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905013

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SIMON HYDRO-SEARCH

MACHIAS GRAVEL PIT
REMEDIAL INVESTIGATION REPORT
SITE NUMBER 905013

August, 1991

Prepared for:

Motorola, Inc.
4000 Commercial Avenue
Northbrook, IL 60062

Prepared by:

Hydro-Search, Inc.
350 Indiana Street, Suite 300
Golden, Colorado 80401

426116032/10003

Table of Contents

Table of Contents
(continued)

Figures

Table of Contents
(continued)

Tables

Appendices

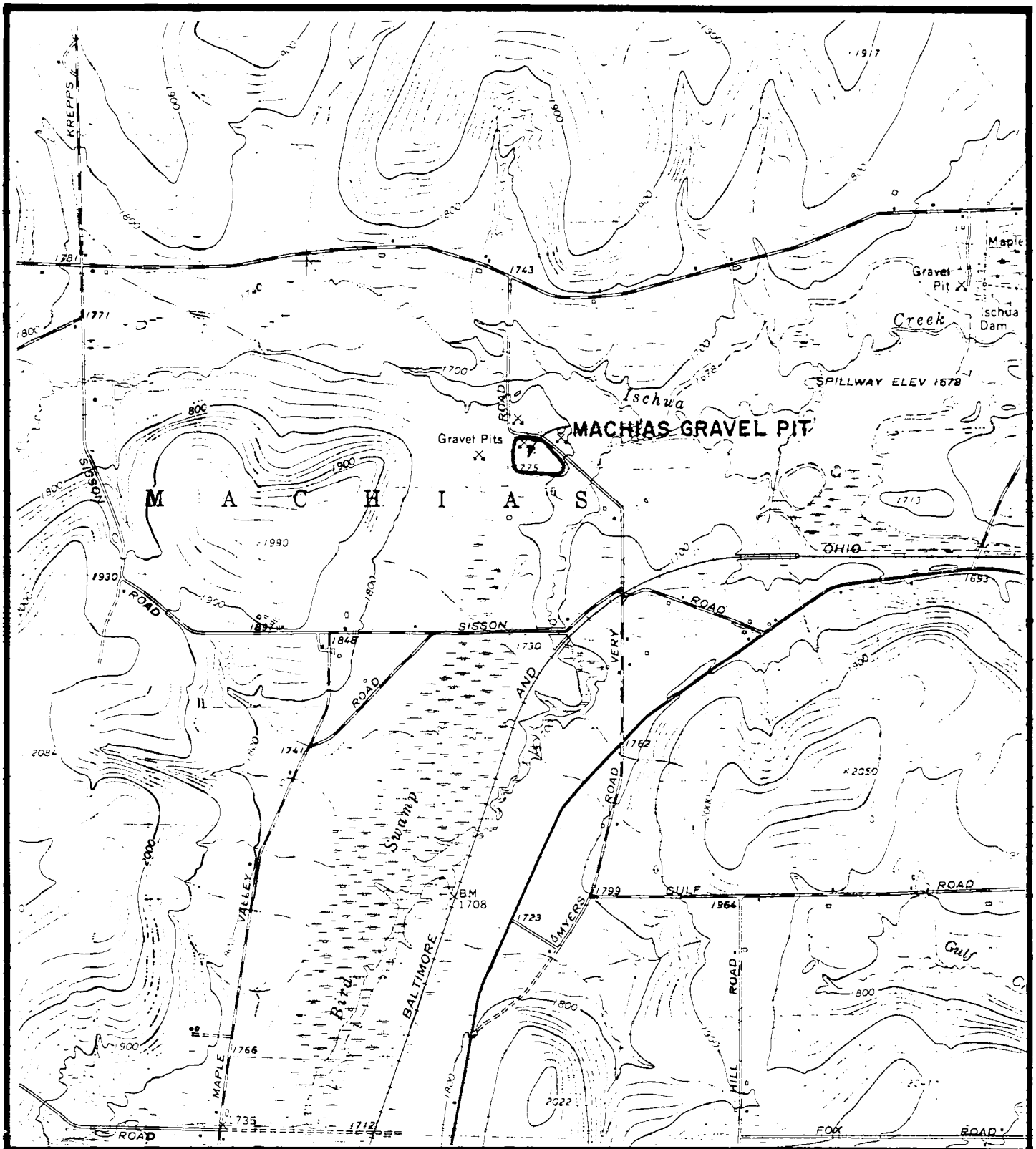
1.0 INTRODUCTION

Hydro-Search, Inc. (HSI) was contracted by Motorola, Inc. to conduct a site investigation at the Machias Gravel Pit. The Remedial Investigation (RI) and the engineering evaluation of recommended remedial alternatives was outlined in the New York State Department of Environmental Conservation (NYSDEC) approved Site Investigation Work Plan dated September 1990 and amended on November 16, 1990. This report contains the results of the field investigation and site characterization. The engineering evaluation of remedial alternatives is provided under separate cover.

1.1 Background

The Machias Gravel Pit site (NYSDEC #905013) is located on Very Road approximately 2-miles west of the town of Machias, Cattaraugus County, New York (Figure 1). The site is approximately 20 acres in size and consists of an active gravel pit operation in the southern portion of the site and an inactive gravel pit area in the northern section (Figure 2). The inactive gravel pit area to the north was reportedly used for the storage of approximately 600 drums of waste material from the former Motorola Plant in Arcade, New York, between March and September 1978. The drums were suspected of containing wastes such as epoxy resins, acids, flammable and nonflammable solvents and cutting oils. The oils received at the site were reportedly spread on local roads for dust control by town personnel. The gravel pit was used as the transfer point to fill tank trucks prior to spraying the oil on rural roads. Based on background information, it is estimated that the contents of approximately 300 drums were spilled directly on the ground surface. The remaining drummed wastes were allegedly stacked on the ground surface along the inactive gravel pit wall.

Based on discussions with State and Town personnel, a maintenance garage for municipal trucks was located on the southern portion of the site (Figure 2). It is uncertain if any waste mishandling and spillage occurred on this portion of the site.



SCALE 1:24000

0 2000 ft

N

NEW YORK

QUADRANGLE LOCATION

LAT. 42°22'05" N
LONG. 75°30'7.5" W

SOURCE: USGS TOPOGRAPHIC MAP
WEST VALLEY, N.Y.

LOCATION MAP

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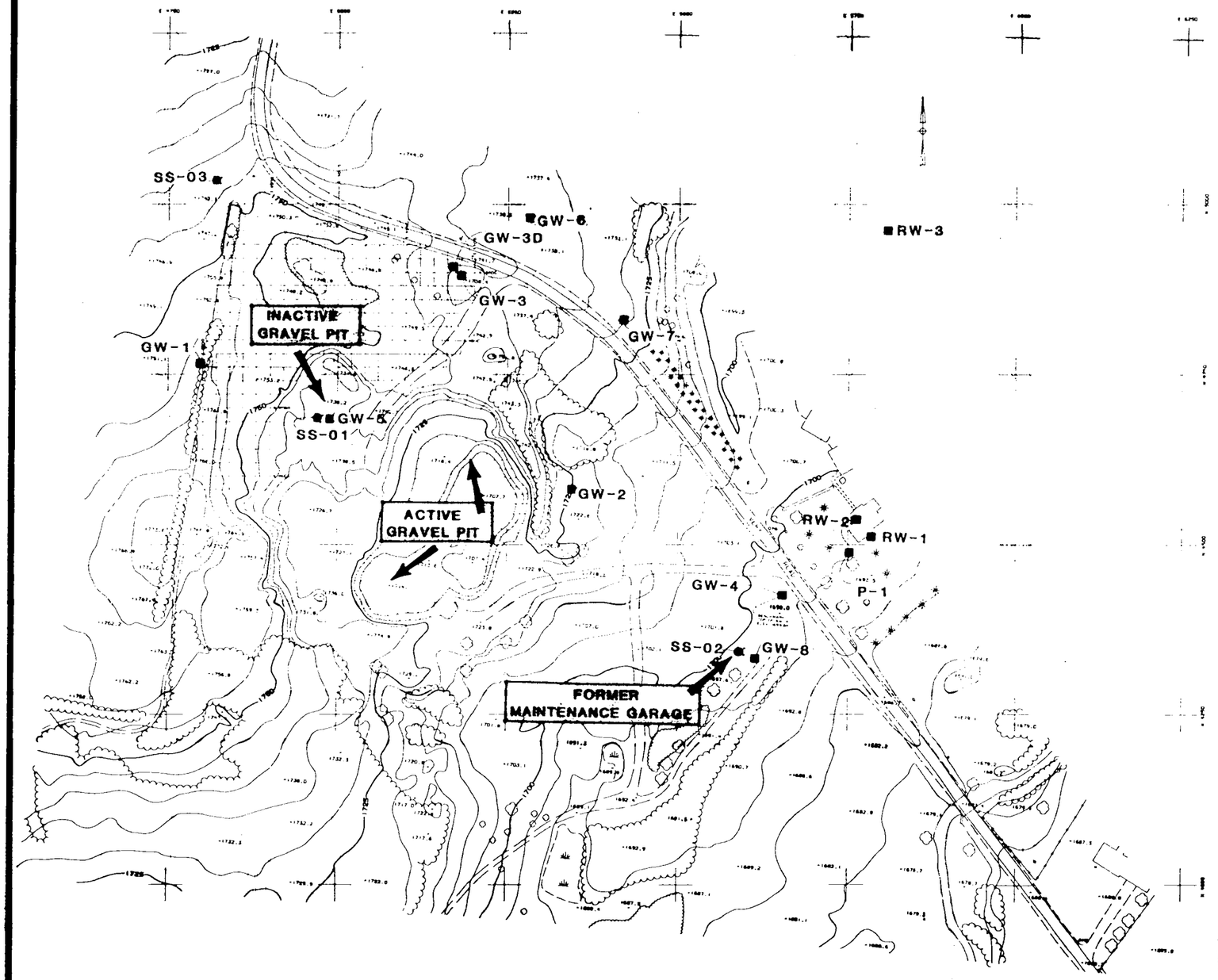
FIGURE 1



LEGEND

- ■ GW-1 — Ground Water Monitoring Well
- ■ RW-1 — Residential Well
- ■ P-1 — Piezometer
- ● SS-01 — Surface Soil Sampling Location
- Area of Potential Buried Drums

QUADRANGLE LOCATION

LAT. 42°22'05" N
LONG. 75°30'25" W

WELL & SOIL SAMPLE LOCATIONS

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FIGURE 2

In 1986 and 1987 NYSDEC oversaw a drum removal and soil remediation project on the site. An attempt to clean contaminated soil was made by excavating a small portion of soil from directly beneath the drums and placing it on plastic. The soil was to be turned routinely to promote volatization. It is unclear whether this soil was eventually removed from the site and disposed. No records documenting soil disposal have been identified.

Approximately 184 drums were removed from the site for proper disposal by the property owners, the town of Machias. A summary of the number of drums removed and the disposal destination is provided in Table 1. There were no documents available to determine if the remaining drums were spilled, placed within the fill adjacent to the inactive pit area, or moved off-site for proper disposal.

Four ground water monitoring wells were installed and sampled in October 1988 as part of a NYSDEC Phase II investigation. Soil samples were also collected. The purpose of this study was to gather site specific information to further characterize the hydrogeology and evaluate the areal and vertical extent of ground water contamination. Sampling of these wells detected volatile and semi-volatile compounds in the ground water at monitoring well GW-3 (Figure 2).

Results of both soil and ground water sampling from the NYSDEC Phase II Investigation indicate that the compounds of potential concern at this site are volatile organic compounds (VOCs), polynuclear aromatic (PNA) compounds, chromium, nickel and lead. In addition a trace of phenol was also detected in a ground water sample from well GW-3.

Chloroform has been detected in a nearby residential well but may be unrelated to former waste handling activities at the site because chloroform was not found on-site and is not a constituent, or expected degradation component, of the alleged wastes.

TABLE 1

DOCUMENTED DRUM REMOVAL FROM MACHIA GRAVEL PIT*

Date	Number of Drums	Destination
10-31-86	160 (crushed)	CID Landfill, Chaffee, NY Contents from drums shipped in CID tank truck to be disposed by CID.
4-15-87	10	Waste Management of North America Landfill in Model City, NY.
1987	10	Lewiston, NY
5-23-88	4	Rollins Environmental, N.J.

* From telephone conversation 4-1-91 with Edward Morgan, Machias Town Supervisor.

1.2 Objectives of the RI/FS

Motorola, Inc. agreed to conduct a remedial investigation and feasibility study (RI/FS) at the Machias Gravel Pit. The site investigation performed was a streamlined and focused version of a formal CERCLA RI/FS. The objectives of the RI were to:

- Collect additional site information to characterize potential source area(s) of contamination.
- Confirm or refute the presence of buried drums.
- Provide additional delineation of the vertical and horizontal extent of constituent migration.
- Evaluate site specific hydrogeologic conditions and identify the nearest potential ground water receptor.
- Estimate potential constituent concentrations at the receptor using analytical modeling methods.
- Determine whether chloroform present in Cole residence well is originating from the gravel pit area.
- Perform a preliminary risk assessment on the constituents of concern to aid in evaluating appropriate remedial alternatives.
- Provide the data necessary for completing the FS.

The FS focuses on evaluation of the probable remedial alternatives for the site. The FS report will be provided under separate cover.

2.0 FIELD METHODS

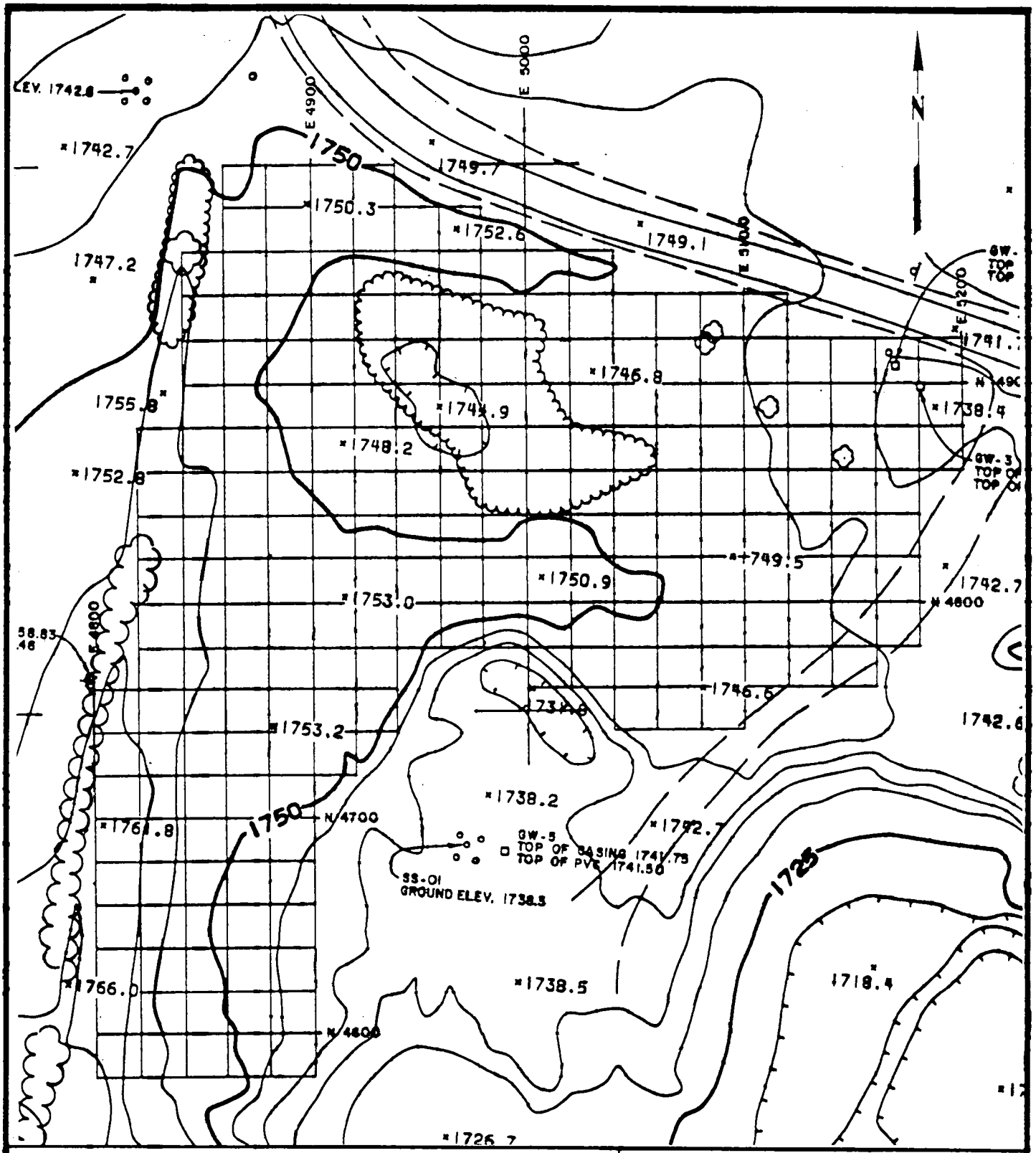
The field investigation closely followed the approach described in the work plan dated September 1990 and an addendum dated November 1990. Seven field tasks were performed to fulfill the study objectives. The field tasks included:

- Task 1 - Burial Drum Identification
- Task 2 - Test Pit Sampling
- Task 3 - Surface and Subsurface Soil Sampling
- Task 4 - Monitoring Well Installation and Ground Water Sampling
- Task 5 - In-Situ Permeability Tests
- Task 6 - Residential Well Sampling
- Task 7 - Piezometer Installation and Measurement
- Task 8 - Air Quality Sampling

2.1 Task 1 - Burial Drum Identification

A total of approximately 600 drums were sent to the Machias Gravel Pit site. Based on historical information it is estimated that 300 drums were emptied directly onto the ground in the inactive gravel pit area. Documentation shows an additional 184 drums being taken off-site for proper disposal. It was uncertain whether the remaining drums were also spilled or if they were buried in a suspect area just north-northwest of the inactive gravel pit. A magnetic gradiometer survey was performed to confirm or refute the presence of buried drums.

Prior to the magnetic survey, a bulldozer scraped the area in order to remove any surface metal and debris. A survey grid was located by McIntosh & McIntosh, P.C. of Lockport, New York, with stakes placed on twenty foot centers and station locations written on each stake (Figure 3). Upon arrival at the Machias Gravel Pit site, the area to be surveyed was visually inspected and any remaining surface metal was removed from the targeted area.



0 50 ft

Scale

Grid Location

Geophysical Survey
Grid Area

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FIGURE 3

The initial magnetic gradiometer survey included a measurement at each grid node. A contour map was constructed using the magnetic field gradient (refer to Section 5.1). Based on this map, three anomalous areas were identified. These areas were re-surveyed with the magnetic gradiometer on a 10 foot grid. Based on anomalously high magnetic field gradients from both magnetic surveys seven areas were designated for test pitting to identify the source(s) of the noted anomalies.

2.2 Task 2 - Test Pit Sampling

Based on results of the geophysical survey, seven test pit locations were selected by HSI in concurrence with NYSDEC oversight personnel. The purpose of the test pits was to determine the cause of the noted magnetic anomalies and visually confirm or refute the presence of buried drums.

Each test pit was excavated to transect a specific anomaly. Test pits were excavated using a rubber-tired backhoe with a 15 foot bucket arm. Prior to test pitting, the bucket end of the backhoe was steam cleaned thoroughly. The pits were excavated vertically until native materials were encountered. Pits ranged from 15 feet to 30 feet in length. Each pit was logged and metal debris were noted. Test pit logs are provided in Appendix A.

Soil samples were collected from five of the seven test pits from locations chosen by HSI in concurrence with NYSDEC oversight personnel. Samples were collected by scraping the full height of a trench side wall with the bucket of the backhoe. A grab sample was collected directly from the bucket for volatile organics analysis. The remainder of the sample was composited in a stainless steel bowl, mixed and placed directly into laboratory prepared containers for analysis of PAH and total metals.

Subsurface soil sample MGSB02-01, was collected from split spoon samples obtained during the drilling of monitoring well GW-8. All split spoon samples gave background PID readings so a grab sample for VOC analysis was collected immediately above the water table from the 14 to 16 foot interval. Total metals and PAH samples were composited from the 12 to 16 foot intervals.

2.4 Task 4 - Monitoring Well Installation and Ground Water Sampling

2.4.1 Monitoring Well Installation

Five monitoring wells were installed at the Machias Gravel Pit site, including two located across Very Road in neighboring fields. Locations of the monitoring wells are shown on Figure 2 and Plate I. The wells are numbered GW-3D, GW-5, GW-6, GW-7 and GW-8. The rationale for the location of each well is provided in Table 2. Well GW-3D was drilled to a total depth of 77.8 feet and screened from 65 to 75 feet below ground surface. Well GW-3D is nested with GW-3. The screened interval of GW-3D is below the bottom of well GW-3. The other monitoring wells were installed with the screened interval straddling the water table.

Drilling

Empire Soils Company of Hamburg, New York was subcontracted by HSI to perform the drilling and installation of monitoring wells. Two all terrain vehicle track rigs were used to drill the wells. Boreholes were advanced using 4.25-inch inside diameter (I.D.) hollow stem augers.

All boreholes were logged using a 2-foot split spoon sampler with samples collected continuously the entire depth of the boring. A PID was used to field screen each soil sample for total volatile organic vapors. Readings were also taken downhole and in the breathing zone for health and safety purposes. During bad weather conditions, soil samples were jarred, sealed and allowed to equilibrate. The PID was then used to obtain head space measurements.

TABLE 2
WELL PLACEMENT RATIONALE
MACHIAS GRAVEL PIT

Well Number	Approximate Water Table Depth	Approximate Screened Interval	Placement Rationale
GW-5	47′	41′-51′	Located within potential source area. Will also provide additional control on water table to confirm or refute potential mounding as suggested in previous site work.
GW-6	48′	45′-55′	Downgradient of potential drum burial area and documented ground water contamination. Will help delineate areal extent of constituent migration.
GW-7	39′	37′-47′	Monitoring point along flow line between potential source area and Cole residence well. Will help delineate areal extent constituent migration.
GW-8	17′	12′-22′	Downgradient of former garage/ maintenance area which may be a source location. Will also provide control on water table elevation in this area.
GW-3D	50′	65′-75′	Clustered adjacent to existing water table well GW-3 which shows ground water contamination. Will provide data on vertical distribution of contaminants and the vertical component of ground water flow.
P-1	11′	8′-18′	Piezometer located to provide control on water table elevations in the vicinity of the Cole residence well.

Drill rigs, all drilling equipment and well construction materials were steam-cleaned prior to drilling at each well location. Well screen and riser pipe were isolated from contact with surface soils by wrapping them with visqueen immediately after decontamination. An HSI hydrogeologist supervised all drilling and well construction activities. Boring logs are presented in Appendix B.

Well Construction

Monitoring wells were constructed of 2-inch I.D., Schedule 40 PVC riser with 10 feet of 0.010-inch continuous-slot PVC screen. The annular space around the screen was backfilled with clean, well-sorted silica sand to a depth of approximately two feet above the top of the screen. Due to heaving sands, some natural formation may be mixed with the artificial sand pack. All wells were constructed with a minimum 3-foot bentonite-pellet seal placed immediately above the sand pack. The pellets were hydrated and allowed to swell. The remaining annular space was then backfilled with a bentonite/cement grout. Detailed well construction summaries are presented in Appendix B.

PVC riser pipe was extended approximately 1.5 to 2 feet above ground surface, with the exception of GW-7 which was completed flush with ground surface. All wells except GW-7 were covered with locking, protective metal casings with cement run-off aprons. GW-7 was finished with a monitoring well manhole cover with three flush mount bolts and a locking pipe plug in the top of the PVC riser pipe.

Well Development

All new wells were developed using the bail and surge method. A minimum of five casing volumes of water were removed and field measurements of pH, specific conductance and temperature were monitored to document stable conditions. Specific development information for each well is included with the well construction summaries in Appendix B.

2.4.2 Ground Water Sampling

Ground water samples were collected from each of the new and existing monitoring wells. The following procedures were used to sample all monitoring wells:

- Depth to water and total depth of each well was determined using an electric water level indicator. The volume of water in the well casing was then calculated.
- A minimum of three well volumes of water was purged from the well with the PVC bailer prior to sampling, except well GW-8 which bailed dry and was allowed to recover approximately 30 minutes.
- Purging continued until three successive pH, specific conductance and temperature measurements showed stable conditions to ensure that the sample was representative of formation water.
- The sample was collected using a PVC bailer. Sample water was poured directly into laboratory prepared containers.
- The bailers were decontaminated between each well by scrubbing the bailer with an Alconox solution, followed by thoroughly flushing the bailer with deionized water.

Samples were collected and containerized in the order of the volatization sensitivity of the parameters. The order of collection was VOC, PAH, phenols, total and dissolved metals (i.e. chromium, nickel and lead). Samples for total metals were not filtered prior to preservation with acid. Samples for dissolved metals were field filtered with a 0.45 micron filter prior to preservation with acid. All samples were containerized, preserved, packaged and shipped in accordance with established U.S. EPA protocols. A completed chain of custody form accompanied each sample shipment.

