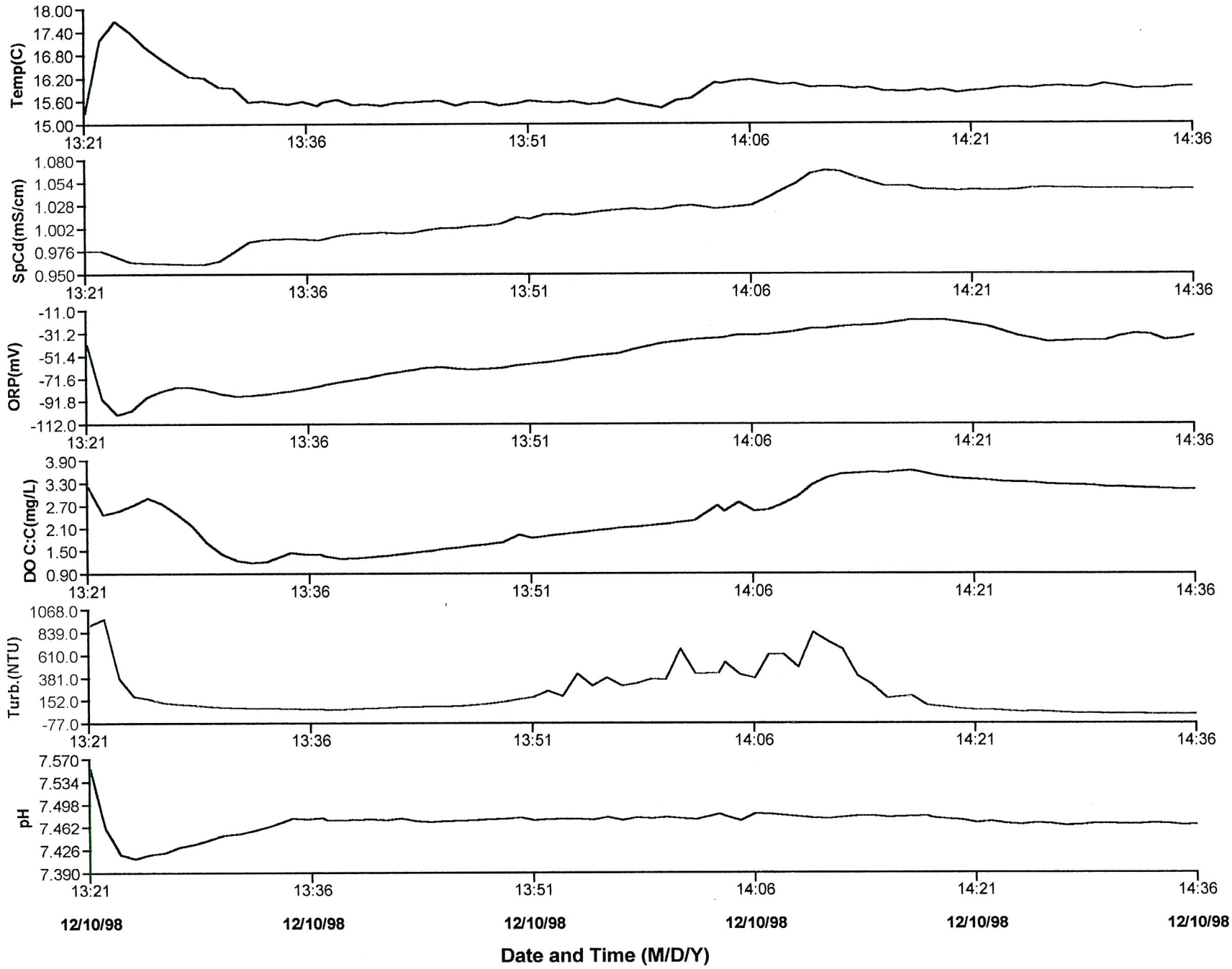
MW-5
-- Data Report --

From 12/10/98 13:21 to 12/10/98 14:36
Number of samples: 76

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/10/98 13:21	15.33	0.977	-41	3.19	907.8	7.55
12/10/98 13:22	17.19	0.977	-90	2.47	972.0	7.46
12/10/98 13:23	17.67	0.971	-103	2.56	377.8	7.42
12/10/98 13:24	17.40	0.965	-99	2.72	200.0	7.41
12/10/98 13:25	17.00	0.964	-88	2.91	173.1	7.42
12/10/98 13:26	16.73	0.963	-83	2.75	135.6	7.42
12/10/98 13:27	16.48	0.963	-79	2.49	123.2	7.43
12/10/98 13:28	16.25	0.962	-79	2.17	110.2	7.44
12/10/98 13:29	16.22	0.962	-81	1.73	97.1	7.44
12/10/98 13:30	15.97	0.966	-85	1.43	90.9	7.45
12/10/98 13:31	15.94	0.976	-87	1.26	86.6	7.45
12/10/98 13:32	15.59	0.987	-86	1.21	82.5	7.46
12/10/98 13:33	15.61	0.990	-85	1.22	79.4	7.46
12/10/98 13:34	15.53	0.990	-83	1.47	74.2	7.48
12/10/98 13:35	15.60	0.990	-80	1.42	69.9	7.47
12/10/98 13:36	15.50	0.989	-78	1.42	70.9	7.48
12/10/98 13:37	15.58	0.990	-77	1.37	69.3	7.47
12/10/98 13:38	15.65	0.994	-74	1.31	69.5	7.47
12/10/98 13:39	15.52	0.996	-72	1.32	74.4	7.47
12/10/98 13:40	15.53	0.997	-70	1.35	79.1	7.47
12/10/98 13:41	15.50	0.998	-68	1.38	87.0	7.47
12/10/98 13:42	15.56	0.997	-66	1.42	91.9	7.48
12/10/98 13:43	15.58	0.997	-64	1.46	95.6	7.47
12/10/98 13:44	15.61	1.000	-62	1.51	96.8	7.47
12/10/98 13:45	15.62	1.003	-61	1.56	99.7	7.47
12/10/98 13:46	15.50	1.002	-63	1.60	101.9	7.47
12/10/98 13:47	15.57	1.004	-63	1.64	112.4	7.47
12/10/98 13:48	15.59	1.005	-63	1.68	125.5	7.47
12/10/98 13:49	15.50	1.007	-62	1.73	145.3	7.48
12/10/98 13:50	15.55	1.014	-60	1.93	171.2	7.48
12/10/98 13:51	15.62	1.013	-58	1.85	188.1	7.47
12/10/98 13:52	15.58	1.017	-57	1.89	251.8	7.48
12/10/98 13:53	15.57	1.018	-55	1.94	200.1	7.48
12/10/98 13:54	15.59	1.017	-53	1.98	427.3	7.48
12/10/98 13:55	15.52	1.019	-51	2.02	302.1	7.47
12/10/98 13:56	15.55	1.021	-51	2.06	384.7	7.48
12/10/98 13:57	15.65	1.022	-49	2.11	302.8	7.47
12/10/98 13:58	15.56	1.023	-46	2.14	324.5	7.48
12/10/98 13:59	15.49	1.022	-43	2.17	371.0	7.48
12/10/98 14:00	15.43	1.023	-40	2.21	365.4	7.48
12/10/98 14:01	15.62	1.026	-39	2.25	672.6	7.48
12/10/98 14:02	15.66	1.027	-37	2.31	425.8	7.47
12/10/98 14:03	16.08	1.024	-36	2.71	430.5	7.48
12/10/98 14:04	16.06	1.024	-36	2.55	540.8	7.48
12/10/98 14:05	16.13	1.026	-33	2.79	415.1	7.47
12/10/98 14:06	16.15	1.027	-33	2.56	380.9	7.48
12/10/98 14:07	16.10	1.034	-33	2.58	618.2	7.48
12/10/98 14:08	16.02	1.043	-31	2.74	615.9	7.48
12/10/98 14:09	16.04	1.052	-30	2.94	489.5	7.48
12/10/98 14:10	15.95	1.063	-28	3.24	834.9	7.48
12/10/98 14:11	15.96	1.066	-27	3.42	744.4	7.48
12/10/98 14:12	15.96	1.065	-26	3.51	666.4	7.48

12/10/98	14:13	15.91	1.059	-25	3.54	401.8	7.48
12/10/98	14:14	15.94	1.054	-25	3.56	312.1	7.48
12/10/98	14:15	15.84	1.049	-23	3.55	181.3	7.48
12/10/98	14:16	15.84	1.049	-20	3.62	205.0	7.48
12/10/98	14:17	15.87	1.045	-21	3.54	113.3	7.48
12/10/98	14:18	15.84	1.045	-20	3.50	104.0	7.48
12/10/98	14:19	15.87	1.044	-21	3.43	88.0	7.48
12/10/98	14:20	15.80	1.043	-22	3.39	73.0	7.47
12/10/98	14:21	15.84	1.044	-24	3.37	60.6	7.47
12/10/98	14:22	15.86	1.044	-26	3.34	60.0	7.47
12/10/98	14:23	15.92	1.044	-30	3.32	52.7	7.47
12/10/98	14:24	15.94	1.044	-34	3.30	45.7	7.47
12/10/98	14:25	15.91	1.046	-36	3.29	47.6	7.47
12/10/98	14:26	15.97	1.047	-39	3.26	42.2	7.47
12/10/98	14:27	15.98	1.046	-39	3.25	36.7	7.47
12/10/98	14:28	15.95	1.046	-38	3.22	30.4	7.47
12/10/98	14:29	15.93	1.046	-38	3.21	28.8	7.47
12/10/98	14:30	16.03	1.046	-38	3.18	27.5	7.47
12/10/98	14:31	15.98	1.046	-34	3.18	25.0	7.47
12/10/98	14:32	15.90	1.046	-32	3.16	25.9	7.47
12/10/98	14:33	15.91	1.045	-33	3.14	22.0	7.47
12/10/98	14:34	15.91	1.045	-37	3.13	22.5	7.47
12/10/98	14:35	15.95	1.045	-36	3.12	19.8	7.47
12/10/98	14:36	15.96	1.045	-33	3.12	18.9	7.47

MW-5


Temp(C)
18.00
17.40
16.80
16.20
15.60
15.00
SpCd(mS/cm)
1.080
1.054
1.028
1.002
0.976
0.950
ORP(mV)
-11.0
-31.2
-51.4
-71.6
-91.8
-112.0
DO C:C(mg/L)
3.90
3.30
2.70
2.10
1.50
0.90
Turb.(NTU)
1068.0
839.0
610.0
381.0
152.0
-77.0
pH
7.570
7.534
7.498
7.462
7.426
7.390
13:21
13:36
13:51
14:06
14:21
14:36
12/10/98
Date and Time (M/D/Y)

MW-9
-- Statistical Report --

From 12/10/98 15:26 to 12/10/98 16:27
Number of samples: 60

Parameter	Min	Max	Mean	Std
Temp (C)	12.13	15.64	14.42	0.58
SpCd (mS/cm)	0.019	1.351	1.288	0.166
ORP (mV)	-112	44	-4	31
DO C:C (mg/L)	3.39	10.77	4.33	0.93
Turb. (NTU)	0.3	1596.6	381.3	566.3
pH ()	6.66	6.93	6.69	0.05

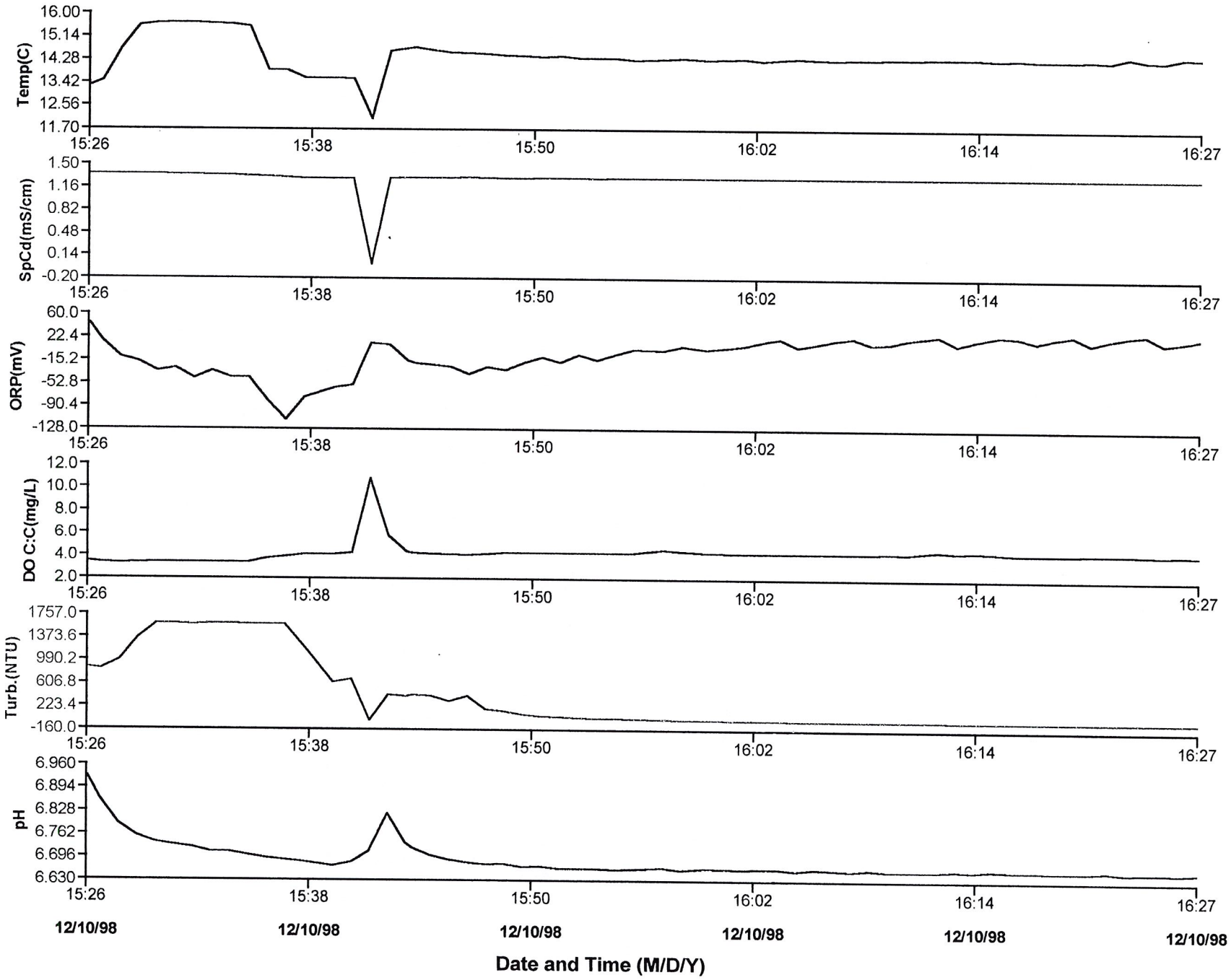
MW-9
-- Data Report --

From 12/10/98 15:26 to 12/10/98 16:27
Number of samples: 60

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/10/98 15:26	13.31	1.350	44	3.55	862.0	6.93
12/10/98 15:27	13.51	1.351	17	3.41	840.2	6.86
12/10/98 15:28	14.70	1.351	-10	3.39	990.6	6.79
12/10/98 15:29	15.53	1.350	-18	3.42	1356.3	6.76
12/10/98 15:30	15.62	1.346	-33	3.45	1596.6	6.74
12/10/98 15:31	15.64	1.343	-28	3.46	1593.5	6.73
12/10/98 15:32	15.64	1.340	-45	3.47	1579.2	6.72
12/10/98 15:33	15.61	1.339	-33	3.45	1595.1	6.71
12/10/98 15:34	15.59	1.337	-43	3.46	1596.4	6.71
12/10/98 15:35	15.50	1.325	-43	3.45	1590.2	6.70
12/10/98 15:36	13.89	1.314	-81	3.81	1588.0	6.70
12/10/98 15:37	13.90	1.303	-112	3.99	1588.1	6.69
12/10/98 15:38	13.61	1.291	-75	4.18	1232.7	6.68
12/10/98 15:39	13.60	1.292	-60	4.18	627.6	6.67
12/10/98 15:40	13.58	1.290	-55	4.33	679.2	6.68
12/10/98 15:41	12.13	0.019	13	10.77	0.3	6.71
12/10/98 15:42	14.62	1.297	11	5.76	424.3	6.82
12/10/98 15:43	14.72	1.303	-16	4.41	402.8	6.74
12/10/98 15:44	14.75	1.304	-19	4.33	426.8	6.72
12/10/98 15:45	14.65	1.304	-22	4.26	410.5	6.70
12/10/98 15:46	14.56	1.307	-25	4.20	324.7	6.69
12/10/98 15:47	14.55	1.308	-37	4.18	408.2	6.68
12/10/98 15:48	14.51	1.301	-26	4.26	195.7	6.68
12/10/98 15:49	14.46	1.297	-31	4.36	164.1	6.68
12/10/98 15:50	14.43	1.297	-19	4.38	113.8	6.67
12/10/98 15:51	14.40	1.299	-10	4.35	83.3	6.67
12/10/98 15:52	14.44	1.300	-18	4.35	75.5	6.67
12/10/98 15:53	14.38	1.300	-5	4.35	57.3	6.67
12/10/98 15:54	14.38	1.299	-14	4.39	51.8	6.67
12/10/98 15:55	14.38	1.300	-4	4.37	47.2	6.66
12/10/98 15:56	14.31	1.301	4	4.34	39.4	6.67
12/10/98 15:57	14.34	1.301	2	4.62	35.5	6.67
12/10/98 15:58	14.37	1.303	9	4.51	30.0	6.66
12/10/98 16:00	14.32	1.302	4	4.40	26.1	6.67
12/10/98 16:02	14.35	1.303	9	4.36	20.3	6.67
12/10/98 16:03	14.30	1.303	17	4.38	18.8	6.67
12/10/98 16:04	14.34	1.304	22	4.37	17.1	6.67
12/10/98 16:05	14.37	1.304	8	4.38	15.6	6.66
12/10/98 16:06	14.33	1.303	13	4.37	14.0	6.67
12/10/98 16:07	14.32	1.305	20	4.34	13.2	6.67
12/10/98 16:08	14.34	1.304	24	4.36	12.9	6.66
12/10/98 16:09	14.34	1.303	13	4.39	12.3	6.67
12/10/98 16:10	14.36	1.302	14	4.41	10.8	6.66
12/10/98 16:11	14.35	1.306	21	4.36	9.8	6.66
12/10/98 16:12	14.38	1.306	27	4.60	9.6	6.66
12/10/98 16:13	14.38	1.307	12	4.51	7.9	6.66
12/10/98 16:14	14.38	1.302	20	4.52	8.0	6.66
12/10/98 16:15	14.34	1.303	25	4.50	7.5	6.67
12/10/98 16:16	14.34	1.303	27	4.44	7.2	6.67
12/10/98 16:17	14.36	1.303	25	4.37	6.7	6.66
12/10/98 16:18	14.33	1.303	18	4.38	6.5	6.66
12/10/98 16:19	14.31	1.305	24	4.36	6.0	6.66

12/10/98 16:20	14.31	1.303	29	4.36	5.9	6.66
12/10/98 16:21	14.34	1.302	15	4.41	5.6	6.66
12/10/98 16:22	14.30	1.302	23	4.41	4.9	6.66
12/10/98 16:23	14.45	1.303	27	4.39	4.9	6.66
12/10/98 16:24	14.34	1.304	31	4.36	4.5	6.66
12/10/98 16:25	14.33	1.307	16	4.34	4.7	6.66
12/10/98 16:26	14.46	1.304	19	4.35	4.9	6.66
12/10/98 16:27	14.45	1.304	25	4.32	5.1	6.66

MW-9


Temp(C)
16.00
15.14
14.28
13.42
12.56
11.70
SpCd(mS/cm)
1.50
1.16
0.82
0.48
0.14
-0.20
ORP(mV)
60.0
22.4
-15.2
-52.8
-90.4
-128.0
DO C:C(mg/L)
12.0
10.0
8.0
6.0
4.0
2.0
Turb.(NTU)
1757.0
1373.6
990.2
606.8
223.4
-160.0
pH
6.960
6.894
6.828
6.762
6.696
6.630
15:26
15:38
15:50
16:02
16:14
16:27
12/10/98
Date and Time (M/D/Y)

MW-10
-- Statistical Report --

From 12/10/98 08:49 to 12/10/98 10:07
Number of samples: 78

Parameter	Min	Max	Mean	Std
Temp (C)	11.19	14.80	13.88	0.64
SpCd (mS/cm)	1.251	1.263	1.257	0.002
ORP (mV)	-175	18	-104	25
DO C:C (mg/L)	0.91	3.57	1.28	0.41
Turb. (NTU)	3.1	867.3	49.8	139.2
pH ()	6.52	7.22	6.58	0.11

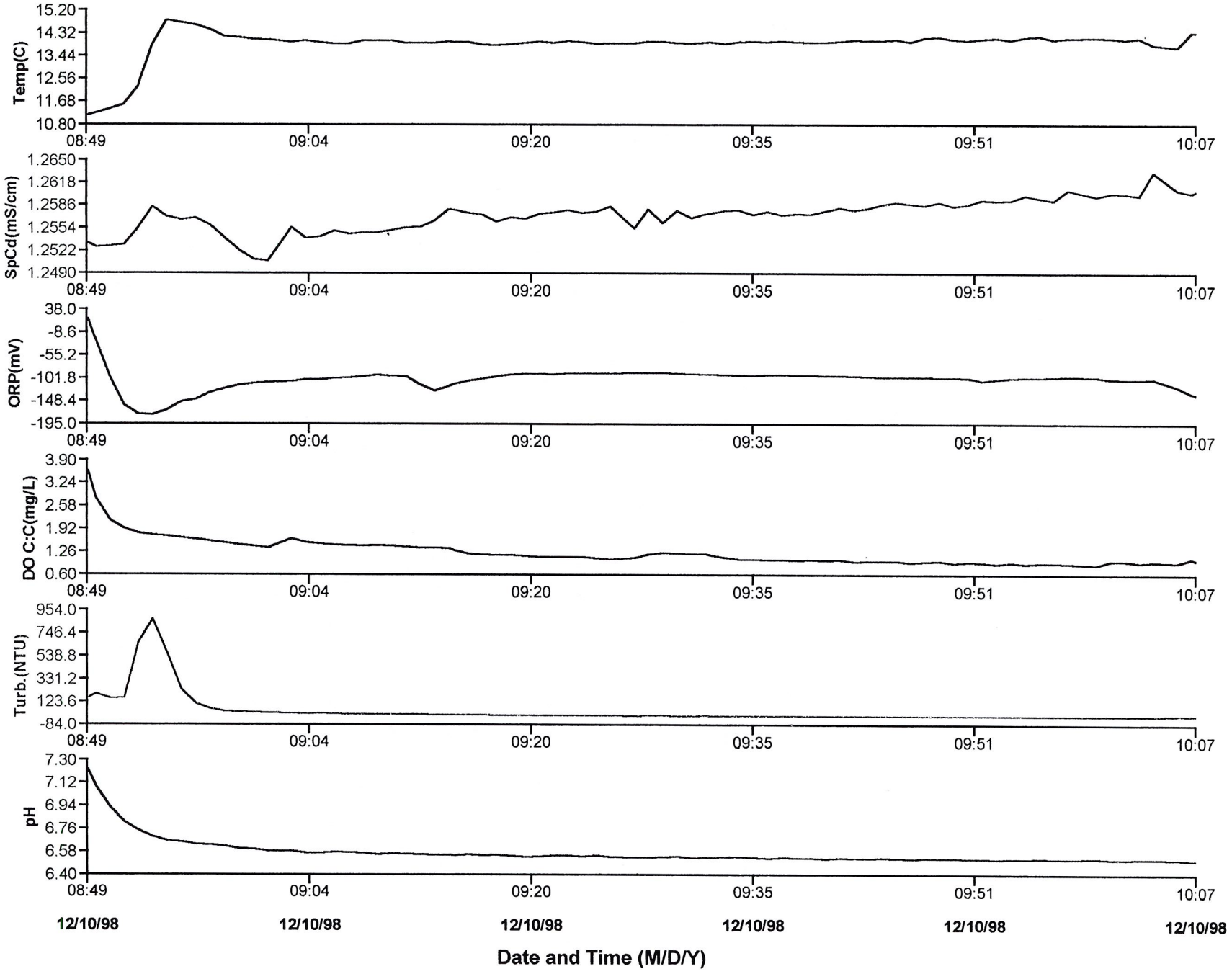
MW-10
-- Data Report --

From 12/10/98 08:49 to 12/10/98 10:07
Number of samples: 78

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/10/98 08:49	11.19	1.253	18	3.57	166.9	7.22
12/10/98 08:50	11.26	1.253	-26	2.78	197.2	7.09
12/10/98 08:51	11.42	1.253	-101	2.16	155.7	6.92
12/10/98 08:52	11.58	1.253	-157	1.93	162.4	6.81
12/10/98 08:53	12.26	1.255	-174	1.80	655.8	6.75
12/10/98 08:54	13.87	1.258	-175	1.74	867.3	6.69
12/10/98 08:55	14.80	1.257	-166	1.73	566.2	6.66
12/10/98 08:56	14.70	1.257	-149	1.67	234.5	6.65
12/10/98 08:57	14.62	1.257	-144	1.63	113.7	6.64
12/10/98 08:58	14.44	1.256	-130	1.58	67.1	6.63
12/10/98 08:59	14.19	1.254	-122	1.53	43.6	6.62
12/10/98 09:00	14.15	1.252	-116	1.47	36.7	6.61
12/10/98 09:01	14.08	1.251	-112	1.43	31.8	6.60
12/10/98 09:02	14.07	1.251	-110	1.39	29.7	6.59
12/10/98 09:03	13.98	1.255	-108	1.64	24.2	6.59
12/10/98 09:04	14.03	1.254	-105	1.54	22.5	6.57
12/10/98 09:05	13.95	1.254	-105	1.49	24.0	6.57
12/10/98 09:06	13.91	1.255	-102	1.48	21.4	6.58
12/10/98 09:07	13.91	1.255	-101	1.46	18.9	6.58
12/10/98 09:08	14.03	1.255	-99	1.45	18.0	6.57
12/10/98 09:09	14.02	1.255	-95	1.46	16.6	6.56
12/10/98 09:10	14.03	1.255	-97	1.44	17.6	6.57
12/10/98 09:11	13.94	1.255	-98	1.42	15.9	6.57
12/10/98 09:12	13.94	1.256	-115	1.40	15.8	6.56
12/10/98 09:13	13.94	1.256	-127	1.39	13.9	6.56
12/10/98 09:14	13.99	1.258	-118	1.39	12.8	6.56
12/10/98 09:15	13.98	1.258	-114	1.34	12.0	6.56
12/10/98 09:16	13.97	1.257	-108	1.23	11.5	6.56
12/10/98 09:17	13.87	1.257	-103	1.20	11.4	6.56
12/10/98 09:18	13.85	1.256	-98	1.19	11.2	6.56
12/10/98 09:19	13.89	1.257	-95	1.18	10.5	6.55
12/10/98 09:20	13.95	1.257	-93	1.15	10.1	6.55
12/10/98 09:21	13.99	1.257	-93	1.13	9.4	6.55
12/10/98 09:22	13.95	1.258	-93	1.14	9.4	6.56
12/10/98 09:23	14.01	1.258	-92	1.14	8.7	6.55
12/10/98 09:24	13.97	1.258	-91	1.13	8.7	6.55
12/10/98 09:25	13.91	1.258	-91	1.09	8.1	6.55
12/10/98 09:26	13.93	1.258	-91	1.07	8.1	6.54
12/10/98 09:27	13.92	1.255	-91	1.11	7.5	6.54
12/10/98 09:28	14.00	1.258	-90	1.22	7.6	6.54
12/10/98 09:29	13.99	1.256	-91	1.25	7.6	6.54
12/10/98 09:30	13.93	1.258	-92	1.23	6.8	6.55
12/10/98 09:31	13.92	1.257	-93	1.22	6.5	6.54
12/10/98 09:32	13.96	1.257	-93	1.22	7.9	6.54
12/10/98 09:33	13.96	1.257	-93	1.18	7.4	6.54
12/10/98 09:34	13.90	1.258	-94	1.12	6.8	6.54
12/10/98 09:35	13.98	1.258	-95	1.07	6.5	6.54
12/10/98 09:36	13.98	1.257	-96	1.07	6.8	6.54
12/10/98 09:37	13.98	1.258	-95	1.05	6.4	6.53
12/10/98 09:38	14.01	1.257	-95	1.05	6.0	6.54
12/10/98 09:39	13.97	1.257	-95	1.04	5.4	6.54
12/10/98 09:40	13.95	1.257	-95	1.05	5.3	6.54

12/10/98 09:41	13.95	1.258	-96	1.04	5.4	6.53
12/10/98 09:42	14.00	1.258	-96	1.05	5.1	6.54
12/10/98 09:43	14.05	1.258	-97	1.00	5.4	6.53
12/10/98 09:44	14.03	1.258	-98	1.02	5.4	6.53
12/10/98 09:45	14.03	1.259	-99	1.02	5.7	6.54
12/10/98 09:46	14.07	1.259	-99	1.01	4.9	6.53
12/10/98 09:47	13.97	1.259	-99	0.98	4.2	6.53
12/10/98 09:48	14.13	1.258	-99	1.00	4.7	6.53
12/10/98 09:49	14.14	1.259	-100	1.01	4.5	6.54
12/10/98 09:50	14.07	1.258	-100	0.96	4.3	6.53
12/10/98 09:51	14.02	1.259	-101	0.99	4.5	6.53
12/10/98 09:52	14.07	1.259	-106	0.98	4.2	6.53
12/10/98 09:53	14.11	1.259	-104	0.94	4.0	6.53
12/10/98 09:54	14.05	1.259	-101	0.97	3.8	6.53
12/10/98 09:55	14.16	1.260	-100	0.94	3.8	6.53
12/10/98 09:56	14.19	1.259	-100	0.96	3.9	6.53
12/10/98 09:57	14.07	1.259	-99	0.96	3.9	6.53
12/10/98 09:58	14.11	1.261	-99	0.95	3.7	6.53
12/10/98 10:00	14.13	1.260	-99	0.91	3.7	6.53
12/10/98 10:01	14.12	1.260	-102	1.02	3.2	6.53
12/10/98 10:02	14.06	1.260	-103	1.03	3.3	6.53
12/10/98 10:03	14.11	1.260	-104	0.97	3.1	6.53
12/10/98 10:04	13.87	1.263	-103	1.00	3.2	6.53
12/10/98 10:05	13.78	1.261	-119	0.97	8.5	6.53
12/10/98 10:06	14.32	1.260	-131	1.09	8.4	6.52
12/10/98 10:07	14.32	1.261	-135	1.05	8.4	6.52

MW-10


Temp(C)
15.20
14.32
13.44
12.56
11.68
10.80
SpCd(mS/cm)
1.2650
1.2618
1.2586
1.2554
1.2522
1.2490
ORP(mV)
38.0
-8.6
-55.2
-101.8
-148.4
-195.0
DO C:C(mg/L)
3.90
3.24
2.58
1.92
1.26
0.60
Turb.(NTU)
954.0
746.4
538.8
331.2
123.6
-84.0
pH
7.30
7.12
6.94
6.76
6.58
6.40
08:49
09:04
09:20
09:35
09:51
10:07
12/10/98
Date and Time (M/D/Y)

MW-11
-- Statistical Report --

From 12/09/98 13:33 to 12/09/98 14:35
Number of samples: 63

Parameter	Min	Max	Mean	Std
Temp (C)	17.23	23.74	20.53	1.51
SpCd (mS/cm)	0.582	0.600	0.587	0.004
ORP (mV)	-245	-48	-152	55
DO C:C (mg/L)	0.64	2.16	1.20	0.45
Turb. (NTU)	12.3	584.8	49.3	79.3
pH ()	7.25	7.81	7.32	0.11

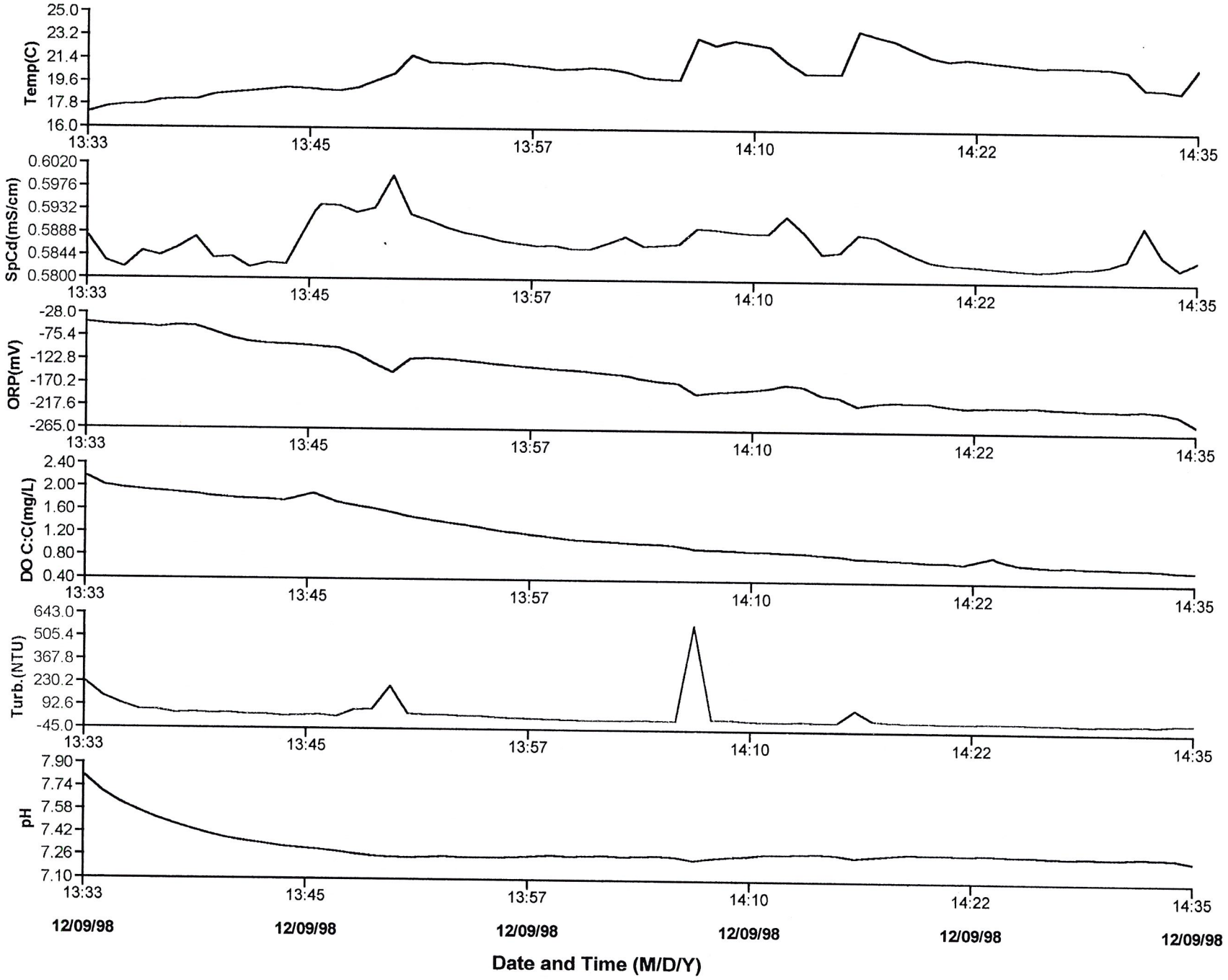
MW-11
-- Data Report --

From 12/09/98 13:33 to 12/09/98 14:35
Number of samples: 63

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/09/98 13:33	17.23	0.588	-48	2.16	230.7	7.81
12/09/98 13:34	17.61	0.583	-53	2.02	148.9	7.70
12/09/98 13:35	17.82	0.582	-54	1.97	105.0	7.62
12/09/98 13:36	17.86	0.585	-55	1.94	68.7	7.57
12/09/98 13:37	18.15	0.585	-59	1.91	67.8	7.52
12/09/98 13:38	18.23	0.586	-54	1.89	51.3	7.47
12/09/98 13:39	18.23	0.588	-56	1.87	54.2	7.44
12/09/98 13:40	18.65	0.584	-67	1.82	49.8	7.41
12/09/98 13:41	18.76	0.584	-79	1.80	51.8	7.38
12/09/98 13:42	18.90	0.582	-87	1.79	43.8	7.36
12/09/98 13:43	19.01	0.583	-90	1.78	44.0	7.34
12/09/98 13:44	19.17	0.583	-91	1.75	36.9	7.33
12/09/98 13:45	19.07	0.593	-95	1.88	42.1	7.31
12/09/98 13:46	19.00	0.594	-96	1.84	43.3	7.30
12/09/98 13:47	18.96	0.594	-99	1.73	34.1	7.29
12/09/98 13:48	19.16	0.593	-111	1.68	73.7	7.28
12/09/98 13:49	19.73	0.594	-130	1.62	76.4	7.26
12/09/98 13:50	20.27	0.600	-148	1.56	211.9	7.26
12/09/98 13:51	21.67	0.592	-121	1.49	52.7	7.26
12/09/98 13:52	21.17	0.591	-119	1.45	47.4	7.26
12/09/98 13:53	21.12	0.590	-120	1.40	46.2	7.26
12/09/98 13:54	21.06	0.589	-123	1.36	39.8	7.26
12/09/98 13:55	21.16	0.588	-127	1.31	40.9	7.26
12/09/98 13:56	21.14	0.587	-130	1.26	34.2	7.26
12/09/98 13:57	20.97	0.587	-133	1.22	29.6	7.26
12/09/98 13:58	20.88	0.587	-136	1.19	27.1	7.27
12/09/98 13:59	20.71	0.587	-140	1.15	26.0	7.27
12/09/98 14:00	20.75	0.586	-141	1.11	22.6	7.27
12/09/98 14:01	20.83	0.586	-143	1.09	19.8	7.27
12/09/98 14:02	20.79	0.587	-148	1.08	19.5	7.27
12/09/98 14:03	20.55	0.588	-150	1.06	18.4	7.27
12/09/98 14:04	20.13	0.587	-158	1.05	23.9	7.27
12/09/98 14:05	20.04	0.587	-163	1.04	18.8	7.27
12/09/98 14:06	19.99	0.587	-165	1.02	18.6	7.27
12/09/98 14:07	23.11	0.590	-188	0.96	584.8	7.25
12/09/98 14:08	22.60	0.590	-184	0.96	28.5	7.26
12/09/98 14:09	22.96	0.589	-181	0.94	26.5	7.27
12/09/98 14:10	22.72	0.589	-179	0.93	19.2	7.28
12/09/98 14:11	22.52	0.589	-175	0.93	17.3	7.29
12/09/98 14:12	21.37	0.592	-168	0.91	16.7	7.29
12/09/98 14:13	20.52	0.589	-171	0.91	19.2	7.29
12/09/98 14:14	20.53	0.585	-188	0.88	16.2	7.29
12/09/98 14:15	20.54	0.586	-193	0.87	17.1	7.29
12/09/98 14:16	23.74	0.589	-210	0.83	89.6	7.27
12/09/98 14:17	23.34	0.589	-205	0.81	29.2	7.28
12/09/98 14:18	23.00	0.587	-201	0.80	23.7	7.29
12/09/98 14:19	22.40	0.585	-203	0.79	19.4	7.30
12/09/98 14:20	21.83	0.584	-202	0.77	20.0	7.30
12/09/98 14:21	21.55	0.584	-208	0.77	18.0	7.29
12/09/98 14:22	21.70	0.583	-211	0.74	17.8	7.29
12/09/98 14:23	21.47	0.583	-210	0.86	19.4	7.30
12/09/98 14:24	21.41	0.583	-210	0.82	18.6	7.29

12/09/98 14:25	21.27	0.583	-210	0.74	18.7	7.29
12/09/98 14:26	21.13	0.583	-209	0.72	17.3	7.29
12/09/98 14:27	21.16	0.583	-211	0.71	16.6	7.28
12/09/98 14:28	21.17	0.583	-213	0.71	14.2	7.28
12/09/98 14:29	21.15	0.583	-214	0.70	12.3	7.28
12/09/98 14:30	21.10	0.584	-214	0.69	14.5	7.28
12/09/98 14:31	20.90	0.585	-215	0.69	13.9	7.28
12/09/98 14:32	19.53	0.591	-214	0.68	15.7	7.29
12/09/98 14:33	19.47	0.585	-216	0.68	15.5	7.28
12/09/98 14:34	19.29	0.583	-224	0.65	23.3	7.28
12/09/98 14:35	21.08	0.585	-245	0.64	21.9	7.26

MW-11


Temp(C)
25.0
23.2
21.4
19.6
17.8
16.0
SpCd(mS/cm)
0.6020
0.5976
0.5932
0.5888
0.5844
0.5800
ORP(mV)
-28.0
-75.4
-122.8
-170.2
-217.6
-265.0
DO C:C(mg/L)
2.40
2.00
1.60
1.20
0.80
0.40
Turb.(NTU)
643.0
505.4
367.8
230.2
92.6
-45.0
pH
7.90
7.74
7.58
7.42
7.26
7.10
13:33
13:45
13:57
14:10
14:22
14:35
12/09/98
Date and Time (M/D/Y)

MW-12
-- Statistical Report --

From 12/07/98 11:49 to 12/07/98 16:31
Number of samples: 282

Parameter	Min	Max	Mean	Std
Temp (C)	14.15	20.49	17.72	1.20
SpCd (mS/cm)	0.002	0.279	0.244	0.076
ORP (mV)	-573	201	-75	166
DO C:C (mg/L)	0.51	10.40	1.62	2.19
Turb. (NTU)	-0.2	1618.5	616.0	635.3
pH ()	7.30	7.69	7.46	0.04

MW-12
-- Data Report --

From 12/07/98 11:49 to 12/07/98 16:31
Number of samples: 282

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/07/98 11:49	14.18	0.262	-12	0.68	1590.2	7.64
12/07/98 11:50	14.19	0.263	-5	0.71	1590.2	7.58
12/07/98 11:51	14.23	0.264	0	0.79	1590.5	7.53
12/07/98 11:52	14.27	0.264	2	0.79	1590.6	7.50
12/07/98 11:53	14.24	0.264	5	0.85	1590.5	7.48
12/07/98 11:54	14.24	0.263	8	0.82	1590.5	7.46
12/07/98 11:55	14.19	0.262	13	0.82	1590.3	7.46
12/07/98 11:56	14.26	0.262	20	0.96	1590.6	7.45
12/07/98 11:57	14.26	0.004	91	7.45	1590.6	7.30
12/07/98 11:58	14.27	0.004	125	8.78	1.1	7.35
12/07/98 11:59	14.28	0.003	145	9.06	1590.6	7.43
12/07/98 12:00	15.60	0.261	-45	2.02	1596.9	7.48
12/07/98 12:01	15.49	0.262	-148	1.02	1596.5	7.46
12/07/98 12:02	15.86	0.262	-230	0.92	1595.4	7.45
12/07/98 12:03	18.39	0.273	-506	0.85	1610.9	7.40
12/07/98 12:04	19.96	0.268	-565	0.92	1618.5	7.48
12/07/98 12:05	16.78	0.265	-512	0.97	1602.9	7.51
12/07/98 12:06	15.51	0.264	-462	0.91	1596.6	7.49
12/07/98 12:07	15.45	0.265	-478	0.89	1596.3	7.47
12/07/98 12:08	15.36	0.264	-426	0.89	1370.7	7.46
12/07/98 12:09	15.24	0.264	-442	0.88	1595.2	7.44
12/07/98 12:10	16.77	0.268	-556	0.82	1602.8	7.42
12/07/98 12:11	17.45	0.268	-573	0.78	1606.2	7.42
12/07/98 12:12	18.71	0.268	-568	0.75	1612.3	7.45
12/07/98 12:13	16.98	0.267	-475	0.79	1288.5	7.48
12/07/98 12:14	15.86	0.265	-364	0.77	770.8	7.47
12/07/98 12:15	15.71	0.265	-378	0.74	1589.8	7.46
12/07/98 12:16	16.72	0.267	-486	0.71	1602.6	7.43
12/07/98 12:17	18.39	0.267	-428	0.70	1607.8	7.43
12/07/98 12:18	17.26	0.266	-290	0.74	681.3	7.46
12/07/98 12:19	16.04	0.265	-263	0.74	911.9	7.46
12/07/98 12:20	16.63	0.266	-435	0.72	1602.2	7.44
12/07/98 12:21	19.07	0.267	-475	0.69	1614.3	7.43
12/07/98 12:22	20.02	0.268	-298	0.72	1448.0	7.44
12/07/98 12:23	18.95	0.267	-199	0.75	1247.6	7.46
12/07/98 12:24	18.77	0.266	-239	0.81	1129.6	7.46
12/07/98 12:25	18.92	0.268	-240	0.81	896.0	7.46
12/07/98 12:26	18.67	0.266	-216	0.81	406.6	7.45
12/07/98 12:27	18.55	0.266	-208	0.78	320.4	7.45
12/07/98 12:28	18.24	0.266	-191	0.72	337.2	7.46
12/07/98 12:29	18.29	0.266	-174	0.69	308.2	7.45
12/07/98 12:30	18.12	0.266	-163	0.67	309.2	7.44
12/07/98 12:31	18.05	0.266	-161	0.66	296.5	7.44
12/07/98 12:32	17.96	0.266	-163	0.65	433.8	7.44
12/07/98 12:33	18.05	0.266	-159	0.65	288.8	7.44
12/07/98 12:34	17.84	0.266	-147	0.65	247.2	7.44
12/07/98 12:35	17.42	0.266	-141	0.65	237.9	7.45
12/07/98 12:36	17.34	0.267	-184	0.64	260.5	7.43
12/07/98 12:37	18.29	0.268	-204	0.63	315.9	7.43
12/07/98 12:38	19.02	0.267	-191	0.64	267.3	7.43
12/07/98 12:39	19.00	0.267	-180	0.65	285.2	7.44
12/07/98 12:40	18.60	0.267	-173	0.65	252.0	7.45

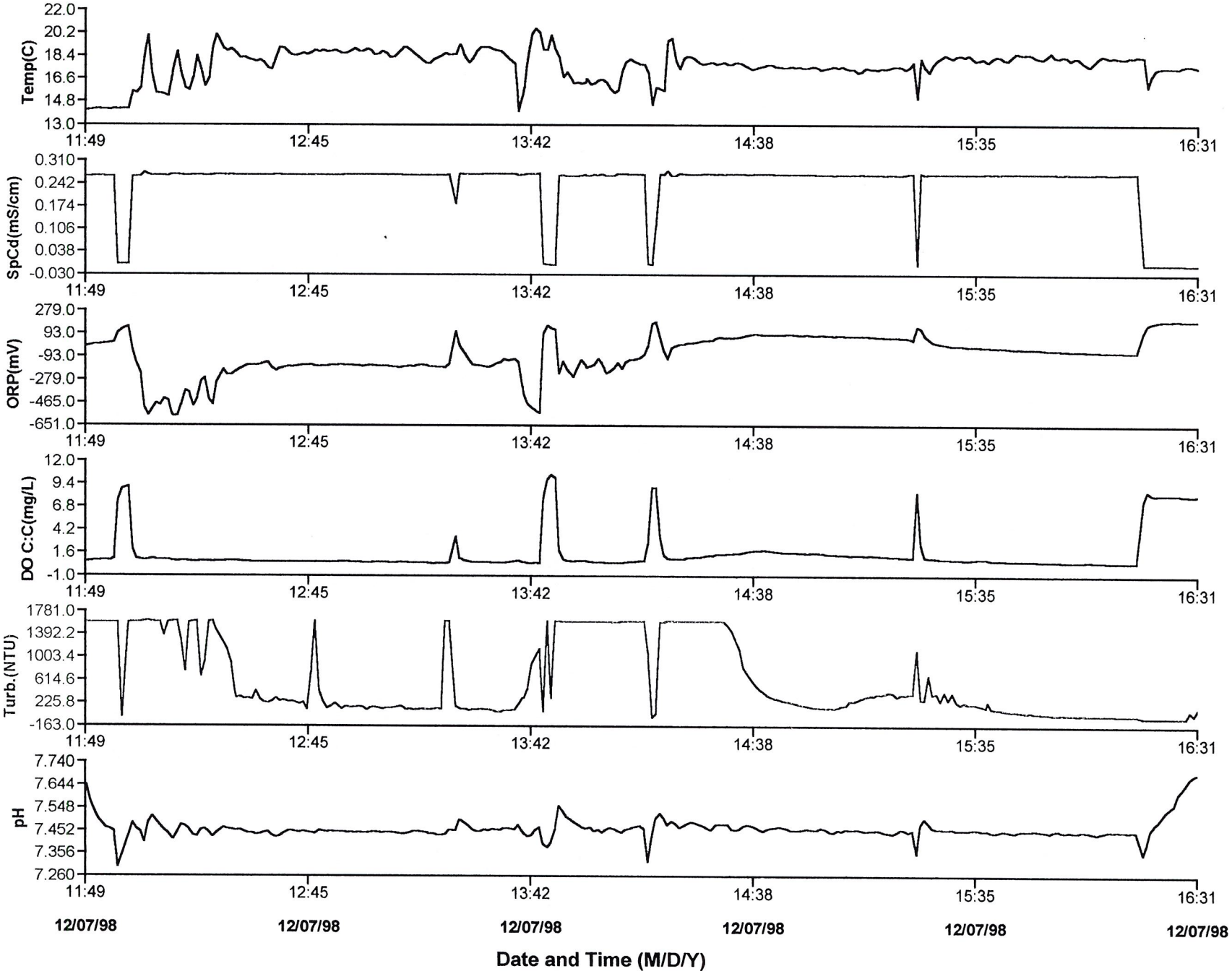
12/07/98 12:41	18.44	0.266	-174	0.65	258.1	7.45
12/07/98 12:42	18.41	0.266	-173	0.64	241.7	7.45
12/07/98 12:43	18.50	0.266	-165	0.63	217.9	7.45
12/07/98 12:44	18.60	0.266	-163	0.63	244.5	7.45
12/07/98 12:45	18.50	0.266	-162	0.63	125.3	7.44
12/07/98 12:46	18.63	0.266	-159	0.62	748.0	7.44
12/07/98 12:47	18.82	0.267	-167	0.63	1610.8	7.44
12/07/98 12:48	18.70	0.267	-171	0.62	437.5	7.45
12/07/98 12:49	18.80	0.267	-169	0.62	257.8	7.45
12/07/98 12:50	18.69	0.267	-168	0.62	143.4	7.45
12/07/98 12:51	18.73	0.267	-163	0.61	182.0	7.45
12/07/98 12:52	18.80	0.267	-160	0.62	226.3	7.45
12/07/98 12:53	18.58	0.267	-157	0.69	137.0	7.45
12/07/98 12:54	18.62	0.268	-161	0.70	176.5	7.45
12/07/98 12:55	18.65	0.268	-163	0.68	177.1	7.44
12/07/98 12:56	18.77	0.268	-161	0.63	158.1	7.45
12/07/98 12:57	18.94	0.268	-164	0.62	165.1	7.44
12/07/98 12:58	18.74	0.268	-165	0.62	171.6	7.45
12/07/98 12:59	18.74	0.268	-170	0.60	165.7	7.44
12/07/98 13:00	18.93	0.268	-167	0.59	118.1	7.44
12/07/98 13:01	18.82	0.268	-162	0.60	161.0	7.45
12/07/98 13:02	18.50	0.268	-164	0.62	166.5	7.45
12/07/98 13:03	18.53	0.268	-167	0.61	148.1	7.45
12/07/98 13:04	18.75	0.268	-169	0.61	134.4	7.44
12/07/98 13:05	18.58	0.268	-169	0.61	151.1	7.45
12/07/98 13:06	18.28	0.268	-173	0.59	148.7	7.45
12/07/98 13:07	18.32	0.268	-174	0.57	160.7	7.44
12/07/98 13:08	18.82	0.268	-180	0.64	180.3	7.44
12/07/98 13:09	19.06	0.267	-172	0.65	155.7	7.44
12/07/98 13:10	19.04	0.267	-171	0.63	127.6	7.44
12/07/98 13:11	18.86	0.267	-168	0.59	139.7	7.44
12/07/98 13:12	18.61	0.267	-171	0.59	121.6	7.45
12/07/98 13:13	18.33	0.267	-162	0.58	124.6	7.45
12/07/98 13:14	18.09	0.267	-157	0.56	131.8	7.45
12/07/98 13:15	17.83	0.267	-162	0.56	125.5	7.45
12/07/98 13:16	17.80	0.267	-172	0.55	127.1	7.44
12/07/98 13:17	18.12	0.267	-171	0.51	133.0	7.44
12/07/98 13:18	18.24	0.267	-176	0.54	142.4	7.43
12/07/98 13:19	18.43	0.267	-177	0.55	134.0	7.44
12/07/98 13:20	18.59	0.267	-178	0.55	1610.5	7.44
12/07/98 13:21	18.48	0.267	-150	0.59	1611.2	7.46
12/07/98 13:22	18.51	0.183	110	3.40	174.6	7.45
12/07/98 13:23	19.25	0.270	-6	1.01	141.7	7.50
12/07/98 13:24	19.12	0.270	-26	0.99	139.4	7.50
12/07/98 13:25	18.26	0.269	-75	0.76	138.1	7.48
12/07/98 13:26	17.89	0.269	-119	0.69	110.9	7.47
12/07/98 13:27	18.21	0.269	-159	0.65	127.9	7.46
12/07/98 13:28	18.79	0.269	-163	0.63	128.7	7.45
12/07/98 13:29	19.05	0.270	-165	0.62	131.1	7.45
12/07/98 13:30	19.07	0.270	-171	0.61	126.6	7.46
12/07/98 13:31	19.06	0.270	-174	0.62	124.8	7.45
12/07/98 13:32	18.91	0.270	-165	0.60	114.6	7.46
12/07/98 13:33	18.81	0.270	-146	0.59	86.2	7.46
12/07/98 13:34	18.76	0.270	-141	0.60	92.3	7.46
12/07/98 13:35	18.52	0.270	-115	0.59	114.4	7.46
12/07/98 13:36	18.19	0.271	-125	0.61	109.6	7.46
12/07/98 13:37	17.78	0.271	-115	0.72	118.4	7.46
12/07/98 13:38	14.15	0.267	-138	0.76	216.8	7.48
12/07/98 13:39	15.41	0.268	-336	0.66	325.0	7.45
12/07/98 13:40	15.95	0.268	-396	0.63	316.8	7.44
12/07/98 13:41	18.31	0.271	-470	0.53	477.7	7.43
12/07/98 13:42	20.08	0.271	-501	0.54	887.7	7.44
12/07/98 13:43	20.49	0.271	-523	0.56	1016.4	7.46

12/07/98 13:44	20.16	0.272	-544	0.52	1139.2	7.47
12/07/98 13:45	18.89	0.004	87	7.82	96.0	7.40
12/07/98 13:46	18.88	0.003	157	9.92	1613.2	7.38
12/07/98 13:47	19.99	0.002	136	10.40	321.0	7.40
12/07/98 13:48	18.86	0.002	124	10.01	1613.1	7.46
12/07/98 13:49	18.28	0.265	-222	1.86	1610.2	7.56
12/07/98 13:50	16.75	0.267	-131	0.93	1602.7	7.53
12/07/98 13:51	17.12	0.264	-194	0.79	1604.6	7.51
12/07/98 13:52	16.27	0.263	-253	0.75	1600.3	7.49
12/07/98 13:53	16.35	0.263	-175	0.78	1600.7	7.48
12/07/98 13:54	16.26	0.265	-121	0.82	1600.2	7.47
12/07/98 13:55	16.33	0.267	-157	0.80	1600.5	7.46
12/07/98 13:56	16.60	0.265	-180	0.75	1601.9	7.46
12/07/98 13:57	16.15	0.265	-167	0.69	1599.7	7.47
12/07/98 13:58	16.27	0.268	-157	0.63	1600.3	7.45
12/07/98 13:59	16.51	0.267	-111	0.64	1601.5	7.46
12/07/98 14:00	16.55	0.269	-149	0.62	1601.6	7.45
12/07/98 14:01	16.35	0.266	-222	0.58	1600.7	7.46
12/07/98 14:02	15.85	0.265	-210	0.57	1598.2	7.46
12/07/98 14:03	15.54	0.265	-181	0.56	1596.7	7.46
12/07/98 14:04	15.74	0.271	-143	0.56	1597.7	7.45
12/07/98 14:05	17.24	0.271	-188	0.58	1605.1	7.44
12/07/98 14:06	17.96	0.270	-136	0.61	1608.7	7.46
12/07/98 14:07	18.16	0.269	-118	0.67	1609.6	7.46
12/07/98 14:08	17.98	0.269	-115	0.68	1608.7	7.47
12/07/98 14:09	17.79	0.269	-102	0.79	1607.7	7.47
12/07/98 14:10	17.72	0.268	-76	0.76	1607.3	7.46
12/07/98 14:11	17.10	0.005	-6	2.72	1083.3	7.32
12/07/98 14:12	14.64	0.003	170	8.92	0.0	7.43
12/07/98 14:13	15.94	0.117	188	8.96	62.7	7.50
12/07/98 14:14	15.81	0.269	51	3.33	1597.9	7.53
12/07/98 14:15	15.69	0.268	-49	1.40	1597.2	7.51
12/07/98 14:16	19.54	0.279	-110	1.04	1616.2	7.48
12/07/98 14:17	19.76	0.265	-22	0.99	1617.3	7.49
12/07/98 14:18	17.98	0.265	-8	0.99	1608.5	7.48
12/07/98 14:19	17.40	0.272	4	0.99	1605.7	7.47
12/07/98 14:20	18.23	0.270	5	1.02	1609.8	7.47
12/07/98 14:21	18.40	0.269	16	1.16	1610.5	7.48
12/07/98 14:22	18.31	0.269	17	1.18	1610.1	7.49
12/07/98 14:23	18.14	0.269	18	1.20	1609.3	7.49
12/07/98 14:24	17.88	0.269	27	1.22	1608.0	7.48
12/07/98 14:25	17.77	0.270	35	1.27	1607.5	7.48
12/07/98 14:26	17.85	0.270	33	1.33	1607.9	7.46
12/07/98 14:27	17.93	0.270	39	1.41	1608.3	7.46
12/07/98 14:28	17.93	0.270	38	1.37	1608.3	7.46
12/07/98 14:29	17.78	0.270	56	1.49	1607.6	7.48
12/07/98 14:30	17.85	0.271	63	1.49	1608.0	7.48
12/07/98 14:31	17.92	0.269	59	1.52	1598.7	7.48
12/07/98 14:32	17.79	0.270	60	1.58	1528.5	7.48
12/07/98 14:33	17.78	0.270	59	1.58	1439.3	7.46
12/07/98 14:34	17.91	0.270	59	1.59	1295.0	7.46
12/07/98 14:35	17.89	0.270	64	1.62	1121.6	7.46
12/07/98 14:36	17.72	0.270	71	1.74	833.8	7.48
12/07/98 14:37	17.57	0.270	77	1.80	719.5	7.48
12/07/98 14:38	17.39	0.270	86	1.89	618.1	7.47
12/07/98 14:39	17.45	0.270	90	1.91	538.4	7.47
12/07/98 14:40	17.56	0.270	86	1.95	474.5	7.46
12/07/98 14:41	17.65	0.271	84	1.95	419.1	7.45
12/07/98 14:42	17.74	0.270	81	1.92	369.6	7.46
12/07/98 14:43	17.73	0.270	84	1.87	339.2	7.47
12/07/98 14:44	17.61	0.269	82	1.82	312.6	7.47
12/07/98 14:45	17.55	0.270	85	1.76	297.1	7.47
12/07/98 14:46	17.52	0.269	83	1.74	274.9	7.47

12/07/98 14:47	17.53	0.269	87	1.69	264.2	7.46
12/07/98 14:48	17.58	0.269	86	1.71	249.8	7.46
12/07/98 14:49	17.54	0.269	82	1.71	236.0	7.46
12/07/98 14:50	17.55	0.270	80	1.68	212.7	7.46
12/07/98 14:51	17.48	0.269	79	1.68	205.2	7.46
12/07/98 14:52	17.51	0.269	82	1.61	192.5	7.46
12/07/98 14:53	17.58	0.269	75	1.66	165.8	7.46
12/07/98 14:54	17.52	0.268	75	1.67	164.9	7.46
12/07/98 14:55	17.36	0.268	78	1.63	158.8	7.46
12/07/98 14:56	17.38	0.268	78	1.60	156.8	7.46
12/07/98 14:57	17.45	0.268	76	1.54	147.5	7.46
12/07/98 14:58	17.52	0.268	74	1.50	158.5	7.45
12/07/98 14:59	17.59	0.267	70	1.50	147.1	7.45
12/07/98 15:00	17.51	0.267	75	1.48	166.5	7.46
12/07/98 15:01	17.61	0.268	74	1.47	187.5	7.45
12/07/98 15:02	17.45	0.267	73	1.47	198.3	7.46
12/07/98 15:03	17.37	0.268	69	1.38	262.5	7.46
12/07/98 15:04	17.36	0.268	73	1.43	268.9	7.46
12/07/98 15:05	17.14	0.267	73	1.42	286.6	7.46
12/07/98 15:06	17.23	0.269	73	1.40	316.2	7.46
12/07/98 15:07	17.47	0.268	71	1.37	343.4	7.45
12/07/98 15:08	17.40	0.268	67	1.39	365.4	7.45
12/07/98 15:09	17.43	0.268	67	1.38	359.0	7.45
12/07/98 15:10	17.36	0.268	65	1.34	387.0	7.46
12/07/98 15:11	17.46	0.268	65	1.31	383.1	7.45
12/07/98 15:12	17.43	0.267	61	1.30	397.9	7.44
12/07/98 15:13	17.50	0.268	61	1.28	420.7	7.44
12/07/98 15:14	17.58	0.268	59	1.26	404.4	7.44
12/07/98 15:15	17.59	0.267	60	1.23	345.8	7.45
12/07/98 15:16	17.54	0.266	58	1.21	382.0	7.46
12/07/98 15:17	17.38	0.268	57	1.18	375.6	7.46
12/07/98 15:18	17.53	0.270	51	1.17	392.8	7.45
12/07/98 15:19	17.92	0.270	37	1.17	391.2	7.45
12/07/98 15:20	15.15	0.004	144	8.38	1114.1	7.36
12/07/98 15:21	18.20	0.272	134	2.53	298.2	7.48
12/07/98 15:22	17.54	0.269	74	1.23	292.4	7.50
12/07/98 15:23	17.15	0.269	46	1.12	700.6	7.49
12/07/98 15:24	17.74	0.269	24	1.08	383.5	7.47
12/07/98 15:25	18.09	0.269	14	1.04	398.0	7.46
12/07/98 15:26	18.27	0.269	8	1.01	274.8	7.46
12/07/98 15:27	18.48	0.269	3	0.99	418.7	7.46
12/07/98 15:28	18.36	0.269	-1	0.98	291.5	7.46
12/07/98 15:29	18.22	0.269	-5	0.95	404.1	7.46
12/07/98 15:30	18.41	0.270	-6	0.94	269.3	7.46
12/07/98 15:31	18.44	0.269	-8	0.93	211.5	7.46
12/07/98 15:32	18.36	0.270	-11	0.91	252.3	7.46
12/07/98 15:33	18.48	0.270	-14	0.91	221.0	7.45
12/07/98 15:34	18.06	0.269	-13	0.96	221.8	7.46
12/07/98 15:35	18.11	0.269	-14	0.97	204.0	7.46
12/07/98 15:36	18.22	0.269	-17	0.97	188.9	7.45
12/07/98 15:37	18.00	0.270	-17	0.98	164.0	7.45
12/07/98 15:38	17.96	0.270	-18	0.95	255.3	7.45
12/07/98 15:39	18.20	0.270	-19	0.86	148.2	7.45
12/07/98 15:40	18.37	0.270	-20	0.86	138.6	7.45
12/07/98 15:41	18.35	0.270	-21	0.85	134.8	7.45
12/07/98 15:42	18.13	0.270	-21	0.83	120.6	7.45
12/07/98 15:43	18.09	0.270	-24	0.82	115.2	7.45
12/07/98 15:44	18.34	0.270	-29	0.79	105.5	7.45
12/07/98 15:45	18.64	0.270	-31	0.79	102.3	7.45
12/07/98 15:46	18.57	0.270	-30	0.79	94.1	7.45
12/07/98 15:47	18.54	0.270	-31	0.79	87.8	7.45
12/07/98 15:48	18.57	0.270	-34	0.77	85.3	7.45
12/07/98 15:49	18.53	0.270	-33	0.76	86.6	7.45

12/07/98 15:50	18.31	0.270	-31	0.76	74.6	7.46
12/07/98 15:51	18.24	0.270	-34	0.76	72.7	7.45
12/07/98 15:52	18.21	0.270	-36	0.74	67.5	7.45
12/07/98 15:53	18.37	0.270	-40	0.73	62.8	7.45
12/07/98 15:54	18.66	0.270	-41	0.73	60.0	7.45
12/07/98 15:55	18.36	0.270	-40	0.74	50.6	7.45
12/07/98 15:56	18.27	0.269	-41	0.72	51.7	7.46
12/07/98 15:57	18.39	0.270	-41	0.70	53.2	7.45
12/07/98 15:58	18.35	0.270	-42	0.69	51.2	7.45
12/07/98 15:59	18.10	0.270	-45	0.70	50.2	7.45
12/07/98 16:00	18.28	0.270	-45	0.69	47.1	7.45
12/07/98 16:01	18.22	0.270	-45	0.69	45.3	7.45
12/07/98 16:02	17.95	0.270	-47	0.68	47.2	7.45
12/07/98 16:03	17.63	0.269	-51	0.74	41.5	7.45
12/07/98 16:04	17.65	0.270	-52	0.73	42.4	7.45
12/07/98 16:05	17.94	0.269	-52	0.69	44.2	7.44
12/07/98 16:06	18.26	0.270	-51	0.67	41.3	7.44
12/07/98 16:07	18.44	0.270	-53	0.67	41.1	7.45
12/07/98 16:09	18.28	0.270	-53	0.64	42.5	7.45
12/07/98 16:10	18.36	0.270	-53	0.66	39.0	7.45
12/07/98 16:11	18.28	0.269	-54	0.66	38.9	7.45
12/07/98 16:12	18.23	0.270	-55	0.64	36.7	7.45
12/07/98 16:13	18.25	0.270	-57	0.65	37.1	7.45
12/07/98 16:14	18.33	0.270	-58	0.63	34.6	7.45
12/07/98 16:15	18.32	0.270	-59	0.64	34.1	7.45
12/07/98 16:16	18.43	0.270	-58	0.64	34.2	7.45
12/07/98 16:17	18.34	0.003	106	7.56	-0.2	7.36
12/07/98 16:18	16.03	0.003	164	8.58	-0.2	7.40
12/07/98 16:19	16.89	0.003	177	8.25	-0.0	7.46
12/07/98 16:20	17.36	0.003	187	8.19	-0.1	7.48
12/07/98 16:21	17.49	0.003	192	8.21	-0.1	7.50
12/07/98 16:22	17.54	0.003	195	8.24	-0.1	7.52
12/07/98 16:23	17.54	0.003	198	8.23	-0.1	7.54
12/07/98 16:24	17.54	0.003	199	8.21	-0.1	7.55
12/07/98 16:25	17.52	0.003	200	8.21	-0.2	7.56
12/07/98 16:26	17.50	0.003	201	8.24	0.0	7.61
12/07/98 16:27	17.64	0.003	199	8.13	-0.0	7.63
12/07/98 16:28	17.71	0.002	198	8.09	1.0	7.65
12/07/98 16:29	17.71	0.002	198	8.08	109.9	7.67
12/07/98 16:30	17.65	0.002	198	8.08	50.7	7.69
12/07/98 16:31	17.54	0.002	199	8.10	149.2	7.69

MW-12


Temp(C)
22.0
20.2
18.4
16.6
14.8
13.0
SpCd(mS/cm)
0.310
0.242
0.174
0.106
0.038
-0.030
ORP(mV)
279.0
93.0
-93.0
-279.0
-465.0
-651.0
DO C:C(mg/L)
12.0
9.4
6.8
4.2
1.6
-1.0
Turb.(NTU)
1781.0
1392.2
1003.4
614.6
225.8
-163.0
pH
7.740
7.644
7.548
7.452
7.356
7.260
11:49
12:45
13:42
14:38
15:35
16:31
12/07/98
Date and Time (M/D/Y)

MW-13
-- Statistical Report --

From 12/09/98 08:43 to 12/09/98 09:21
Number of samples: 39

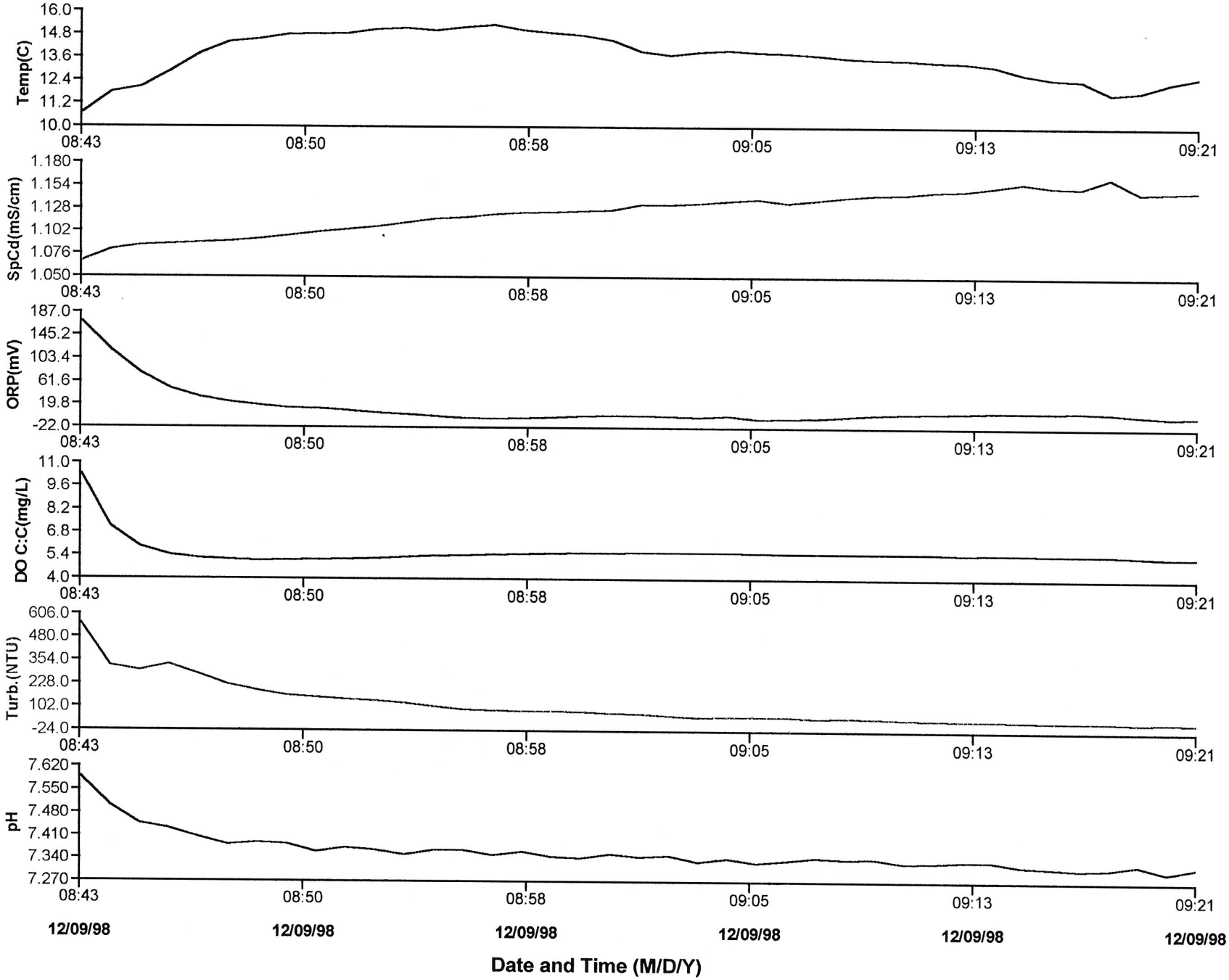
Parameter	Min	Max	Mean	Std
Temp (C)	10.74	15.25	13.67	1.12
SpCd (mS/cm)	1.069	1.164	1.125	0.025
ORP (mV)	-4	169	15	34
DO C:C (mg/L)	5.13	10.29	5.67	0.81
Turb. (NTU)	28.7	553.0	114.1	109.5
pH ()	7.30	7.59	7.36	0.05

MW-13
-- Data Report --

From 12/09/98 08:43 to 12/09/98 09:21
Number of samples: 39

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/09/98 08:43	10.74	1.069	169	10.29	553.0	7.59
12/09/98 08:44	11.80	1.081	118	7.17	322.0	7.50
12/09/98 08:45	12.06	1.086	78	5.98	296.8	7.45
12/09/98 08:46	12.86	1.087	50	5.46	331.1	7.43
12/09/98 08:47	13.78	1.089	34	5.26	276.6	7.41
12/09/98 08:48	14.37	1.090	25	5.18	223.3	7.38
12/09/98 08:49	14.53	1.093	19	5.13	189.3	7.39
12/09/98 08:50	14.75	1.097	14	5.15	164.3	7.38
12/09/98 08:51	14.77	1.101	13	5.19	155.1	7.36
12/09/98 08:52	14.81	1.104	10	5.22	144.2	7.37
12/09/98 08:53	15.02	1.107	6	5.28	137.0	7.37
12/09/98 08:54	15.09	1.112	3	5.37	124.2	7.35
12/09/98 08:55	14.96	1.116	0	5.43	107.7	7.37
12/09/98 08:56	15.14	1.118	-3	5.46	92.4	7.37
12/09/98 08:57	15.25	1.121	-4	5.51	87.2	7.35
12/09/98 08:58	14.99	1.123	-3	5.56	86.3	7.36
12/09/98 08:59	14.85	1.124	-1	5.59	84.1	7.35
12/09/98 09:00	14.72	1.126	1	5.64	82.7	7.34
12/09/98 09:01	14.51	1.127	2	5.64	75.5	7.36
12/09/98 09:02	13.92	1.133	2	5.66	71.2	7.35
12/09/98 09:03	13.75	1.133	1	5.67	63.2	7.35
12/09/98 09:04	13.90	1.135	-0	5.67	56.0	7.33
12/09/98 09:05	13.97	1.137	1	5.65	57.8	7.34
12/09/98 09:06	13.88	1.139	-4	5.62	57.8	7.33
12/09/98 09:07	13.82	1.135	-3	5.60	57.0	7.34
12/09/98 09:08	13.72	1.138	-2	5.60	50.7	7.35
12/09/98 09:09	13.60	1.142	1	5.60	52.1	7.34
12/09/98 09:10	13.52	1.144	4	5.60	49.1	7.34
12/09/98 09:11	13.48	1.145	6	5.60	45.4	7.33
12/09/98 09:12	13.39	1.148	7	5.59	43.7	7.33
12/09/98 09:13	13.36	1.149	8	5.56	39.7	7.34
12/09/98 09:14	13.19	1.153	9	5.58	39.4	7.34
12/09/98 09:15	12.77	1.158	9	5.56	36.8	7.32
12/09/98 09:16	12.55	1.154	9	5.54	36.0	7.32
12/09/98 09:17	12.47	1.152	10	5.53	34.7	7.31
12/09/98 09:18	11.77	1.164	9	5.56	34.5	7.32
12/09/98 09:19	11.90	1.147	4	5.48	28.7	7.33
12/09/98 09:20	12.35	1.148	1	5.42	32.9	7.30
12/09/98 09:21	12.64	1.149	1	5.40	30.6	7.32