2.5 Task 5 - In-Situ Permeability Tests

Baildown-recovery tests were performed in each of the nine monitoring wells. The tests were performed using In-Situ SE-1000A and SE-1000B data loggers with a 15 psi pressure transducer placed down the well. The following procedure was used for testing:

- Static water level was determined and recorded.
- The pressure transducer was placed approximately 1 foot above the bottom of the well.
- A 4-foot, 1.25-inch I.D. bailer was slowly lowered into the well until it was fully submerged.
- The pressure transducer was activated and the readings monitored to check for re-establishment of static conditions prior to test initiation.
- Once static conditions were documented, the pressure transducer was reset and one full bailer volume of water was removed.
- Water levels in the well were then automatically recorded by the data logger until static conditions were re-established.
- The data was preliminarily evaluated in the field to ensure proper recovery-curve development.

Hydraulic conductivities were calculated using the Bouwer and Rice (1976) method. Recovery-curve plots and calculations are included in Appendix C. Results of the testing are presented in Section 3.2.

2.6 Task 6 - Residential Well Sampling

The Cole residence is located to the east and downgradient of the site (Figure 2 and Plate I). The Cole's have two drinking water wells on their property; one for their residence and one for an occupied cabin located north of the residence. Three water samples were collected from the Cole's wells. Two samples were collected from the Cole residence, one before their filtering system (MGRW01-01) and one sample after filtering (MGRW02-01). The third sample was

collected at the cabin (MGRW03-01). The cabin does not have a filtering system. Before collecting the samples, the size of holding tank was determined along with the flow rate from the spigot using a 2.5 gallon bucket. The water was allowed to flow 10 minutes past the calculated time to empty the holding tank to assure that formation water was being collected. Residential well samples were analyzed for VOCs only. Historical data indicate that metals have not been a problem at the Machias Gravel Pit site and, therefore, the residential wells were not sampled for metals. This was in accordance with the NYSDEC approved Work Plan.

2.7 Task 7 - Piezometer Installation and Measurement

A piezometer, P-1, was installed 40.5 feet from the Cole's residential well (Figure 2). Drilling procedures were identical to those of the monitoring wells. The borehole was advanced approximately 6 feet below the water table and the 10-foot PVC 0.010-inch continuous-slot screen was set straddling the water table. The boring log and the piezometer construction summary are included in Appendix B. Piezometer P-1 was finished flush with the ground surface using a metal manhole cover and locking pipe plug.

The piezometer was used to measure the local effect of the Cole residential well. A pressure transducer attached to a Hermit SE1000A data logger was placed about one foot from the bottom of P-1 and activated to measure drawdown as the outside spigot at the Cole residence was turned on. A 100 foot garden hose discharged the water downgradient of P-1 to minimize the effect of possible recharge. The water flowed from the hose at a rate of 8.3 gallons per minute. This rate remained relatively constant throughout the seven hour pumping test. The flow rate was measured with a stop watch and 2.5 gallon bucket. Water levels in P-1 were measured and recorded on the data logger.

A recovery test was conducted immediately following the shut off of the outside spigot. No one was at the Cole residence during the recovery test so the recovery test was not interrupted by water use in the Cole household.

2.8 Task 8 - Air Quality Sampling

A PID was used to monitor the presence of total organic vapors. Background readings were taken off-site. No organic vapors above background levels were detected in the breathing zone, downhole or during head space measurements on soil samples, with the exception of one reading at well GW-7. A reading was taken downhole at GW-7 immediately after hitting the water table while water vapor (steam) was discharging from the hole. The reading downhole was 7 parts per million (ppm) above background, but remained at background in the breathing zone. Subsequent measurements gave background readings. PID's will commonly be affected by the presence of water vapor in the atmosphere and give a reading as though VOCs had been detected. HSI believes that this is what occurred at well GW-7 and that the 7 ppm reading obtained downhole was erroneous.

3.0 GEOLOGY/HYDROGEOLOGY

3.1 Geologic Setting

Topography and surface geology in the Machias area is largely shaped by Pleistocene glaciation. Older sedimentary rocks were scoured by glaciation leaving behind sands and gravels of variable thickness. W. B. Satterthwaite Associates (1985) quote local driller reports that bedrock is at a depth of 40 feet on the flanks of local stream valleys and up to 350 feet deep along valley axis. Depth to bedrock near the gravel pit is reported to be approximately 90 feet (NYS Water Resource Commission, 1973).

Within the boundaries of the study area, unconsolidated deposits unconformably overlie bedrock consisting of the upper Devonian Age Gowanda Shale Member of the Canadaway Formation. This formation is approximately 275 feet thick and underlain by more shales and siltstones. The overlying unconsolidated deposits are fluvioglacial (i.e., stream deposits associated with continental glacial ablation) in origin, and are comprised primarily of sand and gravel with some silty horizons. The uppermost unit is a sand which is underlain by silt. Beneath the silt is an interlayered sand, and sand and gravel with an underlying silt unit. The bottom of the silt unit was not penetrated by any of the borings.

The general sequence of the unconsolidated units is as follows:

- Unit I - Sand: present only in well GW-1. Generally fine sand, some silt, tan, traces of clay in some horizons; unsaturated.
- Unit II - Silt: some clay, trace pebbles present in some horizons; tan to brown; unsaturated.
- Unit IIIA - Sand and gravel: poorly sorted sands and gravel, grain sizes from fine sand to pebbles, cobble size gravel in some horizons; generally unsaturated, the bottom few feet are saturated in some wells.
- Unit IIIB - Sand: interbedded with sand and gravel unit, fine to medium sand, usually well sorted, becoming silty to the southeast and near the bottom of the unit; generally unsaturated.

- Unit IV - Silt: brown to gray, fining to the southeast to silty clay; saturated.

Three geologic cross sections were developed from monitoring well boring logs. Section line locations are shown on Figure 4 and the cross-sections are provided on Figures 5 and 6.

3.2 Hydrogeology/Ground Water Flow

The upper most aquifer beneath the site consists of the fluvioglacial sand and gravel deposits. The aquifer is under unconfined conditions and its lower boundary is marked by the low permeability shale bedrock. A water table contour map is provided on Figure 7.

The water table at the site roughly follows ground surface topography, with the exception of the active pit area. Surface runoff ponds in the active pit area may produce a slight mounding effect from additional recharge. The effect can be seen in the shape of the water table defined by the 1693 foot contour line on Figure 7. Ground water flows in a semi-radial pattern from the active pit area ranging from a northeast to southeast direction. Ground water from the old pit area near well GW-5, (the area where dumping of oils and solvents is known to have taken place) flows northeast, curving east toward Ischua Creek. Ground water from the vicinity of GW-2 and GW-8 flows toward the stream draining Bird Swamp. Although no ground water levels were measured adjacent to the stream, projections of the water table map put the water table about the same elevation as the stream, the likely discharge point.

The gradient of the water table across the site ranges from 3×10^{-4} ft/ft (between GW-5 and GW-2) to 4×10^{-2} ft/ft upgradient from GW-8. The average water table gradient at the site is approximately 1.5×10^{-2} ft/ft. Depth to water is greatest east of the site where the water table is approximately 61 feet below ground surface. P-1 was measured as the shallowest depth to water at 11 feet below ground surface. Presumably the water table eventually intersects Ischua Creek and its tributary from Bird Swamp. Comparing head measurements between the shallow and deep well at well cluster GW-3 shows little head change with depth. This suggests a strong preferential horizontal flow component within the aquifer.

2.3 Task 3 - Surface and Subsurface Soil Sampling

Three surface soil and two subsurface soil samples were collected at the site. Surface soil sample locations were surveyed and are shown on Plate I and Figure 2. Subsurface soil samples were collected during the drilling of wells GW-5 and GW-8.

2.3.1 Surface Soil Sampling

Surface soil samples were collected by first removing surface vegetation and debris with a decontaminated shovel. Actual samples were collected with a stainless steel trowel. Samples were collected at the four corners of a 10 foot by 10 foot square, with an additional sampling point at the center of the square. The samples were placed into a stainless steel mixing bowl and composited. Appropriate proportions were then placed into wide mouth jars for total metals and PAH analysis. Sample aliquots for volatile organic compound (VOC) analysis were obtained as grab samples from the center point at each of three respective locations.

Field notes were kept, recording the date, time and a description of each surface soil sample. MGSS01-01 consisted of a well graded sand and gravel. Sample MGSS02-01 was well graded with clay to gravel size grains and MGSS03-01 consisted of clay and gravel.

2.3.2 Subsurface Soil Samples

Subsurface soil sample MGSB01-01 was collected from split spoon samples taken during the drilling of monitoring well GW-5. Photoionization detector (PID) readings remained at background levels from the surface to total depth of GW-5. The soil sample was, therefore, collected from just above the water table. VOC grab samples were collected from the interval of 42 to 44 feet below ground surface. Total metals and PAH samples were a composite of split spoon samples from the interval of 40 to 44 feet. The sampled soil was a mixture of fine sand, silt and clay.

Section 2.3

on4

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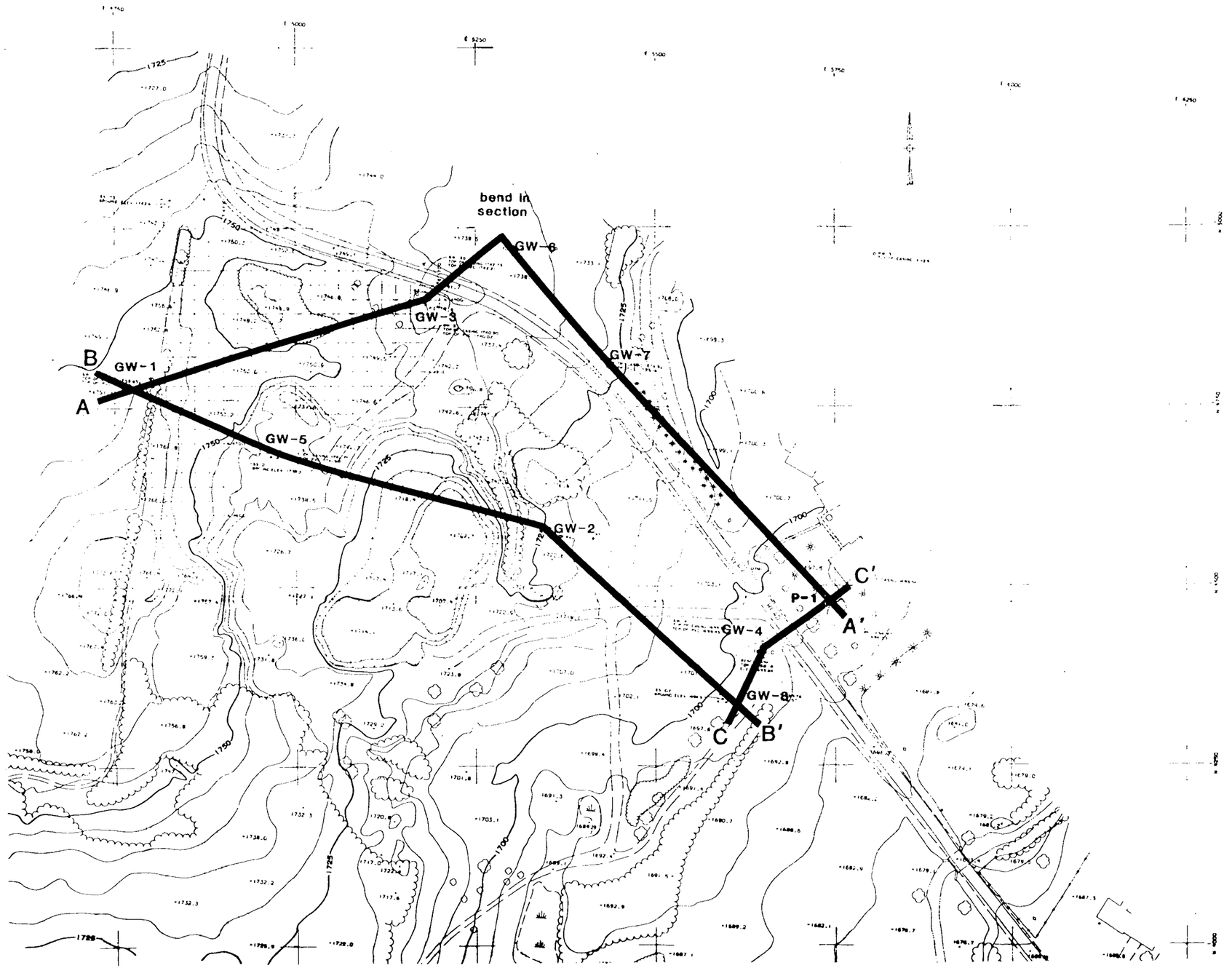
pgs 2.4 - 2.5



LEGEND

A ——— A' Cross Section Location

0 100 ft

SCALE

Cross Section Locations

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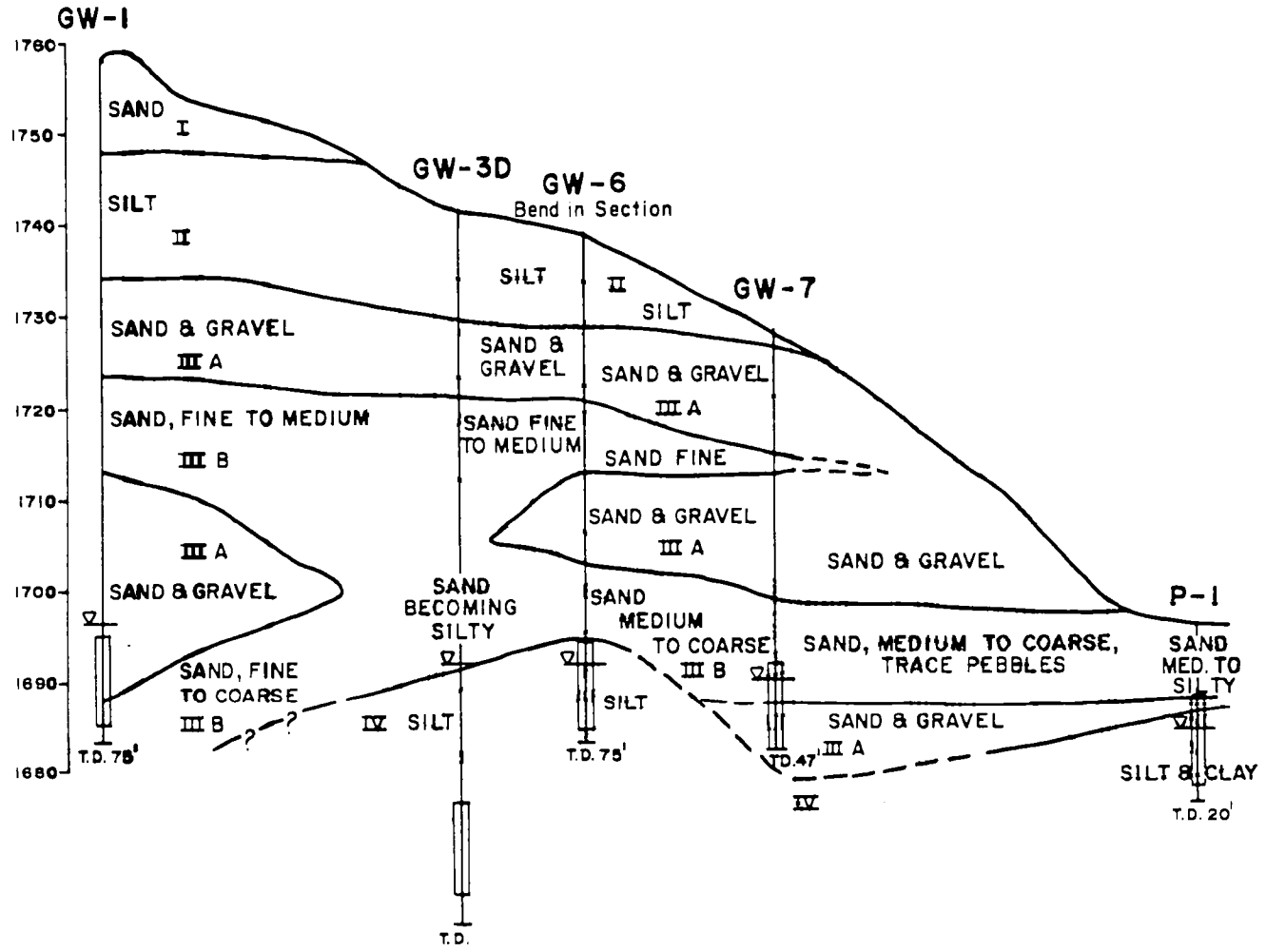
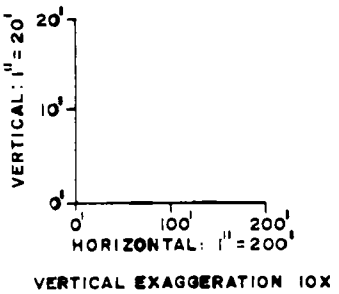
FIGURE 4



CROSS-SECTION A-A'



VERTICAL EXAGGERATION 10X

CROSS-SECTION A-A'	
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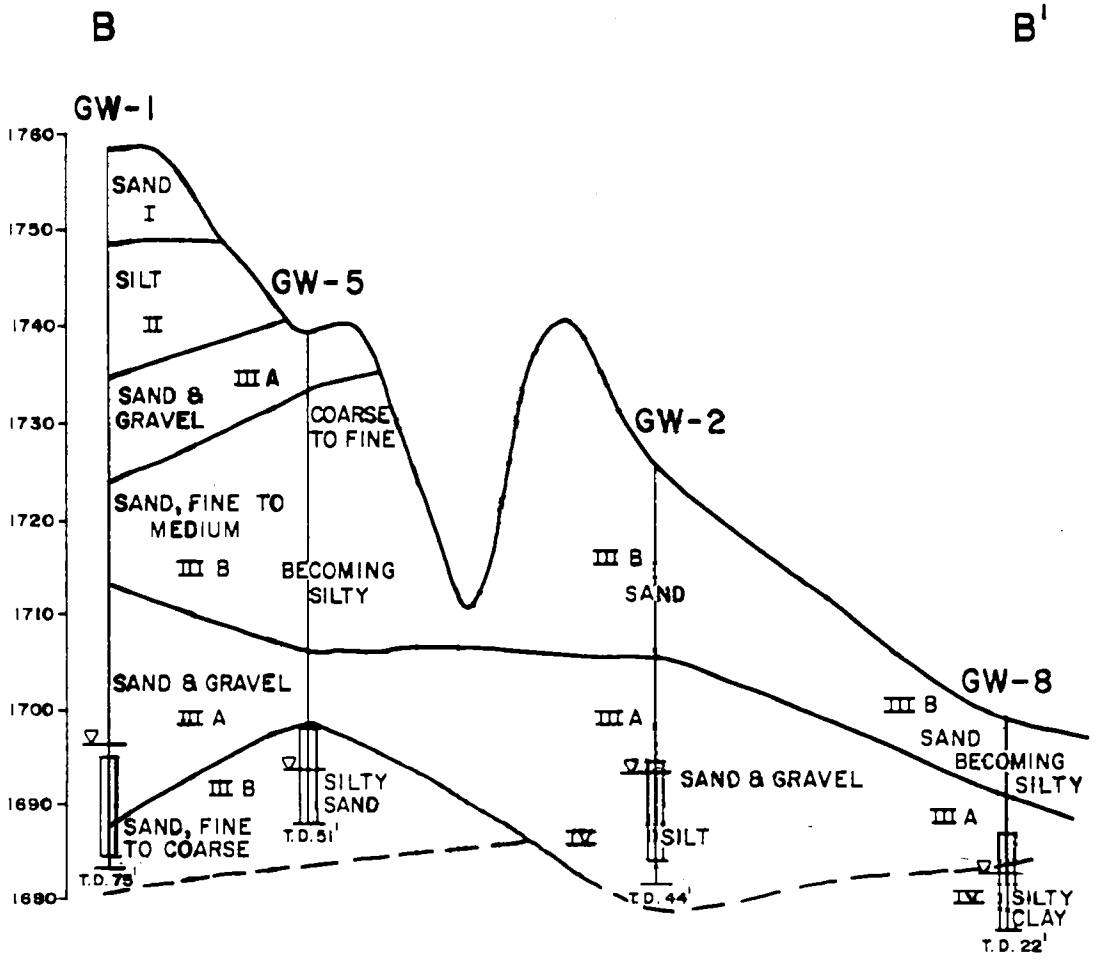
FIGURE 5



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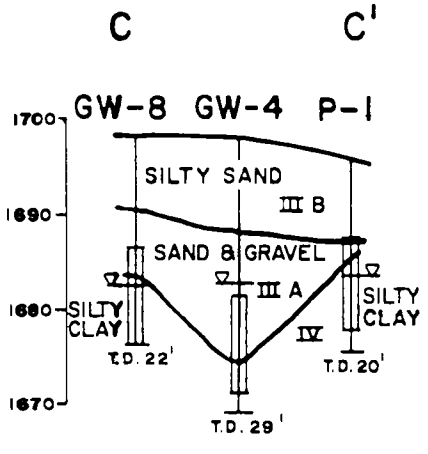

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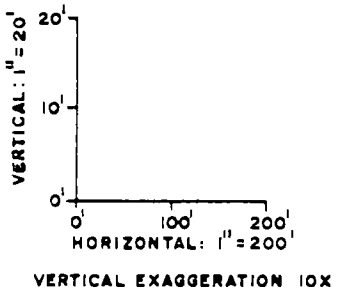

VERTICAL EXAGGERATION 10X

CROSS-SECTIONS B-B' & C-C'

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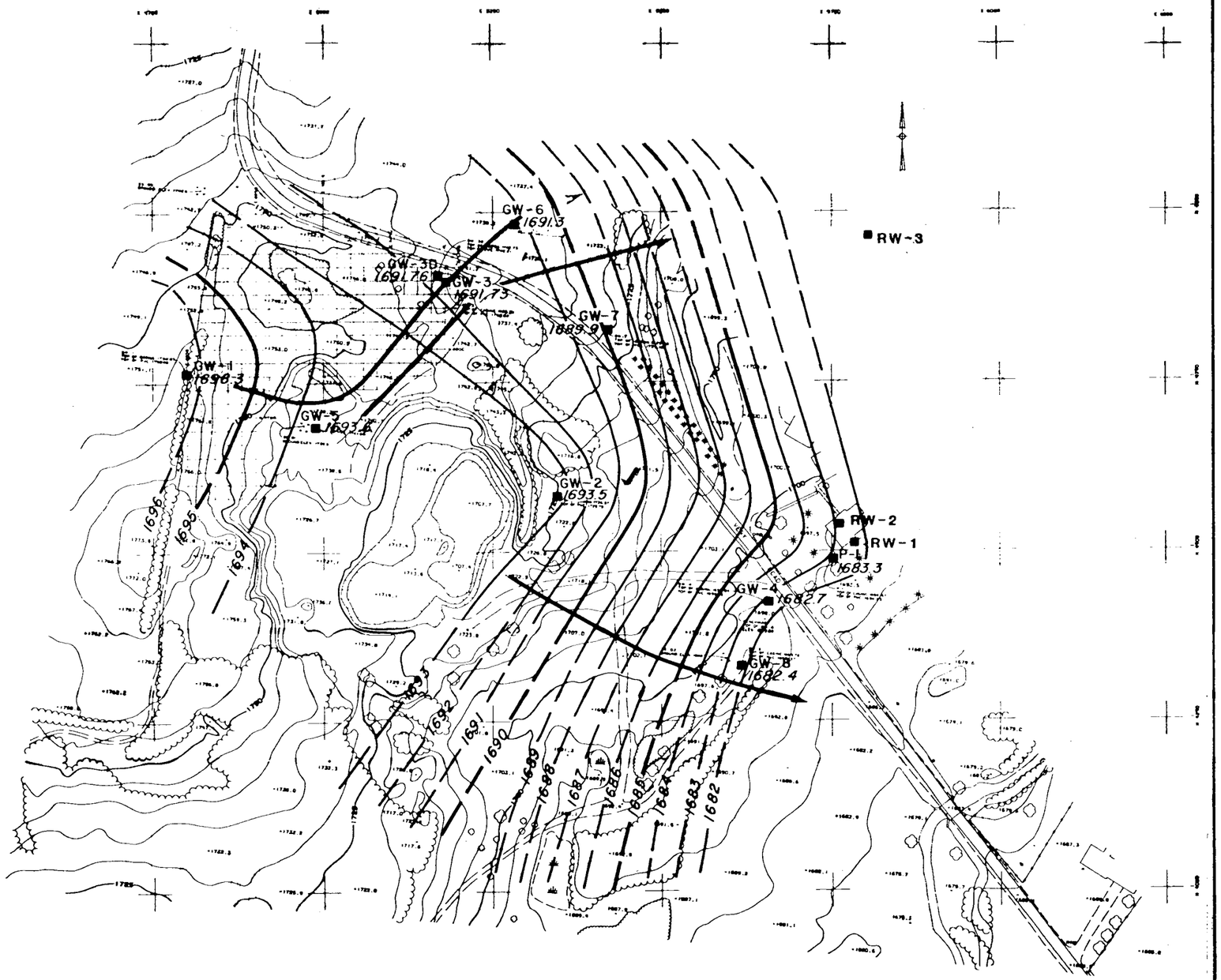
FIGURE 8



LEGEND

Ground Water Flow Direction

1690 — Water Table Elevation Contour

GW-1 ■ 1696.3 — Monitoring Well with Water Table Elevation

WATER TABLE CONTOUR MAP

PROJECT: 42611603-2 | DATE: April 1991

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FIGURE 7

In order to estimate horizontal hydraulic conductivities, baildown-recovery tests were performed on all new and existing monitoring wells. (Test results of well GW-3D are not included in this report as closer examination of the data revealed a problem with the data logger and the results were deemed unreliable and unusable.) Test procedures are defined in Sectiony 2.4 and resulting recovery curves are provided in Appendix C. The data was analyzed using the Bouwer and Rice method (1976) and the results are summarized on Table 3. The conductivities range from 4.46×10^{-4} ft/sec to 5.74×10^{-6} ft/sec. The average hydraulic conductivity of the eight wells is 6.2×10^{-5} ft/sec. These values are consistent with previous test results performed during the Phase II NYSDEC investigation.

The pumping test at the residential well gave transmissivities of 15,100 gpd/ft and 14,600 gpd/ft for the drawdown and recovery test, respectively. Assuming a 50 foot thick aquifer, the hydraulic conductivity determined from the residential well pump test is 4.7×10^{-4} ft/sec and 4.5×10^{-4} ft/sec respectively for the drawdown and recovery portions of the test. These values are in the same range as calculated using bail-down recovery tests. It should be noted, however, that the values for the constant discharge test may be biased low due to limits on pumping rate associated with the residential well pump and time constraints.

Ground water flow rates can be estimated using Darcy's Law. Assuming the average gradient of 1.5×10^{-2} ft/ft and the average hydraulic conductivity of 6.2×10^{-5} ft/sec, the average flow rate is 9.3×10^{-7} ft/sec. The seepage velocity (Darcy velocity/effective porosity) is 3.1×10^{-6} ft/sec, assuming an effective porosity of 0.3 which is in the common range for sands and gravels (Fetter, 1980).

TABLE 3

HYDRAULIC CONDUCTIVITIES OF MONITORING WELLS
AT THE MACHIAS GRAVEL PIT

WELL	HYDRAULIC CONDUCTIVITY	
	HSI	LM&S*
GW-1	5.74×10^{-6} ft/sec	1.00×10^{-4} ft/sec
GW-2	4.46×10^{-4} ft/sec	2.30×10^{-3} ft/sec
GW-3	2.05×10^{-5} ft/sec	2.37×10^{-5} ft/sec
GW-4	2.51×10^{-5} ft/sec	1.40×10^{-5} ft/sec
GW-5	4.82×10^{-5} ft/sec	
GW-6	1.33×10^{-4} ft/sec	
GW-7	1.02×10^{-4} ft/sec	
GW-8	2.61×10^{-4} ft/sec	

* Lawler, Matusky and Skelly Engineers (Contractor for NYSDEC Phase II Investigation)

4.0 ANALYTICAL CHEMISTRY RESULTS

In accordance with the approved RI/FS Work Plan for the Machias Gravel Pit site, samples were collected from the following groups:

- Soils (Test pit, surface, and subsurface).
- Ground water (monitoring well and residential well).

Details of the sample and analysis program is provided in Table 4. Chemistry results are provided in the following subsections. Raw data are on file at the HSI office in Golden, Colorado. Third party data validation was performed by NUS Corporation. Results of the data validation are provided in Appendix D.

4.1 Soil Analytical Results

Three types of soil samples were collected during the RI/FS:

- Test pit soil samples.
- Subsurface soil samples.
- Surface soil samples.

Sample collection techniques are provided in Section 2.0 of this report. All soil samples were analyzed for Hazardous Substance List (HSL) volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs), chromium, nickel and lead. Analytical results are summarized in Tables 5 through 7.

Volatile Organic Compounds

Table 5 provides a summary of VOCs detected in soil samples. The only soil sample in which VOCs were detected was sample SB01-01. This soil sample was collected during drilling of monitoring well GW-5 in the old gravel pit. The soil sample analyzed was collected from 42 to 44 feet below the surface, just above the water table. The only VOCs detected were trichloroethene (TCE, 291 ug/kg) and 1,1,1-trichloroethane (1,1,1-TCA, 27 ug/kg).

Section 4.1

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pgs 4.1 - 4.6

TABLE 4

SAMPLING AND ANALYSIS MATRIX
MACHIAS GRAVEL PIT SITE

Sample Matrix	Investigative Samples	Duplicate Samples	Field Blanks	Total
Soil				
Surface Soil	3	1	—	4
Subsurface Soil	2	—	—	2
Test Pit	5	1	—	6
Water				
Ground Water	11	1	1	13
TOTAL	21	3	1	25

Note: All samples were analyzed for VOCs, PNAs, total chromium, total lead and total nickel. Ground water samples from monitoring wells were also analyzed for total phenols and total and dissolved chromium, total and dissolved lead and total and dissolved nickel. Ground water samples from residential wells were only be analyzed for VOCs.

TABLE 5 – SUMMARY OF SOIL SAMPLE VOLATILE ORGANIC COMPOUND ANALYSES
Machias, New York

SAMPLE DESIGNATION	TP01-01		TP02-01		TP02-01-DP		TP03-01		TP04-01		TP05-01	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
VOLATILE ORGANIC COMPOUNDS	ug/kg		ug/kg		ug/kg		ug/kg		ug/kg		ug/kg	
1,1,1-Trichloroethane	ND		ND		ND		ND		ND		ND	
Trichloroethene	ND		ND		ND		ND		ND		ND	

SAMPLE DESIGNATION	SS01-01		SS02-01		SS03-01		SB01-01		SB02-01	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL	
VOLATILE ORGANIC COMPOUNDS	ug/kg		ug/kg		ug/kg		ug/kg		ug/kg	
1,1,1-Trichloroethane	ND		ND		ND		27		ND	
Trichloroethene	ND		ND		ND		291		ND	

Notes:
- ND – Not detected.
- TP – Test pit.
- SB – Soil boring.
- SS – Surface soil.
- DP – Duplicate.

TABLE 6 – SUMMARY OF POLYAROMATIC HYDROCARBON ANALYSES
Machias, New York

SAMPLE DESIGNATION	TP01-01		TP02-01		TP02-01DP		TP03-01		TP04-01		TP05-01	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SEMI-VOLATILE ORGANIC COMPOUNDS	**ug/kg**		**ug/kg**		**ug/kg**		**ug/kg**		**ug/kg**		**ug/kg**	
Acenaphthylene	ND		ND		ND		ND		ND		280	J
Fluorene	ND		ND		ND		ND		ND		220	J
Phenanthrene	ND		ND		ND		ND		ND		1900	
Anthracene	ND		ND		ND		ND		ND		220	JX
Fluoranthene	ND		ND		ND		340	J	ND		1500	
Pyrene	ND		ND		ND		260	J	ND		1100	
Benzo(a)anthracene	ND		ND		ND		ND		ND		490	J
Benzo(b)fluoranthene	ND		ND		ND		ND		ND		570	
Benzo(k)fluoranthene	ND		ND		ND		ND		ND		410	J
Benzo(a)pyrene	ND		ND		ND		ND		ND		470	J
Indeno(1,2,3-cd)pyrene	ND		ND		ND		ND		ND		400	J
Benzo(g,h,i)perylene	ND		ND		ND		ND		ND		250	JX

SAMPLE DESIGNATION	SB01-01	SB02-01	SS01-01	SS02-01	SS03-01
MATRIX	SOIL	SOIL	SOIL	SOIL	SOIL
SEMI-VOLATILE ORGANIC COMPOUNDS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Acenaphthylene	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND

Notes:
- ND – Not detected.
- TP – Test pit.
- SB – Soil boring.
- SS – Surface soil.
- DP – Duplicate.
- J – Estimated value.
- X – Mass spectrometer does not meet EPA CLP criteria for confirmation, but compound presence is strongly suspected.

TABLE 7 – SUMMARY OF SOIL SAMPLE INORGANIC ANALYSES
Machias, New York

SAMPLE DESIGNATION	TP01-01		TP02-01		TP02-01DP		TP03-01		TP04-01		TP05-01	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
METALS	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Chromium	3.7		5.0		4.8		6.5		8.2		5.5	
Lead	*		*		*		*		*		*	
Nickel	11.0		13.2		13.3		14.0		23		17.3	

SAMPLE DESIGNATION	SB01-01		SB02-01		SS01-01		SS02-01		SS03-01	
MATRIX	SOIL		SOIL		SOIL		SOIL		SOIL	
METALS	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Chromium	ND		3.1		2.5		4.6		6.0	
Lead	5.5		*		608		19.7		13.6	
Nickel	9.6		13.3		11.7		10.2		13.3	

Notes:
- ND – Not detected.
- TP – Test pit.
- SB – Soil boring.
- SS – Surface soil.
- DP – Duplicate.
- * – Analyzed but results rejected by third party data validation due to spike recovery problems.

Polyaromatic Hydrocarbons

Table 6 provides the results of PAH analyses. Only the soil samples collected from test pits 3 and 5 (i.e., TP03-01 and TP05-01) were shown to contain PAHs. A review of test pit logs for each location indicates the presence of construction debris within the fill. The construction debris included asphalt type material. The suite of PAHs detected are typical components of asphalt.

Metals

Results of soil analyses for chromium, nickel and lead are summarized on Table 7. Chromium was found to range in concentration from non-detected to 8.2 mg/kg. Background soil sample SS03-01 collected in the farm field north of the study area showed chromium at 6 mg/kg. Nickel was found to range from 9.6 to 23 mg/kg with a background concentration of 13.3 mg/kg.

The lead data for one batch of samples which included the test pit soil samples and one subsurface soil sample (SB02-01; collected at well location GW-8 from right above the water table) were rejected and qualified as unusable for project purposes by third party data validation due to matrix spike recovery problems (Appendix D). The remaining analyses showed lead to range from 13.6 mg/kg at the background sample location to 608 mg/kg at surface soil sample location SS01-01 located within the inactive gravel pit area.

4.2 Ground Water Analytical Results

Two types of ground water samples were collected during the RI/FS:

- Monitoring well samples.
- Residential well samples.

All monitoring well samples were analyzed for HSL volatile organic compounds, phenols, total chromium, nickel, iron and lead, dissolved chromium, nickel, iron and lead and hardness. Based on the results of previous sampling, VOC's were the only contaminant of concern found in the residential wells, and therefore, residential well samples were analyzed only for HSL volatile organics. Analytical results for ground water samples are provided in Tables 8 through 10.

Volatile Organic Compounds

Tables 8 and 9 summarize the VOCs detected in both monitoring well and residential well samples. VOCs were detected in monitoring wells GW-3, GW-3D, GW-5, GW-6 and GW-7. No VOCs were detected in the other monitoring well or in residential well samples.

The VOCs detected most frequently and in the highest concentrations were TCE and 1,1,1-TCA. TCE ranged in concentration from non-detected to approximately 720 ug/l with the highest concentration detected in well GW-5 located within the old gravel pit area. 1,1,1-TCA concentrations ranged from non-detected to 390 ug/l with the highest concentration detected in well GW-3, approximately 300 feet downgradient of the old gravel pit area.

Phenol (60 ug/l) and benzene (9 ug/l) were detected only in well GW-3. The benzene detection is an estimated value below method detection limit but above the instrument quantification limit. Previous sampling at this location performed by the NYSDEC showed the presence of phenol but no benzene was detected.

Acetone (13 ug/l) was detected only in well GW-3D. It was identified at a low concentration, just slightly above the method detection limit. Acetone is a common laboratory introduced contaminant (U.S. EPA, 1988) and although it was not detected in the laboratory method blank, at such low concentrations and low frequency of detection it may not be representative of actual site conditions.

TABLE 8 – SUMMARY OF GROUND WATER VOLATILE ORGANIC COMPOUNDS AND PHENOL ANALYSES
Machias, New York

SAMPLE DESIGNATION MATRIX	GW01-01 WATER		GW02-01 WATER		GW02-01-DP WATER		GW03-01 WATER		GW03D-01 WATER		GW04-01 WATER		GW05-01 WATER	
VOLATILE ORGANIC COMPOUNDS	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
Acetone	ND		ND		ND		ND		13		ND		ND	
Benzene	ND		ND		ND		9	J	ND		ND		ND	
1,1,1-Trichloroethane	ND		ND		ND		390		160		ND		120	
Trichloroethene	ND		ND		ND		44		7		ND		720	J
Total Phenols	ND		ND		ND		60		ND		ND		ND	

SAMPLE DESIGNATION MATRIX	GW06-01 WATER		GW07-01 WATER		GW08-01 WATER		FIELD BLANK WATER		TRIP BLANK #1 WATER		TRIP BLANK #2 WATER	
VOLATILE ORGANIC COMPOUNDS	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
Acetone	ND		ND		ND		ND		ND		ND	
Benzene	ND		ND		ND		ND		ND		ND	
1,1,1-Trichloroethane	51		13		ND		ND		ND		ND	
Trichloroethene	ND		33		ND		ND		ND		ND	
Total Phenols	ND		ND		ND		ND		ND		ND	

Notes: ND – Not detected.
GW – Ground water.
DP – Duplicate.
J – Estimated value.

TABLE 9 – RESIDENTIAL WELL VOLATILE ORGANIC COMPOUND ANALYSES
Machias, New York

SAMPLE DESIGNATION MATRIX	RW01-01 WATER	RW02-01 WATER	RW03-01 WATER	TRIP BLANK WATER
VOLATILE ORGANIC COMPOUNDS	ug/l	ug/l	ug/l	ug/l
Acetone	ND	ND	ND	ND
Benzene	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND
1,2-Dichloroethene (total)	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND
4-Methyl-2-Pentanone	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND
Styrene	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND
Toluene	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Vinyl Acetate	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND

RW01 - Cole residence prior to carbon filter.
RW02 - Cole residence after carbon filter.
RW03 - Cabin well.
ND - Not Detected.

TABLE 10 – SUMMARY OF GROUND WATER INORGANIC RESULTS (TOTAL AND DISSOLVED)
Machias, New York

SAMPLE DESIGNATION		GW01-01		GW01-01		GW02-01		GW02-01		GW02-01DP		GW02-01DP		GW03-01		GW03-01	
MATRIX		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER	
METALS		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	Chromium	54.4	J	ND		53.5		ND		47.4		ND		ND		ND	
	Lead	69.0		ND		131.0		ND		154.0		ND		21.3		ND	
	Nickel	41.3		ND		155.0		ND		161.0		ND		ND		ND	
	Iron	53700.0	J	23.3	J	120000.0		N/A		125000.0		N/A		16500.0		N/A	
*	Hardness	546.0		N/A		680.0		N/A		730.0		N/A		399.0		N/A	

SAMPLE DESIGNATION		GW03D-01		GW03D-01		GW04-01		GW04-01		GW05-01		GW05-01		GW06-01		GW06-01	
MATRIX		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER	
METALS		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	Chromium	37.6	J	7.3	J	50.0		ND		37.8	J	ND		51.2	J	ND	
	Lead	124.0		ND		16.4	S	ND		75.7		ND		54.9		ND	
	Nickel	133.0		ND		96.8		ND		120.0		ND		83.9		ND	
	Iron	150000.0	J	41.3	J	120000.0		N/A		137000.0	J	86.2	J	85400.0	J	83.1	J
*	Hardness	913.0		N/A		635.0		N/A		643.0		N/A		682.0		N/A	

SAMPLE DESIGNATION		GW07-01		GW07-01		GW08-01		GW08-01		FIELD BLANK		FIELD BLANK	
MATRIX		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER		TOTAL WATER		DISSOLVED WATER	
METALS		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	Chromium	31.3	J	ND		7.2	J	ND		ND		ND	
	Lead	82.9		ND		29.0		ND		ND		ND	
	Nickel	90.5		ND		ND		ND		ND		ND	
	Iron	106000.0	J	27.2	J	61700.0	J	68.5	J	36.7	J	26.4	J
*	Hardness	616.0		N/A		569.0		N/A		0.78		N/A	

Notes:
- * – Hardness = mg equivalent CaCO3/L
- ND – Not detected.
- DP – Duplicate.
- GW – Ground water.
- S – Value presented was calculated using method of standard addition.
- J – Estimated value.
- N/A – Not applicable.

No chloroform was detected in any of the monitoring or residential wells during this sampling event.

Metals

Table 10 summarizes the total and dissolved metals concentrations. Ground water samples from all monitoring wells were sampled and analyzed for select total and dissolved metals. Total chromium ranged from non-detected to approximately 54 ug/l, with dissolved chromium (i.e., the portion truly mobile in the ground water system) being detected only at well GW-3D at an estimated concentration of 7.3 ug/l. It should be noted that the highest total chromium value was for background well GW-1.

Total lead was found to range from 16.4 ug/l to 154 ug/l. Background well GW-1 had a total lead concentration of 69 ug/l. No dissolved lead was detected in any of the ground water samples.

Total nickel concentrations ranged from non-detected to 155 ug/l. Background well GW-1 had a total nickel concentration of 41.3 ug/l. No dissolved nickel was detected in any of the ground water samples.

Total iron concentrations ranged from 16,500 ug/l to 150,000 ug/l. Background well GW-1 had a total iron concentration of 53,700 ug/l. Dissolved iron concentrations ranged from approximately 23 ug/l to 86 ug/l. It should be noted that not all samples were analyzed for dissolved iron as this analysis was only requested for a portion of the samples to aid in subsequent engineering evaluations.

5.0 DATA INTERPRETATION

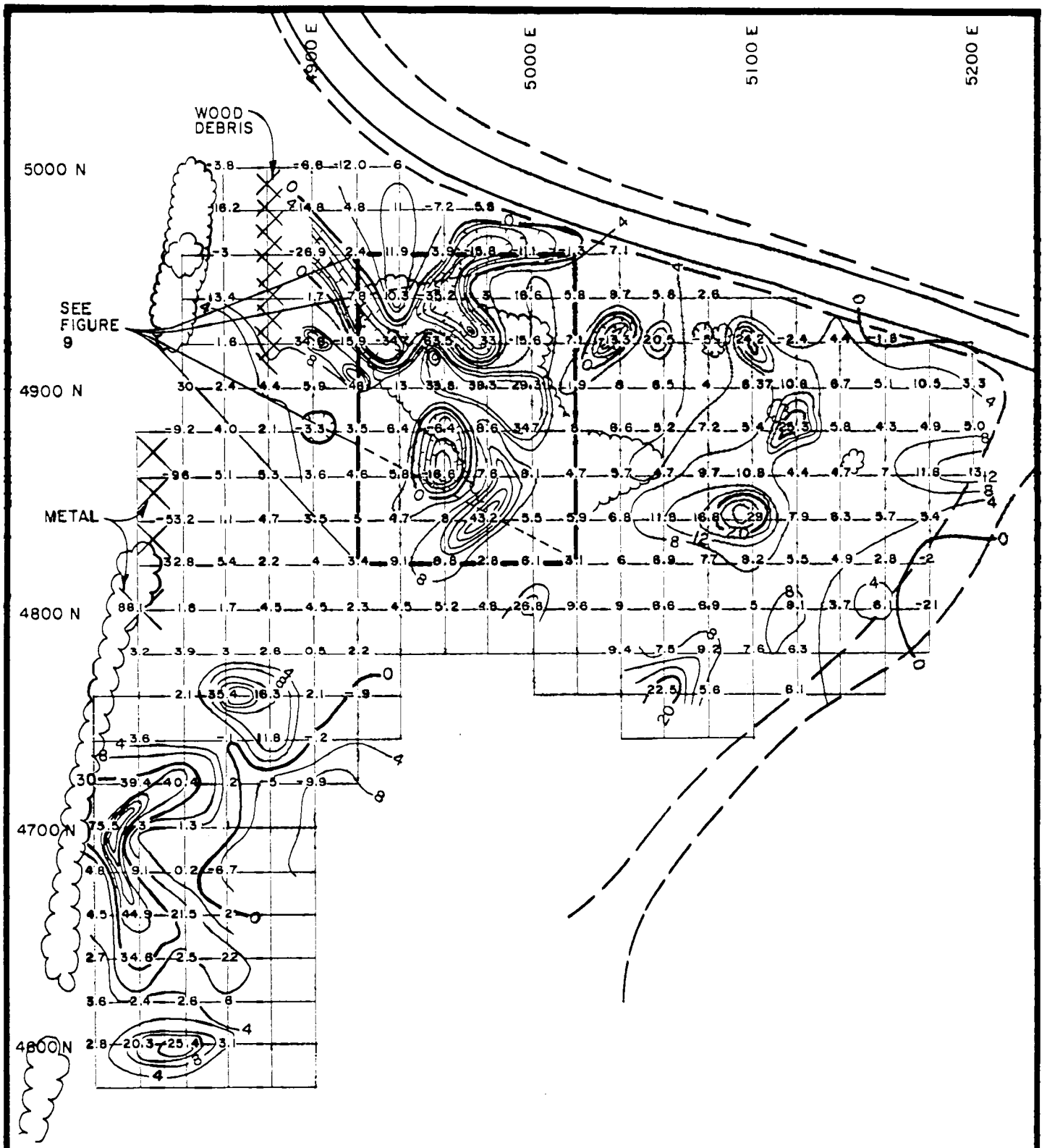
Physical and chemical data were generated during this site investigation to further characterize the site and to aid in a preliminary risk assessment and engineering evaluation of remedial alternatives. Interpretation of the data with respect to project objectives and site conditions is provided below.

5.1 Geophysical Survey Interpretations/Test Pit Results

A magnetic gradiometer survey was conducted over a portion of the site which reportedly contained buried drums. This method has been used successfully at other similar sites for the location of buried wastes. Results of the survey are provided on Figures 8 and 9. It should be noted that the contour interval on Figure 8 may increase at the anomalies due to the high magnetic gradient. This increase was made for clarity of presentation. As can be seen on the figures, a number of anomalous areas were noted with magnetic gradient signatures (i.e., peak-trough) typical of buried metal.

Seven test pit locations were chosen transecting the various anomalies to confirm or refute the presence of buried drums. Test pit locations and observation summaries are provided on Table 11 and Figure 10. Test pit logs are provided in Appendix A.