MW-13


Temp(C)
16.0
14.8
13.6
12.4
11.2
10.0
SpCd(mS/cm)
1.180
1.154
1.128
1.102
1.076
1.050
ORP(mV)
187.0
145.2
103.4
61.6
19.8
-22.0
DO C:C(mg/L)
11.0
9.6
8.2
6.8
5.4
4.0
Turb.(NTU)
606.0
480.0
354.0
228.0
102.0
-24.0
pH
7.620
7.550
7.480
7.410
7.340
7.270
08:43
08:50
08:58
09:05
09:13
09:21
12/09/98
Date and Time (M/D/Y)

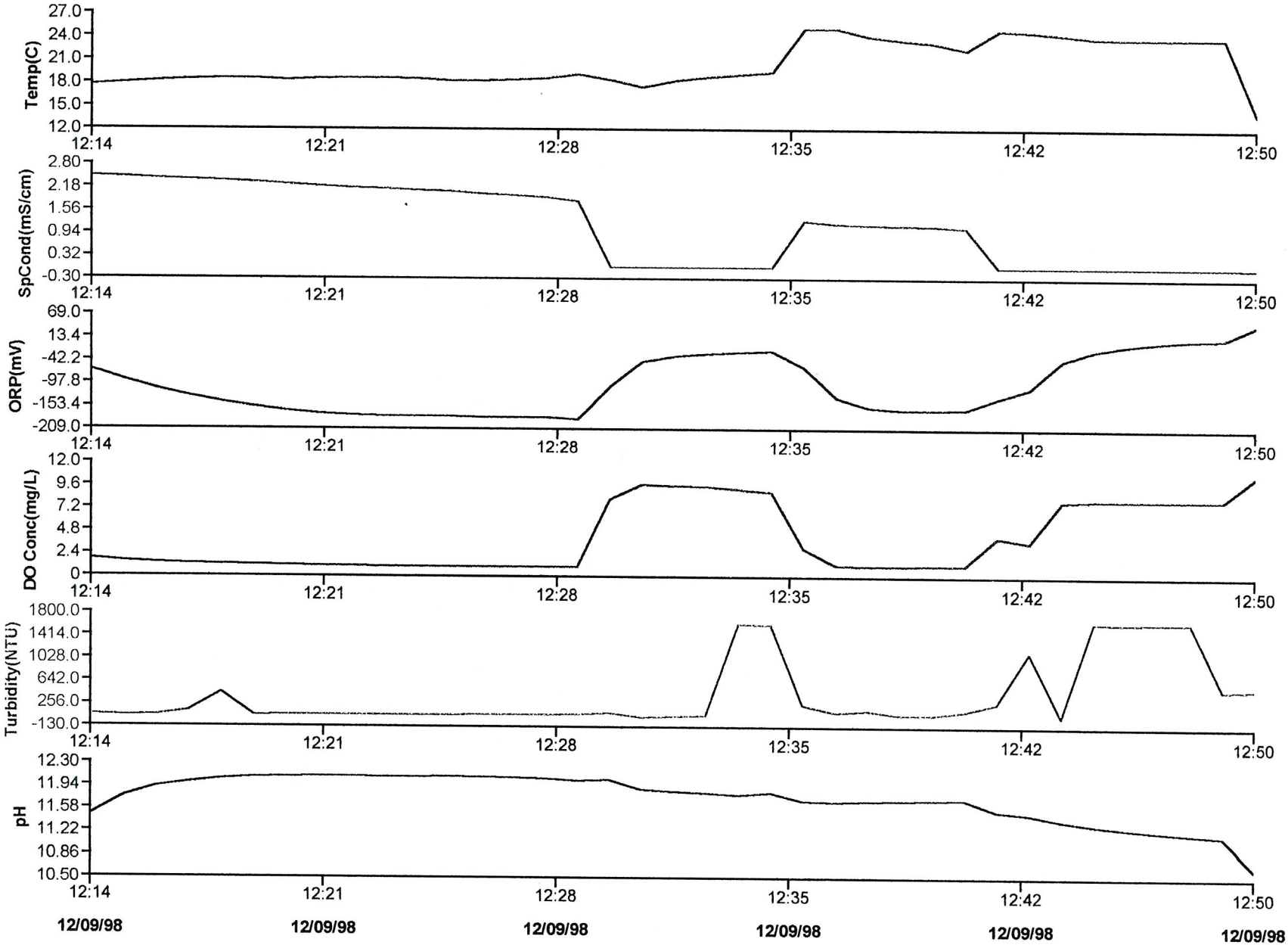
DMW-3
Well Pumped Dry
-- Data Report --

From 12/09/98 12:14 to 12/09/98 12:50
Number of samples: 37

Date and Time M/D/Y	Temp C	SpCond mS/cm	ORP mV	DO Conc mg/L	Turbidity NTU	pH
12/09/98 12:14	17.68	2.457	-69	1.78	66.9	11.48
12/09/98 12:15	17.93	2.429	-93	1.49	49.1	11.76
12/09/98 12:16	18.19	2.395	-114	1.34	57.1	11.91
12/09/98 12:17	18.40	2.366	-131	1.26	130.0	11.98
12/09/98 12:18	18.47	2.335	-145	1.20	436.7	12.03
12/09/98 12:19	18.50	2.299	-157	1.13	54.0	12.06
12/09/98 12:20	18.34	2.250	-165	1.10	65.3	12.07
12/09/98 12:21	18.53	2.199	-173	1.05	63.9	12.08
12/09/98 12:22	18.58	2.162	-177	1.03	64.1	12.08
12/09/98 12:23	18.58	2.125	-178	1.01	63.2	12.07
12/09/98 12:24	18.53	2.093	-179	1.00	66.7	12.07
12/09/98 12:25	18.26	2.061	-179	0.99	65.7	12.08
12/09/98 12:26	18.28	2.005	-180	1.01	75.1	12.07
12/09/98 12:27	18.39	1.956	-180	0.99	74.6	12.06
12/09/98 12:28	18.55	1.909	-181	0.98	73.6	12.04
12/09/98 12:29	19.10	1.807	-186	0.98	77.5	12.02
12/09/98 12:30	18.40	0.012	-106	8.13	101.2	12.03
12/09/98 12:31	17.47	0.007	-46	9.70	30.8	11.88
12/09/98 12:32	18.31	0.005	-32	9.59	48.4	11.85
12/09/98 12:33	18.77	0.005	-26	9.49	61.8	11.82
12/09/98 12:34	19.10	0.005	-23	9.22	1614.9	11.79
12/09/98 12:35	19.42	0.006	-20	8.90	1599.0	11.83
12/09/98 12:36	25.10	1.276	-59	2.95	239.6	11.70
12/09/98 12:37	25.12	1.202	-132	1.22	121.0	11.69
12/09/98 12:38	24.10	1.171	-156	1.17	154.9	11.71
12/09/98 12:39	23.56	1.165	-161	1.17	83.4	11.72
12/09/98 12:40	23.16	1.146	-161	1.18	81.4	11.72
12/09/98 12:41	22.28	1.098	-160	1.22	147.5	11.73
12/09/98 12:42	24.92	0.007	-133	4.13	275.0	11.55
12/09/98 12:43	24.69	0.010	-109	3.60	1127.8	11.50
12/09/98 12:44	24.32	0.004	-42	7.96	50.2	11.41
12/09/98 12:45	23.90	0.004	-17	8.12	1638.9	11.34
12/09/98 12:46	23.80	0.004	-4	8.12	1638.4	11.28
12/09/98 12:47	23.82	0.003	4	8.12	1638.6	11.24
12/09/98 12:48	23.81	0.003	10	8.11	1638.6	11.20
12/09/98 12:49	23.82	0.003	13	8.11	513.2	11.16
12/09/98 12:50	14.00	0.002	46	10.69	527.8	10.65

W-3

Well Pumped Dry



MW-6
Well Pumped Dry
-- Statistical Report --

From 12/08/98 12:29 to 12/08/98 15:23
Number of samples: 152

Parameter	Min	Max	Mean	Std
Temp (C)	13.90	20.64	16.22	1.08
SpCd (mS/cm)	0.002	0.309	0.220	0.132
ORP (mV)	-218	184	-40	126
DO C:C (mg/L)	0.69	9.85	3.44	3.10
Turb. (NTU)	14.4	1616.0	1124.0	434.5
pH ()	7.31	8.08	7.60	0.14

MW-6
Well Pumped Dry
-- Data Report --

From 12/08/98 12:29 to 12/08/98 15:23
Number of samples: 152

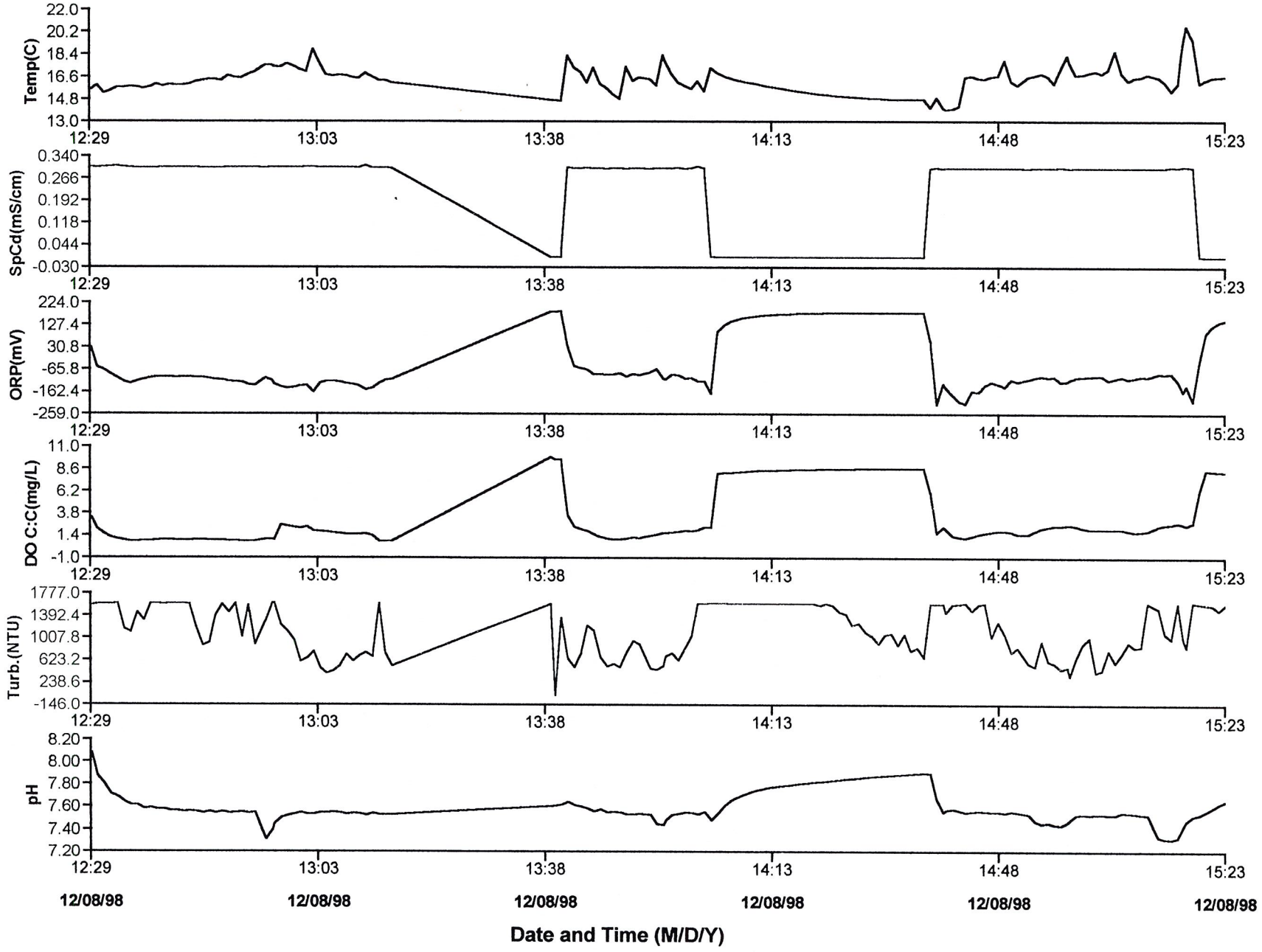
Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/08/98 12:29	15.57	0.304	29	3.28	1570.9	8.08
12/08/98 12:30	15.92	0.302	-57	2.04	1589.6	7.86
12/08/98 12:31	15.28	0.303	-70	1.54	1593.0	7.79
12/08/98 12:32	15.48	0.305	-88	1.13	1593.0	7.70
12/08/98 12:33	15.72	0.306	-104	0.97	1595.3	7.68
12/08/98 12:34	15.72	0.303	-121	0.81	1146.3	7.64
12/08/98 12:35	15.79	0.301	-129	0.71	1091.0	7.61
12/08/98 12:36	15.75	0.301	-120	0.71	1445.1	7.61
12/08/98 12:37	15.64	0.301	-110	0.73	1303.8	7.58
12/08/98 12:38	15.77	0.301	-104	0.78	1595.7	7.58
12/08/98 12:39	16.00	0.301	-100	0.81	1596.9	7.57
12/08/98 12:40	15.85	0.302	-99	0.85	1593.8	7.57
12/08/98 12:41	15.94	0.301	-102	0.85	1596.7	7.56
12/08/98 12:42	15.93	0.302	-103	0.83	1596.6	7.56
12/08/98 12:43	15.91	0.301	-101	0.83	1596.6	7.55
12/08/98 12:44	16.00	0.301	-101	0.83	1593.7	7.56
12/08/98 12:45	16.19	0.301	-102	0.84	1171.5	7.55
12/08/98 12:46	16.30	0.301	-103	0.85	869.6	7.54
12/08/98 12:47	16.39	0.301	-107	0.82	910.8	7.55
12/08/98 12:48	16.36	0.301	-110	0.81	1394.3	7.54
12/08/98 12:49	16.31	0.301	-113	0.79	1578.6	7.55
12/08/98 12:50	16.68	0.302	-119	0.76	1446.4	7.53
12/08/98 12:51	16.51	0.302	-121	0.74	1599.7	7.54
12/08/98 12:52	16.49	0.301	-123	0.72	1008.3	7.54
12/08/98 12:53	16.76	0.302	-134	0.71	1567.3	7.54
12/08/98 12:54	16.94	0.302	-138	0.71	883.4	7.54
12/08/98 12:55	17.49	0.301	-105	0.90	1303.1	7.31
12/08/98 12:56	17.47	0.302	-117	0.89	1604.5	7.39
12/08/98 12:57	17.37	0.302	-130	0.85	1604.0	7.45
12/08/98 12:58	17.32	0.302	-143	2.46	1212.0	7.50
12/08/98 12:59	17.59	0.302	-148	2.32	1103.5	7.52
12/08/98 13:00	17.39	0.302	-145	2.22	950.5	7.53
12/08/98 13:01	17.14	0.303	-140	2.12	589.1	7.54
12/08/98 13:02	16.99	0.304	-137	2.29	645.7	7.53
12/08/98 13:03	18.75	0.304	-166	1.85	758.4	7.53
12/08/98 13:04	17.61	0.302	-127	1.79	475.5	7.54
12/08/98 13:05	16.76	0.302	-119	1.72	390.8	7.54
12/08/98 13:06	16.63	0.302	-120	1.64	431.2	7.54
12/08/98 13:07	16.73	0.302	-121	1.58	520.9	7.54
12/08/98 13:08	16.69	0.302	-128	1.48	715.0	7.53
12/08/98 13:09	16.54	0.302	-132	1.48	597.1	7.54
12/08/98 13:10	16.45	0.301	-139	1.44	683.7	7.53
12/08/98 13:11	16.88	0.309	-155	1.52	744.0	7.52
12/08/98 13:12	16.56	0.300	-149	1.32	672.0	7.53
12/08/98 13:13	16.29	0.301	-128	0.70	1599.1	7.52
12/08/98 13:14	16.30	0.301	-114	0.69	728.7	7.52
12/08/98 13:15	16.10	0.300	-110	0.71	518.9	7.52
12/08/98 13:39	14.71	0.002	183	9.85	1590.9	7.60
12/08/98 13:40	14.67	0.002	183	9.58	14.4	7.60
12/08/98 13:41	14.64	0.002	184	9.56	1346.8	7.61
12/08/98 13:42	18.22	0.302	33	3.48	638.8	7.64

12/08/98 13:43	17.27	0.299	-54	2.27	492.6	7.61
12/08/98 13:44	16.95	0.299	-62	2.02	734.3	7.60
12/08/98 13:45	16.08	0.301	-68	1.80	1209.0	7.58
12/08/98 13:46	17.29	0.299	-88	1.49	1115.4	7.55
12/08/98 13:47	15.99	0.298	-88	1.19	668.0	7.57
12/08/98 13:48	15.65	0.297	-90	1.00	506.4	7.55
12/08/98 13:49	15.15	0.299	-90	0.93	547.3	7.55
12/08/98 13:50	14.80	0.299	-84	0.92	494.9	7.55
12/08/98 13:51	17.35	0.297	-98	1.01	747.2	7.53
12/08/98 13:52	16.26	0.298	-88	1.10	940.8	7.53
12/08/98 13:53	16.52	0.298	-93	1.07	881.9	7.53
12/08/98 13:54	16.37	0.298	-80	1.33	469.7	7.52
12/08/98 13:55	15.89	0.299	-66	1.44	453.7	7.44
12/08/98 13:56	18.28	0.300	-107	1.60	514.5	7.44
12/08/98 13:57	17.75	0.299	-111	1.63	682.5	7.48
12/08/98 13:58	16.83	0.299	-91	1.70	739.5	7.52
12/08/98 13:59	16.09	0.301	-92	1.74	614.3	7.53
12/08/98 14:00	15.83	0.298	-106	1.88	816.5	7.54
12/08/98 14:01	15.60	0.298	-104	1.85	1027.6	7.54
12/08/98 14:02	16.22	0.305	-120	1.94	1599.6	7.53
12/08/98 14:03	15.41	0.299	-118	2.21	1595.7	7.55
12/08/98 14:04	17.24	0.004	-172	2.21	1604.7	7.48
12/08/98 14:05	16.86	0.003	94	8.07	1602.8	7.54
12/08/98 14:06	16.60	0.003	124	8.17	1601.5	7.60
12/08/98 14:07	16.44	0.002	140	8.17	1600.8	7.65
12/08/98 14:08	16.31	0.002	149	8.20	1600.1	7.68
12/08/98 14:09	16.19	0.002	156	8.24	1599.6	7.71
12/08/98 14:10	16.02	0.002	163	8.36	1598.6	7.74
12/08/98 14:11	15.92	0.002	166	8.38	1598.2	7.75
12/08/98 14:12	15.82	0.002	168	8.41	1597.6	7.76
12/08/98 14:13	15.73	0.002	170	8.42	1597.2	7.77
12/08/98 14:14	15.63	0.002	172	8.45	1596.7	7.78
12/08/98 14:15	15.54	0.002	173	8.47	1596.2	7.79
12/08/98 14:16	15.46	0.002	174	8.49	1595.8	7.79
12/08/98 14:17	15.37	0.002	176	8.50	1595.3	7.80
12/08/98 14:18	15.30	0.002	176	8.52	1595.0	7.81
12/08/98 14:19	15.23	0.002	177	8.53	1594.6	7.81
12/08/98 14:20	15.17	0.002	178	8.54	1560.8	7.82
12/08/98 14:21	15.11	0.002	178	8.55	1594.0	7.83
12/08/98 14:22	15.05	0.002	179	8.56	1565.2	7.83
12/08/98 14:23	15.00	0.002	179	8.57	1449.0	7.84
12/08/98 14:24	14.96	0.002	179	8.58	1410.0	7.84
12/08/98 14:25	14.92	0.002	179	8.59	1219.3	7.85
12/08/98 14:26	14.88	0.002	180	8.60	1249.3	7.85
12/08/98 14:27	14.85	0.002	180	8.60	1094.1	7.86
12/08/98 14:28	14.82	0.002	180	8.61	1019.5	7.86
12/08/98 14:29	14.80	0.002	179	8.61	900.6	7.87
12/08/98 14:30	14.78	0.002	179	8.62	1044.6	7.87
12/08/98 14:31	14.76	0.002	179	8.62	1069.8	7.88
12/08/98 14:32	14.75	0.002	179	8.63	872.6	7.88
12/08/98 14:33	14.74	0.002	179	8.63	1055.2	7.89
12/08/98 14:34	14.73	0.002	179	8.63	777.7	7.89
12/08/98 14:35	14.73	0.002	179	8.64	822.1	7.90
12/08/98 14:36	14.72	0.002	179	8.64	662.2	7.90
12/08/98 14:37	14.04	0.298	54	5.99	1589.0	7.90
12/08/98 14:38	14.87	0.301	-218	1.60	1593.1	7.67
12/08/98 14:39	14.01	0.298	-130	2.27	1588.9	7.55
12/08/98 14:40	13.90	0.298	-147	2.00	1445.4	7.57
12/08/98 14:41	13.96	0.298	-178	1.32	1583.1	7.57
12/08/98 14:42	14.18	0.298	-206	1.16	1589.7	7.56
12/08/98 14:43	16.54	0.300	-217	1.07	1601.6	7.54
12/08/98 14:44	16.61	0.299	-162	1.25	1471.6	7.55
12/08/98 14:45	16.42	0.299	-166	1.45	1582.2	7.56

12/08/98 14:46	16.37	0.299	-136	1.62	1600.8	7.55
12/08/98 14:47	16.56	0.299	-123	1.74	1009.5	7.55
12/08/98 14:48	16.61	0.300	-131	1.82	1266.4	7.55
12/08/98 14:49	17.82	0.299	-143	1.84	1050.7	7.54
12/08/98 14:50	16.17	0.299	-112	1.74	755.4	7.55
12/08/98 14:51	15.88	0.299	-121	1.48	825.2	7.55
12/08/98 14:52	16.53	0.298	-111	1.48	557.4	7.53
12/08/98 14:53	16.62	0.299	-103	1.83	507.2	7.47
12/08/98 14:54	16.78	0.300	-98	2.11	934.3	7.45
12/08/98 14:55	16.55	0.299	-102	2.27	595.8	7.46
12/08/98 14:56	16.00	0.299	-100	2.36	554.7	7.44
12/08/98 14:57	17.18	0.301	-124	2.39	459.9	7.44
12/08/98 14:58	18.19	0.298	-120	2.47	496.0	7.46
12/08/98 14:59	17.57	0.298	-113	2.47	349.0	7.48
12/08/98 15:00	16.69	0.298	-103	2.38	650.8	7.52
12/08/98 15:01	16.71	0.298	-100	2.19	888.1	7.53
12/08/98 15:02	16.85	0.299	-99	2.05	995.2	7.52
12/08/98 15:03	16.99	0.299	-97	2.01	415.2	7.53
12/08/98 15:04	16.81	0.299	-96	2.01	446.6	7.53
12/08/98 15:05	17.12	0.299	-114	2.00	778.1	7.52
12/08/98 15:06	18.58	0.299	-106	2.02	574.6	7.52
12/08/98 15:07	16.79	0.298	-102	2.05	730.4	7.55
12/08/98 15:08	16.23	0.298	-107	1.88	915.1	7.54
12/08/98 15:09	16.45	0.299	-104	1.74	833.5	7.53
12/08/98 15:10	16.53	0.299	-99	1.77	847.1	7.53
12/08/98 15:11	16.70	0.299	-100	1.89	1602.4	7.52
12/08/98 15:12	16.50	0.300	-87	2.37	1507.2	7.34
12/08/98 15:13	16.08	0.300	-89	2.51	1073.0	7.32
12/08/98 15:14	15.37	0.303	-87	2.61	981.7	7.31
12/08/98 15:15	15.98	0.301	-118	2.71	1598.7	7.33
12/08/98 15:16	19.30	0.304	-163	2.60	975.4	7.43
12/08/98 15:17	20.64	0.303	-140	2.46	846.3	7.47
12/08/98 15:18	19.48	0.301	-205	2.72	1616.0	7.52
12/08/98 15:19	16.03	0.003	-38	6.19	1599.0	7.53
12/08/98 15:20	16.31	0.003	92	8.38	1579.5	7.56
12/08/98 15:21	16.47	0.003	121	8.36	1564.8	7.59
12/08/98 15:22	16.54	0.003	137	8.29	1486.3	7.63
12/08/98 15:23	16.57	0.003	147	8.25	1581.0	7.65

N-6

Well Pumped Dry



MW-7
Well Pumped Dry
-- Statistical Report --

From 12/08/98 09:57 to 12/08/98 11:19
Number of samples: 83

Parameter	Min	Max	Mean	Std
Temp (C)	11.83	22.67	15.80	2.58
SpCd (mS/cm)	0.004	0.865	0.481	0.370
ORP (mV)	-513	202	-52	195
DO C:C (mg/L)	0.88	9.10	3.93	3.27
Turb. (NTU)	89.3	1622.9	641.6	538.8
pH ()	7.16	7.84	7.35	0.10

MW-7
Well Pumped Dry
-- Data Report --

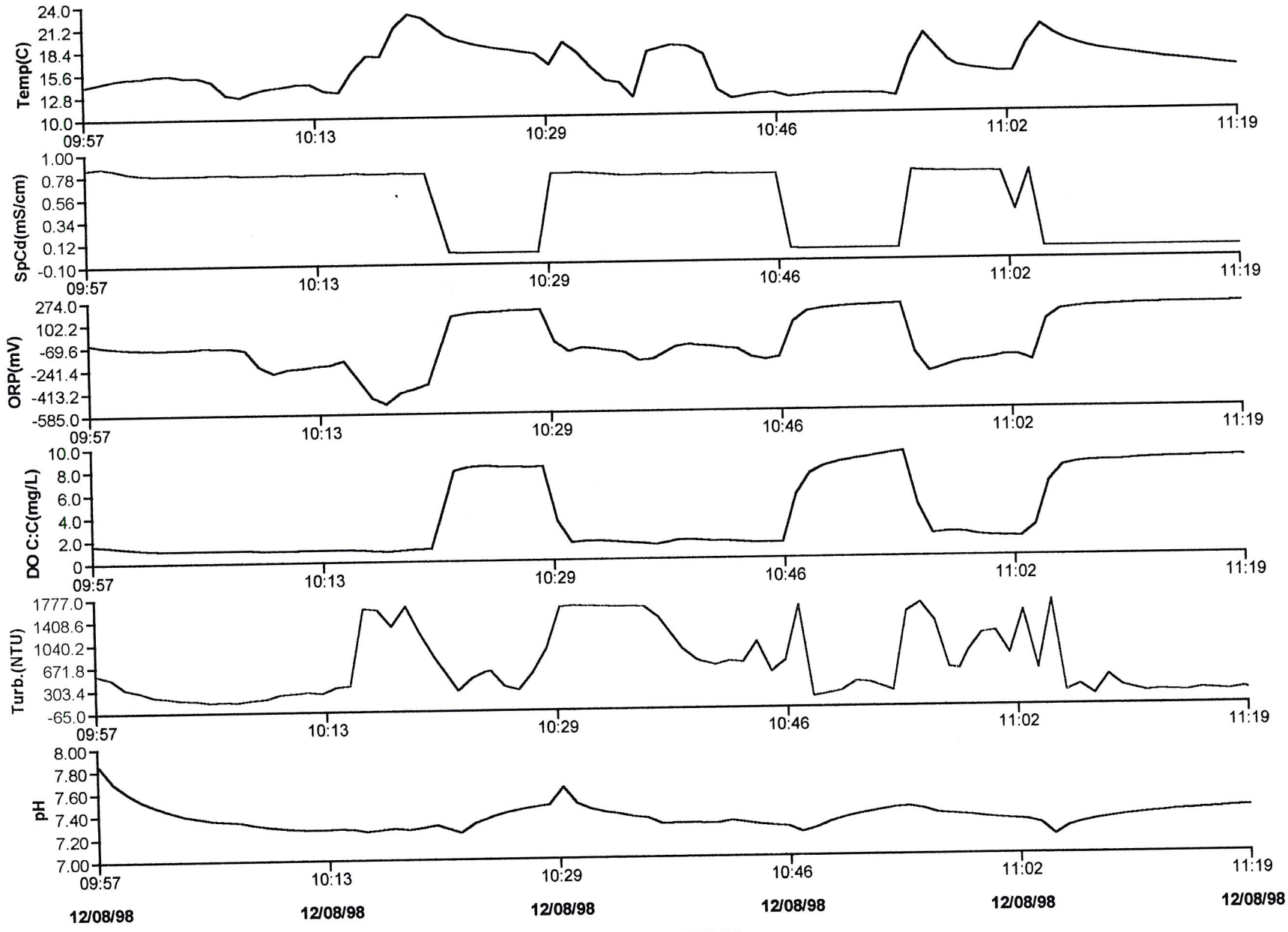
From 12/08/98 09:57 to 12/08/98 11:19
Number of samples: 83

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/08/98 09:57	14.09	0.853	-50	1.54	535.1	7.84
12/08/98 09:58	14.48	0.865	-68	1.46	478.2	7.69
12/08/98 09:59	14.81	0.841	-77	1.35	315.1	7.60
12/08/98 10:00	15.07	0.809	-86	1.22	265.3	7.53
12/08/98 10:01	15.15	0.790	-88	1.12	188.5	7.47
12/08/98 10:02	15.36	0.785	-93	1.08	164.7	7.43
12/08/98 10:03	15.44	0.785	-90	1.09	136.9	7.39
12/08/98 10:04	15.13	0.786	-88	1.09	129.8	7.38
12/08/98 10:05	15.13	0.785	-78	1.09	99.3	7.36
12/08/98 10:06	14.57	0.788	-82	1.08	103.6	7.34
12/08/98 10:07	12.92	0.791	-80	1.10	98.9	7.33
12/08/98 10:08	12.67	0.782	-102	1.08	125.8	7.31
12/08/98 10:09	13.29	0.779	-224	1.03	145.8	7.29
12/08/98 10:10	13.70	0.782	-274	1.00	213.6	7.28
12/08/98 10:11	13.88	0.784	-245	1.02	232.1	7.27
12/08/98 10:12	14.18	0.782	-236	1.04	253.0	7.27
12/08/98 10:13	14.15	0.785	-224	1.04	227.0	7.27
12/08/98 10:14	13.30	0.787	-215	1.05	324.7	7.27
12/08/98 10:15	13.15	0.787	-184	1.04	344.9	7.27
12/08/98 10:16	15.71	0.794	-326	1.00	1596.5	7.25
12/08/98 10:17	17.58	0.786	-465	0.92	1576.5	7.26
12/08/98 10:18	17.48	0.786	-513	0.88	1300.1	7.27
12/08/98 10:19	21.03	0.790	-431	0.94	1622.9	7.26
12/08/98 10:20	22.67	0.785	-399	1.05	1183.1	7.28
12/08/98 10:21	22.23	0.786	-364	1.08	799.6	7.30
12/08/98 10:22	19.95	0.008	147	7.85	249.5	7.23
12/08/98 10:23	19.31	0.007	165	8.15	455.3	7.31
12/08/98 10:24	18.85	0.006	174	8.22	556.7	7.36
12/08/98 10:25	18.73	0.006	176	8.21	562.1	7.37
12/08/98 10:26	18.39	0.006	181	8.14	317.6	7.41
12/08/98 10:27	18.11	0.006	185	8.14	255.3	7.43
12/08/98 10:28	17.84	0.005	187	8.09	535.6	7.46
12/08/98 10:29	17.59	0.005	189	8.15	921.6	7.47
12/08/98 10:30	16.27	0.771	-58	3.37	1599.3	7.62
12/08/98 10:31	18.94	0.770	-130	1.49	1612.5	7.48
12/08/98 10:32	17.68	0.775	-105	1.57	1606.3	7.43
12/08/98 10:33	15.79	0.768	-116	1.61	1596.9	7.40
12/08/98 10:34	14.27	0.759	-128	1.51	1589.4	7.38
12/08/98 10:35	13.94	0.746	-143	1.43	1587.8	7.36
12/08/98 10:36	12.11	0.741	-206	1.35	1578.7	7.35
12/08/98 10:37	17.65	0.747	-200	1.22	1407.0	7.29
12/08/98 10:38	18.40	0.743	-105	1.59	892.6	7.29
12/08/98 10:39	18.30	0.743	-89	1.60	700.9	7.29
12/08/98 10:40	18.20	0.744	-96	1.57	677.6	7.29
12/08/98 10:41	17.25	0.751	-102	1.48	615.2	7.29
12/08/98 10:42	12.85	0.750	-118	1.48	682.3	7.31
12/08/98 10:43	11.83	0.743	-127	1.40	659.7	7.30
12/08/98 10:44	12.12	0.741	-188	1.32	989.5	7.28
12/08/98 10:45	12.43	0.743	-209	1.28	497.1	7.26
12/08/98 10:46	12.47	0.745	-191	1.28	680.1	7.26
12/08/98 10:47	11.95	0.008	72	5.51	1577.8	7.20

12/08/98 10:48	12.09	0.007	153	7.29	92.1	7.24
12/08/98 10:49	12.20	0.007	172	7.88	131.8	7.29
12/08/98 10:50	12.28	0.006	182	8.23	180.8	7.33
12/08/98 10:51	12.30	0.006	189	8.45	328.9	7.36
12/08/98 10:52	12.29	0.006	194	8.59	312.8	7.38
12/08/98 10:53	12.22	0.006	199	8.92	171.9	7.41
12/08/98 10:54	11.96	0.006	202	9.10	1458.8	7.42
12/08/98 10:55	16.45	0.764	-169	4.45	1594.5	7.40
12/08/98 10:56	19.55	0.751	-309	1.96	1296.0	7.36
12/08/98 10:57	17.61	0.749	-279	2.05	539.6	7.36
12/08/98 10:58	16.25	0.749	-251	2.07	517.3	7.35
12/08/98 10:59	15.59	0.745	-237	2.01	800.2	7.34
12/08/98 11:00	15.25	0.743	-225	1.79	1090.4	7.32
12/08/98 11:01	15.04	0.742	-216	1.68	1123.7	7.31
12/08/98 11:02	14.79	0.737	-195	1.66	756.2	7.30
12/08/98 11:03	14.79	0.368	-193	1.61	1460.0	7.29
12/08/98 11:04	18.26	0.751	-234	2.61	505.7	7.27
12/08/98 11:05	20.46	0.007	73	6.40	1619.5	7.16
12/08/98 11:06	19.26	0.007	146	7.72	146.1	7.23
12/08/98 11:07	18.43	0.006	162	7.96	243.3	7.27
12/08/98 11:08	17.85	0.005	171	8.07	89.3	7.29
12/08/98 11:09	17.45	0.005	177	8.12	395.7	7.31
12/08/98 11:10	17.12	0.005	181	8.14	217.8	7.33
12/08/98 11:11	16.69	0.005	185	8.27	130.3	7.35
12/08/98 11:12	16.47	0.005	187	8.31	140.1	7.36
12/08/98 11:13	16.26	0.005	189	8.34	138.2	7.37
12/08/98 11:14	16.07	0.005	190	8.37	130.4	7.38
12/08/98 11:15	15.88	0.004	191	8.39	164.0	7.38
12/08/98 11:16	15.70	0.004	192	8.41	148.6	7.39
12/08/98 11:17	15.51	0.004	192	8.44	137.9	7.39
12/08/98 11:18	15.32	0.004	192	8.47	173.6	7.40
12/08/98 11:19	15.26	0.004	193	8.45	147.8	7.40

N-7

Well Pumped Dry



MW-8
Well Pumped Dry
-- Statistical Report --

From 12/09/98 15:41 to 12/09/98 16:50
Number of samples: 70

Parameter	Min	Max	Mean	Std
Temp (C)	9.44	26.06	18.56	4.19
SpCd (mS/cm)	0.002	1.036	0.806	0.313
ORP (mV)	-252	94	-126	79
DO C:C (mg/L)	1.22	12.08	3.03	2.58
Turb. (NTU)	28.8	1647.1	1517.8	359.7
pH ()	7.52	8.38	7.63	0.18

MW-8
Well Pumped Dry
-- Data Report --

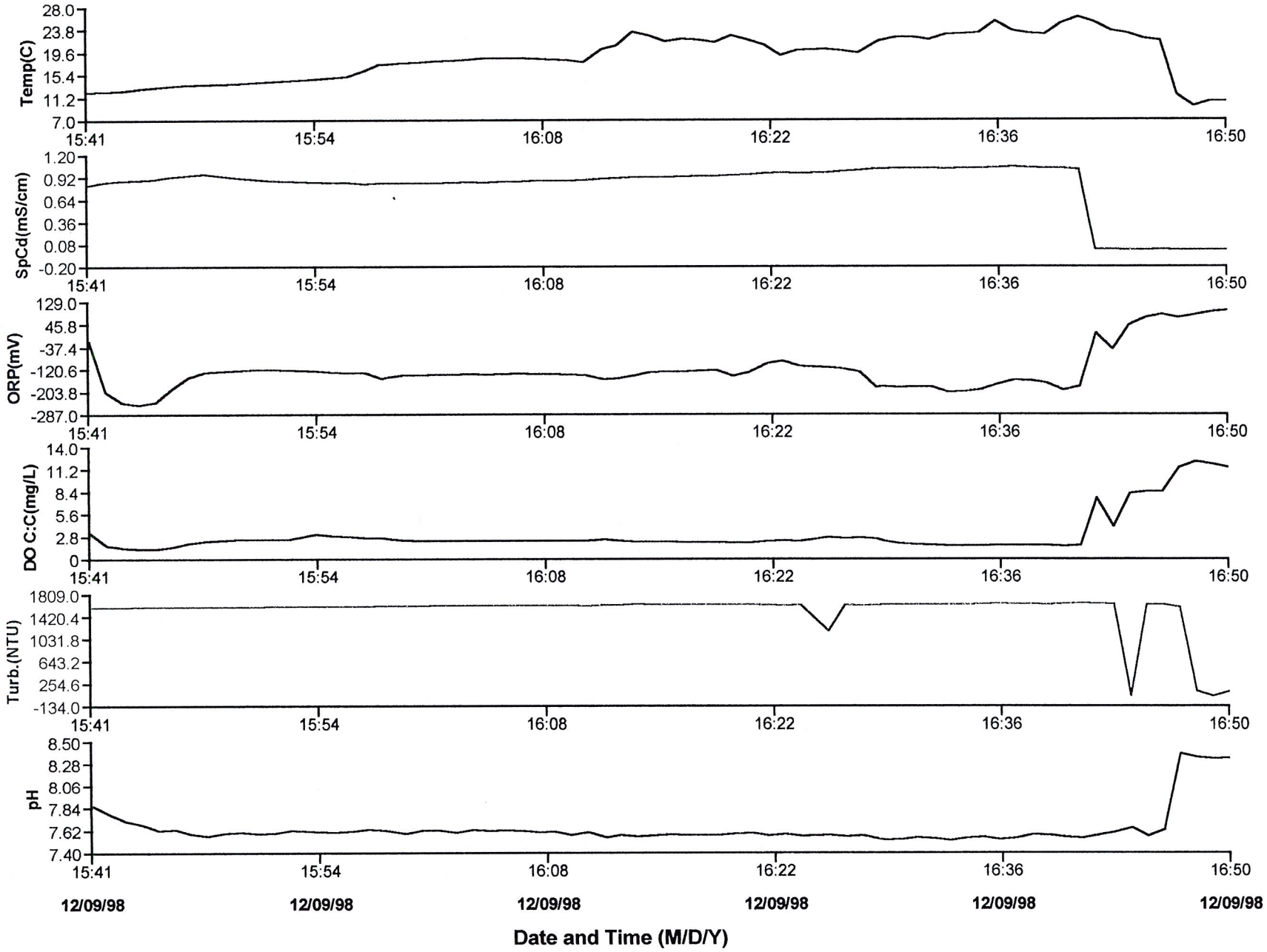
From 12/09/98 15:41 to 12/09/98 16:50
Number of samples: 70

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/09/98 15:41	12.17	0.823	-18	3.16	1580.1	7.86
12/09/98 15:42	12.29	0.857	-205	1.63	1580.8	7.78
12/09/98 15:43	12.40	0.875	-246	1.34	1581.3	7.71
12/09/98 15:44	12.74	0.883	-252	1.25	1583.0	7.67
12/09/98 15:45	13.01	0.890	-243	1.22	1584.4	7.62
12/09/98 15:46	13.29	0.920	-195	1.46	1585.7	7.63
12/09/98 15:47	13.41	0.939	-153	1.93	1586.3	7.58
12/09/98 15:48	13.57	0.953	-134	2.18	1586.9	7.56
12/09/98 15:49	13.65	0.931	-129	2.31	1582.2	7.59
12/09/98 15:50	13.74	0.909	-125	2.42	1582.3	7.60
12/09/98 15:51	13.89	0.893	-123	2.43	1588.5	7.59
12/09/98 15:52	14.08	0.877	-122	2.40	1589.4	7.59
12/09/98 15:53	14.23	0.866	-123	2.38	1590.1	7.62
12/09/98 15:54	14.54	0.855	-128	3.05	1591.5	7.60
12/09/98 15:55	14.76	0.852	-132	2.81	1592.5	7.60
12/09/98 15:56	14.96	0.850	-134	2.75	1593.4	7.61
12/09/98 15:57	15.99	0.834	-135	2.59	1598.5	7.63
12/09/98 15:58	17.23	0.846	-155	2.57	1604.5	7.62
12/09/98 15:59	17.28	0.846	-152	2.45	1604.7	7.61
12/09/98 16:00	17.54	0.845	-144	2.28	1606.0	7.59
12/09/98 16:01	17.60	0.847	-143	2.26	1606.3	7.62
12/09/98 16:02	17.84	0.843	-141	2.24	1607.5	7.62
12/09/98 16:03	17.96	0.848	-141	2.24	1608.0	7.60
12/09/98 16:04	18.15	0.854	-141	2.23	1609.0	7.62
12/09/98 16:05	18.40	0.854	-142	2.22	1610.1	7.61
12/09/98 16:06	18.41	0.864	-140	2.23	1610.2	7.62
12/09/98 16:07	18.39	0.864	-139	2.23	1610.1	7.61
12/09/98 16:08	18.37	0.870	-141	2.23	1609.9	7.60
12/09/98 16:09	18.11	0.873	-139	2.24	1608.7	7.60
12/09/98 16:10	18.05	0.876	-142	2.24	1608.3	7.57
12/09/98 16:11	17.64	0.880	-143	2.23	1606.3	7.60
12/09/98 16:12	20.06	0.896	-160	2.41	1618.1	7.55
12/09/98 16:13	20.68	0.903	-155	2.24	1621.2	7.57
12/09/98 16:14	23.31	0.912	-146	2.14	1634.1	7.55
12/09/98 16:15	22.54	0.915	-134	2.12	1630.3	7.57
12/09/98 16:16	21.50	0.916	-132	2.11	1625.1	7.57
12/09/98 16:17	21.94	0.924	-131	2.07	1627.3	7.57
12/09/98 16:18	21.74	0.928	-128	2.05	1626.3	7.57
12/09/98 16:19	21.33	0.927	-127	2.05	1624.2	7.57
12/09/98 16:20	22.61	0.941	-146	1.99	1630.6	7.59
12/09/98 16:21	21.79	0.945	-133	2.00	1626.5	7.59
12/09/98 16:22	20.78	0.961	-102	2.15	1621.5	7.57
12/09/98 16:23	18.82	0.968	-91	2.24	1611.8	7.58
12/09/98 16:24	19.83	0.963	-110	2.19	1616.7	7.56
12/09/98 16:25	20.00	0.970	-115	2.63	1158.0	7.57
12/09/98 16:26	19.77	0.985	-121	2.55	1616.3	7.56
12/09/98 16:27	19.28	0.998	-133	2.59	1613.8	7.57
12/09/98 16:28	21.10	1.013	-189	2.45	1622.8	7.53
12/09/98 16:29	21.61	1.015	-185	2.23	1625.3	7.52
12/09/98 16:30	22.23	1.019	-190	1.87	1628.4	7.53
12/09/98 16:31	22.20	1.020	-187	1.73	1628.2	7.55

12/09/98 16:32	21.76	1.023	-187	1.70	1626.0	7.54
12/09/98 16:33	22.75	1.018	-206	1.60	1630.9	7.52
12/09/98 16:34	22.81	1.020	-205	1.59	1631.2	7.54
12/09/98 16:35	22.99	1.019	-198	1.56	1632.0	7.55
12/09/98 16:36	25.20	1.029	-179	1.61	1643.0	7.53
12/09/98 16:37	23.47	1.036	-162	1.64	1634.4	7.54
12/09/98 16:38	22.91	1.029	-165	1.63	1631.7	7.57
12/09/98 16:39	22.74	1.024	-173	1.62	1630.8	7.57
12/09/98 16:40	24.88	1.020	-200	1.54	1641.4	7.55
12/09/98 16:41	26.06	1.003	-186	1.61	1647.1	7.54
12/09/98 16:42	25.04	0.010	12	7.52	1642.1	7.57
12/09/98 16:43	23.46	0.011	-47	4.03	1634.3	7.60
12/09/98 16:44	22.91	0.009	42	8.15	38.4	7.64
12/09/98 16:45	21.94	0.008	68	8.34	1626.8	7.56
12/09/98 16:46	21.62	0.010	81	8.38	1625.2	7.62
12/09/98 16:47	11.48	0.002	69	11.38	1575.3	8.38
12/09/98 16:48	9.44	0.005	79	12.08	122.9	8.34
12/09/98 16:49	10.32	0.006	90	11.82	28.8	8.33
12/09/98 16:50	10.38	0.002	94	11.39	112.5	8.33

V-8

Well Pumped Dry



MW-14
Well Pumped Dry
-- Statistical Report --

From 12/08/98 16:25 to 12/08/98 17:41
Number of samples: 77

Parameter	Min	Max	Mean	Std
Temp (C)	11.68	25.79	19.51	3.29
SpCd (mS/cm)	0.001	0.684	0.575	0.190
ORP (mV)	-444	195	-233	147
DO C:C (mg/L)	0.85	10.38	1.96	2.43
Turb. (NTU)	35.6	1616.8	383.8	468.1
pH ()	6.22	7.70	6.91	0.22

MW-14
Well Pumped Dry
-- Data Report --

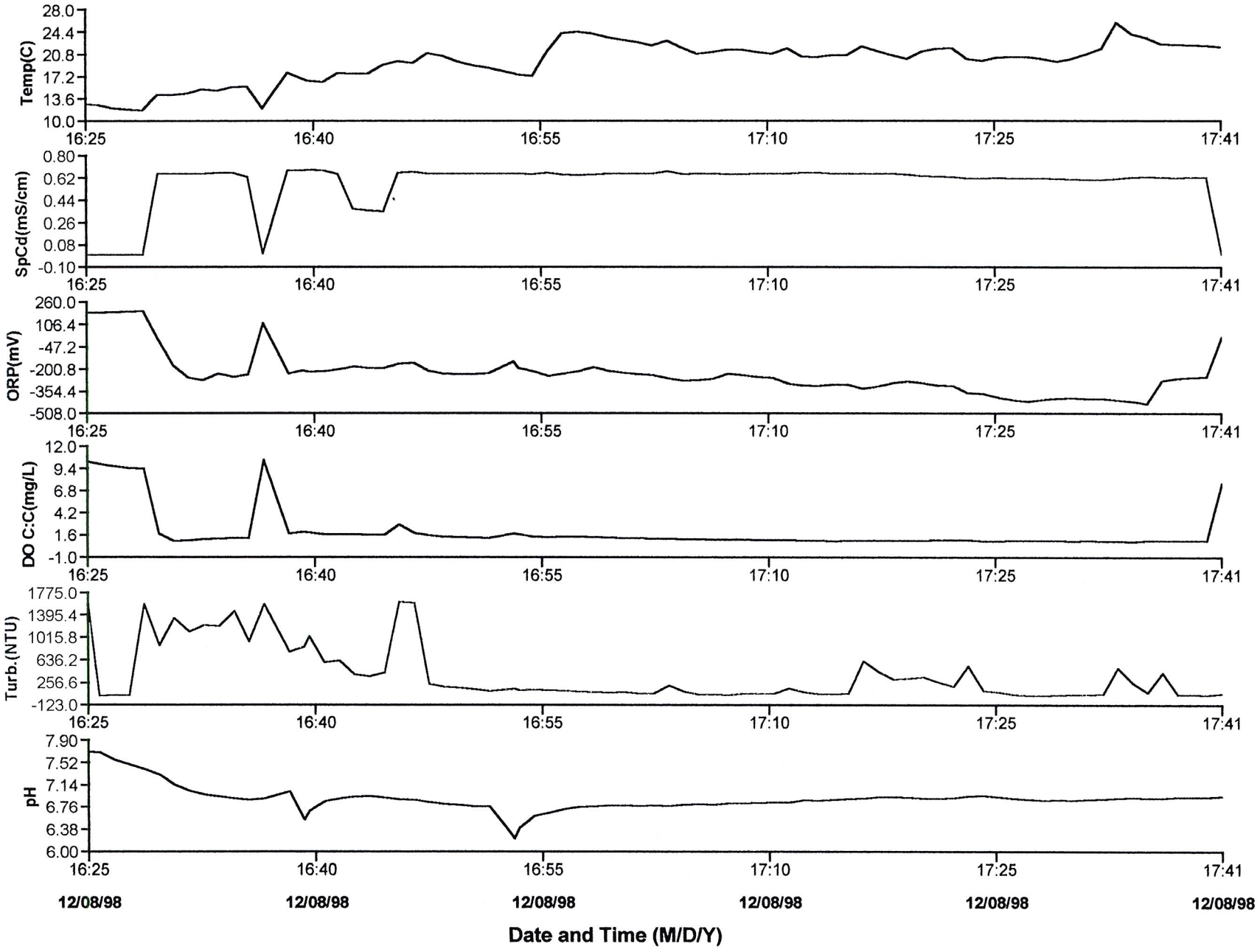
From 12/08/98 16:25 to 12/08/98 17:41
Number of samples: 77

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/08/98 16:25	12.66	0.001	186	10.20	1581.7	7.70
12/08/98 16:26	12.62	0.001	186	9.92	35.6	7.69
12/08/98 16:27	12.06	0.001	191	9.65	41.0	7.56
12/08/98 16:28	11.87	0.001	194	9.45	43.0	7.48
12/08/98 16:29	11.68	0.001	195	9.42	1577.2	7.40
12/08/98 16:30	14.21	0.654	-1	1.72	870.3	7.31
12/08/98 16:31	14.23	0.653	-176	0.89	1335.1	7.14
12/08/98 16:32	14.43	0.654	-260	0.96	1106.8	7.04
12/08/98 16:33	15.14	0.654	-279	1.09	1213.9	6.97
12/08/98 16:34	14.91	0.659	-232	1.16	1204.4	6.94
12/08/98 16:35	15.51	0.661	-256	1.20	1456.0	6.91
12/08/98 16:36	15.57	0.626	-236	1.21	938.6	6.89
12/08/98 16:37	11.98	0.011	117	10.38	1578.9	6.91
12/08/98 16:38	17.89	0.680	-232	1.77	769.1	7.03
12/08/98 16:39	16.86	0.682	-210	1.95	848.2	6.54
12/08/98 16:40	16.55	0.684	-218	1.86	1028.1	6.69
12/08/98 16:41	16.33	0.679	-214	1.68	592.4	6.86
12/08/98 16:42	17.77	0.651	-202	1.63	627.2	6.91
12/08/98 16:43	17.69	0.369	-181	1.64	396.9	6.94
12/08/98 16:44	17.72	0.356	-192	1.62	357.8	6.95
12/08/98 16:45	19.08	0.350	-191	1.60	429.0	6.93
12/08/98 16:46	19.65	0.662	-163	2.81	1616.8	6.90
12/08/98 16:47	19.39	0.669	-156	1.83	1602.7	6.88
12/08/98 16:48	20.96	0.652	-211	1.51	229.9	6.85
12/08/98 16:49	20.53	0.654	-231	1.39	188.9	6.82
12/08/98 16:50	19.63	0.655	-234	1.32	172.3	6.79
12/08/98 16:51	19.03	0.654	-234	1.27	146.1	6.77
12/08/98 16:52	18.61	0.654	-227	1.24	112.0	6.77
12/08/98 16:53	17.75	0.652	-148	1.76	151.0	6.22
12/08/98 16:54	17.54	0.652	-193	1.65	126.7	6.40
12/08/98 16:55	17.31	0.650	-214	1.41	133.9	6.60
12/08/98 16:56	21.24	0.662	-247	1.31	123.9	6.66
12/08/98 16:57	24.18	0.648	-233	1.37	121.0	6.73
12/08/98 16:58	24.38	0.644	-215	1.37	105.8	6.77
12/08/98 16:59	24.08	0.647	-188	1.32	94.3	6.77
12/08/98 17:00	23.49	0.653	-213	1.28	90.0	6.79
12/08/98 17:01	23.10	0.652	-224	1.24	92.4	6.79
12/08/98 17:02	22.72	0.652	-236	1.22	77.1	6.78
12/08/98 17:03	22.23	0.653	-243	1.18	72.6	6.79
12/08/98 17:04	22.92	0.671	-264	1.18	205.9	6.78
12/08/98 17:05	21.78	0.649	-281	1.13	108.4	6.81
12/08/98 17:06	20.84	0.654	-276	1.08	52.9	6.81
12/08/98 17:07	21.14	0.653	-266	1.05	55.9	6.80
12/08/98 17:08	21.49	0.650	-230	1.06	46.8	6.82
12/08/98 17:09	21.47	0.650	-243	1.05	75.8	6.83
12/08/98 17:10	21.12	0.654	-253	1.02	71.2	6.84
12/08/98 17:11	20.82	0.655	-260	0.99	74.5	6.84
12/08/98 17:12	21.71	0.655	-301	0.99	161.3	6.84
12/08/98 17:13	20.39	0.661	-312	0.96	93.1	6.89
12/08/98 17:14	20.31	0.659	-315	0.92	66.5	6.88
12/08/98 17:15	20.55	0.655	-307	0.90	66.5	6.89

12/08/98 17:16	20.59	0.655	-306	0.91	69.5	6.91
12/08/98 17:17	22.03	0.655	-335	0.94	615.1	6.91
12/08/98 17:18	21.29	0.655	-318	0.93	437.6	6.94
12/08/98 17:19	20.54	0.653	-297	0.92	312.0	6.94
12/08/98 17:20	19.94	0.647	-284	0.92	332.1	6.93
12/08/98 17:21	21.17	0.636	-297	0.95	350.5	6.91
12/08/98 17:22	21.64	0.631	-313	0.99	267.4	6.92
12/08/98 17:23	21.73	0.628	-314	1.00	192.8	6.92
12/08/98 17:24	19.97	0.616	-364	0.99	537.6	6.96
12/08/98 17:25	19.68	0.615	-372	0.91	116.9	6.97
12/08/98 17:26	20.19	0.617	-395	0.91	97.3	6.94
12/08/98 17:27	20.25	0.616	-415	0.92	55.4	6.91
12/08/98 17:28	20.30	0.614	-425	0.93	42.9	6.90
12/08/98 17:29	19.98	0.615	-414	0.92	40.3	6.88
12/08/98 17:30	19.56	0.612	-402	0.93	44.9	6.89
12/08/98 17:31	19.99	0.606	-399	0.91	58.7	6.89
12/08/98 17:32	20.72	0.604	-408	0.93	59.9	6.90
12/08/98 17:33	21.67	0.604	-405	0.89	67.3	6.91
12/08/98 17:34	25.79	0.612	-416	0.89	503.3	6.92
12/08/98 17:35	23.96	0.625	-425	0.85	247.5	6.94
12/08/98 17:36	23.36	0.626	-444	0.91	88.0	6.93
12/08/98 17:37	22.31	0.622	-281	0.95	426.8	6.93
12/08/98 17:38	22.24	0.622	-262	0.95	55.6	6.94
12/08/98 17:39	22.16	0.622	-258	0.96	53.7	6.94
12/08/98 17:40	22.08	0.622	-256	0.97	46.3	6.94
12/08/98 17:41	21.89	0.008	22	7.63	68.6	6.96

MW-14

Well Pumped Dry

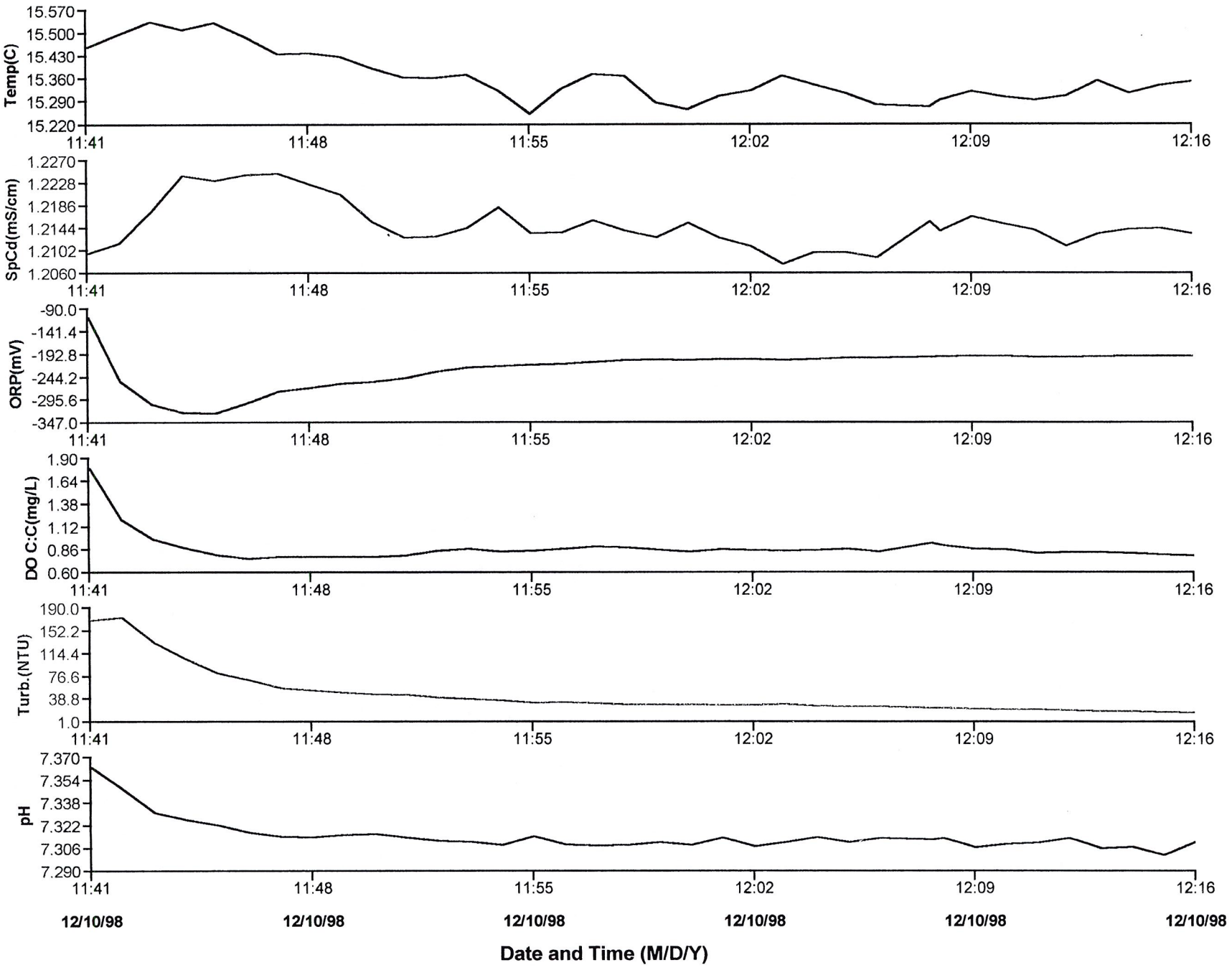


MW-15
-- Data Report --

From 12/10/98 11:41 to 12/10/98 12:16
Number of samples: 36

Date and Time M/D/Y	Temp C	SpCd mS/cm	ORP mV	DO C:C mg/L	Turb. NTU	pH
12/10/98 11:41	15.46	1.210	-111	1.78	168.8	7.36
12/10/98 11:42	15.49	1.212	-254	1.20	173.7	7.35
12/10/98 11:43	15.53	1.217	-306	0.98	132.0	7.33
12/10/98 11:44	15.51	1.224	-323	0.88	105.2	7.33
12/10/98 11:45	15.53	1.223	-325	0.81	81.8	7.32
12/10/98 11:46	15.49	1.224	-303	0.76	70.2	7.32
12/10/98 11:47	15.44	1.224	-276	0.78	57.0	7.31
12/10/98 11:48	15.44	1.222	-267	0.78	52.9	7.31
12/10/98 11:49	15.43	1.221	-259	0.78	49.6	7.32
12/10/98 11:50	15.39	1.215	-255	0.78	46.4	7.32
12/10/98 11:51	15.36	1.213	-246	0.80	45.8	7.31
12/10/98 11:52	15.36	1.213	-232	0.85	41.3	7.31
12/10/98 11:53	15.37	1.214	-223	0.87	39.0	7.31
12/10/98 11:54	15.32	1.218	-220	0.84	36.4	7.31
12/10/98 11:55	15.25	1.214	-217	0.85	33.0	7.31
12/10/98 11:56	15.33	1.214	-215	0.87	33.5	7.31
12/10/98 11:57	15.37	1.216	-210	0.90	32.7	7.31
12/10/98 11:58	15.37	1.214	-207	0.89	30.3	7.31
12/10/98 11:59	15.29	1.213	-206	0.86	30.2	7.31
12/10/98 12:00	15.27	1.215	-206	0.84	29.6	7.31
12/10/98 12:01	15.31	1.213	-204	0.87	29.4	7.31
12/10/98 12:02	15.32	1.211	-204	0.86	29.2	7.31
12/10/98 12:03	15.37	1.208	-206	0.85	30.5	7.31
12/10/98 12:04	15.34	1.210	-204	0.86	27.7	7.31
12/10/98 12:05	15.31	1.210	-201	0.87	26.9	7.31
12/10/98 12:06	15.28	1.209	-201	0.84	26.9	7.31
12/10/98 12:07	15.27	1.216	-199	0.94	24.4	7.31
12/10/98 12:08	15.29	1.214	-199	0.91	24.6	7.31
12/10/98 12:09	15.32	1.216	-198	0.87	23.2	7.31
12/10/98 12:10	15.30	1.215	-198	0.86	22.5	7.31
12/10/98 12:11	15.29	1.214	-199	0.82	22.7	7.31
12/10/98 12:12	15.31	1.211	-199	0.84	21.2	7.31
12/10/98 12:13	15.35	1.213	-198	0.83	19.9	7.31
12/10/98 12:14	15.31	1.214	-198	0.83	19.4	7.31
12/10/98 12:15	15.34	1.214	-197	0.81	17.9	7.30
12/10/98 12:16	15.35	1.213	-198	0.80	17.2	7.31

MW-15


Temp(C)
15.570
15.500
15.430
15.360
15.290
15.220
SpCd(mS/cm)
1.2270
1.2228
1.2186
1.2144
1.2102
1.2060
ORP(mV)
-90.0
-141.4
-192.8
-244.2
-295.6
-347.0
DO C:C(mg/L)
1.90
1.64
1.38
1.12
0.86
0.60
Turb.(NTU)
190.0
152.2
114.4
76.6
38.8
1.0
pH
7.370
7.354
7.338
7.322
7.306
7.290
11:41
11:48
11:55
12:02
12:09
12:16
12/10/98
Date and Time (M/D/Y)

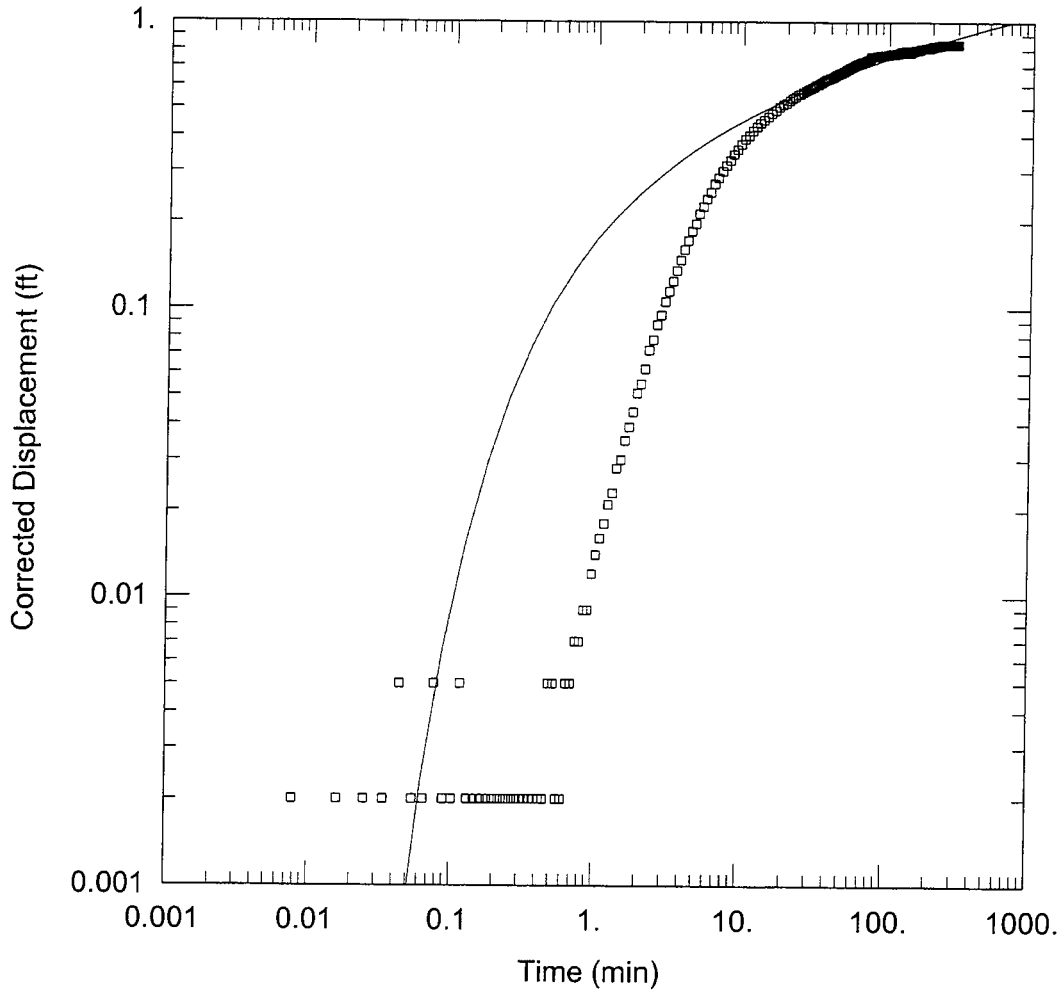
MW-15
-- Statistical Report --

From 12/10/98 11:41 to 12/10/98 12:16
Number of samples: 36

Parameter	Min	Max	Mean	Std
Temp (C)	15.25	15.53	15.36	0.08
SpCd (mS/cm)	1.208	1.224	1.215	0.004
ORP (mV)	-325	-111	-224	42
DO C:C (mg/L)	0.76	1.78	0.88	0.17
Turb. (NTU)	17.2	173.7	46.5	38.6
pH ()	7.30	7.36	7.31	0.01

APPENDIX E

PUMP TEST RESULTS



DII-BINGHAMPTON PLASTICS, PUMP TEST #1

Data Set: C:\MYDOCU~1\PTEST#1.AQT
Date: 08/11/99 Time: 09:19:18

PROJECT INFORMATION

Company: Shield Environmental
Client: DII
Project: 396-0460
Test Location: Binghampton, NY
Test Well: MW-5
Test Date: 02/04/99

AQUIFER DATA

Saturated Thickness: 20. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-5	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-15	16	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.617 ft^2/min
S = 0.001679

Data Set: C:\MYDOCU~1\PTEST#1.AQT
Title: DII-Binghampton Plastics, Pump Test #1
Date: 08/11/99
Time: 09:19:26

PROJECT INFORMATION

Company: Shield Environmental
Client: DII
Project: 396-0460
Location: Binghampton, NY
Test Date: 02/04/99
Test Well: MW-5

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: MW-5

X Location: 0 ft
Y Location: 0 ft

Pumping Period Data

Time (min)	Rate (cu. ft/min)
0.	1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-15

X Location: 16 ft
Y Location: 0 ft

Observation Data

Time (min)	Displacement (ft)
0.0079	0.002
0.0162	0.002
0.025	0.002
0.0344	0.002
0.0442	0.005
0.0547	0.002
0.0657	0.002
0.0774	0.005

0.0899	0.002
0.103	0.002
0.117	0.005
0.1319	0.002
0.1475	0.002
0.1642	0.002
0.1819	0.002
0.2005	0.002
0.2204	0.002
0.2414	0.002
0.2635	0.002
0.287	0.002
0.3119	0.002
0.3369	0.002
0.3635	0.002
0.3919	0.002
0.4219	0.002
0.4535	0.002
0.4885	0.005
0.5252	0.005
0.5635	0.002
0.6052	0.002
0.6485	0.005
0.6952	0.005
0.7435	0.007
0.7952	0.007
0.8502	0.009
0.9085	0.009
0.9702	0.012
1.035	0.014
1.105	0.016
1.179	0.018
1.257	0.021
1.34	0.023
1.429	0.028
1.522	0.03
1.62	0.035
1.725	0.039
1.835	0.044
1.952	0.051
2.077	0.055
2.209	0.062
2.349	0.072
2.497	0.078
2.654	0.088
2.82	0.095
2.997	0.106
3.184	0.115
3.382	0.125
3.592	0.136
3.814	0.148

4.049	0.161
4.297	0.173
4.56	0.187
4.84	0.198
5.137	0.215
5.45	0.228
5.782	0.242
6.134	0.256
6.507	0.274
6.902	0.288
7.32	0.304
7.764	0.318
8.233	0.332
8.732	0.348
9.259	0.362
9.817	0.378
10.41	0.394
11.04	0.406
11.7	0.422
12.4	0.436
13.15	0.45
13.94	0.461
14.77	0.473
15.66	0.487
16.6	0.498
17.59	0.512
18.59	0.521
19.59	0.528
20.59	0.54
21.59	0.549
22.59	0.556
23.59	0.567
24.59	0.57
25.59	0.577
26.59	0.584
27.59	0.591
28.59	0.595
29.59	0.602
30.59	0.607
31.59	0.614
32.59	0.616
33.59	0.623
34.59	0.627
35.59	0.634
36.59	0.639
37.59	0.644
38.59	0.646
39.59	0.65
40.59	0.653
41.59	0.655
42.59	0.662

43.59	0.667
44.59	0.669
45.59	0.674
46.59	0.678
47.59	0.68
48.59	0.685
49.59	0.687
50.59	0.692
51.59	0.697
52.59	0.699
53.59	0.706
54.59	0.708
55.59	0.713
56.59	0.715
57.59	0.72
58.59	0.722
59.59	0.727
60.59	0.731
61.59	0.731
62.59	0.734
63.59	0.738
64.59	0.74
65.59	0.743
66.59	0.743
67.59	0.745
68.59	0.747
69.59	0.747
70.59	0.752
71.59	0.754
72.59	0.754
73.59	0.757
74.59	0.768
75.59	0.777
76.59	0.775
77.59	0.777
78.59	0.775
79.59	0.775
80.59	0.775
81.59	0.777
82.59	0.777
83.59	0.78
84.59	0.78
85.59	0.782
86.59	0.782
87.59	0.784
88.59	0.784
89.59	0.784
90.59	0.784
91.59	0.784
92.59	0.782
93.59	0.784

94.59	0.784
95.59	0.784
96.59	0.784
97.59	0.787
98.59	0.787
99.59	0.789
100.6	0.789
101.6	0.791
102.6	0.793
103.6	0.793
104.6	0.796
105.6	0.796
106.6	0.793
107.6	0.791
108.6	0.791
109.6	0.793
110.6	0.793
111.6	0.796
112.6	0.796
113.6	0.796
114.6	0.798
115.6	0.798
116.6	0.798
117.6	0.8
118.6	0.8
119.6	0.803
120.6	0.798
121.6	0.805
122.6	0.807
123.6	0.81
124.6	0.807
125.6	0.807
126.6	0.81
127.6	0.81
128.6	0.81
129.6	0.812
130.6	0.812
131.6	0.814
132.6	0.814
133.6	0.814
134.6	0.814
135.6	0.814
136.6	0.814
137.6	0.803
138.6	0.798
139.6	0.8
140.6	0.803
141.6	0.805
142.6	0.807
143.6	0.81
144.6	0.81

145.6	0.81
146.6	0.812
147.6	0.812
148.6	0.814
149.6	0.814
150.6	0.814
151.6	0.817
152.6	0.817
153.6	0.817
154.6	0.819
155.6	0.817
156.6	0.817
157.6	0.819
158.6	0.819
159.6	0.819
160.6	0.821
161.6	0.821
162.6	0.821
163.6	0.823
164.6	0.823
165.6	0.826
166.6	0.826
167.6	0.828
168.6	0.828
169.6	0.828
170.6	0.828
171.6	0.83
172.6	0.83
173.6	0.83
174.6	0.83
175.6	0.83
176.6	0.83
177.6	0.83
178.6	0.83
179.6	0.83
180.6	0.833
181.6	0.83
182.6	0.833
183.6	0.83
184.6	0.83
185.6	0.83
186.6	0.833
187.6	0.833
188.6	0.833
189.6	0.833
190.6	0.835
191.6	0.835
192.6	0.833
193.6	0.835
194.6	0.835
195.6	0.835

196.6	0.837
197.6	0.837
198.6	0.84
199.6	0.84
200.6	0.842
201.6	0.842
202.6	0.844
203.6	0.842
204.6	0.844
205.6	0.844
206.6	0.844
207.6	0.842
208.6	0.844
209.6	0.844
210.6	0.847
211.6	0.847
212.6	0.847
213.6	0.844
214.6	0.847
215.6	0.847
216.6	0.847
217.6	0.847
218.6	0.849
219.6	0.849
220.6	0.849
221.6	0.849
222.6	0.849
223.6	0.849
224.6	0.851
225.6	0.849
226.6	0.851
227.6	0.851
228.6	0.851
229.6	0.851
230.6	0.853
231.6	0.853
232.6	0.856
233.6	0.856
234.6	0.853
235.6	0.853
236.6	0.856
237.6	0.853
238.6	0.856
239.6	0.853
240.6	0.856
241.6	0.856
242.6	0.856
243.6	0.856
244.6	0.853
245.6	0.853
246.6	0.856

247.6	0.853
248.6	0.856
249.6	0.856
250.6	0.856
251.6	0.856
252.6	0.856
253.6	0.856
254.6	0.856
255.6	0.856
256.6	0.856
257.6	0.856
258.6	0.856
259.6	0.856
260.6	0.853
261.6	0.856
262.6	0.856
263.6	0.856
264.6	0.856
265.6	0.853
266.6	0.856
267.6	0.853
268.6	0.856
269.6	0.856
270.6	0.853
271.6	0.856
272.6	0.853
273.6	0.856
274.6	0.853
275.6	0.856
276.6	0.856
277.6	0.853
278.6	0.853
279.6	0.853
280.6	0.853
281.6	0.853
282.6	0.853
283.6	0.856
284.6	0.853
285.6	0.856
286.6	0.853
287.6	0.856
288.6	0.856
289.6	0.856
290.6	0.856
291.6	0.856
292.6	0.856
293.6	0.856
294.6	0.856
295.6	0.856
296.6	0.856
297.6	0.858