At most anomaly/test pit locations, metal debris such as pipe, culvert pieces, wire, etc. were found. Two test pit locations (TP-4 and TP-7) did not show any quantities of metal, however, major changes in lithology were noted from silty materials to gravel and cobbles. Test pits were excavated to depths sufficient to encounter native soils. There was no evidence or indication of buried drums (i.e., pieces of drums, sludges, etc.). Soil samples were collected and analyzed from five of the seven test pits. Analytical results presented in Section 4.1 show sample concentrations to be within or below background levels except for PAHs in test pits TP-3 and TP-5. Test pit logs for both locations indicate the presence of asphalt debris. PAHs are



Magnetic Gradiometer Survey Contour Map

PROJECT 426111603-2	REVISIONS
DATE April 1991	

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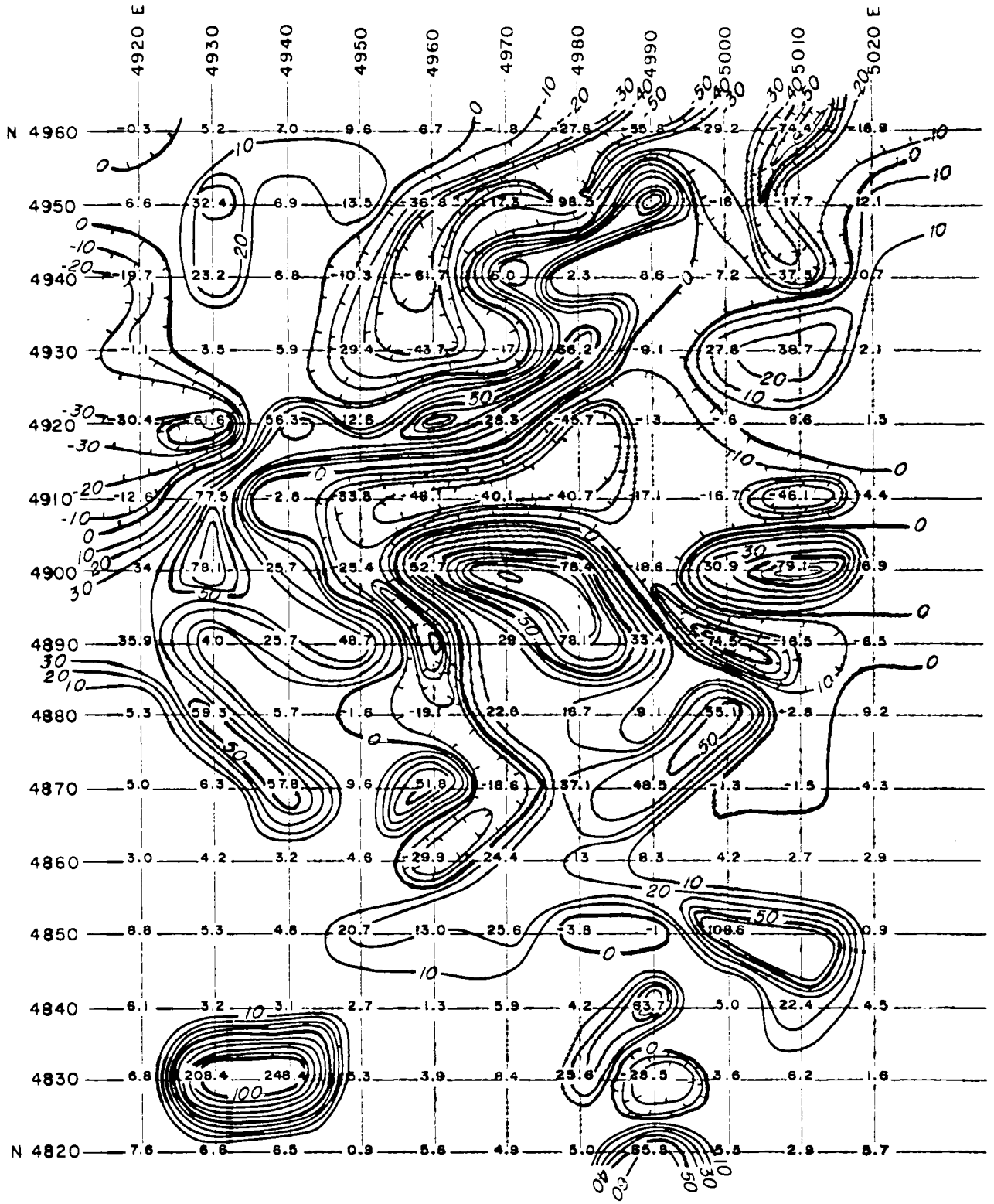
FIGURE 8



Magnetic Gradiometer
Survey Contour Map
(Detailed Spacing)

PROJECT 42611603-2	REVISIONS
DATE April 1991	

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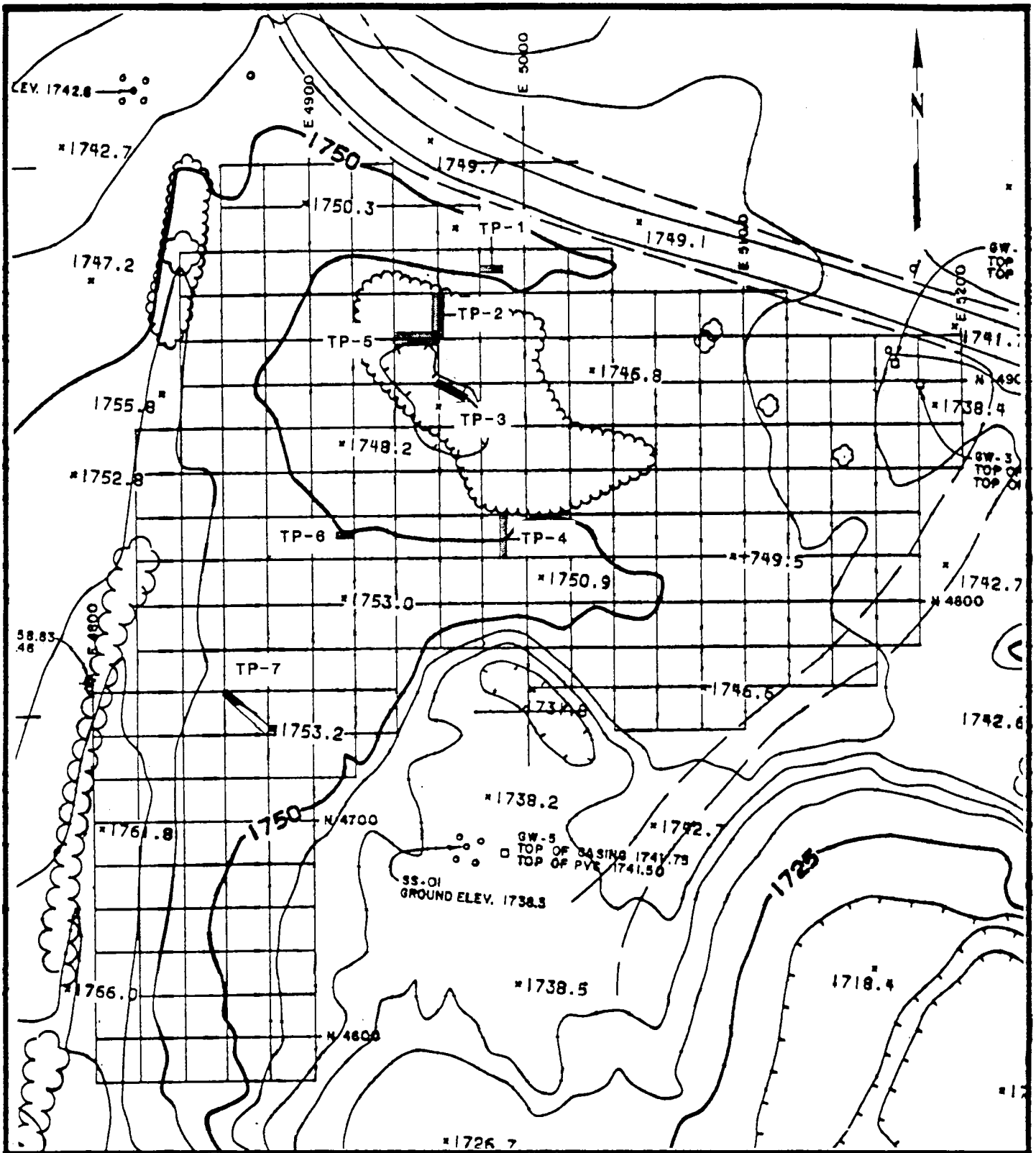
FIGURE 9



Test Pit Locations

PROJECT 42811603-2	REVISIONS
DATE April 1991	

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FIGURE 10

TABLE 11

SUMMARY OF TEST PIT OBSERVATIONS
MACHIAS GRAVEL PIT SITE

Test Pit No.	Coordinate North	Coordinate East	Observations
TP-1	4950	4990 - 4980	Metal pipe and pieces of sheet metal. Wood debris.
TP-2	4940 - 4920	4960	Two pieces of metal culvert and wire. Wood debris.
TP-3	4900 - 4890	4960 - 4970	Piece of wire wrap fiber hose. Asphalt pieces.
TP-4	4840 - 4820	4990	No significant metal. Change in lithology as pit transects from native loamy soil to gravelly fill.
TP-5	4920	4960 - 4940	Pieces of concrete with rebar. Miscellaneous small pieces of metal. Asphalt debris.
TP-6	4830	4940 - 4930	Wood boards with nails.
TP-7	4760 - 4740	4860 - 4880	No significant metal. Major change in fill type from sandy to gravel and cobbles.

common asphalt constituents. The chemical data, therefore, supports the visual observations that no drums have been buried within the suspect area of the site.

5.2 Surface/Subsurface Soil Sample Results

Analytical results for all surface and subsurface soil samples show background conditions except for lead in surface soil sample SS01-01 (608 mg/kg) and two VOCs (trichloroethene, 291 ug/kg and 1,1,1 trichloroethane, 27 ug/kg) in subsurface soil sample SB01-01.

Surface soil sample SS01-01 was collected from the inactive gravel pit area suspected to be the primary location of past spills/drum storage. The elevated lead level (608 mg/kg) at this location may be associated with the surface spillage. Based on the non-detection of all VOCs and PAHs in surface soil within the inactive gravel pit area, previous cleanup work performed by the NYSDEC (refer to Section 1.1) appears to have been successful in removing any surface source of organics contamination associated with past activities.

Subsurface soil sample SB01-01 was collected during the drilling of monitoring well GW-5 within the old gravel pit area. During the drilling of well GW-5 all split spoon samples were field screened for volatile organic vapors. No readings above background were detected. The soil sample chosen for chemical analysis was therefore, in accordance with the work plan, from immediately above the water table. The soil sample showed the presence of TCE and 1,1,1-TCA in the same relative proportions as the ground water sample from the same location (Table 12).

There is no evidence of surface or subsurface soil contamination in the vicinity of the former maintenance garage suggesting that spillage of wastes did not occur in this area.

TABLE 12

COMPARISON OF SOIL BORING SAMPLE AND GROUND WATER SAMPLE DATA AT WELL GW-5 MACHIAS GRAVEL PIT

Sample Type	Sample Number	TCE	1,1,1-TCA	Remarks
Subsurface Soil	SB01-01	291 ug/kg	27 ug/kg	Immediately above water table.
Ground Water	GW05-01	720 ug/l	120 ug/l	Water table well.

TCE - trichloroethene
1,1,1-TCA - trichloroethane

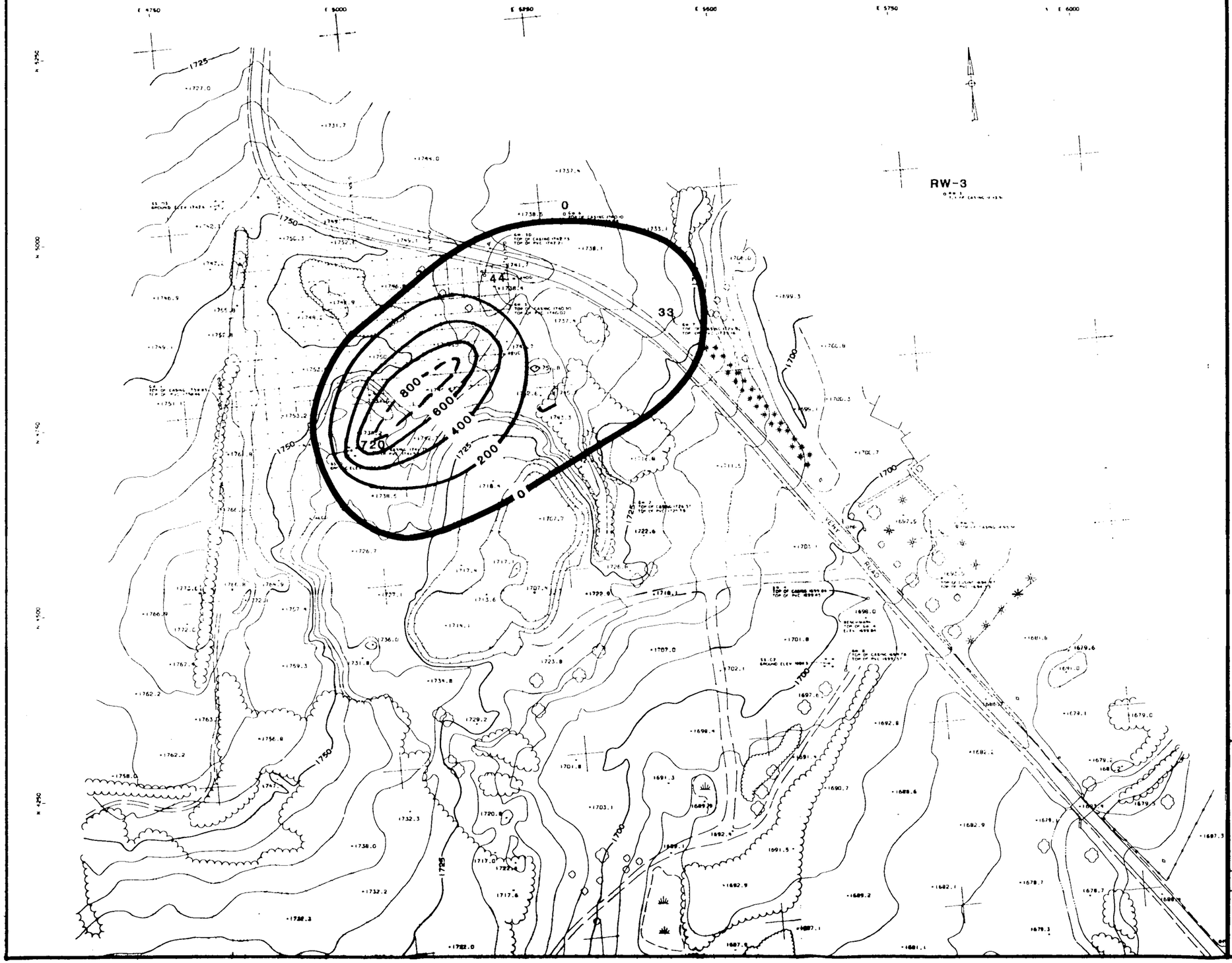
5.3 Ground Water Results

Analytical data for ground water samples summarized, in Section 4.2, indicates that ground water beneath the site has been impacted by past site activities. A slug of VOC contaminants is moving away from the inactive gravel pit area which is known to be an area of past waste spillage/storage. The plume consists primarily of dissolved phase TCE and 1,1,1-TCA. Isoconcentration contour maps for both constituents are provided on Figures 11 and 12.

The main contaminant slug axis is trending in a northeasterly direction, directly downgradient of the inactive gravel pit source area. The width of the plume was inferred based the areal distribution of observations and results of analytical modeling as discussed below in Section 5.4. Ground water contamination extends to at least 25 feet below the water table at location GW-3D (i.e., 75 feet below the ground surface).

While VOC ground contamination is apparent, a comparison of upgradient and downgradient total metals values does not reveal a negative impact on ground water. For example, a comparison of total lead values reveals that although well GW-3D is higher in total lead than background, other downgradient wells, specifically GW-3 and GW-6 have lower than background total lead levels. Other downgradient (GW-5 and GW-7) wells are nearly equal to background levels. The highest total lead value is detected in GW-2 (124 ug/l) which has no indication of VOC contmination and is not considered to be directly downgradient of the contaminant source area. The total lead in GW-2 is less than twice the background level. Total lead (and total metals) is most likely correlated to the amount of suspended sediments in the sample rather than an indication of the mobilization of metals in the ground water system. Dissolved lead concentrations from this location show lead to be non-detected, supporting the observation that lead is not mobile in the ground water system.

The ground water sample collected from well GW-8, located downgradient of the former maintenance garage area, showed no contamination. This is consistent with surface and



LEGEND

200 — Isoconcetration Contour (ug/l)

800 — Model Estimated Isoconcentration Contour (ug/l)

0 100 ft

SCALE

Isoconcentration Contour Map of TCE

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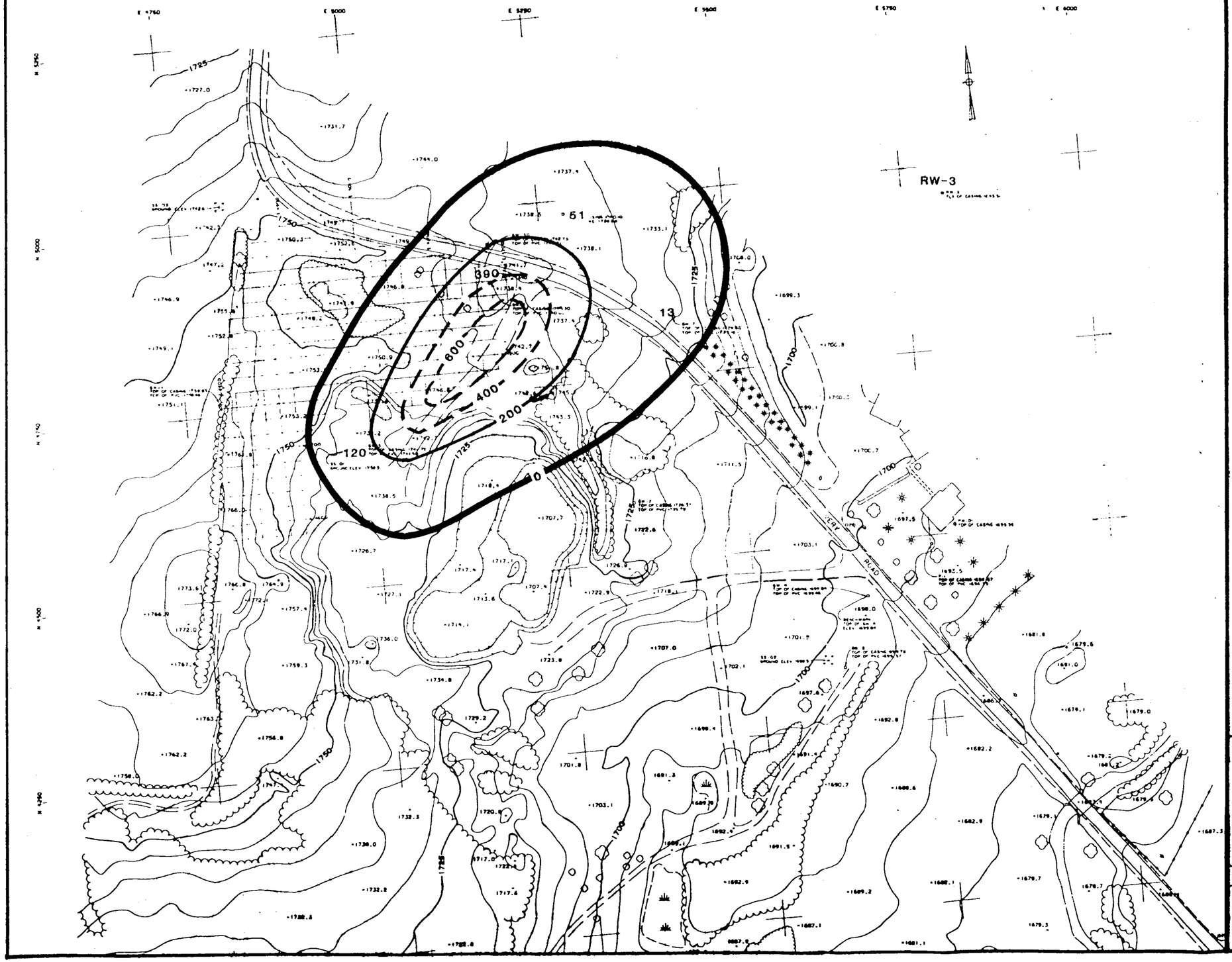
FIGURE 11



LEGEND

200 — Isoconcentration Contour (ug/l)

600 — Model Estimated Isoconcentration Contour (ug/l)

0 100 ft

SCALE

Isoconcentration Contour Map of 1,1,1,-TCA

PROJECT: 42611603-2 | DATE: April 1991

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FIGURE 12

subsurface soil sample results from the area (refer to Section 5.2) indicating clean conditions. These data suggest that there was probably no mishandling or spillage of material in the vicinity of the former maintenance garage.

With respect to the chloroform issue associated with the Cole residence well, the data from this study suggest that the chloroform is a localized problem and not associated with past spillage/waste storage activities at the Machias Gravel Pit site. This conclusion is based on the following:

- Chloroform was not detected in any of the on-site monitoring wells during this sampling or during the initial round of sampling performed in 1989 by the NYSDEC.
- Chloroform is not a suspect degradation product of any of the VOC constituents detected in ground water beneath the site.
- There is no evidence of active biodegradation at the site as TCE readily biodegrades to dichloroethene and dichloroethane.
- Ground water flow direction from the documented source area (i.e., the inactive gravel pit) is to the northeast and not toward the Cole residence.
- The identified ground water contaminant plume parallels the direction of ground water flow.
- The hydraulic properties of the aquifer, as defined by single well bail-down recovery tests and a short term pumping test performed on the Cole well, suggest that normal or extended pumping of this well will not draw contaminants from the defined plume area to the well.

The origin of the sporadic chloroform contamination in the Cole well is not know but is probably local to the well head.

5.4 Contaminant Fate and Transport

The data generated during this study indicate the primary contaminant transport media of concern is ground water. The main contaminants of concern are TCE and 1,1,1-TCA. Based

on ground water flow conditions and the areal distribution of the plume, the primary receptor is the cabin well located approximately 450 feet due north of the Cole residence. Sampling of this well indicates unimpacted conditions at the present time.

To estimate potential receptor concentrations at the cabin well, a two dimensional analytical ground water model was used. A uniform one-directional ground water flow system was assumed with a slug source of contamination. Based on site-specific hydrogeology and the nature of past disposal activities (i.e. storage and spillage over a fixed period of time rather than a continuous injection point source) these are reasonable assumptions.

Computer simulations were run using the Hunt equation (Hunt, 1983):

$$C = 0.01064C_0V_C\exp-\{[(x-v_st)^2/(4A_Lv_st)] + y^2/(4A_Tv_st)\}/[mnv_s(A_LA_T)^{1/2}t]$$

where,

C_0 = difference between solute concentration injected into aquifer and native aquifer solute concentration in mg/L.

C = change in aquifer solute concentration due to solute injection in mg/L.

x,y = cartesian coordinates of monitoring wells in feet.

m = aquifer thickness in feet.

n = aquifer effective porosity as a decimal.

t = time after injection started in days.

v_s = seepage velocity without adsorption in ft/day.

A_L = longitudinal dispersivity without adsorption in feet.

A_T = transverse dispersivity without adsorption in feet.

V_c = volume of injected mass in gallons.

As adsorption is a common retardation factor for contaminant transport in the ground water system, the computer simulations accounted for adsorption by dividing A_L, A_T, v_s and C by:

$$Rd = 1+[D_{bs}/n_p)K_d] \qquad \text{(Walton, 1989)}$$

where,

R_d = retardation factor as a decimal.

D_{bs} = bulk density of dry aquifer skeleton in g/cm^3.

n_p = aquifer actual porosity as a decimal.

K_d = partition coefficient in ml/g.

Input parameters for all variables except K_d, were fixed with either known site specific data or conservative assumptions to provide a worst case estimate. Table 13 summarizes the input parameters and assumptions.

The partition coefficient K_d was used to help calibrate the model to simulate the approximate distribution of contaminant concentrations detected in the field. A range of K_d values were calculated for TCE and 1,1,1-TCA using the following equation with varying organic carbon contents:

$$K_d = K_{oc}\, X_{oc} \qquad \text{(EPA, 1982)}$$

where,

K_{oc} = partition coefficient expressed on an organic carbon basis.

X_{oc} = mass fraction of organic carbon in sediment.

K_{oc} was calculated using the following relationship:

$$K_{oc} = 0.63\, K_{ow} \qquad \text{(EPA, 1982)}$$

where,

K_{ow} = octanol-water partition coefficient (literature values).

In the absence of site specific data for the mass fraction of organic carbon in the aquifer material, K_d was calculated using a range of X_{oc} values from 0.001 to 0.01. This is a conservative yet reasonable range for sand and gravel type aquifers (NYSDEC guidelines use the upper range or greater values in the absence of site specific data).

TABLE 13

SUMMARY OF GROUND WATER ANALYTICAL MODEL INPUT PARAMETERS
MACHIAS GRAVEL PIT SITE

Variable	Assigned Value	Remarks
C_o	TCE - 1100 mg/l 1,1,1-TCA - 950 mg/l	Solubility (EPA, 1981) Solubility (EPA, 1981)
V_c	16,500 gallons	Approximately 300-55 gallon drums.
m	90 ft.	Background geology data.
n	0.35	Literature value (Freeze and Cherry, 1979).
t	1000 days	Approximately 3 years since completion of drum removal.
v_s	0.56 ft/day	Calculated seepage velocity (Section 4).
A_L	30	Literature interpretation (Walton, 1985).
A_T	0.33 (A_L)	Slightly greater than literature approximation of 0.1 (A_L) due to field distribution of constituents suggesting increased A_T.
D_{bs}	2.30	Literature value (Walton, 1989).
n_p	0.4	Literture value (Freeze and Cherry, 1979).

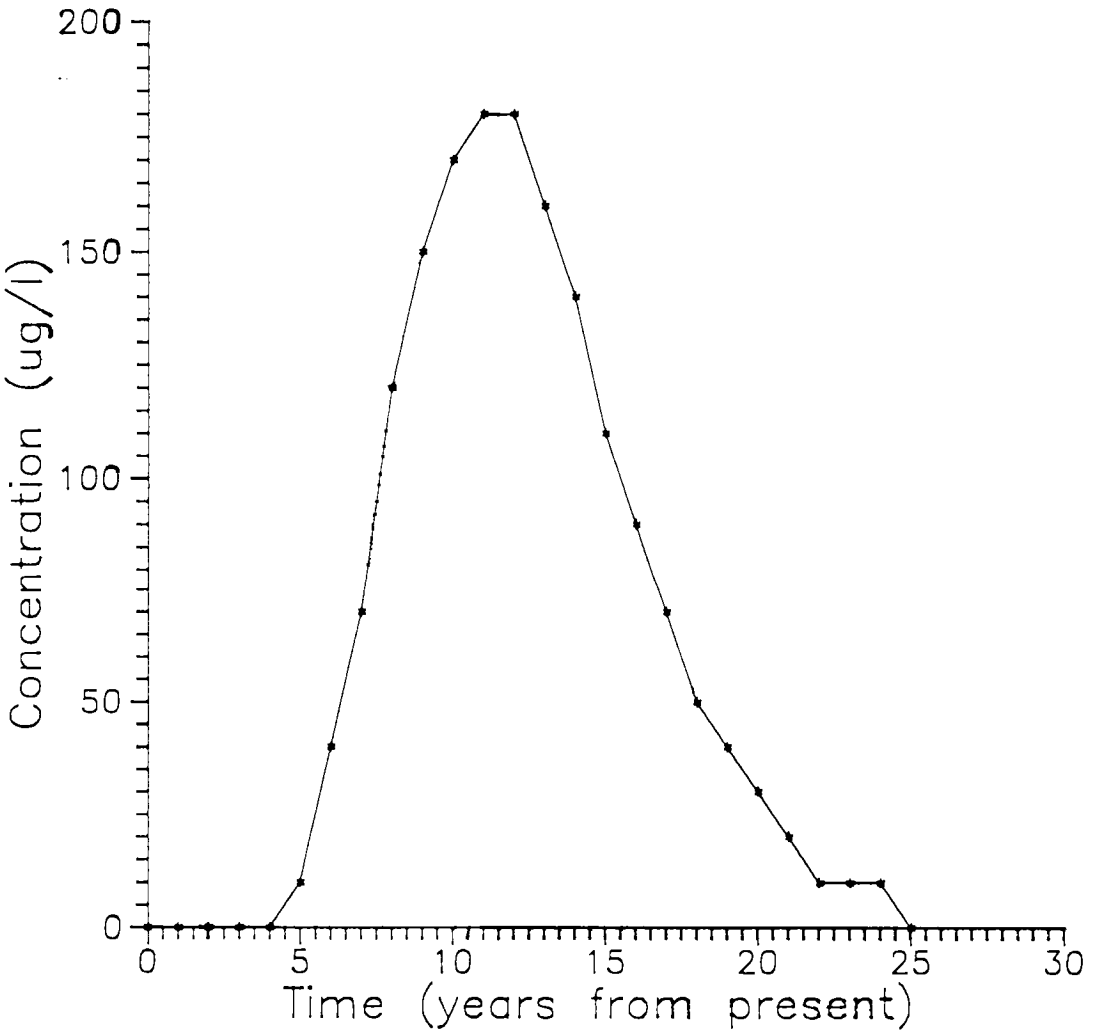
TCE - Trichloroethane
1,1,1-TCA - Trichloroethane

A grid system with 100 by 100 foot centers was established over the study area with the slug injection point being just southwest of monitoring well GW-5. Computer simulations were run with the defined input parameters and varying K_d values. The existing distribution of contaminants noted in the field were reasonably approximated using a K_d calculated based on a mass fraction organic carbon content in the aquifer of 0.003 for both TCE and 1,1,1-TCA. Calculated and actual concentrations for wells are provided in Table 14. Model output is provided in Appendix E.

Once sufficiently calibrated, model simulations were run over an increasing number of years to define the potential contaminant versus time concentration curves for the cabin receptor well (RW-3). The simulations were run with an increased longitudinal dispersivity (A_L = 100) to account for the increase in the travel distance from the source area (Walton, 1985). The predicted TCE and 1,1,1-TCA concentration distribution curves are provided on Figures 13 and 14.

Based on analytical model results, the leading edge of the 1,1,1-TCA slug should start being detected at the receptor well within approximately 2 years. The maximum 1,1,1-TCA concentration at the receptor is estimated to be 160 ug/l. The leading edge of the TCE slug is estimated to arrive at the receptor in approximately four years. The maximum TCE concentration is expected to peak at approximately 180 ug/l.

These estimates are considered to be very conservative and are believed to represent a worst case maximum based on the volume of TCE and 1,1,1-TCA assumed to have been spilled. As additional documented information becomes available regarding the actual volumes of TCE and 1,1,1-TCA potentially disposed, these estimates can be appropriately refined.



Model Estimated TCE Concentrations at Cole's Cabin Well (RW-3)

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DATE April 1991	

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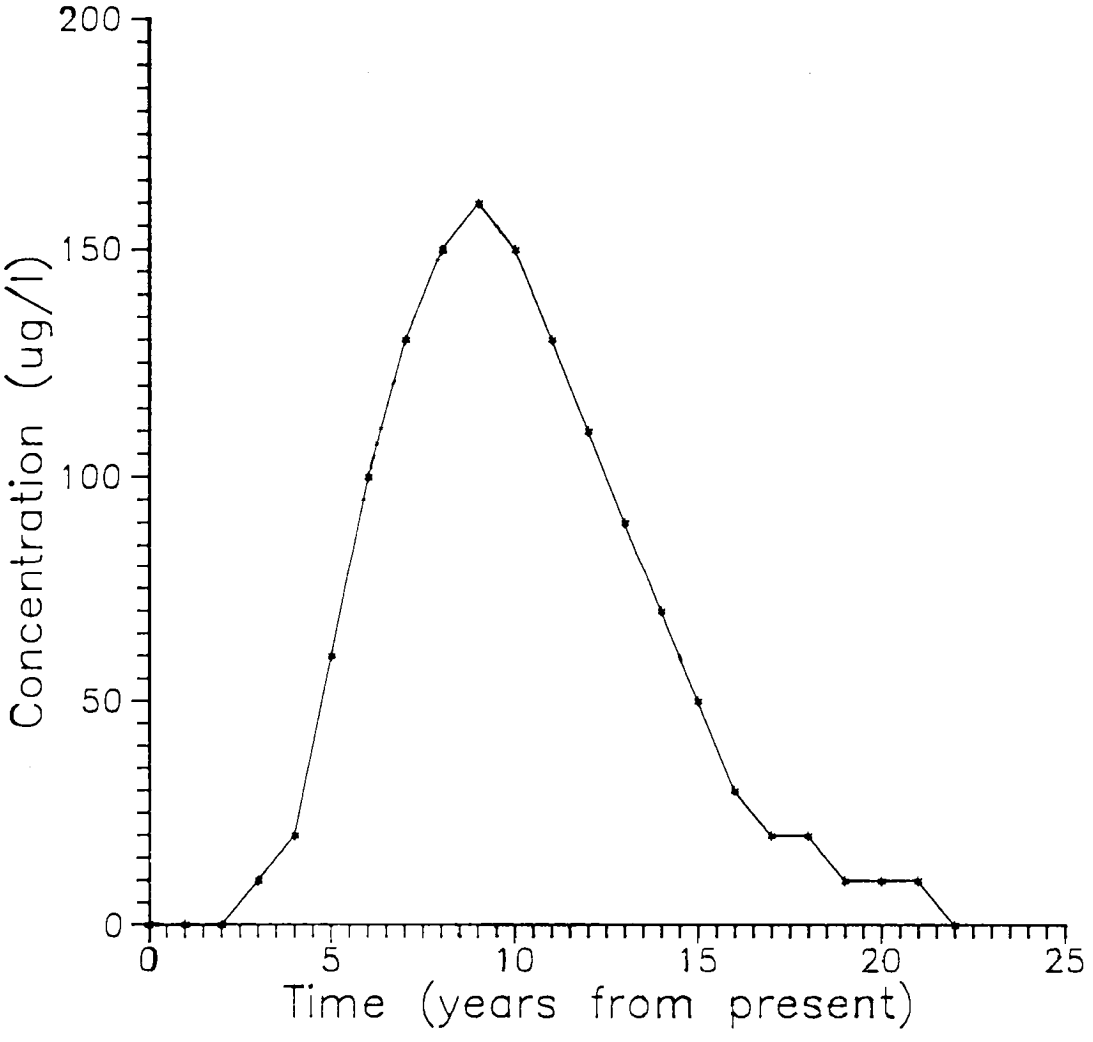
FIGURE 13



Model Estimated 1,1,1-TCA Concentrations at Cole's Cabin Well (RW-3)

PROJECT 42611603-2	REVISIONS
DATE April 1991	

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FIGURE 14

TABLE 14

CALIBRATED MODEL RESULTS
MACHIAS GRAVEL PIT SITE

Monitoring Well	TCE Field	TCE-Model Concentration	1,1,1-TCA Field	1,1,1-TCA-Model Concentration
GW-5	720J	500	120	250
GW-3	44	30	390	170
GW-6	ND	ND	51	10
GW-7*	33	ND	13	ND

Note: All input parameters fixed as defined in Table 13. K_d for TCE and 1,1,1-TCA calculated assuming mass fraction of organic carbon in aquife materials of 0.003.

* Although the assumed transverse dispersivity could not duplicate the side gradient concentrations detected in well GW-7, the areal concentration distribution trend simulated by the model is qualitatively consistent with observed trends.

ND = Not detected
J = Estimated

6.0 PRELIMINARY RISK ASSESSMENT

This section provides a preliminary risk assessment associated with the Machias Gravel Pit site as a result of past spillage/storage of wastes. A general qualitative discussion of the potential health and environmental hazards associated with each exposure pathway for each contaminated media are presented. In addition, a primary objective of this assessment is to provide a preliminary quantitative evaluation of the human health risk associated with future exposure to ground water contamination downgradient of the site. The potential human health risks are quantified for future exposure associated with ground water use. The predicted exposure point concentrations for this analysis are based on analytical ground water modeling results presented in Section 5.0. These are believed to provide a conservative worst-case estimate of risk.

This preliminary risk assessment includes four major components:

- Identification of contaminants of potential concern.
- Exposure assessment.
- Toxicity assessment.
- Risk characterization.

Section 6.1, "Identification of Contaminants of Potential Concern" presents a summary of the evidence of environmental contamination, and selects the contaminants of potential concern to be evaluated. The exposure assessment (Section 6.2) presents the important contaminant migration pathways and exposure routes for potential human and environmental receptors. Estimated daily intakes of contaminants of concern are calculated and presented for the ground water pathway. Section 6.3 presents the results of the toxicity assessment. The relevant dose-response parameters such as reference doses (RfDs) for noncarcinogens and cancer slope factors (CSFs) for carcinogens are presented. Section 6.4, "Risk Characterization" integrates the information developed in the three preceding components. Carcinogenic and noncarcinogenic human health risks are quantified for the ground water exposure pathway. Risks associated with other pathways of exposure are discussed qualitatively.

6.1 Identification of Contaminants of Potential Concern

Contaminants detected at the Machias Gravel Pit site were identified from samples of soil and ground water. A summary of the specific chemical contaminants detected for each environmental media is presented in Section 4.0.

Table 15 presents a summary of volatile organics, semi-volatile compounds (PAHs) and inorganics detected in soil at the site. Of the contaminants detected in soil, concentrations of benzo(a)pyrene and lead exceed the available background data. Benzo(a)pyrene and lead are both suspected human carcinogens. In addition, lead is the only contaminant detected which has an established soil criteria. The highest concentration of lead detected at the site (608 mg/kg) is within the acceptable criteria range (500-1000 mg/kg) established by the USEPA, (1989). Of the remaining contaminants detected in soil, all were either below available background levels or did not have background information available. The volatile compounds (1,1,1-trichloroethane and trichloroethylene) would not be expected to be found in clean background samples from any site; however, the PAHs are typically known to occur at background levels even in pristine soils (ATSDR, 1990). Based on this analysis, the potential contaminants of concern for soil include 1,1,1-trichloroethane, trichloroethylene and benzo(a)pyrene. Based on observations recorded on test pit logs, the benzo(a)pyrene is probably associated with asphalt pieces within the fill, however, since it is a suspect carcinogen it will be included in this preliminary risk evaluation.

Table 16 presents a summary of the contaminants detected in ground water at the site. In accordance with EPA guidance, total metals data in ground water is considered in this evaluation, however, consideration of available dissolved metals data suggests that the inorganics are not significantly mobile within the ground water system. To identify those contaminants of potential concern in ground water, contaminant concentrations are compared to available USEPA Maximum Contaminant Limits (MCLs) and/or USEPA Lifetime Health Advisory levels for drinking water. Concentrations of benzene, 1,1,1-trichloroethane, trichloroethylene, total lead, total nickel, and total iron all exceed the available MCL and/or Health Advisory levels. Of

TABLE 15

SUMMARY OF SOIL DATA FOR MACHIAS GRAVEL PIT

Chemical	Minimum	Maximum	Background	USEPA Soil Criteria
Volatiles (µg/kg)				
1,1,1-Trichloroethane	27	27	NA	NA
Trichloroethylene	291	291	NA	NA
Semi-Volatiles (µg/kg)				
Acenaphthylene	280J	280J	NA	NA
Anthracene	220J	220J	NA	NA
Benzo(a)anthracene	490J	490J	169-59,000 *	NA
Benzo(b)fluoranthene	570	570	15,000-62,000 *	NA
Benzo(k)fluoranthene	410J	410J	300-26,000 *	NA
Benzo(a)pyrene	470J	470J	165-220 *	NA
Benzo(g,h,i)perylene	250J	250J	900-47,000 *	NA
Fluoroanthene	340J	1500	200-166,000 *	NA
Fluorene	220J	220J	NA	NA
Indeno(1,2,3-c,d)pyrene	400J	400J	8,000-61,000 *	NA
Phenanthrene	1900	1900	NA	NA
Pyrene	260J	1100	145-147,000 *	NA
Inorganics (mg/kg)				
Chromium	2.5	8.2	100 **	NA
Lead	5.5	608	10 **	500-1000
Nickel	9.6	23.0	40 **	NA

NA Not available.
J Estimated value.
* (ATSDR, 1990).
** (Bowen, 1966).

Source: ESE, 1991.

TABLE 16

SUMMARY OF GROUND WATER DATA FOR MACHIAS GRAVEL PIT

Chemical	Maximum (μg/L)	USEPA MCL (μg/L)	New York State Ground Water Quality Standards (μg/L)	Lifetime Health Advisory (μg/L)
Organics				
Acetone	13	--	50	--
Benzene	9J	5	ND	--
Total Phenols	60	--	1	4000
1,1,1-Trichloroethane	390	200	5	200
Trichloroethylene	720J	5	5	--
Inorganics				
Chromium	54.4J	100	50	100
Iron (total)	150,000J	300s	300	--
Lead	154	5p	25	--
Nickel	161	--	--	100

ND = Not Detectable
J = Estimated Value
p = Proposed MCL
s = Secondary MCL

Source: ESE, 1991.
New York Division of Water resources, 1991.

these contaminants, benzene was detected in a single sample at an estimated concentration (9 ug/l) only slightly above the MCL. Iron was detected at concentrations greatly exceeding the secondary MCL; however, no adverse human health effects would be expected because the secondary MCL was developed based on taste and staining thresholds in lieu of human health.

Of the remaining contaminants, concentrations of total phenols and chromium were well below their respective MCL and/or Lifetime Health Advisory levels. There is no available standard or criteria for acetone which can be compared to the detected concentration; however, acetone is frequently detected as a result of laboratory contamination. Although there is no evidence that laboratory contamination exists, acetone was only detected in one sample and does not appear to be a widespread contaminant at the site. Based on this analysis, the potential contaminants of concern for ground water include, 1,1,1-trichloroethane, trichloroethylene, total lead and total nickel.

It should be noted that dissolved metal concentrations for both lead and nickel are non-detected suggesting that these metals are fairly immobile within the ground water system. Exposure assessments based on total metals, therefore, provide an extreme worst-case.

6.2 Exposure Assessment

The assessment of pathways by which human and environmental receptors may be exposed to contaminants from the Machias Gravel Pit site includes an examination of existing migration pathways and exposure routes as well as those that may be reasonably expected in the future. The determination of exposure pathways is made by a careful evaluation of the current extent of contamination on and around the site in relation to local land and water uses, and the results of a fate and transport assessment that evaluates potential contaminant migration pathways. Contaminants detected at the Machias Gravel Pit site may migrate off-site or may remain persistent in the source area on-site. Some contaminants of concern such as the VOCs are expected to be relatively mobile and may be transported from the soil to the ground water. Once in the ground water, these mobile contaminants may be transported downgradient where

they may subsequently reach human receptors. Other contaminants such as the inorganics are expected to be less mobile and may remain in the source areas for much longer periods of time.

6.2.1 Ground Water Pathway

Based upon a preliminary evaluation of site characteristics and the results of the monitoring data, ground water is suspected to be the primary source of contamination on-site and the most important mode of contaminant transport. During rainy seasons, water infiltrates the contaminated soils and carries with it dissolved organic and inorganic compounds. Part of the contaminants may be absorbed by the soil underneath the contaminated soil zone. The other part of the contaminants, which is desorbed from the soil particles, may continue to move downward and reach the ground water.

Ground water contamination has been detected in monitoring wells located at the site. Private wells located downgradient of the site have been sampled, however, no contamination has been detected to date. Although exposure to off-site residents is not occurring through the domestic use of ground water at present, future exposure is predicted to occur as the contamination spreads toward these private wells. Residential wells may be used for both potable and nonpotable purposes, and human exposure to ground water contaminants could result from the following events:

- Drinking water consumption.
- Skin absorption of contaminants in water by direct contact during washing or bathing.
- Inhalation of VOCs released into ambient air during showering or other washing activities.

The detailed quantification of exposures includes an analysis of water ingestion, skin absorption and inhalation. Exposure point concentrations for 1,1,1-trichloroethane and trichloroethylene are based on the ground water modeling results presented in Section 5.0.

Estimates of exposure are calculated for both an adult and child hypothetical receptor using water from the cabin well at location RW-3. Since the predicted concentrations are expected to change over time, exposure estimates were calculated for each year of exposure separately then totaled for the exposure pathway of concern. For example, for carcinogenic risks associated with exposure to trichloroethylene, yearly exposure estimates were calculated for each year trichloroethylene is predicted to be present in the cabin well. These yearly estimates were then totaled to obtain the estimated lifetime dose. For those exposure scenarios that evaluate an exposure duration less than lifetime, (i.e., a 6-year exposure for a child) exposure estimates were calculated for those years with the highest exposure point concentrations.

Carcinogenic exposures were calculated only for an adult because it is assumed that the higher exposures received by a child are not significant when averaged over the lifetime of an individual. Noncarcinogenic exposures were calculated for both a child and adult. The equations and assumptions used to calculate exposures were based on the USEPA Risk Assessment Guidance for Superfund (USEPA, 1989).

Residential Potable Use of Ground Water

As previously discussed, residential wells in the area are not currently known to be affected by site-related constituents in ground water. However, this assessment evaluates potential exposure to constituents migrating to the main receptor identified to be the cabin well (RW-3).

Exposure via drinking water may occur by a variety of mechanisms including ingestion of drinking water and ingestion of foods prepared with or in water. A simplified approach was selected to evaluate these potential exposures. Dose estimates are based on a total water intake of 2 liters per day (L/day). This standard exposure value is sufficiently conservative to allow for exposures by multiple household uses such as those previously mentioned. The average person consumes less than 0.5 L/day of tap water for drinking purposes (Andelman, 1984).

Exposure to site-related constituents from ingesting ground water is estimated using the following equation (USEPA, 1989):

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

Where:

CW = Chemical concentration in water (mg/L)
IR = Ingestion rate (2 L/day)
EF = Exposure frequency (365 days/year)
ED = Exposure duration (30 years for an adult; 6 years for a child))
BW = Body weight (70 kg for an adult, 16 kg for a child)
AT = Averaging time (70 years × 365 days/year for carcinogens; ED × 365 days/year for noncarcinogens)

Table 17 presents assumptions for input parameters and Table 18 presents the estimated exposure as a result of the drinking water pathway.

Dermal Absorption of Constituents in Water

Certain nonpotable water uses may result in skin contact and dermal absorption of waterborne constituents. Quantification of exposure received by dermal absorption is highly uncertain due to the theoretical nature of estimating skin permeation rates of chemicals solubilized in water. Many variables affect the uptake of chemicals through the skin including the duration of exposure, type of skin exposed, and amount of skin exposed. USEPA (1989) presents the following equation for calculation of dermal exposure to constituents in water:

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

Where:

CW = Chemical concentration in water (mg/L)
SA = Skin surface area available for contact (19400 cm^2 for adult; 7280 cm^2 for child).
PC = Chemical-specific dermal permeability constant (cm/hr)
ET = Exposure time (1.21 hours/day)
EF = Exposure frequency (365 days/year)
ED = Exposure duration (30 years for adult; 6 years for child)
CF = Volumetric conversion factor for water (1 liter/1,000 cm^3)
BW = Body weight (70 kg for adult; 16 kg for child)
AT = Averaging time (70 years × 365 days/year for carcinogens; ED × 365 days/year for noncarcinogens).

TABLE 17
EXPOSURE PATHWAY ASSUMPTIONS

Exposure Pathway	Adult	Child
Drinking Water		
Water Concentration (mg/l)	CW^1	CW^2
Ingestion rate (l/day)	2	2
Exposure Frequency (days/year)	365	365
Exposure Duration (year)	30	6
Body Weight (kg)	70	16
Averaging Time (days)	25,550	2,190
Dermal Absorption		
Water Concentration (mg/l)	CW^1	CW^2
Skin Surface Area (cm^2)	19,400	7280
Permeability Constant (cm/hr)	0.1	0.1
Exposure Time (hrs/day)	1.21	1.21
Exposure Frequency (days/year)	365	365
Exposure Duration (year)	30	6
Conversion Factor (l/cm^3)	0.001	0.001
Body weight (kg)	70	16
Averaging Time (days)	25,550	2,190
Inhalation		
Water Concentration (mg/l)	CW^1	CW^2
Air Concentration (mg/m^3)	18.2 CW^1	18.2 CW^2
Inhalation Rate (m^3/hr)	0.6	0.6
Exposure Time (hrs/day)	0.2	0.2
Exposure Frequency (days/year)	365	365
Exposure Duration (year)	30	6
Body weight (kg)	70	16
Averaging Time (days)	25,550	2,190

CW^1 = Modeled ground water concentration from cabin well at RW-3. Since predicted concentrations are expected to change over time, the values of CW^1 for each year of exposure were used in the calculation as a function of time. A yearly estimate of exposure was calculated for each year the contaminant is predicted to be present in RW-3, then all of the yearly estimates were totalled to obtain an estimate of lifetime exposure for the adult.

CW^2 = Modeled ground water concentrations from cabin well at RW-3. A yearly estimate of exposure was calculated for the six years with the highest predicted contaminant concentrations for RW-3, then the six yearly estimates were totaled to obtain an exposure estimate for the child.

Source: ESE, 1991.

TABLE 18

ESTIMATED EXPOSURE BY DRINKING WATER INGESTION

Contaminant	Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Child (mg/kg/day)
1,1,1-Trichloroethane	NA	1.27 E-03	1.73 E-02
Trichloroethylene	6.82 E-04	1.59 E-03	2.04 E-02

Source: ESE, 1991.

Permeability constants (PC) reflect the movement of the chemical across the skin to the stratum corneum and into the bloodstream. PC values are based on an equilibrium partitioning and are chemical-specific. However, the open literature has very little useable information pertinent to this exposure variable. As a result, it is generally assumed that chemicals are carried through the skin as a solute in water which is absorbed (rather than being preferentially absorbed independently of the water), and that the chemical concentration in the water being absorbed is equal to the ambient concentration. As a result, the permeation rate of water across the skin boundary is assumed to be the appropriate factor controlling dermal absorption. The permeability constant of water has been reported to be 8.00 E-04 cm/hr (Blank *et al.*, 1984). However, some chemicals such as VOCs are expected to have higher PC values because of their demonstrated lipid solubility. Permeability constants for some VOCs have been reported to range from 1.0 E-01 to 1.0 E-03 cm/hr (Baranowska and Dutkiewicz, 1982; Dutkiewicz and Tyras, 1967). As a result, the PC values used in this assessment are 1.0 E-01 cm/hr for VOCs. Table 19 presents the results of the exposure analysis for the dermal absorption pathway. Calculation input parameters are included in Table 17.

Inhalation of Constituents Volatilized During Showering

As discussed previously, the VOCs in ground water may volatilize during showering and result in inhalation exposure. The evaluation of the inhalation of constituents from showering requires an estimation of the constituent concentration in the air as a result of volatilization. For purposes of this risk assessment, it is assumed that all of the VOCs in the water are volatilized during the shower event. As a result, the constituent concentration in the air (CA) is calculated based on the following equation;

$$CA\ (mg/m^3) = CW \times FR \times ET/RV$$

Where:

CA = VOC concentration in air breathed (mg/m^3)
CW = VOC concentration in water (mg/L)
FR = Flow rate of water during the shower (L/minute)
ET = Exposure time or duration of shower event (minutes)
RV = Room volume (m^3)

TABLE 19

ESTIMATED EXPOSURE BY DERMAL ABSORPTION

Contaminant	Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Child (mg/kg/day)
1,1,1-Trichloroethane	NA	1.48 E-03	7.62 E-03
Trichloroethylene	8.02 E-04	1.87 E-03	8.99 E-03

Source: ESE, 1991.

The average flow rate of water during a typical shower is about 8 gallons per minute or 30.28 L/minute (USEPA, 1989). In addition, the USEPA (1989) has reported that the median showering time period is approximately 7 minutes and the 90th percentile is approximately 12 minutes. For purposes of this risk assessment, it is conservatively assumed that the room volume is 20 m^3. Therefore, CA is estimated to be 18.2 CW (mg/m^3).

Inhalation exposure to VOCs volatilizing during a shower is estimated using the following equation (USEPA, 1989):

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

Where:

CA = VOC concentration in air (mg/m^3)
IR = Inhalation rate (0.6 m^3/hour)
ET = Exposure time (0.2 hours/day)
EF = Exposure frequency (365 days/year)
ED = Exposure duration (30 years for adult; 6 years for child)
BW = Body weight (70 kg for adult; 16 kg for child)
AT = Averaging time (70 years x 365 days/year for carcinogens; ED x 365 days/year for noncarcinogens)

Table 20 presents the results of the exposure analysis for the inhalation exposure pathway. Calculation input parameters are included on Table 17.