298.6	0.853
299.6	0.856

SOLUTION

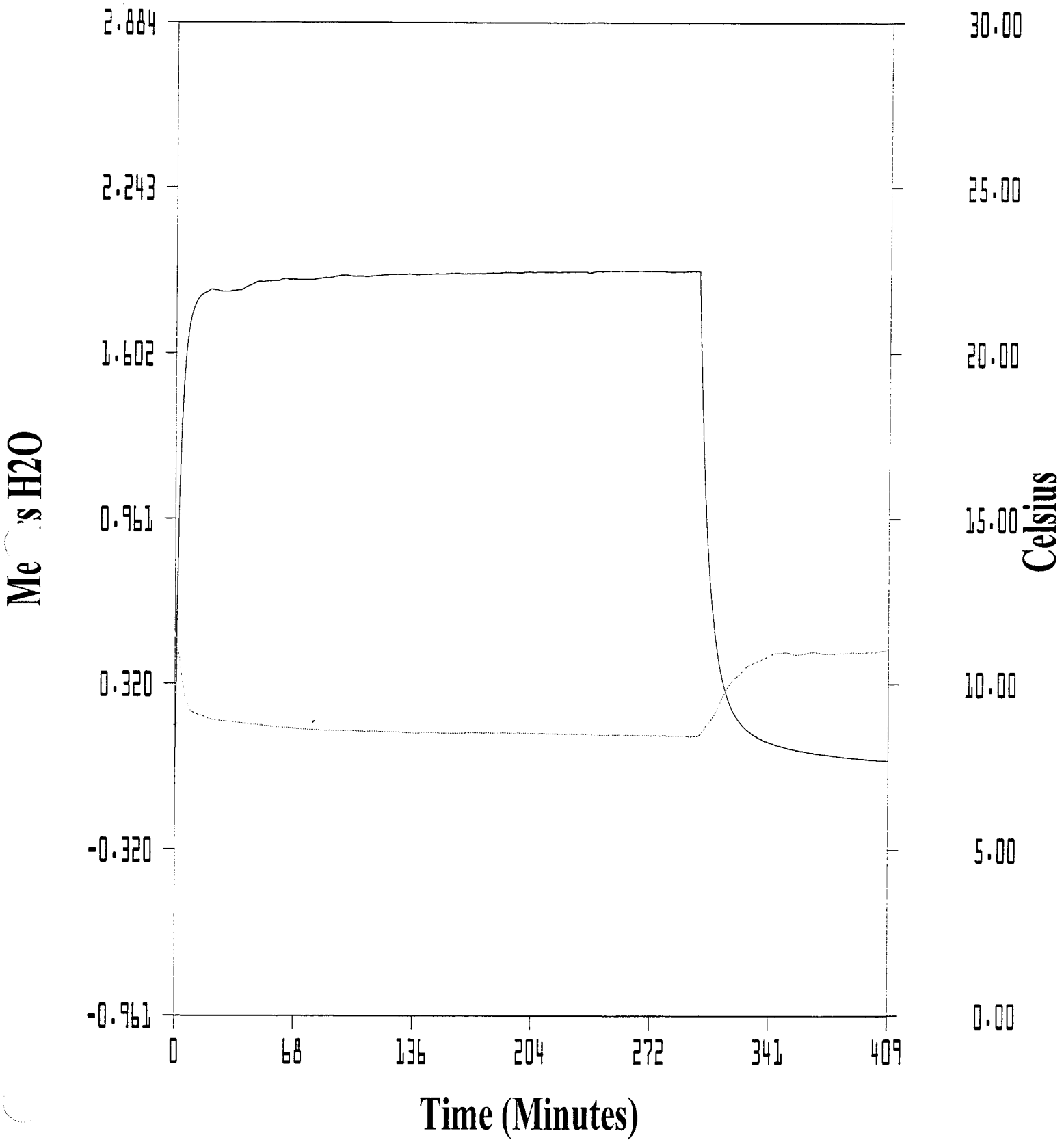
Aquifer Model: Unconfined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

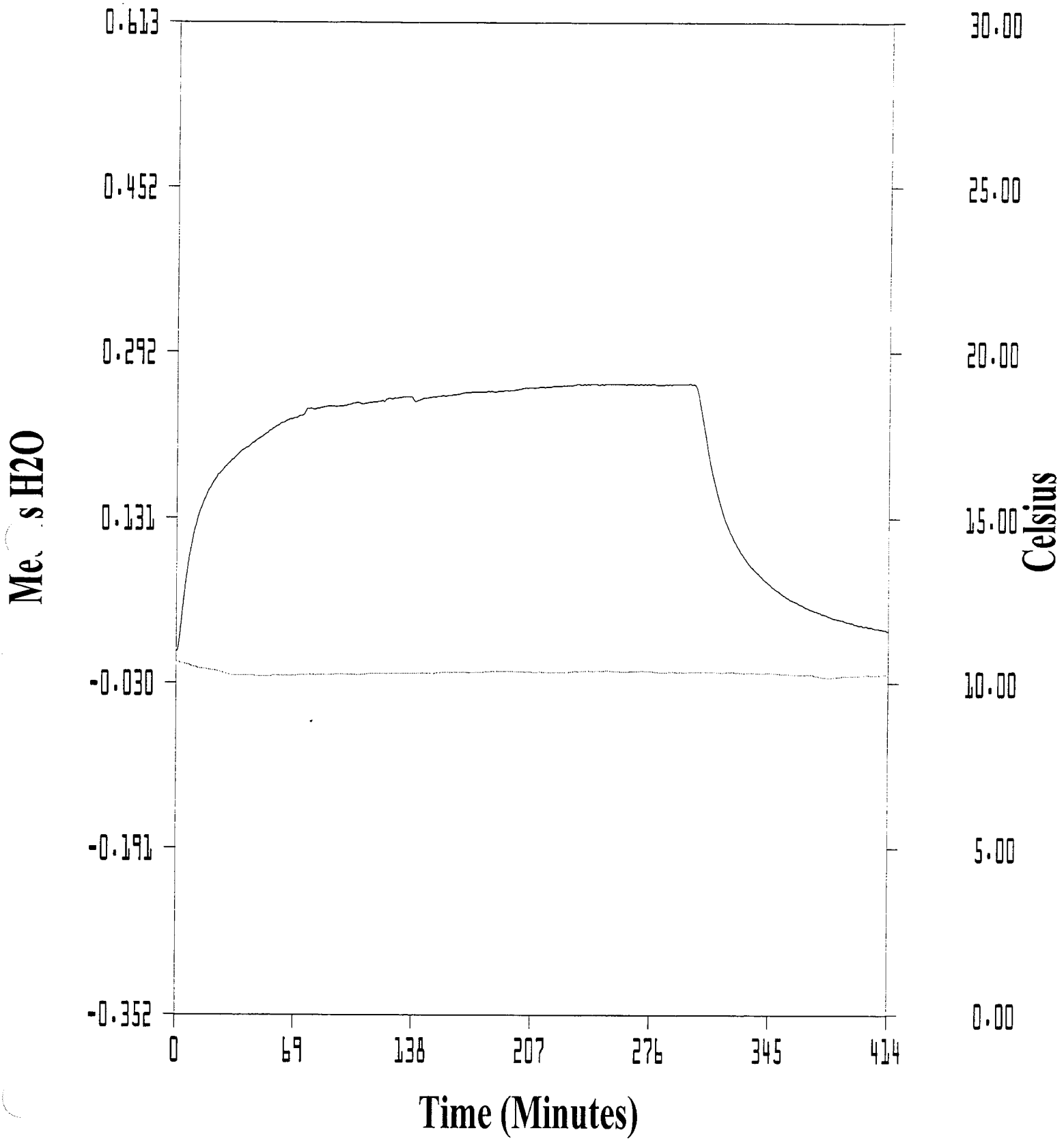
Estimated Parameters

Parameter	Estimate	
T	0.617	ft^2/min
S	0.001679	

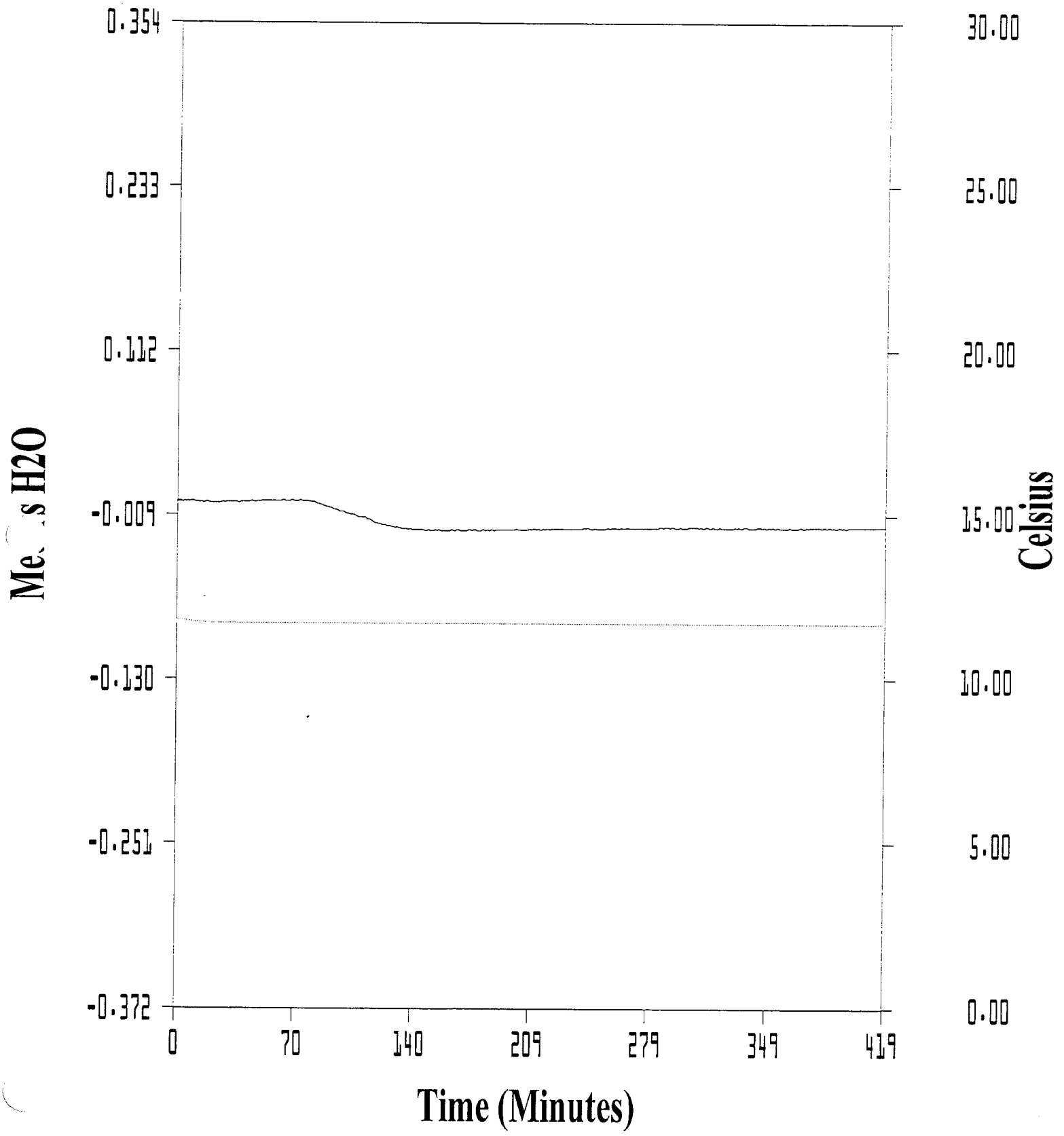
Pump Test 1


2.884
2.243
1.602
0.961
0.320
-0.320
-0.961
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
68
136
204
272
341
409
Me 's H2O
Celsius
Time (Minutes)
[2] - MWS Pressure
[1] - OnBoard Temp

Pump Test 1


0.613
0.452
0.292
0.131
-0.030
-0.191
-0.352
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
69
138
207
276
345
414
Meters H2O
Celsius
Time (Minutes)
[2] - MW15 Pressure
[1] - OnBoard Temp

Pump Test 1


0.354
0.233
0.112
-0.009
-0.130
-0.251
-0.372
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Me. .s H2O
Celsius
0
70
140
209
279
349
419
Time (Minutes)
[2] - MW8 Pressure
[1] - OnBoard Temp

IN_SITU INC. Troll

Report generated: 02/15/99 15:57:41
Report from file: A:\PT1MW5.BIN
DataMgr Version 2.16

S ial number: 00001170
Firmware Version 6.24
Unit name: MW5

Test name: Pump Test 1

Test defined on: 02/04/99 08:43:44
Test scheduled for: 02/04/99 10:30:00
Test started on: 02/04/99 10:30:00
Test stopped on: 02/04/99 17:18:57
Test extracted on: 02/04/99 17:19:05

Data gathered using Logarithmic testing
Maximum time between data points: 1.0000 Minutes.
Number of data samples: 502

TOTAL DATA SAMPLES 502

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure/Level
Channel name: MW5 Pressure
Sensor Range: 15 PSI.
ecific gravity: 1.000
ode: TOC
User-defined reference: 0.000 Meters H20
Referenced on: test start
Pressure head at reference: 4.091 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20	
02/04/99	10:30:00	0.0000	11.43	0.000	
02/04/99	10:30:00	0.0050	11.43	0.001	
02/04/99	10:30:00	0.0100	11.44	0.001	
02/04/99	10:30:00	0.0150	11.44	0.001	
02/04/99	10:30:01	0.0200	11.44	0.000	
02/04/99	10:30:01	0.0250	11.45	0.001	
02/04/99	10:30:01	0.0300	11.45	0.001	
02/04/99	10:30:02	0.0350	11.45	0.001	
02/04/99	10:30:02	0.0400	11.46	0.001	
02/04/99	10:30:02	0.0450	11.47	0.001	
02/04/99	10:30:03	0.0500	11.47	0.001	
02/04/99	10:30:03	0.0550	11.47	0.001	
02/04/99	10:30:03	0.0600	11.47	0.001	
02/04/99	10:30:03	0.0650	11.47	0.001	
02/04/99	10:30:04	0.0700	11.48	0.001	
02/04/99	10:30:04	0.0750	11.48	0.001	
02/04/99	10:30:04	0.0800	11.48	0.001	
02/04/99	10:30:05	0.0850	11.48	0.001	
02/04/99	10:30:05	0.0900	11.49	0.001	
02/04/99	10:30:05	0.0950	11.49	0.001	
02/04/99	10:30:06	0.1000	11.49	0.001	
02/04/99	10:30:06	0.1058	11.50	0.001	
02/04/99	10:30:06	0.1120	11.50	0.001	
02/04/99	10:30:07	0.1185	11.50	0.001	
02/04/99	10:30:07	0.1255	11.50	0.001	
02/04/99	10:30:07	0.1328	11.51	0.001	START TEST; RATE: 0.35 G/MIN

02/04/99	10:30:08	0.1407	11.51	0.011
02/04/99	10:30:08	0.1490	11.52	0.013
02/04/99	10:30:09	0.1578	11.52	0.007
02/04/99	10:30:10	0.1672	11.52	0.013
02/04/99	10:30:10	0.1770	11.53	0.026
02/04/99	10:30:11	0.1875	11.53	0.028
02/04/99	10:30:11	0.1985	11.52	0.034
02/04/99	10:30:12	0.2102	11.54	0.041
02/04/99	10:30:13	0.2227	11.54	0.049
02/04/99	10:30:14	0.2358	11.54	0.058
02/04/99	10:30:14	0.2498	11.54	0.066
02/04/99	10:30:15	0.2647	11.54	0.075
02/04/99	10:30:16	0.2803	11.55	0.084
02/04/99	10:30:17	0.2970	11.55	0.094
02/04/99	10:30:18	0.3147	11.55	0.105
02/04/99	10:30:20	0.3333	11.55	0.116
02/04/99	10:30:21	0.3532	11.55	0.127
02/04/99	10:30:22	0.3742	11.55	0.140
02/04/99	10:30:23	0.3963	11.55	0.153
02/04/99	10:30:25	0.4198	11.55	0.165
02/04/99	10:30:26	0.4447	11.55	0.178
02/04/99	10:30:28	0.4697	11.55	0.186
02/04/99	10:30:29	0.4963	11.54	0.191
02/04/99	10:30:31	0.5247	11.54	0.199
02/04/99	10:30:33	0.5547	11.54	0.205
02/04/99	10:30:35	0.5863	11.53	0.209
02/04/99	10:30:37	0.6213	11.53	0.273
02/04/99	10:30:39	0.6580	11.52	0.274
02/04/99	10:30:41	0.6963	11.52	0.278
02/04/99	10:30:44	0.7380	11.50	0.319
02/04/99	10:30:46	0.7813	11.50	0.323
02/04/99	10:30:49	0.8280	11.48	0.367
02/04/99	10:30:52	0.8763	11.47	0.372
02/04/99	10:30:55	0.9280	11.46	0.411
02/04/99	10:30:58	0.9830	11.44	0.470
02/04/99	10:31:02	1.0413	11.43	0.494
02/04/99	10:31:06	1.1030	11.40	0.497
02/04/99	10:31:10	1.1680	11.39	0.559
02/04/99	10:31:14	1.2380	11.36	0.599
02/04/99	10:31:18	1.3113	11.34	0.631
02/04/99	10:31:23	1.3897	11.31	0.666
02/04/99	10:31:28	1.4730	11.29	0.700
02/04/99	10:31:33	1.5613	11.25	0.735
02/04/99	10:31:39	1.6547	11.21	0.772
02/04/99	10:31:45	1.7530	11.18	0.809
02/04/99	10:31:51	1.8580	11.14	0.847
02/04/99	10:31:58	1.9680	11.10	0.886
02/04/99	10:32:05	2.0847	11.05	0.925
02/04/99	10:32:12	2.2097	11.00	0.965
02/04/99	10:32:20	2.3413	10.94	1.005
02/04/99	10:32:28	2.4813	10.88	1.045
02/04/99	10:32:37	2.6297	10.82	1.086
02/04/99	10:32:47	2.7863	10.74	1.128
02/04/99	10:32:57	2.9530	10.67	1.169
02/04/99	10:33:07	3.1297	10.59	1.210
02/04/99	10:33:18	3.3163	10.51	1.250
02/04/99	10:33:30	3.5147	10.42	1.290
02/04/99	10:33:43	3.7247	10.32	1.329
02/04/99	10:33:56	3.9463	10.23	1.368
02/04/99	10:34:10	4.1813	10.14	1.406
02/04/99	10:34:25	4.4297	10.04	1.442
02/04/99	10:34:41	4.6930	9.96	1.476
02/04/99	10:34:58	4.9730	9.86	1.509
02/04/99	10:35:16	5.2697	9.78	1.541
02/04/99	10:35:34	5.5830	9.69	1.571
02/04/99	10:35:54	5.9147	9.62	1.598
02/04/99	10:36:15	6.2663	9.54	1.624
02/04/99	10:36:38	6.6397	9.47	1.647
02/04/99	10:37:02	7.0347	9.40	1.670

02/04/99	10:37:27	7.4530	9.35	1.692
02/04/99	10:37:53	7.8963	9.30	1.710
02/04/99	10:38:21	8.3663	9.24	1.728
02/04/99	10:38:51	8.8647	9.21	1.746
02/04/99	10:39:23	9.3913	9.18	1.761
02/04/99	10:39:56	9.9497	9.15	1.775
02/04/99	10:40:32	10.5413	9.13	1.786
02/04/99	10:41:10	11.1680	9.10	1.798
02/04/99	10:41:49	11.8313	9.09	1.808
02/04/99	10:42:32	12.5347	9.08	1.814
02/04/99	10:43:16	13.2797	9.06	1.820
02/04/99	10:44:04	14.0697	9.05	1.827
02/04/99	10:44:54	14.9063	9.04	1.831
02/04/99	10:45:47	15.7913	9.02	1.834
02/04/99	10:46:43	16.7297	9.00	1.838
02/04/99	10:47:43	17.7230	8.98	1.840
02/04/99	10:48:43	18.7230	8.96	1.845
02/04/99	10:49:43	19.7230	8.94	1.849
02/04/99	10:50:43	20.7230	8.92	1.850
02/04/99	10:51:43	21.7230	8.91	1.847
02/04/99	10:52:43	22.7230	8.91	1.847
02/04/99	10:53:43	23.7230	8.89	1.846
02/04/99	10:54:43	24.7230	8.89	1.843
02/04/99	10:55:43	25.7230	8.88	1.842
02/04/99	10:56:43	26.7230	8.88	1.841
02/04/99	10:57:43	27.7230	8.88	1.841
02/04/99	10:58:43	28.7230	8.88	1.840
02/04/99	10:59:43	29.7230	8.88	1.841
02/04/99	11:00:43	30.7230	8.86	1.841
02/04/99	11:01:43	31.7230	8.86	1.843
02/04/99	11:02:43	32.7230	8.85	1.843
02/04/99	11:03:43	33.7230	8.84	1.844
02/04/99	11:04:43	34.7230	8.83	1.845
02/04/99	11:05:43	35.7230	8.82	1.846
02/04/99	11:06:43	36.7230	8.81	1.846
02/04/99	11:07:43	37.7230	8.81	1.850
02/04/99	11:08:43	38.7230	8.80	1.853
02/04/99	11:09:43	39.7230	8.80	1.858
02/04/99	11:10:43	40.7230	8.80	1.861
02/04/99	11:11:43	41.7230	8.79	1.864
02/04/99	11:12:43	42.7230	8.78	1.867
02/04/99	11:13:43	43.7230	8.78	1.870
02/04/99	11:14:43	44.7230	8.77	1.873
02/04/99	11:15:43	45.7230	8.77	1.877
02/04/99	11:16:43	46.7230	8.77	1.879
02/04/99	11:17:43	47.7230	8.76	1.879
02/04/99	11:18:43	48.7230	8.75	1.879
02/04/99	11:19:43	49.7230	8.75	1.879
02/04/99	11:20:43	50.7230	8.74	1.881
02/04/99	11:21:43	51.7230	8.73	1.880
02/04/99	11:22:43	52.7230	8.73	1.881
02/04/99	11:23:43	53.7230	8.72	1.882
02/04/99	11:24:43	54.7230	8.72	1.882
02/04/99	11:25:43	55.7230	8.72	1.882
02/04/99	11:26:43	56.7230	8.72	1.883
02/04/99	11:27:43	57.7230	8.70	1.882
02/04/99	11:28:43	58.7230	8.70	1.883
02/04/99	11:29:43	59.7230	8.69	1.887
02/04/99	11:30:43	60.7230	8.69	1.889
02/04/99	11:31:43	61.7230	8.68	1.890
02/04/99	11:32:43	62.7230	8.67	1.890
02/04/99	11:33:43	63.7230	8.68	1.888
02/04/99	11:34:43	64.7230	8.67	1.887
02/04/99	11:35:43	65.7230	8.67	1.888
02/04/99	11:36:43	66.7230	8.66	1.888
02/04/99	11:37:43	67.7230	8.65	1.888
02/04/99	11:38:43	68.7230	8.65	1.887
02/04/99	11:39:43	69.7230	8.65	1.887
02/04/99	11:40:43	70.7230	8.64	1.886

02/04/99	11:41:43	71.7230	8.64	1.886
02/04/99	11:42:43	72.7230	8.64	1.887
02/04/99	11:43:43	73.7230	8.63	1.887
02/04/99	11:44:43	74.7230	8.63	1.886
02/04/99	11:45:43	75.7230	8.62	1.888
[illegible]4/99	11:46:43	76.7230	8.62	1.887
[illegible]4/99	11:47:43	77.7230	8.62	1.887
02/04/99	11:48:43	78.7230	8.62	1.888
02/04/99	11:49:43	79.7230	8.62	1.889
02/04/99	11:50:43	80.7230	8.62	1.891
02/04/99	11:51:43	81.7230	8.61	1.892
02/04/99	11:52:43	82.7230	8.61	1.891
02/04/99	11:53:43	83.7230	8.61	1.893
02/04/99	11:54:43	84.7230	8.61	1.894
02/04/99	11:55:43	85.7230	8.61	1.894
02/04/99	11:56:43	86.7230	8.60	1.894
02/04/99	11:57:43	87.7230	8.60	1.894
02/04/99	11:58:43	88.7230	8.61	1.895
02/04/99	11:59:43	89.7230	8.61	1.898
02/04/99	12:00:43	90.7230	8.61	1.900
02/04/99	12:01:43	91.7230	8.60	1.900
02/04/99	12:02:43	92.7230	8.60	1.903
02/04/99	12:03:43	93.7230	8.59	1.904
02/04/99	12:04:43	94.7230	8.59	1.904
02/04/99	12:05:43	95.7230	8.58	1.904
02/04/99	12:06:43	96.7230	8.58	1.905
02/04/99	12:07:43	97.7230	8.59	1.904
02/04/99	12:08:43	98.7230	8.59	1.903
02/04/99	12:09:43	99.7230	8.59	1.901
02/04/99	12:10:43	100.7230	8.59	1.900
02/04/99	12:11:43	101.7230	8.59	1.900
02/04/99	12:12:43	102.7230	8.58	1.900
02/04/99	12:13:43	103.7230	8.58	1.900
[illegible]4/99	12:14:43	104.7230	8.57	1.901
[illegible]4/99	12:15:43	105.7230	8.57	1.901
02/04/99	12:16:43	106.7230	8.57	1.900
02/04/99	12:17:43	107.7230	8.57	1.898
02/04/99	12:18:43	108.7230	8.56	1.899
02/04/99	12:19:43	109.7230	8.56	1.900
02/04/99	12:20:43	110.7230	8.57	1.900
02/04/99	12:21:43	111.7230	8.57	1.901
02/04/99	12:22:43	112.7230	8.57	1.902
02/04/99	12:23:43	113.7230	8.57	1.903
02/04/99	12:24:43	114.7230	8.57	1.904
02/04/99	12:25:43	115.7230	8.56	1.904
02/04/99	12:26:43	116.7230	8.56	1.904
02/04/99	12:27:43	117.7230	8.56	1.905
02/04/99	12:28:43	118.7230	8.56	1.905
02/04/99	12:29:43	119.7230	8.56	1.907
02/04/99	12:30:43	120.7230	8.56	1.906
02/04/99	12:31:43	121.7230	8.56	1.907
02/04/99	12:32:43	122.7230	8.56	1.908
02/04/99	12:33:43	123.7230	8.55	1.908
02/04/99	12:34:43	124.7230	8.54	1.908
02/04/99	12:35:43	125.7230	8.55	1.909
02/04/99	12:36:43	126.7230	8.55	1.909
02/04/99	12:37:43	127.7230	8.55	1.908
02/04/99	12:38:43	128.7230	8.54	1.907
02/04/99	12:39:43	129.7230	8.54	1.908
02/04/99	12:40:43	130.7230	8.53	1.908
02/04/99	12:41:43	131.7230	8.53	1.909
[illegible]4/99	12:42:43	132.7230	8.53	1.910
[illegible]4/99	12:43:43	133.7230	8.53	1.909
02/04/99	12:44:43	134.7230	8.53	1.909
02/04/99	12:45:43	135.7230	8.53	1.908
02/04/99	12:46:43	136.7230	8.52	1.907
02/04/99	12:47:43	137.7230	8.52	1.907
02/04/99	12:48:43	138.7230	8.52	1.907
02/04/99	12:49:43	139.7230	8.52	1.908

02/04/99	12:50:43	140.7230	8.53	1.907
02/04/99	12:51:43	141.7230	8.54	1.909
02/04/99	12:52:43	142.7230	8.54	1.908
02/04/99	12:53:43	143.7230	8.54	1.909
02/04/99	12:54:43	144.7230	8.54	1.909
[illegible]	12:55:43	145.7230	8.54	1.909
[illegible]	12:56:43	146.7230	8.54	1.910
02/04/99	12:57:43	147.7230	8.54	1.910
02/04/99	12:58:43	148.7230	8.54	1.910
02/04/99	12:59:43	149.7230	8.53	1.909
02/04/99	13:00:43	150.7230	8.53	1.910
02/04/99	13:01:43	151.7230	8.52	1.910
02/04/99	13:02:43	152.7230	8.52	1.910
02/04/99	13:03:43	153.7230	8.52	1.910
02/04/99	13:04:43	154.7230	8.52	1.910
02/04/99	13:05:43	155.7230	8.52	1.912
02/04/99	13:06:43	156.7230	8.52	1.912
02/04/99	13:07:43	157.7230	8.52	1.912
02/04/99	13:08:43	158.7230	8.52	1.912
02/04/99	13:09:43	159.7230	8.52	1.913
02/04/99	13:10:43	160.7230	8.51	1.913
02/04/99	13:11:43	161.7230	8.51	1.912
02/04/99	13:12:43	162.7230	8.52	1.912
02/04/99	13:13:43	163.7230	8.52	1.910
02/04/99	13:14:43	164.7230	8.52	1.911
02/04/99	13:15:43	165.7230	8.52	1.911
02/04/99	13:16:43	166.7230	8.53	1.912
02/04/99	13:17:43	167.7230	8.54	1.911
02/04/99	13:18:43	168.7230	8.54	1.910
02/04/99	13:19:43	169.7230	8.54	1.910
02/04/99	13:20:43	170.7230	8.54	1.912
02/04/99	13:21:43	171.7230	8.53	1.912
02/04/99	13:22:43	172.7230	8.53	1.912
[illegible]	13:23:43	173.7230	8.53	1.912
[illegible]	13:24:43	174.7230	8.53	1.911
02/04/99	13:25:43	175.7230	8.53	1.911
02/04/99	13:26:43	176.7230	8.53	1.912
02/04/99	13:27:43	177.7230	8.53	1.913
02/04/99	13:28:43	178.7230	8.54	1.912
02/04/99	13:29:43	179.7230	8.53	1.914
02/04/99	13:30:43	180.7230	8.53	1.914
02/04/99	13:31:43	181.7230	8.52	1.914
02/04/99	13:32:43	182.7230	8.53	1.913
02/04/99	13:33:43	183.7230	8.53	1.914
02/04/99	13:34:43	184.7230	8.53	1.914
02/04/99	13:35:43	185.7230	8.53	1.915
02/04/99	13:36:43	186.7230	8.53	1.916
02/04/99	13:37:43	187.7230	8.53	1.916
02/04/99	13:38:43	188.7230	8.53	1.917
02/04/99	13:39:43	189.7230	8.53	1.916
02/04/99	13:40:43	190.7230	8.53	1.916
02/04/99	13:41:43	191.7230	8.53	1.917
02/04/99	13:42:43	192.7230	8.53	1.916
02/04/99	13:43:43	193.7230	8.53	1.916
02/04/99	13:44:43	194.7230	8.52	1.916
02/04/99	13:45:43	195.7230	8.53	1.915
02/04/99	13:46:43	196.7230	8.53	1.915
02/04/99	13:47:43	197.7230	8.53	1.915
02/04/99	13:48:43	198.7230	8.53	1.917
02/04/99	13:49:43	199.7230	8.53	1.917
02/04/99	13:50:43	200.7230	8.53	1.917
[illegible]	13:51:43	201.7230	8.52	1.918
[illegible]	13:52:43	202.7230	8.52	1.918
02/04/99	13:53:43	203.7230	8.51	1.917
02/04/99	13:54:43	204.7230	8.51	1.917
02/04/99	13:55:43	205.7230	8.51	1.917
02/04/99	13:56:43	206.7230	8.50	1.917
02/04/99	13:57:43	207.7230	8.50	1.918
02/04/99	13:58:43	208.7230	8.50	1.918

02/04/99	13:59:43	209.7230	8.51	1.918
02/04/99	14:00:43	210.7230	8.51	1.917
02/04/99	14:01:43	211.7230	8.51	1.917
02/04/99	14:02:43	212.7230	8.50	1.918
02/04/99	14:03:43	213.7230	8.50	1.917
[illegible]4/99	14:04:43	214.7230	8.49	1.917
[illegible]4/99	14:05:43	215.7230	8.50	1.918
02/04/99	14:06:43	216.7230	8.49	1.918
02/04/99	14:07:43	217.7230	8.49	1.917
02/04/99	14:08:43	218.7230	8.50	1.917
02/04/99	14:09:43	219.7230	8.49	1.917
02/04/99	14:10:43	220.7230	8.49	1.917
02/04/99	14:11:43	221.7230	8.49	1.918
02/04/99	14:12:43	222.7230	8.49	1.918
02/04/99	14:13:43	223.7230	8.49	1.917
02/04/99	14:14:43	224.7230	8.49	1.917
02/04/99	14:15:43	225.7230	8.49	1.918
02/04/99	14:16:43	226.7230	8.49	1.918
02/04/99	14:17:43	227.7230	8.49	1.918
02/04/99	14:18:43	228.7230	8.49	1.918
02/04/99	14:19:43	229.7230	8.49	1.917
02/04/99	14:20:43	230.7230	8.49	1.918
02/04/99	14:21:43	231.7230	8.49	1.918
02/04/99	14:22:43	232.7230	8.49	1.918
02/04/99	14:23:43	233.7230	8.49	1.918
02/04/99	14:24:43	234.7230	8.48	1.918
02/04/99	14:25:43	235.7230	8.49	1.915
02/04/99	14:26:43	236.7230	8.48	1.915
02/04/99	14:27:43	237.7230	8.49	1.916
02/04/99	14:28:43	238.7230	8.48	1.918
02/04/99	14:29:43	239.7230	8.47	1.919
02/04/99	14:30:43	240.7230	8.46	1.921
02/04/99	14:31:43	241.7230	8.46	1.921
[illegible]4/99	14:32:43	242.7230	8.46	1.921
[illegible]4/99	14:33:43	243.7230	8.46	1.919
02/04/99	14:34:43	244.7230	8.46	1.920
02/04/99	14:35:43	245.7230	8.45	1.921
02/04/99	14:36:43	246.7230	8.46	1.921
02/04/99	14:37:43	247.7230	8.46	1.921
02/04/99	14:38:43	248.7230	8.46	1.923
02/04/99	14:39:43	249.7230	8.47	1.921
02/04/99	14:40:43	250.7230	8.47	1.921
02/04/99	14:41:43	251.7230	8.46	1.921
02/04/99	14:42:43	252.7230	8.47	1.921
02/04/99	14:43:43	253.7230	8.47	1.922
02/04/99	14:44:43	254.7230	8.47	1.921
02/04/99	14:45:43	255.7230	8.46	1.923
02/04/99	14:46:43	256.7230	8.46	1.921
02/04/99	14:47:43	257.7230	8.46	1.920
02/04/99	14:48:43	258.7230	8.46	1.921
02/04/99	14:49:43	259.7230	8.46	1.921
02/04/99	14:50:43	260.7230	8.46	1.921
02/04/99	14:51:43	261.7230	8.45	1.920
02/04/99	14:52:43	262.7230	8.46	1.921
02/04/99	14:53:43	263.7230	8.46	1.921
02/04/99	14:54:43	264.7230	8.46	1.922
02/04/99	14:55:43	265.7230	8.45	1.922
02/04/99	14:56:43	266.7230	8.45	1.922
02/04/99	14:57:43	267.7230	8.45	1.921
02/04/99	14:58:43	268.7230	8.45	1.921
02/04/99	14:59:43	269.7230	8.46	1.921
[illegible]4/99	15:00:43	270.7230	8.45	1.921
[illegible]4/99	15:01:43	271.7230	8.45	1.922
02/04/99	15:02:43	272.7230	8.45	1.921
02/04/99	15:03:43	273.7230	8.45	1.921
02/04/99	15:04:43	274.7230	8.45	1.921
02/04/99	15:05:43	275.7230	8.45	1.921
02/04/99	15:06:43	276.7230	8.45	1.922
02/04/99	15:07:43	277.7230	8.45	1.921

02/04/99	15:08:43	278.7230	8.45	1.921
02/04/99	15:09:43	279.7230	8.46	1.921
02/04/99	15:10:43	280.7230	8.45	1.920
02/04/99	15:11:43	281.7230	8.45	1.920
02/04/99	15:12:43	282.7230	8.45	1.919
02/04/99	15:13:43	283.7230	8.45	1.919
02/04/99	15:14:43	284.7230	8.45	1.919
02/04/99	15:15:43	285.7230	8.45	1.919
02/04/99	15:16:43	286.7230	8.45	1.920
02/04/99	15:17:43	287.7230	8.45	1.920
02/04/99	15:18:43	288.7230	8.44	1.920
02/04/99	15:19:43	289.7230	8.43	1.919
02/04/99	15:20:43	290.7230	8.44	1.919
02/04/99	15:21:43	291.7230	8.43	1.920
02/04/99	15:22:43	292.7230	8.43	1.921
02/04/99	15:23:43	293.7230	8.43	1.921
02/04/99	15:24:43	294.7230	8.42	1.920
02/04/99	15:25:43	295.7230	8.42	1.921
02/04/99	15:26:43	296.7230	8.43	1.921
02/04/99	15:27:43	297.7230	8.42	1.921
02/04/99	15:28:43	298.7230	8.43	1.921
02/04/99	15:29:43	299.7230	8.43	1.921
02/04/99	15:30:43	300.7230	8.45	1.673
02/04/99	15:31:43	301.7230	8.52	1.434
02/04/99	15:32:43	302.7230	8.59	1.235
02/04/99	15:33:43	303.7230	8.66	1.070
02/04/99	15:34:43	304.7230	8.73	0.932
02/04/99	15:35:43	305.7230	8.80	0.816
02/04/99	15:36:43	306.7230	8.87	0.718
02/04/99	15:37:43	307.7230	8.94	0.635
02/04/99	15:38:43	308.7230	9.04	0.565
02/04/99	15:39:43	309.7230	9.12	0.504
02/04/99	15:40:43	310.7230	9.22	0.454
02/04/99	15:41:43	311.7230	9.34	0.411
02/04/99	15:42:43	312.7230	9.45	0.373
02/04/99	15:43:43	313.7230	9.57	0.340
02/04/99	15:44:43	314.7230	9.68	0.313
02/04/99	15:45:43	315.7230	9.78	0.288
02/04/99	15:46:43	316.7230	9.88	0.267
02/04/99	15:47:43	317.7230	9.96	0.249
02/04/99	15:48:43	318.7230	10.03	0.232
02/04/99	15:49:43	319.7230	10.09	0.218
02/04/99	15:50:43	320.7230	10.15	0.205
02/04/99	15:51:43	321.7230	10.21	0.193
02/04/99	15:52:43	322.7230	10.24	0.183
02/04/99	15:53:43	323.7230	10.30	0.174
02/04/99	15:54:43	324.7230	10.36	0.165
02/04/99	15:55:43	325.7230	10.42	0.157
02/04/99	15:56:43	326.7230	10.47	0.150
02/04/99	15:57:43	327.7230	10.52	0.144
02/04/99	15:58:43	328.7230	10.55	0.139
02/04/99	15:59:43	329.7230	10.58	0.134
02/04/99	16:00:43	330.7230	10.61	0.129
02/04/99	16:01:43	331.7230	10.64	0.124
02/04/99	16:02:43	332.7230	10.67	0.120
02/04/99	16:03:43	333.7230	10.69	0.117
02/04/99	16:04:43	334.7230	10.71	0.112
02/04/99	16:05:43	335.7230	10.73	0.109
02/04/99	16:06:43	336.7230	10.75	0.106
02/04/99	16:07:43	337.7230	10.78	0.103
02/04/99	16:08:43	338.7230	10.81	0.100
02/04/99	16:09:43	339.7230	10.83	0.097
02/04/99	16:10:43	340.7230	10.87	0.095
02/04/99	16:11:43	341.7230	10.89	0.092
02/04/99	16:12:43	342.7230	10.91	0.090
02/04/99	16:13:43	343.7230	10.93	0.087
02/04/99	16:14:43	344.7230	10.94	0.085
02/04/99	16:15:43	345.7230	10.94	0.083
02/04/99	16:16:43	346.7230	10.94	0.082

15:30
STOP PUMP; RATE 0.0 G/MIN

02/04/99	16:17:43	347.7230	10.94	0.079
02/04/99	16:18:43	348.7230	10.96	0.078
02/04/99	16:19:43	349.7230	10.96	0.075
02/04/99	16:20:43	350.7230	10.95	0.074
02/04/99	16:21:43	351.7230	10.94	0.072
[illegible]4/99	16:22:43	352.7230	10.93	0.070
[illegible]4/99	16:23:43	353.7230	10.90	0.069
02/04/99	16:24:43	354.7230	10.89	0.067
02/04/99	16:25:43	355.7230	10.89	0.066
02/04/99	16:26:43	356.7230	10.89	0.065
02/04/99	16:27:43	357.7230	10.89	0.063
02/04/99	16:28:43	358.7230	10.90	0.063
02/04/99	16:29:43	359.7230	10.91	0.061
02/04/99	16:30:43	360.7230	10.93	0.060
02/04/99	16:31:43	361.7230	10.94	0.059
02/04/99	16:32:43	362.7230	10.95	0.058
02/04/99	16:33:43	363.7230	10.96	0.056
02/04/99	16:34:43	364.7230	10.97	0.056
02/04/99	16:35:43	365.7230	10.97	0.055
02/04/99	16:36:43	366.7230	10.97	0.053
02/04/99	16:37:43	367.7230	10.96	0.052
02/04/99	16:38:43	368.7230	10.94	0.051
02/04/99	16:39:43	369.7230	10.93	0.051
02/04/99	16:40:43	370.7230	10.93	0.049
02/04/99	16:41:43	371.7230	10.92	0.049
02/04/99	16:42:43	372.7230	10.93	0.048
02/04/99	16:43:43	373.7230	10.93	0.047
02/04/99	16:44:43	374.7230	10.93	0.046
02/04/99	16:45:43	375.7230	10.93	0.046
02/04/99	16:46:43	376.7230	10.92	0.044
02/04/99	16:47:43	377.7230	10.92	0.043
02/04/99	16:48:43	378.7230	10.93	0.042
02/04/99	16:49:43	379.7230	10.93	0.041
[illegible]4/99	16:50:43	380.7230	10.93	0.041
[illegible]4/99	16:51:43	381.7230	10.94	0.039
02/04/99	16:52:43	382.7230	10.94	0.039
02/04/99	16:53:43	383.7230	10.94	0.038
02/04/99	16:54:43	384.7230	10.94	0.037
02/04/99	16:55:43	385.7230	10.94	0.037
02/04/99	16:56:43	386.7230	10.95	0.036
02/04/99	16:57:43	387.7230	10.96	0.035
02/04/99	16:58:43	388.7230	10.96	0.035
02/04/99	16:59:43	389.7230	10.96	0.034
02/04/99	17:00:43	390.7230	10.96	0.034
02/04/99	17:01:43	391.7230	10.95	0.033
02/04/99	17:02:43	392.7230	10.95	0.032
02/04/99	17:03:43	393.7230	10.95	0.032
02/04/99	17:04:43	394.7230	10.95	0.031
02/04/99	17:05:43	395.7230	10.96	0.030
02/04/99	17:06:43	396.7230	10.97	0.030
02/04/99	17:07:43	397.7230	10.97	0.030
02/04/99	17:08:43	398.7230	10.97	0.029
02/04/99	17:09:43	399.7230	10.97	0.028
02/04/99	17:10:43	400.7230	10.97	0.028
02/04/99	17:11:43	401.7230	10.97	0.027
02/04/99	17:12:43	402.7230	10.98	0.027
02/04/99	17:13:43	403.7230	11.00	0.026
02/04/99	17:14:43	404.7230	11.01	0.026
02/04/99	17:15:43	405.7230	11.01	0.025
02/04/99	17:16:43	406.7230	11.02	0.025
02/04/99	17:17:43	407.7230	11.02	0.025
[illegible]4/99	17:18:43	408.7230	11.10	0.025

IN_SITU INC. Troll

Report generated: 02/15/99 15:57:09
Report from file: A:\PT1MW15.BIN
DataMgr Version 2.16

Serial number: 00001186
Firmware Version 6.24
Unit name: MW15

Test name: Pump Test 1

Test defined on: 02/04/99 08:30:28
Test scheduled for: 02/04/99 10:30:00
Test started on: 02/04/99 10:30:00
Test stopped on: 02/04/99 17:24:19
Test extracted on: 02/04/99 17:24:54

Data gathered using Logarithmic testing
Maximum time between data points: 1.0000 Minutes.
Number of data samples: 507

TOTAL DATA SAMPLES 507

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure/Level
Channel name: MW15 Pressure
Sensor Range: 15 PSI.
ecific gravity: 1.000
ode: TOC
User-defined reference: 0.000 Meters H20
Referenced on: test start
Pressure head at reference: 3.791 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20	
02/04/99	10:30:00	0.0000	10.52	0.000	
02/04/99	10:30:00	0.0050	10.52	0.000	
02/04/99	10:30:00	0.0100	10.53	0.000	
02/04/99	10:30:00	0.0150	10.54	0.000	
02/04/99	10:30:01	0.0200	10.54	0.000	
02/04/99	10:30:01	0.0250	10.54	0.000	
02/04/99	10:30:01	0.0300	10.55	0.000	
02/04/99	10:30:02	0.0350	10.55	0.000	
02/04/99	10:30:02	0.0400	10.56	0.000	
02/04/99	10:30:02	0.0450	10.55	0.000	
02/04/99	10:30:03	0.0500	10.56	0.001	
02/04/99	10:30:03	0.0550	10.56	0.000	
02/04/99	10:30:03	0.0600	10.56	0.001	
02/04/99	10:30:03	0.0650	10.57	0.000	
02/04/99	10:30:04	0.0700	10.57	0.001	
02/04/99	10:30:04	0.0750	10.58	0.001	
02/04/99	10:30:04	0.0800	10.58	0.001	
02/04/99	10:30:05	0.0850	10.58	0.001	
02/04/99	10:30:05	0.0900	10.58	0.001	
02/04/99	10:30:05	0.0950	10.60	0.001	
02/04/99	10:30:06	0.1000	10.59	0.001	
02/04/99	10:30:06	0.1058	10.59	0.001	
02/04/99	10:30:06	0.1120	10.61	0.001	
02/04/99	10:30:07	0.1185	10.61	0.001	
02/04/99	10:30:07	0.1255	10.61	0.001	
02/04/99	10:30:07	0.1328	10.61	0.001	START TEST ; RATE 0.35 GAL/MIN

02/04/99	10:30:08	0.1407	10.61	0.001
02/04/99	10:30:08	0.1490	10.62	0.001
02/04/99	10:30:09	0.1578	10.62	0.001
02/04/99	10:30:10	0.1672	10.62	0.001
02/04/99	10:30:10	0.1770	10.62	0.001
[illegible]4/99	10:30:11	0.1875	10.62	0.001
[illegible]4/99	10:30:11	0.1985	10.62	0.001
02/04/99	10:30:12	0.2102	10.62	0.001
02/04/99	10:30:13	0.2227	10.63	0.001
02/04/99	10:30:14	0.2358	10.63	0.001
02/04/99	10:30:14	0.2498	10.64	0.001
02/04/99	10:30:15	0.2647	10.64	0.001
02/04/99	10:30:16	0.2803	10.64	0.001
02/04/99	10:30:17	0.2970	10.64	0.001
02/04/99	10:30:18	0.3147	10.64	0.001
02/04/99	10:30:20	0.3333	10.64	0.001
02/04/99	10:30:21	0.3532	10.64	0.001
02/04/99	10:30:22	0.3742	10.64	0.001
02/04/99	10:30:23	0.3963	10.64	0.001
02/04/99	10:30:25	0.4198	10.64	0.001
02/04/99	10:30:26	0.4447	10.64	0.001
02/04/99	10:30:28	0.4697	10.65	0.001
02/04/99	10:30:29	0.4963	10.65	0.001
02/04/99	10:30:31	0.5247	10.65	0.001
02/04/99	10:30:33	0.5547	10.65	0.001
02/04/99	10:30:35	0.5863	10.65	0.001
02/04/99	10:30:37	0.6213	10.64	0.001
02/04/99	10:30:39	0.6580	10.64	0.001
02/04/99	10:30:41	0.6963	10.64	0.001
02/04/99	10:30:44	0.7380	10.64	0.001
02/04/99	10:30:46	0.7813	10.64	0.001
02/04/99	10:30:49	0.8280	10.64	0.001
02/04/99	10:30:52	0.8763	10.64	0.002
[illegible]4/99	10:30:55	0.9280	10.64	0.002
[illegible]4/99	10:30:58	0.9830	10.63	0.003
02/04/99	10:31:02	1.0413	10.63	0.003
02/04/99	10:31:06	1.1030	10.62	0.004
02/04/99	10:31:10	1.1680	10.63	0.004
02/04/99	10:31:14	1.2380	10.63	0.005
02/04/99	10:31:18	1.3113	10.62	0.006
02/04/99	10:31:23	1.3897	10.62	0.006
02/04/99	10:31:28	1.4730	10.62	0.007
02/04/99	10:31:33	1.5613	10.62	0.008
02/04/99	10:31:39	1.6547	10.62	0.009
02/04/99	10:31:45	1.7530	10.61	0.011
02/04/99	10:31:51	1.8580	10.61	0.012
02/04/99	10:31:58	1.9680	10.61	0.013
02/04/99	10:32:05	2.0847	10.61	0.015
02/04/99	10:32:12	2.2097	10.61	0.017
02/04/99	10:32:20	2.3413	10.61	0.019
02/04/99	10:32:28	2.4813	10.60	0.022
02/04/99	10:32:37	2.6297	10.60	0.024
02/04/99	10:32:47	2.7863	10.60	0.027
02/04/99	10:32:57	2.9530	10.60	0.029
02/04/99	10:33:07	3.1297	10.60	0.032
02/04/99	10:33:18	3.3163	10.60	0.035
02/04/99	10:33:30	3.5147	10.60	0.038
02/04/99	10:33:43	3.7247	10.60	0.041
02/04/99	10:33:56	3.9463	10.60	0.045
02/04/99	10:34:10	4.1813	10.59	0.049
02/04/99	10:34:25	4.4297	10.58	0.053
[illegible]4/99	10:34:41	4.6930	10.58	0.057
[illegible]4/99	10:34:58	4.9730	10.57	0.060
02/04/99	10:35:16	5.2697	10.57	0.065
02/04/99	10:35:34	5.5830	10.56	0.070
02/04/99	10:35:54	5.9147	10.56	0.074
02/04/99	10:36:15	6.2663	10.55	0.078
02/04/99	10:36:38	6.6397	10.56	0.084
02/04/99	10:37:02	7.0347	10.55	0.088

02/04/99	10:37:27	7.4530	10.55	0.093
02/04/99	10:37:53	7.8963	10.54	0.097
02/04/99	10:38:21	8.3663	10.52	0.101
02/04/99	10:38:51	8.8647	10.51	0.106
02/04/99	10:39:23	9.3913	10.51	0.110
[illegible]/04/99	10:39:56	9.9497	10.49	0.115
[illegible]/04/99	10:40:32	10.5413	10.48	0.120
02/04/99	10:41:10	11.1680	10.47	0.124
02/04/99	10:41:49	11.8313	10.47	0.129
02/04/99	10:42:32	12.5347	10.45	0.133
02/04/99	10:43:16	13.2797	10.44	0.137
02/04/99	10:44:04	14.0697	10.44	0.141
02/04/99	10:44:54	14.9063	10.43	0.144
02/04/99	10:45:47	15.7913	10.43	0.148
02/04/99	10:46:43	16.7297	10.42	0.152
02/04/99	10:47:43	17.7230	10.41	0.156
02/04/99	10:48:43	18.7230	10.40	0.159
02/04/99	10:49:43	19.7230	10.39	0.161
02/04/99	10:50:43	20.7230	10.38	0.165
02/04/99	10:51:43	21.7230	10.38	0.167
02/04/99	10:52:43	22.7230	10.37	0.169
02/04/99	10:53:43	23.7230	10.35	0.173
02/04/99	10:54:43	24.7230	10.34	0.174
02/04/99	10:55:43	25.7230	10.33	0.176
02/04/99	10:56:43	26.7230	10.31	0.178
02/04/99	10:57:43	27.7230	10.30	0.180
02/04/99	10:58:43	28.7230	10.28	0.181
02/04/99	10:59:43	29.7230	10.26	0.184
02/04/99	11:00:43	30.7230	10.25	0.185
02/04/99	11:01:43	31.7230	10.23	0.187
02/04/99	11:02:43	32.7230	10.23	0.188
02/04/99	11:03:43	33.7230	10.22	0.190
02/04/99	11:04:43	34.7230	10.22	0.191
[illegible]/04/99	11:05:43	35.7230	10.22	0.193
[illegible]/04/99	11:06:43	36.7230	10.21	0.195
02/04/99	11:07:43	37.7230	10.22	0.196
02/04/99	11:08:43	38.7230	10.22	0.197
02/04/99	11:09:43	39.7230	10.23	0.198
02/04/99	11:10:43	40.7230	10.22	0.199
02/04/99	11:11:43	41.7230	10.22	0.200
02/04/99	11:12:43	42.7230	10.22	0.202
02/04/99	11:13:43	43.7230	10.22	0.203
02/04/99	11:14:43	44.7230	10.22	0.204
02/04/99	11:15:43	45.7230	10.21	0.205
02/04/99	11:16:43	46.7230	10.21	0.207
02/04/99	11:17:43	47.7230	10.21	0.207
02/04/99	11:18:43	48.7230	10.21	0.209
02/04/99	11:19:43	49.7230	10.21	0.210
02/04/99	11:20:43	50.7230	10.21	0.211
02/04/99	11:21:43	51.7230	10.21	0.212
02/04/99	11:22:43	52.7230	10.21	0.213
02/04/99	11:23:43	53.7230	10.21	0.215
02/04/99	11:24:43	54.7230	10.21	0.216
02/04/99	11:25:43	55.7230	10.21	0.217
02/04/99	11:26:43	56.7230	10.23	0.218
02/04/99	11:27:43	57.7230	10.23	0.219
02/04/99	11:28:43	58.7230	10.23	0.220
02/04/99	11:29:43	59.7230	10.23	0.221
02/04/99	11:30:43	60.7230	10.21	0.223
02/04/99	11:31:43	61.7230	10.22	0.223
02/04/99	11:32:43	62.7230	10.22	0.224
[illegible]/04/99	11:33:43	63.7230	10.23	0.225
[illegible]/04/99	11:34:43	64.7230	10.21	0.226
02/04/99	11:35:43	65.7230	10.21	0.226
02/04/99	11:36:43	66.7230	10.22	0.226
02/04/99	11:37:43	67.7230	10.22	0.227
02/04/99	11:38:43	68.7230	10.22	0.228
02/04/99	11:39:43	69.7230	10.23	0.228
02/04/99	11:40:43	70.7230	10.23	0.229

02/04/99	11:41:43	71.7230	10.24	0.230
02/04/99	11:42:43	72.7230	10.25	0.230
02/04/99	11:43:43	73.7230	10.24	0.231
02/04/99	11:44:43	74.7230	10.24	0.234
02/04/99	11:45:43	75.7230	10.24	0.237
02/04/99	11:46:43	76.7230	10.24	0.236
02/04/99	11:47:43	77.7230	10.26	0.237
02/04/99	11:48:43	78.7230	10.24	0.236
02/04/99	11:49:43	79.7230	10.26	0.236
02/04/99	11:50:43	80.7230	10.24	0.236
02/04/99	11:51:43	81.7230	10.24	0.237
02/04/99	11:52:43	82.7230	10.24	0.237
02/04/99	11:53:43	83.7230	10.24	0.238
02/04/99	11:54:43	84.7230	10.25	0.238
02/04/99	11:55:43	85.7230	10.26	0.238
02/04/99	11:56:43	86.7230	10.24	0.238
02/04/99	11:57:43	87.7230	10.25	0.239
02/04/99	11:58:43	88.7230	10.24	0.239
02/04/99	11:59:43	89.7230	10.25	0.239
02/04/99	12:00:43	90.7230	10.25	0.239
02/04/99	12:01:43	91.7230	10.26	0.239
02/04/99	12:02:43	92.7230	10.26	0.238
02/04/99	12:03:43	93.7230	10.26	0.239
02/04/99	12:04:43	94.7230	10.26	0.239
02/04/99	12:05:43	95.7230	10.26	0.239
02/04/99	12:06:43	96.7230	10.26	0.239
02/04/99	12:07:43	97.7230	10.26	0.240
02/04/99	12:08:43	98.7230	10.26	0.240
02/04/99	12:09:43	99.7230	10.26	0.240
02/04/99	12:10:43	100.7230	10.26	0.240
02/04/99	12:11:43	101.7230	10.26	0.241
02/04/99	12:12:43	102.7230	10.26	0.242
02/04/99	12:13:43	103.7230	10.26	0.242
02/04/99	12:14:43	104.7230	10.25	0.243
02/04/99	12:15:43	105.7230	10.25	0.243
02/04/99	12:16:43	106.7230	10.25	0.242
02/04/99	12:17:43	107.7230	10.25	0.241
02/04/99	12:18:43	108.7230	10.26	0.241
02/04/99	12:19:43	109.7230	10.26	0.242
02/04/99	12:20:43	110.7230	10.26	0.242
02/04/99	12:21:43	111.7230	10.27	0.243
02/04/99	12:22:43	112.7230	10.28	0.243
02/04/99	12:23:43	113.7230	10.28	0.243
02/04/99	12:24:43	114.7230	10.28	0.243
02/04/99	12:25:43	115.7230	10.28	0.243
02/04/99	12:26:43	116.7230	10.29	0.243
02/04/99	12:27:43	117.7230	10.29	0.244
02/04/99	12:28:43	118.7230	10.29	0.244
02/04/99	12:29:43	119.7230	10.29	0.245
02/04/99	12:30:43	120.7230	10.29	0.243
02/04/99	12:31:43	121.7230	10.28	0.245
02/04/99	12:32:43	122.7230	10.28	0.246
02/04/99	12:33:43	123.7230	10.28	0.247
02/04/99	12:34:43	124.7230	10.28	0.246
02/04/99	12:35:43	125.7230	10.28	0.246
02/04/99	12:36:43	126.7230	10.29	0.247
02/04/99	12:37:43	127.7230	10.29	0.247
02/04/99	12:38:43	128.7230	10.29	0.247
02/04/99	12:39:43	129.7230	10.29	0.247
02/04/99	12:40:43	130.7230	10.29	0.247
02/04/99	12:41:43	131.7230	10.28	0.248
02/04/99	12:42:43	132.7230	10.29	0.248
02/04/99	12:43:43	133.7230	10.29	0.248
02/04/99	12:44:43	134.7230	10.29	0.248
02/04/99	12:45:43	135.7230	10.29	0.248
02/04/99	12:46:43	136.7230	10.28	0.248
02/04/99	12:47:43	137.7230	10.28	0.245
02/04/99	12:48:43	138.7230	10.29	0.243
02/04/99	12:49:43	139.7230	10.29	0.244

02/04/99	12:50:43	140.7230	10.29	0.245
02/04/99	12:51:43	141.7230	10.30	0.245
02/04/99	12:52:43	142.7230	10.29	0.246
02/04/99	12:53:43	143.7230	10.30	0.247
02/04/99	12:54:43	144.7230	10.30	0.247
02/04/99	12:55:43	145.7230	10.29	0.247
02/04/99	12:56:43	146.7230	10.29	0.247
02/04/99	12:57:43	147.7230	10.30	0.247
02/04/99	12:58:43	148.7230	10.28	0.248
02/04/99	12:59:43	149.7230	10.29	0.248
02/04/99	13:00:43	150.7230	10.29	0.248
02/04/99	13:01:43	151.7230	10.30	0.249
02/04/99	13:02:43	152.7230	10.32	0.249
02/04/99	13:03:43	153.7230	10.30	0.249
02/04/99	13:04:43	154.7230	10.32	0.250
02/04/99	13:05:43	155.7230	10.31	0.249
02/04/99	13:06:43	156.7230	10.33	0.249
02/04/99	13:07:43	157.7230	10.33	0.250
02/04/99	13:08:43	158.7230	10.33	0.250
02/04/99	13:09:43	159.7230	10.31	0.250
02/04/99	13:10:43	160.7230	10.32	0.250
02/04/99	13:11:43	161.7230	10.32	0.250
02/04/99	13:12:43	162.7230	10.33	0.250
02/04/99	13:13:43	163.7230	10.33	0.251
02/04/99	13:14:43	164.7230	10.33	0.251
02/04/99	13:15:43	165.7230	10.33	0.252
02/04/99	13:16:43	166.7230	10.33	0.252
02/04/99	13:17:43	167.7230	10.33	0.252
02/04/99	13:18:43	168.7230	10.33	0.252
02/04/99	13:19:43	169.7230	10.32	0.252
02/04/99	13:20:43	170.7230	10.32	0.252
02/04/99	13:21:43	171.7230	10.31	0.253
02/04/99	13:22:43	172.7230	10.32	0.253
02/04/99	13:23:43	173.7230	10.32	0.253
02/04/99	13:24:43	174.7230	10.32	0.253
02/04/99	13:25:43	175.7230	10.33	0.253
02/04/99	13:26:43	176.7230	10.33	0.253
02/04/99	13:27:43	177.7230	10.32	0.253
02/04/99	13:28:43	178.7230	10.32	0.253
02/04/99	13:29:43	179.7230	10.34	0.253
02/04/99	13:30:43	180.7230	10.35	0.254
02/04/99	13:31:43	181.7230	10.34	0.253
02/04/99	13:32:43	182.7230	10.34	0.254
02/04/99	13:33:43	183.7230	10.35	0.253
02/04/99	13:34:43	184.7230	10.35	0.253
02/04/99	13:35:43	185.7230	10.34	0.253
02/04/99	13:36:43	186.7230	10.36	0.254
02/04/99	13:37:43	187.7230	10.35	0.254
02/04/99	13:38:43	188.7230	10.35	0.254
02/04/99	13:39:43	189.7230	10.35	0.254
02/04/99	13:40:43	190.7230	10.35	0.255
02/04/99	13:41:43	191.7230	10.35	0.255
02/04/99	13:42:43	192.7230	10.35	0.254
02/04/99	13:43:43	193.7230	10.35	0.255
02/04/99	13:44:43	194.7230	10.35	0.255
02/04/99	13:45:43	195.7230	10.35	0.255
02/04/99	13:46:43	196.7230	10.35	0.255
02/04/99	13:47:43	197.7230	10.35	0.255
02/04/99	13:48:43	198.7230	10.34	0.256
02/04/99	13:49:43	199.7230	10.34	0.256
02/04/99	13:50:43	200.7230	10.34	0.257
02/04/99	13:51:43	201.7230	10.34	0.257
02/04/99	13:52:43	202.7230	10.34	0.257
02/04/99	13:53:43	203.7230	10.34	0.257
02/04/99	13:54:43	204.7230	10.34	0.257
02/04/99	13:55:43	205.7230	10.34	0.257
02/04/99	13:56:43	206.7230	10.33	0.257
02/04/99	13:57:43	207.7230	10.33	0.257
02/04/99	13:58:43	208.7230	10.33	0.257

02/04/99	13:59:43	209.7230	10.33	0.257
02/04/99	14:00:43	210.7230	10.33	0.258
02/04/99	14:01:43	211.7230	10.34	0.258
02/04/99	14:02:43	212.7230	10.33	0.258
02/04/99	14:03:43	213.7230	10.32	0.257
[illegible]4/99	14:04:43	214.7230	10.33	0.258
[illegible]4/99	14:05:43	215.7230	10.32	0.258
02/04/99	14:06:43	216.7230	10.32	0.258
02/04/99	14:07:43	217.7230	10.32	0.258
02/04/99	14:08:43	218.7230	10.32	0.259
02/04/99	14:09:43	219.7230	10.32	0.259
02/04/99	14:10:43	220.7230	10.32	0.259
02/04/99	14:11:43	221.7230	10.32	0.259
02/04/99	14:12:43	222.7230	10.32	0.259
02/04/99	14:13:43	223.7230	10.33	0.259
02/04/99	14:14:43	224.7230	10.32	0.259
02/04/99	14:15:43	225.7230	10.32	0.259
02/04/99	14:16:43	226.7230	10.33	0.259
02/04/99	14:17:43	227.7230	10.33	0.259
02/04/99	14:18:43	228.7230	10.33	0.259
02/04/99	14:19:43	229.7230	10.34	0.259
02/04/99	14:20:43	230.7230	10.34	0.260
02/04/99	14:21:43	231.7230	10.35	0.260
02/04/99	14:22:43	232.7230	10.36	0.261
02/04/99	14:23:43	233.7230	10.35	0.261
02/04/99	14:24:43	234.7230	10.35	0.260
02/04/99	14:25:43	235.7230	10.35	0.260
02/04/99	14:26:43	236.7230	10.36	0.261
02/04/99	14:27:43	237.7230	10.36	0.260
02/04/99	14:28:43	238.7230	10.37	0.261
02/04/99	14:29:43	239.7230	10.38	0.260
02/04/99	14:30:43	240.7230	10.37	0.261
02/04/99	14:31:43	241.7230	10.37	0.261
[illegible]4/99	14:32:43	242.7230	10.37	0.261
[illegible]4/99	14:33:43	243.7230	10.37	0.261
02/04/99	14:34:43	244.7230	10.38	0.260
02/04/99	14:35:43	245.7230	10.38	0.260
02/04/99	14:36:43	246.7230	10.37	0.261
02/04/99	14:37:43	247.7230	10.37	0.260
02/04/99	14:38:43	248.7230	10.37	0.261
02/04/99	14:39:43	249.7230	10.38	0.261
02/04/99	14:40:43	250.7230	10.38	0.261
02/04/99	14:41:43	251.7230	10.38	0.261
02/04/99	14:42:43	252.7230	10.37	0.261
02/04/99	14:43:43	253.7230	10.36	0.261
02/04/99	14:44:43	254.7230	10.36	0.261
02/04/99	14:45:43	255.7230	10.36	0.261
02/04/99	14:46:43	256.7230	10.37	0.261
02/04/99	14:47:43	257.7230	10.35	0.261
02/04/99	14:48:43	258.7230	10.35	0.261
02/04/99	14:49:43	259.7230	10.35	0.261
02/04/99	14:50:43	260.7230	10.35	0.260
02/04/99	14:51:43	261.7230	10.35	0.261
02/04/99	14:52:43	262.7230	10.35	0.261
02/04/99	14:53:43	263.7230	10.35	0.261
02/04/99	14:54:43	264.7230	10.36	0.261
02/04/99	14:55:43	265.7230	10.35	0.260
02/04/99	14:56:43	266.7230	10.36	0.261
02/04/99	14:57:43	267.7230	10.35	0.260
02/04/99	14:58:43	268.7230	10.37	0.261
02/04/99	14:59:43	269.7230	10.37	0.261
[illegible]4/99	15:00:43	270.7230	10.38	0.260
[illegible]4/99	15:01:43	271.7230	10.37	0.261
02/04/99	15:02:43	272.7230	10.36	0.260
02/04/99	15:03:43	273.7230	10.37	0.261
02/04/99	15:04:43	274.7230	10.36	0.260
02/04/99	15:05:43	275.7230	10.35	0.261
02/04/99	15:06:43	276.7230	10.35	0.261
02/04/99	15:07:43	277.7230	10.34	0.260

02/04/99	15:21:43	291.7230	10.32	0.261
02/04/99	15:22:43	292.7230	10.34	0.261
02/04/99	15:23:43	293.7230	10.33	0.261
02/04/99	15:24:43	294.7230	10.32	0.261
02/04/99	15:25:43	295.7230	10.32	0.261
02/04/99	15:26:43	296.7230	10.33	0.261
02/04/99	15:27:43	297.7230	10.34	0.262
02/04/99	15:28:43	298.7230	10.34	0.260
02/04/99	15:29:43	299.7230	10.34	0.261
02/04/99	15:30:43	300.7230	10.33	0.260
02/04/99	15:31:43	301.7230	10.34	0.257
02/04/99	15:32:43	302.7230	10.34	0.250
02/04/99	15:33:43	303.7230	10.34	0.240
02/04/99	15:34:43	304.7230	10.34	0.231
02/04/99	15:35:43	305.7230	10.34	0.221
02/04/99	15:36:43	306.7230	10.34	0.212
02/04/99	15:37:43	307.7230	10.34	0.203
02/04/99	15:38:43	308.7230	10.34	0.193
02/04/99	15:39:43	309.7230	10.34	0.184
02/04/99	15:40:43	310.7230	10.34	0.176
02/04/99	15:41:43	311.7230	10.34	0.169
02/04/99	15:42:43	312.7230	10.34	0.163
02/04/99	15:43:43	313.7230	10.33	0.156
02/04/99	15:44:43	314.7230	10.32	0.150
02/04/99	15:45:43	315.7230	10.32	0.144
02/04/99	15:46:43	316.7230	10.32	0.139
02/04/99	15:47:43	317.7230	10.32	0.134
02/04/99	15:48:43	318.7230	10.33	0.129
02/04/99	15:49:43	319.7230	10.33	0.125
02/04/99	15:50:43	320.7230	10.34	0.121
02/04/99	15:51:43	321.7230	10.34	0.117
02/04/99	15:52:43	322.7230	10.34	0.114
02/04/99	15:53:43	323.7230	10.34	0.110
02/04/99	15:54:43	324.7230	10.32	0.107
02/04/99	15:55:43	325.7230	10.32	0.103
02/04/99	15:56:43	326.7230	10.33	0.101
02/04/99	15:57:43	327.7230	10.32	0.098
02/04/99	15:58:43	328.7230	10.32	0.096
02/04/99	15:59:43	329.7230	10.31	0.093
02/04/99	16:00:43	330.7230	10.31	0.091
02/04/99	16:01:43	331.7230	10.32	0.088
02/04/99	16:02:43	332.7230	10.32	0.086
02/04/99	16:03:43	333.7230	10.33	0.084
02/04/99	16:04:43	334.7230	10.32	0.082
02/04/99	16:05:43	335.7230	10.32	0.080
02/04/99	16:06:43	336.7230	10.31	0.079
02/04/99	16:07:43	337.7230	10.30	0.077
02/04/99	16:08:43	338.7230	10.30	0.075
02/04/99	16:09:43	339.7230	10.30	0.074
02/04/99	16:10:43	340.7230	10.30	0.072
02/04/99	16:11:43	341.7230	10.30	0.070
02/04/99	16:12:43	342.7230	10.31	0.069
02/04/99	16:13:43	343.7230	10.32	0.067
02/04/99	16:14:43	344.7230	10.32	0.066
02/04/99	16:15:43	345.7230	10.32	0.064
02/04/99	16:16:43	346.7230	10.31	0.063

STOP PUMP ; RATE 0.0

02/04/99	16:30:43	360.7230	10.26	0.049
02/04/99	16:31:43	361.7230	10.26	0.047
02/04/99	16:32:43	362.7230	10.26	0.046
02/04/99	16:33:43	363.7230	10.26	0.046
02/04/99	16:34:43	364.7230	10.26	0.044
02/04/99	16:35:43	365.7230	10.26	0.044
02/04/99	16:36:43	366.7230	10.27	0.043
02/04/99	16:37:43	367.7230	10.26	0.042
02/04/99	16:38:43	368.7230	10.26	0.041
02/04/99	16:39:43	369.7230	10.26	0.041
02/04/99	16:40:43	370.7230	10.23	0.040
02/04/99	16:41:43	371.7230	10.23	0.040
02/04/99	16:42:43	372.7230	10.21	0.039
02/04/99	16:43:43	373.7230	10.20	0.039
02/04/99	16:44:43	374.7230	10.19	0.037
02/04/99	16:45:43	375.7230	10.18	0.037
02/04/99	16:46:43	376.7230	10.18	0.037
02/04/99	16:47:43	377.7230	10.17	0.036
02/04/99	16:48:43	378.7230	10.17	0.035
02/04/99	16:49:43	379.7230	10.17	0.034
02/04/99	16:50:43	380.7230	10.17	0.034
02/04/99	16:51:43	381.7230	10.18	0.033
02/04/99	16:52:43	382.7230	10.20	0.033
02/04/99	16:53:43	383.7230	10.19	0.032
02/04/99	16:54:43	384.7230	10.20	0.032
02/04/99	16:55:43	385.7230	10.20	0.032
02/04/99	16:56:43	386.7230	10.21	0.032
02/04/99	16:57:43	387.7230	10.23	0.031
02/04/99	16:58:43	388.7230	10.22	0.030
02/04/99	16:59:43	389.7230	10.21	0.030
02/04/99	17:00:43	390.7230	10.21	0.030
02/04/99	17:01:43	391.7230	10.21	0.029
02/04/99	17:02:43	392.7230	10.22	0.029
02/04/99	17:03:43	393.7230	10.22	0.027
02/04/99	17:04:43	394.7230	10.23	0.027
02/04/99	17:05:43	395.7230	10.23	0.027
02/04/99	17:06:43	396.7230	10.23	0.026
02/04/99	17:07:43	397.7230	10.23	0.027
02/04/99	17:08:43	398.7230	10.24	0.025
02/04/99	17:09:43	399.7230	10.24	0.025
02/04/99	17:10:43	400.7230	10.26	0.026
02/04/99	17:11:43	401.7230	10.26	0.025
02/04/99	17:12:43	402.7230	10.24	0.025
02/04/99	17:13:43	403.7230	10.24	0.025
02/04/99	17:14:43	404.7230	10.24	0.024
02/04/99	17:15:43	405.7230	10.24	0.023
02/04/99	17:16:43	406.7230	10.24	0.023
02/04/99	17:17:43	407.7230	10.26	0.023
02/04/99	17:18:43	408.7230	10.24	0.022
02/04/99	17:19:43	409.7230	10.26	0.022
02/04/99	17:20:43	410.7230	10.26	0.022
02/04/99	17:21:43	411.7230	10.26	0.022
02/04/99	17:22:43	412.7230	10.26	0.021
02/04/99	17:23:43	413.7230	10.26	0.020

Test scheduled for: 02/04/99 10:30:00
Test started on: 02/04/99 10:30:00
Test stopped on: 02/04/99 17:29:36
Test extracted on: 02/04/99 17:29:45

Data gathered using Logarithmic testing
Maximum time between data points: 1.0000 Minutes.
Number of data samples: 512

TOTAL DATA SAMPLES 512

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure/Level
Channel name: MW8 Pressure
Sensor Range: 15 PSI.
ecific gravity: 1.000
de: TOC
User-defined reference: 0.000 Meters H20
Referenced on: test start
Pressure head at reference: 3.671 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20	
02/04/99	10:30:00	0.0000	11.69	0.000	
02/04/99	10:30:00	0.0050	11.68	0.000	
02/04/99	10:30:00	0.0100	11.68	0.000	
02/04/99	10:30:00	0.0150	11.68	0.000	
02/04/99	10:30:01	0.0200	11.68	0.001	
02/04/99	10:30:01	0.0250	11.69	0.001	
02/04/99	10:30:01	0.0300	11.70	0.000	
02/04/99	10:30:02	0.0350	11.70	0.001	
02/04/99	10:30:02	0.0400	11.70	0.001	
02/04/99	10:30:02	0.0450	11.70	0.001	
02/04/99	10:30:03	0.0500	11.71	0.001	
02/04/99	10:30:03	0.0550	11.71	0.001	
02/04/99	10:30:03	0.0600	11.71	0.001	
02/04/99	10:30:03	0.0650	11.71	0.001	
02/04/99	10:30:04	0.0700	11.72	0.001	
02/04/99	10:30:04	0.0750	11.72	0.001	
02/04/99	10:30:04	0.0800	11.73	0.001	
02/04/99	10:30:05	0.0850	11.73	0.001	
02/04/99	10:30:05	0.0900	11.73	0.001	
02/04/99	10:30:05	0.0950	11.73	0.001	
02/04/99	10:30:06	0.1000	11.74	0.001	
02/04/99	10:30:06	0.1058	11.74	0.001	
02/04/99	10:30:06	0.1120	11.74	0.001	
02/04/99	10:30:07	0.1185	11.74	0.001	
02/04/99	10:30:07	0.1255	11.75	0.001	
02/04/99	10:30:07	0.1328	11.75	0.001	START TEST

02/04/99	10:30:17	0.2970	11.79	0.001
02/04/99	10:30:18	0.3147	11.79	0.001
02/04/99	10:30:20	0.3333	11.79	0.001
02/04/99	10:30:21	0.3532	11.79	0.001
02/04/99	10:30:22	0.3742	11.79	0.001
02/04/99	10:30:23	0.3963	11.79	0.001
02/04/99	10:30:25	0.4198	11.79	0.001
02/04/99	10:30:26	0.4447	11.79	0.001
02/04/99	10:30:28	0.4697	11.79	0.001
02/04/99	10:30:29	0.4963	11.79	0.001
02/04/99	10:30:31	0.5247	11.80	0.001
02/04/99	10:30:33	0.5547	11.80	0.001
02/04/99	10:30:35	0.5863	11.80	0.001
02/04/99	10:30:37	0.6213	11.80	0.001
02/04/99	10:30:39	0.6580	11.80	0.001
02/04/99	10:30:41	0.6963	11.80	0.001
02/04/99	10:30:44	0.7380	11.80	0.001
02/04/99	10:30:46	0.7813	11.80	0.001
02/04/99	10:30:49	0.8280	11.80	0.001
02/04/99	10:30:52	0.8763	11.80	0.001
02/04/99	10:30:55	0.9280	11.80	0.001
02/04/99	10:30:58	0.9830	11.80	0.001
02/04/99	10:31:02	1.0413	11.80	0.001
02/04/99	10:31:06	1.1030	11.80	0.001
02/04/99	10:31:10	1.1680	11.80	0.001
02/04/99	10:31:14	1.2380	11.80	0.001
02/04/99	10:31:18	1.3113	11.80	0.001
02/04/99	10:31:23	1.3897	11.80	0.001
02/04/99	10:31:28	1.4730	11.80	0.001
02/04/99	10:31:33	1.5613	11.80	0.001
02/04/99	10:31:39	1.6547	11.80	0.001
02/04/99	10:31:45	1.7530	11.80	0.001
02/04/99	10:31:51	1.8580	11.79	0.001
02/04/99	10:31:58	1.9680	11.79	0.001
02/04/99	10:32:05	2.0847	11.80	0.001
02/04/99	10:32:12	2.2097	11.80	0.001
02/04/99	10:32:20	2.3413	11.80	0.001
02/04/99	10:32:28	2.4813	11.79	0.001
02/04/99	10:32:37	2.6297	11.79	0.001
02/04/99	10:32:47	2.7863	11.79	0.001
02/04/99	10:32:57	2.9530	11.79	0.001
02/04/99	10:33:07	3.1297	11.79	0.001
02/04/99	10:33:18	3.3163	11.79	0.001
02/04/99	10:33:30	3.5147	11.79	0.001
02/04/99	10:33:43	3.7247	11.79	0.001
02/04/99	10:33:56	3.9463	11.79	0.001
02/04/99	10:34:10	4.1813	11.78	0.001
02/04/99	10:34:25	4.4297	11.78	0.001
02/04/99	10:34:41	4.6930	11.78	0.001
02/04/99	10:34:58	4.9730	11.78	0.001
02/04/99	10:35:16	5.2697	11.77	0.001
02/04/99	10:35:34	5.5830	11.77	0.001
02/04/99	10:35:54	5.9147	11.77	0.001
02/04/99	10:36:15	6.2663	11.77	0.001
02/04/99	10:36:38	6.6397	11.77	0.001
02/04/99	10:37:02	7.0347	11.76	0.001

02/04/99	10:45:47	15.7913	11.71	0.000
02/04/99	10:46:43	16.7297	11.71	0.001
02/04/99	10:47:43	17.7230	11.71	0.001
02/04/99	10:48:43	18.7230	11.71	0.000
02/04/99	10:49:43	19.7230	11.70	0.000
02/04/99	10:50:43	20.7230	11.70	0.000
02/04/99	10:51:43	21.7230	11.70	0.000
02/04/99	10:52:43	22.7230	11.70	0.000
02/04/99	10:53:43	23.7230	11.70	0.000
02/04/99	10:54:43	24.7230	11.70	0.000
02/04/99	10:55:43	25.7230	11.70	0.000
02/04/99	10:56:43	26.7230	11.70	0.001
02/04/99	10:57:43	27.7230	11.70	0.000
02/04/99	10:58:43	28.7230	11.70	0.001
02/04/99	10:59:43	29.7230	11.70	0.001
02/04/99	11:00:43	30.7230	11.70	0.001
02/04/99	11:01:43	31.7230	11.70	0.001
02/04/99	11:02:43	32.7230	11.70	0.001
02/04/99	11:03:43	33.7230	11.70	0.001
02/04/99	11:04:43	34.7230	11.70	0.001
02/04/99	11:05:43	35.7230	11.70	0.000
02/04/99	11:06:43	36.7230	11.70	0.000
02/04/99	11:07:43	37.7230	11.70	0.001
02/04/99	11:08:43	38.7230	11.69	0.001
02/04/99	11:09:43	39.7230	11.70	0.001
02/04/99	11:10:43	40.7230	11.70	0.001
02/04/99	11:11:43	41.7230	11.70	0.001
02/04/99	11:12:43	42.7230	11.70	0.001
02/04/99	11:13:43	43.7230	11.70	0.001
02/04/99	11:14:43	44.7230	11.70	0.001
02/04/99	11:15:43	45.7230	11.70	0.001
02/04/99	11:16:43	46.7230	11.70	0.001
02/04/99	11:17:43	47.7230	11.70	0.001
02/04/99	11:18:43	48.7230	11.70	0.001
02/04/99	11:19:43	49.7230	11.70	0.001
02/04/99	11:20:43	50.7230	11.70	0.001
02/04/99	11:21:43	51.7230	11.70	0.001
02/04/99	11:22:43	52.7230	11.70	0.001
02/04/99	11:23:43	53.7230	11.70	0.001
02/04/99	11:24:43	54.7230	11.70	0.001
02/04/99	11:25:43	55.7230	11.70	0.001
02/04/99	11:26:43	56.7230	11.70	0.001
02/04/99	11:27:43	57.7230	11.70	0.001
02/04/99	11:28:43	58.7230	11.70	0.001
02/04/99	11:29:43	59.7230	11.70	0.001
02/04/99	11:30:43	60.7230	11.70	0.001
02/04/99	11:31:43	61.7230	11.70	0.001
02/04/99	11:32:43	62.7230	11.70	0.002
02/04/99	11:33:43	63.7230	11.70	0.001
02/04/99	11:34:43	64.7230	11.70	0.001
02/04/99	11:35:43	65.7230	11.70	0.001
02/04/99	11:36:43	66.7230	11.70	0.001
02/04/99	11:37:43	67.7230	11.70	0.002
02/04/99	11:38:43	68.7230	11.70	0.001
02/04/99	11:39:43	69.7230	11.70	0.001
02/04/99	11:40:43	70.7230	11.70	0.001

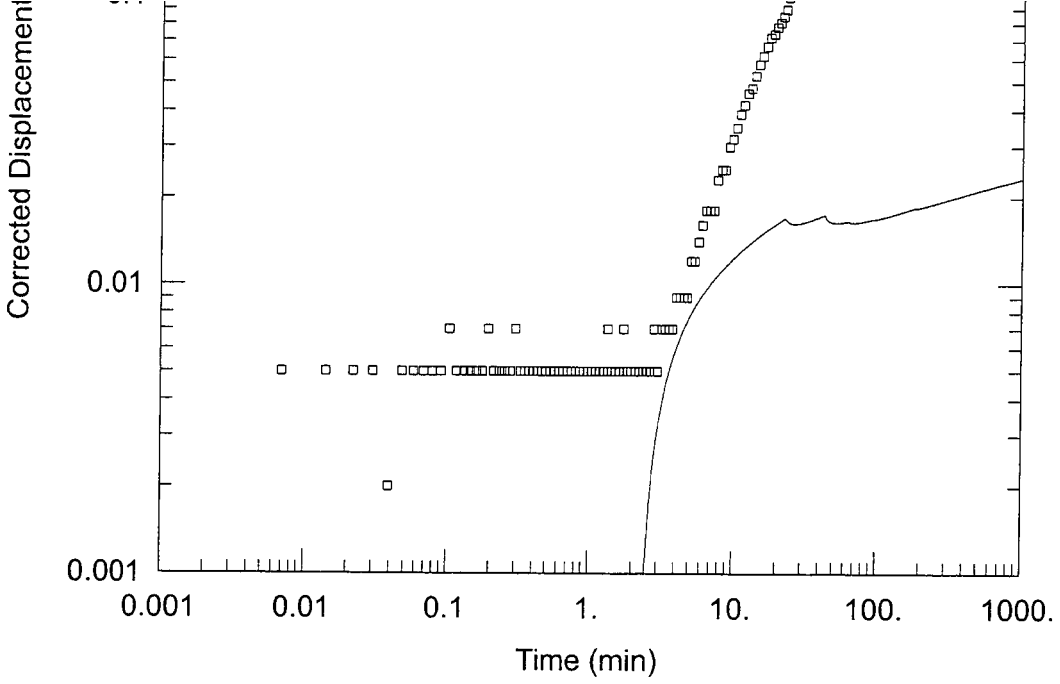
02/04/99	11:54:43	84.7230	11.70	-0.001
02/04/99	11:55:43	85.7230	11.70	-0.001
02/04/99	11:56:43	86.7230	11.70	-0.002
02/04/99	11:57:43	87.7230	11.70	-0.003
02/04/99	11:58:43	88.7230	11.70	-0.003
02/04/99	11:59:43	89.7230	11.70	-0.004
02/04/99	12:00:43	90.7230	11.70	-0.004
02/04/99	12:01:43	91.7230	11.70	-0.004
02/04/99	12:02:43	92.7230	11.70	-0.005
02/04/99	12:03:43	93.7230	11.70	-0.005
02/04/99	12:04:43	94.7230	11.70	-0.006
02/04/99	12:05:43	95.7230	11.70	-0.006
02/04/99	12:06:43	96.7230	11.70	-0.006
02/04/99	12:07:43	97.7230	11.70	-0.006
02/04/99	12:08:43	98.7230	11.70	-0.007
02/04/99	12:09:43	99.7230	11.70	-0.008
02/04/99	12:10:43	100.7230	11.70	-0.008
02/04/99	12:11:43	101.7230	11.70	-0.008
02/04/99	12:12:43	102.7230	11.70	-0.008
02/04/99	12:13:43	103.7230	11.70	-0.008
02/04/99	12:14:43	104.7230	11.70	-0.009
02/04/99	12:15:43	105.7230	11.70	-0.010
02/04/99	12:16:43	106.7230	11.70	-0.011
02/04/99	12:17:43	107.7230	11.70	-0.011
02/04/99	12:18:43	108.7230	11.70	-0.011
02/04/99	12:19:43	109.7230	11.70	-0.011
02/04/99	12:20:43	110.7230	11.70	-0.011
02/04/99	12:21:43	111.7230	11.70	-0.012
02/04/99	12:22:43	112.7230	11.70	-0.012
02/04/99	12:23:43	113.7230	11.70	-0.013
02/04/99	12:24:43	114.7230	11.70	-0.013
02/04/99	12:25:43	115.7230	11.70	-0.014
02/04/99	12:26:43	116.7230	11.70	-0.015
02/04/99	12:27:43	117.7230	11.70	-0.015
02/04/99	12:28:43	118.7230	11.70	-0.015
02/04/99	12:29:43	119.7230	11.70	-0.015
02/04/99	12:30:43	120.7230	11.70	-0.016
02/04/99	12:31:43	121.7230	11.70	-0.016
02/04/99	12:32:43	122.7230	11.70	-0.016
02/04/99	12:33:43	123.7230	11.70	-0.017
02/04/99	12:34:43	124.7230	11.70	-0.017
02/04/99	12:35:43	125.7230	11.70	-0.017
02/04/99	12:36:43	126.7230	11.70	-0.018
02/04/99	12:37:43	127.7230	11.70	-0.018
02/04/99	12:38:43	128.7230	11.70	-0.018
02/04/99	12:39:43	129.7230	11.70	-0.018
02/04/99	12:40:43	130.7230	11.70	-0.018
02/04/99	12:41:43	131.7230	11.70	-0.018
02/04/99	12:42:43	132.7230	11.70	-0.019
02/04/99	12:43:43	133.7230	11.70	-0.019
02/04/99	12:44:43	134.7230	11.70	-0.019
02/04/99	12:45:43	135.7230	11.70	-0.019
02/04/99	12:46:43	136.7230	11.70	-0.020
02/04/99	12:47:43	137.7230	11.70	-0.019
02/04/99	12:48:43	138.7230	11.70	-0.020
02/04/99	12:49:43	139.7230	11.70	-0.020

02/04/99	13:03:43	153.7230	11.70	-0.020
02/04/99	13:04:43	154.7230	11.70	-0.020
02/04/99	13:05:43	155.7230	11.70	-0.020
02/04/99	13:06:43	156.7230	11.70	-0.020
02/04/99	13:07:43	157.7230	11.70	-0.020
02/04/99	13:08:43	158.7230	11.70	-0.020
02/04/99	13:09:43	159.7230	11.70	-0.020
02/04/99	13:10:43	160.7230	11.70	-0.020
02/04/99	13:11:43	161.7230	11.70	-0.020
02/04/99	13:12:43	162.7230	11.70	-0.020
02/04/99	13:13:43	163.7230	11.70	-0.020
02/04/99	13:14:43	164.7230	11.70	-0.020
02/04/99	13:15:43	165.7230	11.70	-0.020
02/04/99	13:16:43	166.7230	11.70	-0.020
02/04/99	13:17:43	167.7230	11.70	-0.020
02/04/99	13:18:43	168.7230	11.70	-0.020
02/04/99	13:19:43	169.7230	11.70	-0.020
02/04/99	13:20:43	170.7230	11.70	-0.020
02/04/99	13:21:43	171.7230	11.70	-0.020
02/04/99	13:22:43	172.7230	11.70	-0.020
02/04/99	13:23:43	173.7230	11.70	-0.020
02/04/99	13:24:43	174.7230	11.70	-0.020
02/04/99	13:25:43	175.7230	11.70	-0.020
02/04/99	13:26:43	176.7230	11.70	-0.020
02/04/99	13:27:43	177.7230	11.70	-0.020
02/04/99	13:28:43	178.7230	11.70	-0.020
02/04/99	13:29:43	179.7230	11.70	-0.020
02/04/99	13:30:43	180.7230	11.70	-0.020
02/04/99	13:31:43	181.7230	11.70	-0.020
02/04/99	13:32:43	182.7230	11.70	-0.020
02/04/99	13:33:43	183.7230	11.70	-0.020
02/04/99	13:34:43	184.7230	11.70	-0.020
02/04/99	13:35:43	185.7230	11.70	-0.020
02/04/99	13:36:43	186.7230	11.70	-0.020
02/04/99	13:37:43	187.7230	11.70	-0.020
02/04/99	13:38:43	188.7230	11.70	-0.020
02/04/99	13:39:43	189.7230	11.70	-0.020
02/04/99	13:40:43	190.7230	11.70	-0.020
02/04/99	13:41:43	191.7230	11.70	-0.020
02/04/99	13:42:43	192.7230	11.70	-0.020
02/04/99	13:43:43	193.7230	11.70	-0.020
02/04/99	13:44:43	194.7230	11.70	-0.020
02/04/99	13:45:43	195.7230	11.70	-0.020
02/04/99	13:46:43	196.7230	11.70	-0.020
02/04/99	13:47:43	197.7230	11.70	-0.020
02/04/99	13:48:43	198.7230	11.70	-0.020
02/04/99	13:49:43	199.7230	11.70	-0.020
02/04/99	13:50:43	200.7230	11.70	-0.019
02/04/99	13:51:43	201.7230	11.70	-0.020
02/04/99	13:52:43	202.7230	11.70	-0.020
02/04/99	13:53:43	203.7230	11.70	-0.020
02/04/99	13:54:43	204.7230	11.70	-0.020
02/04/99	13:55:43	205.7230	11.70	-0.020
02/04/99	13:56:43	206.7230	11.70	-0.020
02/04/99	13:57:43	207.7230	11.70	-0.020
02/04/99	13:58:43	208.7230	11.70	-0.019

02/04/99	14:12:43	222.7230	11.70	-0.019
02/04/99	14:13:43	223.7230	11.70	-0.019
02/04/99	14:14:43	224.7230	11.70	-0.019
02/04/99	14:15:43	225.7230	11.70	-0.019
02/04/99	14:16:43	226.7230	11.70	-0.019
02/04/99	14:17:43	227.7230	11.70	-0.019
02/04/99	14:18:43	228.7230	11.70	-0.019
02/04/99	14:19:43	229.7230	11.70	-0.019
02/04/99	14:20:43	230.7230	11.70	-0.019
02/04/99	14:21:43	231.7230	11.70	-0.019
02/04/99	14:22:43	232.7230	11.70	-0.019
02/04/99	14:23:43	233.7230	11.70	-0.019
02/04/99	14:24:43	234.7230	11.70	-0.019
02/04/99	14:25:43	235.7230	11.70	-0.019
02/04/99	14:26:43	236.7230	11.70	-0.019
02/04/99	14:27:43	237.7230	11.70	-0.019
02/04/99	14:28:43	238.7230	11.70	-0.019
02/04/99	14:29:43	239.7230	11.70	-0.019
02/04/99	14:30:43	240.7230	11.70	-0.018
02/04/99	14:31:43	241.7230	11.70	-0.018
02/04/99	14:32:43	242.7230	11.70	-0.018
02/04/99	14:33:43	243.7230	11.70	-0.018
02/04/99	14:34:43	244.7230	11.70	-0.019
02/04/99	14:35:43	245.7230	11.70	-0.019
02/04/99	14:36:43	246.7230	11.70	-0.019
02/04/99	14:37:43	247.7230	11.70	-0.018
02/04/99	14:38:43	248.7230	11.70	-0.019
02/04/99	14:39:43	249.7230	11.70	-0.019
02/04/99	14:40:43	250.7230	11.70	-0.019
02/04/99	14:41:43	251.7230	11.70	-0.019
02/04/99	14:42:43	252.7230	11.70	-0.019
02/04/99	14:43:43	253.7230	11.70	-0.019
02/04/99	14:44:43	254.7230	11.70	-0.018
02/04/99	14:45:43	255.7230	11.70	-0.018
02/04/99	14:46:43	256.7230	11.70	-0.019
02/04/99	14:47:43	257.7230	11.70	-0.018
02/04/99	14:48:43	258.7230	11.70	-0.018
02/04/99	14:49:43	259.7230	11.70	-0.018
02/04/99	14:50:43	260.7230	11.70	-0.018
02/04/99	14:51:43	261.7230	11.70	-0.019
02/04/99	14:52:43	262.7230	11.70	-0.018
02/04/99	14:53:43	263.7230	11.70	-0.018
02/04/99	14:54:43	264.7230	11.70	-0.018
02/04/99	14:55:43	265.7230	11.70	-0.018
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02/04/99	14:58:43	268.7230	11.70	-0.018
02/04/99	14:59:43	269.7230	11.70	-0.018
02/04/99	15:00:43	270.7230	11.70	-0.018
02/04/99	15:01:43	271.7230	11.70	-0.018
02/04/99	15:02:43	272.7230	11.70	-0.018
02/04/99	15:03:43	273.7230	11.70	-0.018
02/04/99	15:04:43	274.7230	11.70	-0.018
02/04/99	15:05:43	275.7230	11.70	-0.018
02/04/99	15:06:43	276.7230	11.70	-0.018
02/04/99	15:07:43	277.7230	11.70	-0.018

02/04/99	15:21:43	291.7230	11.70	-0.018	
02/04/99	15:22:43	292.7230	11.70	-0.018	
02/04/99	15:23:43	293.7230	11.70	-0.018	
02/04/99	15:24:43	294.7230	11.70	-0.018	
02/04/99	15:25:43	295.7230	11.70	-0.018	
02/04/99	15:26:43	296.7230	11.70	-0.018	
02/04/99	15:27:43	297.7230	11.70	-0.018	
02/04/99	15:28:43	298.7230	11.70	-0.018	
02/04/99	15:29:43	299.7230	11.70	-0.018	STOP PUMP
02/04/99	15:30:43	300.7230	11.70	-0.018	
02/04/99	15:31:43	301.7230	11.70	-0.018	
02/04/99	15:32:43	302.7230	11.70	-0.018	
02/04/99	15:33:43	303.7230	11.70	-0.018	
02/04/99	15:34:43	304.7230	11.70	-0.018	
02/04/99	15:35:43	305.7230	11.70	-0.018	
02/04/99	15:36:43	306.7230	11.70	-0.018	
02/04/99	15:37:43	307.7230	11.70	-0.018	
02/04/99	15:38:43	308.7230	11.70	-0.018	
02/04/99	15:39:43	309.7230	11.70	-0.018	
02/04/99	15:40:43	310.7230	11.70	-0.018	
02/04/99	15:41:43	311.7230	11.70	-0.018	
02/04/99	15:42:43	312.7230	11.70	-0.018	
02/04/99	15:43:43	313.7230	11.70	-0.018	
02/04/99	15:44:43	314.7230	11.70	-0.018	
02/04/99	15:45:43	315.7230	11.70	-0.018	
02/04/99	15:46:43	316.7230	11.70	-0.018	
02/04/99	15:47:43	317.7230	11.70	-0.018	
02/04/99	15:48:43	318.7230	11.70	-0.018	
02/04/99	15:49:43	319.7230	11.70	-0.018	
02/04/99	15:50:43	320.7230	11.70	-0.018	
02/04/99	15:51:43	321.7230	11.70	-0.018	
02/04/99	15:52:43	322.7230	11.70	-0.018	
02/04/99	15:53:43	323.7230	11.70	-0.018	
02/04/99	15:54:43	324.7230	11.70	-0.018	
02/04/99	15:55:43	325.7230	11.70	-0.018	
02/04/99	15:56:43	326.7230	11.70	-0.018	
02/04/99	15:57:43	327.7230	11.70	-0.018	
02/04/99	15:58:43	328.7230	11.70	-0.018	
02/04/99	15:59:43	329.7230	11.70	-0.018	
02/04/99	16:00:43	330.7230	11.70	-0.018	
02/04/99	16:01:43	331.7230	11.70	-0.018	
02/04/99	16:02:43	332.7230	11.70	-0.018	
02/04/99	16:03:43	333.7230	11.70	-0.018	
02/04/99	16:04:43	334.7230	11.70	-0.018	
02/04/99	16:05:43	335.7230	11.70	-0.018	
02/04/99	16:06:43	336.7230	11.70	-0.018	
02/04/99	16:07:43	337.7230	11.70	-0.018	
02/04/99	16:08:43	338.7230	11.70	-0.018	
02/04/99	16:09:43	339.7230	11.70	-0.018	
02/04/99	16:10:43	340.7230	11.70	-0.018	
02/04/99	16:11:43	341.7230	11.70	-0.018	
02/04/99	16:12:43	342.7230	11.70	-0.018	
02/04/99	16:13:43	343.7230	11.70	-0.018	
02/04/99	16:14:43	344.7230	11.70	-0.018	
02/04/99	16:15:43	345.7230	11.70	-0.018	
02/04/99	16:16:43	346.7230	11.70	-0.018	

02/04/99	16:30:43	360.7230	11.70	-0.018
02/04/99	16:31:43	361.7230	11.70	-0.018
02/04/99	16:32:43	362.7230	11.70	-0.018
02/04/99	16:33:43	363.7230	11.70	-0.018
02/04/99	16:34:43	364.7230	11.70	-0.018
02/04/99	16:35:43	365.7230	11.70	-0.018
02/04/99	16:36:43	366.7230	11.70	-0.018
02/04/99	16:37:43	367.7230	11.70	-0.018
02/04/99	16:38:43	368.7230	11.70	-0.018
02/04/99	16:39:43	369.7230	11.70	-0.018
02/04/99	16:40:43	370.7230	11.70	-0.018
02/04/99	16:41:43	371.7230	11.70	-0.018
02/04/99	16:42:43	372.7230	11.70	-0.018
02/04/99	16:43:43	373.7230	11.70	-0.018
02/04/99	16:44:43	374.7230	11.70	-0.018
02/04/99	16:45:43	375.7230	11.70	-0.018
02/04/99	16:46:43	376.7230	11.70	-0.018
02/04/99	16:47:43	377.7230	11.70	-0.018
02/04/99	16:48:43	378.7230	11.70	-0.018
02/04/99	16:49:43	379.7230	11.70	-0.018
[illegible]	16:50:43	380.7230	11.70	-0.018
[illegible]	16:51:43	381.7230	11.70	-0.018
02/04/99	16:52:43	382.7230	11.70	-0.018
02/04/99	16:53:43	383.7230	11.70	-0.018
02/04/99	16:54:43	384.7230	11.70	-0.018
02/04/99	16:55:43	385.7230	11.70	-0.018
02/04/99	16:56:43	386.7230	11.70	-0.018
02/04/99	16:57:43	387.7230	11.70	-0.018
02/04/99	16:58:43	388.7230	11.70	-0.018
02/04/99	16:59:43	389.7230	11.70	-0.018
02/04/99	17:00:43	390.7230	11.70	-0.018
02/04/99	17:01:43	391.7230	11.70	-0.018
02/04/99	17:02:43	392.7230	11.70	-0.018
02/04/99	17:03:43	393.7230	11.70	-0.018
02/04/99	17:04:43	394.7230	11.70	-0.018
02/04/99	17:05:43	395.7230	11.70	-0.018
02/04/99	17:06:43	396.7230	11.70	-0.018
02/04/99	17:07:43	397.7230	11.70	-0.018
02/04/99	17:08:43	398.7230	11.70	-0.018
02/04/99	17:09:43	399.7230	11.70	-0.018
02/04/99	17:10:43	400.7230	11.70	-0.018
02/04/99	17:11:43	401.7230	11.70	-0.018
02/04/99	17:12:43	402.7230	11.70	-0.018
02/04/99	17:13:43	403.7230	11.70	-0.018
02/04/99	17:14:43	404.7230	11.70	-0.018
02/04/99	17:15:43	405.7230	11.70	-0.018
02/04/99	17:16:43	406.7230	11.70	-0.018
02/04/99	17:17:43	407.7230	11.70	-0.018
[illegible]	17:18:43	408.7230	11.70	-0.018
[illegible]	17:19:43	409.7230	11.70	-0.018
02/04/99	17:20:43	410.7230	11.70	-0.018
02/04/99	17:21:43	411.7230	11.70	-0.018
02/04/99	17:22:43	412.7230	11.70	-0.018
02/04/99	17:23:43	413.7230	11.70	-0.018
02/04/99	17:24:43	414.7230	11.70	-0.018
02/04/99	17:25:43	415.7230	11.70	-0.018



DII BINGHAMPTON PLASTICS, PUMP TEST #2

Data Set: C:\MYDOCU~1\PTEST#2.AQT
Date: 08/11/99 Time: 09:06:44

PROJECT INFORMATION

Company: Shield Environmental
Client: DII
Project: 396-0460
Test Location: Binghampton. NY
Test Well: DMW-1
Test Date: 02/08/99

AQUIFER DATA

Saturated Thickness: 20. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DMW-1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-15	40	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1. ft^2/min
S = 0.001039

Client: DII
Project: 396-0460
Location: Binghampton. NY
Test Date: 02/08/99
Test Well: DMW-1

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: DMW-1

X Location: 0 ft
Y Location: 0 ft

Pumping Period Data

Time (min)	Rate (cu. ft/min)
0.	0.
2.1	0.0636
22.55	0.0524
43.05	0.0439
63.2	0.0418
93.25	0.0412
123.3	0.0412
183.3	0.0405

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-15

X Location: 40 ft
Y Location: 0 ft

Observation Data

Time (min)	Displacement (ft)
0.007	0.005

0.0917	0.005
0.1042	0.007
0.1173	0.005
0.1313	0.005
0.1462	0.005
0.1618	0.005
0.1785	0.005
0.1962	0.007
0.2148	0.005
0.2347	0.005
0.2557	0.005
0.2778	0.005
0.3013	0.007
0.3262	0.005
0.3512	0.005
0.3778	0.005
0.4062	0.005
0.4362	0.005
0.4678	0.005
0.5028	0.005
0.5395	0.005
0.5778	0.005
0.6195	0.005
0.6628	0.005
0.7095	0.005
0.7578	0.005
0.8095	0.005
0.8645	0.005
0.9228	0.005
0.9845	0.005
1.05	0.005
1.12	0.005
1.193	0.005
1.271	0.005
1.355	0.007
1.443	0.005
1.536	0.005
1.635	0.005
1.74	0.007
1.85	0.005
1.966	0.005
2.091	0.005
2.223	0.005

3.828	0.007
4.063	0.009
4.311	0.009
4.575	0.009
4.855	0.009
5.151	0.012
5.465	0.012
5.796	0.014
6.148	0.016
6.521	0.018
6.916	0.018
7.335	0.018
7.778	0.023
8.248	0.025
8.746	0.025
9.273	0.03
9.831	0.032
10.42	0.035
11.05	0.039
11.71	0.042
12.42	0.046
13.16	0.048
13.95	0.053
14.79	0.058
15.67	0.062
16.61	0.067
17.6	0.072
18.6	0.074
19.6	0.078
20.6	0.081
21.6	0.085
22.6	0.09
23.6	0.099
24.6	0.104
25.6	0.108
26.6	0.113
27.6	0.118
28.6	0.122
29.6	0.125
30.6	0.129
31.6	0.136
32.6	0.141
33.6	0.145

42.6	0.178
43.6	0.18
44.6	0.182
45.6	0.185
46.6	0.185
47.6	0.187
48.6	0.189
49.6	0.191
50.6	0.194
51.6	0.196
52.6	0.201
53.6	0.203
54.6	0.205
55.6	0.208
56.6	0.21
57.6	0.215
58.6	0.217
59.6	0.221
60.6	0.221
61.6	0.224
62.6	0.228
63.6	0.228
64.6	0.231
65.6	0.233
66.6	0.233
67.6	0.235
68.6	0.238
69.6	0.24
70.6	0.24
71.6	0.242
72.6	0.242
73.6	0.245
74.6	0.242
75.6	0.245
76.6	0.245
77.6	0.247
78.6	0.249
79.6	0.249
80.6	0.249
81.6	0.251
82.6	0.251
83.6	0.254
84.6	0.254

93.6	0.265
94.6	0.268
95.6	0.268
96.6	0.27
97.6	0.27
98.6	0.27
99.6	0.27
100.6	0.272
101.6	0.274
102.6	0.274
103.6	0.274
104.6	0.277
105.6	0.277
106.6	0.277
107.6	0.277
108.6	0.279
109.6	0.279
110.6	0.279
111.6	0.279
112.6	0.274
113.6	0.277
114.6	0.277
115.6	0.279
116.6	0.279
117.6	0.279
118.6	0.281
119.6	0.284
120.6	0.284
121.6	0.286
122.6	0.286
123.6	0.288
124.6	0.288
125.6	0.288
126.6	0.302
127.6	0.302
128.6	0.302
129.6	0.302
130.6	0.302
131.6	0.302
132.6	0.302
133.6	0.302
134.6	0.3
135.6	0.302

136.6	0.302
137.6	0.302
138.6	0.302
139.6	0.302
140.6	0.304
141.6	0.304
142.6	0.304
143.6	0.304
144.6	0.307
145.6	0.307
146.6	0.307
147.6	0.307
148.6	0.307
149.6	0.307
150.6	0.307
151.6	0.307
152.6	0.307
153.6	0.307
154.6	0.307
155.6	0.309
156.6	0.309
157.6	0.309
158.6	0.309
159.6	0.309
160.6	0.309
161.6	0.307
162.6	0.309
163.6	0.309
164.6	0.311
165.6	0.311
166.6	0.311
167.6	0.311
168.6	0.311
169.6	0.314
170.6	0.314
171.6	0.314
172.6	0.316
173.6	0.316
174.6	0.314
175.6	0.316
176.6	0.316
177.6	0.316
178.6	0.316
179.6	0.318
180.6	0.318
181.6	0.318
182.6	0.321
183.6	0.311
184.6	0.321
185.6	0.323
186.6	0.323

187.6	0.323
188.6	0.323
189.6	0.323
190.6	0.323
191.6	0.323
192.6	0.323
193.6	0.323
194.6	0.325
195.6	0.323
196.6	0.325
197.6	0.325
198.6	0.325
199.6	0.328
200.6	0.325
201.6	0.325
202.6	0.325
203.6	0.328
204.6	0.328
205.6	0.33
206.6	0.328
207.6	0.328
208.6	0.33
209.6	0.33
210.6	0.33
211.6	0.33
212.6	0.328
213.6	0.332
214.6	0.33
215.6	0.33
216.6	0.33
217.6	0.33
218.6	0.33
219.6	0.332
220.6	0.33
221.6	0.332
222.6	0.332
223.6	0.332
224.6	0.332
225.6	0.332
226.6	0.334
227.6	0.332
228.6	0.334
229.6	0.334
230.6	0.337
231.6	0.337
232.6	0.337
233.6	0.337
234.6	0.337
235.6	0.339
236.6	0.339
237.6	0.339

238.6	0.339
239.6	0.337
240.6	0.337
241.6	0.337
242.6	0.339
243.6	0.337
244.6	0.339
245.6	0.337
246.6	0.339
247.6	0.339
248.6	0.337
249.6	0.337
250.6	0.337
251.6	0.339
252.6	0.339
253.6	0.339
254.6	0.339
255.6	0.341
256.6	0.341
257.6	0.341
258.6	0.341
259.6	0.346
260.6	0.348
261.6	0.348
262.6	0.351
263.6	0.351
264.6	0.353
265.6	0.346
266.6	0.344
267.6	0.344
268.6	0.344
269.6	0.346
270.6	0.346
271.6	0.346
272.6	0.346
273.6	0.344
274.6	0.346
275.6	0.346
276.6	0.346
277.6	0.346
278.6	0.346
279.6	0.346
280.6	0.348
281.6	0.348
282.6	0.348
283.6	0.348
284.6	0.348
285.6	0.348
286.6	0.348
287.6	0.348
288.6	0.351

289.6	0.348
290.6	0.351
291.6	0.351
292.6	0.353
293.6	0.353
294.6	0.353
295.6	0.351
296.6	0.351
297.6	0.351
298.6	0.353
299.6	0.353
300.6	0.353

SOLUTION

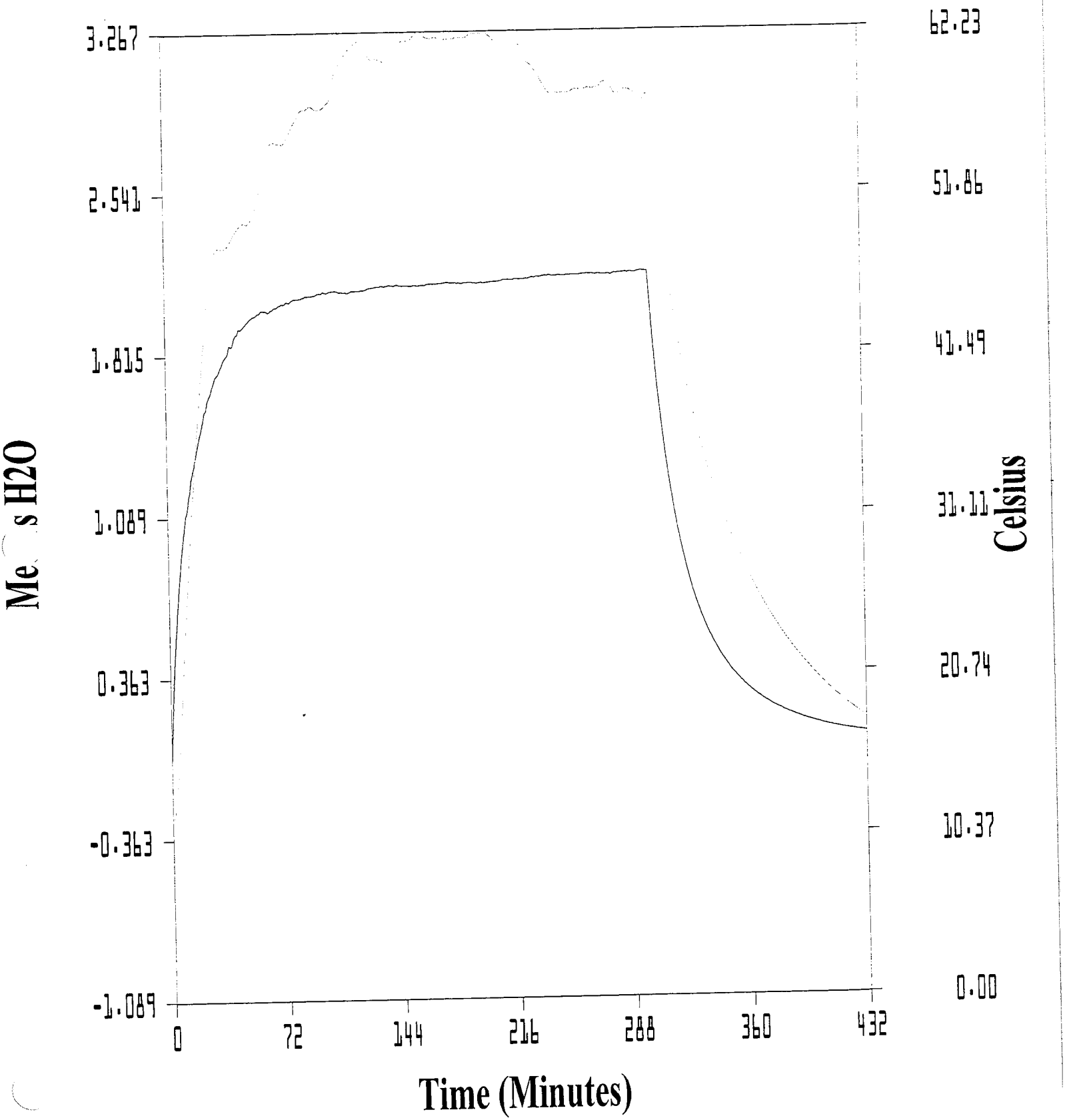
Aquifer Model: Unconfined
Solution Method: Theis

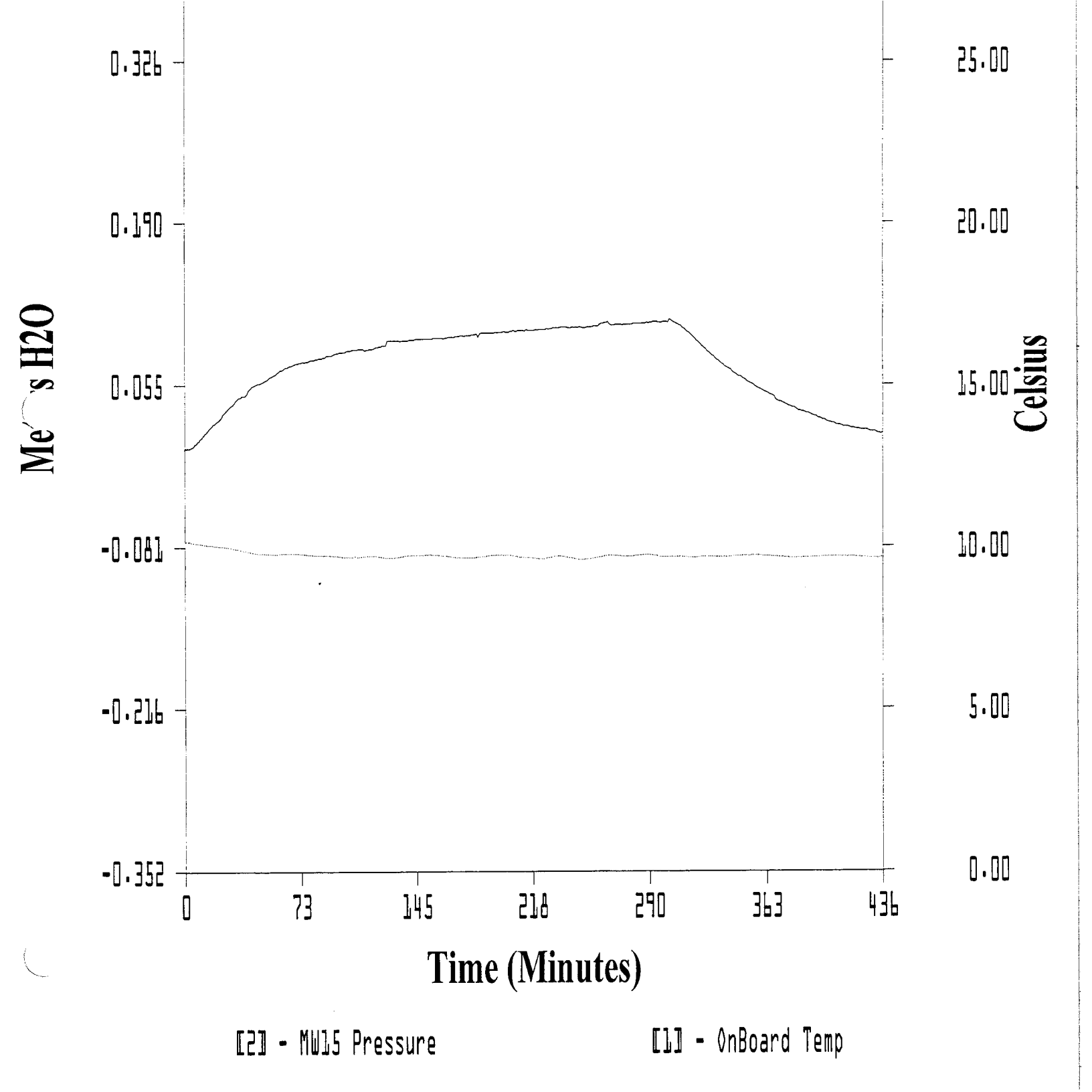
VISUAL ESTIMATION RESULTS

Estimated Parameters

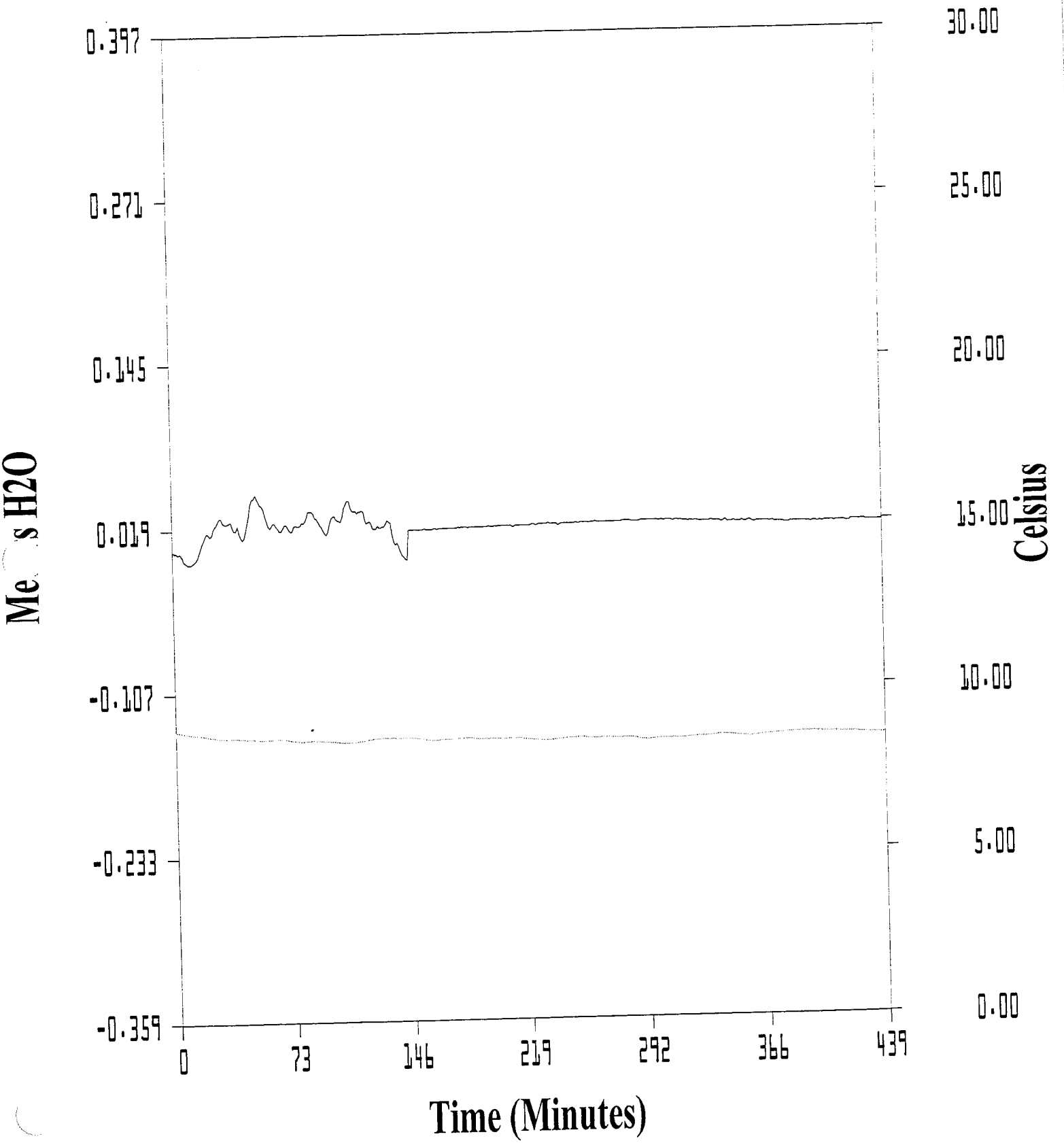
Parameter	Estimate	
T	1.	ft^2/min
S	0.001039	

Pump Test 2


3.267
2.541
1.815
1.089
0.363
-0.363
-1.089
Me s H2O
62.23
51.86
41.49
31.11
20.74
10.37
0.00
Celsius
0
72
144
216
288
360
432
Time (Minutes)
[2] - DMW1 Pressure
[1] - OnBoard Temp


0.326
0.190
0.055
-0.081
-0.216
-0.352
Me's H2O
25.00
20.00
15.00
10.00
5.00
0.00
Celsius
0
73
145
218
290
363
436
Time (Minutes)
[2] - MW15 Pressure
[1] - OnBoard Temp

Pump Test 2


0.397
0.271
0.145
0.019
-0.107
-0.233
-0.359
Meters H2O
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Celsius
0
73
146
219
292
366
439
Time (Minutes)
[2] - MW10 Pressure
[1] - OnBoard Temp

Test scheduled for: 02/08/99 10:30:00
Test started on: 02/08/99 10:30:00
Test stopped on: 02/08/99 17:42:32
Test extracted on: 02/08/99 17:42:45

Data gathered using Logarithmic testing
Maximum time between data points: 1.0000 Minutes.
Number of data samples: 525

TOTAL DATA SAMPLES 525

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure/Level
Channel name: DMW1 Pressure
Sensor Range: 15 PSI.
Specific gravity: 1.000
Mode: TOC
User-defined reference: 0.000 Meters H20
Referenced on: test start
Pressure head at reference: 4.000 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20
02/08/99	10:30:00	0.0000	11.61	0.000
02/08/99	10:30:00	0.0050	11.61	0.000
02/08/99	10:30:00	0.0100	11.61	0.000
02/08/99	10:30:00	0.0150	11.63	0.000
02/08/99	10:30:01	0.0200	11.63	0.000
02/08/99	10:30:01	0.0250	11.63	0.000
02/08/99	10:30:01	0.0300	11.64	0.000
02/08/99	10:30:02	0.0350	11.64	0.000
02/08/99	10:30:02	0.0400	11.64	0.000
02/08/99	10:30:02	0.0450	11.65	0.001
02/08/99	10:30:03	0.0500	11.65	0.000
02/08/99	10:30:03	0.0550	11.65	0.000
02/08/99	10:30:03	0.0600	11.66	0.001
02/08/99	10:30:03	0.0650	11.66	0.000
02/08/99	10:30:04	0.0700	11.66	0.001
02/08/99	10:30:04	0.0750	11.66	0.000
02/08/99	10:30:04	0.0800	11.67	0.000
02/08/99	10:30:05	0.0850	11.68	0.000
02/08/99	10:30:05	0.0900	11.68	0.001
02/08/99	10:30:05	0.0950	11.68	0.000
02/08/99	10:30:06	0.1000	11.68	0.001
02/08/99	10:30:06	0.1058	11.68	0.001
02/08/99	10:30:06	0.1120	11.69	0.001
02/08/99	10:30:07	0.1185	11.69	0.001 START - 0
02/08/99	10:30:07	0.1255	11.69	0.009
02/08/99	10:30:07	0.1328	11.69	0.008

02/08/99	10:30:08	0.1407	11.69	0.006
02/08/99	10:30:08	0.1490	11.70	0.006
02/08/99	10:30:09	0.1578	11.70	0.008
02/08/99	10:30:10	0.1672	11.71	0.007
02/08/99	10:30:10	0.1770	11.72	0.008
[illegible]8/99	10:30:11	0.1875	11.72	0.010
[illegible]8/99	10:30:11	0.1985	11.71	0.009
02/08/99	10:30:12	0.2102	11.72	0.014
02/08/99	10:30:13	0.2227	11.72	0.013
02/08/99	10:30:14	0.2358	11.73	0.017
02/08/99	10:30:14	0.2498	11.73	0.021
02/08/99	10:30:15	0.2647	11.73	0.024
02/08/99	10:30:16	0.2803	11.73	0.026
02/08/99	10:30:17	0.2970	11.73	0.030
02/08/99	10:30:18	0.3147	11.74	0.035
02/08/99	10:30:20	0.3333	11.74	0.039
02/08/99	10:30:21	0.3532	11.74	0.041
02/08/99	10:30:22	0.3742	11.74	0.046
02/08/99	10:30:23	0.3963	11.74	0.047
02/08/99	10:30:25	0.4198	11.74	0.053
02/08/99	10:30:26	0.4447	11.74	0.057
02/08/99	10:30:28	0.4697	11.74	0.060
02/08/99	10:30:29	0.4963	11.75	0.069
02/08/99	10:30:31	0.5247	11.74	0.070
02/08/99	10:30:33	0.5547	11.76	0.079
02/08/99	10:30:35	0.5863	11.75	0.082
02/08/99	10:30:37	0.6213	11.76	0.089
02/08/99	10:30:39	0.6580	11.75	0.094
02/08/99	10:30:41	0.6963	11.76	0.105
02/08/99	10:30:44	0.7380	11.76	0.109
02/08/99	10:30:46	0.7813	11.76	0.117
02/08/99	10:30:49	0.8280	11.77	0.127
02/08/99	10:30:52	0.8763	11.78	0.133
[illegible]8/99	10:30:55	0.9280	11.78	0.141
[illegible]8/99	10:30:58	0.9830	11.79	0.150
02/08/99	10:31:02	1.0413	11.80	0.161
02/08/99	10:31:06	1.1030	11.82	0.173
02/08/99	10:31:10	1.1680	11.83	0.184
02/08/99	10:31:14	1.2380	11.85	0.193
02/08/99	10:31:18	1.3113	11.88	0.205
02/08/99	10:31:23	1.3897	11.90	0.216
02/08/99	10:31:28	1.4730	11.93	0.226
02/08/99	10:31:33	1.5613	11.98	0.243
02/08/99	10:31:39	1.6547	12.03	0.258
02/08/99	10:31:45	1.7530	12.07	0.268
02/08/99	10:31:51	1.8580	12.14	0.285
02/08/99	10:31:58	1.9680	12.21	0.300
02/08/99	10:32:05	2.0847	12.29	0.319
02/08/99	10:32:12	2.2097	12.39	0.333
02/08/99	10:32:20	2.3413	12.50	0.350
02/08/99	10:32:28	2.4813	12.61	0.369
02/08/99	10:32:37	2.6297	12.76	0.388
02/08/99	10:32:47	2.7863	12.91	0.411
02/08/99	10:32:57	2.9530	13.09	0.430
02/08/99	10:33:07	3.1297	13.27	0.449
02/08/99	10:33:18	3.3163	13.50	0.477
02/08/99	10:33:30	3.5147	13.74	0.496
02/08/99	10:33:43	3.7247	13.99	0.518
02/08/99	10:33:56	3.9463	14.29	0.545
02/08/99	10:34:10	4.1813	14.61	0.569
02/08/99	10:34:25	4.4297	14.96	0.596
[illegible]8/99	10:34:41	4.6930	15.34	0.619
[illegible]8/99	10:34:58	4.9730	15.76	0.648
02/08/99	10:35:16	5.2697	16.21	0.675
02/08/99	10:35:34	5.5830	16.71	0.707
02/08/99	10:35:54	5.9147	17.23	0.735
02/08/99	10:36:15	6.2663	17.80	0.766
02/08/99	10:36:38	6.6397	18.41	0.798
02/08/99	10:37:02	7.0347	19.06	0.828

02/08/99	10:37:27	7.4530	19.75	0.860
02/08/99	10:37:53	7.8963	20.49	0.893
02/08/99	10:38:21	8.3663	21.27	0.927
02/08/99	10:38:51	8.8647	22.10	0.961
02/08/99	10:39:23	9.3913	22.97	0.995
02/08/99	10:39:56	9.9497	23.88	1.029
02/08/99	10:40:32	10.5413	24.83	1.064
02/08/99	10:41:10	11.1680	25.83	1.097
02/08/99	10:41:49	11.8313	26.86	1.113
02/08/99	10:42:32	12.5347	27.94	1.138
02/08/99	10:43:16	13.2797	29.05	1.184
02/08/99	10:44:04	14.0697	30.19	1.204
02/08/99	10:44:54	14.9063	31.36	1.262
02/08/99	10:45:47	15.7913	32.57	1.292
02/08/99	10:46:43	16.7297	33.81	1.322
02/08/99	10:47:43	17.7230	35.07	1.361
02/08/99	10:48:43	18.7230	36.32	1.395
02/08/99	10:49:43	19.7230	37.56	1.429
02/08/99	10:50:43	20.7230	38.79	1.460
02/08/99	10:51:43	21.7230	40.02	1.489
02/08/99	10:52:43	22.7230	41.20	1.523
02/08/99	10:53:43	23.7230	42.33	1.564
02/08/99	10:54:43	24.7230	43.48	1.573
02/08/99	10:55:43	25.7230	44.59	1.613
02/08/99	10:56:43	26.7230	45.63	1.632
02/08/99	10:57:43	27.7230	46.52	1.647
02/08/99	10:58:43	28.7230	47.24	1.675
02/08/99	10:59:43	29.7230	47.75	1.692
02/08/99	11:00:43	30.7230	48.10	1.719
02/08/99	11:01:43	31.7230	48.29	1.728
02/08/99	11:02:43	32.7230	48.42	1.737
02/08/99	11:03:43	33.7230	48.47	1.758
02/08/99	11:04:43	34.7230	48.46	1.771
02/08/99	11:05:43	35.7230	48.41	1.792
02/08/99	11:06:43	36.7230	48.41	1.805
02/08/99	11:07:43	37.7230	48.43	1.813
02/08/99	11:08:43	38.7230	48.50	1.827
02/08/99	11:09:43	39.7230	48.62	1.862
02/08/99	11:10:43	40.7230	48.81	1.855
02/08/99	11:11:43	41.7230	49.00	1.860
02/08/99	11:12:43	42.7230	49.19	1.893
02/08/99	11:13:43	43.7230	49.38	1.907
02/08/99	11:14:43	44.7230	49.53	1.912
02/08/99	11:15:43	45.7230	49.69	1.936
02/08/99	11:16:43	46.7230	49.82	1.931
02/08/99	11:17:43	47.7230	49.93	1.939
02/08/99	11:18:43	48.7230	50.00	1.946
02/08/99	11:19:43	49.7230	50.04	1.955
02/08/99	11:20:43	50.7230	50.01	1.963
02/08/99	11:21:43	51.7230	49.96	1.971
02/08/99	11:22:43	52.7230	50.05	1.979
02/08/99	11:23:43	53.7230	50.17	1.985
02/08/99	11:24:43	54.7230	50.33	1.991
02/08/99	11:25:43	55.7230	50.55	1.993
02/08/99	11:26:43	56.7230	50.86	1.997
02/08/99	11:27:43	57.7230	51.22	2.005
02/08/99	11:28:43	58.7230	51.59	2.006
02/08/99	11:29:43	59.7230	52.02	2.016
02/08/99	11:30:43	60.7230	52.38	2.017
02/08/99	11:31:43	61.7230	53.10	2.016
02/08/99	11:32:43	62.7230	53.69	2.016
02/08/99	11:33:43	63.7230	54.06	2.009
02/08/99	11:34:43	64.7230	54.70	2.011
02/08/99	11:35:43	65.7230	55.05	2.020
02/08/99	11:36:43	66.7230	55.09	2.021
02/08/99	11:37:43	67.7230	55.14	2.028
02/08/99	11:38:43	68.7230	55.20	2.032
02/08/99	11:39:43	69.7230	55.14	2.031
02/08/99	11:40:43	70.7230	55.11	2.040

02/08/99	11:54:43	84.7230	56.96	2.069
02/08/99	11:55:43	85.7230	57.13	2.074
02/08/99	11:56:43	86.7230	57.24	2.076
02/08/99	11:57:43	87.7230	57.26	2.082
02/08/99	11:58:43	88.7230	57.24	2.078
02/08/99	11:59:43	89.7230	57.27	2.081
02/08/99	12:00:43	90.7230	57.39	2.080
02/08/99	12:01:43	91.7230	57.46	2.081
02/08/99	12:02:43	92.7230	57.45	2.083
02/08/99	12:03:43	93.7230	57.38	2.085
02/08/99	12:04:43	94.7230	57.30	2.090
02/08/99	12:05:43	95.7230	57.27	2.092
02/08/99	12:06:43	96.7230	57.25	2.092
02/08/99	12:07:43	97.7230	57.23	2.092
02/08/99	12:08:43	98.7230	57.27	2.100
02/08/99	12:09:43	99.7230	57.30	2.096
02/08/99	12:10:43	100.7230	57.41	2.093
02/08/99	12:11:43	101.7230	57.53	2.096
02/08/99	12:12:43	102.7230	57.62	2.100
02/08/99	12:13:43	103.7230	57.72	2.101
02/08/99	12:14:43	104.7230	57.93	2.103
02/08/99	12:15:43	105.7230	58.41	2.103
02/08/99	12:16:43	106.7230	59.09	2.103
02/08/99	12:17:43	107.7230	59.56	2.099
02/08/99	12:18:43	108.7230	59.88	2.096
02/08/99	12:19:43	109.7230	59.99	2.097
02/08/99	12:20:43	110.7230	60.20	2.096
02/08/99	12:21:43	111.7230	60.38	2.094
02/08/99	12:22:43	112.7230	60.60	2.096
02/08/99	12:23:43	113.7230	60.70	2.092
02/08/99	12:24:43	114.7230	60.88	2.094
02/08/99	12:25:43	115.7230	61.01	2.097
02/08/99	12:26:43	116.7230	61.14	2.103
02/08/99	12:27:43	117.7230	61.26	2.099
02/08/99	12:28:43	118.7230	61.31	2.101
02/08/99	12:29:43	119.7230	61.41	2.101
02/08/99	12:30:43	120.7230	61.56	2.101
02/08/99	12:31:43	121.7230	61.61	2.101
02/08/99	12:32:43	122.7230	61.64	2.104
02/08/99	12:33:43	123.7230	61.68	2.104
02/08/99	12:34:43	124.7230	61.57	2.105
02/08/99	12:35:43	125.7230	61.28	2.108
02/08/99	12:36:43	126.7230	61.05	2.112
02/08/99	12:37:43	127.7230	60.85	2.113
02/08/99	12:38:43	128.7230	60.68	2.114
02/08/99	12:39:43	129.7230	60.52	2.116
02/08/99	12:40:43	130.7230	60.44	2.117
02/08/99	12:41:43	131.7230	60.52	2.119
02/08/99	12:42:43	132.7230	60.52	2.120
02/08/99	12:43:43	133.7230	60.47	2.118
02/08/99	12:44:43	134.7230	60.45	2.123
02/08/99	12:45:43	135.7230	60.40	2.121
02/08/99	12:46:43	136.7230	60.35	2.119
02/08/99	12:47:43	137.7230	60.30	2.122
02/08/99	12:48:43	138.7230	60.24	2.123
02/08/99	12:49:43	139.7230	60.20	2.125

02/08/99	13:03:43	153.7230	61.57	2.121
02/08/99	13:04:43	154.7230	61.64	2.124
02/08/99	13:05:43	155.7230	61.81	2.124
02/08/99	13:06:43	156.7230	61.94	2.122
02/08/99	13:07:43	157.7230	62.08	2.120
02/08/99	13:08:43	158.7230	62.17	2.123
02/08/99	13:09:43	159.7230	62.23	2.124
02/08/99	13:10:43	160.7230	62.22	2.124
02/08/99	13:11:43	161.7230	62.17	2.123
02/08/99	13:12:43	162.7230	62.04	2.125
02/08/99	13:13:43	163.7230	61.91	2.128
02/08/99	13:14:43	164.7230	61.83	2.128
02/08/99	13:15:43	165.7230	61.81	2.130
02/08/99	13:16:43	166.7230	61.78	2.128
02/08/99	13:17:43	167.7230	61.79	2.130
02/08/99	13:18:43	168.7230	61.81	2.128
02/08/99	13:19:43	169.7230	61.84	2.130
02/08/99	13:20:43	170.7230	61.85	2.132
02/08/99	13:21:43	171.7230	61.80	2.131
02/08/99	13:22:43	172.7230	61.73	2.132
02/08/99	13:23:43	173.7230	61.67	2.132
02/08/99	13:24:43	174.7230	61.66	2.135
02/08/99	13:25:43	175.7230	61.71	2.135
02/08/99	13:26:43	176.7230	61.73	2.133
02/08/99	13:27:43	177.7230	61.72	2.134
02/08/99	13:28:43	178.7230	61.71	2.134
02/08/99	13:29:43	179.7230	61.71	2.132
02/08/99	13:30:43	180.7230	61.76	2.133
02/08/99	13:31:43	181.7230	61.76	2.130
02/08/99	13:32:43	182.7230	61.81	2.132
02/08/99	13:33:43	183.7230	61.83	2.130
02/08/99	13:34:43	184.7230	61.83	2.129
02/08/99	13:35:43	185.7230	61.81	2.132
02/08/99	13:36:43	186.7230	61.81	2.134
02/08/99	13:37:43	187.7230	61.81	2.132
02/08/99	13:38:43	188.7230	61.80	2.135
02/08/99	13:39:43	189.7230	61.84	2.134
02/08/99	13:40:43	190.7230	61.94	2.135
02/08/99	13:41:43	191.7230	62.08	2.131
02/08/99	13:42:43	192.7230	62.11	2.132
02/08/99	13:43:43	193.7230	62.07	2.128
02/08/99	13:44:43	194.7230	62.07	2.130
02/08/99	13:45:43	195.7230	62.09	2.132
02/08/99	13:46:43	196.7230	62.07	2.135
02/08/99	13:47:43	197.7230	62.07	2.131
02/08/99	13:48:43	198.7230	62.06	2.131
02/08/99	13:49:43	199.7230	62.05	2.132
02/08/99	13:50:43	200.7230	62.08	2.132
02/08/99	13:51:43	201.7230	62.08	2.134
02/08/99	13:52:43	202.7230	62.02	2.135
02/08/99	13:53:43	203.7230	61.92	2.136
02/08/99	13:54:43	204.7230	61.83	2.137
02/08/99	13:55:43	205.7230	61.68	2.135
02/08/99	13:56:43	206.7230	61.59	2.136
02/08/99	13:57:43	207.7230	61.53	2.137
02/08/99	13:58:43	208.7230	61.51	2.138

02/08/99	13:59:43	209.7230	61.49	2.141
02/08/99	14:00:43	210.7230	61.46	2.144
02/08/99	14:01:43	211.7230	61.46	2.144
02/08/99	14:02:43	212.7230	61.43	2.145
02/08/99	14:03:43	213.7230	61.38	2.144
02/08/99	14:04:43	214.7230	61.34	2.144
02/08/99	14:05:43	215.7230	61.29	2.144
02/08/99	14:06:43	216.7230	61.27	2.143
02/08/99	14:07:43	217.7230	61.30	2.146
02/08/99	14:08:43	218.7230	61.33	2.148
02/08/99	14:09:43	219.7230	61.34	2.146
02/08/99	14:10:43	220.7230	61.39	2.145
02/08/99	14:11:43	221.7230	61.38	2.147
02/08/99	14:12:43	222.7230	61.26	2.146
02/08/99	14:13:43	223.7230	61.08	2.146
02/08/99	14:14:43	224.7230	60.77	2.149
02/08/99	14:15:43	225.7230	60.45	2.146
02/08/99	14:16:43	226.7230	60.21	2.150
02/08/99	14:17:43	227.7230	60.11	2.153
02/08/99	14:18:43	228.7230	60.04	2.154
02/08/99	14:19:43	229.7230	59.97	2.151
02/08/99	14:20:43	230.7230	59.78	2.155
02/08/99	14:21:43	231.7230	59.65	2.158
02/08/99	14:22:43	232.7230	59.53	2.155
02/08/99	14:23:43	233.7230	59.35	2.156
02/08/99	14:24:43	234.7230	59.12	2.160
02/08/99	14:25:43	235.7230	58.92	2.160
02/08/99	14:26:43	236.7230	58.72	2.161
02/08/99	14:27:43	237.7230	58.53	2.158
02/08/99	14:28:43	238.7230	58.35	2.163
02/08/99	14:29:43	239.7230	58.19	2.161
02/08/99	14:30:43	240.7230	58.13	2.158
02/08/99	14:31:43	241.7230	58.15	2.159
02/08/99	14:32:43	242.7230	58.11	2.158
02/08/99	14:33:43	243.7230	58.16	2.160
02/08/99	14:34:43	244.7230	58.16	2.163
02/08/99	14:35:43	245.7230	58.13	2.161
02/08/99	14:36:43	246.7230	58.14	2.158
02/08/99	14:37:43	247.7230	58.16	2.161
02/08/99	14:38:43	248.7230	58.17	2.160
02/08/99	14:39:43	249.7230	58.18	2.163
02/08/99	14:40:43	250.7230	58.15	2.162
02/08/99	14:41:43	251.7230	58.14	2.161
02/08/99	14:42:43	252.7230	58.20	2.163
02/08/99	14:43:43	253.7230	58.21	2.163
02/08/99	14:44:43	254.7230	58.29	2.163
02/08/99	14:45:43	255.7230	58.37	2.163
02/08/99	14:46:43	256.7230	58.37	2.162
02/08/99	14:47:43	257.7230	58.38	2.162
02/08/99	14:48:43	258.7230	58.36	2.165
02/08/99	14:49:43	259.7230	58.34	2.165
02/08/99	14:50:43	260.7230	58.36	2.166
02/08/99	14:51:43	261.7230	58.38	2.165
02/08/99	14:52:43	262.7230	58.39	2.168
02/08/99	14:53:43	263.7230	58.39	2.165
02/08/99	14:54:43	264.7230	58.47	2.166
02/08/99	14:55:43	265.7230	58.44	2.167
02/08/99	14:56:43	266.7230	58.42	2.165
02/08/99	14:57:43	267.7230	58.41	2.163
02/08/99	14:58:43	268.7230	58.45	2.165
02/08/99	14:59:43	269.7230	58.49	2.167
02/08/99	15:00:43	270.7230	58.49	2.165
02/08/99	15:01:43	271.7230	58.52	2.163
02/08/99	15:02:43	272.7230	58.66	2.164
02/08/99	15:03:43	273.7230	58.80	2.164
02/08/99	15:04:43	274.7230	58.84	2.164
02/08/99	15:05:43	275.7230	58.73	2.166
02/08/99	15:06:43	276.7230	58.67	2.163
02/08/99	15:07:43	277.7230	58.54	2.163

08/99	15:08:43	278.7230	58.50	2.166
08/99	15:09:43	279.7230	58.36	2.170
08/99	15:10:43	280.7230	58.15	2.167
08/99	15:11:43	281.7230	58.02	2.170
08/99	15:12:43	282.7230	58.03	2.170
3/99	15:13:43	283.7230	58.08	2.170
8/99	15:14:43	284.7230	58.18	2.171
08/99	15:15:43	285.7230	58.27	2.172
08/99	15:16:43	286.7230	58.31	2.172
08/99	15:17:43	287.7230	58.36	2.170
08/99	15:18:43	288.7230	58.34	2.172
08/99	15:19:43	289.7230	58.33	2.172
08/99	15:20:43	290.7230	58.27	2.170
08/99	15:21:43	291.7230	58.22	2.171
08/99	15:22:43	292.7230	58.14	2.171
08/99	15:23:43	293.7230	57.90	2.175
08/99	15:24:43	294.7230	57.53	2.175
08/99	15:25:43	295.7230	57.32	2.178
08/99	15:26:43	296.7230	57.29	2.177
08/99	15:27:43	297.7230	57.47	2.177
08/99	15:28:43	298.7230	57.69	2.175
08/99	15:29:43	299.7230	57.90	2.175
08/99	15:30:43	300.7230	58.00	2.072 END OF TEST
08/99	15:31:43	301.7230	57.73	1.963
08/99	15:32:43	302.7230	56.95	1.864
08/99	15:33:43	303.7230	55.88	1.772
08/99	15:34:43	304.7230	54.68	1.687
08/99	15:35:43	305.7230	53.46	1.609
08/99	15:36:43	306.7230	52.28	1.540
08/99	15:37:43	307.7230	51.15	1.472
08/99	15:38:43	308.7230	50.06	1.409
08/99	15:39:43	309.7230	49.05	1.351
08/99	15:40:43	310.7230	48.09	1.295
08/99	15:41:43	311.7230	47.19	1.244
3/99	15:42:43	312.7230	46.34	1.194
8/99	15:43:43	313.7230	45.53	1.146
08/99	15:44:43	314.7230	44.78	1.100
08/99	15:45:43	315.7230	44.05	1.057
08/99	15:46:43	316.7230	43.34	1.017
08/99	15:47:43	317.7230	42.67	0.979
08/99	15:48:43	318.7230	42.04	0.941
08/99	15:49:43	319.7230	41.42	0.907
08/99	15:50:43	320.7230	40.83	0.874
08/99	15:51:43	321.7230	40.26	0.842
08/99	15:52:43	322.7230	39.72	0.813
08/99	15:53:43	323.7230	39.19	0.784
08/99	15:54:43	324.7230	38.68	0.757
08/99	15:55:43	325.7230	38.19	0.731
08/99	15:56:43	326.7230	37.71	0.707
08/99	15:57:43	327.7230	37.26	0.684
08/99	15:58:43	328.7230	36.80	0.662
08/99	15:59:43	329.7230	36.36	0.642
08/99	16:00:43	330.7230	35.95	0.621
08/99	16:01:43	331.7230	35.53	0.602
08/99	16:02:43	332.7230	35.13	0.584
08/99	16:03:43	333.7230	34.73	0.566
08/99	16:04:43	334.7230	34.36	0.549
08/99	16:05:43	335.7230	33.99	0.533
08/99	16:06:43	336.7230	33.62	0.517
08/99	16:07:43	337.7230	33.27	0.502
08/99	16:08:43	338.7230	32.92	0.489
08/99	16:09:43	339.7230	32.58	0.476
3/99	16:10:43	340.7230	32.23	0.463
8/99	16:11:43	341.7230	31.91	0.450
08/99	16:12:43	342.7230	31.58	0.437
08/99	16:13:43	343.7230	31.28	0.425
08/99	16:14:43	344.7230	30.98	0.416
08/99	16:15:43	345.7230	30.68	0.404
08/99	16:16:43	346.7230	30.39	0.394

02/08/99	16:30:43	360.7230	26.86	0.281
02/08/99	16:31:43	361.7230	26.64	0.274
02/08/99	16:32:43	362.7230	26.42	0.268
02/08/99	16:33:43	363.7230	26.21	0.263
02/08/99	16:34:43	364.7230	26.00	0.257
02/08/99	16:35:43	365.7230	25.80	0.252
02/08/99	16:36:43	366.7230	25.60	0.246
02/08/99	16:37:43	367.7230	25.40	0.241
02/08/99	16:38:43	368.7230	25.21	0.236
02/08/99	16:39:43	369.7230	25.02	0.231
02/08/99	16:40:43	370.7230	24.83	0.227
02/08/99	16:41:43	371.7230	24.66	0.222
02/08/99	16:42:43	372.7230	24.48	0.217
02/08/99	16:43:43	373.7230	24.30	0.213
02/08/99	16:44:43	374.7230	24.13	0.210
02/08/99	16:45:43	375.7230	23.95	0.205
02/08/99	16:46:43	376.7230	23.78	0.201
02/08/99	16:47:43	377.7230	23.62	0.198
02/08/99	16:48:43	378.7230	23.45	0.195
02/08/99	16:49:43	379.7230	23.29	0.191
02/08/99	16:50:43	380.7230	23.13	0.186
02/08/99	16:51:43	381.7230	22.98	0.184
02/08/99	16:52:43	382.7230	22.83	0.180
02/08/99	16:53:43	383.7230	22.69	0.176
02/08/99	16:54:43	384.7230	22.54	0.174
02/08/99	16:55:43	385.7230	22.39	0.171
02/08/99	16:56:43	386.7230	22.25	0.167
02/08/99	16:57:43	387.7230	22.12	0.164
02/08/99	16:58:43	388.7230	21.98	0.162
02/08/99	16:59:43	389.7230	21.84	0.159
02/08/99	17:00:43	390.7230	21.72	0.156
02/08/99	17:01:43	391.7230	21.58	0.153
02/08/99	17:02:43	392.7230	21.46	0.150
02/08/99	17:03:43	393.7230	21.33	0.148
02/08/99	17:04:43	394.7230	21.21	0.145
02/08/99	17:05:43	395.7230	21.09	0.143
02/08/99	17:06:43	396.7230	20.97	0.141
02/08/99	17:07:43	397.7230	20.84	0.138
02/08/99	17:08:43	398.7230	20.72	0.136
02/08/99	17:09:43	399.7230	20.61	0.134
02/08/99	17:10:43	400.7230	20.50	0.132
02/08/99	17:11:43	401.7230	20.39	0.130
02/08/99	17:12:43	402.7230	20.28	0.128
02/08/99	17:13:43	403.7230	20.18	0.126
02/08/99	17:14:43	404.7230	20.07	0.124
02/08/99	17:15:43	405.7230	19.97	0.122
02/08/99	17:16:43	406.7230	19.86	0.120
02/08/99	17:17:43	407.7230	19.76	0.118
02/08/99	17:18:43	408.7230	19.66	0.116
02/08/99	17:19:43	409.7230	19.56	0.115
02/08/99	17:20:43	410.7230	19.47	0.113
02/08/99	17:21:43	411.7230	19.37	0.111
02/08/99	17:22:43	412.7230	19.28	0.110
02/08/99	17:23:43	413.7230	19.18	0.108
02/08/99	17:24:43	414.7230	19.10	0.107
02/08/99	17:25:43	415.7230	19.01	0.105