6.2.2 Soil Pathway

An important exposure pathway of concern at the Machias Gravel Pit Site exists as a result of the environmental persistence of the contaminants of concern in the soil. Contaminants present in the surficial soils may be absorbed through the skin on contact or accidentally ingested by unintentional hand-to-mouth activity. Access to the site is not restricted. Although trespassing is not known to be a problem at the site, there is nothing to preclude trespassers. Contaminants may be absorbed through the skin as a result of direct contact with the soil. The degree of exposure is largely dependant on the concentration of the contaminant in the soil, the exposed

TABLE 20

ESTIMATED EXPOSURE BY INHALATION FROM SHOWERING

Contaminant	Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Adult (mg/kg/day)	Non-Carcinogenic Dose Child (mg/kg/day)
1,1,1-Trichloroethane	NA	1.38 E-03	1.89 E-02
Trichloroethylene	7.45 E-04	1.68 E-03	2.23 E-02

Source: ESE, 1991.

skin surface, the absorption rate, and the frequency of exposure. Although surface soil in the inactive gravel pit area does contain some elevated inorganics, concentrations are not extremely high and exposure is expected to occur infrequently. As a result dermal exposure is not anticipated to be significant.

Contaminants in soil may also be directly ingested by adults and children who may occasionally trespass on the site. However, as discussed for dermal absorption, the soil concentrations and exposure frequency are both expected to be low enough to suggest that exposure should not be significant.

Future land use of the site may include some type of industrial, commercial, or residential development. Future residential development of the site may not be a likely scenario; however, consideration of this potential may be required in a more detailed risk assessment. Based on the existing information known about the site, soil exposures through a residential scenario would not be expected to be significant, because of the generally low concentration of the contaminants of concern.

6.2.3 Air Pathway

The presence of contaminants of concern in soil at the site may result in a release of contaminants to the atmosphere via volatilization and/or dust entrainment.

The volatile organic contaminants of concern have relatively high vapor pressures and Henry's Law constants, facilitating their release from the soil or surface water to the air. The semi-volatile compounds and inorganics have very low or no vapor pressures and Henry's Law constants such that volatilization is not a likely transport process. Under current site conditions, volatilization is not expected to be significant because the surface soil concentrations of the volatile organics are non-detected. As a result, inhalation of vapors is not expected to be significant at the site.

Residual contaminants bound to surficial soils may also be transported as suspended particulates or dust, and thus may migrate from a site when environmental conditions are favorable. Some of the factors influencing the potential for dust entrainment into the atmosphere include surface soil moisture, soil particle sizes, kind and amount of vegetative cover, wind velocity and the amount of soil surface exposed to the eroding wind force. For example, dust formation may be significant during extended periods of dry weather. While concentrations of contaminants are expected to be present in the dusts generated on-site, concentrations are not expected to be extremely high due to known current levels in soil. As a result, inhalation exposure through this pathway is not expected to be of concern at this site.

6.2.4 Surface Water Pathway

Although there are no clearly identified surface water features which directly route surface runoff, drainage at the site appears to occur both internally and externally. Typically, when precipitation falls on the contaminated source area, any surface runoff either drains internally toward a central depression or may quickly drain off-site by general surface flow. For the purpose of this exposure assessment, it is assumed that migration of contaminants in surface runoff is insignificant.

6.3 Toxicity Assessment

This section identifies the health-related guidelines that are used in the risk characterization (Section 6.4) to evaluate the potential health risks posed by the exposures estimated in the previous section. In evaluating potential health risks, both carcinogenic and noncarcinogenic health effects must be considered. Health effects must also be considered for each potential route of exposure identified in the exposure assessment. For this preliminary risk assessment, oral, dermal and inhalation routes of exposure are of concern.

The criteria used to evaluate the potential for noncarcinogenic health effects are generally referred to as reference doses (RfD) or reference concentration (RfC). The criteria that are used

in the evaluation of carcinogenic risk are referred to as carcinogenic slope factors (CSF). RfDs, RfCs, and CSFs are all developed by the USEPA. The USEPA has developed oral and inhalation criteria. Dermal criteria have not been developed for any chemicals. In the absence of dermal criteria, the criteria for ingestion was used for the dermal route in accordance with Appendix A of Volume 1 of the USEPA Risk Assessment Guidance of Superfund (USEPA, 1989). Table 21 presents the toxicity criteria available from the USEPA for the potential contaminants of concern. Toxicity data for benzo(a)pyrene and lead are not available because the USEPA is currently reviewing the toxicological information for these two chemicals.

6.4 Risk Characterization

The objective of this risk characterization section is to integrate information developed in the toxicity assessment and the exposure assessment to obtain a preliminary estimate of the current and potential health risks associated with the potential contaminants of concern at the site. The preliminary estimate of health risks for carcinogenic and noncarcinogenic contaminants as well as for the different potential exposure pathways is discussed separately because of the different toxicologic endpoints and methods employed in characterizing risk. Incidental human health risk associated with exposure to the carcinogenic contaminant (trichloroethylene) in the ground water pathway is calculated by multiplying the exposure levels for each route by its respective cancer slope factor. For the noncarcinogenic contaminant (1,1,1-trichloroethane) modeled in the ground water pathway, a hazard index (HI) approach is followed. This approach assumes that multiple exposures could result from different routes and that the combined magnitude of the adverse effects is proportional to the sum of the ratios of the estimated exposures to the acceptable exposures for each route. When the calculated HI exceeds a value of 1.0 for any contaminant, route, or for the sum of HIs for multiple contaminants or routes, there may be concern for a potential health risk.

Since carcinogenic risk estimates are based on the presumption of lifetime exposure, cumulative doses received by an adult are assumed to be most representative of exposure. In general,

TABLE 21

TOXICITY CRITERIA FOR THE POTENTIAL CONTAMINANTS OF CONCERN AT THE MACHIAS GRAVEL PIT SITE

Contaminant	Ingestion Route		Inhalation Route	
	RfD (mg/kg/day)	CSF $(mg/kg/day)^{-1}$	RfD (mg/kg/day)	CSF $(mg/kg/day)^{-1}$
Benzo(a)pyrene	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Nickel	2.0E-02	NA	NA	8.4E-01
1,1,1-Trichloroethane	9.0E-02	NA	3.0E-01	NA
Trichloroethylene	NA	1.1E-02	NA	1.7E-02

NA = Not available.

Source: USEPA, 1990.

elevated exposures received during early childhood alone are not that significant in determining lifetime cancer risk. As a result, for the purposes of this preliminary risk assessment, carcinogenic risks were calculated based on lifetime exposure estimates for an adult. Noncarcinogenic effects may be the result of chronic (long-term) exposure, and may occur for both children and adults. Therefore, the noncarcinogenic HIs were developed for both an adult and child.

6.4.1 Risks Associated With the Ground water Pathway (Quantitative Estimates)

Ground water may be used for potable and nonpotable domestic purposes. Potentially impacted residents may, therefore, be exposed to contaminants through drinking water, dermal absorption, and inhalation pathways. Both carcinogenic and noncarcinogenic health risks are summarized for each route of exposure associated with ground water use.

The total estimate of future noncarcinogenic risks associated with the ground water pathway are summarized in Table 22. The total adult hazard index for each route of exposure ranges from 4.60 E-03 to 1.64 E-02. The total hazard index for the adult (sum of hazard indices for drinking water, dermal absorption, and inhalation) is 3.51 E-02. Since all route-specific and total noncarcinogenic HIs are less than one, there is no significant noncarcinogenic health threat for the adult.

The total child hazard index for each route of exposure ranges from 6.30 E-02 to 1.92 E-01. The total hazard index for a child (sum of hazard indices for drinking water, dermal absorption, and inhalation) is 3.40 E-01. Since all route-specific and total noncarcinogenic HIs are less than unity, there is no significant noncarcinogenic health threat for the child.

The total estimate of future carcinogenic risks associated with the ground water pathway is summarized in Table 23. The total lifetime carcinogenic risk levels for each route of exposure ranges from 7.50 E-06 to 1.27 E-05. The total cancer risk estimate of 2.90 E-05 (sum of cancer risk levels for drinking water, dermal absorption and inhalation) is within the acceptable risk

TABLE 22

ESTIMATED NONCARCINOGENIC RISKS ASSOCIATED WITH THE GROUND WATER EXPOSURE PATHWAY (RISK TO 1,1,1-TRICHLOROETHANE)

Exposure Route	Noncarcinogenic Hazard Indexes	
	Adult	Child
Drinking Water	1.41 E-02	1.92 E-01
Dermal Absorption	1.64 E-02	8.47 E-02
Inhalation	4.60 E-03	6.30 E-02
Total	3.51 E-02	3.40 E-01

Source: ESE, 1991.

TABLE 23

ESTIMATED CARCINOGENIC RISKS ASSOCIATED WITH THE GROUND WATER EXPOSURE PATHWAY (RISK TO TRICHLOROETHYLENE)

Exposure Route	Carcinogenic Risk Level
Drinking Water	7.50 E-06
Dermal Absorption	8.82 E-06
Inhalation	1.27 E-05
Total	2.90 E-05

Source: ESE, 1991.

range (10^{-4} to 10^{-6}), but exceeds the target level of 10^{-6}. These cancer risk estimates suggest that future use of the ground water may result in unacceptable risks when compared to the target risk level. It is important to note that this analysis is based on many conservative assumptions which may tend to overestimate the cancer risk estimate. For example, the ground water models used to predict future ground water concentrations and the exposure-related assumptions were all conservative (high probability that these parameters were overestimated to some degree). As a result, future carcinogenic risks associated with the use of ground water are likely to be lower than the estimate presented in Table 23.

6.4.2. Risks Associated With Other Pathways (Qualitative Estimates)

Based on the available data, significant health risks associated with soil, surface water, and air exposure pathways are not expected at the Machias Gravel Pit Site. Exposure point concentrations for these pathways are not expected to be very high based on minimal concentrations in the source areas and the low potential for release and migration. In addition, there are few receptors in close proximity to the site, and those that are would be expected to be present for only short periods of time and infrequent occurrences (trespassers on-site). Although the toxicity of some of the contaminants of concern is relatively high [benzo(a)pyrene is a human carcinogen], because the potential for exposure is low, the potential for significant risk is also low. (It should be noted that the benzo(a)pyrene is probably associated with asphalt pieces within the on-site fill materials.)

7.0 SUMMARY AND CONCLUSIONS

7.1 Summary

The investigation of the Machias Gravel Pit site performed by Motorola, Inc. included the following:

- Geophysical survey/test pits to confirm or refute the presence of buried drums.
- Surface/subsurface soil sampling.
- Monitoring well/ground water sampling.
- Residential well sampling.
- Slug tests.
- Constant discharge test.

The site in underlain by approximately 90 feet of unconsolidated fluvioglacial deposits overlaying shale bedrock. Unconsolidated deposits consist primarily of sand and sand and gravel units interlayered with silty horizons. The uppermost aquifer is within the sand and gravel deposits and is unconfined. Ground water flow roughly parallels surface topography. From the inactive gravel pit area (i.e., the area where the drummed wastes were handled and stored) ground water flows in a northeasterly direction eventually curving east toward Ischua Creek.

A magnetic gradiometer survey was performed to identify areas of potential buried metal within a suspect drum burial area. Results of the gradiometer survey were used to locate seven test pits to visually confirm or refute the presence of buried drums. No evidence of buried drums was identified in any of the test pits. Analytical data from soil samples collected from the test pits also showed unimpacted conditions reaffirming conclusions based on visual observations that no drum disposal occurred in the suspect burial area.

Surface soil samples show unimpacted conditions except for elevated total lead within the inactive gravel pit area. Subsurface soil field screening and sampling also suggests unimpacted conditions except for TCE and 1,1,1-TCA immediately above the water table (approx. 43 feet below the ground surface) beneath the inactive gravel pit area.

Ground water analyses show a slug of TCE and 1,1,1-TCA contamination flowing in a northeasterly (downgradient) direction, away from the inactive gravel pit area. The first downgradient receptor is the cabin well located approximately 450 feet north of the Cole residence well. Subsequent analytical ground water modeling developed projected time versus concentration curves for TCE and 1,1,1-TCA at the receptor well. The Cole residence well does not appear to be in the contaminant migration pathway. No chloroform was detected in any of the monitoring wells or residential well samples.

A preliminary risk assessment was performed based on the analytical data generated during this study and the results of the analytical ground water modeling. The preliminary risk assessment included:

- Identification of contaminants of potential concern.
- Exposure assessment.
- Toxicity assessment.
- Risk characterization.

Results of the preliminary risk assessment are considered conservative, worst-case estimates due to conservative analytical ground water modeling assumptions.

7.2 Conclusions

Based on the physical and chemical data generated during this investigation and subsequent data evaluation, the following conclusions are provided:

- Based on results of the geophysical survey and subsequent test pit excavation/sampling, no drums were disposed within the suspect drum burial area.

- The primary source area of contamination is confirmed to be the inactive gravel pit. There is no evidence of past waste handling/storage activities in the former maintenance garage area.

- A slug of VOC contamination is migrating via the ground water system to the northeast, toward the cabin well approximately 450 feet north of the Cole residence. The primary constituents of concern are TCE and 1,1,1-TCA.

- The Cole residence does not appear to be within the migration pathway of the VOC contamination.

- The sporadic chloroform problem associated with the Cole residence well appears to be an isolated issue not related to past waste handling/storage activities at the Machias Gravel Pit site.

- There is no significant non-carcinogenic health threat for adults or children associated with 1,1,1-TCA in the ground water.

- The total estimate of future carcinogenic risks associated with the ground water pathway is 2.9×10^{-5}.

- There are no apparent significant health risks associated with the soil, surface water or air exposure pathways.

The data from this study was also used in an engineering evaluation of remedial alternatives. The evaluation is provided under separate cover.

8.0 ADDITIONAL NYSDEC REQUIREMENTS

In order to complete the Work Plan and NYSDEC requirements, the following additional items are presented in this section:

- Final application of the Hazard Ranking Systems (HRS) and revised scoring sheets.
- A completed Site Characterization Fact Sheet (SCFS).

Each are discussed below.

8.1 Final Application of HRS

8.1.1 Existing HRS Score

The Phase II Site Investigation Report dated July 1989, prepared by Lawler, Matusky & Skelly Engineers (LMS) for the NYSDEC included a HRS score for the Machias Gravel Pit site. The HRS score provided in the report was as follows:

- Migration route (S_m) - 37.49.
- Fire and explosion (S_{FE}) - Not applicable.
- Direct contact (S_{DC}) - 12.50.

The migration route score is based on an evaluation of the ground water (S_{GW}), surface water (S_{SW}) and air (S_A) migration pathways. The following migration pathway scores were calculated:

- S_{GW} - 64.29
- S_{SW} - 8.62
- S_A - 0

The ground water route score is the "driving factor" for the total migration pathway score.

8.1.2 Re-evaluation of HRS Score

Based on the data and interpretations presented in this study, a modification of the migration route score is appropriate to reflect the additional information. A modification of the fire and explosion hazard score and the direct contact hazard score is not proposed as these appear to accurately reflect site conditions (i.e., little to no hazard with respect to direct contact and fire/explosion).

As noted in Section 8.1.1 the migration route score is based on an evaluation of the ground water, surface water and air migration pathway. The surface water route score and the air route score appear to be representative of site conditions and no modification is proposed.

The ground water route score however appears to be biased high. A revised ground water route scoring sheet is included in Appendix F. The primary modifications are associated with the "waste characteristics" and "targets" rating factors. Each of these rating factors are discussed below.

Waste Characteristics

The previous HRS scoring for ground water included a toxicity/persistence value of 18. This value was assigned based on using heptachlor epoxide for scoring purposes, however, this chemical was not detected in ground water. The modified ground water route scoring sheet includes a toxicity/persistence value of 12 using trichloroethene for scoring purposes. This was identified by the preliminary risk assessment as the main chemical of concern in the ground water. The modified total waste characteristics score is therefore 15.

Targets

The previous HRS scoring for ground water included a "distance to nearest well/population served" matrix value of 30. This value was based on an assumed total population served by ground water of 1278 people within a 3-mile radius of the site.

Based on ground water flow evaluations presented in this report, the impacted aquifer discharges to Ischua Creek, immediately north and east of the site. This is considered a hydrogeologic boundary and ground water users on the other side of a hydrogeologic boundary should not be included in the population served estimate. In light of the hydrogeologic boundary, a more representative population served estimate is in the 1 to 100 category which yields an assigned value of 3 which results in a matrix value of 10 (the matrix value includes an evaluation of the distance to the nearest well). The modified total targets score is, therefore, 19.

The two above rating factor modifications result in a revised ground water route score of $S_{GW}=22.37$. With no revisions proposed to the surface water and air migration route scores, the revised total migration route score is $S_m=13.86$.

8.2 Site Characterization Fact Sheet (SCFS)

As requested by the NYSDEC in a letter to Motorola, Inc. dated August 16, 1990, an SCFS was completed for the site and is included in Appendix G of this report. The purpose of the SCFS is to summarize available technical data for the site which will aid in defining those treatment technologies which may be applicable for further consideration in the engineering evaluation of remedial alternatives. The results of the engineering evaluation are provided under separate cover.

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Appendix A
Test Pit Logs

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-1
Date: 12/6/90	Coordinates: 4950N, 4980 - 4990E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1		BG	Fill - brown, loamy — 1.0′	
			BG	Fill - dark brown humus — 1.5′	
	2			Fill - brown sandy silt with some gravel and clay. Much wood debris. Rusty metal sheets and a 5 foot long piece of metal pipe.	
	3				
	4				
	5				
	6			— 6.5′	
			BG	sand and gravel - some silt — 7.0′	
	7			End of Excavation	
				Excavation dimension - 18′ × 3′ × 7′	

Remarks: Pipe identified above was oriented subvertical in the ground.
Sample collected - TP01-01

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-2
Date: 12/6/90	Coordinates: 4940N - 4920N, 4960E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1		BG	Fill - wood and roofing debris. Metal stripping approximately 3 inches wide. 1.5′	
	2			Fill - brown loam with gravel. Some wood debris toward top. Two pieces of metal culvert and wire found two to three feet below the surface.	
	3				
	4				
	5				
	6			6.5′	
	7		BG	Sand and gravel - brown, silty 7.0′	
				End of Excavation	
				Excavation dimension - 20′ × 3′ × 7′	

Remarks: Sample collected - TP02-01

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-3
Date: 12/6/90	Coordinates: 4900N - 4890N, 4970E - 4960E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1		BG	Fill - Dark brown with humus	
				1.0'	
	2			Fill - Dark brown to black loamy fill. Some asphalt pieces. Slice of wire wrap fiber hose.	
	3		BG	3.0'	
	4			Fill - olive to tan, clayey.	
	5			5.5'	
	6		BG	Sand and gravel - brownish with silt.	
				Excavation dimension - 15' × 3' × 5.5'	

Remarks: Only metal found was associated with wire wrap hose.
Sample collected - TP03-01

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-4
Date: 12/7/90	Coordinates: 4840N - 4820N, 4990E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1		BG	Soil/Fill - dark brown, loamy with roots 1.0'	
	2			Gravel/Fill - dark brown gravelly loam. Becomes more gravelly to the north of excavation.	
	3				
	4				
	5		BG	5.0'	
			BG	Sand - brown to tan, clayey 5.5'	
	6			End of Excavation	
				Excavation dimension - 20' × 3' x 5.5'	

Remarks: No significant metal but major change in amount of gravel trending from south to north.
Sample collected - TP04-01

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-5
Date: 12/7/90	Coordinates: 4920N, 4940E - 4960E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1			Fill - black, loamy	
				1.5'	
			BG	Fill - brown, humus	
	2			2.0'	
			BG	Fill - brown, loamy with some sand and gravel. Clayey zone at four feet. Small pieces of concrete with rebar, miscellaneous small metal debris; asphalt pieces.	
	3				
	4				
	5				
	6				
				7.0'	
	7		BG	Sand and Gravel - loamy	
				7.5'	
	8			End of Excavation	
				Excavation dimensions - 20' x 3' x 7.5'	

Remarks: Sample collected: TP05-01

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit

LOG OF EXCAVATION NO. TP-6

Date: 12/7/90

Coordinates: 4830N, 4930E - 4940E

Excavation Method: Backhoe

Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	1			Fill - dark brown, humus, roots.	
				2.0'	
	2		BG	Fill - dark brown loam with some silt and trace of gravel. Wood boards with nails.	
	3				
	4				
	5				
	6			- clayey zone	
				7.0'	
	7			Sand - light brown, medium grain 7.5'	
	8			End of Excavation	
				Excavation dimensions - 12' x 3' x 7.5' *10' x 3' x 6'	

Remarks: *Initial excavation offset by 2 feet due to no apparent metal. No sample collected.

BG - Background

PROJECT NO.

HYDRO-SEARCH, INC.

LOG OF EXCAVATION

PROJECT: Machias Gravel Pit	LOG OF EXCAVATION NO. TP-7
Date: 12/6/90	Coordinates: 4760N - 4740N, 4860E - 4880E
Excavation Method: Backhoe	Ground Surface Elevation:

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	PID	MATERIAL DESCRIPTION	SOILS ANALYSIS
	0		BG	Top soil - roots 0.5′	
	1–6			Sand - tan fine to medium sand, trace silt. Becomes gravelly and cobbly as excavation progresses north.	
	5		BG	5.5′	
				End of Excavation	
				Excavation dimensions - 20′ × 3′ × 5.5′	

Remarks: No major metal found but distinct change from sand to cobbles.
No samples collected.

BG - Background

PROJECT NO.	HYDRO-SEARCH, INC.	

Appendix B

Borehole Logs and Well Construction Summaries

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. P-1

SHEET 1 OF 2

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		09:30	14:00
DATE		12/6/90	12/6/90
CASING DEPTH			

DATUM: N4485.45, E5750.48 Top of PVC: 1694.33

DRILL RIG: ATV

SURFACE CONDITIONS: lawn, 1' snow, 35°F, windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	1 3 3 3		Silt: well sorted, moist, brown (OL).						1.1' recovery
2	3 5		as above						
3	10 8		Silty Clay: clay, some very fine silt, moist (CL).						.7' recovery
4	2 5		Sand: sand, fine, trace cobbles, well sorted, brown (SP).						
5	7 8								1.0' recovery
6	3 8		Silty Sand: very fine, some silt, trace pebbles, brown (SM).						
7	7 6								1.1' recovery
8	1 5		as above, medium to fine sand						
9	5 5		Silty Clay: trace pebbles, brown (CL).						1.1' recovery
10	2 4		Sand and Gravel: fine to coarse sand, pebbles to cobbles, poorly sorted, very moist (GW).						
11	4 4								.7' recovery
12									approximate water table

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. P-1

SHEET 2 OF 2

	DRILLING START	DRILLING FINISH
TIME	09:30	14:00
DATE	12/6/90	12/6/90

WATER LEVEL TIME DATE

CASING DEPTH

DATUM: N44485.45, E5750.48 Top of PVC: 1694.33

DRILL RIG: ATV

SURFACE CONDITIONS: lawn, 1' snow, 35°F, Windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	2 4 6 9		Clayey Silt: very fine silt, pliable, very moist to wet, brown (ML).						.5' recovery
14	1 3 6 6		as above						HNu = background
15			Silty Clay: gray (CL).						
16	1 2 5 5		Sand and Gravel: poorly sorted, wet (GW).						1.6' recovery
17			Silty Clay: wet, brown-gray (CL).						
18	5 17 15 15		as above, trace pebbles						1.0' recovery
19			Sand: coarse, well sorted, wet (SP).						
20			T.D. 20 feet						

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-3D

SHEET 1 OF 7

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 08:20	TIME 09:45
DATE 12/11/90	DATE 12/12/90

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	1 1 2 3		**Silt**: some clay and pebbles, well sorted, moist, brown (ML).						
2			**Silty Clay**: some pebbles, wet (CL).						
3									
4									
5			as above with trace pebbles						
6									
7	4 4 5 6		**Silt**: some clay, trace pebbles, wet, brown (ML).						1.5' recovery
8									
9	3 3 3 3		as above						1.0' recovery
10									
11	2 3 3 3		as above with some pebbles						.3' recovery
12									HNu = background

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

WATER LEVEL / TIME / DATE / CASING DEPTH

BORING NO. GW-3D

SHEET 2 OF 7

DRILLING START: TIME 08:20, DATE 12/11/90 — FINISH: TIME 09:45, DATE 12/12/90

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	1 3 6 4		Sand: fine to medium, some gravel, fair sorting, moist (SP).						.7' recovery
14	7 4		Sand and Gravel: very fine to coarse, poorly sorted, subangular, moist (SW).						
15	6 6		as above						HNu = background
16	5 5								
17	6 4		as above with very fine to medium sand						.5' recovery
18	3 3								
19	5 3		as above						1.0' recovery
20	1		Sand: fine to medium, angular to subangular, trace pebbles, fair sorting, moist, brown (SP).						HNu = background
21	6 7								
22	5 7		Sandy Silt: some very fine sand (ML).						
23	7 7		Sand: medium to coarse, moist, brown (SP).						1.5' recovery
24	7								

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-3D

SHEET 3 OF 7

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		TIME 08:20	TIME 09:45
DATE		DATE 12/11/90	DATE 12/12/90
CASING DEPTH			