3/99	17:26:43	416.7230	18.91	0.103
8/99	17:27:43	417.7230	18.83	0.103
8/99	17:28:43	418.7230	18.75	0.101
8/99	17:29:43	419.7230	18.66	0.099
08/99	17:30:43	420.7230	18.58	0.098
8/99	17:31:43	421.7230	18.50	0.097
8/99	17:32:43	422.7230	18.42	0.096
08/99	17:33:43	423.7230	18.34	0.095
08/99	17:34:43	424.7230	18.26	0.094
08/99	17:35:43	425.7230	18.18	0.092
08/99	17:36:43	426.7230	18.10	0.091
08/99	17:37:43	427.7230	18.03	0.090
08/99	17:38:43	428.7230	17.96	0.089
08/99	17:39:43	429.7230	17.88	0.088
08/99	17:40:43	430.7230	17.82	0.086
08/99	17:41:43	431.7230	17.75	0.085

Test scheduled for: 02/08/99 10:30:00
Test started on: 02/08/99 10:30:00
Test stopped on: 02/08/99 17:45:48
Test extracted on: 02/08/99 17:45:55

Data gathered using Logarithmic testing
Maximum time between data points: 1.0000 Minutes.
Number of data samples: 529

TOTAL DATA SAMPLES 529

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure/Level
Channel name: MW15 Pressure
Sensor Range: 15 PSI.
ecific gravity: 1.000
de: TOC
User-defined reference: 0.000 Meters H20
Referenced on: test start
Pressure head at reference: 3.734 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20
02/08/99	10:30:00	0.0000	10.05	0.000
02/08/99	10:30:00	0.0050	10.05	0.001
02/08/99	10:30:00	0.0100	10.06	0.001
02/08/99	10:30:00	0.0150	10.06	0.000
02/08/99	10:30:01	0.0200	10.06	0.001
02/08/99	10:30:01	0.0250	10.07	0.001
02/08/99	10:30:01	0.0300	10.08	0.001
02/08/99	10:30:02	0.0350	10.08	0.001
02/08/99	10:30:02	0.0400	10.08	0.001
02/08/99	10:30:02	0.0450	10.08	0.001
02/08/99	10:30:03	0.0500	10.09	0.001
02/08/99	10:30:03	0.0550	10.09	0.001
02/08/99	10:30:03	0.0600	10.09	0.001
02/08/99	10:30:03	0.0650	10.10	0.001
02/08/99	10:30:04	0.0700	10.11	0.001
02/08/99	10:30:04	0.0750	10.11	0.001
02/08/99	10:30:04	0.0800	10.11	0.001
02/08/99	10:30:05	0.0850	10.11	0.001
02/08/99	10:30:05	0.0900	10.12	0.001
02/08/99	10:30:05	0.0950	10.12	0.001
02/08/99	10:30:06	0.1000	10.14	0.001
02/08/99	10:30:06	0.1058	10.12	0.001
02/08/99	10:30:06	0.1120	10.12	0.001
02/08/99	10:30:07	0.1185	10.13	0.001
02/08/99	10:30:07	0.1255	10.14	0.001
02/08/99	10:30:07	0.1328	10.13	0.001

02/08/99	10:30:17	0.2970	10.17	0.001
02/08/99	10:30:18	0.3147	10.18	0.002
02/08/99	10:30:20	0.3333	10.17	0.001
02/08/99	10:30:21	0.3532	10.17	0.001
02/08/99	10:30:22	0.3742	10.17	0.001
02/08/99	10:30:23	0.3963	10.18	0.001
02/08/99	10:30:25	0.4198	10.18	0.002
02/08/99	10:30:26	0.4447	10.18	0.001
02/08/99	10:30:28	0.4697	10.18	0.001
02/08/99	10:30:29	0.4963	10.18	0.001
02/08/99	10:30:31	0.5247	10.18	0.001
02/08/99	10:30:33	0.5547	10.18	0.001
02/08/99	10:30:35	0.5863	10.18	0.001
02/08/99	10:30:37	0.6213	10.18	0.001
02/08/99	10:30:39	0.6580	10.18	0.001
02/08/99	10:30:41	0.6963	10.18	0.001
02/08/99	10:30:44	0.7380	10.18	0.001
02/08/99	10:30:46	0.7813	10.18	0.001
02/08/99	10:30:49	0.8280	10.18	0.001
02/08/99	10:30:52	0.8763	10.18	0.001
02/08/99	10:30:55	0.9280	10.18	0.001
02/08/99	10:30:58	0.9830	10.18	0.001
02/08/99	10:31:02	1.0413	10.18	0.001
02/08/99	10:31:06	1.1030	10.18	0.001
02/08/99	10:31:10	1.1680	10.18	0.001
02/08/99	10:31:14	1.2380	10.18	0.001
02/08/99	10:31:18	1.3113	10.18	0.001
02/08/99	10:31:23	1.3897	10.18	0.001
02/08/99	10:31:28	1.4730	10.18	0.002
02/08/99	10:31:33	1.5613	10.18	0.001
02/08/99	10:31:39	1.6547	10.18	0.001
02/08/99	10:31:45	1.7530	10.18	0.001
02/08/99	10:31:51	1.8580	10.18	0.002
02/08/99	10:31:58	1.9680	10.18	0.001
02/08/99	10:32:05	2.0847	10.18	0.001
02/08/99	10:32:12	2.2097	10.17	0.001
02/08/99	10:32:20	2.3413	10.17	0.001
02/08/99	10:32:28	2.4813	10.17	0.001
02/08/99	10:32:37	2.6297	10.17	0.001
02/08/99	10:32:47	2.7863	10.17	0.001
02/08/99	10:32:57	2.9530	10.18	0.002
02/08/99	10:33:07	3.1297	10.16	0.001
02/08/99	10:33:18	3.3163	10.16	0.002
02/08/99	10:33:30	3.5147	10.15	0.002
02/08/99	10:33:43	3.7247	10.15	0.002
02/08/99	10:33:56	3.9463	10.15	0.002
02/08/99	10:34:10	4.1813	10.15	0.003
02/08/99	10:34:25	4.4297	10.14	0.003
02/08/99	10:34:41	4.6930	10.14	0.003
02/08/99	10:34:58	4.9730	10.14	0.003
02/08/99	10:35:16	5.2697	10.14	0.004
02/08/99	10:35:34	5.5830	10.14	0.004
02/08/99	10:35:54	5.9147	10.13	0.004
02/08/99	10:36:15	6.2663	10.13	0.005
02/08/99	10:36:38	6.6397	10.12	0.006
02/08/99	10:37:02	7.0347	10.12	0.006

08/99	10:37:27	7.4530	10.12	0.006
08/99	10:37:53	7.8963	10.12	0.007
08/99	10:38:21	8.3663	10.12	0.008
08/99	10:38:51	8.8647	10.11	0.008
08/99	10:39:23	9.3913	10.11	0.009
8/99	10:39:56	9.9497	10.11	0.010
08/99	10:40:32	10.5413	10.10	0.011
/08/99	10:41:10	11.1680	10.09	0.012
/08/99	10:41:49	11.8313	10.09	0.013
/08/99	10:42:32	12.5347	10.08	0.014
/08/99	10:43:16	13.2797	10.07	0.015
/08/99	10:44:04	14.0697	10.06	0.016
/08/99	10:44:54	14.9063	10.06	0.018
/08/99	10:45:47	15.7913	10.07	0.019
/08/99	10:46:43	16.7297	10.06	0.020
/08/99	10:47:43	17.7230	10.05	0.022
/08/99	10:48:43	18.7230	10.05	0.022
/08/99	10:49:43	19.7230	10.04	0.024
02/08/99	10:50:43	20.7230	10.03	0.025
02/08/99	10:51:43	21.7230	10.03	0.026
02/08/99	10:52:43	22.7230	10.03	0.027
02/08/99	10:53:43	23.7230	10.02	0.030
02/08/99	10:54:43	24.7230	10.02	0.032
02/08/99	10:55:43	25.7230	10.02	0.033
02/08/99	10:56:43	26.7230	10.00	0.034
02/08/99	10:57:43	27.7230	10.00	0.036
02/08/99	10:58:43	28.7230	9.98	0.037
02/08/99	10:59:43	29.7230	9.97	0.038
02/08/99	11:00:43	30.7230	9.96	0.039
02/08/99	11:01:43	31.7230	9.96	0.041
02/08/99	11:02:43	32.7230	9.94	0.043
02/08/99	11:03:43	33.7230	9.93	0.044
02/08/99	11:04:43	34.7230	9.92	0.044
02/08/99	11:05:43	35.7230	9.91	0.046
0 8/99	11:06:43	36.7230	9.89	0.046
0 8/99	11:07:43	37.7230	9.88	0.046
02/08/99	11:08:43	38.7230	9.88	0.048
02/08/99	11:09:43	39.7230	9.86	0.051
02/08/99	11:10:43	40.7230	9.85	0.052
02/08/99	11:11:43	41.7230	9.84	0.053
02/08/99	11:12:43	42.7230	9.83	0.054
02/08/99	11:13:43	43.7230	9.82	0.055
02/08/99	11:14:43	44.7230	9.82	0.056
02/08/99	11:15:43	45.7230	9.82	0.056
02/08/99	11:16:43	46.7230	9.81	0.056
02/08/99	11:17:43	47.7230	9.80	0.057
02/08/99	11:18:43	48.7230	9.80	0.058
02/08/99	11:19:43	49.7230	9.80	0.058
02/08/99	11:20:43	50.7230	9.80	0.059
02/08/99	11:21:43	51.7230	9.79	0.060
02/08/99	11:22:43	52.7230	9.79	0.061
02/08/99	11:23:43	53.7230	9.79	0.062
02/08/99	11:24:43	54.7230	9.79	0.063
02/08/99	11:25:43	55.7230	9.79	0.063
02/08/99	11:26:43	56.7230	9.79	0.064
02/08/99	11:27:43	57.7230	9.79	0.065
02/08/99	11:28:43	58.7230	9.79	0.066
02/08/99	11:29:43	59.7230	9.80	0.067
02/08/99	11:30:43	60.7230	9.80	0.067
02/08/99	11:31:43	61.7230	9.80	0.068
02/08/99	11:32:43	62.7230	9.82	0.070
02/08/99	11:33:43	63.7230	9.80	0.070
0 8/99	11:34:43	64.7230	9.81	0.070
0 8/99	11:35:43	65.7230	9.81	0.071
02/08/99	11:36:43	66.7230	9.81	0.071
02/08/99	11:37:43	67.7230	9.81	0.072
02/08/99	11:38:43	68.7230	9.80	0.072
02/08/99	11:39:43	69.7230	9.80	0.073
02/08/99	11:40:43	70.7230	9.80	0.073

08/99	11:41:43	71.7230	9.79	0.074
08/99	11:42:43	72.7230	9.79	0.074
08/99	11:43:43	73.7230	9.79	0.075
08/99	11:44:43	74.7230	9.78	0.074
08/99	11:45:43	75.7230	9.77	0.075
8/99	11:46:43	76.7230	9.77	0.075
8/99	11:47:43	77.7230	9.76	0.075
08/99	11:48:43	78.7230	9.76	0.076
08/99	11:49:43	79.7230	9.76	0.076
08/99	11:50:43	80.7230	9.75	0.076
08/99	11:51:43	81.7230	9.75	0.077
08/99	11:52:43	82.7230	9.74	0.077
08/99	11:53:43	83.7230	9.74	0.077
08/99	11:54:43	84.7230	9.74	0.077
08/99	11:55:43	85.7230	9.74	0.077
08/99	11:56:43	86.7230	9.74	0.078
08/99	11:57:43	87.7230	9.74	0.078
08/99	11:58:43	88.7230	9.74	0.079
08/99	11:59:43	89.7230	9.74	0.079
08/99	12:00:43	90.7230	9.73	0.079
08/99	12:01:43	91.7230	9.73	0.079
08/99	12:02:43	92.7230	9.72	0.080
08/99	12:03:43	93.7230	9.72	0.081
08/99	12:04:43	94.7230	9.72	0.082
08/99	12:05:43	95.7230	9.71	0.082
08/99	12:06:43	96.7230	9.71	0.082
08/99	12:07:43	97.7230	9.70	0.082
08/99	12:08:43	98.7230	9.69	0.082
08/99	12:09:43	99.7230	9.69	0.082
08/99	12:10:43	100.7230	9.69	0.083
08/99	12:11:43	101.7230	9.70	0.084
08/99	12:12:43	102.7230	9.69	0.084
08/99	12:13:43	103.7230	9.69	0.084
08/99	12:14:43	104.7230	9.69	0.084
8/99	12:15:43	105.7230	9.69	0.084
8/99	12:16:43	106.7230	9.71	0.084
08/99	12:17:43	107.7230	9.69	0.084
08/99	12:18:43	108.7230	9.69	0.085
08/99	12:19:43	109.7230	9.69	0.085
08/99	12:20:43	110.7230	9.70	0.085
08/99	12:21:43	111.7230	9.71	0.085
08/99	12:22:43	112.7230	9.71	0.084
08/99	12:23:43	113.7230	9.72	0.084
08/99	12:24:43	114.7230	9.72	0.084
08/99	12:25:43	115.7230	9.72	0.085
08/99	12:26:43	116.7230	9.72	0.085
08/99	12:27:43	117.7230	9.72	0.085
08/99	12:28:43	118.7230	9.72	0.086
08/99	12:29:43	119.7230	9.72	0.086
08/99	12:30:43	120.7230	9.71	0.086
08/99	12:31:43	121.7230	9.70	0.087
08/99	12:32:43	122.7230	9.70	0.087
08/99	12:33:43	123.7230	9.68	0.088
08/99	12:34:43	124.7230	9.68	0.088
08/99	12:35:43	125.7230	9.67	0.088
08/99	12:36:43	126.7230	9.66	0.092
08/99	12:37:43	127.7230	9.66	0.092
08/99	12:38:43	128.7230	9.66	0.092
08/99	12:39:43	129.7230	9.66	0.092
08/99	12:40:43	130.7230	9.67	0.092
08/99	12:41:43	131.7230	9.68	0.092
08/99	12:42:43	132.7230	9.69	0.092
8/99	12:43:43	133.7230	9.69	0.091
8/99	12:44:43	134.7230	9.70	0.092
08/99	12:45:43	135.7230	9.71	0.092
08/99	12:46:43	136.7230	9.71	0.092
08/99	12:47:43	137.7230	9.72	0.092
08/99	12:48:43	138.7230	9.73	0.092
08/99	12:49:43	139.7230	9.73	

02/08/99	12:50:43	140.7230	9.74	0.093
02/08/99	12:51:43	141.7230	9.74	0.093
02/08/99	12:52:43	142.7230	9.74	0.093
02/08/99	12:53:43	143.7230	9.75	0.093
02/08/99	12:54:43	144.7230	9.75	0.094
02/08/99	12:55:43	145.7230	9.74	0.094
02/08/99	12:56:43	146.7230	9.75	0.094
02/08/99	12:57:43	147.7230	9.75	0.094
02/08/99	12:58:43	148.7230	9.76	0.094
02/08/99	12:59:43	149.7230	9.76	0.094
02/08/99	13:00:43	150.7230	9.76	0.094
02/08/99	13:01:43	151.7230	9.76	0.094
02/08/99	13:02:43	152.7230	9.76	0.094
02/08/99	13:03:43	153.7230	9.77	0.094
02/08/99	13:04:43	154.7230	9.76	0.094
02/08/99	13:05:43	155.7230	9.75	0.094
02/08/99	13:06:43	156.7230	9.75	0.094
02/08/99	13:07:43	157.7230	9.75	0.094
02/08/99	13:08:43	158.7230	9.74	0.094
02/08/99	13:09:43	159.7230	9.73	0.094
02/08/99	13:10:43	160.7230	9.73	0.094
02/08/99	13:11:43	161.7230	9.72	0.094
02/08/99	13:12:43	162.7230	9.72	0.094
02/08/99	13:13:43	163.7230	9.71	0.094
02/08/99	13:14:43	164.7230	9.71	0.095
02/08/99	13:15:43	165.7230	9.70	0.095
02/08/99	13:16:43	166.7230	9.70	0.095
02/08/99	13:17:43	167.7230	9.68	0.095
02/08/99	13:18:43	168.7230	9.68	0.095
02/08/99	13:19:43	169.7230	9.68	0.096
02/08/99	13:20:43	170.7230	9.67	0.096
02/08/99	13:21:43	171.7230	9.66	0.096
02/08/99	13:22:43	172.7230	9.66	0.096
02/08/99	13:23:43	173.7230	9.68	0.096
02/08/99	13:24:43	174.7230	9.67	0.096
02/08/99	13:25:43	175.7230	9.67	0.096
02/08/99	13:26:43	176.7230	9.67	0.096
02/08/99	13:27:43	177.7230	9.67	0.096
02/08/99	13:28:43	178.7230	9.66	0.096
02/08/99	13:29:43	179.7230	9.67	0.097
02/08/99	13:30:43	180.7230	9.67	0.097
02/08/99	13:31:43	181.7230	9.67	0.097
02/08/99	13:32:43	182.7230	9.68	0.098
02/08/99	13:33:43	183.7230	9.69	0.095
02/08/99	13:34:43	184.7230	9.69	0.098
02/08/99	13:35:43	185.7230	9.70	0.098
02/08/99	13:36:43	186.7230	9.70	0.098
02/08/99	13:37:43	187.7230	9.71	0.098
02/08/99	13:38:43	188.7230	9.71	0.098
02/08/99	13:39:43	189.7230	9.72	0.098
02/08/99	13:40:43	190.7230	9.72	0.098
02/08/99	13:41:43	191.7230	9.74	0.098
02/08/99	13:42:43	192.7230	9.74	0.098
02/08/99	13:43:43	193.7230	9.74	0.098
02/08/99	13:44:43	194.7230	9.74	0.099
02/08/99	13:45:43	195.7230	9.75	0.098
02/08/99	13:46:43	196.7230	9.75	0.099
02/08/99	13:47:43	197.7230	9.75	0.099
02/08/99	13:48:43	198.7230	9.76	0.099
02/08/99	13:49:43	199.7230	9.74	0.100
02/08/99	13:50:43	200.7230	9.74	0.099
02/08/99	13:51:43	201.7230	9.74	0.099
02/08/99	13:52:43	202.7230	9.74	0.099
02/08/99	13:53:43	203.7230	9.73	0.100
02/08/99	13:54:43	204.7230	9.72	0.100
02/08/99	13:55:43	205.7230	9.72	0.101
02/08/99	13:56:43	206.7230	9.71	0.100
02/08/99	13:57:43	207.7230	9.70	0.100
02/08/99	13:58:43	208.7230	9.69	0.101

02/08/99	13:59:43	209.7230	9.68	0.101
02/08/99	14:00:43	210.7230	9.68	0.101
02/08/99	14:01:43	211.7230	9.68	0.101
02/08/99	14:02:43	212.7230	9.66	0.100
02/08/99	14:03:43	213.7230	9.68	0.101
[illegible]8/99	14:04:43	214.7230	9.66	0.101
[illegible]8/99	14:05:43	215.7230	9.66	0.101
02/08/99	14:06:43	216.7230	9.66	0.101
02/08/99	14:07:43	217.7230	9.65	0.101
02/08/99	14:08:43	218.7230	9.65	0.101
02/08/99	14:09:43	219.7230	9.64	0.101
02/08/99	14:10:43	220.7230	9.64	0.101
02/08/99	14:11:43	221.7230	9.63	0.101
02/08/99	14:12:43	222.7230	9.63	0.101
02/08/99	14:13:43	223.7230	9.63	0.101
02/08/99	14:14:43	224.7230	9.63	0.101
02/08/99	14:15:43	225.7230	9.63	0.101
02/08/99	14:16:43	226.7230	9.65	0.102
02/08/99	14:17:43	227.7230	9.66	0.101
02/08/99	14:18:43	228.7230	9.66	0.102
02/08/99	14:19:43	229.7230	9.68	0.102
02/08/99	14:20:43	230.7230	9.70	0.103
02/08/99	14:21:43	231.7230	9.70	0.103
02/08/99	14:22:43	232.7230	9.71	0.103
02/08/99	14:23:43	233.7230	9.71	0.103
02/08/99	14:24:43	234.7230	9.72	0.103
02/08/99	14:25:43	235.7230	9.71	0.103
02/08/99	14:26:43	236.7230	9.70	0.103
02/08/99	14:27:43	237.7230	9.70	0.103
02/08/99	14:28:43	238.7230	9.70	0.103
02/08/99	14:29:43	239.7230	9.68	0.103
02/08/99	14:30:43	240.7230	9.67	0.103
02/08/99	14:31:43	241.7230	9.66	0.103
[illegible]8/99	14:32:43	242.7230	9.65	0.103
[illegible]8/99	14:33:43	243.7230	9.63	0.103
02/08/99	14:34:43	244.7230	9.63	0.103
02/08/99	14:35:43	245.7230	9.63	0.103
02/08/99	14:36:43	246.7230	9.61	0.103
02/08/99	14:37:43	247.7230	9.61	0.103
02/08/99	14:38:43	248.7230	9.61	0.103
02/08/99	14:39:43	249.7230	9.61	0.103
02/08/99	14:40:43	250.7230	9.62	0.103
02/08/99	14:41:43	251.7230	9.62	0.103
02/08/99	14:42:43	252.7230	9.62	0.103
02/08/99	14:43:43	253.7230	9.63	0.103
02/08/99	14:44:43	254.7230	9.64	0.103
02/08/99	14:45:43	255.7230	9.65	0.104
02/08/99	14:46:43	256.7230	9.65	0.104
02/08/99	14:47:43	257.7230	9.66	0.104
02/08/99	14:48:43	258.7230	9.68	0.104
02/08/99	14:49:43	259.7230	9.69	0.105
02/08/99	14:50:43	260.7230	9.69	0.106
02/08/99	14:51:43	261.7230	9.70	0.106
02/08/99	14:52:43	262.7230	9.71	0.107
02/08/99	14:53:43	263.7230	9.72	0.107
02/08/99	14:54:43	264.7230	9.72	0.108
02/08/99	14:55:43	265.7230	9.74	0.105
02/08/99	14:56:43	266.7230	9.73	0.105
02/08/99	14:57:43	267.7230	9.73	0.105
02/08/99	14:58:43	268.7230	9.72	0.105
02/08/99	14:59:43	269.7230	9.72	0.105
[illegible]8/99	15:00:43	270.7230	9.72	0.105
[illegible]8/99	15:01:43	271.7230	9.72	0.105
02/08/99	15:02:43	272.7230	9.71	0.105
02/08/99	15:03:43	273.7230	9.71	0.105
02/08/99	15:04:43	274.7230	9.70	0.105
02/08/99	15:05:43	275.7230	9.70	0.105
02/08/99	15:06:43	276.7230	9.70	0.105
02/08/99	15:07:43	277.7230	9.71	0.105

02/08/99	15:08:43	278.7230	9.71	0.105
02/08/99	15:09:43	279.7230	9.71	0.105
02/08/99	15:10:43	280.7230	9.71	0.106
02/08/99	15:11:43	281.7230	9.72	0.106
02/08/99	15:12:43	282.7230	9.72	0.106
02/08/99	15:13:43	283.7230	9.73	0.106
02/08/99	15:14:43	284.7230	9.74	0.106
02/08/99	15:15:43	285.7230	9.74	0.106
02/08/99	15:16:43	286.7230	9.75	0.106
02/08/99	15:17:43	287.7230	9.76	0.106
02/08/99	15:18:43	288.7230	9.76	0.107
02/08/99	15:19:43	289.7230	9.75	0.106
02/08/99	15:20:43	290.7230	9.75	0.107
02/08/99	15:21:43	291.7230	9.74	0.107
02/08/99	15:22:43	292.7230	9.73	0.108
02/08/99	15:23:43	293.7230	9.72	0.108
02/08/99	15:24:43	294.7230	9.72	0.108
02/08/99	15:25:43	295.7230	9.70	0.107
02/08/99	15:26:43	296.7230	9.69	0.107
02/08/99	15:27:43	297.7230	9.68	0.107
02/08/99	15:28:43	298.7230	9.68	0.108
02/08/99	15:29:43	299.7230	9.68	0.108
02/08/99	15:30:43	300.7230	9.68	0.108 — EOD
02/08/99	15:31:43	301.7230	9.68	0.107
02/08/99	15:32:43	302.7230	9.68	0.110
02/08/99	15:33:43	303.7230	9.69	0.109
02/08/99	15:34:43	304.7230	9.69	0.108
02/08/99	15:35:43	305.7230	9.69	0.107
02/08/99	15:36:43	306.7230	9.69	0.106
02/08/99	15:37:43	307.7230	9.69	0.105
02/08/99	15:38:43	308.7230	9.69	0.105
02/08/99	15:39:43	309.7230	9.70	0.104
02/08/99	15:40:43	310.7230	9.68	0.103
02/08/99	15:41:43	311.7230	9.69	0.102
02/08/99	15:42:43	312.7230	9.68	0.101
02/08/99	15:43:43	313.7230	9.68	0.099
02/08/99	15:44:43	314.7230	9.67	0.098
02/08/99	15:45:43	315.7230	9.66	0.097
02/08/99	15:46:43	316.7230	9.66	0.096
02/08/99	15:47:43	317.7230	9.66	0.094
02/08/99	15:48:43	318.7230	9.66	0.093
02/08/99	15:49:43	319.7230	9.66	0.091
02/08/99	15:50:43	320.7230	9.67	0.090
02/08/99	15:51:43	321.7230	9.68	0.089
02/08/99	15:52:43	322.7230	9.70	0.087
02/08/99	15:53:43	323.7230	9.68	0.086
02/08/99	15:54:43	324.7230	9.68	0.085
02/08/99	15:55:43	325.7230	9.70	0.083
02/08/99	15:56:43	326.7230	9.69	0.082
02/08/99	15:57:43	327.7230	9.69	0.081
02/08/99	15:58:43	328.7230	9.70	0.079
02/08/99	15:59:43	329.7230	9.68	0.079
02/08/99	16:00:43	330.7230	9.68	0.077
02/08/99	16:01:43	331.7230	9.68	0.076
02/08/99	16:02:43	332.7230	9.68	0.075
02/08/99	16:03:43	333.7230	9.68	0.074
02/08/99	16:04:43	334.7230	9.68	0.072
02/08/99	16:05:43	335.7230	9.68	0.072
02/08/99	16:06:43	336.7230	9.69	0.070
02/08/99	16:07:43	337.7230	9.68	0.070
02/08/99	16:08:43	338.7230	9.68	0.069
02/08/99	16:09:43	339.7230	9.69	0.068
02/08/99	16:10:43	340.7230	9.69	0.067
02/08/99	16:11:43	341.7230	9.70	0.065
02/08/99	16:12:43	342.7230	9.70	0.065
02/08/99	16:13:43	343.7230	9.70	0.064
02/08/99	16:14:43	344.7230	9.71	0.063
02/08/99	16:15:43	345.7230	9.70	0.062
02/08/99	16:16:43	346.7230	9.71	0.062

02/08/99	16:17:43	347.7230	9.71	0.060
02/08/99	16:18:43	348.7230	9.72	0.060
02/08/99	16:19:43	349.7230	9.71	0.059
02/08/99	16:20:43	350.7230	9.72	0.058
02/08/99	16:21:43	351.7230	9.71	0.057
02/08/99	16:22:43	352.7230	9.71	0.056
02/08/99	16:23:43	353.7230	9.72	0.056
02/08/99	16:24:43	354.7230	9.72	0.055
02/08/99	16:25:43	355.7230	9.72	0.053
02/08/99	16:26:43	356.7230	9.73	0.053
02/08/99	16:27:43	357.7230	9.72	0.052
02/08/99	16:28:43	358.7230	9.73	0.051
02/08/99	16:29:43	359.7230	9.71	0.051
02/08/99	16:30:43	360.7230	9.71	0.050
02/08/99	16:31:43	361.7230	9.71	0.049
02/08/99	16:32:43	362.7230	9.71	0.049
02/08/99	16:33:43	363.7230	9.70	0.048
02/08/99	16:34:43	364.7230	9.70	0.047
02/08/99	16:35:43	365.7230	9.70	0.046
02/08/99	16:36:43	366.7230	9.70	0.046
02/08/99	16:37:43	367.7230	9.69	0.045
02/08/99	16:38:43	368.7230	9.69	0.042
02/08/99	16:39:43	369.7230	9.68	0.041
02/08/99	16:40:43	370.7230	9.68	0.041
02/08/99	16:41:43	371.7230	9.67	0.041
02/08/99	16:42:43	372.7230	9.68	0.040
02/08/99	16:43:43	373.7230	9.66	0.039
02/08/99	16:44:43	374.7230	9.66	0.039
02/08/99	16:45:43	375.7230	9.66	0.038
02/08/99	16:46:43	376.7230	9.65	0.037
02/08/99	16:47:43	377.7230	9.65	0.037
02/08/99	16:48:43	378.7230	9.65	0.036
02/08/99	16:49:43	379.7230	9.65	0.036
02/08/99	16:50:43	380.7230	9.65	0.035
02/08/99	16:51:43	381.7230	9.65	0.034
02/08/99	16:52:43	382.7230	9.65	0.033
02/08/99	16:53:43	383.7230	9.65	0.033
02/08/99	16:54:43	384.7230	9.65	0.032
02/08/99	16:55:43	385.7230	9.65	0.032
02/08/99	16:56:43	386.7230	9.66	0.032
02/08/99	16:57:43	387.7230	9.66	0.031
02/08/99	16:58:43	388.7230	9.65	0.031
02/08/99	16:59:43	389.7230	9.65	0.030
02/08/99	17:00:43	390.7230	9.66	0.030
02/08/99	17:01:43	391.7230	9.66	0.029
02/08/99	17:02:43	392.7230	9.66	0.028
02/08/99	17:03:43	393.7230	9.66	0.028
02/08/99	17:04:43	394.7230	9.68	0.027
02/08/99	17:05:43	395.7230	9.68	0.027
02/08/99	17:06:43	396.7230	9.68	0.026
02/08/99	17:07:43	397.7230	9.68	0.025
02/08/99	17:08:43	398.7230	9.68	0.025
02/08/99	17:09:43	399.7230	9.69	0.025
02/08/99	17:10:43	400.7230	9.69	0.024
02/08/99	17:11:43	401.7230	9.69	0.023
02/08/99	17:12:43	402.7230	9.70	0.023
02/08/99	17:13:43	403.7230	9.70	0.022
02/08/99	17:14:43	404.7230	9.70	0.022
02/08/99	17:15:43	405.7230	9.70	0.022
02/08/99	17:16:43	406.7230	9.70	0.021
02/08/99	17:17:43	407.7230	9.70	0.021
02/08/99	17:18:43	408.7230	9.69	0.021
02/08/99	17:19:43	409.7230	9.69	0.020
02/08/99	17:20:43	410.7230	9.69	0.020
02/08/99	17:21:43	411.7230	9.69	0.020
02/08/99	17:22:43	412.7230	9.68	0.020
02/08/99	17:23:43	413.7230	9.68	0.020
02/08/99	17:24:43	414.7230	9.69	0.019
02/08/99	17:25:43	415.7230	9.69	0.018

02/08/99	17:26:43	416.7230	9.69	0.018
02/08/99	17:27:43	417.7230	9.68	0.018
02/08/99	17:28:43	418.7230	9.68	0.018
02/08/99	17:29:43	419.7230	9.68	0.018
02/08/99	17:30:43	420.7230	9.67	0.018
[illegible]8/99	17:31:43	421.7230	9.66	0.017
[illegible]8/99	17:32:43	422.7230	9.65	0.017
02/08/99	17:33:43	423.7230	9.66	0.017
02/08/99	17:34:43	424.7230	9.66	0.017
02/08/99	17:35:43	425.7230	9.66	0.017
02/08/99	17:36:43	426.7230	9.64	0.016
02/08/99	17:37:43	427.7230	9.64	0.015
02/08/99	17:38:43	428.7230	9.63	0.015
02/08/99	17:39:43	429.7230	9.63	0.015
02/08/99	17:40:43	430.7230	9.64	0.015
02/08/99	17:41:43	431.7230	9.64	0.015
02/08/99	17:42:43	432.7230	9.64	0.014
02/08/99	17:43:43	433.7230	9.64	0.014
02/08/99	17:44:43	434.7230	9.65	0.013
02/08/99	17:45:43	435.7230	9.71	0.014

IN_SITU INC. Troll

Report generated: 02/15/99 16:21:30
Report from file: A:\PT2MW10.BIN
DataMgr Version 2.16

Serial number: 00000105
Firmware Version 7.05
Unit name: MW10

Test name: Pump Test 2

Test defined on: 02/08/99 08:38:07
Test scheduled for: 02/08/99 10:30:00
Test started on: 02/08/99 10:30:00
Test stopped on: 02/08/99 17:48:44
Test extracted on: 02/08/99 17:48:52

Data gathered using Logarithmic testing
  Maximum time between data points: 1.0000 Minutes.
  Number of data samples: 532

TOTAL DATA SAMPLES 532

Channel number [1]
  Measurement type: Temperature
  Channel name: OnBoard Temp

Channel number [2]
  Measurement type: Pressure/Level
  Channel name: MW10 Pressure
  Sensor Range: 15 PSI.
  Specific gravity: 1.000
  Mode: TOC
  User-defined reference: 0.000 Meters H20
  Referenced on: test start
  Pressure head at reference: 3.531 Meters H20

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Meters H20
02/08/99	10:30:00	0.0000	8.77	0.000
02/08/99	10:30:00	0.0050	8.76	0.001
02/08/99	10:30:00	0.0100	8.77	0.000
02/08/99	10:30:00	0.0150	8.77	0.001
02/08/99	10:30:01	0.0200	8.77	0.001
02/08/99	10:30:01	0.0250	8.78	0.001
02/08/99	10:30:01	0.0300	8.78	0.001
02/08/99	10:30:02	0.0350	8.78	0.001
02/08/99	10:30:02	0.0400	8.78	0.001
02/08/99	10:30:02	0.0450	8.79	0.001
02/08/99	10:30:03	0.0500	8.80	0.001
02/08/99	10:30:03	0.0550	8.80	0.001
02/08/99	10:30:03	0.0600	8.80	0.001
02/08/99	10:30:03	0.0650	8.80	0.001
02/08/99	10:30:04	0.0700	8.81	0.001
02/08/99	10:30:04	0.0750	8.81	0.001
02/08/99	10:30:04	0.0800	8.81	0.001
02/08/99	10:30:05	0.0850	8.81	0.001
02/08/99	10:30:05	0.0900	8.82	0.001
02/08/99	10:30:05	0.0950	8.82	0.001
02/08/99	10:30:06	0.1000	8.83	0.001
02/08/99	10:30:06	0.1058	8.83	0.001
02/08/99	10:30:06	0.1120	8.83	0.001
02/08/99	10:30:07	0.1185	8.83	0.001
02/08/99	10:30:07	0.1255	8.83	0.001
02/08/99	10:30:07	0.1328	8.84	0.001

02/08/99	10:30:08	0.1407	8.84	0.001
02/08/99	10:30:08	0.1490	8.85	0.002
02/08/99	10:30:09	0.1578	8.85	0.001
02/08/99	10:30:10	0.1672	8.85	0.001
02/08/99	10:30:10	0.1770	8.86	0.002
02/08/99	10:30:11	0.1875	8.86	0.003
02/08/99	10:30:11	0.1985	8.86	0.003
02/08/99	10:30:12	0.2102	8.86	0.003
02/08/99	10:30:13	0.2227	8.87	0.003
02/08/99	10:30:14	0.2358	8.87	0.003
02/08/99	10:30:14	0.2498	8.87	0.003
02/08/99	10:30:15	0.2647	8.88	0.003
02/08/99	10:30:16	0.2803	8.87	0.003
02/08/99	10:30:17	0.2970	8.88	0.003
02/08/99	10:30:18	0.3147	8.88	0.003
02/08/99	10:30:20	0.3333	8.88	0.003
02/08/99	10:30:21	0.3532	8.88	0.003
02/08/99	10:30:22	0.3742	8.88	0.003
02/08/99	10:30:23	0.3963	8.88	0.003
02/08/99	10:30:25	0.4198	8.88	0.003
02/08/99	10:30:26	0.4447	8.88	0.003
02/08/99	10:30:28	0.4697	8.88	0.003
02/08/99	10:30:29	0.4963	8.88	0.003
02/08/99	10:30:31	0.5247	8.88	0.003
02/08/99	10:30:33	0.5547	8.88	0.003
02/08/99	10:30:35	0.5863	8.88	0.003
02/08/99	10:30:37	0.6213	8.88	0.003
02/08/99	10:30:39	0.6580	8.88	0.003
02/08/99	10:30:41	0.6963	8.88	0.003
02/08/99	10:30:44	0.7380	8.89	0.003
02/08/99	10:30:46	0.7813	8.88	0.003
02/08/99	10:30:49	0.8280	8.88	0.003
02/08/99	10:30:52	0.8763	8.88	0.003
02/08/99	10:30:55	0.9280	8.88	0.003
02/08/99	10:30:58	0.9830	8.88	0.003
02/08/99	10:31:02	1.0413	8.88	0.003
02/08/99	10:31:06	1.1030	8.88	0.003
02/08/99	10:31:10	1.1680	8.88	0.002
02/08/99	10:31:14	1.2380	8.88	0.002
02/08/99	10:31:18	1.3113	8.88	0.002
02/08/99	10:31:23	1.3897	8.88	0.001
02/08/99	10:31:28	1.4730	8.88	0.002
02/08/99	10:31:33	1.5613	8.88	0.002
02/08/99	10:31:39	1.6547	8.88	0.002
02/08/99	10:31:45	1.7530	8.88	0.002
02/08/99	10:31:51	1.8580	8.88	0.002
02/08/99	10:31:58	1.9680	8.87	0.002
02/08/99	10:32:05	2.0847	8.87	0.002
02/08/99	10:32:12	2.2097	8.87	0.002
02/08/99	10:32:20	2.3413	8.87	0.002
02/08/99	10:32:28	2.4813	8.86	0.002
02/08/99	10:32:37	2.6297	8.86	0.001
02/08/99	10:32:47	2.7863	8.86	0.002
02/08/99	10:32:57	2.9530	8.86	0.001
02/08/99	10:33:07	3.1297	8.86	0.001
02/08/99	10:33:18	3.3163	8.85	0.001
02/08/99	10:33:30	3.5147	8.85	0.001
02/08/99	10:33:43	3.7247	8.84	0.001
02/08/99	10:33:56	3.9463	8.84	0.001
02/08/99	10:34:10	4.1813	8.84	0.001
02/08/99	10:34:25	4.4297	8.84	0.001
02/08/99	10:34:41	4.6930	8.84	0.001
02/08/99	10:34:58	4.9730	8.83	0.001
02/08/99	10:35:16	5.2697	8.83	0.001
02/08/99	10:35:34	5.5830	8.83	-0.001
02/08/99	10:35:54	5.9147	8.83	-0.001
02/08/99	10:36:15	6.2663	8.82	-0.002
02/08/99	10:36:38	6.6397	8.82	-0.004
02/08/99	10:37:02	7.0347	8.81	-0.005

02/08/99	10:37:27	7.4530	8.81	-0.005
02/08/99	10:37:53	7.8963	8.81	-0.006
02/08/99	10:38:21	8.3663	8.80	-0.006
02/08/99	10:38:51	8.8647	8.80	-0.006
02/08/99	10:39:23	9.3913	8.80	-0.007
02/08/99	10:39:56	9.9497	8.79	-0.007
02/08/99	10:40:32	10.5413	8.78	-0.007
02/08/99	10:41:10	11.1680	8.78	-0.007
02/08/99	10:41:49	11.8313	8.78	-0.007
02/08/99	10:42:32	12.5347	8.78	-0.006
02/08/99	10:43:16	13.2797	8.77	-0.006
02/08/99	10:44:04	14.0697	8.77	-0.005
02/08/99	10:44:54	14.9063	8.76	-0.004
02/08/99	10:45:47	15.7913	8.75	-0.002
02/08/99	10:46:43	16.7297	8.75	0.001
02/08/99	10:47:43	17.7230	8.74	0.005
02/08/99	10:48:43	18.7230	8.73	0.009
02/08/99	10:49:43	19.7230	8.72	0.011
02/08/99	10:50:43	20.7230	8.71	0.015
02/08/99	10:51:43	21.7230	8.70	0.017
02/08/99	10:52:43	22.7230	8.69	0.015
02/08/99	10:53:43	23.7230	8.69	0.014
02/08/99	10:54:43	24.7230	8.67	0.015
02/08/99	10:55:43	25.7230	8.67	0.020
02/08/99	10:56:43	26.7230	8.66	0.022
02/08/99	10:57:43	27.7230	8.66	0.023
02/08/99	10:58:43	28.7230	8.66	0.026
02/08/99	10:59:43	29.7230	8.66	0.028
02/08/99	11:00:43	30.7230	8.65	0.028
02/08/99	11:01:43	31.7230	8.64	0.025
02/08/99	11:02:43	32.7230	8.64	0.024
02/08/99	11:03:43	33.7230	8.65	0.023
02/08/99	11:04:43	34.7230	8.65	0.024
02/08/99	11:05:43	35.7230	8.65	0.025
02/08/99	11:06:43	36.7230	8.65	0.025
02/08/99	11:07:43	37.7230	8.65	0.021
02/08/99	11:08:43	38.7230	8.65	0.018
02/08/99	11:09:43	39.7230	8.64	0.018
02/08/99	11:10:43	40.7230	8.64	0.022
02/08/99	11:11:43	41.7230	8.64	0.017
02/08/99	11:12:43	42.7230	8.64	0.013
02/08/99	11:13:43	43.7230	8.62	0.011
02/08/99	11:14:43	44.7230	8.62	0.013
02/08/99	11:15:43	45.7230	8.62	0.018
02/08/99	11:16:43	46.7230	8.62	0.023
02/08/99	11:17:43	47.7230	8.61	0.030
02/08/99	11:18:43	48.7230	8.61	0.039
02/08/99	11:19:43	49.7230	8.60	0.042
02/08/99	11:20:43	50.7230	8.60	0.043
02/08/99	11:21:43	51.7230	8.60	0.046
02/08/99	11:22:43	52.7230	8.60	0.043
02/08/99	11:23:43	53.7230	8.60	0.040
02/08/99	11:24:43	54.7230	8.59	0.038
02/08/99	11:25:43	55.7230	8.58	0.037
02/08/99	11:26:43	56.7230	8.59	0.034
02/08/99	11:27:43	57.7230	8.59	0.030
02/08/99	11:28:43	58.7230	8.60	0.025
02/08/99	11:29:43	59.7230	8.60	0.022
02/08/99	11:30:43	60.7230	8.60	0.020
02/08/99	11:31:43	61.7230	8.61	0.022
02/08/99	11:32:43	62.7230	8.61	0.024
02/08/99	11:33:43	63.7230	8.61	0.023
02/08/99	11:34:43	64.7230	8.61	0.021
02/08/99	11:35:43	65.7230	8.61	0.020
02/08/99	11:36:43	66.7230	8.61	0.018
02/08/99	11:37:43	67.7230	8.60	0.018
02/08/99	11:38:43	68.7230	8.60	0.020
02/08/99	11:39:43	69.7230	8.58	0.022
02/08/99	11:40:43	70.7230	8.58	0.022

02/08/99	11:41:43	71.7230	8.56	0.020
02/08/99	11:42:43	72.7230	8.55	0.018
02/08/99	11:43:43	73.7230	8.55	0.017
02/08/99	11:44:43	74.7230	8.54	0.018
02/08/99	11:45:43	75.7230	8.53	0.021
[illegible]8/99	11:46:43	76.7230	8.53	0.022
[illegible]8/99	11:47:43	77.7230	8.52	0.021
02/08/99	11:48:43	78.7230	8.52	0.021
02/08/99	11:49:43	79.7230	8.52	0.022
02/08/99	11:50:43	80.7230	8.53	0.024
02/08/99	11:51:43	81.7230	8.53	0.023
02/08/99	11:52:43	82.7230	8.53	0.025
02/08/99	11:53:43	83.7230	8.54	0.028
02/08/99	11:54:43	84.7230	8.54	0.032
02/08/99	11:55:43	85.7230	8.55	0.032
02/08/99	11:56:43	86.7230	8.54	0.032
02/08/99	11:57:43	87.7230	8.54	0.031
02/08/99	11:58:43	88.7230	8.54	0.027
02/08/99	11:59:43	89.7230	8.53	0.027
02/08/99	12:00:43	90.7230	8.53	0.025
02/08/99	12:01:43	91.7230	8.53	0.022
02/08/99	12:02:43	92.7230	8.52	0.020
02/08/99	12:03:43	93.7230	8.52	0.018
02/08/99	12:04:43	94.7230	8.52	0.015
02/08/99	12:05:43	95.7230	8.52	0.014
02/08/99	12:06:43	96.7230	8.52	0.017
02/08/99	12:07:43	97.7230	8.52	0.022
02/08/99	12:08:43	98.7230	8.50	0.027
02/08/99	12:09:43	99.7230	8.50	0.028
02/08/99	12:10:43	100.7230	8.49	0.029
02/08/99	12:11:43	101.7230	8.48	0.026
02/08/99	12:12:43	102.7230	8.48	0.025
02/08/99	12:13:43	103.7230	8.47	0.025
[illegible]8/99	12:14:43	104.7230	8.47	0.024
[illegible]8/99	12:15:43	105.7230	8.47	0.028
02/08/99	12:16:43	106.7230	8.47	0.034
02/08/99	12:17:43	107.7230	8.47	0.037
02/08/99	12:18:43	108.7230	8.47	0.040
02/08/99	12:19:43	109.7230	8.47	0.040
02/08/99	12:20:43	110.7230	8.47	0.035
02/08/99	12:21:43	111.7230	8.48	0.032
02/08/99	12:22:43	112.7230	8.48	0.032
02/08/99	12:23:43	113.7230	8.49	0.032
02/08/99	12:24:43	114.7230	8.50	0.030
02/08/99	12:25:43	115.7230	8.50	0.032
02/08/99	12:26:43	116.7230	8.51	0.032
02/08/99	12:27:43	117.7230	8.52	0.032
02/08/99	12:28:43	118.7230	8.53	0.032
02/08/99	12:29:43	119.7230	8.54	0.025
02/08/99	12:30:43	120.7230	8.55	0.022
02/08/99	12:31:43	121.7230	8.55	0.023
02/08/99	12:32:43	122.7230	8.56	0.024
02/08/99	12:33:43	123.7230	8.57	0.022
02/08/99	12:34:43	124.7230	8.58	0.018
02/08/99	12:35:43	125.7230	8.58	0.018
02/08/99	12:36:43	126.7230	8.58	0.018
02/08/99	12:37:43	127.7230	8.58	0.020
02/08/99	12:38:43	128.7230	8.59	0.019
02/08/99	12:39:43	129.7230	8.59	0.019
02/08/99	12:40:43	130.7230	8.59	0.020
02/08/99	12:41:43	131.7230	8.59	0.020
[illegible]8/99	12:42:43	132.7230	8.59	0.022
[illegible]8/99	12:43:43	133.7230	8.59	0.025
02/08/99	12:44:43	134.7230	8.59	0.023
02/08/99	12:45:43	135.7230	8.59	0.022
02/08/99	12:46:43	136.7230	8.58	0.013
02/08/99	12:47:43	137.7230	8.58	0.008
02/08/99	12:48:43	138.7230	8.58	0.006
02/08/99	12:49:43	139.7230	8.58	0.007

02/08/99	12:50:43	140.7230	8.58	0.004
02/08/99	12:51:43	141.7230	8.58	0.000
02/08/99	12:52:43	142.7230	8.58	-0.003
02/08/99	12:53:43	143.7230	8.58	-0.004
02/08/99	12:54:43	144.7230	8.58	-0.006
02/08/99	12:55:43	145.7230	8.58	-0.006
02/08/99	12:56:43	146.7230	8.58	0.017
02/08/99	12:57:43	147.7230	8.58	0.017
02/08/99	12:58:43	148.7230	8.58	0.017
02/08/99	12:59:43	149.7230	8.56	0.017
02/08/99	13:00:43	150.7230	8.56	0.017
02/08/99	13:01:43	151.7230	8.55	0.017
02/08/99	13:02:43	152.7230	8.55	0.017
02/08/99	13:03:43	153.7230	8.53	0.017
02/08/99	13:04:43	154.7230	8.53	0.017
02/08/99	13:05:43	155.7230	8.51	0.017
02/08/99	13:06:43	156.7230	8.51	0.018
02/08/99	13:07:43	157.7230	8.50	0.017
02/08/99	13:08:43	158.7230	8.50	0.017
02/08/99	13:09:43	159.7230	8.50	0.017
02/08/99	13:10:43	160.7230	8.49	0.017
02/08/99	13:11:43	161.7230	8.50	0.017
02/08/99	13:12:43	162.7230	8.50	0.018
02/08/99	13:13:43	163.7230	8.50	0.018
02/08/99	13:14:43	164.7230	8.51	0.017
02/08/99	13:15:43	165.7230	8.51	0.018
02/08/99	13:16:43	166.7230	8.51	0.018
02/08/99	13:17:43	167.7230	8.52	0.018
02/08/99	13:18:43	168.7230	8.52	0.018
02/08/99	13:19:43	169.7230	8.52	0.018
02/08/99	13:20:43	170.7230	8.52	0.018
02/08/99	13:21:43	171.7230	8.52	0.018
02/08/99	13:22:43	172.7230	8.52	0.018
02/08/99	13:23:43	173.7230	8.53	0.018
02/08/99	13:24:43	174.7230	8.53	0.018
02/08/99	13:25:43	175.7230	8.52	0.018
02/08/99	13:26:43	176.7230	8.53	0.018
02/08/99	13:27:43	177.7230	8.53	0.018
02/08/99	13:28:43	178.7230	8.54	0.018
02/08/99	13:29:43	179.7230	8.55	0.018
02/08/99	13:30:43	180.7230	8.55	0.018
02/08/99	13:31:43	181.7230	8.55	0.018
02/08/99	13:32:43	182.7230	8.55	0.018
02/08/99	13:33:43	183.7230	8.54	0.018
02/08/99	13:34:43	184.7230	8.53	0.018
02/08/99	13:35:43	185.7230	8.53	0.018
02/08/99	13:36:43	186.7230	8.52	0.018
02/08/99	13:37:43	187.7230	8.52	0.018
02/08/99	13:38:43	188.7230	8.52	0.018
02/08/99	13:39:43	189.7230	8.51	0.018
02/08/99	13:40:43	190.7230	8.51	0.018
02/08/99	13:41:43	191.7230	8.51	0.018
02/08/99	13:42:43	192.7230	8.51	0.018
02/08/99	13:43:43	193.7230	8.51	0.018
02/08/99	13:44:43	194.7230	8.51	0.018
02/08/99	13:45:43	195.7230	8.52	0.018
02/08/99	13:46:43	196.7230	8.52	0.019
02/08/99	13:47:43	197.7230	8.52	0.018
02/08/99	13:48:43	198.7230	8.52	0.018
02/08/99	13:49:43	199.7230	8.52	0.018
02/08/99	13:50:43	200.7230	8.52	0.019
02/08/99	13:51:43	201.7230	8.51	0.018
02/08/99	13:52:43	202.7230	8.51	0.019
02/08/99	13:53:43	203.7230	8.50	0.019
02/08/99	13:54:43	204.7230	8.50	0.019
02/08/99	13:55:43	205.7230	8.50	0.019
02/08/99	13:56:43	206.7230	8.50	0.019
02/08/99	13:57:43	207.7230	8.51	0.019
02/08/99	13:58:43	208.7230	8.51	0.019

02/08/99	13:59:43	209.7230	8.51	0.019
02/08/99	14:00:43	210.7230	8.51	0.019
02/08/99	14:01:43	211.7230	8.51	0.018
02/08/99	14:02:43	212.7230	8.52	0.018
02/08/99	14:03:43	213.7230	8.52	0.019
[illegible]8/99	14:04:43	214.7230	8.51	0.019
[illegible]8/99	14:05:43	215.7230	8.50	0.019
02/08/99	14:06:43	216.7230	8.49	0.019
02/08/99	14:07:43	217.7230	8.48	0.019
02/08/99	14:08:43	218.7230	8.48	0.019
02/08/99	14:09:43	219.7230	8.47	0.019
02/08/99	14:10:43	220.7230	8.47	0.019
02/08/99	14:11:43	221.7230	8.47	0.019
02/08/99	14:12:43	222.7230	8.46	0.019
02/08/99	14:13:43	223.7230	8.45	0.020
02/08/99	14:14:43	224.7230	8.45	0.020
02/08/99	14:15:43	225.7230	8.44	0.019
02/08/99	14:16:43	226.7230	8.44	0.019
02/08/99	14:17:43	227.7230	8.44	0.020
02/08/99	14:18:43	228.7230	8.43	0.020
02/08/99	14:19:43	229.7230	8.43	0.020
02/08/99	14:20:43	230.7230	8.43	0.020
02/08/99	14:21:43	231.7230	8.43	0.020
02/08/99	14:22:43	232.7230	8.44	0.020
02/08/99	14:23:43	233.7230	8.44	0.020
02/08/99	14:24:43	234.7230	8.44	0.020
02/08/99	14:25:43	235.7230	8.45	0.020
02/08/99	14:26:43	236.7230	8.45	0.020
02/08/99	14:27:43	237.7230	8.46	0.020
02/08/99	14:28:43	238.7230	8.47	0.020
02/08/99	14:29:43	239.7230	8.47	0.018
02/08/99	14:30:43	240.7230	8.48	0.019
02/08/99	14:31:43	241.7230	8.48	0.020
[illegible]8/99	14:32:43	242.7230	8.48	0.020
[illegible]8/99	14:33:43	243.7230	8.49	0.020
02/08/99	14:34:43	244.7230	8.50	0.020
02/08/99	14:35:43	245.7230	8.50	0.020
02/08/99	14:36:43	246.7230	8.50	0.020
02/08/99	14:37:43	247.7230	8.50	0.020
02/08/99	14:38:43	248.7230	8.50	0.020
02/08/99	14:39:43	249.7230	8.50	0.020
02/08/99	14:40:43	250.7230	8.51	0.020
02/08/99	14:41:43	251.7230	8.51	0.020
02/08/99	14:42:43	252.7230	8.51	0.020
02/08/99	14:43:43	253.7230	8.50	0.020
02/08/99	14:44:43	254.7230	8.50	0.020
02/08/99	14:45:43	255.7230	8.49	0.020
02/08/99	14:46:43	256.7230	8.49	0.020
02/08/99	14:47:43	257.7230	8.48	0.020
02/08/99	14:48:43	258.7230	8.48	0.020
02/08/99	14:49:43	259.7230	8.48	0.020
02/08/99	14:50:43	260.7230	8.47	0.020
02/08/99	14:51:43	261.7230	8.47	0.020
02/08/99	14:52:43	262.7230	8.48	0.021
02/08/99	14:53:43	263.7230	8.48	0.020
02/08/99	14:54:43	264.7230	8.48	0.020
02/08/99	14:55:43	265.7230	8.49	0.020
02/08/99	14:56:43	266.7230	8.48	0.020
02/08/99	14:57:43	267.7230	8.48	0.020
02/08/99	14:58:43	268.7230	8.49	0.020
02/08/99	14:59:43	269.7230	8.48	0.020
[illegible]8/99	15:00:43	270.7230	8.48	0.020
[illegible]8/99	15:01:43	271.7230	8.48	0.020
02/08/99	15:02:43	272.7230	8.48	0.020
02/08/99	15:03:43	273.7230	8.47	0.020
02/08/99	15:04:43	274.7230	8.47	0.020
02/08/99	15:05:43	275.7230	8.47	0.020
02/08/99	15:06:43	276.7230	8.47	0.020
02/08/99	15:07:43	277.7230	8.47	0.020

02/08/99	15:08:43	278.7230	8.47	0.020
02/08/99	15:09:43	279.7230	8.47	0.021
02/08/99	15:10:43	280.7230	8.47	0.021
02/08/99	15:11:43	281.7230	8.47	0.021
02/08/99	15:12:43	282.7230	8.47	0.021
02/08/99	15:13:43	283.7230	8.47	0.021
02/08/99	15:14:43	284.7230	8.45	0.020
02/08/99	15:15:43	285.7230	8.45	0.020
02/08/99	15:16:43	286.7230	8.44	0.020
02/08/99	15:17:43	287.7230	8.42	0.020
02/08/99	15:18:43	288.7230	8.42	0.020
02/08/99	15:19:43	289.7230	8.41	0.020
02/08/99	15:20:43	290.7230	8.41	0.021
02/08/99	15:21:43	291.7230	8.41	0.021
02/08/99	15:22:43	292.7230	8.41	0.021
02/08/99	15:23:43	293.7230	8.41	0.021
02/08/99	15:24:43	294.7230	8.41	0.021
02/08/99	15:25:43	295.7230	8.41	0.021
02/08/99	15:26:43	296.7230	8.41	0.021
02/08/99	15:27:43	297.7230	8.42	0.021
02/08/99	15:28:43	298.7230	8.43	0.021
02/08/99	15:29:43	299.7230	8.43	0.021
02/08/99	15:30:43	300.7230	8.44	0.021
02/08/99	15:31:43	301.7230	8.44	0.020
02/08/99	15:32:43	302.7230	8.44	0.021
02/08/99	15:33:43	303.7230	8.44	0.021
02/08/99	15:34:43	304.7230	8.44	0.020
02/08/99	15:35:43	305.7230	8.44	0.021
02/08/99	15:36:43	306.7230	8.43	0.021
02/08/99	15:37:43	307.7230	8.43	0.021
02/08/99	15:38:43	308.7230	8.44	0.021
02/08/99	15:39:43	309.7230	8.43	0.020
02/08/99	15:40:43	310.7230	8.43	0.020
02/08/99	15:41:43	311.7230	8.43	0.021
02/08/99	15:42:43	312.7230	8.43	0.021
02/08/99	15:43:43	313.7230	8.43	0.020
02/08/99	15:44:43	314.7230	8.44	0.021
02/08/99	15:45:43	315.7230	8.44	0.020
02/08/99	15:46:43	316.7230	8.44	0.020
02/08/99	15:47:43	317.7230	8.45	0.020
02/08/99	15:48:43	318.7230	8.45	0.020
02/08/99	15:49:43	319.7230	8.45	0.020
02/08/99	15:50:43	320.7230	8.45	0.020
02/08/99	15:51:43	321.7230	8.46	0.020
02/08/99	15:52:43	322.7230	8.46	0.020
02/08/99	15:53:43	323.7230	8.47	0.020
02/08/99	15:54:43	324.7230	8.47	0.020
02/08/99	15:55:43	325.7230	8.47	0.020
02/08/99	15:56:43	326.7230	8.47	0.020
02/08/99	15:57:43	327.7230	8.47	0.020
02/08/99	15:58:43	328.7230	8.47	0.020
02/08/99	15:59:43	329.7230	8.47	0.020
02/08/99	16:00:43	330.7230	8.48	0.020
02/08/99	16:01:43	331.7230	8.48	0.020
02/08/99	16:02:43	332.7230	8.48	0.020
02/08/99	16:03:43	333.7230	8.49	0.020
02/08/99	16:04:43	334.7230	8.50	0.020
02/08/99	16:05:43	335.7230	8.50	0.020
02/08/99	16:06:43	336.7230	8.51	0.020
02/08/99	16:07:43	337.7230	8.51	0.020
02/08/99	16:08:43	338.7230	8.51	0.020
02/08/99	16:09:43	339.7230	8.51	0.019
02/08/99	16:10:43	340.7230	8.51	0.019
02/08/99	16:11:43	341.7230	8.50	0.020
02/08/99	16:12:43	342.7230	8.50	0.020
02/08/99	16:13:43	343.7230	8.50	0.019
02/08/99	16:14:43	344.7230	8.50	0.019
02/08/99	16:15:43	345.7230	8.49	0.019
02/08/99	16:16:43	346.7230	8.48	0.019

02/08/99	16:17:43	347.7230	8.48	0.020
02/08/99	16:18:43	348.7230	8.47	0.019
02/08/99	16:19:43	349.7230	8.47	0.019
02/08/99	16:20:43	350.7230	8.46	0.019
02/08/99	16:21:43	351.7230	8.45	0.019
02/08/99	16:22:43	352.7230	8.45	0.020
02/08/99	16:23:43	353.7230	8.45	0.019
02/08/99	16:24:43	354.7230	8.44	0.019
02/08/99	16:25:43	355.7230	8.44	0.019
02/08/99	16:26:43	356.7230	8.44	0.020
02/08/99	16:27:43	357.7230	8.45	0.020
02/08/99	16:28:43	358.7230	8.45	0.019
02/08/99	16:29:43	359.7230	8.45	0.018
02/08/99	16:30:43	360.7230	8.46	0.018
02/08/99	16:31:43	361.7230	8.47	0.019
02/08/99	16:32:43	362.7230	8.48	0.019
02/08/99	16:33:43	363.7230	8.48	0.019
02/08/99	16:34:43	364.7230	8.49	0.019
02/08/99	16:35:43	365.7230	8.49	0.019
02/08/99	16:36:43	366.7230	8.50	0.019
02/08/99	16:37:43	367.7230	8.50	0.019
02/08/99	16:38:43	368.7230	8.50	0.019
02/08/99	16:39:43	369.7230	8.50	0.018
02/08/99	16:40:43	370.7230	8.50	0.019
02/08/99	16:41:43	371.7230	8.51	0.019
02/08/99	16:42:43	372.7230	8.51	0.018
02/08/99	16:43:43	373.7230	8.52	0.018
02/08/99	16:44:43	374.7230	8.52	0.018
02/08/99	16:45:43	375.7230	8.52	0.018
02/08/99	16:46:43	376.7230	8.52	0.018
02/08/99	16:47:43	377.7230	8.53	0.018
02/08/99	16:48:43	378.7230	8.53	0.018
02/08/99	16:49:43	379.7230	8.53	0.018
02/08/99	16:50:43	380.7230	8.53	0.018
02/08/99	16:51:43	381.7230	8.54	0.018
02/08/99	16:52:43	382.7230	8.55	0.018
02/08/99	16:53:43	383.7230	8.55	0.018
02/08/99	16:54:43	384.7230	8.55	0.018
02/08/99	16:55:43	385.7230	8.55	0.018
02/08/99	16:56:43	386.7230	8.55	0.018
02/08/99	16:57:43	387.7230	8.56	0.018
02/08/99	16:58:43	388.7230	8.56	0.018
02/08/99	16:59:43	389.7230	8.56	0.018
02/08/99	17:00:43	390.7230	8.56	0.018
02/08/99	17:01:43	391.7230	8.56	0.018
02/08/99	17:02:43	392.7230	8.56	0.018
02/08/99	17:03:43	393.7230	8.56	0.018
02/08/99	17:04:43	394.7230	8.56	0.018
02/08/99	17:05:43	395.7230	8.55	0.018
02/08/99	17:06:43	396.7230	8.55	0.018
02/08/99	17:07:43	397.7230	8.55	0.018
02/08/99	17:08:43	398.7230	8.55	0.018
02/08/99	17:09:43	399.7230	8.54	0.018
02/08/99	17:10:43	400.7230	8.53	0.018
02/08/99	17:11:43	401.7230	8.53	0.018
02/08/99	17:12:43	402.7230	8.53	0.018
02/08/99	17:13:43	403.7230	8.53	0.018
02/08/99	17:14:43	404.7230	8.53	0.018
02/08/99	17:15:43	405.7230	8.53	0.018
02/08/99	17:16:43	406.7230	8.53	0.018
02/08/99	17:17:43	407.7230	8.53	0.018
02/08/99	17:18:43	408.7230	8.53	0.018
02/08/99	17:19:43	409.7230	8.53	0.018
02/08/99	17:20:43	410.7230	8.52	0.018
02/08/99	17:21:43	411.7230	8.52	0.018
02/08/99	17:22:43	412.7230	8.52	0.018
02/08/99	17:23:43	413.7230	8.52	0.018
02/08/99	17:24:43	414.7230	8.52	0.018
02/08/99	17:25:43	415.7230	8.52	0.018

02/08/99	17:26:43	416.7230	8.52	0.018
02/08/99	17:27:43	417.7230	8.52	0.018
02/08/99	17:28:43	418.7230	8.52	0.018
02/08/99	17:29:43	419.7230	8.52	0.019
02/08/99	17:30:43	420.7230	8.51	0.019
02/08/99	17:31:43	421.7230	8.51	0.019
02/08/99	17:32:43	422.7230	8.50	0.019
02/08/99	17:33:43	423.7230	8.50	0.019
02/08/99	17:34:43	424.7230	8.50	0.018
02/08/99	17:35:43	425.7230	8.49	0.019
02/08/99	17:36:43	426.7230	8.49	0.019
02/08/99	17:37:43	427.7230	8.48	0.019
02/08/99	17:38:43	428.7230	8.48	0.018
02/08/99	17:39:43	429.7230	8.48	0.018
02/08/99	17:40:43	430.7230	8.48	0.018
02/08/99	17:41:43	431.7230	8.48	0.018
02/08/99	17:42:43	432.7230	8.48	0.018
02/08/99	17:43:43	433.7230	8.48	0.018
02/08/99	17:44:43	434.7230	8.47	0.018
02/08/99	17:45:43	435.7230	8.47	0.018
02/08/99	17:46:43	436.7230	8.46	0.018
02/08/99	17:47:43	437.7230	8.45	0.018
02/08/99	17:48:43	438.7230	8.52	0.018

APPENDIX F

DATA USABILITY SUMMARY REPORTS

Data Usability Summary Report:

Lot # AK180115

Shield Environmental Associates, Inc.
4225 Northern Pike, Suite 101
Monroeville, Pennsylvania 15146

August 1999

1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to Lot #AK180115, for two groundwater samples, four soil samples, and one trip blank sample collected at the DII Binghamton facility. Two soil samples and a groundwater sample were analyzed for the following constituents from the site-specific parameter list (SSPL):

- X Tetrachloroethene
- X Trichloroethene
- X 1,1-Dichloroethene
- X 1,2-Dichloroethene (cis- and trans-)
- X 1,2-Dichloroethane

Two other soil samples and one other groundwater sample were analyzed for Target Analyte List/Target Compound List (TAL/TCL) analytes, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and total cyanide. The two groundwater samples were analyzed for general chemistry parameters, including chloride, sulfate, nitrate, and total organic carbon. Groundwater sample 004 and soil sample 005 were analyzed for total petroleum hydrocarbons (TPH), diesel range, also. The trip blank sample was analyzed for TCL VOCs only. The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

VOCs

Tetrachloroethene was reported in the six environmental samples, with concentrations ranging up to 210 micrograms per kilogram (ug/kg) in sample 005. Cis-1,2-dichloroethene was reported in five samples (001, 002, 003, 004, and 006) with the highest concentrations reported in sample 003. The remaining compounds detected included trichloroethene in four samples; 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethene (total), methylene chloride, and toluene in three samples; ethylbenzene and vinyl chloride in two samples; and chloroform, acetone, and xylene (total) in one sample. Ten

Tentatively Identified Compounds (TICs) were reported in sample 001, one TIC was reported in sample 003, and no TICs were reported in samples 002 and 007.

Other Parameters

Only TCL SVOC TICs (aldol condensation products, unknown hydrocarbons, butylated hydroxytolune, and unknown compounds) were detected in the three samples analyzed for SVOCs.

PCBs/pesticide analyses indicated presence of alpha-BHC in sample 003 in low concentrations. No other PCBs/pesticides were detected in the samples.

TAL metals were reported above the detection limit in the samples analyzed for metals. Aluminum, arsenic, lead, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, vanadium, and zinc were detected in soil samples 001and 002. Aluminum, arsenic, lead, barium, selenium, cadmium, calcium, copper, iron, magnesium, manganese, sodium, and zinc were detected in groundwater sample 003. Total cyanide was not detected in any of the samples analyzed.

Nitrate was not detected in any of the samples; chloride concentrations ranged from 170 to 250 milligrams per liter (mg/L), and TOC from 9 to 15 mg/L. Sulfate was not detected; the detection limit was elevated in all samples due to matrix interference.

TPH-diesel range were reported in both samples, 004 (1,200,000 ug/L and 005 (2,900 milligrams per kilogram [mg/kg]).

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deficiencies in this sample lot were:

VOCs

- One surrogate recovery was out of QC limits (greater than upper limit) for sample 001. Re-extraction and reanalysis performed in accordance with QC protocols achieved similar results, indicating a matrix effect. The detected volatile compounds have been qualified as "J," for estimated values.

- The laboratory matrix spike/matrix spike duplicates (MS/MSDs) for soil failed spike recovery. The control sample associated with this batch was in control, therefore no action was taken.

- Samples 004 and 005 were diluted due to high concentrations of TICs. As a result, the increased reporting limits of VOCs decreased the likelihood of reporting VOCs above the reporting limit prior to dilution.

SVOCs

X Due to matrix interference and high analyte concentrations, the soil and water SVOC MS/MSDs were analyzed at a dilution. No corrective action was taken.

X Six out of six surrogate recoveries were out of QC limits for sample 002, all low, with five out of six less than 10% recovery, representing both the base neutral and acid fraction. Re-extraction and reanalysis achieved similar results demonstrating matrix effects. Based on the low surrogate recoveries, all results (nondetectable) are classified as "J," for estimated.

X Samples 001 and 003 were diluted due to high concentrations of TICs, resulting in increased reporting limits.

PCBs/Pesticides

- The continuing calibration of the instrument for analyses of PCBs/ pesticides in samples 001, 002, and 003 exceeded the 25% criterion for the difference between the true and reported values for endrin (28.8%) and 4,4-DDE (26.3%). Therefore, the nondetected results for these compounds are to be flagged "UJ" in all samples.

Metals

- The water method blank contained zinc in concentration greater than the reporting limit, but less than two times the reporting limit (0.062 mg/L). The affected results for sample 003 (0.42 mg/L) were flagged "MBD."

- Matrix spike recoveries and RPDs for soil were not calculated for aluminum, barium, chromium, copper, iron, manganese, and

zinc due to sample concentrations reading greater than four times the spike amount. The affected results were flagged "NC/MSB."

- MS/MSD recoveries for soil were outside the control limits for calcium, lead, selenium, and silver. However, the LCS was in control indicating a matrix effect; the affected results were flagged with "N." Lead and calcium results for soil were flagged as "J" for estimated.

- The serial dilution form, Form IX, was not provided since the serial dilution was not performed for a client sample.

General Chemistry

- The MS/MSD percent recoveries was outside of control limits for sulfate and nitrate. The LCS results were in control. The affected results are flagged with "N."

- Holding time was exceeded for nitrate. The nitrate analyses were performed six days after receipt in the lab and seven days after the collection. The results are qualified as "UJ," for estimated values below the detection limit.

1.3 Recommendations

The followings are recommended:

- Provide information about the PCBs/pesticides and TPH analysis in the case narrative.

X Call out dilution factors in the narrative, where significant, as this is of interest to the Shield project manager when reviewing and interpreting results.

X Provide discussion of TICs, where significant numbers or concentrations are found, as this may be relevant to Shield's understanding of site conditions.

- The case narrative should indicate the percentage drift during continuing calibration of instrument for PCBs/pesticides analysis was outside QC limits.

2.0 Completeness of Data Package

In general, the data package was complete, and items were provided in formats consistent with or equivalent to the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) Category B guidance. MS/MSD raw data were not provided in cases when client samples were not spiked.

3.0 Compliance with Holding Times

All VOC samples were analyzed within the required seven-day holding time upon the verified receipt time in the laboratory. Other TCL/TAL analyses were performed within required holding time. Chloride, sulfate, and TOC were all analyzed within the required 28-day holding time. Holding time for nitrate analyses were exceeded and analyses were performed 6 days after the samples were received.

4.0 Quality Control Data

4.1 Blanks

No target constituents were detected in blanks for any of the analyses, excluding metals. Zinc was reported in the method blank in concentrations less than two times the reporting limit.

4.2 MS/MSDs

MS/MSDs were completed using client sample 003 for SVOC compounds only. The remaining MS/MSDs were completed using laboratory QC samples. All

spike recoveries and RPDs were within QC limits except the following:

VOCs

- The laboratory MS/MSD for soil failed spike recovery. The laboratory control sample associated with these samples was in control, therefore no qualifying action was taken.

SVOCs

X Due to matrix interference and high analyte concentrations, the soil and water MS/MSDs were analyzed at a dilution. No corrective action was taken.

Metals

- For soil, matrix spike recovery and RPDs were not calculated for aluminum, barium, chromium, copper, iron, manganese, and zinc due to sample concentrations reading greater than four times the spike amount. The affected results were flagged "NC/MSB."

- MS/MSD recoveries for soil were outside the control limits for calcium, lead, selenium, and silver. However, the LCS was in control indicating a matrix effect; the affected results were flagged with "N." Lead and calcium results for soil were flagged with "J," for estimated. No qualification was required for selenium or silver results.

General Chemistry

- The MS/MSD percent recoveries was outside of control limits for sulfate and nitrate. The LCS was in control. The affected results are flagged with "N."

4.3 Surrogate Recoveries

Surrogate recoveries for VOCs, SVOCs, and PCB/Pesticides were within acceptance limits, except for the following:

VOCs

- Surrogate recovery was out of QC limits (greater than upper limit) for sample 001. Re-extraction and reanalysis performed in accordance with QC protocols achieved similar results, indicating a matrix effect. The detected volatile compounds have been flagged with "J," for estimated values.

SVOCs

X Six out of six surrogate recoveries were out of QC limits for sample 002, all low (base neutral and acid fractions) with five out of six less than 10% recovery. Re-extraction and reanalysis achieved similar results, demonstrating matrix effects. Based on the low recoveries, all results (nondetectable), are flagged as "J", for estimated.

4.4 Laboratory Control Samples

The low-level VOC control samples were within control limits. The control sample for SVOCs and PCBs/pesticides was also within control limits. The interference check sample and laboratory control sample for metals were within control limits. The laboratory control samples for total cyanide was within control limits, and the laboratory control samples for TPH-diesel range were within control limit.

4.5 Other QC Data

Other QC data provided, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols.

5.0 Analytical Methods

The analytical laboratory used the analytical methods specified in the approved quality assurance project plan (QAPP). The analytical methods used for this sample group were:

Parameter	Analytical Method	
Chloride (Colorimetric, Automated Ferricyanide)	MCAWW	325.2
Extractable Petroleum Hydrocarbons	SW846	8015 MOD
Inductively Coupled Plasma (ICP) Metals	SW846	6010A
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846	7470A
Nitrate	MCAWW	353.2
Organochlorine Pesticides and PCBs	SW846	8080A
Semivolatile Organic Compounds by GC/MS	SW846	8270B
Sulfate	MCAWW	375.4
Total Cyanide	MCAWW	335.2
Total Organic Carbon	MCAWW	415.1
Total Residue as Percent Solid	MCAWW	160.3 MOD
Trace Inductively Coupled Plasma (ICP) Metals	SW846	6010A
Volatile Organics by GC/MS	SW846	8260A

References:

MCAWW - "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, in the case of pesticides/ Aroclors, raw data results were checked against the summary reports. Dilution factors, calculations, and rounding were checked, and no errors were found. Since calculations were done by the laboratory using spreadsheet formulas, the results were checked by plugging the values in the data printouts into the formulas provided.

7.0 Data Qualifiers

Data qualifiers that have been placed by the laboratory are:

- Those VOC and SVOC results that were between the detection limit and reporting limit were flagged with "J," for estimated.
- TICs were flagged with a "NJ" for approximate concentration.
- The water method blank for metals contained zinc; the affected concentrations were flagged with "MBD."
- Soil matrix spike recoveries and RPDs for metals were not calculated for aluminum, barium, chromium, copper, iron, manganese, and zinc due to sample concentrations reading greater than four times the spike amount. The affected results were flagged "NC/MSB."
- Soil MS/MSDs recoveries for metals were outside the control limit for calcium, lead, selenium, and silver. The affected results were flagged with "N."

During data review process the following qualifiers were added:

- Detected VOCs in sample 001 were flagged as "J" for estimated, due to surrogate recoveries outside of control limits.

- SVOC results for sample 002 (all below reporting limits) were flagged as "J" for estimated, due to surrogate recoveries outside of control limits.

- The nondetected results for endrin and 4,4-DDE in samples 001, 002, and 003 are to be qualified as "UJ" for an estimate concentration below the reporting limit, due to continuing calibration verification results outside of QC limits.

- Lead and calcium concentrations in soil samples 001 and 002 were flagged "J" because of MS/MSD spike recovery is out of QC limits.

- Nondetectable nitrate concentrations in samples 003 and 004 are flagged with "UJ" since the holding time is exceeded.

Table 1
Analytical Summary
Lot # A8K180115

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL	TCL/TAL	Total Cyanide	Chloride, Sulfate, Nitrate, TOC	TPH
BP001	T1 SS2 (2'-4') soil	CNJAL 001		x	x		
BP002	T1 SS1 (4'-6') soil	CNJCK 002		x	x		
BP003	T1 GW water	CNJCL 003		x	x	x	
BP004	T4 GW water	CNJDM 004	x			x	x
BP005	T4 SS2 (2'-4') soil	CNJDX 005	x				x
BP006	T5 SS1 (4'-6') soil	CNJE4 006	x				
BP007	Trip Blank water	CNJE8 007		x (VOCs only)			

SHIELD ENVIRONMENTAL ASSOC. INC.

COPY

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID: A8K180115 001

Method: SW846 8260A
Volatile Organics, GC/MS (8260A)

Sample WT/Vol: 5 / g

Date Received: 11/17/98

Work Order: CNJAL101

Date Extracted: 11/27/98

Dilution factor: 1

Date Analyzed: 11/27/98

Moisture %: 14

QC Batch: 8335235

Client Sample Id: BP001 T1 SS2 (2'-4')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q	
71-55-6	**1,1,1-Trichloroethane**	**20**		J
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U	
79-00-5	1,1,2-Trichloroethane	5.0	U	
75-34-3	**1,1-Dichloroethane**	**9.5**		J
75-35-4	1,1-Dichloroethene	5.0	U	
107-06-2	1,2-Dichloroethane	5.0	U	
540-59-0	**1,2-Dichloroethene (total)**	**4.3**	**J**	
78-87-5	1,2-Dichloropropane	5.0	U	
78-93-3	2-Butanone	20	U	
591-78-6	2-Hexanone	20	U	
108-10-1	4-Methyl-2-pentanone	20	U	
67-64-1	Acetone	20	U	
71-43-2	Benzene	5.0	U	
75-27-4	Bromodichloromethane	5.0	U	
75-25-2	Bromoform	5.0	U	
74-83-9	Bromomethane	10	U	
75-15-0	Carbon disulfide	5.0	U	
56-23-5	Carbon tetrachloride	5.0	U	
108-90-7	Chlorobenzene	5.0	U	
124-48-1	Dibromochloromethane	5.0	U	
75-00-3	Chloroethane	10	U	
67-66-3	Chloroform	5.0	U	
74-87-3	Chloromethane	10	U	
156-59-2	**cis-1,2-Dichloroethene**	**4.3**		J
10061-01-5	cis-1,3-Dichloropropene	5.0	U	
100-41-4	**Ethylbenzene**	**3.4**	**J**	
75-09-2	**Methylene chloride**	**1.3**	**J**	
100-42-5	Styrene	5.0	U	

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SHIELD ENVIRONMENTAL ASSOC. INC.

COPY

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID: A8K180115 001

Method: SW846 8260A
Volatile Organics, GC/MS (8260A)

Sample WT/Vol: 5 / g

Date Received: 11/17/98

Work Order: CNJAL101

Date Extracted: 11/27/98

Dilution factor: 1

Date Analyzed: 11/27/98

Moisture %: 14

QC Batch: 8335235

Client Sample Id: BP001 T1 SS2 (2'-4')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q	
127-18-4	**Tetrachloroethene**	**7.0**		J
108-88-3	**Toluene**	**8.0**		J
156-60-5	trans-1,2-Dichloroethene	2.5	U	
10061-02-6	trans-1,3-Dichloropropene	5.0	U	
79-01-6	**Trichloroethene**	**1.5**	**J**	
75-01-4	Vinyl chloride	10	U	
1330-20-7	**Xylenes (total)**	**15**		

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FORM I

042

COPY

SHIELD ENVIRONMENTAL ASSOC.INC.

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270B
Base/Neutrals and Acids (8270B)

Lab Sample ID:A8K180115 002

Sample WT/Vol: 30.02 / g
Work Order: CNJCK102
Dilution factor: 1
Moisture %:7.7

Date Received: 11/17/98
Date Extracted:11/19/98
Date Analyzed: 11/24/98

QC Batch: 8323122

Client Sample Id: BP002 T1 SS1 (4'-6')
Soil Extract Vol: 1 / mL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
108-95-2	Phenol	330	U
111-44-4	bis(2-Chloroethyl) ether	330	U
95-57-8	2-Chlorophenol	330	U
541-73-1	1,3-Dichlorobenzene	330	U
106-46-7	1,4-Dichlorobenzene	330	U
95-50-1	1,2-Dichlorobenzene	330	U
95-48-7	2-Methylphenol	330	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	330	U
106-44-5	4-Methylphenol	330	U
621-64-7	N-Nitrosodi-n-propylamine	330	U
67-72-1	Hexachloroethane	330	U
98-95-3	Nitrobenzene	330	U
78-59-1	Isophorone	330	U
88-75-5	2-Nitrophenol	330	U
105-67-9	2,4-Dimethylphenol	330	U
111-91-1	bis(2-Chloroethoxy)methane	330	U
120-83-2	2,4-Dichlorophenol	330	U
120-82-1	1,2,4-Trichlorobenzene	330	U
91-20-3	Naphthalene	330	U
106-47-8	4-Chloroaniline	330	U
87-68-3	Hexachlorobutadiene	330	U
59-50-7	4-Chloro-3-methylphenol	330	U
91-57-6	2-Methylnaphthalene	330	U
77-47-4	Hexachlorocyclopentadiene	1600	U
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	330	U
91-58-7	2-Chloronaphthalene	330	U
88-74-4	2-Nitroaniline	1600	U

J
BNQ
8/9/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270B
Base/Neutrals and Acids (8270B)

Lab Sample ID:A8K180115 002

Sample WT/Vol: 30.02 / g
Work Order: CNJCK102
Dilution factor: 1
Moisture %:7.7

Date Received: 11/17/98
Date Extracted:11/19/98
Date Analyzed: 11/24/98

QC Batch: 8323122

Client Sample Id: BP002 T1 SS1 (4'-6')
Soil Extract Vol: 1 / mL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
131-11-3	Dimethyl phthalate	330	U
208-96-8	Acenaphthylene	330	U
606-20-2	2,6-Dinitrotoluene	330	U
99-09-2	3-Nitroaniline	1600	U
83-32-9	Acenaphthene	330	U
51-28-5	2,4-Dinitrophenol	1600	U
100-02-7	4-Nitrophenol	1600	U
132-64-9	Dibenzofuran	330	U
121-14-2	2,4-Dinitrotoluene	330	U
84-66-2	Diethyl phthalate	330	U
7005-72-3	4-Chlorophenyl phenyl ether	330	U
86-73-7	Fluorene	330	U
100-01-6	4-Nitroaniline	1600	U
534-52-1	4,6-Dinitro-2-methylphenol	1600	U
86-30-6	N-Nitrosodiphenylamine	330	U
101-55-3	4-Bromophenyl phenyl ether	330	U
118-74-1	Hexachlorobenzene	330	U
87-86-5	Pentachlorophenol	330	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
86-74-8	Carbazole	330	U
84-74-2	Di-n-butyl phthalate	330	U
206-44-0	Fluoranthene	330	U
129-00-0	Pyrene	330	U
85-68-7	Butyl benzyl phthalate	330	U
91-94-1	3,3'-Dichlorobenzidine	1600	U
56-55-3	Benzo(a)anthracene	330	U
218-01-9	Chrysene	330	U

J
BHD
8/9/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270B
Base/Neutrals and Acids (8270B)

Lab Sample ID:A8K180115 002

Sample WT/Vol: 30.02 / g
Work Order: CNJCK102
Dilution factor: 1
Moisture %:7.7

Date Received: 11/17/98
Date Extracted:11/19/98
Date Analyzed: 11/24/98

QC Batch: 8323122

Client Sample Id: BP002 T1 SS1 (4'-6')
Soil Extract Vol: 1 / mL

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
117-81-7	bis(2-Ethylhexyl) phthalate	330	U
117-84-0	Di-n-octyl phthalate	330	U
205-99-2	Benzo(b)fluoranthene	330	U
207-08-9	Benzo(k)fluoranthene	330	U
50-32-8	Benzo(a)pyrene	330	U
193-39-5	Indeno(1,2,3-cd)pyrene	330	U
53-70-3	Dibenz(a,h)anthracene	330	U
191-24-2	Benzo(ghi)perylene	330	U

J
BKJ
8/9/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:A8K180115 001

Sample WT/Vol: 30.02 / g
Work Order: CNJAL103
Dilution factor: 1
Moisture %:

Date Received: 11/17/98
Date Extracted:11/21/98
Date Analyzed: 11/24/98

QC Batch: 8325107

Client Sample Id: BP001 T1 SS2 (2'-4')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	3.3	U
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	83	U
12674-11-2	Aroclor 1016	33	U
11104-28-2	Aroclor 1221	33	U
11141-16-5	Aroclor 1232	33	U
53469-21-9	Aroclor 1242	33	U
12672-29-6	Aroclor 1248	33	U
11097-69-1	Aroclor 1254	33	U
11096-82-5	Aroclor 1260	33	U

NG 8/14/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:A8K180115 002

Sample WT/Vol: 30.18 / g
Work Order: CNJCK103
Dilution factor: 1
Moisture %:

Date Received: 11/17/98
Date Extracted:11/21/98
Date Analyzed: 11/24/98

QC Batch: 8325107

Client Sample Id: BP002 T1 SS1 (4'-6')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	3.3	U
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	83	U
12674-11-2	Aroclor 1016	33	U
11104-28-2	Aroclor 1221	33	U
11141-16-5	Aroclor 1232	33	U
53469-21-9	Aroclor 1242	33	U
12672-29-6	Aroclor 1248	33	U
11097-69-1	Aroclor 1254	33	U
11096-82-5	Aroclor 1260	33	U

NG 8/14/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:A8K180115 003

Sample WT/Vol: 1000 / mL
Work Order: CNJCL103
Dilution factor: 1
Moisture %:NA

Date Received: 11/17/98
Date Extracted:11/20/98
Date Analyzed: 11/27/98

QC Batch: 8324106

Client Sample Id: BP003 T1 GW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	**alpha-BHC**	**0.032**	
319-85-7	beta-BHC	0.025	U
319-86-8	delta-BHC	0.025	U
58-89-9	gamma-BHC (Lindane)	0.025	U
76-44-8	Heptachlor	0.025	U
309-00-2	Aldrin	0.025	U
1024-57-3	Heptachlor epoxide	0.025	U
959-98-8	Endosulfan I	0.025	U
60-57-1	Dieldrin	0.050	U
72-55-9	4,4'-DDE	0.050	U
72-20-8	Endrin	0.050	U
33213-65-9	Endosulfan II	0.050	U
72-54-8	4,4'-DDD	0.050	U
1031-07-8	Endosulfan sulfate	0.050	U
50-29-3	4,4'-DDT	0.050	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.050	U
7421-93-4	Endrin aldehyde	0.050	U
5103-71-9	alpha-Chlordane	0.025	U
5103-74-2	gamma-Chlordane	0.025	U
8001-35-2	Toxaphene	1.2	U
12674-11-2	Aroclor 1016	0.50	U
11104-28-2	Aroclor 1221	0.50	U
11141-16-5	Aroclor 1232	0.50	U
53469-21-9	Aroclor 1242	0.50	U
12672-29-6	Aroclor 1248	0.50	U
11097-69-1	Aroclor 1254	1.0	U
11096-82-5	Aroclor 1260	1.0	U

NG 814199

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Client Sample ID: BP001 T1 SS2 (2'-4')

TOTAL Metals

Lot-Sample #...: A8K180115-001 **Matrix.....:** SOLID
Date Sampled...: 11/16/98 09:20 **Date Received..:** 11/17/98
% Moisture.....: 14

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8323108						
Aluminum	8950	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/30/98	CNJAL104
Arsenic	7.2 BNG 8/10/99	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10P
Lead	J BNG 8/10/99 12.5	0.30 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10Q
Antimony	ND	6.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL105
Barium	60.8	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL106
Selenium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10R
Beryllium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL107
Mercury	ND	0.10 Dilution Factor: 1	mg/kg	SW846 7471A	11/19-11/20/98	CNJAL10U
Thallium	ND	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10T
Cadmium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL108
Calcium	BNG 8/10/99 18400 J	500 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL109
Chromium	10.9	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10A
Cobalt	7.5	5.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10C
Copper	19.4	2.5 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJAL10D

(Continued on next page)

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Client Sample ID: BP002 T1 SS1 (4'-6')

TOTAL Metals

Lot-Sample #...: A8K180115-002 **Matrix.....:** SOLID
Date Sampled...: 11/16/98 09:35 **Date Received..:** 11/17/98
% Moisture.....: 7.7

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8323108						
Aluminum	**8240**	**20.0** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/30/98**	**CNJCK104**
Arsenic	**5.7** J BNQ 8/10/99	**1.0** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK10P**
Lead	**9.0**	**0.30** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK10Q**
Antimony	ND	6.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK105
Barium	**34.7**	**20.0** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK106**
Selenium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK10R
Beryllium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK107
Mercury	ND	0.10 Dilution Factor: 1	mg/kg	SW846 7471A	11/19-11/20/98	CNJCK10U
Thallium	ND	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK10T
Cadmium	ND J BNQ 8/10/99	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK108
Calcium	**8880**	**500** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK109**
Chromium	**9.4**	**1.0** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK10A**
Cobalt	**6.6**	**5.0** Dilution Factor: 1	**mg/kg**	**SW846 6010A**	**11/19-11/22/98**	**CNJCK10C**
Copper	17.5	2.5 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJCK10D

(Continued on next page)

COPY

SHIELD ENVIRONMENTAL ASSOC.INC.

Client Sample ID: BP003 T1 GW

General Chemistry

Lot-Sample #...: A8K180115-003 **Work Order #...:** CNJCL **Matrix.....:** WATER
Date Sampled...: 11/16/98 12:00 **Date Received..:** 11/17/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chloride - Automated	**170**	**2**	**mg/L**	**MCAWW 325.2**	**11/30/98**	**8334359**
		Dilution Factor: 2				
Nitrate	ND	0.1	mg/L	MCAWW 353.2	11/23/98	8328400
		Dilution Factor: 1				
Sulfate	ND G	120	mg/L	MCAWW 375.4	12/14/98	8348336
		Dilution Factor: 25				
Total Cyanide	ND	0.010	mg/L	MCAWW 335.2	11/30/98	8334328
		Dilution Factor: 1				
Total Organic Carbon	**15**	**1**	**mg/L**	**MCAWW 415.1**	**12/11/98**	**8345255**
		Dilution Factor: 1				

LCS BNQ 8/10/99

NOTE(S):

Reporting Limit

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

COPY

SHIELD ENVIRONMENTAL ASSOC.INC.

Client Sample ID: BP004 T4 GW

General Chemistry

Lot-Sample #...: A8K180115-004 Work Order #...: CNJDM Matrix.....: WATER
Date Sampled...: 11/16/98 15:05 Date Received..: 11/17/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chloride - Automated	250	5	mg/L	MCAWW 325.2	11/30/98	8334359
	Dilution Factor: 5					
Nitrate	ND	0.1	mg/L	MCAWW 353.2	11/23/98	8328400
	Dilution Factor: 1					
Sulfate	ND G	50	mg/L	MCAWW 375.4	12/07/98	8341383
	Dilution Factor: 10					
Total Organic Carbon	9	1	mg/L	MCAWW 415.1	12/11/98	8345255
	Dilution Factor: 1					

WJ BHG 8/10/99

NOTE(S):

RL Reporting Limit

Elevated reporting limit. The reporting limit is elevated due to matrix interference.

A8K180115
BP001 – BP 007
4 soil, 2 GW-Trench
LTrip

Analytical Services Protocol (ASP)
Category B Checklist

T° = 1.9° C

3.1 SDG Narrative

001 SRG02 out of QC limit
LCS0 SRG02

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package.

Defic - No info about TPH analysis
- Not enough samples for VOC collected at → BP003
- No info about PCB's/Pest

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists).

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated.

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order.

3.3 NYSDEC Data Package Summary Forms

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG.

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

3.5.1.1 System Monitoring Compound Summary

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary

3.5.1.3 QC Check Sample/Standard

3.5.1.4 Method Blank Summary

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5 GC/MS Instrument Performance Check

BFB in chronological order; by instrument.

3.5.1.6 Instrument Detection Limits NA

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples.

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA).

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found."

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract.

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). ✓

3.5.3 Standards Data

for both { % RSD within limits ≤ 30%
% RRF within limit ≥ 0.01% exclud
1,4-Dioxane (%RSD o

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. 12/1/98 5 levels ✓
11/25/98 5 levels

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

2 chloroethyl vinyl ether 55.9%D → Quanta Standard 50
↑ 11/27/98 2-Chloroethyl vinyl ether 29%

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. 11/25/98 - OK ✓ 0% ±25 ✓

RRF ≥ 0.01 excluding 1-4 Dioxane

12/2/98 8:52 21:41 - Acetone %D 50.4 ✓

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations ✓

Quanta 50

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

6 sets

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples. 1 8A5	
3.5.4.2.1	Tabulated results (Form I-VOA).	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	✓
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	✓ None found
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	✓ None found
3.5.4.3	Matrix Spike Blank Data covered by Dave Soyle	✓
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	✓
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

No client sample

3.5.4.4	Matrix Spike Data	
3.5.4.4.1	Tabulated results (Form I-VOA) of all TCL compounds. Form I-VOA-TIC is not required.	
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	
3.5.4.5	Matrix Spike Duplicate Data	
3.5.4.5.1	Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required.	
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	
3.4.5.6	QC Check Sample/Standard 4 sets	✓
3.5.4.6.1	Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

see on back of this page

3.5.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC sample (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

BP001 BP002 BP003

3.6 GC/MS Semivolatiles Data

3.6.1 QC Summary

out for soils 003 and Re→004 lab MS/MSD = labels

within limits for water samples and blank QC

GW samples diluted

3.6.1.1 Surrogate Percent Recovery Summary (Form II-SV)

lab MS/MSD 8323122 RPD, Rec

BP003

Low

3.6.1.2 Matrix Spike/Matrix Spike Duplicate Summary (Form III-SV) 8323111 Rec out RPD

diluted for Pyrene

8323111

3.6.1.3 QC Check Sample/Standard 8323122

Sample MS/MSD BP003 8334119 Rec out, RPD OK 8341198lut. Rec, RPD OK

3 sets

3.6.1.4 Method Blank Summary (Form IV-SV)

10 sets for 2 instruments

DFTPP

3.6.1.5 GC/MS Instrument Performance and Mass Calibration (Form V-SV)

12 sets

3.6.1.6 Internal Standard Area and RT Summary (Form VIII-SV)

3.6.1.7 Instrument Detection Limits N/A

3.6.2 Sample Data - NO TICs

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form I-CLP-SV, including Form I SV-TIC), followed by the raw data for semivolatile samples. These sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

Sample #	Dilution Factor	Noishere #	
BP001	25	14	NP → TICs JAB, J
BP002	1	7.7	NP → TICs JAB
BP002-RE1	1	7.7	→ Matrix interference NO TICs JAB

Sample #	Dilution	Dilution	
BP03	10	N/A	-NO TICs NS, J

3.6.2.1 TCL Results - Organic Analysis Data Sheet (Form I-SV-1, SV-2).

Tabulated results (identification and quantitation) of the specified target compounds.

On Form I-SV, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. **NOTE:** Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.6.2.2 Tentatively Identified Compounds (Form I-SV-TIC)

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found".

3.6.2.3 Reconstructed total ion chromatograms (RIC) for each sample.

RICs must be normalized to the largest nonsolvent component, and must contain the following header information:

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the GC/MS operator must identify such edits or manual procedures by initialing and dating the changes made to the report.

If automated data system procedures are used for preliminary identification and/or quantification of the Target Compound List compounds, the complete data system report must be included in all sample data packages, in addition to the reconstructed ion chromatogram. The complete data system report shall include:

- Sample number
- Date and time of analysis
- RT or scan number of identified TCL compounds
- Ion used for quantitation with measured area
- Copy of area table from data system
- GC/MS instrument ID
- Lab file ID

3.6.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.6.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra.

3.6.2.4.2 Copies of TIC mass spectra associated best-match spectra (three best matches).

3.6.2.4.3 GPC chromatograms (if GPC performed). N/A

3.6.3 Standards Data

5 levels 10/22/97 11/9/98 12/3/98 12/4/98 RSD out for benzidine NR NR

3.6.3.1 Initial Calibration Data (Form VI-SV-1, SV-2) - in order by instrument, if more than one instrument used.

%RSD, RRF within limits

3.6.3.1.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration.

3.6.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed.

11/30/98 90 out for
11/29/98 -%0 out for
11/27/98 -%0 out for
11/25/98 -% D " "
and 3-3' Dimethoxybenzidine-NR
2-4 Toluenediamine NR
-%D within limits

3.6.3.2	Continuing calibration (Form VII-SV-1, SV-2) - in order by instrument, if more than one instrument used. 12/3/98 -%0 out for 12/4/98 - " "	✓
3.6.3.2.1	Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations.	✓
3.6.3.2.2	When more than one continuing calibration is performed, forms must be in chronological order, by instrument.	✓
3.6.3.3	Internal Standard Area Summary (Form VIII-SV-1, SV-2) in order by instrument, if more than one instrument used.	only in QC samples
3.6.3.4	Semivolatile GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the semivolatile GPC calibration mixture.	NA

3.6.4 Raw QC Data ✓

3.6.4.1	DFTPP (for each 12-hour period, for each GC/MS system utilized) NO sets	✓
3.6.4.1.1	Bar graph spectrum.	✓
3.6.4.1.2	Mass listing.	✓
3.6.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.6.4.2	Blank Data - NO - in chronological order, by extraction date. 832311 NO 8323122 NO TICs 8334119 NO TICs **NOTE:** This order is different from that used for samples.	✓
3.6.4.2.1	Tabulated results (Form I-SV-1, SV-2)	✓

ND

3.6.4.2.2	Tentatively Identified Compounds (Form I-SV-TIC) - even if none found.	✓
3.6.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.6.4.2.4	Superfund-TCL spectra with lab generated standard. Provides:	—
•	Raw TCL compound spectra	—
•	Enhanced or background subtracted spectra	—
•	Laboratory generated TCL standard spectra	—
3.6.4.2.5	GC/MS library search spectra for Tentatively Identified Compounds (TIC).	✓
3.6.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	✓
3.6.4.3	Matrix Spike Blank Data covered by blank	—
3.6.4.3.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	—
3.6.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are required.	—
3.6.4.4	Matrix Spike Data Sample D8003 8323111	✓
3.6.4.4.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	✓
3.6.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓

BP003 8323111

3.6.4.5	Matrix Spike Duplicate Data	✓
3.6.4.5.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	✓
3.6.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓
3.6.4.6	QC Check Sample/Standard 8323111 8323122 8341119	✓
3.6.4.6.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds.	✓
3.6.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓

3.6.5 Copy of Calculations

✓

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a <u>software package</u>, a copy of the formula used must be supplied as well as values for all terms in the formula.

✓

3.6.6 Copy of Extraction Logs

✓ ✓ ✓

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

✓ ✓

3.7 GC/ECD Pesticide/Aroclor Data

3.7.1 QC Summary

3.7.1.1 Surrogate Percent Recovery Summary (Form II-PEST)

3.7.1.2 Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-PEST)

3.7.1.3 QC Check Sample/Standard Recovery

3.7.1.4 Method Blank Summary (Form IV-PEST)

3.7.1.5 Instrument Detection Limits

3.7.2 Sample Data

Sample data shall be arranged in packets with the Traffic Report copy, the Organic Analysis Data Sheet (Form I-PEST), followed by the raw data for pesticide samples. The sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

3.7.2.1 TCL Results - Organic Analysis Data Sheet (Form I-PEST).

On Form I-PEST, the appropriate concentration units shall be entered. For example, ug/L for water samples or ug/Kg for soil/sediment samples. No other units are acceptable.

NOTE: Report analytical results to two significant figures for all pesticide/PCB samples.

3.7.2.2 Copies of pesticide chromatograms.

All chromatograms must be labeled with the following information.

- Sample number ✓
- Volume injected (ul) ✓
- Date and time of injection ✓
- GC column identification (by stationary phase and internal diameter) ✓
- GC instrument identification ✓
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or on a print-out of retention times if retention times are printed over the peak. ✓

3.7.2.3 Copies of pesticide chromatograms from second GC column confirmation. ✓

3.7.2.4 GC integration report or data system printout and calibration plots (area vs. concentration) for 4-4'DDT, 4,4'DDD, 4,4'-DDE or toxaphene (where appropriate). NA

3.7.2.5 Manual work sheets. NA

3.7.2.6 UV traces from GPC (if GPC performed). NA

3.7.2.7 If pesticide/Aroclors are confirmed by GC/MS, the Laboratory shall submit copies of reconstructed ion chromatograms, raw spectra and copies of background-subtracted mass spectra of Superfund target compounds listed in Exhibit C (Superfund-TCL) that are identified in the sample and corresponding background-subtracted Superfund-TCL standard mass spectra. Compound names must be clearly marked on all spectra. For multicomponent pesticides/Aroclors confirmed by GC/MS, the Laboratory shall submit mass spectra of 3 major peaks of multicomponent compounds from samples and standards. NA

3.7.3 Standards Data

6 levels 11/24/98 ✓ 2 cols

3.7.3.1 Initial Calibration of Single Component Analytes (Form VI-PEST-1 and PEST-2) - all GC columns, all instruments, in chronological order by GC column and instrument. %RSD ✓ ✓

3.7.3.2 Initial Calibration of Multicomponent Analytes (Form VI-PEST-3) - all GC columns, all instruments, in chronological order by GC column and instrument.

3.7.3.3 Analyte Resolution Summary (Form VI-PEST-4) - all GC columns and instruments, in chronological order by GC column and instrument.

3.7.3.4 Calibration Verification Summary (Form VII-PEST-1) - for all Performance Evaluation Mixtures and Instrument blanks, on all GC columns and instruments, in chronological order by GC column and instrument.

3.7.3.5 Calibration Verification Summary (Form VII-PEST-2) - for all mid point concentrations of Individual Standard Mixtures A and B and Instrument blanks used for calibration verification, on all GC columns and instruments, in chronological order by GC column and instrument.

3.7.3.6 Analytical Sequence (Form VIII-PEST) - all GC columns and instruments, in chronological order by GC column and instrument.

3.7.3.7 Florisil Cartridge Check (Form IX-PEST-1) - for all lots of cartridges used to process samples in the sample lot. NA

3.7.3.8 Pesticide GPC Calibration (Form IX-PEST-2) - all GPC columns, in chronological order by calibration date. NA

3.7.3.9 Pesticide Identification Summary for Single Component Analytes (Form X-PEST-1) - for all samples with positively identified single component analytes, In order by increasing sample number.

3.7.3.10 Pesticide Identification Summary for Multicomponent Analytes (Form X-PEST-2) - for all samples positively identified multicomponent analytes, in order by increasing sample number.

3.7.3.11 Chromatograms and data system printouts are required for all standards including the following:

- Resolution Check Mixture.
- Performance Evaluation Mixtures, all.
- Individual Standard Mixture A, at three concentrations, each initial calibration.
- All multicomponent analytes (Toxaphene and Aroclors), each initial calibration.
- All mid point concentrations of Individual Standard Mixtures A and B used for calibration verification.
- Florisil cartridge check solution, all lots. NA
- Pesticide GPC Calibration Check Solution, all calibrations relating to samples in the lot number. NA
- All multicomponent analyte standards analyzed for confirmation.

3.7.3.12 A printout of retention times and corresponding peak areas or peak heights must accompany each chromatogram. In addition, all chromatograms are required to be labeled with the following:

- Sample Number for the standard.
- Label all standard peaks for all individual compounds either directly out from the peak or on the printout of retention times if retention times are printed over the peak.
- Total nanograms injected for each standard.

- Date and time of injection. ✓

- GC column identification (by stationary phase and internal diameter). ✓

- GC instrument identification. ✓

3.7.3.13 Pesticide GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the pesticide GPC calibration mixture. NA

3.7.4 Raw QC Data ✓

dilut -1 8325107 ND 8324106 ND

3.7.4.1 Blank Data - in chronological order, by type of blank (method, instrument, sulfur cleanup). **NOTE:** This order is different from that used for samples. ND ✓

3.7.4.1.1 Tabulated results (Form I-PEST). ✓

3.7.4.1.2 Chromatogram(s) and data system printout(s) (GC) for each GC column and instrument used for analysis. ✓

3.7.4.2 Matrix Spike Data

3.7.4.2.1 Tabulated results (Form I-PEST) of <u>all</u> TCL compounds.

3.7.4.2.2 Chromatogram(s) and data system printout(s) (GC). No Client sample spiked

3.7.4.3 Matrix Spike Duplicate Data

3.7.4.3.1 Tabulated results (Form I-PEST) of <u>all</u> TCL compounds.

3.7.4.3.2 Chromatogram(s) and data system printout(s) (GC).

3.7.4.4	Matrix Spike Blank Data — Blank	
3.7.4.4.1	Tabulated results (Form I-PEST) of all TCL compounds.	
3.7.4.4.2	Chromatogram(s) and data system printout(s) (GC).	
3.7.4.5	QC Check Sample/Standard 8324104	✓
	8324106 – dup	
	8325107	
3.7.4.5.1	Tabulated results (Form I-PEST) of all TCL compounds.	✓
3.7.4.5.2	Chromatogram(s) and data system printout(s) (GC).	✓

3.7.5 Copy of Calculations

✓

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

✓

N

3.7.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

✓

3.9 Inorganic Data

BB001
BB002
BB003

Sample data shall be submitted with the Inorganic Analysis Data Reporting Forms for all samples in the sample lot arranged in increasing alphanumeric sample number order, followed by the QC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.

3.9.1 Results – Inorganic Analysis Data Sheet (Form I-IN)

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid sample must be reported on a dry weight basis. Analytical results must be reported to two significant figures if the result value is less than 10; to three significant figures if the value is greater than or equal to 10. Results for percent solids must be reported to one decimal place.

3.9.2 Quality Control Data

%R { Hg 80-120; Other 90-110

Hg & other within limit

3.9.2.1 Initial and Continuing Calibration Verification [FORM II-IN (Part 1)]

3.9.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.9.2.3 Blanks [FORM III-IN] 2 blanks BW contamination with Zn 0.062 mg/L; Cu 2.00 ok

3.9.2.4 ICP Interference Check Sample [FORM IV-IN] ± 20% within limits

3.9.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

Interference: for water % Rec. R'd with limits batch 8328252; for soil - batch 8323108 { Rec, R PD not calculated for: Al, Ba, Cr, Co, Fe, Mn, Zn - "NC/MSB"; Spike Rec out for Ca↑, Pb↑, Se↓, Ag↑ - "N"

qualified soil data U, J

80-120

3.9.2.6	Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]	NA
3.9.2.7	Duplicates [FORM VI-IN]	NA
3.9.2.8	Quality Control Sample [FORM VII-IN]	Soil & water % Rec ✓
3.9.2.9	Standard Addition Results [FORM VIII-IN]	No results coded "S" or "T" in Form I NA
3.9.2.10	ICP Serial Dilutions [FORM IX-IN]	Not found - not performed - client spike
3.9.2.11	Holding Times [FORM X-IN]	Not found. Analyses within holding time

3.9.3 Verification of Instrument Parameters

3.9.3.1	Instrument Detection Limits (Semiannually) [FORM XI-IN]	CRDL 2x IDL ✓
3.9.3.2	ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 1)]	✓
3.9.3.3	ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)]	✓
3.9.3.4	ICP Linear Ranges (Quarterly) [FORM XIII-IN]	✓

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.)

3.9.4 Raw Data

✓

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. This statement does not apply to the Verifications of Instrument Parameters submitted as part of each

data package. Raw data must contain all instrument readouts used for the sample results, including those readouts that may fall below the IDL. All AA and ICP instruments must provide a legible hard copy of the direct real-time instrument readout (i.e., stripcharts, printer tapes, etc.) A photocopy of the direct sequential instrument readout must be included. A hardcopy of the instrument's direct instrument readout for cyanide must be included if the instrumentation has the capability.

The order of raw data in the data package shall be: ICP, Flame AA, Furnace AA, Mercury, and Cyanide. All raw data shall include intensities (ICP) and absorbances with concentration units for flame AA, furnace AA, Mercury and Cyanide. All flame and furnace AA data shall be grouped by element.

Raw data must be labeled with sample number and appropriate codes, to unequivocally identify:

3.9.4.1 Calibration standards, including source and prep date.

3.9.4.2 Initial and continuing calibration blanks and preparation blanks.

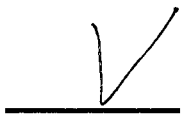
3.9.4.3 Initial and continuing calibration verification standards, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike.

3.9.4.4 Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.9.4.5 Duplicates.

3.9.4.6 Spikes (indicating standard solutions used, final spike concentrations, volumes involved). If spike information (source, concentration, volume) is consistent for a given sample lot, a general statement outlining these parameters is sufficient.

3.9.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.



3.9.4.8 All information for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and intercepts of linear fit, final sample concentration (standard addition concentration), and type of background correction used: BS for Smith-Heiftje, BD for deuterium Arc, or BZ for Zeeman.

ICP

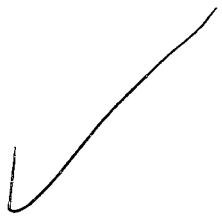
3.9.4.10 Integration times for AA analyses.

N/A

3.9.5 Digestion Logs

N

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparation, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.



3.10 Wet-Chemical Data

Sample data shall be submitted with the Conventional Analysis Data Reporting Forms for all sample in the SDG, arranged in increasing sample number order, followed by the ZC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.



3.10.1 Results – Wet-Chemical Analysis Data Sheet

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid samples must be reported on a dry weight basis.

3.10.2 Quality Control Data

3.10.2.1 Initial and Continuing Calibration Verification

3.10.2.2 CRQL Standard for Wet-Chemical Analysis

3.10.2.3 Blanks

3.10.2.4 Spike Sample Recovery

3.10.2.5 Post Digest Spike Sample Recovery

3.10.2.6 Duplicates

3.10.2.7 Laboratory Control Sample

3.10.2.8 Holding Times

3.10.3 Raw Data

For each reported value, the Laboratory shall included in the data package all raw data from the instrument used to obtain that value and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters).

Raw data must be labeled with the sample number to unequivocally identify:

3.10.3.1 Calibration standards, including source and prep date.

3.10.3.2 Initial and continuing calibration blanks and preparation blanks.

3.10.3.3 Initial and continuing calibration verification standards.

3.10.3.4 Diluted and undiluted samples (by sample number) for all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights, and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.10.3.5 Duplicates.

3.10.3.6 Spikes (indicating standard solutions used, final spike concentration, volumes involved).

3.10.3.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.

3.10.3.8 Time and date of each analysis. Instrument run logs can be submitted if they contain this information.

3.10.4 Digestion and Distillation Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.

3.11 ~~Toxicity Characteristic Leaching Procedure (TCLP)~~ TPH Data

3.11.1 ~~Results – Toxicity Characteristic Leaching Procedure~~ Results - TPH (TCLP) Analysis Data Sheet (Form I-TCLP)

Tabulated analytical results (identification and quantitation) of the specified analytes. Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of milligrams per liter (mg/L).

3.11.2 ~~TCLP Inorganic~~ TPH Quality Control Data

3.11.2.1 Initial and Continuing Calibration Verification [FORM II-IN (PART 1)]

3.11.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.11.2.3 Blanks [FORM III-IN]

3.11.2.4 ~~ICP Interference~~ Check Sample [FORM ~~IV~~ III-IN] ✓

3.11.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

3.11.2.6 Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]

3.11.2.7 Duplicates [FORM VI-IN]

3.11.2.8 Quality Control Sample [FORM VII-IN]

3.11.2.9 Standard Addition Results [FORM VIII-IN]

3.11.2.10 ICP Serial Dilutions [FORM IX-IN] _____

3.11.2.11 Holding Times [FORM X-IN] _____

3.11.3 Verification of Instrument Parameters _____

3.11.3.1 Instrument Detection Limits (Semiannually) [FORM XI-IN] _____

3.11.3.2 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 1)]

3.11.3.3 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)] _____

3.11.3.4 ICP Linear Ranges (Quarterly) [FORM XIII-IN] _____

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.)

3.11.4 Raw Data _____

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. _____

Raw data must be labeled with the sample number and appropriate codes to unequivocally identify:

3.11.4.1 Calibration standards, including source and prep date. _____

3.11.4.2 Initial and continuing calibration blanks and preparation blanks. _____

3.11.4.3 Initial and continuing calibration verification standards, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike. _____

3.11.4.4 Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient). _____

3.11.4.5 Duplicates. _____

3.11.4.6 Spikes (indicating standard solutions used final spike concentrations, volumes involved). _____

3.11.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record. _____

3.11.4.8 All information for furnace analysis clearly and sequentially identified on the raw data. _____

3.11.4.9 Time and date of each analysis. _____

3.11.4.10 Integration times for AA Analyses. _____

3.11.5 Digestion Logs _____

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparations, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. _____

3.5.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC sample (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

TPH - Extractable

3.6 GC/~~MS Semivolatiles Data~~

3.6.1 QC Summary

3.6.1.1 Surrogate Percent Recovery Summary (Form II-~~SV~~)

3.6.1.2 Matrix Spike/Matrix Spike Duplicate Summary (Form III-~~SV~~) % Rec

3.6.1.3 QC Check Sample/Standard → Duplicate also Form III % Rec. Batch 8323109 - water Batch 8327255 soil

3.6.1.4 Method Blank Summary (Form IV-~~SV~~) . Covers LCS/LCSD samples soil water

3.6.1.5 GC/MS Instrument Performance and Mass Calibration (Form V-SV)

3.6.1.6 Internal Standard Area and RT Summary (Form VIII-SV)

3.6.1.7 ~~Instrument Detection Limits~~

3.6.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form I-~~CLP-SV~~, including Form I ~~SV-TIC~~), followed by the raw data for ~~semivolatile~~ TPH samples. These sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

004 dilution 1000 water
005 Dilution 50 - soil

3.6.2.1 TCL Results - Organic Analysis Data Sheet (Form I-~~SV-1, SV-2~~).

Tabulated results (identification and quantitation) of the specified target compounds.

On Form I-~~SV~~, the appropriate concentration units shall be entered. For example, µg/L for water samples or mg/kg for soil/sediment samples. No other units are acceptable. **NOTE:** Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.6.2.2 ~~Tentatively Identified Compounds (Form I-SV-TIC)~~

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found".

3.6.2.3 Reconstructed total ion chromatograms (RIC) for each sample.

RICs must be normalized to the largest nonsolvent component, and must contain the following header information:

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the GC/MS operator must identify such edits or manual procedures by initialing and dating the changes made to the report. NA

If automated data system procedures are used for preliminary identification and/or quantification of the Target Compound List compounds, the complete data system report must be included in all sample data packages, in addition to the reconstructed ion chromatogram. The complete data system report shall include:

- Sample number
- Date and time of analysis
- RT or scan number of identified TCL compounds
- Ion used for quantitation with measured area
- Copy of area table from data system
- GC/MS instrument ID
- Lab file ID

3.6.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.6.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra.

3.6.2.4.2 Copies of TIC mass spectra associated best-match spectra (three best matches).

3.6.2.4.3 GPC chromatograms (if GPC performed).

3.6.3 Standards Data

5/11/93 – 5 levels

3.6.3.1 Initial Calibration Data (Form VI-~~SV-1, SV-2~~) - in order by instrument, if more than one instrument used.

0/0 RSD

for TPH - Diesel

TPH

3.6.3.1.1 ~~Semivolatile~~ standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration.

3.6.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed.

Analytical sequence 1

3.6.3.2 Continuing calibration (Form VIII ~~SV-1, SV-2~~) - in order by instrument, if more than one instrument used. ✓

TPH-Diesel

3.6.3.2.1 ~~Semivolatile~~ standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.6.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, by instrument. NA

3.6.3.3 Internal Standard Area Summary (Form VIII-~~SV-1, SV-2~~) in order by instrument, if more than one instrument used. —

3.6.3.4 ~~Semivolatile GPC Calibration Data - UV~~ detector traces showing peaks that correspond to the compounds in the semivolatile GPC calibration mixture. —

3.6.4 Raw QC Data ✓

PEM

3.6.4.1 ~~DFTPP~~ (for each 12-hour period, for each GC/MS system utilized) ✓

3.6.4.1.1 Bar graph spectrum. ✓

3.6.4.1.2 Mass listing. ✓

3.6.4.1.3 Reconstructed total ion chromatogram (RIC). ✓

ND

3.6.4.2 Blank Data - in chronological order, by extraction date.
NOTE: This order is different from that used for samples. ✓

soil ND ✓ water NP

3.6.4.2.1 Tabulated results (Form I ~~SV-1, SV-2~~) ✓

3.6.4.2.2 ~~Tentatively Identified Compounds (Form I-SV-TIC) - even if none found.~~ N/A

3.6.4.2.3 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). ✓

3.6.4.2.4 Superfund-TCL spectra with lab generated standard. Provides: _____

- Raw TCL compound spectra _____
- Enhanced or background subtracted spectra _____
- Laboratory generated TCL standard spectra _____

3.6.4.2.5 GC/MS library search spectra for Tentatively Identified Compounds (TIC). _____

3.6.4.2.6 Quantitation/ Calculation of Tentatively Identified Compound(s) (TIC) concentrations. _____

3.6.4.3 Matrix Spike Blank Data covered by blank _____

3.6.4.3.1 Tabulated results (Form I-~~SV-1, SV-2~~) of <u>all</u> TCL compounds. Form I-~~SV-~~TIC <u>not</u> required. _____

3.6.4.3.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are required. _____

3.6.4.4 Matrix Spike Data Not performed in client samples _____

3.6.4.4.1 Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required. _____

3.6.4.4.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required. _____

3.6.4.5	Matrix Spike Duplicate Data	Not performed in client data
3.6.4.5.1	Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. Form I-SV-TIC not required.	
3.6.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	
3.6.4.6	QC Check Sample/Standard	✓
3.6.4.6.1	Tabulated results (Form ~~I-SV-1~~, ~~SV-2~~) of all TCL compounds.	✓
3.6.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓

3.6.5 Copy of Calculations

✓

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values ~~for all terms in the~~ formula.

✓

3.6.6 Copy of Extraction Logs

✓ ✓ ✓

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments ~~describing~~ any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

✓

✓

Data Usability Summary Report:

Lot # A8K180164

Shield Environmental Associates, Inc.
4225 Northern Pike, Suite 101
Monroeville, Pennsylvania 15146

August 1999

1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to Lot #A8K180164, for 11 soil and water samples collected at the Binghamton Plastics, New York facility. This sample lot included one trip blank, one groundwater sample, and nine soil samples. The groundwater sample (002) and two soil samples (008, 009) were analyzed for Target Compound List (TCL) volatile and semivolatile organic constituents (VOCs and SVOCs) and pesticides/PCBs, and Target Analyte List (TAL) metals. The trip blank (sample 011) was analyzed for TCL VOCs only. The remaining soil samples were analyzed for the following constituents from the site-specific parameter list (SSPL):

- 1,1,1-Trichloroethane
- Tetrachloroethene
- Trichloroethene
- 1,1-Dichloroethene
- 1,2-Dichloroethene (cis- and trans-)
- 1,2-Dichloroethane

All soils were analyzed for percent moisture, although all results were reported on an "as received" basis. The groundwater sample was analyzed for the general chemistry parameters chloride, sulfate, nitrate, total organic carbon (TOC), and total cyanide. The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

VOCs

Trichloroethene was the VOC most frequently detected, and in the highest concentrations, up to 1,300 micrograms per kilogram (ug/kg) in soil (sample 007). Other detected VOCs included tetrachloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethane, methylene chloride, and acetone.

Other Parameters

Samples 002, 008, and 009, analyzed for TCL/TAL, contained no detectable pesticide/PCB compounds and no listed SVOCs, although SVOC tentatively identified compounds (TICs) were detected in all three samples. Metals were reported in these samples in concentrations consistent with environmental media. Chloride, nitrate, and TOC were detected in groundwater sample 002.

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deviations in this sample lot were:

- The required holding time was exceeded for nitrate in sample 002.
- SVOC TICs were detected in the soil method blank.
- Zinc was detected in the water method blank for metals.
- The continuing calibration blank for TOC contained TOC in detectable concentrations.
- Spike recoveries for the soil MS/MSD were out of QC limits for lead, calcium, selenium, and silver.
- Recoveries and relative percent differences (RPDs) for aluminum, barium, chromium, copper, iron, manganese, and zinc soil MS/MSDs were not calculated because the sample amount was more than four times the spike amount.
- VOC surrogate recoveries were out of QC limits for samples 001 and 003.
- Pesticide/PCB surrogate recoveries were out of QC limits for samples 008 and 009.

1.3 Recommendations

It is recommended that the laboratory clearly indicate that soil results are presented on an "as received" rather than dry weight basis.

2.0 Completeness of Data Package

The data package was complete, including raw data and supporting QC information. One discrepancy in the data package was that the chain of custody listed Shield sample BP017, MW14 (10'-12'), Quanterra sample 010, as a water sample, when in fact it was a soil sample.

3.0 Compliance with Holding Times and Sample Preservation

All VOC samples (not acidified upon collection) were analyzed within seven days of sample collection. TCL/TAL analyses for samples 002, 008, and 009 were performed within the required holding times. Nitrate sample 002 was not analyzed within the required 48-hour holding time, therefore the result was qualified as "J," for estimated.

The cooler receipt indicated that the cooler temperature upon receipt was 1.7°C, slightly below the Contract Laboratory Program (CLP) range of 4°C ± 2°C.

4.0 QC Data

4.1 Blanks

One trip blank (011) was analyzed with this sample lot for TCL VOCs. The only detected constituent was methylene chloride, a common laboratory contaminant, at a low concentration of 1.3 ug/L J. No data are qualified on the basis of the trip blank results.

Two VOC method blanks were run with this data set, one for water and one for soils. Both method blanks were analyzed for TCL VOCs, and the water blank was also analyzed for VOC TICs. There were no detectable TICs or listed VOCs in the water blank, and no detectable listed VOCs in the soil blank.

Two SVOC method blanks were analyzed, one for water and one for soil. No target compounds were detected, however, two SVOC TICs were detected in the soil method blank, an unknown and an aldol condensation product. The same TICs were detected in the soil samples analyzed for SVOCs, and the sample results (008 and 009) were flagged by the laboratory with "B," indicating detection in the method blank. No data are otherwise qualified, based on these method blank results.

Zinc was detected in a low concentration (0.062 mg/L, compared to a reporting limit of 0.05 mg/L) in the water blank for metals. The zinc result for sample 002 was flagged by the laboratory as "MBD," indicating the presence of zinc in a method blank at a concentration less than two times the reporting limit. In addition, the zinc result was flagged as "J," for estimated, by the data reviewer, because the sample concentration was less than ten times the blank concentration.

The pesticide/PCB method blanks for soil and water were nondetectable, and the general chemistry parameter method blanks were also nondetectable. However, the continuing calibration blank for TOC had a detectable concentration (4.5 mg/L). The sample 002 result for TOC (7 mg/L) was less than five times the amount found in the blank, therefore the result has been qualified as "R," for unusable.

4.2 MS/MSDs

There were two pairs of VOC MS/MSDs, one laboratory MS/MSD pair for water, and one pair for soil using sample 001. All spike recoveries and RPDs were within QC limits.

There were two MS/MSD pairs for SVOCs, one laboratory pair for water, and one pair for soil using sample 008. The soil MS/MSD met QC limits for spike recovery and RPD. The water MS/MSD pair was out of QC limits for both

analyses, for one spike out of 11. RPDs were within limits. This is attributed to matrix effects, and no qualifying action has been taken.

For pesticides/PCBs, there was one laboratory MS/MSD pair run for soil, and two laboratory control samples run for water in lieu of an MS/MSD pair. Spike recoveries and RPDs met QC limits.

The MS/MSDs for metals in water met QC limits, although there were deviations for the soil MS/MSDs. Spike recoveries and RPDs for aluminum, barium, chromium, copper, iron, manganese, and zinc MS/MSDs for soil were not calculated because the sample amount was greater than four times the spike amount. These spike results were flagged by the laboratory as "NC, MSB." Also, spike recoveries failed QC limits for calcium, lead, selenium, and silver, and were flagged by the laboratory as "N." Based on the degree of spike recovery deviation, the concentrations in the soil samples, and CLP guidance, the lead and calcium results have been qualified as "J," for estimated; selenium and silver results have not been qualified.

The chloride and nitrate MS/MSDs did not meet spike recovery QC limits; the RPDs were within limits. This was attributed to matrix interference, and no qualifying action was taken. The duplicate results for percent solids were within control limits.

4.3 Surrogate Recoveries

VOC surrogate recoveries were below QC limits for sample 001, sample 003, and the MS/MSD sample pair, which used sample 001. The samples were re-extracted and reanalyzed, with similar results. As specified in CLP guidance, detected results for samples 001 and 003 were qualified as "J," and nondetected results as "UJ," for estimated.

For SVOCs, surrogates were diluted out for sample 002, and the laboratory MS/MSD pair. All other surrogate recoveries met QC limits; no qualifying action is taken.

For pesticides/PCBs, surrogates were diluted out for the MS/MSD pair and laboratory control samples. One out of two of the surrogate recoveries failed for

samples 008 and 009 (low recoveries, less than 10%). These results were not flagged by the laboratory as being due to dilution, therefore the nondetected results are qualified as "R, " for unusable.

4.4 Laboratory Control Samples

Laboratory control samples were within QC limits for VOCs, SVOCs, and pesticides/PCBs. The interference check sample and laboratory control sample for metals were within control limits. No data qualification is required, based on laboratory control samples.

4.5 Other QC Data

Other QC data provided, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols. There were minor deviations seen per CLP recommendations in initial and continuing calibration for VOCs (% RSD, % D, and RRF); however, not for reported compounds. No data qualification is required on the basis of these results.

5.0 Analytical Methods

The analytical laboratory used the analytical methods specified in the approved quality assurance project plan (QAPP). The analytical methods used for this sample group were:

Parameter	Analytical Method	
Volatile Organics by Gas Chromatograph/Mass Spectrometry (GC/MS)	SW846	8260A
SVOCs by GC/MS	SW846	8270B
Organochlorine Pesticides and PCBs	SW846	8080A
Inductively Coupled Plasma (ICP) Metals	SW846	6010B
Mercury (Manual Cold-Vapor)	SW846	7470A
Total Residue as Percent Solids	MCAWW	160.3 MOD
Chloride	MCAWW	325.2
Nitrate	MCAWW	353.2
Sulfate	MCAWW	375.4
Total Organic Carbon	MCAWW	415.1

Total Cyanide		MCAWW	335.2
References:			

MCAWW - "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, for those samples where no organic compounds were detected, raw data results, and spreadsheet calculations were checked against the summary reports. Dilution factors, calculations, and rounding were checked, and no errors were found. Raw data for inorganics and wet chemistry analyses were also compared to reported results, and no errors were found.

7.0 Data Qualifiers

Data qualifiers that have been placed by the laboratory are:

1. Those VOC and SVOC results which are between the method detection limit and the reporting limit in the summary data reports provided in electronic format by the laboratory have been correctly flagged with a "J" for estimated quantity.

2. Soil MS/MSD recoveries and RPDs for aluminum, barium, chromium, copper, iron, manganese, and zinc lead were not calculated because the sample amount was more than four times the spike amount. The MS/MSD results were qualified by the laboratory as "NC, MSB."

3. Soil MS/MSD QC limits for spike recoveries were not met for lead, calcium, selenium, and silver, and results were qualified as "N."

4. The zinc result for groundwater sample 002 was flagged as "MBD," due to the presence of zinc in the water method blank.

Data qualifiers that have been added on the basis of the data review process are:

1. Detectable VOC results for samples 001 and 003 have been qualified as "J," and nondetectable results as "UJ," for estimated, because of surrogate recoveries that failed to meet QC limits.

2. Nondetecable pesticide/PCB results for samples 008 and 009 were qualified as "R," for unusable, for failure of surrogate recoveries to meet QC limits.

3. The zinc result for sample 002 was qualified as "J," for estimated, due to the presence of zinc in the corresponding method blank.

4. Lead and calcium results for samples 008 and 009 were qualified as "J," for estimated, based on the failure of MS/MSDs to meet QC criteria.

5. The TOC result for sample 002 was qualified as "R,'" for unusable, because of failure of the continuing calibration blank to meet QC criteria.

6. The nitrate result for sample 002 was qualified as "J," for estimated, due to holding time exceedance.

Table 1
Analytical Summary - Lot #A8K180164

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL	% Solids	TAL/TCL	General Chemistry[1]
BP008	SS2T2 (2'-4') Soil	CNJP0 001	X	X		
BP009	T2GW Water	CNJPC 002			X	X
BP010	T2SS1 (4'-6') Soil	CNJPH 003	X	X		
BP011	T6SS2 (2'-4') Soil	CNJPM 004	X	X		
BP012	T6SS1 (2'-4') Soil	CNJPP 005	X	X		
BP013	T7SS2 (4'-6') Soil	CNJPW 006	X	X		
BP014	T7SS1 (6'-8') Soil	CNJQ2 007	X	X		
BP015	T3SS2 (2'-4') Soil	CNJQ9 008		X	X	
BP016	T3SS1 (4'-6') Soil	CNJQJ 009		X	X	
BP017	MW14 (10'-12') Soil	CNJQM 010	X	X		
BP018	TRIP BLANK Water	CNJQT 011			X (2)	

(1) Chloride, Nitrate, Sulfate, Total Cyanide, Total Organic Carbon

(2) VOCs only

COPY

SHIELD ENVIRONMENTAL ASSOC.INC.

Client Sample ID: BP009 T2 GW

General Chemistry

Lot-Sample #...: A8K180164-002 Work Order #...: CNJPC Matrix.....: WATER
Date Sampled...: 11/17/98 08:48 Date Received..: 11/18/98

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chloride - Automated	2	1	mg/L	MCAWW 325.2	11/30/98	8334359
	Dilution Factor: 1					
Nitrate	J 1.1 BN 8/12/99	0.1	mg/L	MCAWW 353.2	11/23/98	8328400
	Dilution Factor: 1					
Sulfate	ND G	100	mg/L	MCAWW 375.4	12/07/98	8341383
	Dilution Factor: 20					
Total Cyanide	ND	0.010	mg/L	MCAWW 335.2	12/01-12/08/98	8335193
	Dilution Factor: 1					
Total Organic Carbon	7 R BN 8/12/99	1	mg/L	MCAWW 415.1	12/11/98	8345255
	Dilution Factor: 1					

NOTE(S):

L Reporting Limit

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

SHIELD ENVIRONMENTAL ASSOC. INC.

COPY

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260A
Volatile Organics, GC/MS (8260A)

Lab Sample ID: A8K180164 001

Sample WT/Vol: 5 / g
Work Order: CNJP0102
Dilution factor: 1
Moisture %: 13

Date Received: 11/18/98
Date Extracted: 11/24/98
Date Analyzed: 11/24/98

QC Batch: 8329198

Client Sample Id: BP008 SS2 T2 (2'-4')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q	
108-90-7	Chlorobenzene	2.1	J	
108-88-3	Toluene	5.0	U	uJ
71-43-2	Benzene	5.0	U	uJ
71-55-6	1,1,1-Trichloroethane	0.56	J	
75-34-3	1,1-Dichloroethane	2.2	J	
75-35-4	1,1-Dichloroethene	5.0	U	uJ
75-00-3	Chloroethane	10	U	uJ
156-59-2	cis-1,2-Dichloroethene	5.3		J
127-18-4	Tetrachloroethene	3.3	J	
156-60-5	trans-1,2-Dichloroethene	2.5	U	uJ
79-01-6	Trichloroethene	10		J
75-01-4	Vinyl chloride	10	U	uJ

BNJ
8/12/99

FORM I

SHIELD ENVIRONMENTAL ASSOC. INC.

COPY

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260A
Volatile Organics, GC/MS (8260A)

Lab Sample ID: A8K180164 003

Sample WT/Vol: 5 / g
Work Order: CNJPH102
Dilution factor: 1
Moisture %: 11

Date Received: 11/18/98
Date Extracted: 11/24/98
Date Analyzed: 11/24/98

QC Batch: 8329198

Client Sample Id: BP010 T2 SS1 (4'-6')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q	
71-55-6	1,1,1-Trichloroethane	2.2	J	
75-34-3	1,1-Dichloroethane	5.0	U	UJ
75-35-4	1,1-Dichloroethene	5.0	U	UJ
75-00-3	Chloroethane	10	U	UJ
156-59-2	cis-1,2-Dichloroethene	6.6		J
127-18-4	Tetrachloroethene	7.0		J
156-60-5	trans-1,2-Dichloroethene	2.5	U	UJ
79-01-6	Trichloroethene	27		J
75-01-4	Vinyl chloride	10	U	UJ

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SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name: QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID: A8K180164 008

Sample WT/Vol: 30.02 / g
Work Order: CNJQ9104
Dilution factor: 1
Moisture %:

Date Received: 11/18/98
Date Extracted: 11/21/98
Date Analyzed: 11/24/98

QC Batch: 8325107

Client Sample Id: BP015 T3 SS2 (2'-4')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	3.3	U
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	83	U
12674-11-2	Aroclor 1016	33	U
11104-28-2	Aroclor 1221	33	U
11141-16-5	Aroclor 1232	33	U
53469-21-9	Aroclor 1242	33	U
12672-29-6	Aroclor 1248	33	U
11097-69-1	Aroclor 1254	33	U
11096-82-5	Aroclor 1260	33	U

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8/12/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:A8K180164 009

Sample WT/Vol: 30 / g
Work Order: CNJQJ104
Dilution factor: 1
Moisture %:

Date Received: 11/18/98
Date Extracted:11/21/98
Date Analyzed: 11/24/98

QC Batch: 8325107

Client Sample Id: BP016 T3 SS1 (4'-6')

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	3.3	U
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	83	U
12674-11-2	Aroclor 1016	33	U
11104-28-2	Aroclor 1221	33	U
11141-16-5	Aroclor 1232	33	U
53469-21-9	Aroclor 1242	33	U
12672-29-6	Aroclor 1248	33	U
11097-69-1	Aroclor 1254	33	U
11096-82-5	Aroclor 1260	33	U

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8/12/99

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Client Sample ID: BP009 T2 GW

TOTAL Metals

Lot-Sample #...: A8K180164-002

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	38.5	0.10 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10J
Magnesium	10.7	5.0 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10K
Manganese	4.6	0.015 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10L
Nickel	0.046	0.040 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10M
Potassium	ND	5.0 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/03/98	CNJPC10N
Silver	ND	0.010 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10P
Sodium	ND	5.0 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/03/98	CNJPC10Q
Vanadium	ND	0.050 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/04/98	CNJPC10R
Zinc	0.55 MBD	0.050 Dilution Factor: 1	mg/L	SW846 6010A	11/25-12/03/98	CNJPC10T

J BLS 8/12/99

NOTE(S):

MBD This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.

COPY

SHIELD ENVIRONMENTAL ASSOC.INC.

Client Sample ID: BP015 T3 SS2 (2'-4')

TOTAL Metals

Lot-Sample #...: A8K180164-008
Date Sampled...: 11/17/98 14:06 Date Received..: 11/18/98
% Moisture.....: 29
Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8323108						
Aluminum	12500	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/30/98	CNJQ9105
Arsenic	6.1 J BNJ 8/12/99	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910Q
Lead	23.8	0.30 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910R
Antimony	ND	6.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ9106
Barium	64.3	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ9107
Selenium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910T
Beryllium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ9108
Mercury	ND	0.10 Dilution Factor: 1	mg/kg	SW846 7471A	11/19-11/20/98	CNJQ910V
Thallium	ND	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910U
Cadmium	ND J BNJ 8/12/99	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ9109
Calcium	902	500 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910A
Chromium	13.1	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910C
Cobalt	8.4	5.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910D
pper	23.1	2.5 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQ910E

(Continued on next page)

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Client Sample ID: BP016 T3 SS1 (4'-6')

TOTAL Metals

Lot-Sample #...: A8K180164-009
Date Sampled...: 11/17/98 14:21 Date Received..: 11/18/98
% Moisture.....: 12

Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8323108						
Aluminum	10900	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/30/98	CNJQJ105
Arsenic	8.3	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10Q
Lead	9.8	0.30 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10R
Antimony	ND	6.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ106
Barium	54.9	20.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ107
Selenium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10T
Beryllium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ108
Mercury	ND	0.10 Dilution Factor: 1	mg/kg	SW846 7471A	11/19-11/20/98	CNJQJ10V
Thallium	ND	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10U
Cadmium	ND	0.50 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ109
Calcium	22400	500 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10A
Chromium	12.2	1.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10C
Cobalt	8.3	5.0 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10D
Copper	15.2	2.5 Dilution Factor: 1	mg/kg	SW846 6010A	11/19-11/22/98	CNJQJ10E

J BNQ 8/12/99

J BNQ 8/12/99

(Continued on next page)

A8K180164 7/27/99

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package.

case narative ✓

CASE NARRATIVE DOES NOT COVER PCB/Pest.

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists).

✓

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated.

by A. Danford ✓

4A3-C530

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order.

✓

3.3 NYSDEC Data Package Summary Forms

Holding Times:

VOCs - okay for all (w/in 7 days of collection)

SVOCs, Pest - OK

SVOCs: 002 - ND; TICs
008 - ND; 2TICs
009 - ND; 2TICs

CN - 14 days
NO3 - 48 hrs
SO4 - 28 days
TOC - 28 days

Pest/PCBs: ND
002, 008, 009

001 chlorobenz, 1,1TCA, 1,1DCA, 1,2DCE, PCE, TCE(J)	009 PCE: 0.73, J
002 ND w/ TICs	010 TCE: 2.5
003 TCE: 7; TCA, DCE, PCE	011 meth. chloride 1.3
004 TCE (1.2); PCE	
005 TCE 1.6	
006 1,2DCE - 150 VC - 140 TCE	41 (others)
007 TCE: 1,300 (PCE, 1,2DCE)	
008 acetone	

5 days - 14 days to anal. 5 days ✓ because of holding time for nitrate

3.4 Chain-of-Custody Forms

Internal COC, cooler receipt ✓

Copies of both the external and internal chain-of-custody sheets ~~for all~~ samples within the SDG. ✓

NOTE: COC says sample BP017 (MW14 10-12') is water, but is soil

1.7°C; otherwise - no discrepancies.

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

out: 003, 001, MS/MSD (001)

3.5.1.1 System Monitoring Compound Summary ✓

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary 2: lab (water); soil (sample001) all OK ✓

3.5.1.3 QC Check Sample/Standard 2 (water, soil): both OK ✓

3.5.1.4 Method Blank Summary ✓

2 meth. blanks

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5 GC/MS Instrument Performance Check 502 - 11/17, 11/24 UXi: 11/23, 11/24 (4) ✓

BFB in chronological order; by instrument.

p.028 Failed internal std. area summary: sample 001 - low (lab: matrix interference)

3.5.1.6 ~~Instrument Detection Limits~~ NA for non-CLP

Pos: J qual.

Non-detect (low): UJ

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples. ✓

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA).

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

On Form 1-VOA, the appropriate concentration units shall be entered. For example, ug/L for water samples or ug/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

For 002, 008, 009

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found."

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract.

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

002 TICs: Higher than TCL RLs; fuel-type components

008 TICs: NONE

009 TICs: none

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). ✓

002 ND; 6 TICs
008 acetone; no TICs
009 PCE; no TICs

3.5.3 Standards Data

RRF: ≥ 0.05

Initial: 11/18

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. ✓

502
UX2. i 11/23

%RSD - 30% some deviations

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

Hand edits on some - no good chromatos. - manually integrated

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

502; 11/25 %RSD 25% RRF > 0.05

minor deviations - not for reported compounds

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. ✓

UX2. i 11/23
11/24

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3.5.4.1.1 Bar graph spectrum. ✓

3.5.4.1.2 Mass listing. ✓

3.5.4.1.3 Reconstructed total ion chromatogram (RIC). ✓

3.5.4.2 Blank Data - in chronological order. NOTE: This order is different from that used for samples. 2

3.5.4.2.1 Tabulated results (Form I-VOA) (water only) → TCL: TICs ND; compounds ND ✓

3.5.4.2.2 Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found. ✓

3.5.4.2.3 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS). ✓

3.5.4.2.4 TCL spectra with lab generated standard. ✓

3.5.4.2.5 GC/MS library search spectra for tentatively Identified Compounds (TIC). for water blank ✓

3.5.4.2.6 Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations. NONE DETECTED ✓

3.5.4.3 Matrix Spike Blank Data

3.5.4.3.1 Tabulated results (Form I-VOA) of all TCL compounds.

3.5.4.3.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). covered by method blank

3.5.4.4 Matrix Spike Data — sample 001 spiked ✓

3.5.4.4.1 Tabulated results (Form I-VOA) of all TCL compounds. Form I-VOA-TIC is not required. ✓

3.5.4.4.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). ✓

3.5.4.5 Matrix Spike Duplicate Data ✓

3.5.4.5.1 Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required. ✓

3.5.4.5.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). ✓

3.4.5.6 QC Check Sample/Standard — OK (2) ✓

3.5.4.6.1 Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required. ✓

3.5.4.6.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). ✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

calcs. spot-checked against spreadsheets formulas and runlogs

3.5.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC sample (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

NA for headspace analysis; provided for rem (OK)

3.6 GC/MS Semivolatiles Data

3.6.1 QC Summary

*Lab MS/MSD dilute&out for: * sample 002 - water

3.6.1.1 Surrogate Percent Recovery Summary (Form II-SV)

sample 008 (soil): spike, RPD OK. Lab MS/MSD for water: OK (dilution, 1/11 out for water)

3.6.1.2 Matrix Spike/Matrix Spike Duplicate Summary (Form III-SV)

3.6.1.3 QC Check Sample/Standard (2 - soil and water) ALL OK

3.6.1.4 Method Blank Summary (Form IV-SV) 2 performed (water, soil) 10/22, 11/24

3.6.1.5 GC/MS Instrument Performance and Mass Calibration (Form V-SV)

5: A4ENT4, A4HP6 → - Tuning & Mass Cal (Form V) - Std. Area Summary (Form VIII) all OK

3.6.1.6 Internal Standard Area and RT Summary (Form VIII-SV) 11/23, 11/29, 11/30

HP6: 11/29, 11/30 ENT4: 11/24

3.6.1.7 Instrument Detection Limits NA

NA for Non-CLP

3.6.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form I-CLP-SV, including Form I SV-TIC), followed by the raw data for semivolatile samples. These sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

3.6.2.1 TCL Results - Organic Analysis Data Sheet (Form I-SV-1, SV-2). ✓

Tabulated results (identification and quantitation) of the specified target compounds. ✓

On Form I-SV, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. **NOTE:** Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10. ✓

002 : 14 TICS: butylated Hydroxytoluene } (long retention time)
unknown Hydrocarbon
unknown

3.6.2.2 Tentatively Identified Compounds (Form I-SV-TIC) ✓

008 : unknown
009 : aldol condensation product 7400, 8900

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found". ✓

3.6.2.3 Reconstructed total ion chromatograms (RIC) for each sample. ✓

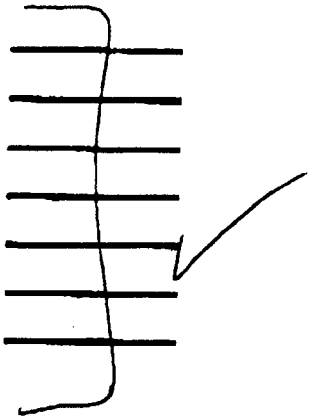
RICs must be normalized to the largest nonsolvent component, and must contain the following header information: ✓

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the GC/MS operator must identify such edits or manual procedures by initialing and dating the changes made to the report. ✓

If automated data system procedures are used for preliminary identification and/or quantification of the Target Compound List compounds, the complete data system report must be included in all sample data packages, in addition to the reconstructed ion chromatogram. The complete data system report shall include: ✓

- Sample number
- Date and time of analysis
- RT or scan number of identified TCL compounds
- Ion used for quantitation with measured area
- Copy of area table from data system
- GC/MS instrument ID
- Lab file ID



3.6.2.4 For each sample, by each compound identified, the following shall be included in the data package: ✓

3.6.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.6.2.4.2 Copies of TIC mass spectra associated best-match spectra (three best matches). ✓

3.6.2.4.3 GPC chromatograms (if GPC performed). NA NA

3.6.3 Standards Data Ext.4: 10/22 ✓

RRF ≥0.05 %RSD ≤30%

11/23 hp6.

3.6.3.1 Initial Calibration Data (Form VI-SV-1, SV-2) - in order by instrument, if more than one instrument used. ✓

OK some clear. for non-target cmpds.

3.6.3.1.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.6.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed. ✓

(11/30) (11/29 hp6.1)

RRF ≥ 0.05 ± 25% D

(11/24 ext 4.1)

3.6.3.2 Continuing calibration (Form VII-SV-1, SV-2) - in order by instrument, if more than one instrument used. ✓

some exceedance of CLP criteria but not internal CLP criteria

3.6.3.2.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.6.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, by instrument. ✓

3.6.3.3 Internal Standard Area Summary (Form VIII-SV-1, SV-2) in order by instrument, if more than one instrument used. ✓ QC summary

3.6.3.4 Semivolatile GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the semivolatile GPC calibration mixture. NA

3.6.4 Raw QC Data ✓

3.6.4.1 DFTPP (for each 12-hour period, for each GC/MS system utilized) ✓ (2 instruments)

3.6.4.1.1 Bar graph spectrum. ✓

3.6.4.1.2 Mass listing. ✓

3.6.4.1.3 Reconstructed total ion chromatogram (RIC). ✓

3.6.4.2 Blank Data - in chronological order, by extraction date.
NOTE: This order is different from that used for samples. ✓

3.6.4.2.1 Tabulated results (Form I-SV-1, SV-2) ✓

1 water - NO TICS
1 soil - TICs: ① Unknown ② Aldol condensation product

3.6.4.2.2 Tentatively Identified Compounds (Form I-SV-TIC) - even if none found.

3.6.4.2.3 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).

3.6.4.2.4 Superfund-TCL spectra with lab generated standard. Provides:

- Raw TCL compound spectra
- Enhanced or background subtracted spectra
- Laboratory generated TCL standard spectra

3.6.4.2.5 GC/MS library search spectra for Tentatively Identified Compounds (TIC).

3.6.4.2.6 Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.

3.6.4.3 Matrix Spike Blank Data

3.6.4.3.1 Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. Form I-SV-TIC not required.

NA - covered w/ method blank

3.6.4.3.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are required.

3.6.4.4 Matrix Spike Data

sample 008 (solid)

3.6.4.4.1 Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. Form I-SV-TIC not required.

3.6.4.4.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.

3.6.4.5 Matrix Spike Duplicate Data ✓

3.6.4.5.1 Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. Form I-SV-TIC not required. ✓

3.6.4.5.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required. ✓

3.6.4.6 QC Check Sample/Standard 2 : 1 soil / water ✓

3.6.4.6.1 Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. ✓

3.6.4.6.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required. ✓

3.6.5 Copy of Calculations

✓

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

spreadsheet & formulae & instrument logs checked

3.6.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

extraction worksheets & instrument logs ✓

3.7 GC/ECD Pesticide/Aroclor Data ✓

3.7.1 QC Summary out: sample 008, sample 009 ✓

for water: MS/MSD & LCS: diluted out

3.7.1.1 LCS/Surrogate Percent Recovery Summary (Form II-PEST) ✓

LCSD diluted out

3.7.1.2 Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-PEST) soil: lab MS/MSD ✓ spike recovery and RPD okay

3.7.1.3 QC Check Sample/Standard Recovery ✓ OK - water (pair) OK - solid (single)

3.7.1.4 Method Blank Summary (Form IV-PEST) ✓

water solid

3.7.1.5 Instrument Detection Limits ✓ NA for non-clp

3.7.2 Sample Data 002, 008, 009 ✓

Sample data shall be arranged in packets with the Traffic Report copy, the Organic Analysis Data Sheet (Form I-PEST), followed by the raw data for pesticide samples. The sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples. ✓

3.7.2.1 TCL Results - Organic Analysis Data Sheet (Form I-PEST). ✓

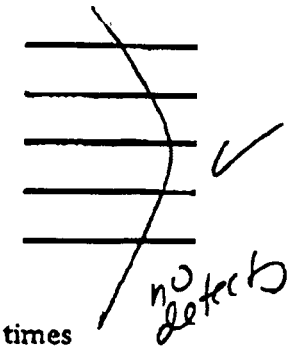
On Form I-PEST, the appropriate concentration units shall be entered. For example, ug/L for water samples or ug/Kg for soil/sediment samples. No other units are acceptable. ✓ 002: ug/L 009: ug/kg 008: ug/kg

NOTE: Report analytical results to two significant figures for all pesticide/PCB samples.

3.7.2.2 Copies of pesticide chromatograms. ✓

All chromatograms must be labeled with the following information. ✓

- Sample number
- Volume injected (ul)
- Date and time of injection
- GC column identification (by stationary phase and internal diameter)
- GC instrument identification
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or on a print-out of retention times if retention times are printed over the peak.



3.7.2.3 Copies of pesticide chromatograms from second GC column confirmation.

2 chromatograms per sample

3.7.2.4 GC integration report or data system printout and calibration plots (area vs. concentration) for 4-4'DDT, 4,4'DDD, 4,4'-DDE or toxaphene (where appropriate).

not detected

3.7.2.5 Manual work sheets.

no manual work sheets.

3.7.2.6 UV traces from GPC (if GPC performed).

not performed

3.7.2.7 If pesticide/Aroclors are confirmed by GC/MS, the Laboratory shall submit copies of reconstructed ion chromatograms, raw spectra and copies of background-subtracted mass spectra of Superfund target compounds listed in Exhibit C (Superfund-TCL) that are identified in the sample and corresponding background-subtracted Superfund-TCL standard mass spectra. Compound names must be clearly marked on all spectra. For multicomponent pesticides/Aroclors confirmed by GC/MS, the Laboratory shall submit mass spectra of 3 major peaks of multicomponent compounds from samples and standards.

NA

3.7.3 Standards Data

Standards pts. briefly reviewed only

hpbl.i 02-022/11

3.7.3.1 Initial Calibration of Single Component Analytes (Form VI-PEST-1 and PEST-2) - all GC columns, all instruments, in chronological order by GC column and instrument.

✓

6-level cal.

3.7.3.2	Initial Calibration of Multicomponent Analytes (Form VI-PEST-3) - all GC columns, all instruments, in chronological order by GC column and instrument.	multi-component: 594-599 ✓
3.7.3.3	Analyte Resolution Summary (Form VI-PEST-4) - all GC columns and instruments, in chronological order by GC column and instrument.	not found
3.7.3.4	Calibration Verification Summary (Form VII-PEST-1) - for all Performance Evaluation Mixtures and Instrument blanks, on all GC columns and instruments, in chronological order by GC column and instrument.	p. 1051 - continuing cal. drift exceedances
3.7.3.5	Calibration Verification Summary (Form VII-PEST-2) - for all mid point concentrations of Individual Standard Mixtures A and B and Instrument blanks used for calibration verification, on all GC columns and instruments, in chronological order by GC column and instrument.	continuing cal. or Drift report p. 800, 869, 882 and various following cited pages
3.7.3.6	Analytical Sequence (Form VIII-PEST) - all GC columns and instruments, in chronological order by GC column and instrument.	p. 856, ~~926~~ 1015
3.7.3.7	Florisil Cartridge Check (Form IX-PEST-1) - for all lots of cartridges used to process samples in the sample lot.	NA
3.7.3.8	Pesticide GPC Calibration (Form IX-PEST-2) - all GPC columns, in chronological order by calibration date.	NA
3.7.3.9	Pesticide Identification Summary for Single Component Analytes (Form X-PEST-1) - for all samples with positively identified single component analytes, In order by increasing sample number.	Single Component: ~~600~~ - 605
3.7.3.10	Pesticide Identification Summary for Multicomponent Analytes (Form X-PEST-2) - for all samples positively identified multicomponent analytes, in order by increasing sample number.	not found

STDs run for both soil & water

3.7.3.11 Chromatograms and data system printouts are required for all standards including the following: ✓

- Resolution Check Mixture. ✓
- Performance Evaluation Mixtures, all. ex. p. 610, 614, ✓ 857
- Individual Standard Mixture A, at three concentrations, each initial calibration.
- All multicomponent analytes (Toxaphene and Aroclors), each initial calibration. p. 661
- All mid point concentrations of Individual Standard Mixtures A and B used for calibration verification. ex. p. soil - p. 636, 638; water - p. 641
- Florisil cartridge check solution, all lots. NA
- Pesticide GPC Calibration Check Solution, all calibrations relating to samples in the lot number. NA
- All multicomponent analyte standards analyzed for confirmation. ex. p. 661

3.7.3.12 A printout of retention times and corresponding peak areas or peak heights must accompany each chromatogram. In addition, all chromatograms are required to be labeled with the following: ✓

- Sample Number for the standard. ✓
- Label all standard peaks for all individual compounds either directly out from the peak or on the printout of retention times if retention times are printed over the peak. ✓
- Total nanograms injected for each standard. ✓

- Date and time of injection. ✓
- GC column identification (by stationary phase and internal diameter). ✓
- GC instrument identification. ✓

3.7.3.13 Pesticide GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the pesticide GPC calibration mixture. NA

3.7.4 Raw QC Data ✓

3.7.4.1 Blank Data - in chronological order, by type of blank (method, instrument, sulfur cleanup). **NOTE:** This order is different from that used for samples. 1 each for soil, water all ND

3.7.4.1.1 Tabulated results (Form I-PEST). ✓

3.7.4.1.2 Chromatogram(s) and data system printout(s) (GC) for each GC column and instrument used for analysis. ✓

3.7.4.2 Matrix Spike Data ✓

3.7.4.2.1 Tabulated results (Form I-PEST) of all TCL compounds. OK Form I's OK ✓

3.7.4.2.2 Chromatogram(s) and data system printout(s) (GC). data provided ✓

3.7.4.3 Matrix Spike Duplicate Data raw MS/MSD: soil ✓ LCS/LCSD water ✓

3.7.4.3.1 Tabulated results (Form I-PEST) of all TCL compounds. ✓

3.7.4.3.2 Chromatogram(s) and data system printout(s) (GC). ✓

3.7.4.4 Matrix Spike Blank Data

3.7.4.4.1 Tabulated results (Form I-PEST) of all TCL compounds.

3.7.4.4.2 Chromatogram(s) and data system printout(s) (GC).

covered by method blank

3.7.4.5 QC Check Sample/Standard

and check sample dup.

3.7.4.5.1 Tabulated results (Form I-PEST) of all TCL compounds.

3.7.4.5.2 Chromatogram(s) and data system printout(s) (GC).

LCS/LCSD for water for LCS for soil

3.7.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

checked for LCS

3.7.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

- Instrument log sheets
- Organic extraction log sheets

field for comments

3.9 Inorganic Data

Sample data shall be submitted with the Inorganic Analysis Data Reporting Forms for all samples in the sample lot arranged in increasing alphanumeric sample number order, followed by the QC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.

3.9.1 Results – Inorganic Analysis Data Sheet (Form I-IN)

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid sample must be reported on a dry weight basis. Analytical results must be reported to two significant figures if the result value is less than 10; to three significant figures if the value is greater than or equal to 10. Results for percent solids must be reported to one decimal place.

3.9.2 Quality Control Data

3.9.2.1 Initial and Continuing Calibration Verification [FORM II-IN (Part 1)]

3.9.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.9.2.3 Blanks [FORM III-IN]

3.9.2.4 ICP Interference Check Sample [FORM IV-IN]

3.9.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

metals spikes:
solid: NC, MSB: Recovery, RPD not calculated because sample amount was more than 4X spike amount
Al, Ba, Cr, Cu, Fe, Mn, Zn

N: spike recovery out of limits

Ca	Pb,	Se	Ag
high (2)	high (1)	low (1)	high (1)

3.9.2.6	Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]	NA
3.9.2.7	Duplicates [FORM VI-IN]	performed w/spike
3.9.2.8	Quality Control Sample [FORM VII-IN] (soil / water)	all OK
3.9.2.9	Standard Addition Results [FORM VIII-IN]	NA
3.9.2.10	ICP Serial Dilutions [FORM IX-IN]	NA
3.9.2.11	Holding Times [FORM X-IN]	OK

3.9.3 Verification of Instrument Parameters ✓

3.9.3.1	Instrument Detection Limits (Quarterly) (Semiannually) [FORM ~~XI-IN~~ X-IN]	✓
3.9.3.2	ICP Interelement Correction Factors (Annually) [FORM ~~XII~~ XI-IN (PART 1)]	✓
3.9.3.3	ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)]	✓
3.9.3.4	ICP Linear Ranges (Quarterly) [FORM XIII-IN]	✓

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.) NOTE: Run log included in QC summer

3.9.4 Raw Data ✓

Raw Data contained in: ① Run log w/QC section ② Inorganic instrument print-outs

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. This statement does not apply to the Verifications of Instrument Parameters submitted as part of each

data package. Raw data must contain all instrument readouts used for the sample results, including those readouts that may fall below the IDL. All AA and ICP instruments must provide a legible hard copy of the direct real-time instrument readout (i.e., stripcharts, printer tapes, etc.) A photocopy of the direct sequential instrument readout must be included. A hardcopy of the instrument's direct instrument readout for cyanide must be included if the instrumentation has the capability. see gen. chem. sections for CN results.

Run log w/ QC summary

The order of raw data in the data package shall be: ICP, Flame AA, Furnace AA, Mercury, and Cyanide. All raw data shall include intensities (ICP) and absorbances with concentration units for flame AA, furnace AA, Mercury and Cyanide. All flame and furnace AA data shall be grouped by element.

Raw data must be labeled with sample number and appropriate codes, to unequivocally identify:

3.9.4.1 Calibration standards, including source and prep date.

3.9.4.2 Initial and continuing calibration blanks and preparation blanks.

3.9.4.3 Initial and continuing calibration verification standards, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike.

3.9.4.4 Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.9.4.5 Duplicates.

Run w/ spike

3.9.4.6 Spikes (indicating standard solutions used, final spike concentrations, volumes involved). If spike information (source, concentration, volume) is consistent for a given sample lot, a general statement outlining these parameters is sufficient.

3.9.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation. ✓

3.9.4.8 All information for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and intercepts of linear fit, final sample concentration (standard addition concentration), and type of background correction used: BS for Smith-Heiftje, BD for deuterium Arc, or BZ for Zeeman. ✓

3.9.4.10 Integration times for AA analyses. NA

✓

3.9.5 Digestion Logs

prep. logs

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparation, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. ✓ ✓

3.10 Wet-Chemical Data

OOZ (waters): chloride, nitrate, sulfate, CN, TOC ✓

Sample data shall be submitted with the Conventional Analysis Data Reporting Forms for all sample in the SDG, arranged in increasing sample number order, followed by the ZC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs. ✓

All others but trip blank: % solids

3.10.1 Results – Wet-Chemical Analysis Data Sheet ✓

Tabulated analytical results (identification and quantitation) of the specified analytes. ✓

Appropriate concentration units must be specified and entered on Form I. The quantitative values shall be reported in units of micrograms per liter (~~ug~~/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid samples must be reported on a dry weight basis. ✓

OK for total solids

mg/L

3.10.2 Quality Control Data ✓

Summary: OK for Cl, NO_3, SO_4, CN

3.10.2.1 Initial and Continuing Calibration Verification ✓ see cal. section, p.196

3.10.2.2 CRQL Standard for Wet-Chemical Analysis NA

3.10.2.3 Blanks ✓ ND for Cl, NO_3, SO_4, CN, TOC. OK for Solids

3.10.2.4 Spike Sample Recovery ✓ 2/2 spikes low (N) for Sulfate

3.10.2.5 Post Digest Spike Sample Recovery NA 1/2 spike (N) high for nitrate

Others OK ✓ RPDs ok ✓

3.10.2.6 Duplicates ✓ Dup. for solids: OK (5 sets) OK – performed on spike

3.10.2.7 Laboratory Control Sample ✓ OK for CN, Cl, SO_4, NO_3, TOC

3.10.2.8 Holding Times OK except for nitrate – qualified

3.10.3 Raw Data ✓

For each reported value, the Laboratory shall included in the data package all raw data from the instrument used to obtain that value and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters). ✓

RAW DATA contained in: GEN CHEM LOG SHEETS (p. 1739)

Raw data must be labeled with the sample number to unequivocally identify:

3.10.3.1	Calibration standards, including source and prep date.	✓
3.10.3.2	Initial and continuing calibration blanks and preparation blanks.	✓
3.10.3.3	Initial and continuing calibration verification standards.	✓
3.10.3.4	Diluted and undiluted samples (by sample number) for all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights, and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).	✓
3.10.3.5	Duplicates.	✓
3.10.3.6	Spikes (indicating standard solutions used, final spike concentration, volumes involved).	✓
3.10.3.7	Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.	✓
3.10.3.8	Time and date of each analysis. Instrument run logs can be submitted if they contain this information.	✓

CCB: 4.5 ppm
CCV: D=118% p. 1793, 1794: TOC: mid-run CCV, CCB failed — instrument recalibrated. SAMPLE reported due to insuff. sample for recal.

3.10.4 Digestion and Distillation Logs — NA

reported conc: ppm

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. — NA

"R" qualify 24 — sample less than 5X blank

3.11 Toxicity Characteristic Leaching Procedure (TCLP) Data

3.11.1 Results – Toxicity Characteristic Leaching Procedure (TCLP) Analysis Data Sheet (Form I-TCLP)

Tabulated analytical results (identification and quantitation) of the specified analytes. Appropriate concentration units must be specified and entered on Form 1-IN. The quantitative values shall be reported in units of milligrams per liter (mg/L).

3.11.2 TCLP Inorganic Quality Control Data

3.11.2.1 Initial and Continuing Calibration Verification [FORM II-IN (PART 1)]

3.11.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.11.2.3 Blanks [FORM III-IN]

3.11.2.4 ICP Interference Check Sample [FORM IV-IN]

3.11.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

3.11.2.6 Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]

3.11.2.7 Duplicates [FORM VI-IN]

3.11.2.8 Quality Control Sample [FORM VII-IN]

3.11.2.9 Standard Addition Results [FORM VIII-IN]

3.11.2.10 ICP Serial Dilutions [FORM IX-IN] _____

3.11.2.11 Holding Times [FORM X-IN] _____

3.11.3 Verification of Instrument Parameters _____

3.11.3.1 Instrument Detection Limits (Semiannually) [FORM XI-IN] _____

3.11.3.2 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 1)] _____

3.11.3.3 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)] _____

3.11.3.4 ICP Linear Ranges (Quarterly) [FORM XIII-IN] _____

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.)

3.11.4 Raw Data _____

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. _____

Raw data must be labeled with the sample number and appropriate codes to unequivocally identify:

3.11.4.1 Calibration standards, including source and prep date. _____

3.11.4.2 Initial and continuing calibration blanks and preparation blanks. _____

3.11.4.3	Initial and continuing calibration verification standards, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike.	_____
3.11.4.4	Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).	_____
3.11.4.5	Duplicates.	_____
3.11.4.6	Spikes (indicating standard solutions used final spike concentrations, volumes involved).	_____
3.11.4.7	Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record.	_____
3.11.4.8	All information for furnace analysis clearly and sequentially identified on the raw data.	_____
3.11.4.9	Time and date of each analysis.	_____
3.11.4.10	Integration times for AA Analyses.	_____

3.11.5 Digestion Logs _____

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparations, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. _____

Data Usability Summary Report:

Lot # A8K190163

Shield Environmental Associates, Inc.
4225 Northern Pike, Suite 101
Monroeville, Pennsylvania 15146

August 1999

1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to Lot #A8K190163, for 14 soil and water samples collected at the Binghamton Plastics, New York facility. This sample lot included one trip blank and two rinsate blanks (split spoon and bucket), three groundwater samples, and eight soil samples. One soil sample (009, Stockpile) was analyzed for Toxicity Characteristic Leaching Procedure (TCLP) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, pesticides, and herbicides, and also for ignitibility and the paint filter test. The other 13 samples were analyzed for the following constituents from the site-specific parameter list (SSPL):

- 1,1,1-Trichloroethane
- Tetrachloroethene
- Trichloroethene
- 1,1-Dichloroethene
- 1,2-Dichloroethene (cis- and trans-)
- 1,2-Dichloroethane

All soils were analyzed for percent moisture, although all results were reported on an "as received" basis. The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

VOCs

Trichloroethene was the VOC most frequently detected, and in the highest concentrations, up to 250 micrograms per kilogram (ug/kg) in soil (sample 001) and up to 180 micrograms per liter (ug/L) in groundwater (sample 004). Other detected VOCs included tetrachloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethane, and toluene.

Other Parameters

Sample 009, analyzed by the TCLP method, had detectable toluene and trichloroethane in the leachate. The leachate was nondetectable for SVOCs,

herbicides, pesticides, and metals. This sample was negative for the paint filter test, and its flashpoint was greater than 180°F. In the soil samples analyzed for SSPL, percent solids ranged from 88 to 92.8%.

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deviations in this sample lot were:

- Surrogate recoveries were out of QC limits for VOCs for two MS samples and an intra-lab QC sample. However, the laboratory control sample was within limits, and no qualifying action was taken.

- Surrogate recoveries for SVOCs were out of QC limits for sample 009 and the matrix spike/matrix spike duplicate (MS/MSD). Since only one out of six surrogates failed, the results are not qualified.

- Toluene was detected in a low estimated concentration in a rinsate blank (002). However, toluene is not a reported SSPL constituent, and no results are qualified.

- A spike recovery was outside of QC limits for one VOC MS/MSD, attributed to matrix effects; no data qualification is required.

- MS/MSD spike recoveries were outside of QC limits for SVOCs (sample 009). This was attributed to matrix effects, and no qualification was taken.

- Recoveries and relative percent differences (RPDs) for lead MS/MSDs were not calculated because the sample amount was more than four times the spike amount. The MS/MSD results were qualified by the laboratory as NC, MSB.

- Duplicate analyses were not performed for flashpoint for the sample batch containing sample 009. A standard was analyzed; no results are qualified.

1.3 Recommendations

It is recommended that the laboratory clearly indicate that soil results are presented on an "as received" rather than dry weight basis.

2.0 Completeness of Data Package

The data package was complete, including raw data and supporting QC information, except for a duplicate analysis for flashpoint.

3.0 Compliance with Holding Times and Sample Preservation

All VOC samples (not acidified upon collection) were analyzed within seven days of sample collection. TCLP extraction and analyses for sample 009 were performed within the required holding times.

The cooler receipt indicated that the cooler temperature upon receipt was 1.5°C, slightly below the Contract Laboratory Program (CLP) range of 4°C ± 2°C. No sample deviations were noted on the cooler receipt form.

4.0 QC Data

4.1 Blanks

One trip blank (014) and two rinsate blanks (002, 013) were analyzed with this sample lot for SSPL parameters only. The three blanks were nondetectable for SSPL constituents. Chlorobenzene, toluene, and benzene were reported in addition to the SSPL constituents for sample 002. Chlorobenzene and benzene were not detected, however, a low concentration of toluene (0.66 ug/L J) was detected at an estimated concentration. The only other sample where toluene was a reported constituent was sample 009, and the concentration in the TCLP extraction was more than 50 times greater than the concentration in the rinsate blank. Therefore, no data are qualified based on the rinsate blank results.

Four VOC method blanks were run with this data set, one for TCLP analysis, one for SSPL water analysis, and two for SSPL soil analysis. No target constituents were detected in the SSPL blanks nor TCLP blank. Four tentatively identified compounds (TICs) in low concentrations (about 0.1 milligram per liter [mg/L]) were reported for the TCLP blank.

The SVOC method blank analyzed in conjunction with sample 009 was nondetectable for TCLP SVOCs, as were the TCLP method blanks for pesticides, herbicides, and metals.

The percent solids method blank was nondetectable.

4.2 MS/MSDs

There were four pairs of VOC MS/MSDs, one to TCLP analysis, two for SSPL soil, and one for SSPL water. Three of the MS/MSD pairs used samples from this lot (sample 002 for SSPL water, sample 009 for TCLP, sample 005 for SSPL soil).

Spike recoveries and RPDs were within QC limits for the SSPL water pair, the TCLP pair, and the laboratory MS/MSD for SSPL soil. For the SSPL soil MS/MSD that used sample 005, one spike recovery was slightly out of QC limits for the MSD. This was considered to be a matrix effect, since the laboratory control sample was in control, and no qualifying action was taken.

Sample 009 was used for the MS/MSD spike for TCLP SVOCs. Three out of 13 spike recoveries were out of QC limits for both the MS and MSD; the RPDs were within limits. The laboratory control sample was within control limits, so the QC deviations for the MS/MSD were considered to be matrix effects, and no qualifying action was taken.

A check sample and check sample duplicate were run in lieu of an MS/MSD for TCLP pesticides, and spike recoveries and RPDs were within control limits. Sample 009 was used for the herbicide MS/MSD. Spike recoveries and RPDs were within control limits.

The lead recoveries and RPDs were not calculated because the sample amount was greater than four times the spike amount. These spike results were

appropriately flagged as NC, MSB. All other metals MS/MSD spike recoveries and RPDs were within control limits.

The duplicate results for percent solids were within control limits. Flashpoint QC results indicate that no duplicate analysis was performed with the batch that included sample 009. This was reported by the internal laboratory reviewer as a QC deviation (p. 1368).

4.3 Surrogate Recoveries

For VOCs, surrogate recovery was within QC limits for all field samples. Surrogates were out of QC limits for two laboratory matrix spikes and one intra-lab QC sample analyzed with this batch. However, the laboratory control sample was within QC limits, therefore no action was taken, and no data were qualified.

For SVOCs, one out of six surrogate recoveries were outside of QC limits (recoveries of greater than the upper limit) for sample 009, and for the MS/MSD, which used sample 009. There were no detected SVOCs in the sample. The sample was reported in the case narrative to have been re-extracted and re-extracted and reanalyzed, with similar results, indicating matrix effects. The results are not otherwise qualified because failure of two or more surrogates triggers action.

Surrogate recoveries were within QC limits for pesticides and herbicides.

4.4 Laboratory Control Samples

Four VOC laboratory control samples were run; all were within control limits. The control samples for SVOCs, pesticides, and herbicides were also within control limits. The interference check sample and laboratory control sample for metals were within control limits. No data qualification is required, based on laboratory control samples.

4.5 Other QC Data

Other QC data provided, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols. There were minor deviations seen per CLP recommendations in initial and continuing calibration for VOCs (% RSD, % D, and RRF); however, not for reported compounds. No data qualification is required on the basis of these results.

5.0 Analytical Methods

The analytical laboratory used the analytical methods specified in the approved quality assurance project plan (QAPP). The analytical methods used for this sample group were:

Parameter	Analytical Method	
Volatile Organics by Gas Chromatograph/Mass Spectrometry (GC/MS)	SW846	8260A
SVOCs by GC/MS	SW846	8270B
TCLP Pesticides	SW846	8080A
TCLP Herbicides	SW846	8150B
Inductively Coupled Plasma (ICP) Metals	SW846	6010B
Mercury (Manual Cold-Vapor)	SW846	7470A
Total Residue as Percent Solids	MCAWW	160.3 MOD
Paint Filter Test	SW846	9095
Pensky-Martens Method for Determining Ignitability	SW826	1010

References:

MCAWW - "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, for those samples where no organic compounds were detected, raw data results, and spreadsheet calculations were checked against the summary reports. Dilution factors, calculations, and rounding were checked, and no errors were found. Raw data for inorganics and wet chemistry analyses were also compared to reported results, and no errors were found.

7.0 Data Qualifiers

Data qualifiers that have been placed by the laboratory are:

- Those VOC results which are between the method detection limit and the reporting limit in the summary data reports provided in electronic format by the laboratory have been correctly flagged with a "J" for estimated quantity.

- Recoveries and RPDs for lead were not calculated because the sample amount was more than four times the spike amount. The MS/MSD results were qualified by the laboratory as NC, MSB.

No data qualifiers have been added, based on the data review process.

Table 1
Analytical Summary
Lot # A8K190163

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL	Percent Solids	TCLP (VOC, SVOC, Metals, Pest/Herb), Paint Filter, Ignitibility
BP019	SB8 SS 4-6' soil	CNLID 001	x	x	
BP020	Split Spoon Rinsate water	CNLIJ 002	x		
BP021	SB7 SS 4-6' soil	CNLIK 003	x	x	
BP022	T9 GW water	CNLIM 004	x		
BP023	T9 SS1 2-4' soil	CNLIN 005	x	x	
BP024	T10 GW water	CNLIP 006	x		
BP025	T10 SS1 2-4' soil	CNLIQ 007	x	x	
BP026	MW15 SS 6-8' soil	CNLIR 008	x	x	
BP027	Stockpile soil	CNLIW 009		x	x
BP028	T11 SS1 4-6' soil	CNL22 010	x	x	
BP029	T12 SS1 4-6' soil	CNL6M 011	x	x	
BP030	T12 GW water	CNL6P 012	x		
BP031	Bucket Rinsate water	CNL6Q 013	x		
BP032	Trip Blank water	CNL6T 014	x		

7/26/99 A8K190163

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package.

case narrative

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists).

described in case narrative

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated.

signed by Quanterra PM

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order.

✓

Flashpoint: >180°F. Paint filter: NE G

3.3 NYSDEC Data Package Summary Forms

14 samples: TCLP. 8 SSPL soil; 5 SSPL water

VOCs 7-day holding time

Leach-Extraction-Analysis Dates of TCLP sample

in TCLP: herb ND, pesticides ND, metals ND, SVOCs ND

Conc. ranges / detects:

11/24	001	PCE, TCE (<10)	
11/24	002	Toluene (<1)	
11/24	003	ND	
11/24	004	TCE (180), 1,2-DCE, PCE	
11/24	005	ND	
11/24	006	TCE (<10)	
11/25	007	TCE (<10)	
11/25	008	TCE (75) DCE	
12/04	009	tol, TCE 0.11	
11/25	010	TCE (230) DCE, 1,1-D	
11/25	011	TCE (250), DCE, PCE	
11/24	012	TCE (170), DCE, DCA	
11/24	013	ND	
11/24	014	ND	

3.4 Chain-of-Custody Forms

internal, external cooler receipt form ✓

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG. received: 1.5°C - temp. vial ✓

otherwise, no exceptions noted.

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

1/3 2/3 Intralab QC, MS/MSD: out all samples in

3.5.1.1 System Monitoring Compound Summary ✓

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary 4 pairs: ug/L, mg/L, ug/kg (2 pr.): ← out of 5 spiked (1) out for ✓

3.5.1.3 QC Check Sample/Standard (1): mg/L, ug/L; (2) ug/kg } all in ✓

3.5.1.4 Method Blank Summary ✓

ALL Samples covered: 4 Blanks: water, solid, solid, solid

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5 GC/MS Instrument Performance Check ✓

BFB in chronological order; by instrument.

9 BFB Form V: 502: 11/17, 11/24, 11/25, 12/01, 12/03, 12/04
TUNING & MASS CAL. 503: 11/25 504: UX1: 11/23, 11/24

3.5.1.6 Instrument Detection Limits NA for non-CLP

Form VIII: Internal Std. area summary:

3.5.2 Sample Data

5: 502: 11/24, 12/03, 12/04
503: 11/25
UX1: 11/24

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples. ✓

TICs not required for SSPL, TCLP

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA). ✓

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative. ✓

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10. mg/L for TCLP

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found." NA

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract. ✓

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number ✓
- Date and time of analysis ✓
- GC/MS instrument ID ✓
- Lab file ID ✓

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). NA

uX2.1 : 11/23
Initial Cal: 503: 11/25
502 11/17; 11/25; 12/01

3.5.3 Standards Data

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. ✓ OK except %RSD: 30% RRF ≥ 0.05 for four non-target VOCs.

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. RRF ≥ 0.05 ✓
OK except %D ± 25% for four non-target compounds

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓
502: 11/25
12/03
uX1: 11/24

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓
12/04

3.5.4 Raw QC Data

9

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples.	4: ug/Kg(2) ug/L mg/L
3.5.4.2.1	Tabulated results (Form I-VOA).	all ✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	p. 380 4 TICs detected only for mg/L b/ank in low concs ~ 0.10mg/L
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	not provided
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	not provided
3.5.4.3	Matrix Spike Blank Data	covered w/ method
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	N/A
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	

BP020 Split spoon rinsate
BP027 Stockpile
BP023 TP551 2-4'

3.5.4.4	Matrix Spike Data	✓
3.5.4.4.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.5.4.5	Matrix Spike Duplicate Data	✓
3.5.4.5.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.4.5.6	QC Check Sample/Standard	✓
3.5.4.6.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

4 ug/kg (2)
ug/L
mg/L

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

highlighted in sample report; checked against Form Is and sample log

3.5.6 Copy of Extraction Logs

GC/MS Run Log

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC sample (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

3.6 GC/MS Semivolatiles Data

1 sample only (TCLP): 004

3.6.1 QC Summary

BP027 Stockpile

3.6.1.1 Surrogate Percent Recovery Summary (Form II-SV) 1/6 out for Sample, MS/MSD

3.6.1.2 Matrix Spike/Matrix Spike Duplicate Summary (Form III-SV) 3/13 out (027 spike)

3.6.1.3 QC Check Sample/Standard 0/13 out

3.6.1.4 Method Blank Summary (Form IV-SV)

HP7: 12/05

3.6.1.5 GC/MS Instrument Performance and Mass Calibration (Form V-SV)

12/05 stds. & samples, etc.

3.6.1.6 Internal Standard Area and RT Summary (Form VIII-SV)

3.6.1.7 Instrument Detection Limits NA for non-CLP

3.6.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form I-CLP-SV, including Form I SV-TIC), followed by the raw data for semivolatile samples. These sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

ND in TCLP extract for TCLP SVOCs

3.6.2.1 TCL Results - Organic Analysis Data Sheet (Form I-SV-1, SV-2). ✓

Tabulated results (identification and quantitation) of the specified target compounds. ✓

On Form I-SV, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. **NOTE:** Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10. mg/L SOP TCLP extract

3.6.2.2 Tentatively Identified Compounds (Form I-SV-TIC) NA SOP TCLP

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found".

3.6.2.3 Reconstructed total ion chromatograms (RIC) for each sample. ✓

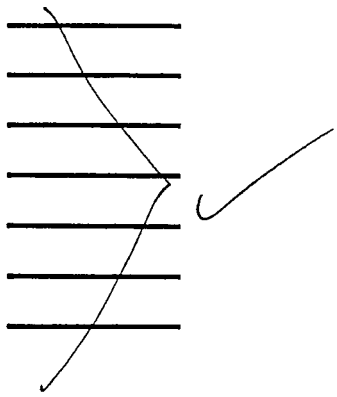
RICs must be normalized to the largest nonsolvent component, and must contain the following header information: ✓

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the GC/MS operator must identify such edits or manual procedures by initialing and dating the changes made to the report. ✓

If automated data system procedures are used for preliminary identification and/or quantification of the Target Compound List compounds, the complete data system report must be included in all sample data packages, in addition to the reconstructed ion chromatogram. The complete data system report shall include: ✓

- Sample number
- Date and time of analysis
- RT or scan number of identified TCL compounds
- Ion used for quantitation with measured area
- Copy of area table from data system
- GC/MS instrument ID
- Lab file ID

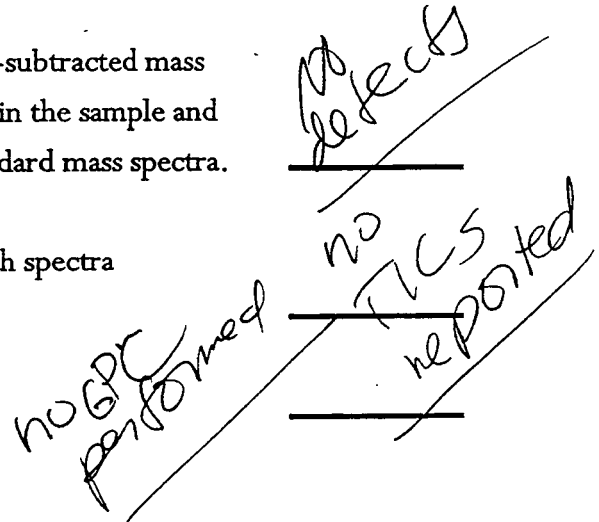


3.6.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.6.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra.

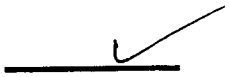
3.6.2.4.2 Copies of TIC mass spectra associated best-match spectra (three best matches).

3.6.2.4.3 GPC chromatograms (if GPC performed).



hp 7.i 12/05

3.6.3 Standards Data

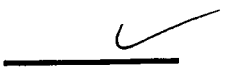


RRF ≥ 0.05 %RSD ≤ 30 %

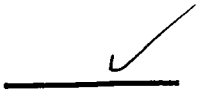
3.6.3.1 Initial Calibration Data (Form VI-SV-1, SV-2) - in order by instrument, if more than one instrument used.

all OK

3.6.3.1.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration.



3.6.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed.



3.6.3.2 Continuing calibration (Form VII-SV-1, SV-2) - in order by instrument, if more than one instrument used. OK

3.6.3.2.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. 12/05

3.6.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, by instrument.

3.6.3.3 Internal Standard Area Summary (Form VIII-SV-1, SV-2) in order by instrument, if more than one instrument used. in QC summary

3.6.3.4 Semivolatile GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the semivolatile GPC calibration mixture. no GPC performed

3.6.4 Raw QC Data 12/05 10:38 12/05 14:10

3.6.4.1 DFTPP (for each 12-hour period, for each GC/MS system utilized)

3.6.4.1.1 Bar graph spectrum.

3.6.4.1.2 Mass listing.

3.6.4.1.3 Reconstructed total ion chromatogram (RIC).

3.6.4.2 Blank Data - in chronological order, by extraction date.
NOTE: This order is different from that used for samples.

3.6.4.2.1 Tabulated results (Form I-SV-1, SV-2) MB/method BNG blanks ND

3.6.4.2.2 Tentatively Identified Compounds (Form I-SV-TIC) - even if none found. NA

3.6.4.2.3 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS). no detects

3.6.4.2.4 Superfund-TCL spectra with lab generated standard. Provides:

- Raw TCL compound spectra
- Enhanced or background subtracted spectra
- Laboratory generated TCL standard spectra

3.6.4.2.5 GC/MS library search spectra for Tentatively Identified Compounds (TIC). NA

3.6.4.2.6 Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.

3.6.4.3 Matrix Spike ~~Blank~~ Data performed on sample 009 ✓

3.6.4.3.1 Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required. ✓

3.6.4.3.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are required. ✓

3.6.4.4 Matrix Spike Data Dup ✓

3.6.4.4.1 Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required. ✓

3.6.4.4.2 Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required. ✓

Blank:

refer to method blank

3.6.4.5	Matrix Spike Duplicate Data	
3.6.4.5.1	Tabulated results (Form I-SV-1, SV-2) of all TCL compounds. Form I-SV-TIC not required.	
3.6.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	
3.6.4.6	QC Check Sample/Standard	✓
3.6.4.6.1	Tabulated results (Form I-SV-1, SV-2) of all TCL compounds.	✓
3.6.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓

3.6.5 Copy of Calculations

✓

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

checked for sample: dilutions, etc.

✓

checked against sample log.

3.6.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

✓

Instrument Log Sheets
Organic Extraction Log Sheets (Extraction Bench Worksheets)

3.7 GC/ECD Pesticide/Aroclor Data ✓

3.7.1 QC Summary ✓

3.7.1.1 Surrogate Percent Recovery Summary (Form II-PEST) ALL OK ✓

3.7.1.2 Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-PEST) check sample/check sample dup: ALL OK ✓

3.7.1.3 QC Check Sample/Standard Recovery ✓

3.7.1.4 Method Blank Summary (Form IV-PEST) ✓

3.7.1.5 Instrument Detection Limits N/A for non-CLP separated by TCLP pest. (p. 585) and herb. (p. 954) ✓

3.7.2 Sample Data ✓

Sample data shall be arranged in packets with the Traffic Report copy, the Organic Analysis Data Sheet (Form I-PEST), followed by the raw data for pesticide samples. The sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples. ✓

3.7.2.1 TCL Results - Organic Analysis Data Sheet (Form I-PEST). ✓

On Form I-PEST, the appropriate concentration units shall be entered. For example, ug/L for water samples or ug/Kg for soil/sediment samples. No other units are acceptable. mg/L for TCLP extract. 2 column phases rtx1701 rtx-5

NOTE: Report analytical results to two significant figures for all pesticide/PCB samples. ✓

3.7.2.2 Copies of pesticide chromatograms. ✓

All chromatograms must be labeled with the following information. ✓

- Sample number ✓
- Volume injected (ul) ✓
- Date and time of injection ✓
- GC column identification (by stationary phase and internal diameter) ✓
- GC instrument identification ✓
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or on a print-out of retention times if retention times are printed over the peak. ✓

3.7.2.3 Copies of pesticide chromatograms from second GC column confirmation. ✓

3.7.2.4 GC integration report or data system printout and calibration plots (area vs. concentration) for 4-4'DDT, 4,4'DDD, 4,4'-DDE or toxaphene (where appropriate). ✓

3.7.2.5 Manual work sheets. ✓

3.7.2.6 UV traces from GPC (if GPC performed). NOT PERFORMED

3.7.2.7 If pesticide/Aroclors are confirmed by GC/MS, the Laboratory shall submit copies of reconstructed ion chromatograms, raw spectra and copies of background-subtracted mass spectra of Superfund target compounds listed in Exhibit C (Superfund-TCL) that are identified in the sample and corresponding background-subtracted Superfund-TCL standard mass spectra. Compound names must be clearly marked on all spectra. For multicomponent pesticides/Aroclors confirmed by GC/MS, the Laboratory shall submit mass spectra of 3 major peaks of multicomponent compounds from samples and standards. no detects

3.7.3 Standards Data

3.7.3.1 Initial Calibration of Single Component Analytes (Form VI-PEST-1 and PEST-2) - all GC columns, all instruments, in chronological order by GC column and instrument. ✓

p. 568

3.7.3.2 Initial Calibration of Multicomponent Analytes (Form VI-PEST-3) - all GC columns, all instruments, in chronological order by GC column and instrument. p. 574

cal. history - p. 580

3.7.3.3 Analyte Resolution Summary (Form VI-PEST-4) - all GC columns and instruments, in chronological order by GC column and instrument. _____

3.7.3.4 Calibration Verification Summary (Form VII-PEST-1) - for all Performance Evaluation Mixtures and Instrument blanks, on all GC columns and instruments, in chronological order by GC column and instrument. ✓ p. 722

3.7.3.5 Calibration Verification Summary (Form VII-PEST-2) - for all mid point concentrations of Individual Standard Mixtures A and B and Instrument blanks used for calibration verification, on all GC columns and instruments, in chronological order by GC column and instrument. _____

3.7.3.6 Analytical Sequence (Form VIII-PEST) - all GC columns and instruments, in chronological order by GC column and instrument. p. 814; p. 840 ✓ 875

3.7.3.7 Florisil Cartridge Check (Form IX-PEST-1) - for all lots of cartridges used to process samples in the sample lot. NA

3.7.3.8 Pesticide GPC Calibration (Form IX-PEST-2) - all GPC columns, in ~~chronological order by calibration date.~~ NA

3.7.3.9 Pesticide Identification Summary for Single Component Analytes (Form X-PEST-1) - for all samples with positively identified single component analytes, In order by increasing sample number. no detects

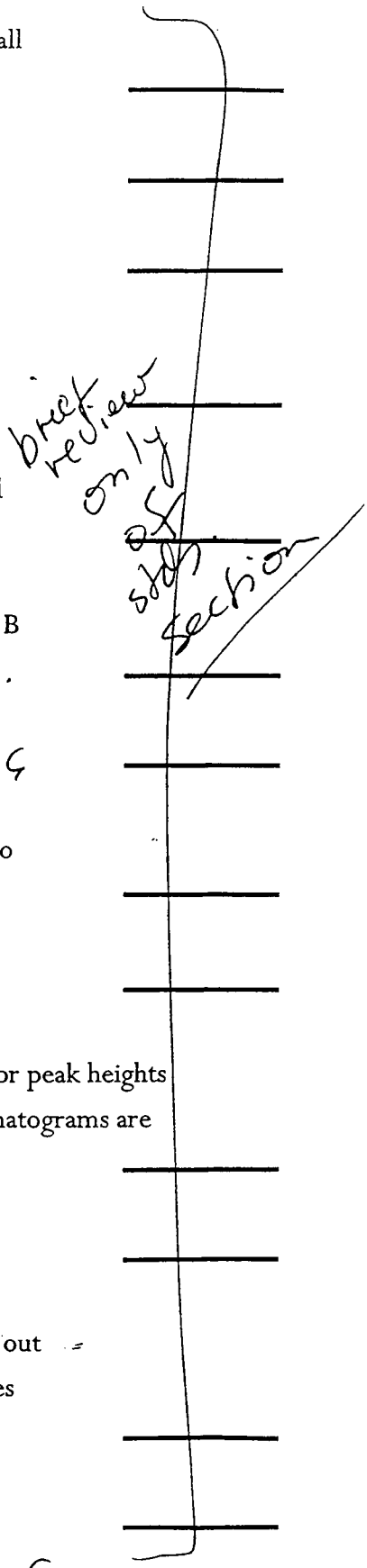
3.7.3.10 Pesticide Identification Summary for Multicomponent Analytes (Form X-PEST-2) - for all samples positively identified multicomponent analytes, in order by increasing sample number. no detects

3.7.3.11 Chromatograms and data system printouts are required for all standards including the following:

- Resolution Check Mixture.
- Performance Evaluation Mixtures, all.
- Individual Standard Mixture A, at three concentrations, each initial calibration.
- All multicomponent analytes (Toxaphene and Aroclors), each initial calibration.
- All mid point concentrations of Individual Standard Mixtures A and B used for calibration verification.
- Florisil cartridge check solution, all lots.
- Pesticide GPC Calibration Check Solution, all calibrations relating to samples in the lot number.
- All multicomponent analyte standards analyzed for confirmation.

3.7.3.12 A printout of retention times and corresponding peak areas or peak heights must accompany each chromatogram. In addition, all chromatograms are required to be labeled with the following:

- Sample Number for the standard.
- Label all standard peaks for all individual compounds either directly out from the peak or on the printout of retention times if retention times are printed over the peak.
- Total nanograms injected for each standard.



continuing cal. report: p.866

see back for notes re: herb. QC data.

copy!

Herbicides (2,4-D + 2,45-TP

Surrogates - all OK
check sample: OK
MS/MSD - OK (performed on 004)
Blank summary - provided.

Sample data:

Both chromatograms provided.

Form VIII - Analytical Sequence:
p. 1005
Continuing cal. report - p. 1006

Raw data provided for:

~~Surrogates~~ Surrogates - all OK
LCS ← all OK
MS/MSD ✓ all OK (sample 004)
Blank

Instrument log sheets
Extraction bench worksheets

continuing cal. % diff report: p. 841, 854, 858, 871, 884

- Date and time of injection.
- GC column identification (by stationary phase and internal diameter).
- GC instrument identification.

3.7.3.13 Pesticide GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the pesticide GPC calibration mixture.

Recovery report: p. 877, 890

3.7.4 Raw QC Data

3.7.4.1 Blank Data - in chronological order, by type of blank (method, instrument, sulfur cleanup). **NOTE:** This order is different from that used for samples.

3.7.4.1.1 Tabulated results (Form I-PEST). all nd

3.7.4.1.2 Chromatogram(s) and data system printout(s) (GC) for each GC column and instrument used for analysis.

3.7.4.2 Matrix Spike Data

3.7.4.2.1 Tabulated results (Form I-PEST) of all TCL compounds.

3.7.4.2.2 Chromatogram(s) and data system printout(s) (GC).

3.7.4.3 Matrix Spike Duplicate Data

3.7.4.3.1 Tabulated results (Form I-PEST) of all TCL compounds.

3.7.4.3.2 Chromatogram(s) and data system printout(s) (GC).

NA - LCS-LCSD run in lieu of MS/MSD

3.7.4.4 Matrix Spike Blank Data

covered by method for blank CS/LCSD.

3.7.4.4.1 Tabulated results (Form I-PEST) of all TCL compounds. ✓

3.7.4.4.2 Chromatogram(s) and data system printout(s) (GC). ✓

3.7.4.5 QC Check Sample/Standard ✓

check sample + check sample dup.

3.7.4.5.1 Tabulated results (Form I-PEST) of all TCL compounds. ✓

3.7.4.5.2 Chromatogram(s) and data system printout(s) (GC). ✓

(2)

3.7.5 Copy of Calculations

spreadsheet calcs.

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

3.7.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers. ✓

Instrument Log Sheets
Post. Organic Extraction Sheets

3.9 Inorganic Data

1 sample only: 004 for TCLP metals

Sample data shall be submitted with the Inorganic Analysis Data Reporting Forms for all samples in the sample lot arranged in increasing alphanumeric sample number order, followed by the QC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs. ✓

3.9.1 Results – Inorganic Analysis Data Sheet (Form I-IN) ✓

Tabulated analytical results (identification and quantitation) of the specified analytes. ✓

Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid sample must be reported on a dry weight basis. Analytical results must be reported to two significant figures if the result value is less than 10; to three significant figures if the value is greater than or equal to 10. Results for percent solids must be reported to one decimal place. ✓

no detects

mg/L for TCLP

3.9.2 Quality Control Data ✓

3.9.2.1 Initial and Continuing Calibration Verification [FORM II-IN (Part 1)] p. 109 ✓ see cal. section

3.9.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.9.2.3 Blanks [FORM III-IN] ALL ND ✓

3.9.2.4 ICP Interference Check Sample [FORM IV-IN] ✓

3.9.2.5 Spike Sample Recovery [FORM V-IN (PART 1)] ✓

Lead: NC MSB

LCS: OK

3.9.2.6	Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]	NA
3.9.2.7	Duplicates [FORM VI-IN] MS/MSD	✓
3.9.2.8	Quality Control Sample [FORM VII-IN] LCS	✓
3.9.2.9	Standard Addition Results [FORM VIII-IN]	NA
3.9.2.10	ICP Serial Dilutions [FORM IX-IN]	NA
3.9.2.11	Holding Times [FORM X-IN]	OK

3.9.3 Verification of Instrument Parameters

3.9.3.1	Instrument Detection Limits (Semiannually) [FORM X-IN]	✓ OK
3.9.3.2	ICP Interelement Correction Factors (Annually) [FORM XI-IN (PART 1)]	✓ OK
3.9.3.3	ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)].	✓ OK
3.9.3.4	ICP Linear Ranges (Quarterly) [FORM XII-IN]	✓

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.) also: Analysis run logs

3.9.4 Raw Data

Inorganic instrument printouts P-110C

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. This statement does not apply to the Verifications of Instrument Parameters submitted as part of each

ICP data review checklist

data package. Raw data must contain all instrument readouts used for the sample results, including those readouts that may fall below the IDL. All AA and ICP instruments must provide a legible hard copy of the direct real-time instrument readout (i.e., stripcharts, printer tapes, etc.) A photocopy of the direct sequential instrument readout must be included. A hardcopy of the instrument's direct instrument readout for cyanide must be included if the instrumentation has the capability.

The order of raw data in the data package shall be: ICP, Flame AA, Furnace AA, Mercury, and Cyanide. All raw data shall include intensities (ICP) and absorbances with concentration units for flame AA, furnace AA, Mercury and Cyanide. All flame and furnace AA data shall be grouped by element.

Raw data must be labeled with sample number and appropriate codes, to unequivocally identify:

3.9.4.1 Calibration standards, including source and prep date.

3.9.4.2 Initial and continuing calibration blanks and preparation blanks.

3.9.4.3 Initial and continuing calibration verification ~~standards~~, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike.

3.9.4.4 Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.9.4.5 Duplicates.

3.9.4.6 Spikes (indicating standard solutions used, final spike concentrations, volumes involved). If spike information (source, concentration, volume) is consistent for a given sample lot, a general statement outlining these parameters is sufficient.

3.9.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation. ✓

3.9.4.8 All information for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and intercepts of linear fit, final sample concentration (standard addition concentration), and type of background correction used: BS for Smith-Heiftje, BD for deuterium Arc, or BZ for Zeeman. ✓

3.9.4.10 Integration times for AA analyses. NA

3.9.5 Digestion Logs ✓

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparation, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.

prep. log: p. 1348.
TCLP log book: p. 1352.
✓

3.10 Wet-Chemical Data

Sample data shall be submitted with the Conventional Analysis Data Reporting Forms for all sample in the SDG, arranged in increasing sample number order, followed by the ZC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.

0% solids only for soil samples; flashpoint for OO4: p. 1367

3.10.1 Results – Wet-Chemical Analysis Data Sheet

✓

Tabulated analytical results (identification and quantitation) of the specified analytes. ✓

Appropriate concentration units must be specified and entered on Form I. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid samples must be reported on a dry weight basis. ✓

5/0

3.10.2 Quality Control Data

3.10.2.1 Initial and Continuing Calibration Verification — NA

3.10.2.2 CRQL Standard for Wet-Chemical Analysis

3.10.2.3 Blanks — OK

3.10.2.4 Spike Sample Recovery — NA

3.10.2.5 Post Digest Spike Sample Recovery

3.10.2.6 Duplicates — Dups. not run for flash batch. — OK

3.10.2.7 Laboratory Control Sample

3.10.2.8 Holding Times — NA

3.10.3 Raw Data

For each reported value, the Laboratory shall included in the data package all raw data from the instrument used to obtain that value and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters). ✓

Raw data must be labeled with the sample number to unequivocally identify:

3.10.3.1 Calibration standards, including source and prep date. NA

3.10.3.2 Initial and continuing calibration blanks and preparation blanks. for flash, one std. x4

3.10.3.3 Initial and continuing calibration verification standards.

3.10.3.4 Diluted and undiluted samples (by sample number) for all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights, and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient). NA

3.10.3.5 Duplicates. no dup. for flash

3.10.3.6 Spikes (indicating standard solutions used, final spike concentration, volumes involved). NA

3.10.3.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation. ✓

3.10.3.8 Time and date of each analysis. Instrument run logs can be submitted if they contain this information. ✓

3.10.4 Digestion and Distillation Logs NA

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.

3.11 Toxicity Characteristic Leaching Procedure (TCLP) Data

3.11.1 Results – Toxicity Characteristic Leaching Procedure (TCLP) Analysis Data Sheet (Form I-TCLP)

Tabulated analytical results (identification and quantitation) of the specified analytes. Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of milligrams per liter (mg/L).

3.11.2 TCLP Inorganic Quality Control Data

3.11.2.1 Initial and Continuing Calibration Verification [FORM II-IN (PART 1)]

3.11.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.11.2.3 Blanks [FORM III-IN]

3.11.2.4 ICP Interference Check Sample [FORM IV-IN]

3.11.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

3.11.2.6 Post Digest Spike Sample Recovery [FORM V-IN (PART 2)]

3.11.2.7 Duplicates [FORM VI-IN]

3.11.2.8 Quality Control Sample [FORM VII-IN]

3.11.2.9 Standard Addition Results [FORM VIII-IN]

Data Usability Summary Report:

Lot # C8L090186
Lot # C8L100209

Shield Environmental Associates, Inc.
4225 Northern Pike, Suite 101
Monroeville, Pennsylvania 15146

August 1999

1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to two consecutively analyzed sample lots, #C8L090186 and #C8L100209, for seven groundwater samples and two trip blanks (water) collected at the DII Binghamton Plastic facility. All of the samples were analyzed for the following constituents from the site-specific parameter list (SSPL):

- Tetrachloroethene
- Trichloroethene
- 1,1,1-Trichloroethane
- 1,1-Dichloroethene
- 1,2-Dichloroethene (cis- and trans-)
- 1,2-Dichloroethane

Three groundwater samples were also analyzed for the general chemistry parameters chloride, nitrate, sulfate, and total organic carbon (TOC). The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

Volatile Organic Compounds (VOCs)

Trichloroethene, 1,1,1-trichloroethane, trans- and cis-1,2-dichloroethene, 1,1-dichloroethane, 1,1-dichloroethene, and vinyl chloride were detected in one sample (004) in Lot #C8L100209, and only trichloroethene was reported at an estimated concentration below the reporting limit in sample 002 of this lot. The remaining of the samples in this lot and Lot #C8L090186 were reported as nondetectable for the analyzed constituents. The sample 004 of Lot #C8L100209 was analyzed undiluted and 10X diluted due to high level concentrations of cis-1,2-dichloroethene and trichloroethene. The trip blank samples were reported as nondetectable for SSPL VOCs. Tentatively Identified Compounds (TICs) were not reported for any of the samples in these sample lots.

Other Parameters

Nitrate was detected in a range of nondetectable to 1.4 milligrams per liter (mg/L). Chloride concentrations ranged from 14 to 350 mg/L, sulfate from 28 to 110 mg/L, and TOC from nondetectable to 9 mg/L.

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deviation for these sample lots was that the cooler receipt logs, indicating the sample conditions upon receiving, were not provided for either sample lot.

1.3 Recommendations

The sample cooler receipt logs should be submitted with the sampling data package.

2.0 Completeness of Data Package

The data packages were complete except for:

- The sample cooler receipt logs that were not submitted for either sample lot.
- Form VIII-internal standard and retention time summaries were not provided. However, the equivalent information was found in the raw data.

Matrix spike/matrix spike duplicate (MS/MSD) raw data in Lot #C8L090186 were provided for the VOC MS/MSD pair because a client sample (001) was used for the analysis.

3.0 Compliance with Holding Times and Sample Preservation

All VOC samples were analyzed within the required 7-day holding time. Chloride, sulfate, and TOC were all analyzed within the required 28-day holding time, and the nitrate analyses were performed within the 48-hour holding time.

4.0 QC Data

4.1 Blanks

One trip blank was submitted with each sample lot (sample 005), and was analyzed for SSPL VOCs. No SSPL VOCs were detected in the trip blank samples.

One VOC method blank per sample lot was run for SSPL VOC analysis, and no reportable VOCs were detected. TICs were not reported.

The chloride, nitrate, sulfate, and TOC blanks were all nondetectable for the constituents of interest.

4.2 MS/MSDs

One MS/MSD pair was run for VOCs in the sample 001 for Lot #C8L090186 and one laboratory MS/MSD pair for VOCs in the Lot #C8L100209. Spike recoveries and relative percent differences (RPDs) were within QC limits for all MS/MSD pairs.

There was one matrix spike run for sulfate, TOC, nitrate, and chloride. Spike recoveries and RPDs were within control limits for sulfate, TOC, nitrate, and chloride.

4.3 Surrogate Recoveries

For VOCs, recoveries of all of the surrogates were within QC limits.

4.4 Laboratory Control Samples

One VOC check sample was run for each lot and was within control limits. The laboratory control samples for chloride, nitrate, sulfate, and TOC were within control limits.

4.5 Other QC Data

Other QC data provided for VOCs, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols.

5.0 Analytical Methods

The analytical laboratory used the analytical methods specified in the approved quality assurance project plan (QAPP). The analytical methods used for this sample group were:

Parameter	Analytical Method	
Volatile Organics by Gas Chromatograph/Mass Spectrometry (GC/MS)	SW846	8260A
Chloride	MCAWW	325.2
Nitrate	MCAWW	353.2
Sulfate	MCAWW	375.4
Total Organic Carbon	MCAWW	415.1

References:

MCAWW - "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, for those samples where no VOCs were detected, raw data results were checked against the summary reports by plugging the values in the data printouts into the formulas provided. Information in the instrument logs was also checked against the general chemistry reports. No errors were found.

7.0 Data Qualifiers

Data qualifiers added by the laboratory are:

- VOC results that are greater than the method detection limit but below the reporting limit are qualified as "J" for estimated.

No data qualifiers were added, based on the data review process.

Table 1
Analytical Summary
Lot #C8L100209
Lot #C8L090186

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL	General Chemistry[1]
Lot #C8L100209				
BP036	MW13-GW water	CP6R9 001	x	
BP037	DMW4-GW water	CP6RJ 002	x	x
BP038	MW6-GW water	CP6RT 003	x	
BP039	MW11-GW water	CP6RW 004	x	x
BP040	MW14-GW water	CP6T1 005	x	x
BP041	Trip Blank water	CP6T4 006	x	
Lot #C8L090186				
BP033	MW12-GW water	CP5AR 001	x	
BP034	MW7-GW water	CP5C1 002	x	
BP035	Trip Blank water	CP5C3 003	x	

[1]Nitrate, sulfate, chloride, and total organic carbon.

C8L090186
Samples 033, 34, 35 No Selects

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

* No cooler receipt log

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package. ✓

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists). ✓

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated. ✓

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order. ✓

3.3 NYSDEC Data Package Summary Forms

2 groundwater samples 1 MS/MSD in the sample
1 trip blank ✓

Dilution factor 1

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG.

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

3.5.1.1 System Monitoring Compound Summary — surrogate recovery within limit; 1 Form II for all samples

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary — 1 pair, %Rec, RPD within limit

3.5.1.3 QC Check Sample/Standard — 1 Form III within limit

3.5.1.4 Method Blank Summary — 1 Form IV covers all samples

No detects for any reported compounds

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5 GC/MS Instrument Performance Check — 2 sets Form V not provided; % relative abundance within limits

Internal area summary Form VIII, and BFB in chronological order; by instrument.

→ summary of ion abundance

3.5.1.6 Instrument Detection Limits — NA

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples.

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA). NA

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative. ✓

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found." None found ✓

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract. ✓

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number ✓
- Date and time of analysis ✓
- GC/MS instrument ID ✓
- Lab file ID ✓

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). NA

3.5.3 Standards Data

Initial calibration 11/9/98 5 levels
Continuing calibration 12/10/98
Average %RSD = 7.5

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. ✓

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. $\overline{RRF}$ within limits
%D within limits except 2-Butanone (65.2%)

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

2 sets % Relative abundance within limits

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples. 1 set	✓
3.5.4.2.1	Tabulated results (Form I-VOA).	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	None ~~report~~ found ✓
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	NA
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	NA
3.5.4.3	Matrix Spike Blank Data Covered by method Blank	—
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	—
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	—

3.5.4.4	Matrix Spike Data	✓
3.5.4.4.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.5.4.5	Matrix Spike Duplicate Data	✓
3.5.4.5.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.4.5.6	QC Check Sample/Standard 1 set	
3.5.4.6.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

see here

Formule = DF x AM x 1/V0 x Vt

001 1,2-dichloroethane
1 x 281.076 x 1/5 x 1 = 56.22 ✓

002 Toluene
1 x 249.362 x 1/5 x 1 = 49.87 ✓

003 Bromofluorobenzene
1 x 260.539 x 1/5 x 1 = 52.11 ✓

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Lot #C8L100209
Samples 036 - 041

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

*Cooler receipt not provided

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package. ✓

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists). ✓

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated. ✓

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order. ✓

3.3 NYSDEC Data Package Summary Forms

5 samples - groundwater
1 trip blank ✓

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG.

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

3.5.1.1 System Monitoring Compound Summary — 1 Form II - Surrogate recovery within limits for all sample

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary — 1 set %REC within limits, %RPD

3.5.1.3 QC Check Sample/Standard — 1 single %REC within limits

3.5.1.4 Method Blank Summary — 1 set within limits

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.) Form IV covers all samples, QC samples

3.5.1.5 GC/MS Instrument Performance Check

BFB in chronological order; by instrument. within limits

Internal standards

3.5.1.6 Instrument Detection Limits — Form VIII not specifying what samples covered. Checked with raw data Ok — NA

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples.

NA

Dilution 1 for all samples except for sample 004 with dilution F. 10

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA).

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found."

NA

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract.

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). NA

3.5.3 Standards Data 11/09/98 1 set 5 levels

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. %RSD average 7.5 ✓ %RSD, RRF within limits

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

12/10/98 1 set

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. %D out of limit for 2-Butanone only RRF within limits ✓

Internal standard → within limits

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples.	
3.5.4.2.1	Tabulated results (Form I-VOA).	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	NA
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	NA
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	NA

Method Blank covers it

3.5.4.3	Matrix Spike Blank Data	—
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	—
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	—

3.5.4.4	Matrix Spike Data	✓
3.5.4.4.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.5.4.5	Matrix Spike Duplicate Data	✓
3.5.4.5.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.4.5.6	QC Check Sample/Standard 1 set	✓
3.5.4.6.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

see on back of the page

Formula Amt x DF x 1/Vo x V_t

002 Trichloroethene 5.99 x 1 x 1/5x1 = 1.198 ✓

004 1,1-DCA 44.47 x 1 x 1/5x1 = 8.895 ✓

004 RE1 Vinyl Chloride 40.7783 x 10 x 1/5x1 = 81.56 ✓

005 BFB 254.311 x 1 x 1/5x1 = 50.86 ✓

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3.9.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.

3.9.4.8 All information for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and intercepts of linear fit, final sample concentration (standard addition concentration), and type of background correction used: BS for Smith-Heiftje, BD for deuterium Arc, or BZ for Zeeman.

3.9.4.10 Integration times for AA analyses.

3.9.5 Digestion Logs

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparation, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.

3.10 Wet-Chemical Data

holding time OK

Sample data shall be submitted with the Conventional Analysis Data Reporting Forms for all sample in the SDG, arranged in increasing sample number order, followed by the ZC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.

✓

Dilution factor	DMW-4	MW-11	MW-14
Chloride	4	1	1
Nitrate	1	1	1
Sulfate	1	2	5
TOC	1	1	1

3.10.1 Results – Wet-Chemical Analysis Data Sheet

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid samples must be reported on a dry weight basis.

3.10.2 Quality Control Data

3.10.2.1 Initial and Continuing Calibration Verification

3.10.2.2 CRQL Standard for Wet-Chemical Analysis

3.10.2.3 Blanks

3.10.2.4 Spike Sample Recovery

3.10.2.5 Post Digest Spike Sample Recovery

3.10.2.6 Duplicates

3.10.2.7 Laboratory Control Sample

3.10.2.8 Holding Times

3.10.3 Raw Data

For each reported value, the Laboratory shall included in the data package all raw data from the instrument used to obtain that value and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters).

Raw data must be labeled with the sample number to unequivocally identify:

3.10.3.1 Calibration standards, including source and prep date. ✓

3.10.3.2 Initial and continuing calibration blanks and preparation blanks. ✓

3.10.3.3 Initial and continuing calibration verification standards. ✓

3.10.3.4 Diluted and undiluted samples (by sample number) for all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights, and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient). ✓

3.10.3.5 Duplicates. ✓

3.10.3.6 Spikes (indicating standard solutions used, final spike concentration, volumes involved). ✓

3.10.3.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation. _____

3.10.3.8 Time and date of each analysis. Instrument run logs can be submitted if they contain this information. ✓

3.10.4 Digestion and Distillation Logs _____

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. NA

RECEIVED
AUG 12 1999

Data Usability Summary Report:

Lot # C8L110187

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1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to Lot #C8L110187, for seven groundwater samples, one equipment rinsate sample, and one trip blank sample collected at the DII Binghamton facility. Six of the samples and the trip blank were analyzed for the following constituents from the site-specific parameter list (SSPL):

- Tetrachloroethene
- Trichloroethene
- 1,1-Dichloroethene
- 1,2-Dichloroethene (cis- and trans-)
- 1,2-Dichloroethane

In addition, one groundwater sample and the equipment rinsate sample were analyzed for Target Analyte List/Target Compound List (TAL/TCL) analytes, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and total cyanide. Also, four groundwater samples were analyzed for general chemistry parameters, including chloride, sulfate, nitrate, and total organic carbons. The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

VOCs

Trichloroethene was reported in all seven groundwater samples with concentrations ranging from 1.1 micrograms per liter (ug/L) in sample 003 to 6,900 ug/L in sample 009. Tetrachloroethene, 1,1,1-trichloroethane, and cis-1,2-dichloroethene were reported in five groundwater samples (001, 005, 006, 007, and 009) with the highest concentrations for these compounds reported in sample 009. The remaining compounds detected in samples include 1,1-dichloroethane in four samples, vinyl chloride and 1,1,1-dichloroethene in three samples,

dichloroethene (total), and methylene chloride in one sample. High dilutions, 50 and 100 times, were required for samples 009 and 005, respectively, which substantially raised the reporting limits. One Tentatively Identified Compound (TIC), 1,2-dichloro-1,1,2-trifluoroethane, was reported in sample 005; no other TICs were reported in any of the samples.

Other Parameters

TCL SVOCs and PCBs/pesticides were not detected in the two samples analyzed for these parameters, 004 and 005.

TAL metals were above the reporting limit in the one environmental sample analyzed, sample 005, including calcium, chromium, iron, magnesium, manganese, and sodium; cyanide was not detected. Sample 004, the rinsate blank, contained some metals that were below the contract-required detection limit but above the instrument detection limit, and were flagged with "B."

Nitrate was detected in a range of nondetectable to 0.9 milligrams per liter (mg/L). Chloride concentrations ranged from 2 to 270 mg/L, sulfate from 18 to 53 mg/L, and TOC from 1 to 10 mg/L.

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deficiencies in this sample lot were:

- The cooler receipt log, indicating sample conditions upon receiving, was not provided.
- The relative percent difference for the SVOC laboratory matrix spike/matrix spike duplicate (MS/MSD) samples was above the control limit for phenol and 4-nitrophenol. The spike recoveries for these compounds were within limits, and therefore, no action was taken.
- The mercury spike recoveries in the MS/MSDs were above QC limits (131% and 132%). However, sample results were below detection limits and were not qualified.
- The continuing calibration of the instrument for analyses of PCB/pesticides

in samples 004 and 005 exceeded the 25% criterion for the difference between the calculated and true amount for endrin (28.8%) and 4,4-DDE (26.3%). Therefore, the nondetected results for these compounds are to be flagged "UJ" in both samples.

1.3 Recommendations

The followings are recommended:

- The sample cooler receipt log should be submitted with the sampling data package.
- The case narrative should indicate the percentage drift during continuing calibration for PCBs/pesticides analysis was outside limits for endrin 4,4-DDE in samples 004 and 005.

2.0 Completeness of Data Package

The data package was complete, except for the lack of a sample cooler receipt.

3.0 Compliance with Holding Times

All VOC samples were analyzed within the required 7-day holding time. Other TCL/TAL analyses were performed within the required holding times. Chloride, sulfate, and TOC were all analyzed within the required 28-day holding time, and the nitrate analyses were performed within the 48-hour holding time.

4.0 Quality Control Data

4.1 Blanks

No target constituents were detected in blanks for any of the analyses.

4.2 MS/MSDs

MS/MSDs were completed using client samples 001and 006 for VOC compounds, sample 004 for metals, and sample 006 for nitrate. The remaining MS/MSDs were completed using laboratory QC samples. All spike recoveries and RPDs were within QC limits except for the following:

SVOCs

- Relative percent difference way above the control limit for phenol and 4-nitrophenol for the MS/MSD laboratory QC sample. The spike recoveries for these compounds were within limits.

Metals

- The mercury spike recoveries in the MS/MSD were above QC limits. The mercury results were nondetectable for both samples analyzed, and no qualification was required.

4.3 Surrogate Recoveries

Surrogate recoveries for VOCs, SVOCs, and PCB/Pesticides were within acceptance limits.

4.4 Laboratory Control Samples

Two low-level VOC control samples were run; both were within control limits. The control samples for SVOCs and pesticides/PCBs were also within control limits. The interference check sample and laboratory control sample for metals were within control limits. The laboratory control sample for total cyanide was within control limits.

4.5 Other QC Data

Other QC data provided, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols.

5.0 Analytical Methods

The analytical laboratory used the analytical methods specified in the approved quality assurance project plan (QAPP). The analytical methods used for this sample group were:

Parameter	Analytical Method	
Chloride (Colorimetric, Automated Ferricyanide)	MCAWW	325.2
Inductively Coupled Plasma (ICP) Metals	SW846	6010A
Mercury in Liquid Waste (Manual Cold-Vapor)	SW846	7470A
Nitrate	MCAWW	353.2
Organochlorine Pesticides and PCBs	SW846	8080A
Semivolatile Organic Compounds by GC/MS	SW846	8270B
Sulfate	MCAWW	375.4
Total Cyanide	MCAWW	335.2
Total Organic Carbon	MCAWW	415.1
Trace Inductively Coupled Plasma (ICP) Metals	SW846	6010A
Volatile Organics by GC/MS	SW846	8260A

References:

MCAWW - "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, in the case of pesticides/ aroclors, raw data results were checked against the summary reports. Dilution factors, calculations, and rounding were checked, and no errors were found. Since calculations were done by the laboratory using spreadsheet formulas, the results were checked by plugging the values in the data printouts into the formulas provided.

7.0 Data Qualifiers

Data qualifiers that have been placed by the laboratory are:

- Those VOC and SVOC results that were between the detection limit and reporting limit were flagged with "J," for estimated.
- A TIC, identified as 1,2-dichloro-1,1,2-trifluoroethane, was detected in sample 005. The TIC was flagged with a "NJ" for approximate concentration.
- Those VOC results that exceeded the calibration limit were flagged with "E" for concentration outside the calibration limit.
- MS/MSD relative percentage difference for phenol and 4-nitrophenol did not meet QC requirements, and was flagged with "p" and "*."
- Metals results that were greater than the instrument detection limit (IDL) but less than the contract-required detection limit (CRDL) were flagged with "B."

The data qualifiers that have been added, based on the data review process, are:

- The nondetected results for endrin and 4,4-DDE in samples 004 and 005 are to be qualified as "UJ" for an estimate concentration below the reporting limit.

Table 1
Analytical Summary
Lot # C8L110187

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL	TCL/TAL	Total Cyanide	Chloride, Sulfate, Nitrate, TOC
BP042	MW10 water	CP804 001	x			x
BP043	MW8 GW water	CP824 002	x			x
BP044	DMW3 GW water	CP82A 003	x			x
BP045	MW15 GW water	CP896 009	x			x
BP046	Equipment Rinsate water	CP82E 004		x	x	
BP047	MW5 GW water	CP83X 005		x	x	
BP048	MW9 GW water	CP875 006	x			x
BP049	MW2 GW water	CP877 007	x			
BP050	Trip Blank water	CP88C 008		x (VOCs only)		

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Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:C8L110187 004

Sample WT/Vol: 1000 / mL
Work Order: CP82E102
Dilution factor: 1
Moisture %:NA

Date Received: 12/11/98
Date Extracted:12/15/98
Date Analyzed: 12/18/98

QC Batch: 8349127

Client Sample Id: BP046 EQUIPMENT RINSATE

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.025	U
319-85-7	beta-BHC	0.025	U
319-86-8	delta-BHC	0.025	U
58-89-9	gamma-BHC (Lindane)	0.025	U
76-44-8	Heptachlor	0.025	U
309-00-2	Aldrin	0.025	U
1024-57-3	Heptachlor epoxide	0.025	U
959-98-8	Endosulfan I	0.025	U
60-57-1	Dieldrin	0.050	U
72-55-9	4,4'-DDE	0.050	U
72-20-8	Endrin	0.050	U
33213-65-9	Endosulfan II	0.050	U
72-54-8	4,4'-DDD	0.050	U
1031-07-8	Endosulfan sulfate	0.050	U
50-29-3	4,4'-DDT	0.050	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.050	U
7421-93-4	Endrin aldehyde	0.050	U
5103-71-9	alpha-Chlordane	0.025	U
5103-74-2	gamma-Chlordane	0.025	U
8001-35-2	Toxaphene	1.2	U
12674-11-2	Aroclor 1016	0.50	U
11104-28-2	Aroclor 1221	0.50	U
11141-16-5	Aroclor 1232	0.50	U
53469-21-9	Aroclor 1242	0.50	U
12672-29-6	Aroclor 1248	0.50	U
11097-69-1	Aroclor 1254	1.0	U
11096-82-5	Aroclor 1260	1.0	U

UJ NO
UJ 8/4/99

L435

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Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8080A
Pesticides/PCB (8080A)

Lab Sample ID:C8L110187 005

Sample WT/Vol: 1000 / mL
Work Order: CP83X102
Dilution factor: 1
Moisture %:NA

Date Received: 12/11/98
Date Extracted:12/15/98
Date Analyzed: 12/18/98

QC Batch: 8349127

Client Sample Id: BP047 MW5-GW

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
319-84-6	alpha-BHC	0.025	U
319-85-7	beta-BHC	0.025	U
319-86-8	delta-BHC	0.025	U
58-89-9	gamma-BHC (Lindane)	0.025	U
76-44-8	Heptachlor	0.025	U
309-00-2	Aldrin	0.025	U
1024-57-3	Heptachlor epoxide	0.025	U
959-98-8	Endosulfan I	0.025	U
60-57-1	Dieldrin	0.050	U
72-55-9	4,4'-DDE	0.050	U
72-20-8	Endrin	0.050	U
33213-65-9	Endosulfan II	0.050	U
72-54-8	4,4'-DDD	0.050	U
1031-07-8	Endosulfan sulfate	0.050	U
50-29-3	4,4'-DDT	0.050	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.050	U
7421-93-4	Endrin aldehyde	0.050	U
5103-71-9	alpha-Chlordane	0.025	U
5103-74-2	gamma-Chlordane	0.025	U
8001-35-2	Toxaphene	1.2	U
12674-11-2	Aroclor 1016	0.50	U
11104-28-2	Aroclor 1221	0.50	U
11141-16-5	Aroclor 1232	0.50	U
53469-21-9	Aroclor 1242	0.50	U
12672-29-6	Aroclor 1248	0.50	U
11097-69-1	Aroclor 1254	1.0	U
11096-82-5	Aroclor 1260	1.0	U

UJ NG 8/4/99
UJ

L448

FORM I

C8L110187
samples 042 - 050
049 - dup of 048
050 trip blank
046 Rinsate

Cyanide Chem: MS/MSD on 048 for Metals

Analytical Services Protocol (ASP) Category B Checklist

3.1 SDG Narrative

Metals
MS/MSD → rinsate 046
excl. Hg
% Rec. high for ↑ batch QC within limits for LCS

VOCs
MS/MSD on samples 042 & 048
043 2x dilution
047, 045 diluted/undiluted
Chloroform in rinsate

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package. ✓

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists). ✓

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated. ✓

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order. ✓

3.3 NYSDEC Data Package Summary Forms

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG.

Not holding time

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

surrogate recovery within limits

3.5.1.1 System Monitoring Compound Summary

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary — 2 sets MW-10 MW-9 — % Rec, % RPD within limits

3.5.1.3 QC Check Sample/Standard — 2 sets — %Rec within limits

3.5.1.4 Method Blank Summary — 2 sets low — all samples covered
TCL/TAL ~~with~~ CD

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.) 3 sets Form V

3.5.1.5 GC/MS Instrument Performance Check — samples, QC covered

BFB in chronological order; by instrument.

3.5.1.6 Instrument Detection Limits — Internal standard — Form VIII — 2 sets covered all — within limits
NA

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples.

TCL/TAL samples 001 005 008 — 2x dil. inhibit.

Dilution			
001	1	004 - 1	007 - 1
002	2	005 - 1 (100)	008 - 1
003	1	006 - 1	009 - 1

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA). ✓

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative. ✓

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC). ✓ for samples 004, 005, 008

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found." ✓

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract. ✓

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number ✓
- Date and time of analysis ✓
- GC/MS instrument ID ✓
- Lab file ID ✓

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). for TCL/TAL samples only ✓

Samples 004, 005, 008

3.5.3 Standards Data

5 level One set 11/9/98 CLP Form VI

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. average %RSD = 7.5 %RSD ≤ 30% %RR ≥ 90% ✓

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

12/13/98 continuing calib. set
%RRF ≥ 0.01
%D ± 25% excluding Dichlorodifluoromethane & Butanone. However their %D ≤ 50 - Acceptable

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. ✓ 12/11/98 12/13/98 2 sets 1 set %D ± 25% excluding Dichlorodifluoromethane 32.8 → ≤ 50% - Acceptable standard Not required - 2-Butanone 73.9% %RRF OK for these 2 cc

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3 sets 11/9/98
12/11/98
12/13/98

Form VA ✓

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓

2 sets ~~three~~ TCL NO

3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples.	
3.5.4.2.1	Tabulated results (Form I-VOA). ✓	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found. ✓ None reported	✓
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC). None found	✓
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations. None found	✓
3.5.4.3	Matrix Spike Blank Data Covered by blank	✓
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	✓
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

Formula: Amt × DF × 1/Vo × Vt

sample #	Compound	Rel conc.
001	TCE	320.721 × 1 × 1/5 × 1 = 64.14 ✓
002	1,1-DCE	6.5591 × 2 × 1/5 × 1 = 2.62 ✓
003	TCE	5.5272 × 1 × 1/5 × 1 = 1.105 ✓
004	Chloroform	80.1685 × 1 × 1/5 × 1 = 16.03 ✓
005	TICS	33.72 × 1 × 1/5 × 1 = 6.74 ✓
005 dilution	1,1,1-TCA	52.8642 × 100 × 1/5 × 1 = 1057 ✓
006	PCE	6.1738 × 1 × 1/5 × 1 = 1.23 ✓
007	cis-1,2-dce	39.65 × 1 × 1/5 × 1 = 7.93 ✓
~~008~~		
009	VC	112.92 × 1 × 1/5 × 1 = 22.58 ✓
009 dilution	1,1-DCE	55.9275 × 50 × 1/5 × 1 = 559.3 ✓

(5) back page

3.5.4.4	Matrix Spike Data MW-9, MW-10	✓
3.5.4.4.1	Tabulated results (Form I-VOA) of all TCL compounds. Form I-VOA-TIC is not required. — provided for both	✓
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.5.4.5	Matrix Spike Duplicate Data MW-10 / MW-9	✓
3.5.4.5.1	Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required.	✓
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.4.5.6	QC Check Sample/Standard 2 stds	✓
3.5.4.6.1	Tabulated results (Form I-VOA) of all TCL Compounds. Form I-VOA-TIC is not required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

see back of page 5

3.5.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC sample (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers. ✓

3.6 GC/MS Semivolatiles Data ND ✓

3.6.1 QC Summary 6 levels ✓

3.6.1.1 Surrogate Percent Recovery Summary (Form II-SV) all within limits ✓

% RPD of 2 exclude 4 - blend 4 = Nitrophenol high

3.6.1.2 Matrix Spike/Matrix Spike Duplicate Summary (Form III-SV) % Rec OK ✓

3.6.1.3 QC Check Sample/Standard Form III % Rec OK ✓

3.6.1.4 Method Blank Summary (Form IV-SV) ND covers 8 soils QC soils ✓

2 sets 12/17/98 ; 12/21/98

3.6.1.5 GC/MS Instrument Performance and Mass Calibration (Form V-SV) ✓ ✓

3.6.1.6 Internal Standard Area and RT Summary (Form VIII-SV) ✓ ✓ within limits

3.6.1.7 Instrument Detection Limits NA

3.6.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form I-CLP-SV, including Form I SV-TIC), followed by the raw data for semivolatile samples. These sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples. ✓

for soils 004 005

3.6.2.1 TCL Results - Organic Analysis Data Sheet (Form I-SV-1, SV-2). ✓

Tabulated results (identification and quantitation) of the specified target compounds. ✓

On Form I-SV, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. **NOTE:** Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10. ✓

3.6.2.2 Tentatively Identified Compounds (Form I-SV-TIC) none for both

This form must be included even if no compounds are found. If so, indicate this on the form by entering "0" in the field for "Number found". ✓

3.6.2.3 Reconstructed total ion chromatograms (RIC) for each sample. ✓

RICs must be normalized to the largest nonsolvent component, and must contain the following header information: ✓

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

In all instances where the data system report has been edited, or where manual integration or quantitation has been performed, the GC/MS operator must identify such edits or manual procedures by initialing and dating the changes made to the report. no manual edits

If automated data system procedures are used for preliminary identification and/or quantification of the Target Compound List compounds, the complete data system report must be included in all sample data packages, in addition to the reconstructed ion chromatogram. The complete data system report shall include: ✓

- Sample number ✓
- Date and time of analysis ✓
- RT or scan number of identified TCL compounds ✓
- Ion used for quantitation with measured area ✓
- Copy of area table from data system ✓
- GC/MS instrument ID ✓
- Lab file ID ✓

3.6.2.4 For each sample, by each compound identified, the following shall be included in the data package: ✓

3.6.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.6.2.4.2 Copies of TIC mass spectra associated best-match spectra (three best matches). none found ✓

3.6.2.4.3 GPC chromatograms (if GPC performed). NA

3.6.3 Standards Data

%RRF ≥ 0.05 %RSD ≤ 30% provided 12/17 ✓

3.6.3.1 Initial Calibration Data (Form VI-SV-1, SV-2) - in order by instrument, if more than one ~~instrument~~ used. ✓

3.6.3.1.1 Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.6.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed. ✓

	St. 80	St. 120	St. 160
-pyridine	✓	✓	
-N-nitrosodimethylamine		✓	✓
Ethyl methacrylate	✓	✓	✓
-bis(2-chloroisopropyl)ether	✓	✓	✓
Benzoic acid	?	✓	✓
N-nitroso-di-n-propylamine			

Manual edits pg. 8
8, 391, 392

12/21/9

3.6.3.2	Continuing calibration (Form VII-SV-1, SV-2) - in order by instrument, if more than one instrument used.	✓
3.6.3.2.1	Semivolatile standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations.	✓
3.6.3.2.2	When more than one continuing calibration is performed, forms must be in chronological order, by instrument.	—
3.6.3.3	Internal Standard Area Summary (Form VIII-SV-1, SV-2) in order by instrument, if more than one instrument used.	—
3.6.3.4	Semivolatile GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the semivolatile GPC calibration mixture.	—

3.6.4 Raw QC Data

12/17 12/21

3.6.4.1	DFTPP (for each 12-hour period, for each GC/MS system utilized)	✓
3.6.4.1.1	Bar graph spectrum.	✓
3.6.4.1.2	Mass listing.	✓
3.6.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.6.4.2	Blank Data - in chronological order, by extraction date. **NOTE:** This order is different from that used for samples.	✓
3.6.4.2.1	Tabulated results (Form I-SV-1, SV-2)	✓

3.6.4.2.2	Tentatively Identified Compounds (Form I-SV-TIC) - even if none found.	✓
3.6.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.6.4.2.4	Superfund-TCL spectra with lab generated standard. Provides:	—
•	Raw TCL compound spectra	—
•	Enhanced or background subtracted spectra	—
•	Laboratory generated TCL standard spectra	—
3.6.4.2.5	GC/MS library search spectra for Tentatively Identified Compounds (TIC).	none found ✓
3.6.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	NA
3.6.4.3	Matrix Spike Blank Data Covered by Blank	—
3.6.4.3.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	—
3.6.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are required.	✓
3.6.4.4	Matrix Spike Data No Raw data → MS / MSD not performed in client sample	—
3.6.4.4.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	—
3.6.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	—

3.6.4.5	Matrix Spike Duplicate Data	
3.6.4.5.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds. Form I-SV-TIC <u>not</u> required.	
3.6.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	
3.6.4.6	QC Check Sample/Standard	✓
3.6.4.6.1	Tabulated results (Form I-SV-1, SV-2) of <u>all</u> TCL compounds.	✓
3.6.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS), Spectra are not required.	✓

3.6.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

3.6.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers. ✓

ND for samples 004, 005

3.7 GC/ECD Pesticide/Aroclor Data

3.7.1 QC Summary

3.7.1.1 Surrogate Percent Recovery Summary (Form II-PEST) — within limits

3.7.1.2 Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-PEST) — within limits

3.7.1.3 QC Check Sample/Standard Recovery — 2 samples (duplicate)

3.7.1.4 Method Blank Summary (Form IV-PEST)

3.7.1.5 Instrument Detection Limits — NA

3.7.2 Sample Data

ND

Sample data shall be arranged in packets with the Traffic Report copy, the Organic Analysis Data Sheet (Form I-PEST), followed by the raw data for pesticide samples. The sample packets should then be placed in increasing sample number order, considering both letters and numbers in ordering samples.

3.7.2.1 TCL Results - Organic Analysis Data Sheet (Form I-PEST).

On Form I-PEST, the appropriate concentration units shall be entered. For example, ug/L for water samples or ug/Kg for soil/sediment samples. No other units are acceptable.

NOTE: Report analytical results to two significant figures for all pesticide/PCB samples.

3.7.2.2 Copies of pesticide chromatograms.

All chromatograms must be labeled with the following information.

- Sample number ✓
- Volume injected (ul) ✓
- Date and time of injection ✓
- GC column identification (by stationary phase and internal diameter) ✓
- GC instrument identification ✓
- Positively identified compounds must be labeled with the names of compounds, either directly out from the peak, or on a print-out of retention times if retention times are printed over the peak. No detects ✓

3.7.2.3 Copies of pesticide chromatograms from second GC column confirmation. No detects to confirm

3.7.2.4 GC integration report or data system printout and calibration plots (area vs. concentration) for 4-4'DDT, 4,4'DDD, 4,4'-DDE or toxaphene (where appropriate). NA

3.7.2.5 Manual work sheets. ~~NA~~

3.7.2.6 UV traces from GPC (if GPC performed). NA

3.7.2.7 If pesticide/Aroclors are confirmed by GC/MS, the Laboratory shall submit copies of reconstructed ion chromatograms, raw spectra and copies of background-subtracted mass spectra of Superfund target compounds listed in Exhibit C (Superfund-TCL) that are identified in the sample and corresponding background-subtracted Superfund-TCL standard mass spectra. Compound names must be clearly marked on all spectra. For multicomponent pesticides/Aroclors confirmed by GC/MS, the Laboratory shall submit mass spectra of 3 major peaks of multicomponent compounds from samples and standards. NA

3.7.3 Standards Data 8 levels

3.7.3.1 Initial Calibration of Single Component Analytes (Form VI-PEST-1 and PEST-2) - all GC columns, all instruments, in chronological order by GC column and instrument. ✓

3.7.3.2 Initial Calibration of Multicomponent Analytes (Form VI-PEST-3) - all GC columns, all instruments, in chronological order by GC column and instrument. ✓

3.7.3.3 Analyte Resolution Summary (Form VI-PEST-4) - all GC columns and instruments, in chronological order by GC column and instrument. ✓

3.7.3.4 Calibration Verification Summary (Form VII-PEST-1) - for all Performance Evaluation Mixtures and Instrument blanks, on all GC columns and instruments, in chronological order by GC column and instrument. C. 482 ✓

3.7.3.5 Calibration Verification Summary (Form VII-PEST-2) - for all mid point concentrations of Individual Standard Mixtures A and B and Instrument blanks used for calibration verification, on all GC columns and instruments, in chronological order by GC column and instrument. ✓

3.7.3.6 Analytical Sequence (Form VIII-PEST) - all GC columns and instruments, in chronological order by GC column and instrument. ✓

3.7.3.7 Florisil Cartridge Check (Form IX-PEST-1) - for all lots of cartridges used to process samples in the sample lot. NA

3.7.3.8 Pesticide GPC Calibration (Form IX-PEST-2) - all GPC columns, in chronological order by calibration date. NA

3.7.3.9 Pesticide Identification Summary for Single Component Analytes (Form X-PEST-1) - for all samples with positively identified single component analytes, In order by increasing sample number. ✓

3.7.3.10 Pesticide Identification Summary for Multicomponent Analytes (Form X-PEST-2) - for all samples positively identified multicomponent analytes, in order by increasing sample number. ✓

3.7.3.11 Chromatograms and data system printouts are required for all standards including the following:

- Resolution Check Mixture.
- Performance Evaluation Mixtures, all.
- Individual Standard Mixture A, at three concentrations, each initial calibration.
- All multicomponent analytes (Toxaphene and Aroclors), each initial calibration.
- All mid point concentrations of Individual Standard Mixtures A and B used for calibration verification.
- Florisil cartridge check solution, all lots. NA
- Pesticide GPC Calibration Check Solution, all calibrations relating to samples in the lot number. NA
- All multicomponent analyte standards analyzed for confirmation.

3.7.3.12 A printout of retention times and corresponding peak areas or peak heights must accompany each chromatogram. In addition, all chromatograms are required to be labeled with the following:

- Sample Number for the standard.
- Label all standard peaks for all individual compounds either directly out from the peak or on the printout of retention times if retention times are printed over the peak.
- Total nanograms injected for each standard.

- Date and time of injection. ✓
- GC column identification (by stationary phase and internal diameter). ✓
- GC instrument identification. ✓

3.7.3.13 Pesticide GPC Calibration Data - UV detector traces showing peaks that correspond to the compounds in the pesticide GPC calibration mixture. NA

3.7.4 Raw QC Data ND ✓

3.7.4.1 Blank Data - in chronological order, by type of blank (method, instrument, sulfur cleanup). **NOTE:** This order is different from that used for samples. ✓

3.7.4.1.1 Tabulated results (Form I-PEST). ✓

3.7.4.1.2 Chromatogram(s) and data system printout(s) (GC) for each GC column and instrument used for analysis. ✓

3.7.4.2 Matrix Spike Data — Covered by Lab Client MS ✓

3.7.4.2.1 Tabulated results (Form I-PEST) of all TCL compounds. ✓

3.7.4.2.2 Chromatogram(s) and data system printout(s) (GC). ✓

3.7.4.3 Matrix Spike Duplicate Data — Covered by Lab Client MSD ✓

3.7.4.3.1 Tabulated results (Form I-PEST) of all TCL compounds. ✓

3.7.4.3.2 Chromatogram(s) and data system printout(s) (GC). ✓

3.7.4.4	Matrix Spike Blank Data	
3.7.4.4.1	Tabulated results (Form I-PEST) of all TCL compounds.	
3.7.4.4.2	Chromatogram(s) and data system printout(s) (GC).	
3.7.4.5	QC Check Sample/Standard	
3.7.4.5.1	Tabulated results (Form I-PEST) of all TCL compounds.	
3.7.4.5.2	Chromatogram(s) and data system printout(s) (GC).	

3.7.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula.

3.7.6 Copy of Extraction Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. matrix spike, matrix spike duplicate, matrix spike blank) correspond to each batch extracted, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) final volumes and vial identification numbers.

3.9 Inorganic Data

Sample data shall be submitted with the Inorganic Analysis Data Reporting Forms for all samples in the sample lot arranged in increasing alphanumeric sample number order, followed by the QC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs.

3.9.1 Results – Inorganic Analysis Data Sheet (Form I-IN)

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I-IN. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid sample must be reported on a dry weight basis. Analytical results must be reported to two significant figures if the result value is less than 10; to three significant figures if the value is greater than or equal to 10. Results for percent solids must be reported to one decimal place.

3.9.2 Quality Control Data

3.9.2.1 Initial and Continuing Calibration Verification [FORM II-IN (Part 1)]

3.9.2.2 CRDL Standard for AA and Linear Range Analysis for ICP [FORM II-IN (PART 2)]

3.9.2.3 Blanks [FORM III-IN]

3.9.2.4 ICP Interference Check Sample [FORM IV-IN]

3.9.2.5 Spike Sample Recovery [FORM V-IN (PART 1)]

3.9.2.6 Post Digest Spike Sample Recovery [FORM V-IN (PART 2)] NA - spike sample Rec within limit

3.9.2.7 Duplicates [FORM VI-IN] of sample 004 ± 20% criteria used % RPD ✓

3.9.2.8 Quality Control Sample [FORM VII-IN] less than ±20% Recovery ✓

3.9.2.9 Standard Addition Results [FORM VIII-IN] No result indicated "S" or "+" in Form I NA

3.9.2.10 ICP Serial Dilutions [FORM IX-IN] less than 10x IDL ✓

3.9.2.11 Holding Times [FORM X-IN] Form Not provided Holding time OK ✓

3.9.3 Verification of Instrument Parameters

3.9.3.1 Instrument Detection Limits (Semiannually) [FORM XI-IN] CRDL ≥ IDL OK ✓

3.9.3.2 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 1)] ✓

3.9.3.3 ICP Interelement Correction Factors (Annually) [FORM XII-IN (PART 2)] ✓

3.9.3.4 ICP Linear Ranges (Quarterly) [FORM XIII-IN] ✓

(Note that copies of Verification of Instrument Parameters forms for the current quarter must be submitted with each data package.)

3.9.4 Raw Data ✓

For each reported value, the Laboratory shall include in the data package all raw data from the instrument used to obtain that value. This applies to all required QA/QC measurements, instrument standardization, as well as sample results. This statement does not apply to the Verifications of Instrument Parameters submitted as part of each

data package. Raw data must contain all instrument readouts used for the sample results, including those readouts that may fall below the IDL. All AA and ICP instruments must provide a legible hard copy of the direct real-time instrument readout (i.e., stripcharts, printer tapes, etc.) A photocopy of the direct sequential instrument readout must be included. A hardcopy of the instrument's direct instrument readout for cyanide must be included if the instrumentation has the capability.

The order of raw data in the data package shall be: ICP, Flame AA, Furnace AA, Mercury, and Cyanide. All raw data shall include intensities (ICP) and absorbances with concentration units for flame AA, furnace AA, Mercury and Cyanide. All flame and furnace AA data shall be grouped by element.

Raw data must be labeled with sample number and appropriate codes, to unequivocally identify:

3.9.4.1 Calibration standards, including source and prep date.

3.9.4.2 Initial and continuing calibration blanks and preparation blanks.

3.9.4.3 Initial and continuing calibration verification standards, interference check samples, ICP serial dilution samples, CRDL Standard for ICP and AA, Laboratory Control Sample and Post Digestion Spike.

3.9.4.4 Diluted and undiluted samples and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.9.4.5 Duplicates.

3.9.4.6 Spikes (indicating standard solutions used, final spike concentrations, volumes involved). If spike information (source, concentration, volume) is consistent for a given sample lot, a general statement outlining these parameters is sufficient.

3.9.4.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation. ✓

3.9.4.8 All information for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and intercepts of linear fit, final sample concentration (standard addition concentration), and type of background correction used: BS for Smith-Heiftje, BD for deuterium Arc, or BZ for Zeeman. all ICP only

3.9.4.10 Integration times for AA analyses. NA

3.9.5 Digestion Logs ✓

Logs shall be submitted in the following order: digestion logs for ICP, flame AA, furnace AA and mercury preparation, followed by a copy of the distillation log for cyanide. These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e. laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable. ✓

3.10 Wet-Chemical Data

Sample data shall be submitted with the Conventional Analysis Data Reporting Forms for all sample in the SDG, arranged in increasing sample number order, followed by the ZC analyses data, Quarterly Verification of Instrument Parameters forms, raw data, and copies of the digestion and distillation logs. ✓

Sample I.D.	001	002	003	004	005	006	009
Dilution Factor Chloride	4	2	1		4	4	4
Nitrate	1	1	1		1	1	1
Sulfate	1	4	1		1	1	1
TOC	1	1	1		1	1	1
CN	1	1	1				

3.10.1 Results – Wet-Chemical Analysis Data Sheet

Tabulated analytical results (identification and quantitation) of the specified analytes.

Appropriate concentration units must be specified and entered on Form I. The quantitative values shall be reported in units of micrograms per liter (ug/L) for aqueous samples and milligrams per kilogram (mg/kg) for solid samples. No other units are acceptable. Results for solid samples must be reported on a dry weight basis.

3.10.2 Quality Control Data

3.10.2.1 Initial and Continuing Calibration Verification

3.10.2.2 CRQL Standard for Wet-Chemical Analysis

3.10.2.3 Blanks ND

3.10.2.4 Spike Sample Recovery MS/MSD for total CN also

%Rec %RPD

OK

3.10.2.5 Post Digest Spike Sample Recovery

NA ↑ within limits

3.10.2.6 Duplicates

3.10.2.7 Laboratory Control Sample 1 1 total CN also

%Rec OK

3.10.2.8 Holding Times OK

3.10.3 Raw Data

For each reported value, the Laboratory shall included in the data package all raw data from the instrument used to obtain that value and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters).

Raw data must be labeled with the sample number to unequivocally identify:

3.10.3.1 Calibration standards, including source and prep date.

3.10.3.2 Initial and continuing calibration blanks and preparation blanks.

3.10.3.3 Initial and continuing calibration verification standards.

3.10.3.4 Diluted and undiluted samples (by sample number) for all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights, and dilutions are consistent for all samples in a given sample lot, a general statement outlining these parameters is sufficient).

3.10.3.5 Duplicates.

3.10.3.6 Spikes (indicating standard solutions used, final spike concentration, volumes involved).

3.10.3.7 Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.

3.10.3.8 Time and date of each analysis. Instrument run logs can be submitted if they contain this information.

3.10.4 Digestion and Distillation Logs

These logs must include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.

Data Usability Summary Report:

Lot # A9B100136
Lot # A9B030175

Shield Environmental Associates, Inc.
4225 Northern Pike, Suite 101
Monroeville, Pennsylvania 15146

August 1999

1.0 Overview

1.1 General Description of Analytical Program and Results

This data usability summary report pertains to two consecutively analyzed sample lots, #A9B100136 and #A9B030175, for four water samples and two trip blanks (water) collected at the DII Binghamton Plastics facility. All of the water samples were analyzed for the following constituents from the site-specific parameter list (SSPL):

- Tetrachloroethene
- Trichloroethene
- 1,1,1-Trichloroethane
- 1,1-Dichloroethene
- 1,2-Dichloroethene (cis- and trans-)
- 1,2-Dichloroethane

The analytical program is summarized in Table 1, and the general findings are discussed below. The Quanterra laboratory numbers (001, 002, etc.) are referenced in the following discussions.

Volatile Organic Compounds (VOCs)

Tetrachloroethene, trichloroethene, 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene were detected in samples in these lots, with 1,1,1-trichloroethane most frequently detected. The highest concentration of 1,1,1-trichloroethane, up to 620 micrograms per liter (ug/L), was reported in sample 001 in Lot #A9B130136. However, the highest VOC concentration was reported for trichloroethene, up to 8,200 ug/L, in the same sample, 001, in Lot #A9B130136. Tentatively Identified Compounds (TICs) were not reported for any of the samples in this sample lot.

1.2 Quality Control Problems or Deficiencies

The quality control (QC) deviations in these sample lots were:

- The cooler temperature was low, less than 1°C. However, there was no report of cracked or frozen sample containers, therefore the quality of the samples was not compromised.
- The trip blank sample for Lot #A9B100136, sample 002, was received in the laboratory with bubbles. The trip blank sample results are rejected and qualified as "R."
- The case narrative for Lot #A9B100136 did not indicate the presence of bubbles in the sample 002.

1.3 Recommendations

The trip blank samples prepared in the laboratory should be checked for bubbles before shipment to the client. Also, the case narrative should indicate the presence of bubbles in the sample upon receiving.

2.0 Completeness of Data Package

The data package was complete. No VOC MS/MSD raw data were provided, because no client samples were used for MS/MSD analysis.

3.0 Compliance with Holding Times and Sample Preservation

All VOC samples were analyzed within the required 7-day holding time upon the verified time of the sample receipt.

The cooler receipts indicated that coolers temperatures upon receipt were 0.1 °C, below the Contract Laboratory Program (CLP) range of 4 °C ± 2 °C.

4.0 QC Data

4.1 Blanks

The trip blank sample for Lot #A9B100136 (sample 002) was received with bubbles, therefore the results (listed as "U" for undetectable) were qualified as "R."

One VOC method blank was run with sample Lot #A9B100136 and two VOC method blanks were analyzed with sample Lot #A9B030175 for SSPL VOC analysis. No SSPL constituents were detected in either method blank. TICs were not reported.

4.2 MS/MSDs

There was no laboratory MS/MSD pair run for VOCs for the samples in Lot #A9B100136. An LCS/LCSD pair was run for Lot #A9B100136 instead of an MS/MSD pair. Two pairs of MS/MSDs were analyzed for VOC for the samples in Lot #A9B030175. Spike recoveries and relative percent differences (RPDs) were within QC limits for both MS/MSD pairs.

4.3 Surrogate Recoveries

The VOC surrogate recoveries for all sample lots were within QC limits, excluding one of the MS/MSD samples for Lot #A9B030175. However, since the laboratory control samples were within QC limits, no qualifying action was taken.

4.4 Laboratory Control Samples

A pair of VOC check samples for Lot #A9B100136 and single check sample for VOC for Lot #A9B030175 were within control limits.

4.5 Other QC Data

Other QC data provided for VOCs, including calibration standards, calibration verification, and instrument tuning, indicate that analyses were performed in accordance with acceptable laboratory protocols. There were minor deviations seen per CLP recommendations in initial and continuing calibration for VOCs (% RSD, % D, and RRF); however, not for reported compounds.

5.0 Analytical Methods

The samples were analyzed as per the quality assurance project plan (QAPP) by Volatile Organics by Gas Chromatograph/Mass SW846 8260A as specified in SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," Third Edition, November 1986 and its updates.

6.0 Comparison of Raw Data to Summary Reports

For detected compounds in samples, or surrogates, for those samples where no VOCs were detected, raw data results were checked against the summary reports by plugging the values in the data printouts into the formulas provided.

7.0 Data Qualifiers

Data qualifiers that have been placed by the laboratory for VOC results that are greater than the method detection limit but below the reporting limit are flagged with "J," for estimated.

Data qualifiers that have been added, based on the data review process, are for Lot #A9B100136, sample 002, the trip blank results (all reported as nondetectable). The results are qualified as "R" for rejected, due to presence of bubbles upon receiving in the laboratory.

Table 1
Analytical Summary
Lot #A9B100136
Lot #A9B030175

Shield Sample No.	Shield Sample Identification	Laboratory Work Order and Sample No.	SSPL
Lot #A9B100136			
BP055	DMW1 - water	CQMX0 001	x
BP056	Trip Blank - water	CQMXW 002	x
Lot #A9B030175			
BP051	MH282 - water	CQG66 001	x
BP052	CB342 - water	CQG6E 002	x
BP053	CB045 - water	CQG6F 003	x
BP054	Trip Blank - water	CQG6H 004	x

SHIELD ENVIRONMENTAL ASSOC.INC.

COPY

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) WATER
Method: SW846 8260A
Volatile Organics, GC/MS (8260A)

Lab Sample ID:A9B100136 002

7/23/99

Sample WT/Vol: 5 / mL
Work Order: CQMXW101
Dilution factor: 1
Moisture %:NA

Date Received: 02/10/99
Date Extracted:02/12/99
Date Analyzed: 02/12/99

QC Batch: 9045104

Client Sample Id: BP056 TRIP BLANK

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q	
71-55-6	1,1,1-Trichloroethane	5.0	~~U~~	R
75-34-3	1,1-Dichloroethane	5.0	~~U~~	R
75-35-4	1,1-Dichloroethene	5.0	~~U~~	R
75-00-3	Chloroethane	10	~~U~~	R
156-59-2	cis-1,2-Dichloroethene	2.5	~~U~~	R
127-18-4	Tetrachloroethene	5.0	~~U~~	R
156-60-5	trans-1,2-Dichloroethene	2.5	~~U~~	R
79-01-6	Trichloroethene	5.0	~~U~~	R
75-01-4	Vinyl chloride	10	~~U~~	R

Lot # 498100136
Samples 055, 056

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package.

Not included in SDG
It should have noted the trip blank was received with bubble Results of trip Blank "R"

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists).

Not included in SDG: labels smeared ~~not~~ and identification not corresponding with COC. Corrected

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated.

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order.

3.3 NYSDEC Data Package Summary Forms

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG. ✓

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

3.5.1.1	System Monitoring Compound Summary	Surrogate recovery - Form II	all in limits
3.5.1.2	Matrix Spike/Matrix Spike Duplicate Summary		
3.5.1.3	QC Check Sample/Standard	Form III	all in limits
3.5.1.4	Method Blank Summary	Form IV	all samples covered

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5	GC/MS Instrument Performance Check	Form V - 2 provided covers samples + standards + method blank	relative abundance all w/in % limits

BFB in chronological order; by instrument.

3.5.1.6	Instrument Detection Limits		FOR SSBL analysis- not required

VOA Internal Standard area Summary Form VIII VOA organics- all within limits

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples. NA ✓

Dilution factors
055 - DMW1-6W 71.42
056 - TRIP BLANK 1

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA).

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

On Form 1-~~VOA~~, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found."

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract.

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). NA

Calibration history

Initial 2 sets | 5 levels %RSD ≤ 30% 2 sets Continuing % 0 within limits
2 dates RRF ≥ 0.05
2/4/99
2/12/99 outside limits for 4 compounds not reported

3.5.3 Standards Data

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. ✓

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

Continuing calib. 2 sets 2/4/99 %D within limits ± 25%
2/12/99 RRF ≥ 0.05 excluding 1,4-Dioxane

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. ✓

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

2 sets % relative abundance within limits ✓

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples.	1 set 2/12/99
3.5.4.2.1	Tabulated results (Form I-VOA).	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	NA
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	NA ✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	✓
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	NA
	Covered by these samples (BS)	
3.5.4.3	Matrix Spike Blank Data	—
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	—
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	—

3.5.4.4	Matrix Spike Data	—
3.5.4.4.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds. Form I-VOA-TIC is <u>not</u> required.	—
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓
3.5.4.5	Matrix Spike Duplicate Data	—
3.5.4.5.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	—
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	—
3.4.5.6	QC Check Sample/Standard 2 Samples	—
3.5.4.6.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. 1 Chem for Soyle ✓

Formula DF x Amt x 1/VO
Sample 001 DF = 1 VO = 0.07
1 x 576.30 x 1/0.07 = 8232.85 ✓ For TCE

A9B030175
Samples 51, 52, 53, 54

Analytical Services Protocol (ASP)
Category B Checklist

3.1 SDG Narrative

Lab MS/MSD QC raw data not provided
Surrogate recovery ✗ for MS/MSD out of range

This document shall be clearly labeled "SDG Narrative" and shall contain: Laboratory name; Case number; Sample Delivery Group number (SDG); sample numbers in the SDG, differentiating between initial analyses and re-analyses; Contract number; and detailed documentation of any quality control, sample, shipment and/or analytical problems encountered in processing the samples reported in the data package. ✓

The Laboratory must also include any problems encountered: both technical and administrative, corrective actions taken, and resolution and an explanation for all flagged edits (i.e., manual edits on quantitation lists). ✓

Additionally, the SDG Narrative itself must be signed in original signature by the Laboratory Manager or his designee and dated. ✓

3.2 Lab Sample Information Sheets

A copy of the Lab Sample Information Sheets (LSIS) for all of the samples in the SDG. The LSIS shall be arranged in increasing sample number order. ✓

3.3 NYSDEC Data Package Summary Forms

✓

3.4 Chain-of-Custody Forms

Copies of both the external and internal chain-of-custody sheets for all samples within the SDG. ✓

3.5 GC/MS Volatiles Data

3.5.1 QC Summary

Surrogate recovery Form II

3.5.1.1 System Monitoring Compound Summary — all in limits excluding MSD/MS surrogate 02. → out of limit recovered within limit

3.5.1.2 Matrix Spike/Matrix Spike Duplicate Summary — 2 pairs 2 pairs

3.5.1.3 QC Check Sample/Standard — 2 pairs — all in limits

3.5.1.4 Method Blank Summary — 2 pairs — all samples covered

(If more than a single form is necessary, forms must be arranged in chronological order by date of analysis of the blank, by instrument.)

3.5.1.5 GC/MS Instrument Performance Check — Forms V - provided 3 covering all samples ✓ Relative % Abundance within limits

BFB in chronological order; by instrument.

3.5.1.6 Instrument Detection Limits — N/A all within limits

Internal Standard Summary - Form VIII provided 2 covering LCS, Blank, ✓ samples

3.5.2 Sample Data

Sample data shall be arranged in packets with the Organic Analysis Data Sheet (Form 1-VOA, including Form 1-VOC-TIC), followed by the raw data for volatile samples. ✓

↑ N/A

Dilution Factor 1 for all samples

3.5.2.1 TCL Results - Organic Analysis Data Sheet (Form 1-VOA).

Tabulated results (identification and quantitation) of the specified target compounds. The validation and release of these results is authorized by a specific, signed statement in the SDG Narrative (Paragraph 3.1). In the event that the Laboratory Manager cannot validate all data reported for each sample, the Laboratory Manager shall provide a detailed description of the problems associated with the sample in the SDG Narrative.

On Form 1-VOA, the appropriate concentration units shall be entered. For example, µg/L for water samples or µg/Kg for soil/sediment samples. No other units are acceptable. NOTE: Report analytical results to one significant figure if the value is less than 10; to two significant figures above 10.

3.5.2.2 Tentatively Identified Compounds (Form 1-VOA-TIC).

This form must be included even if no compounds are found. If so, indicate this on the form by entering "O" in the field for "Number found."

NA

3.5.2.3 Reconstructed Total Ion Chromatograms (RIC) for each sample or sample extract.

RICs must be normalized to the largest non-solvent component and contain the following header information :

- Sample number
- Date and time of analysis
- GC/MS instrument ID
- Lab file ID

3.5.2.4 For each sample, by each compound identified, the following shall be included in the data package:

3.5.2.4.1 Copies of raw spectra and copies of background-subtracted mass spectra of target compounds that are identified in the sample and corresponding background-subtracted TCL standard mass spectra. ✓

3.5.2.4.2 Copies of mass spectra of TIC organic compounds with associated best-match spectra (three best matches). NA

3.5.3 Standards Data

Calibration History 3 sets 1/14-2/3 initial also 2/4 2/4

average RSD% 11 RRF for 2 compound (not SSPL) lower ≤ 0.05% Isobutanol 1,4-Dioxan

3.5.3.1 Initial Calibration Data (Form IV-VOA) - in order by instrument if more than one instrument used. ✓

3.5.3.1.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for the initial calibration. ✓

3.5.3.1.2 All initial calibration data that pertain to samples in the data package must be included, regardless of when it was performed and for which case. When more than one initial calibration is performed, the data must be put in chronological order, by instrument. ✓

Continuing 2/8 2/9

%D within limits if RRF within limits excluding 1-4 Dioxane (Not in SSPL)

3.5.3.2 Continuing Calibration (Form VII-VOA) - in order by instrument, if more than one instrument used. ✓

3.5.3.2.1 VOA standard(s) reconstructed ion chromatograms and quantitation reports (or legible facsimile) for all continuing (12 hour) calibrations. ✓

3.5.3.2.2 When more than one continuing calibration is performed, forms must be in chronological order, within fraction and instrument. ✓

3.5.4 Raw QC Data

3.5.4.1 BFB (for each 12-hour period, for each GC/MS system utilized). ✓

3 sets % relative abundance within limits

3.5.4.1.1	Bar graph spectrum.	✓
3.5.4.1.2	Mass listing.	✓
3.5.4.1.3	Reconstructed total ion chromatogram (RIC).	✓
3.5.4.2	Blank Data - in chronological order. NOTE: This order is different from that used for samples. 2 sets	
3.5.4.2.1	Tabulated results (Form I-VOA).	✓
3.5.4.2.2	Tentatively Identified Compounds (Form I-VOA-TIC) - even if none found.	NA
3.5.4.2.3	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (BC/MS).	✓
3.5.4.2.4	TCL spectra with lab generated standard.	✓
3.5.4.2.5	GC/MS library search spectra for tentatively Identified Compounds (TIC).	NA
3.5.4.2.6	Quantitation/Calculation of Tentatively Identified Compound(s) (TIC) concentrations.	NA
3.5.4.3	Matrix Spike Blank Data Covered by Method blank	
3.5.4.3.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds.	
3.5.4.3.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	

Raw QC MS/MSD data Not provided

3.5.4.4	Matrix Spike Data	
3.5.4.4.1	Tabulated results (Form I-VOA) of <u>all</u> TCL compounds. Form I-VOA-TIC is <u>not</u> required.	
3.5.4.4.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	
3.5.4.5	Matrix Spike Duplicate Data	
3.5.4.5.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	
3.5.4.5.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	
3.4.5.6	QC Check Sample/Standard 2 sets	✓
3.5.4.6.1	Tabulated results (Form I-VOA) of <u>all</u> TCL Compounds. Form I-VOA-TIC is <u>not</u> required.	✓
3.5.4.6.2	Reconstructed ion chromatogram(s) and quantitation report(s) or legible facsimile (GC/MS).	✓

3.5.5 Copy of Calculations

The Laboratory must provide a copy of the calculations work sheet showing how final results are obtained from values printed on the quantitation report. If manipulations are performed by a software package, a copy of the formula used must be supplied as well as values for all terms in the formula. ✓

See back

Formule Aut x DF x 1/Vo

Lot # A9E 0175

Sample	Compound	DF	Vo	Conc. on column	Final
001	1,1,1 Trichloroethane	1	5	17.68	3.53 ✓
002	PCE	1	5	13.33	2.66 ✓
003	TCE	1	5	83.98	16.79 ✓

APPENDIX G

AIR CONCENTRATION CALCULATIONS

Dii Binghamton, New York
Data Input Values

Chemical	VP	MW	$Di_{(a)}$	Kd	H	Sol	Conc
PCE	14	165.8	0.072	1.6	0.018	200	0.185
TCE	58	131.4	0.079	0.57	0.010	110	0.024
cis 1,2-DCE	400	96.94	0.074	0.21	0.0041	3500	0.012
1,1-DCA	182	99	0.074	0.32	0.0056	5100	0.024
1,1,1-TCA	100	133.4	0.078	0.81	0.017	1300	0.025

VP = Vapor Pressure (mm/Hg)
MW = Molecular weight (g/mole)
$Di_{(a)}$ = Diffusion coefficient (cm^2/sec)
Kd = Soil water partition coefficient (g/cm^3)
H = Henrys Law constant ($atm\text{-}m^3/mol$)
Sol = Solubility (mg/L-water)
Conc = Concentration (mg/kg)

Area of concern = 80' x 160'
Soil moisture = 11 %
Soil temperature = 70°F
Depth of Soil cover = 2'

Location:	**Dii Binghamton, New York**
Chemical	**1,1,1-TCA**

Parameter	Definition	Entered Value
K_d	soil water partition coefficient ^	0.81
s	solubility (mg/L-water)^	1300
n_m	soil moisture content, expressed as a weight fraction*	0.11
Θ_m	soil moisture content, expressed as L-water/kg-soil**	0.11

Soil Saturation Concentration

$$C_{sat} = (K_d \times s \times n_m) + (s \times \Theta_m)$$

C_{sat} = 258.83

* from analytical from Quanterra

^ from literature

** calculated

chemical concentration = **0.025** mg/kg

Emission Rate Calculation for: **PCE**

for concentrations > Csat

Parameter	Definition	Entered Value
E_i	Emission rate of component i (g/s)	
$D_{i(a)}$	Diffusion coefficient of component i in air (cm^2/sec)	0.078
C_{si}	Saturation vapor concentration of component i.	0.000726959
A	Exposed area of contamination (cm^2) use 80' x 160'	11892326.4
P_t	Total soil porosity (unitless)	0.35
M_i	Mole fraction of component i in the waste (gmole/gmole)	2.9985E-08
d_{sc}	Effective depth of soil cover (cm) 2 '	60.957

$$E_i = D_i \times C_{si} \times A \times (P_t^{4/3}) \times (M_i/d_{sc})$$

E_i = 8.18E-08 grams per second

6.88E-11 grams per second-m^2

Where:

$$Csi = \frac{p\ MW_i}{R\ T}$$

Parameter	Definition	Entered Value
p	Vapor pressure of the chemical i (mm Hg)	100
R	Molar gas constant (62,361 mm Hg-cm^3 / mole- K)	62361
T*	Absolute temperature of waste (in situ) (K)	294.26
MW_i	Molecular weight of component i (g/mole)	133.4

Csi = 0.000727

degree F 70 estimated

Where:

$$P_t = 1 - B / p$$

Parameter	Definition	Entered Value
B	Soil bulk density (g/cm^3)	
p	Particle density (g/cm^3)	2.65

P_t = 0.35 default number

Location: **Dii Binghamton, New York**
Chemical **1,1,1-TCA**

Emission Rate Calculation for: **1,1,1-TCA**

This scenario assumes all contamination to be in solution with the soil moisture and adsorbed to soil particles within the soil matrix

for concentrations < Csat

Parameter	Definition	Entered Value	
E_i	Emission rate of component i (g/s)		
D_{ei}	Effective diffusivity of component i in air (cm^2/sec)	0.055161626	
C_i	Bulk soil concentration of component i in g/g	0.000000025	
A	Exposed area of contamination (cm^2)	11892326.4	
K_{as}	Soil air partition coefficent g/cm^3	0.860493827	
t	Exposure interval (s= exposure time X exposure frequency x exposure duration in seconds)	790000000	s = 1 year
ε	soil porosity (dimensionless) ($\varepsilon = P_t$ for dry soil or P_a when soil is more often wet than dry	0.35	

$$E_i = \frac{A \times 2 \times D_{ei} \times \varepsilon \times K_{as} \times C_i}{\sqrt{pi \times sigma \times t}}$$

CALCULATED VALUES

D_{ei}	effective diffusivity (cm^2/s) = $D_i \times \varepsilon^{0.33}$	0.055161626
K_{as}	soil/air partition coefficient (g soil/cm^3 air) = $(H/K_d) \times 41$ where 41 is a units conversion factor	0.860493827
sigma		0.008209422

$$sigma = \frac{D_{ei} \times \varepsilon}{\varepsilon + (p) \times (1 - \varepsilon)/K_{as}}$$

$D_{i(a)}$	molecular diffusivity (cm^2/s)	0.078
H	Henrys law constant (atm-m^3/mol)	0.017
Kd	soil water partition coeffcient	0.81

E_i =	9.701757E-10	grams per second
	8.157997E-17	grams per second-m^2

Location: **Dii Binghamton, New York**
Chemical **1,1,1-TCA**

CONVERSION OF 1 HOUR AVG CONCENTRATIONS TO ANNUAL AVERAGES
Using the Air/Superfund Guidance: Predictive Baseline Emissions for Superfund Sites
EPA 450/1-92-002
Page 33, item E

Given the highest concentration is found at 38 meters, and that the longest side is 48 meters, then it is possible that the receptor can be located within the source area.

Area Dimensions:	X =	48.76 meters
	Y =	24.38 meters

Total source area emissions: Qt

conc < Csat 9.701757E-10

Step 1: Determine the natural log of the horizontal dimension

x = 106.68

ln (x) = 3.89

Step 2: Enter the value from step 1into the following equation.

$$\ln(C/Qt) = 13.0 - 0.261x \ln(x) - 0.241x (\ln(x))^2 + 0.0124 x (\ln(x))^3$$

ln(C/Qt) = 9.072645

Step 3: Take the value from 2 to produce the normalized concentration

$$C/Qt = e^{\ln(C/Qt)}$$

C/Qt = 8713.643

Step 4: Multiply the normalized concentration by the emission rate to produce the long term (annual average) concentration in ug/m^3

$$C = (C/Qt) \times Qt$$

C = **8.45E-06** ug/m^3

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Dii-Binghamton,New York-1,1,1-TCA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.815700E-16
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	48.7680
LENGTH OF SMALLER SIDE (M)	=	24.3840
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.3112E-09	6	1.0	1.0	10000.0	.00	20.
100.	.3162E-09	6	1.0	1.0	10000.0	.00	0.
200.	.9873E-10	6	1.0	1.0	10000.0	.00	1.
300.	.4850E-10	6	1.0	1.0	10000.0	.00	0.
400.	.2944E-10	6	1.0	1.0	10000.0	.00	1.
500.	.2012E-10	6	1.0	1.0	10000.0	.00	3.
600.	.1486E-10	6	1.0	1.0	10000.0	.00	0.
700.	.1153E-10	6	1.0	1.0	10000.0	.00	2.
800.	.9292E-11	6	1.0	1.0	10000.0	.00	3.
900.	.7706E-11	6	1.0	1.0	10000.0	.00	3.
1000.	.6535E-11	6	1.0	1.0	10000.0	.00	3.
1100.	.5642E-11	6	1.0	1.0	10000.0	.00	3.
1200.	.4943E-11	6	1.0	1.0	10000.0	.00	3.
1300.	.4383E-11	6	1.0	1.0	10000.0	.00	0.
1400.	.3927E-11	6	1.0	1.0	10000.0	.00	0.
1500.	.3547E-11	6	1.0	1.0	10000.0	.00	0.
1600.	.3228E-11	6	1.0	1.0	10000.0	.00	1.
1700.	.2957E-11	6	1.0	1.0	10000.0	.00	0.
1800.	.2725E-11	6	1.0	1.0	10000.0	.00	0.
1900.	.2524E-11	6	1.0	1.0	10000.0	.00	2.
2000.	.2348E-11	6	1.0	1.0	10000.0	.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

38.	.8579E-09	6	1.0	1.0	10000.0	.00	15.

****

*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
35.	.8491E-09	6	1.0	1.0	10000.0	.00	17.
36.	.8547E-09	6	1.0	1.0	10000.0	.00	17.
37.	.8578E-09	6	1.0	1.0	10000.0	.00	15.
38.	.8579E-09	6	1.0	1.0	10000.0	.00	18.
39.	.8560E-09	6	1.0	1.0	10000.0	.00	19.
40.	.8519E-09	6	1.0	1.0	10000.0	.00	20.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.8579E-09	38.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Location:	**Dii Binghamton, New York**
Chemical	**1,1-DCA**

Parameter	Definition	Entered Value
K_d	soil water partition coefficient ^	0.32
s	solubility (mg/L-water)^	5100
n_m	soil moisture content, expressed as a weight fraction*	0.11
Θ_m	soil moisture content, expressed as L-water/kg-soil**	0.11

Soil Saturation Concentration

$C_{sat} = (K_d \times s \times n_m) + (s \times \Theta_m)$

C_{sat} = 740.52

* from analytical from Quanterra

^ from literature

** calculated

chemical concentration = **0.024** mg/kg

Emission Rate Calculation for: PCE

for concentrations > Csat

Parameter	Definition	Entered Value
E_i	Emission rate of component i (g/s)	
$D_{i(a)}$	Diffusion coefficient of component i in air (cm^2/sec)	0.074
C_{si}	Saturation vapor concentration of component i.	0.000981885
A	Exposed area of contamination (cm^2) use 80' x 160'	11892326.4
P_t	Total soil porosity (unitless)	0.35
M_i	Mole fraction of component i in the waste (gmole/gmole)	3.87879E-08
d_{sc}	Effective depth of soil cover (cm) 2 '	60.957

$E_i = D_i \times C_{si} \times A \times (P_t^{4/3}) \times (M_i/d_{sc})$

E_i = 1.36E-07 grams per second

1.14E-10 grams per second-m^2

Where:

$$Csi = \frac{p\ MW_i}{R\ T}$$

Parameter	Definition	Entered Value
p	Vapor pressure of the chemical i (mm Hg)	182
R	Molar gas constant (62,361 mm Hg-cm^3 / mole- K)	62361
T*	Absolute temperature of waste (in situ) (K)	294.26
MW_i	Molecular weight of component i (g/mole)	99

Csi = 0.000982

degree F 70 estimated

Where:

$P_t = 1 - B / p$

Parameter	Definition	Entered Value
B	Soil bulk density (g/cm^3)	
p	Particle density (g/cm^3)	2.65

P_t = 0.35 default number

Location: **Dii Binghamton, New York**
Chemical **1,1-DCA**

Emission Rate Calculation for: **1,1-DCA**

This scenario assumes all contamination to be in solution with the soil moisture and adsorbed to soil particles within the soil matrix

for concentrations < Csat

Parameter	Definition	Entered Value	
E_i	Emission rate of component i (g/s)		
D_{ei}	Effective diffusivity of component i in air (cm^2/sec)	0.052332824	
C_i	Bulk soil concentration of component i in g/g	0.000000024	
A	Exposed area of contamination (cm^2)	11892326.4	
K_{as}	Soil air partition coefficent g/cm^3	0.7175	
t	Exposure interval (s= exposure time X exposure frequency x exposure duration in seconds)	790000000	s = 1 year
E	soil porosity (dimensionless) ($E = P_t$ for dry soil or P_a when soil is more often wet than dry	0.35	

$$E_i = \frac{A \times 2 \times D_{ei} \times E \times K_{as} \times C_i}{\sqrt{pi \times sigma \times t}}$$

CALCULATED VALUES

D_{ei}	effective diffusivity (cm^2/s) = $D_i \times E^{0.33}$	0.052332824
K_{as}	soil/air partition coefficient (g soil/cm^3 air) = (H/K_d) x 41 where 41 is a units conversion factor	0.7175
sigma		0.006658854

$$sigma = \frac{D_{ei} \times E}{E + (p) \times (1 - E)/K_{as}}$$

$D_{i(a)}$	molecular diffusivity (cm^2/s)	0.074
H	Henrys law constant (atm-m^3/mol)	0.0056
Kd	soil water partition coeffcient	0.32

E_i =	9.083348E-10	grams per second
	7.637991E-17	grams per second-m^2

Location: **Dii Binghamton, New York**
Chemical **1,1-DCA**

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Given the highest concentration is found at 38 meters, and that the longest side is 48 meters, then it is possible that the receptor can be located within the source area.

Area Dimensions: X = 48.76 meters
Y = 24.38 meters

Total source area emissions: Qt
conc < Csat 9.083348E-10

Step 1: Determine the natural log of the horizontal dimension
x = 106.68
ln (x) = 3.89

Step 2: Enter the value from step 1into the following equation.

$$\ln(C/Qt) = 13.0 - 0.261x \ln(x) - 0.241x (\ln(x))^2 + 0.0124 x (\ln(x))^3$$

ln(C/Qt) = 9.072645

Step 3: Take the value from 2 to produce the normalized concentration

$$C/Qt = e^{\ln(C/Qt)}$$

C/Qt = 8713.643

Step 4: Multiply the normalized concentration by the emission rate to produce the long term (annual average) concentration in ug/m^3

$$C = (C/Qt) \times Qt$$

C = **7.91E-06** ug/m^3

08/11/99
15:05:52

*** SCREEN3 MODEL RUN ***
** VERSION DATED 96043 ***

Dii-Binghamton,New York- 1,1-DCA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.763799E-16
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	48.7680
LENGTH OF SMALLER SIDE (M)	=	24.3840
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.2914E-09	6	1.0	1.0	10000.0	.00	20.
100.	.2960E-09	6	1.0	1.0	10000.0	.00	0.
200.	.9245E-10	6	1.0	1.0	10000.0	.00	1.
300.	.4541E-10	6	1.0	1.0	10000.0	.00	0.
400.	.2756E-10	6	1.0	1.0	10000.0	.00	1.
500.	.1884E-10	6	1.0	1.0	10000.0	.00	3.
600.	.1391E-10	6	1.0	1.0	10000.0	.00	0.
700.	.1080E-10	6	1.0	1.0	10000.0	.00	2.
800.	.8701E-11	6	1.0	1.0	10000.0	.00	3.
900.	.7216E-11	6	1.0	1.0	10000.0	.00	3.
1000.	.6120E-11	6	1.0	1.0	10000.0	.00	3.
1100.	.5283E-11	6	1.0	1.0	10000.0	.00	3.
1200.	.4629E-11	6	1.0	1.0	10000.0	.00	3.
1300.	.4104E-11	6	1.0	1.0	10000.0	.00	0.
1400.	.3677E-11	6	1.0	1.0	10000.0	.00	0.
1500.	.3321E-11	6	1.0	1.0	10000.0	.00	0.
1600.	.3023E-11	6	1.0	1.0	10000.0	.00	1.
1700.	.2769E-11	6	1.0	1.0	10000.0	.00	0.
1800.	.2552E-11	6	1.0	1.0	10000.0	.00	0.
1900.	.2363E-11	6	1.0	1.0	10000.0	.00	2.
000.	.2198E-11	6	1.0	1.0	10000.0	.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

38.	.8033E-09	6	1.0	1.0	10000.0	.00	15.

****
*** SCREEN DISCRETE DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
356.	.3369E-10	6	1.0	1.0	10000.0	.00	1.
36.	.8004E-09	6	1.0	1.0	10000.0	.00	17.
37.	.8032E-09	6	1.0	1.0	10000.0	.00	15.
38.	.8033E-09	6	1.0	1.0	10000.0	.00	18.
39.	.8016E-09	6	1.0	1.0	10000.0	.00	19.
40.	.7977E-09	6	1.0	1.0	10000.0	.00	20.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.8033E-09	38.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Location:	**Dii Binghamton, New York**
Chemical	**cis 1,2,-DCE**

Parameter	Definition	Entered Value
K_d	soil water partition coefficient ^	0.21
s	solubility (mg/L-water)^	3500
n_m	soil moisture content, expressed as a weight fraction*	0.11
Θ_m	soil moisture content, expressed as L-water/kg-soil**	0.11

Soil Saturation Concentration

$C_{sat} = (K_d \times s \times n_m) + (s \times \Theta_m)$

C_{sat} = 465.85

* from analytical from Quanterra

^ from literature

** calculated

chemical concentration = **0.012** mg/kg

Emission Rate Calculation for: **PCE**

for concentrations > Csat

Parameter	Definition	Entered Value
E_i	Emission rate of component i (g/s)	
$D_{i(a)}$	Diffusion coefficient of component i in air (cm^2/sec)	0.074
C_{si}	Saturation vapor concentration of component i.	0.002113085
A	Exposed area of contamination (cm^2) use 80' x 160'	11892326.4
P_t	Total soil porosity (unitless)	0.35
M_i	Mole fraction of component i in the waste (gmole/gmole)	1.98061E-08
d_{sc}	Effective depth of soil cover (cm) 2 '	60.957

$E_i = D_i \times C_{si} \times A \times (P_t^{4/3}) \times (M_i/d_{sc})$

E_i = 1.49E-07 grams per second

1.25E-10 grams per second-m^2

Where:

$$Csi = \frac{p\ MW_i}{R\ T}$$

Parameter	Definition	Entered Value
p	Vapor pressure of the chemical i (mm Hg)	400
R	Molar gas constant (62,361 mm Hg-cm^3 / mole- K)	62361
T*	Absolute temperature of waste (in situ) (K)	294.26
MW_i	Molecular weight of component i (g/mole)	96.94

Csi = 0.002113

degree F 70 estimated

Where:

$P_t = 1 - B / p$

Parameter	Definition	Entered Value
B	Soil bulk density (g/cm^3)	
p	Particle density (g/cm^3)	2.65

P_t = 0.35 default number

Location: **Dii Binghamton, New York**
Chemical **cis 1,2,-DCE**

Emission Rate Calculation for: **cis 1,2,-DCE**

This scenario assumes all contamination to be in solution with the soil moisture and adsorbed to soil particles within the soil matrix

for concentrations < Csat

Parameter	Definition	Entered Value	
E_i	Emission rate of component i (g/s)		
D_{ei}	Effective diffusivity of component i in air (cm^2/sec)	0.052332824	
C_i	Bulk soil concentration of component i in g/g	0.000000012	
A	Exposed area of contamination (cm^2)	11892326.4	
K_{as}	Soil air partition coefficent g/cm^3	0.80047619	
t	Exposure interval (s= exposure time X exposure frequency x exposure duration in seconds)	790000000	s = 1 year
E	soil porosity (dimensionless) ($E = P_t$ for dry soil or P_a when soil is more often wet than dry	0.35	

$$E_i = \frac{A \times 2 \times D_{ei} \times E \times K_{as} \times C_i}{\sqrt{pi \times sigma \times t}}$$

CALCULATED VALUES

D_{ei}	effective diffusivity (cm^2/s) = $D_i \times E^{0.33}$	0.052332824
K_{as}	soil/air partition coefficient (g soil/cm^3 air) = $(H/K_d) \times 41$ where 41 is a units conversion factor	0.80047619
sigma		0.007321195

$$sigma = \frac{D_{ei} \times E}{E + (p) \times (1 - E)/K_{as}}$$

$D_{i(a)}$	molecular diffusivity (cm^2/s)	0.074
H	Henrys law constant ($atm\text{-}m^3/mol$)	0.0041
Kd	soil water partition coeffcient	0.21

E_i =	4.608504E-10	grams per second
	3.875191E-17	grams per second-m^2

Location: **Dii Binghamton, New York**
Chemical **cis 1,2-DCE**

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Given the highest concentration is found at 38 meters, and that the longest side is 48 meters, then it is possible that the receptor can be located within the source area.

Area Dimensions: X = 48.76 meters
Y = 24.38 meters

Total source area emissions: Qt
conc < Csat 4.608504E-10

Step 1: Determine the natural log of the horizontal dimension
x = 106.68
ln (x) = 3.89

Step 2: Enter the value from step 1into the following equation.

$$\ln(C/Qt) = 13.0 - 0.261x \ln(x) - 0.241x (\ln(x))^2 + 0.0124 x (\ln(x))^3$$

ln(C/Qt) = 9.072645

Step 3: Take the value from 2 to produce the normalized concentration

$$C/Qt = e^{\ln(C/Qt)}$$

C/Qt = 8713.643

Step 4: Multiply the normalized concentration by the emission rate to produce the long term (annual average) concentration in ug/m^3

$$C = (C/Qt) \times Qt$$

C = 4.02E-06 ug/m^3

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15:07:31

*** SCREEN3 MODEL RUN ***
* VERSION DATED 96043 ***

Dii-Binghamton, New York- cis 1,2-DCE

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.387519E-16
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	48.7680
LENGTH OF SMALLER SIDE (M)	=	24.3840
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.1478E-09	6	1.0	1.0	10000.0	.00	20.
100.	.1502E-09	6	1.0	1.0	10000.0	.00	0.
200.	.4690E-10	6	1.0	1.0	10000.0	.00	1.
300.	.2304E-10	6	1.0	1.0	10000.0	.00	0.
400.	.1399E-10	6	1.0	1.0	10000.0	.00	1.
500.	.9559E-11	6	1.0	1.0	10000.0	.00	3.
600.	.7058E-11	6	1.0	1.0	10000.0	.00	0.
700.	.5478E-11	6	1.0	1.0	10000.0	.00	2.
800.	.4415E-11	6	1.0	1.0	10000.0	.00	3.
900.	.3661E-11	6	1.0	1.0	10000.0	.00	3.
1000.	.3105E-11	6	1.0	1.0	10000.0	.00	3.
1100.	.2681E-11	6	1.0	1.0	10000.0	.00	3.
1200.	.2348E-11	6	1.0	1.0	10000.0	.00	3.
1300.	.2082E-11	6	1.0	1.0	10000.0	.00	0.
1400.	.1865E-11	6	1.0	1.0	10000.0	.00	0.
1500.	.1685E-11	6	1.0	1.0	10000.0	.00	0.
1600.	.1534E-11	6	1.0	1.0	10000.0	.00	1.
1700.	.1405E-11	6	1.0	1.0	10000.0	.00	0.
1800.	.1295E-11	6	1.0	1.0	10000.0	.00	0.
1900.	.1199E-11	6	1.0	1.0	10000.0	.00	2.
000.	.1115E-11	6	1.0	1.0	10000.0	.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

38.	.4076E-09	6	1.0	1.0	10000.0	.00	15.

****
*** SCREEN DISCRETE DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
35.	.4034E-09	6	1.0	1.0	10000.0	.00	17.
36.	.4061E-09	6	1.0	1.0	10000.0	.00	17.
37.	.4075E-09	6	1.0	1.0	10000.0	.00	15.
38.	.4076E-09	6	1.0	1.0	10000.0	.00	18.
39.	.4067E-09	6	1.0	1.0	10000.0	.00	19.
40.	.4047E-09	6	1.0	1.0	10000.0	.00	20.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.4076E-09	38.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Location: **Dii Binghamton, New York**
Chemical **PCE**

Parameter	Definition	Entered Value
K_d	soil water partition coefficient ^	1.60
s	solubility (mg/L-water)^	200
n_m	soil moisture content, expressed as a weight fraction*	0.11
Θ_m	soil moisture content, expressed as L-water/kg-soil**	0.11

Soil Saturation Concentration

$C_{sat} = (K_d \times s \times n_m) + (s \times \Theta_m)$

C_{sat} = 57.20

* from analytical from Quanterra
^ from literature
** calculated

chemical concentration = **0.185** mg/kg

Emission Rate Calculation for: PCE

for concentrations > Csat

Parameter	Definition	Entered Value
E_i	Emission rate of component i (g/s)	
$D_{i(a)}$	Diffusion coefficient of component i in air (cm^2/sec)	0.072
C_{si}	Saturation vapor concentration of component i.	0.000126493
A	Exposed area of contamination (cm^2) use 80' x 160'	11892326.4
P_t	Total soil porosity (unitless)	0.35
M_i	Mole fraction of component i in the waste (gmole/gmole)	1.78528E-07
d_{sc}	Effective depth of soil cover (cm) 2 '	60.957

$E_i = D_i \times C_{si} \times A \times (P_t^{4/3}) \times (M_i/d_{sc})$

E_i = 7.82E-08 grams per second
6.58E-11 grams per second-m^2

Where:

$$Csi = \frac{p\ MW_i}{R\ T}$$

Parameter	Definition	Entered Value
p	Vapor pressure of the chemical i (mm Hg)	14
R	Molar gas constant (62,361 mm Hg-cm^3 / mole- K)	62361
T*	Absolute temperature of waste (in situ) (K)	294.26
MW_i	Molecular weight of component i (g/mole)	165.8

Csi = 0.000126

degree F 70 estimated

Where:

$P_t = 1 - B / p$

Parameter	Definition	Entered Value
B	Soil bulk density (g/cm^3)	
p	Particle density (g/cm^3)	2.65

P_t = 0.35 default number

Location: **Dii Binghamton, New York**
Chemical **PCE**

Emission Rate Calculation for: **PCE**

This scenario assumes all contamination to be in solution with the soil moisture and adsorbed to soil particles within the soil matrix

for concentrations < Csat

Parameter	Definition	Entered Value	
E_i	Emission rate of component i (g/s)		
D_{ei}	Effective diffusivity of component i in air (cm^2/sec)	0.050918424	
C_i	Bulk soil concentration of component i in g/g	0.000000185	
A	Exposed area of contamination (cm^2)	11892326.4	
K_{as}	Soil air partition coefficent g/cm^3	0.46125	
t	Exposure interval (s= exposure time X exposure frequency x exposure duration in seconds)	790000000	s = 1 year
E	soil porosity (dimensionless) ($E = P_t$ for dry soil or P_a when soil is more often wet than dry	0.35	

$$E_i = \frac{A \times 2 \times D_{ei} \times E \times K_{as} \times C_i}{\sqrt{pi \times sigma \times t}}$$

CALCULATED VALUES

D_{ei}	effective diffusivity (cm^2/s) = $D_i \times E^{0.33}$	0.050918424
K_{as}	soil/air partition coefficient (g soil/cm^3 air) = $(H/K_d) \times 41$ where 41 is a units conversion factor	0.46125
sigma		0.004363278

$$sigma = \frac{D_{ei} \times E}{E + (p) \times (1 - E)/K_{as}}$$

$D_{i(a)}$	molecular diffusivity (cm^2/s)	0.072
H	Henrys law constant (atm-m^3/mol)	0.018
Kd	soil water partition coeffcient	1.60

E_i =	6.683567E-09	grams per second
	5.620067E-16	grams per second-m^2

Location: **Dii Binghamton, New York**
Chemical **PCE**

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Given the highest concentration is found at 38 meters, and that the longest side is 48 meters, then it is possible that the receptor can be located within the source area.

Area Dimensions:	X =	48.76 meters
	Y =	24.38 meters

Total source area emissions: Qt

conc < Csat	6.683567E-09

Step 1: Determine the natural log of the horizontal dimension

x = 106.68

ln (x) = 3.89

Step 2: Enter the value from step 1into the following equation.

$$\ln(C/Qt) = 13.0 - 0.261x \ln(x) - 0.241x (\ln(x))^2 + 0.0124 x (\ln(x))^3$$

ln(C/Qt) = 9.072645

Step 3: Take the value from 2 to produce the normalized concentration

$$C/Qt = e^{\ln(C/Qt)}$$

C/Qt = 8713.643

Step 4: Multiply the normalized concentration by the emission rate to produce the long term (annual average) concentration in ug/m^3

$$C = (C/Qt) \times Qt$$

C = **5.82E-05** ug/m^3

08/11/99
15:10:27

*** SCREEN3 MODEL RUN ***
** VERSION DATED 96043 ***

Dii-Binghamton, New York- PCE

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.562000E-15
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	48.7680
LENGTH OF SMALLER SIDE (M)	=	24.3840
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.2144E-08	6	1.0	1.0	10000.0	.00	20.
100.	.2178E-08	6	1.0	1.0	10000.0	.00	0.
200.	.6802E-09	6	1.0	1.0	10000.0	.00	1.
300.	.3341E-09	6	1.0	1.0	10000.0	.00	0.
400.	.2028E-09	6	1.0	1.0	10000.0	.00	1.
500.	.1386E-09	6	1.0	1.0	10000.0	.00	3.
600.	.1024E-09	6	1.0	1.0	10000.0	.00	0.
700.	.7945E-10	6	1.0	1.0	10000.0	.00	2.
800.	.6402E-10	6	1.0	1.0	10000.0	.00	3.
900.	.5309E-10	6	1.0	1.0	10000.0	.00	3.
1000.	.4503E-10	6	1.0	1.0	10000.0	.00	3.
1100.	.3888E-10	6	1.0	1.0	10000.0	.00	3.
1200.	.3406E-10	6	1.0	1.0	10000.0	.00	3.
1300.	.3020E-10	6	1.0	1.0	10000.0	.00	0.
1400.	.2705E-10	6	1.0	1.0	10000.0	.00	0.
1500.	.2444E-10	6	1.0	1.0	10000.0	.00	0.
1600.	.2224E-10	6	1.0	1.0	10000.0	.00	1.
1700.	.2038E-10	6	1.0	1.0	10000.0	.00	0.
1800.	.1877E-10	6	1.0	1.0	10000.0	.00	0.
1900.	.1739E-10	6	1.0	1.0	10000.0	.00	2.
000.	.1618E-10	6	1.0	1.0	10000.0	.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

38.	.5911E-08	6	1.0	1.0	10000.0	.00	15.

****
*** SCREEN DISCRETE DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
35.	.5850E-08	6	1.0	1.0	10000.0	.00	17.
36.	.5889E-08	6	1.0	1.0	10000.0	.00	17.
37.	.5910E-08	6	1.0	1.0	10000.0	.00	15.
38.	.5911E-08	6	1.0	1.0	10000.0	.00	18.
39.	.5898E-08	6	1.0	1.0	10000.0	.00	19.
40.	.5869E-08	6	1.0	1.0	10000.0	.00	20.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.5911E-08	38.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Location: Dii Binghamton, New York
Chemical TCE

Parameter	Definition	Entered Value
K_d	soil water partition coefficient ^	0.57
s	solubility (mg/L-water)^	110
n_m	soil moisture content, expressed as a weight fraction*	0.11
Θ_m	soil moisture content, expressed as L-water/kg-soil**	0.11

Soil Saturation Concentration

$C_{sat} = (K_d \times s \times n_m) + (s \times \Theta_m)$

C_{sat} = 19.00

* from analytical from Quanterra
^ from literature
** calculated

chemical concentration = **0.024** mg/kg

Emission Rate Calculation for: **PCE**

for concentrations > Csat

Parameter	Definition	Entered Value
E_i	Emission rate of component i (g/s)	
$D_{i(a)}$	Diffusion coefficient of component i in air (cm^2/sec)	0.079
C_{si}	Saturation vapor concentration of component i.	0.000415315
A	Exposed area of contamination (cm^2) use 80' x 160'	11892326.4
P_t	Total soil porosity (unitless)	0.35
M_i	Mole fraction of component i in the waste (gmole/gmole)	2.92237E-08
d_{sc}	Effective depth of soil cover (cm) 2 '	60.957

$E_i = D_i \times C_{si} \times A \times (P_t^{4/3}) \times (M_i/d_{sc})$

E_i = 4.61E-08 grams per second
3.88E-11 grams per second-m^2

Where:

$$Csi = \frac{p\ MW_i}{R\ T}$$

Parameter	Definition	Entered Value
p	Vapor pressure of the chemical i (mm Hg)	58
R	Molar gas constant (62,361 mm Hg-cm^3 / mole- K)	62361
T*	Absolute temperature of waste (in situ) (K)	294.26
MW_i	Molecular weight of component i (g/mole)	131.4

Csi = 0.000415

degree F 70 estimated

Where:

$P_t = 1 - B / p$

Parameter	Definition	Entered Value
B	Soil bulk density (g/cm^3)	
p	Particle density (g/cm^3)	2.65

P_t = 0.35 default number

Location: **Dii Binghamton, New York**
Chemical **TCE**

Emission Rate Calculation for: **TCE**

This scenario assumes all contamination to be in solution with the soil moisture and adsorbed to soil particles within the soil matrix

for concentrations < Csat

Parameter	Definition	Entered Value	
E_i	Emission rate of component i (g/s)		
D_{ei}	Effective diffusivity of component i in air (cm^2/sec)	0.055868826	
C_i	Bulk soil concentration of component i in g/g	0.000000024	
A	Exposed area of contamination (cm^2)	11892326.4	
K_{as}	Soil air partition coefficent g/cm^3	0.719298246	
t	Exposure interval (s= exposure time X exposure frequency x exposure duration in seconds)	790000000	s = 1 year
E	soil porosity (dimensionless) ($E = P_t$ for dry soil or P_a when soil is more often wet than dry	0.35	

$$E_i = \frac{A \times 2 \times D_{ei} \times E \times K_{as} \times C_i}{\sqrt{pi \times sigma \times t}}$$

CALCULATED VALUES

D_{ei}	effective diffusivity (cm^2/s) = $D_i \times E^{0.33}$	0.055868826
K_{as}	soil/air partition coefficient (g soil/cm^3 air) = (H/K_d) x 41 where 41 is a units conversion factor	0.719298246
sigma		0.007124321

$$sigma = \frac{D_{ei} \times E}{E + (p) \times (1 - E)/K_{as}}$$

$D_{i(a)}$	molecular diffusivity (cm^2/s)	0.079
H	Henrys law constant (atm-m^3/mol)	0.01
Kd	soil water partition coeffcient	0.57

E_i = 9.086245E-10 grams per second
7.640427E-17 grams per second-m^2

Location: **Dii Binghamton, New York**
Chemical **TCE**

CONVERSION OF 1 HOUR AVG CONCENTRATIONS TO ANNUAL AVERAGES
Using the Air/Superfund Guidance: Predictive Baseline Emissions for Superfund Sites
EPA 450/1-92-002
Page 33, item E

Given the highest concentration is found at 38 meters, and that the longest side is 48 meters, then it is possible that the receptor can be located within the source area.

Area Dimensions:	X =	48.76 meters
	Y =	24.38 meters

Total source area emissions: Qt

conc < Csat 9.086245E-10

Step 1: Determine the natural log of the horizontal dimension

x = 106.68

ln (x) = 3.89

Step 2: Enter the value from step 1into the following equation.

$$\ln(C/Qt) = 13.0 - 0.261x \ln(x) - 0.241x (\ln(x))^2 + 0.0124 x (\ln(x))^3$$

ln(C/Qt) = 9.072645

Step 3: Take the value from 2 to produce the normalized concentration

$$C/Qt = e^{\ln(C/Qt)}$$

C/Qt = 8713.643

Step 4: Multiply the normalized concentration by the emission rate to produce the long term (annual average) concentration in ug/m^3

$$C = (C/Qt) \times Qt$$

C = 7.92E-06 ug/m^3

08/11/99
15:11:53

*** SCREEN3 MODEL RUN ***
* VERSION DATED 96043 ***

Dii-Binghamton, New York- TCE

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.764000E-16
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	48.7680
LENGTH OF SMALLER SIDE (M)	=	24.3840
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	.2915E-09	6	1.0	1.0	10000.0	.00	20.
100.	.2961E-09	6	1.0	1.0	10000.0	.00	0.
200.	.9247E-10	6	1.0	1.0	10000.0	.00	1.
300.	.4542E-10	6	1.0	1.0	10000.0	.00	0.
400.	.2757E-10	6	1.0	1.0	10000.0	.00	1.
500.	.1885E-10	6	1.0	1.0	10000.0	.00	3.
600.	.1391E-10	6	1.0	1.0	10000.0	.00	0.
700.	.1080E-10	6	1.0	1.0	10000.0	.00	2.
800.	.8703E-11	6	1.0	1.0	10000.0	.00	3.
900.	.7218E-11	6	1.0	1.0	10000.0	.00	3.
1000.	.6121E-11	6	1.0	1.0	10000.0	.00	3.
1100.	.5285E-11	6	1.0	1.0	10000.0	.00	3.
1200.	.4630E-11	6	1.0	1.0	10000.0	.00	3.
1300.	.4106E-11	6	1.0	1.0	10000.0	.00	0.
1400.	.3678E-11	6	1.0	1.0	10000.0	.00	0.
1500.	.3322E-11	6	1.0	1.0	10000.0	.00	0.
1600.	.3024E-11	6	1.0	1.0	10000.0	.00	1.
1700.	.2770E-11	6	1.0	1.0	10000.0	.00	0.
1800.	.2552E-11	6	1.0	1.0	10000.0	.00	0.
1900.	.2364E-11	6	1.0	1.0	10000.0	.00	2.
000.	.2199E-11	6	1.0	1.0	10000.0	.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

38.	.8035E-09	6	1.0	1.0	10000.0	.00	15.

****
*** SCREEN DISCRETE DISTANCES ***
****

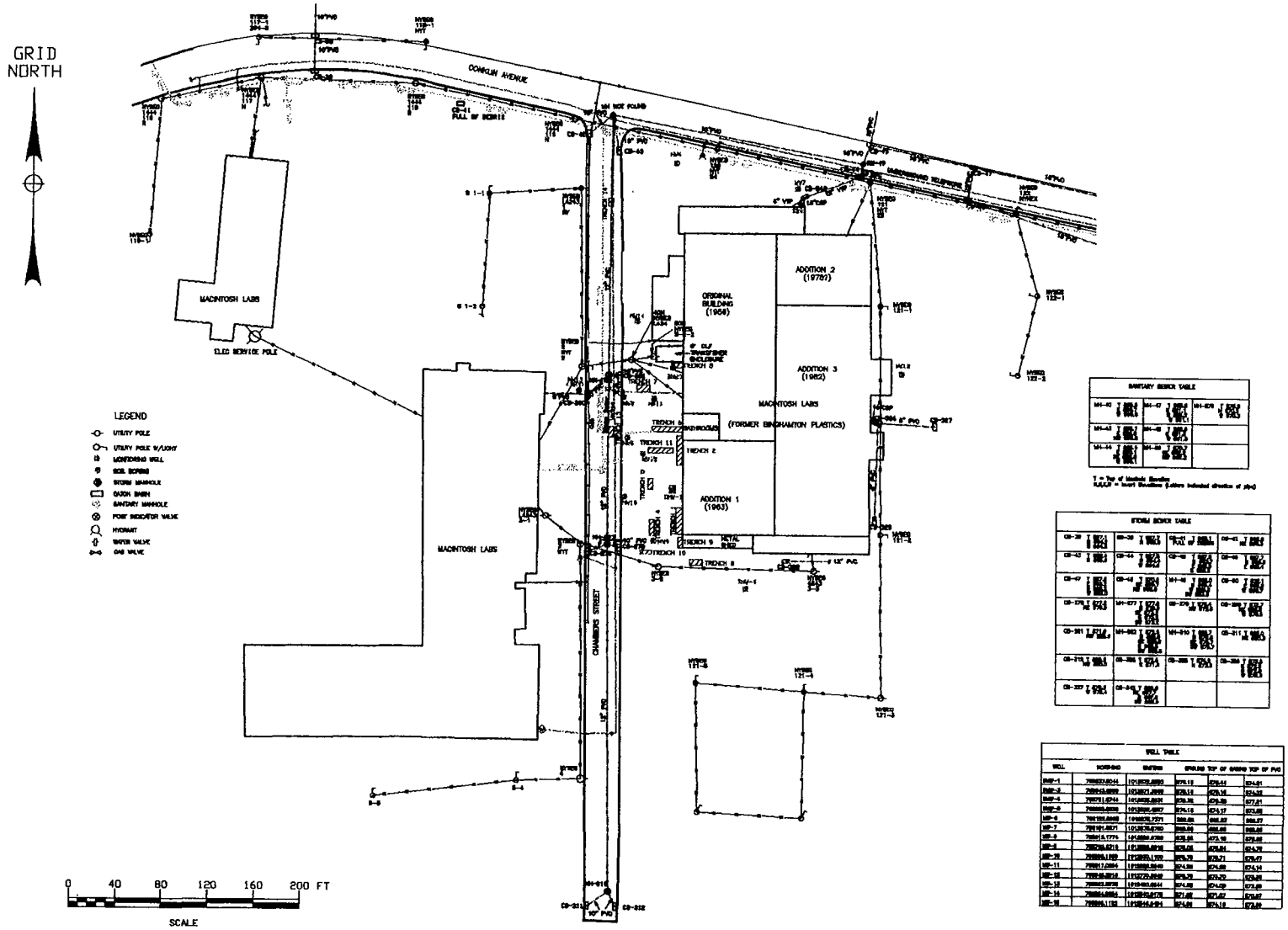
TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
35.	.7953E-09	6	1.0	1.0	10000.0	.00	17.
367.	.3197E-10	6	1.0	1.0	10000.0	.00	0.
37.	.8035E-09	6	1.0	1.0	10000.0	.00	15.
38.	.8035E-09	6	1.0	1.0	10000.0	.00	18.
39.	.8018E-09	6	1.0	1.0	10000.0	.00	19.
40.	.7979E-09	6	1.0	1.0	10000.0	.00	20.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.8035E-09	38.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****



SANITARY SEWER TABLE

STORM SEWER TABLE

WELL TABLE

WELL	NORTHING	EASTING	GROUND TOP OF CASING	TOP OF PVC

FEBRUARY 22, 2000

PROJECT NO.: 396-0460
DRAWN BY: P.D.H.
APPROVED BY: M.M.

PLATE 1

SITE MAP

DII BINGHAMTON, CONKLIN AVENUE
BINGHAMTON, NEW YORK

SHIELD ENVIRONMENTAL ASSOCIATES, INC.
2456 Fortune Drive, Suite 100
Lexington, KY 40509
606-294-5155

60460-1