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
25	3 6 7 5		Sand and Silt: very fine to coarse, interbedded, well sorted, moist, brown (SM).						1.2' recovery
26	7 8 10 15		Sand: fine, angular, well sorted (SP).						1.3' recovery
28	7 9 9 10		Sand: fine to medium, poorly sorted, moist, brown (SW).						1.5' recovery
30	9 10 11 12		as above						1.0' recovery
32	6 6 9 6		as above with very fine sand, dry						1.4' recovery
34	6 8 9 10		as above						.9' recovery
36									

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-3D

SHEET 4 OF 7

WATER LEVEL					DRILLING START	DRILLING FINISH
TIME					08:20	09:45
DATE					12/11/90	12/12/90
CASING DEPTH						

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
37	7 13 13 10		as above						1.1' recovery
38	9 10 10 8		Silty Sand: very fine to fine, some silt, dry, brown (SM).						HNu = background 1.4' recovery
40	12 14 16 20		as above with trace pebbles						1.3' recovery
42	9 10 20 15		as above						.6' recovery
44	10 10 10 11		as above						.9' recovery
46	8 14 16 20		as above, becoming moist						1.3' recovery HNu = background
48									

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-3D

SHEET 5 OF 7

WATER LEVEL	DRILLING START	DRILLING FINISH
TIME	08:20	09:45
DATE	12/11/90	12/12/90
CASING DEPTH		

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
49	6 6 8 8		as above, wet						approximate water table
50	7 7 9 6		Silt: wet, brown (ML).						1.5' recovery
52	3 3 4 7		as above						
54	6 6 7 8		as above						1.8' recovery
56	9 13 17 17		as above						2.0' recovery
58	10 8 16 16		as above, trace clay						HNu = background 2.0' recovery
60									

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-3D

SHEET 6 OF 7

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 08:20	TIME 09:45
DATE 12/11/90	DATE 12/12/90

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
61	10 14 14 6		as above, without clay						2.0' recovery
62	5 5 11 16		as above						2.0' recovery HNu = background
64	7 9 12 16		as above						2.0' recovery
66	12 11 13 14		as above						2.0' recovery
68	6 9 12 15		as above						2.0' recovery
70	4 12 13 15		as above, trace clay						2.0' recovery
72									

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-3D

SHEET 7 OF 7

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		TIME 08:20	TIME 09:45
DATE		DATE 12/11/90	DATE 12/12/90
CASING DEPTH			

DATUM: N4905.05, E5168.97 Top of PVC: 1742.21

DRILL RIG: ATV

SURFACE CONDITIONS: silt and clay, cloudy, 25°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
73	4 5 7 9		Clayey Silt: some clay, wet, gray-brown (ML).						HNu = background 2.0' recovery
74	6 5 5 10		as above, with 2" sand stringer						2.0' recovery
76	5 6 10 6		Sand and Gravel: fine, to coarse sand and pebbles, subangular to subrounded, trace silt, gray (GW).						2.0' recovery
78			T.D. = 77.8 feet						HNu = background

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-5

SHEET 1 OF 5

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START: TIME 08:40, DATE 12/10/90 — FINISH: TIME 14:10, DATE 12/10/90

DATUM: N4681.86, E4987.56 Top of PVC: 1741.50

DRILL RIG: ATV

SURFACE CONDITIONS: sand and gravel

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	3 5 13 10		Sand and Gravel: coarse sand to pebbles, some fine sand, angular to subangular grains, moist to slightly moist, brown (GW).					1.0' recovery
2								
3	4 25 30 16		as above					.5' recovery
4								HNu = background
5	5 8 10 12		Sand: very coarse to fine, trace pebbles, poorly sorted, angular, moist, brown (SW).					1.5' recovery
6								
7	1 7 8 10		as above without pebbles					1.4' recovery
8								
9	3 10 12 13		Silty Sand: coarse to fine, some silt, poorly sorted, moist, brown (SM).					1.5' recovery
10								HNu = background
11	2 7 12 12		as above					1.6' recovery
12								

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-5

SHEET 2 OF 5

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START: TIME 08:40, DATE 12/10/90

DRILLING FINISH: TIME 14:10, DATE 12/10/90

DATUM: N4681.86, E4987.56 Top of PVC: 1741.50

DRILL RIG: ATV

SURFACE CONDITIONS: sand and gravel

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	3 12 15 16		as above, slightly coarser						1.4' recovery
14	1 9 14 17		as above						1.8' recovery HNu = background
16	2 7 11 17		as above Sand and Silt: fine sand and silt, gradational fining downward from upper silty sand unit, trace clay, moist, yellow-brown (SM).						1.6' recovery
18	4 13 24 18		as above						1.9' recovery HNu = Background
20	3 10 15 16		as above, coarsening to medium sand and silt						2.0' recovery
22	2 15 24 28		as above, fining to fine sand and silt						1.9' recovery
24									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-5

SHEET 3 OF 5

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 08:40	TIME 14:10
DATE 12/10/90	DATE 12/10/90

DATUM: N4681.86, E4987.56 Top of PVC: 1741.50

DRILL RIG: ATV

SURFACE CONDITIONS: sand and gravel

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
25	2 13 27 26		as above, coarsening to medium sand and silt						1.7' recovery
26									HNu = background
27	4 15 21 27		as above, fining to fine sand and silt						1.6' recovery
28									
29	3 17 26 35		Sandy Silt: some very fine sand, trace clay, moist, yellow-brown (ML).						2.0' recovery
30									HNu = background
31	5 32 52 62		as above						1.9' recovery
32									
33	2 26 29 30		as above						1.1' recovery
34			Sand and Gravel: fine sand and pebbles, some silt, slightly moist, brown (GM).						HNu = background
35	10 100/ 5"		as above with trace clay						.1' recovery
36									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-5

SHEET 4 OF 5

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 08:40	TIME 14:10
DATE 12/10/90	DATE 12/10/90

DATUM: N4681.86, E4987.56 Top of PVC: 1741.50

DRILL RIG: ATV

SURFACE CONDITIONS: sand and gravel

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
37	10 40 34 40		as above						1.0' recovery
38	6 32 40 46		as above						1.2' recovery
40	7 50 60 36		as above						HNu = background 1.4' recovery
41			Sandy Silt: some fine sand, some clay, moist, brown (ML).						
42	4 19 26 37		as above, becoming very moist						1.9' recovery collected sample GWSB01-01 at 13:15
44	3 12 22 25		as above, wet at 45'						1.6' recovery approximate water table 45'
46	2 9 11 12		Silty Sand: fine to medium sand, some silt, trace clay, wet, brown (SM).						HNu = background 1.8' recovery
48									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-5

SHEET 5 OF 5

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		08:40	14:10
DATE		12/10/90	12/10/90
CASING DEPTH			

DATUM: N4681.86, E4987.56 Top of PVC: 1741.50

DRILL RIG: ATV

SURFACE CONDITIONS: sand and gravel

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
49	3 13 17 21		**as** above						2.0' recovery
50	1 6 11 12		**as** above						2.0' recovery
51			T.D. = 51 feet						
52									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-6

SHEET 1 OF 5

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		TIME 10:00	TIME 11:00
DATE		DATE 12/07/90	DATE 12/10/90
CASING DEPTH			

DATUM: N4979.34, E5282.47 Top of PVC: 1739.88

DRILL RIG: ATV

SURFACE CONDITIONS: corn field, 1' snow, cloudy to partly cloudy, 35°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	1 2 2 2		Silt: some clay, trace pebbles, brown (ML).						1.2' recovery
2	3 4 6 6		as above						.9' recovery
4	3 7 6 4		as above						.9' recovery
6	7 8 5 5		as above						1.2' recovery
8	2 3 2 2		as above						.3' recovery
10	3 1 2 2		Sand: fine, some pebbles, medium sorting, wet, brown (SW).						.5' recovery
12									

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-6

SHEET 2 OF 5

WATER LEVEL					DRILLING START	DRILLING FINISH
TIME					TIME 10:00	TIME 11:00
DATE					DATE 12/07/90	DATE 12/10/90
CASING DEPTH						

DATUM: N4979.34, E5282.47 Top of PVC: 1739.88

DRILL RIG: ATV

SURFACE CONDITIONS: corn field, 1' snow, cloudy to partly cloudy, 35°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	12 32 13 12		Sand: very fine to pebbles, poorly sorted, brown (SW).						.9' recovery
14									
15	10 11 12 20		as above, trace silt						.6' recovery
16									
17	15 12 11 11		large cobble jammed in split spoon, no recovery						0.0' recovery
18									
19	9 6 6 6		Sand: fine to medium, medium sorting, subangular, brown (SW).						.8' recovery
20									
21	11 9 8 8		as above with very fine sand						.6' recovery
22									
23	6 7 9 10		Sand: fine, well sorted, subangular, slightly moist, brown (SP).						.8' recovery
24									

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-6

SHEET 3 OF 5

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		TIME 10:00	TIME 11:00
DATE		DATE 12/07/90	DATE 12/10/90
CASING DEPTH			

DATUM: N4979.34, E5282.47 Top of PVC: 1739.88

DRILL RIG: ATV

SURFACE CONDITIONS: corn field, 1' snow, cloudy to partly cloudy, 35°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
25	10 10 10 11		as above					1.5' recovery
26	14 16 19 17		Sand and Gravel: some silt, poorly sorted, angular to subangular, brown (GM).					.9' recovery
28	11 15 19 17		as above					.8' recovery
30	13 22 17 14		as above, clay stringer at 31.5'					1.2' recovery
32	16 18 16 13		Sand: fine, some cobbles, well sorted, subangular, brown (SP).					.8' recovery
34	17 15 15 16		Sand and Gravel: very fine to pebbles, poorly sorted, angular to subangular, brown (GW).					1.0' recovery
36								

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-6

SHEET 4 OF 5

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 10:00	TIME 11:00
DATE 12/07/90	DATE 12/10/90

DATUM: N4979.34, E5282.47 Top of PVC: 1739.88

DRILL RIG: ATV

SURFACE CONDITIONS: corn field, 1' snow, cloudy to partly cloudy, 35°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
37	16 13 15 18		Sand: medium to coarse, trace pebbles, medium sorting, dry, brown (SW).					.8' recovery
38	16 15 14 13		as above					.8' recovery
40	15 18 26 32		as above					1.2' recovery
42	15 27 20 8		as above with fine sand					
44	14 16 16 18		Silt: trace pebbles, brownish gray (ML).					
46	10 12 18 20		Sand and Gravel: very fine sand to pebbles, poorly sorted, brown (GW).					
48								

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-6

SHEET 5 OF 5

WATER LEVEL		DRILLING START	DRILLING FINISH
TIME		TIME 10:00	TIME 11:00
DATE		DATE 12/07/90	DATE 12/10/90
CASING DEPTH			

DATUM: N4979.34, E5282.47 Top of PVC: 1739.88

DRILL RIG: ATV

SURFACE CONDITIONS: corn field, 1' snow, cloudy to partly cloudy, 35°F

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
49	12 14 17 26		no sample					approximate water table 48'
50	12 17 14 21		Silt: well sorted, wet, brown (ML).					
52	10 10 13 15		Sand: fine, well sorted, wet, brown (SP).					
54	12 14 14 17		no sample					
56			T.D. = 56 feet					

DRILLING CONTR

LOGGED BY Larry Gardiner

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-7

SHEET 1 OF 4

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START: TIME 15:00, DATE 12/03/90

DRILLING FINISH: TIME 17:00, DATE 12/04/90

DATUM: N4825.45, E5420.21 Top of PVC: 1729.16

DRILL RIG: ATV

SURFACE CONDITIONS: grassy field, 3" snow, 35°F, windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	2 2 3 7		Silt: some sand and clay, roots near surface, coarsening downward, slightly moist, tan to brown (OL).						1.5' recovery
2	8 7 6 6		Sand and Gravel: some silt and clay, pebbles, subrounded, moist, brown (GM).						1.0' recovery
4	3 2 11 9		as above with increasing sand, very moist						.6' recovery HNu = background
6	13 15 10 8		as above with pebbles and cobbles						.3' recovery
8	3 11 17 16		as above with trace clay, slightly moist						.6' recovery HNu = background
10	8 18 24 10		as above						.9' recovery
12									

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-7

SHEET 2 OF 4

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START	DRILLING FINISH
TIME 15:00	TIME 17:00
DATE 12/03/90	DATE 12/04/90

DATUM: N4825.45, E5420.21 Top of PVC: 1729.16

DRILL RIG: ATV

SURFACE CONDITIONS: grassy field, 3" snow, 35°F, windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	22 15 18 36		as above with only pebbles						.8' recovery
14									HNu = background
	9 11		Silty Sand: some silt, trace pebbles, slightly moist, brown (SM).						
15	16 57								1.0' recovery
16									
	67 31		Sand and Gravel: coarse sand and pebbles, some silt, poorly sorted, slightly moist, light brown (GM).						
17	26 32								.9' recovery
18									
	12 32								
19	62 30		as above, dry						1.0' recovery
20									HNu = background
	22 50								
21	65 100/4"		no recovery						0.0' recovery
22									
	10 20								
23	26 29		as above with small pebbles, moist						1.5' recovery
24									HNu = background

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-7

SHEET 3 OF 4

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START: TIME 15:00, DATE 12/03/90

DRILLING FINISH: TIME 17:00, DATE 12/04/90

DATUM: N4825.45, E5420.21 Top of PVC: 1729.16

DRILL RIG: ATV

SURFACE CONDITIONS: grassy field, 3" snow, 35°F, windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
25	26 40 55 62		as above with large pebbles, trace clay						1.7' recovery
26									
27	54 80 100/3"		as above						.9' recovery
28									
29	18 33 34 42		as above with trace cobbles						1.3' recovery
30									HNu = background
31	18 30 30 30		Sand: coarse to medium, trace silt, trace pebbles, some sorting, slightly moist, brown (SP).						1.4' recovery
32									
33	9 24 26 29		as above						1.4' recovery
34									HNu = background
35	10 27 32 38		as above						1.6' recovery
36									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-7

SHEET 4 OF 4

WATER LEVEL				DRILLING START	DRILLING FINISH
TIME				15:00	17:00
DATE				12/03/90	12/04/90
CASING DEPTH					

DATUM: N4825.45, E5420.21 Top of PVC: 1729.16

DRILL RIG: ATV

SURFACE CONDITIONS: grassy field, 3" snow, 35°F, windy

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
37	23 30 40 43		as above with some pebbles						1.8' recovery
38	14 27 29 42		as above, wet at 39.8'						1.35' recovery
39									approximate water table
40	14 19 24 24								HNu = 7 above background - steam emitting, probably moisture influence
41			Sand and Gravel: coarse sand, trace silt, pebbles rounded to subangular, wet, brown (GP).						1.7' recovery
42	3 16 33 30		as above						HNu = background
43									.7' recovery, 1' sluff from running sands
44	5 19 42 37		as above as above with large pebbles						HNu = background 1.6' recovery
45									HNu = background
46	9 26 82		as above						.6' recovery
47			T.D. = 47 feet						
48									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split spoon

BORING NO. GW-8

SHEET 1 OF 2

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DRILLING START: TIME 08:50, DATE 12/07/90

DRILLING FINISH: TIME 11:00, DATE 12/07/90

DATUM: N4328.37, E5614.88 Top of PVC: 1699.57

DRILL RIG: ATV

SURFACE CONDITIONS: silt, sand and gravel, moist, patches of snow

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
1	2 4 3 6		**Silt**: some clay, trace sand, roots near surface, moist, dark brown (OL).						1.2' recovery
2	2 1 3 7		**Silty Sand**: medium to coarse sand, some silt, trace pebbles and clay, moist, brown (SM).						.8' recovery
4	3 5 6 6		as above with some pebbles						1.2' recovery HNu = background
6	2 7 8 5		as above with some clay, trace pebbles						1.4' recovery
8	Shelby tube		**Sand and Gravel**: coarse sand, pebbles and cobbles, moist, brown (GP).						1.0' recovery HNu = background
10	3 5 5 5		as above						.9' recovery
12									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

FIELD LOG - SOIL BOREHOLE

SITE NAME AND LOCATION: Motorola, Machias, New York

DRILLING METHOD: Auger

SAMPLE METHOD: Split Spoon

BORING NO. GW-8

SHEET 2 OF 2

WATER LEVEL		
TIME		
DATE		
CASING DEPTH		

DRILLING START	DRILLING FINISH
TIME 08:50	TIME 11:00
DATE 12/07/90	DATE 12/07/90

DATUM: N4328.37, E5614.88 Top of PVC: 1699.57

DRILL RIG: ATV

ANGLE: Vertical BEARING N/A

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS: silt, sand and gravel, moist, patches of snow

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS
13	3 10 13 15		Sand: coarse, some pebbles, moist, brown (SP).						1.0' recovery
14	3 12		as above						.7' recovery
15	7 5		Silt and Clay: some very fine sand, wet, brown, medium plasticity (CL).						HNu = background approximate water table 16.5'
16	3 3								
17	5 7		as above						1.7' recovery
18	2 4								
19	6 8		as above						1.8' recovery
20	3 9								HNu = Background
21	13 18		as above Silty Sand: coarse, some silt, clay and gravel, very poorly sorted, wet, gray (SM).						1.5' recovery
22			T.D. = 22 feet						
23									
24									

DRILLING CONTR

LOGGED BY Sandra Haws

DATE

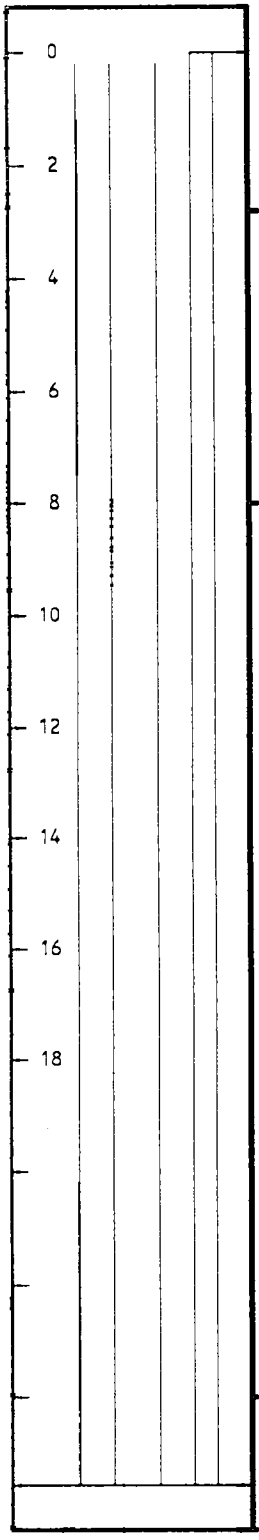
PIEZOMETER CONSTRUCTION SUMMARY

Well No. P-1

Boring No. X-Ref: _____

Survey Coords: N4485.45, E5750.48 Elevation Ground Level _____

Top of PVC 1699.57



Drilling Summary:

Total Depth: 18 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: 0 feet
Driller: Empire Soils (Art)

Rig: ATV

Drilling Fluid: none

Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/6	9:30	12/6	14:00
Casing:	12/6	14:30	12/6	14:37
Filter Placement:	12/6	14:40	12/6	15:00
Cementing:	12/6	15:35	12/6	15:45
Development:	12/9	16:00	12/9	16:20

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
0 - 8	C	-
8 - 18	S	-
-	-	-
-	-	-
-	-	-

Casing: C1: 2", schedule 40 PVC

Casing: C2:

Screen: S1: 2", 0.010 continuous slot PVC

Filter Pack: silica sand (18-6')

Grout Seal: cement-bentonite (3-0')

Bentonite Seal: pellets (6-3')

Well Development:

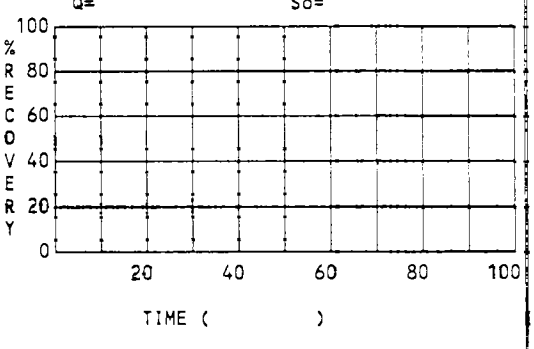
12/9/90 - 6 gallons, bailer

Stabilization Test Data: N/A

Time	Ph	Spec. Cond.	Temp (C)

Recovery Data:

Q= So=



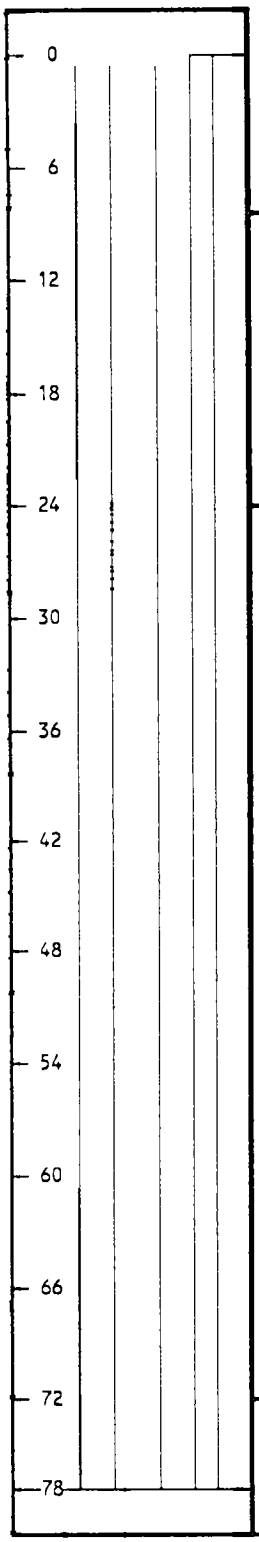
Comments: _____

Motorola, Machias, New York

SITE NAME _____ LOCATION _____

SUPERVISED BY _____ DATE _____

MONITOR WELL CONSTRUCTION SUMMARY



Well No. GW-3D

Boring No. X-Ref: _____

Survey Coords: N4905.05, E5168.97 Elevation Ground Level _____

Top of PVC 1742.21

Drilling Summary:
Total Depth: 77.8 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: ±2 feet
Driller: Empire Soils (Kenny and Art)
Rig: ATV
Drilling Fluid: none
Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/11	8:20	12/12	9:45
Casing:	12/12	9:50	12/12	10:08
Filter Placement:	12/12	10:10	12/12	10:50
Cementing:	12/12	12:30	12/12	15:30
Development:	12/14	13:40	12/14	15:15

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2 - 65	C	_____ - _____
65 - 75	S	_____ - _____
___ - ___	_____	_____ - _____
___ - ___	_____	_____ - _____
___ - ___	_____	_____ - _____

Casing: C1: 2", schedule 40 PVC
Casing: C2:
Screen: S1: 2", 0.010 continuous slot PVC
Filter Pack: silica sand (75-63')
Grout Seal: cement-bentonite (59.2-0')
Bentonite Seal: pellets (63-59.2)

Well Development:

12/14/90 - 21 gallons, bailer

Stabilization Test Data: 12/14/90

Time	pH	Spec. Cond.	Temp (C)
15:20	6.35	390	7.5
15:23	6.50	455	8.5
15:27	6.55	475	8.5
15:29	6.60	472	8.5
15:32	6.65	479	8.5

Recovery Data:

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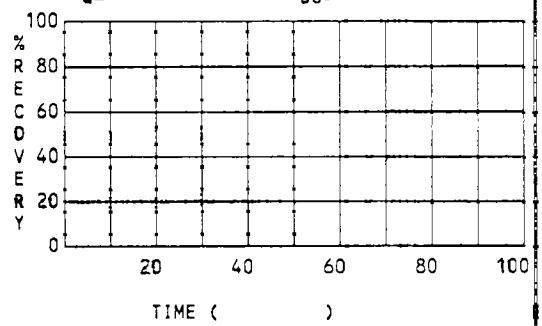


Comments: cement runoff apron

Motorola - Machias, New York

SITE NAME _____ LOCATION _____

SUPERVISED BY _____ DATE _____

MONITOR WELL CONSTRUCTION SUMMARY

Well No. GW-5

Boring No. X-Ref:

Survey Coords: N4681.86, E4987.56

Elevation Ground Level

Top of PVC 1741.5

SITE NAME

LOCATION

Drilling Summary:
Total Depth: 52.0 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: ±2 feet
Driller: Empire Soils (Art)

Rig: ATV

Drilling Fluid: none

Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/10	8:40	12/10	14:10
Casing:	12/10	15:35	12/10	15:45
Filter Placement:	12/10	15:55	12/10	17:00
Cementing:	12/11	9:00	12/11	11:30
Development:	12/13	9:10	12/13	9:50

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2 - 41	C	-
41 - 51	S	-
-	-	-
-	-	-
-	-	-

Casing: C1: 2", schedule 40 PVC

Casing: C2:

Screen: S1: 2", 0.010 continuous slot PVC

Filter Pack: silica sand (51-39')

Grout Seal: cement-bentonite (36-0')

Bentonite Seal: pellets (39-36')

Well Development:

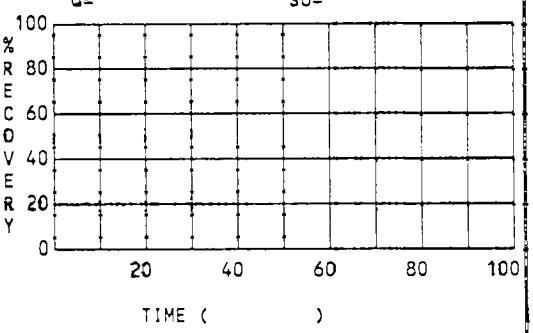
12/13/90 - 5 gallons, bailer

Stabilization Test Data: 12/14/90

Time	pH	Spec. Cond.	Temp (C)
10:30	6.65	199	6.5
10:33	6.90	200	8.0
10:35	6.70	200	7.5
10:38	6.80	199	7.5

Recovery Data:

Q= So=



Comments: cement runoff apron

Motorola - Machias, New York

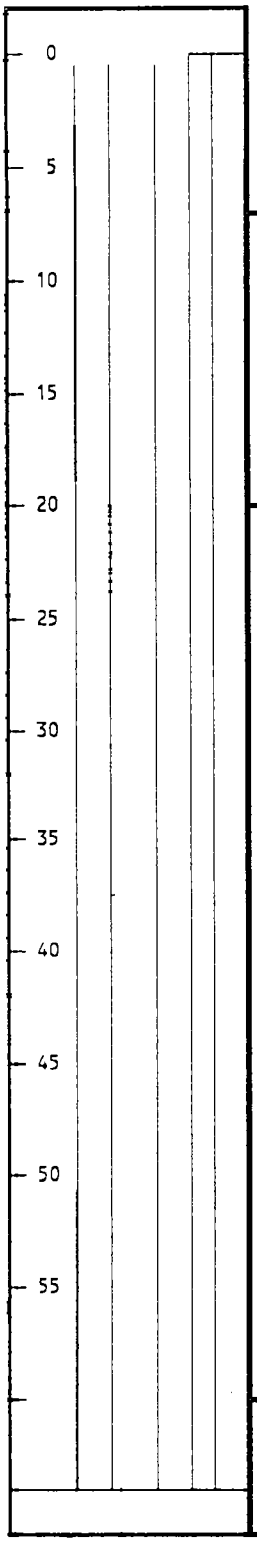
SUPERVISED BY

DATE

MONITOR WELL CONSTRUCTION SUMMARY

Well No. GW-6

Boring No. X-Ref:



Survey Coords: N4979.34, E5282.47

Elevation Ground Level

Top of PVC 1739.88

Drilling Summary:
Total Depth: 54.5 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: ±2 feet
Driller: Empire Soils (Kenny)

Rig: ATV

Drilling Fluid: none

Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/7	10:00	12/10	11:00
Casing:	12/10	11:45	12/10	11:55
Filter Placement:	12/10	12:35	12/10	12:55
Cementing:	12/10	13:40	12/10	14:15
Development:	12/13	10:20	12/13	10:45

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
+ 2 - 44.5	C	-
44.5 - 54.5	S	-
-	-	-
-	-	-
-	-	-

Casing: C1: 2", schedule 40 PVC

Casing: C2:

Screen: S1: 2", 0.010 continuous slot PVC

Filter Pack: silica sand (54.5-44.5')

Grout Seal: cement-bentonite (39-0')

Bentonite Seal: pellets (44.5-39')

Well Development:

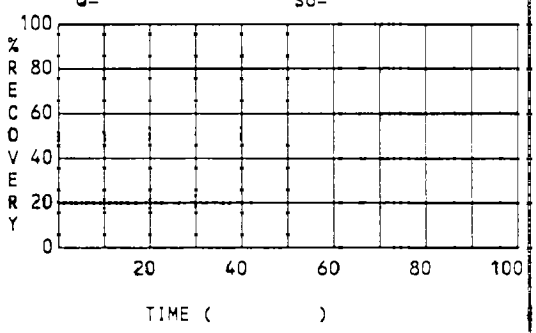
12/13/90 - 6 gallons, bailer

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
14:00	6.50	278	7.0
14:10	7.25	300	6.5
14:16	7.40	300	7.0
14:20	7.45	310	6.5

Recovery Data:

Q= So=



Comments: cement runoff apron

Motorola - Machias, New York

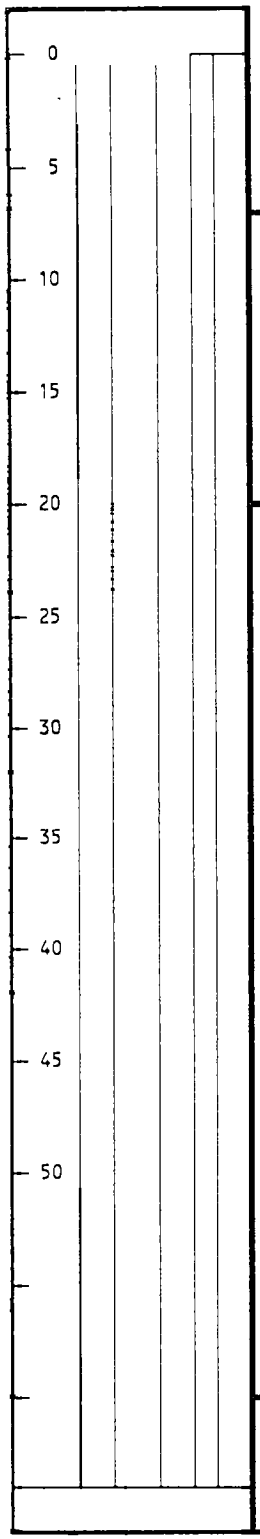
SITE NAME

LOCATION

SUPERVISED BY

DATE

MONITOR WELL CONSTRUCTION SUMMARY



Well No. GW-7

Boring No. X-Ref: _____

Survey Coords: N4825.45, E5420.21

Elevation Ground Level _____

Top of PVC 1729.16

Drilling Summary:
Total Depth: 46.5 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: 0 feet
Driller: Empire Soils (Kenny)
Rig: ATV
Drilling Fluid: water
Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/3	15:00	12/4	17:00
Casing:	12/6	11:20	12/6	11:30
Filter Placement:	12/6	11:30	12/6	12:15
Cementing:	12/7	8:15	12/7	10:00
Development:	12/12	16:00	12/12	17:00

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
0 - 36.5	C	-
36.5 - 46.5	S	-
-	-	-
-	-	-
-	-	-

Casing: C1: 2", schedule 40 PVC
Casing: C2:
Screen: S1: 2", 0.010 continuous slot PVC
Filter Pack: silica sand and natural (46.5-34.5')
Grout Seal: cement-bentonite (30.5-0')
Bentonite Seal: pellets (34.5-30.5')

Well Development:

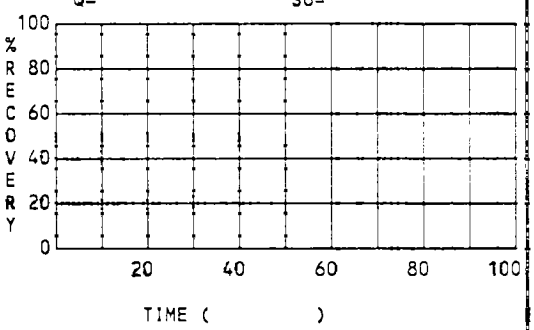
12/12/90 - 7 gallons, bailer

Stabilization Test Data: 12/13/90

Time	pH	Spec. Cond.	Temp (C)
16:35	7.6	259	6.5
16:37	7.9	271	6.5
16:39	8.1	270	6.5
16:41	8.0	275	7.0

Recovery Data:

Q= So=



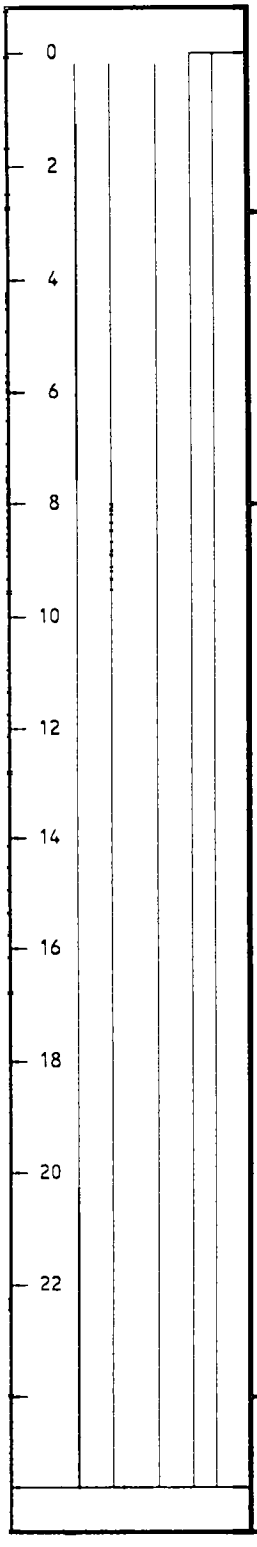
Comments: _____

Motorola - Machias, New York

SITE NAME _____ LOCATION _____

SUPERVISED BY _____ DATE _____

MONITOR WELL CONSTRUCTION SUMMARY



Well No. GW-8

Boring No. X-Ref:

Survey Coords: N4328.37, E5614.88 Elevation Ground Level

Top of PVC 1699.57

Drilling Summary:
Total Depth: 22 feet
Borehole Diameter: 8.25 inches
Casing Stick-up Height: ±2 feet
Driller: Empire Soils (Art)
Rig: ATV
Drilling Fluid: none
Protective Casing: steel locking

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	12/7	8:50	12/7	11:00
Casing:	12/7	11:10	12/7	11:13
Filter Placement:	12/7	11:22	12/7	12:05
Cementing:	12/7	13:10	12/7	15:00
Development:	12/11	14:10	12/11	14:30
	12/12	8:10	12/12	8:30

Well Design & Specifications

Basic: Geologic Log X Geophysical Log ___
Casing String(s): C = Casing S = Screen

Depth	String(s)	Elevation
+2 - 12	C	___ - ___
12 - 22	S	___ - ___
___ - ___	___	___ - ___
___ - ___	___	___ - ___
___ - ___	___	___ - ___

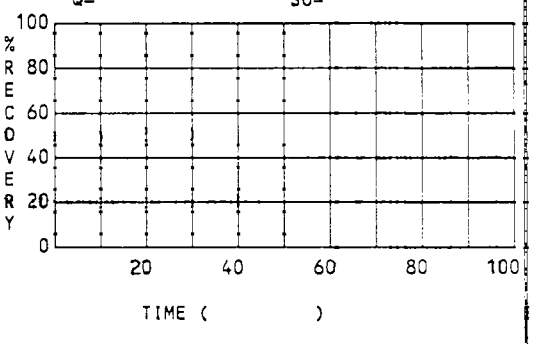
Casing: C1: 2", schedule 40 PVC
Casing: C2:
Screen: S1: 2", 0.010 continuous slot PVC
Filter Pack: silica sand (22-10')
Grout Seal: cement-bentonite (6.8-0')
Bentonite Seal: pellets (10-6.8')

Well Development:
12/12/90 - 7 gallons, bailer
went dry after 5 gallons

Stabilization Test Data: 12/14/90

Time	pH	Spec. Cond.	Temp (C)
16:00	6.35	390	7.5
16:05	6.50	455	8.5
16:08	6.55	475	8.5
16:13	6.60	472	8.5
16:15	6.65	479	8.5

Recovery Data:
Q= So=



Comments: cement runoff apron

Motorola, Machias, New York

SITE NAME ___ LOCATION ___

SUPERVISED BY ___ DATE ___

Appendix C

Recovery-Curve Plots

Well GW-1

$D = 50'$
$H = 6.48'$
$L = 6.48'$
$r_c = .083$
$r_w = .083$

$L/r_w = 78$
$A = 4$
$B = .65$

Assume $K_{sand\ pack} \approx K_{aquifer}$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(6.48/.083)} + \frac{4 + .65 \ln[(50-6.48)/.083]}{78} \right]^{-1}$$

$$= \left[.2524 + .1013 \right]^{-1} = 2.827$$

$$K = \frac{(.083)^2 (2.827)(.229)}{2(6.48)} = 3.44 \times 10^{-4}\ ft/min \text{ or } \underline{\underline{5.74 \times 10^{-6}\ ft/sec}}$$

Well GW-2

$D = 50'$
$H = 11'$
$L = 10'$
$r_c = .083'$
$r_w = .083'$

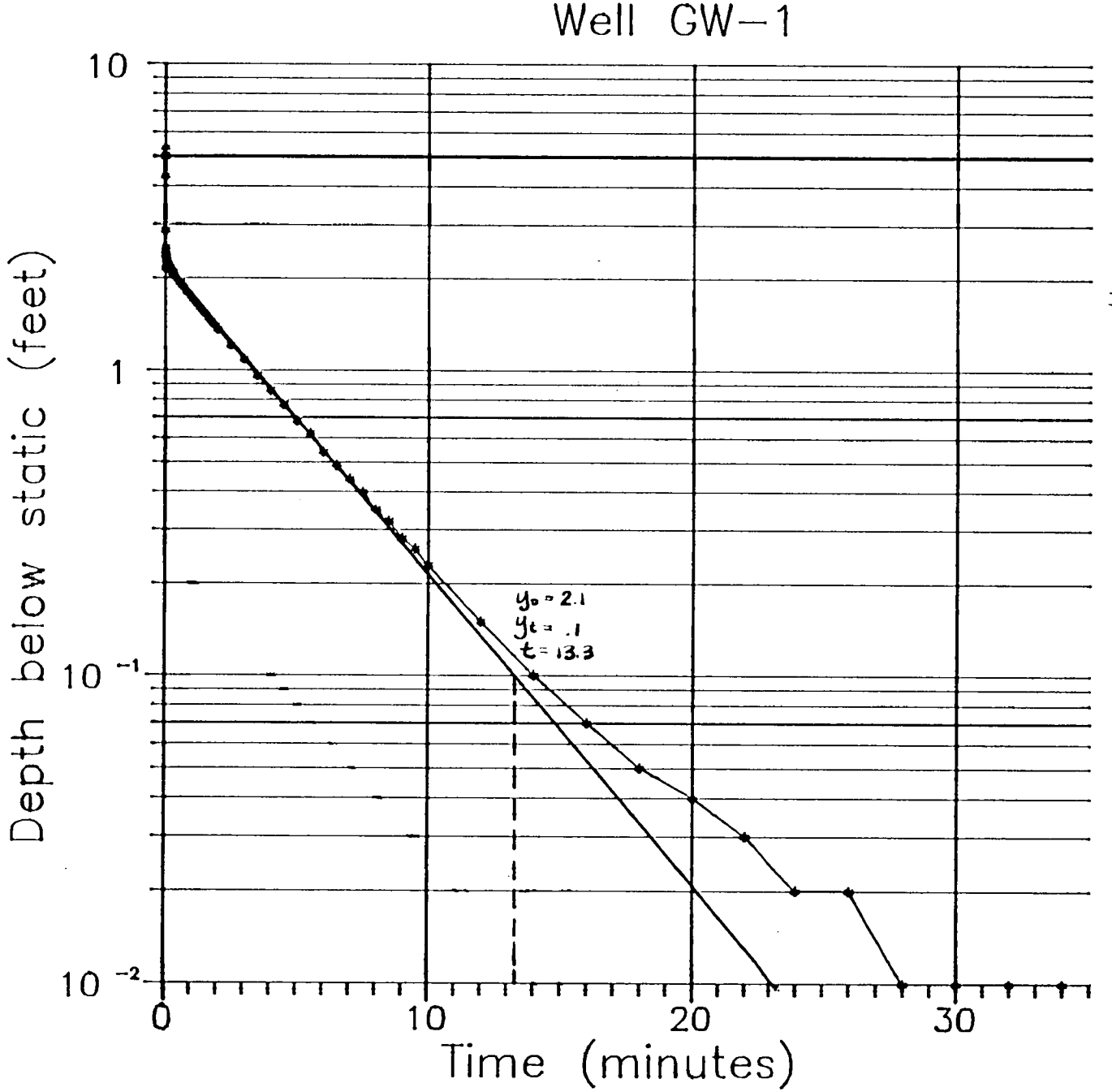
$4/r_w = 120.5$
$A = 4.8$
$B = .8$

assume $K_{sand\ pack} \approx K_{aquifer}$

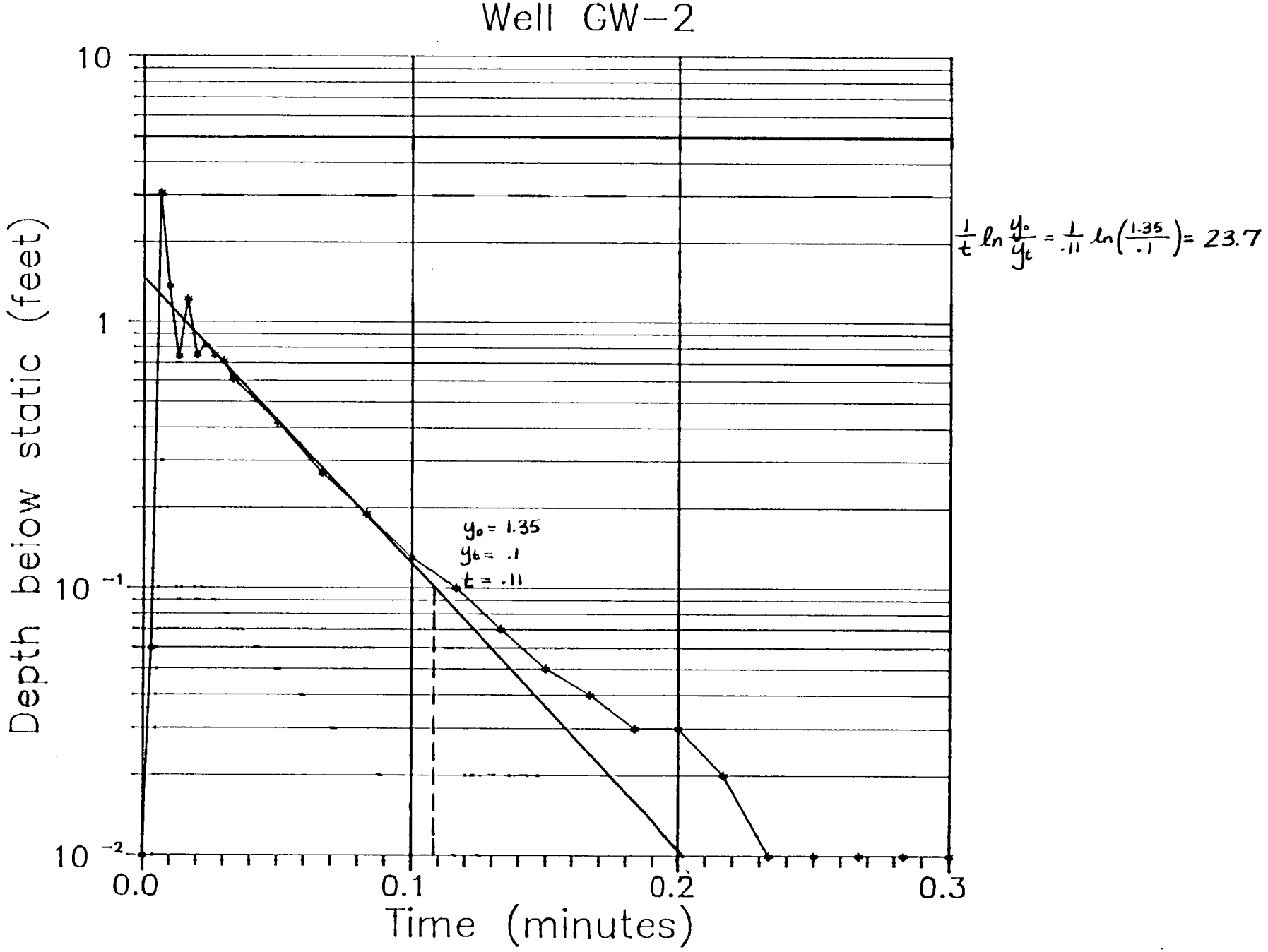
$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(11/.083)} + \frac{4.8 + .8 \ln[(50-11)/.083]}{10/.083} \right]^{-1}$$

$$= \left[.225 + .080 \right]^{-1} = 3.28$$

$$K = \frac{(.083)^2 (3.28)(23.7)}{2(10)} = 2.68 \times 10^{-2}\ ft/min \text{ or } \underline{\underline{4.46 \times 10^{-4}\ ft/sec}}$$



$$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{13.3} \ln\left(\frac{2.1}{.1}\right) = .229$$


Well GW-2
10
1
10^{-1}
10^{-2}
Depth below static (feet)
0.0
0.1
0.2
0.3
Time (minutes)
$y_o = 1.35$
$y_t = .1$
$t = .11$
$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{.11} \ln\left(\frac{1.35}{.1}\right) = 23.7$

Well GW-3

$D = 50$
$H = 11.55'$
$L = 10'$
$r_c = .083$
$r_w = .083$

$L/r_w = 120.5$
$A = 4.8$
$B = .8$

Assume $K_{sandpack} \approx K_{aquifer}$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(11.55/.083)} + \frac{4.8 + .8 \ln[(50-11.55)/.083]}{120.5} \right]^{-1}$$

$$= [.2229 + .0797]^{-1} = 3.305$$

$$K = \frac{(.083)^2(3.305)(1.08)}{2(10)} = 1.23 \times 10^{-3} \text{ ft/min} \text{ or } \underline{\underline{2.05 \times 10^{-5} \text{ ft/sec}}}$$

Well GW-4

$D = 50$
$H = 12.36$
$L = 10$
$r_c = .083$
$r_w = .083$

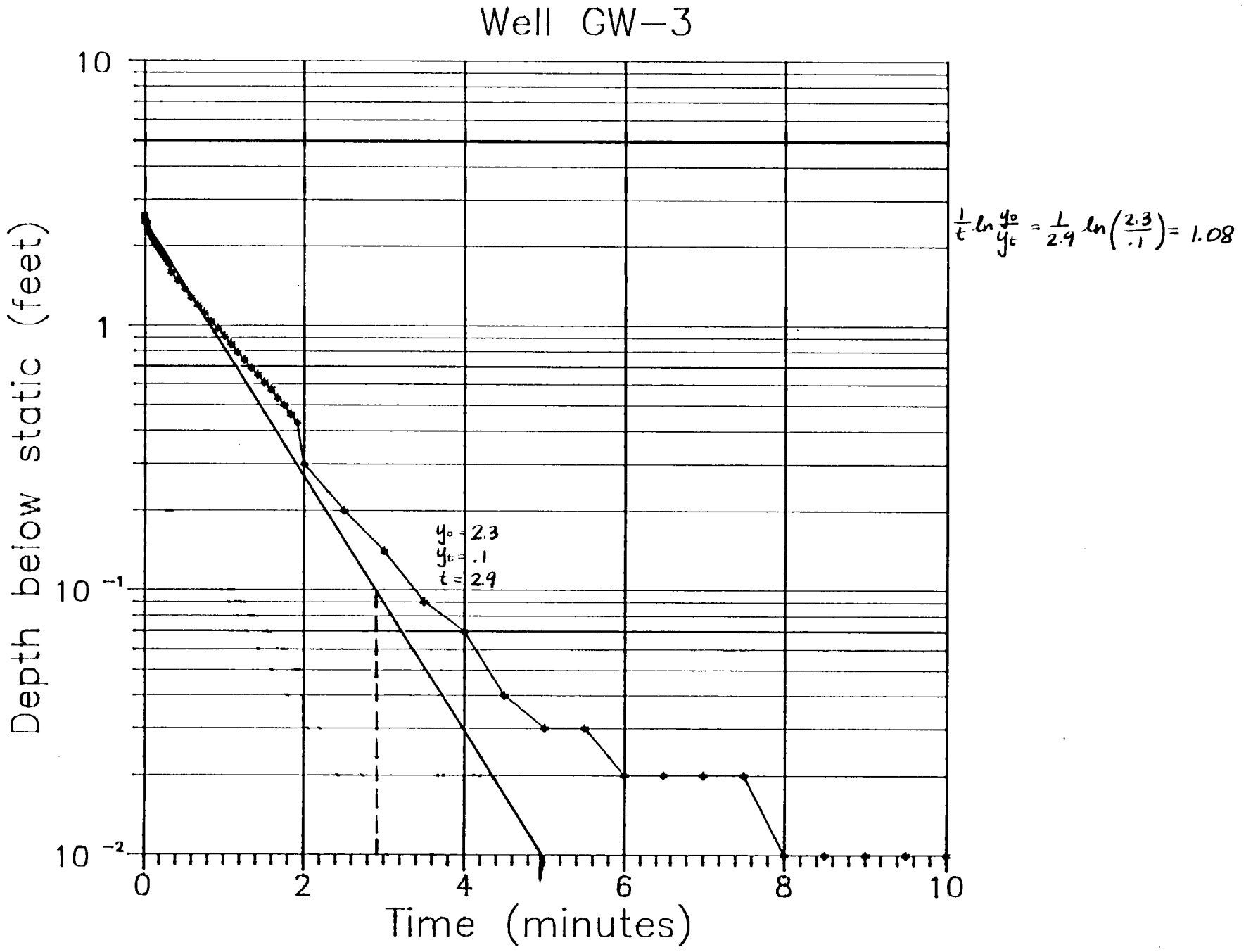
$L/r_w = 120.5$
$A = 4.8$
$B = .8$

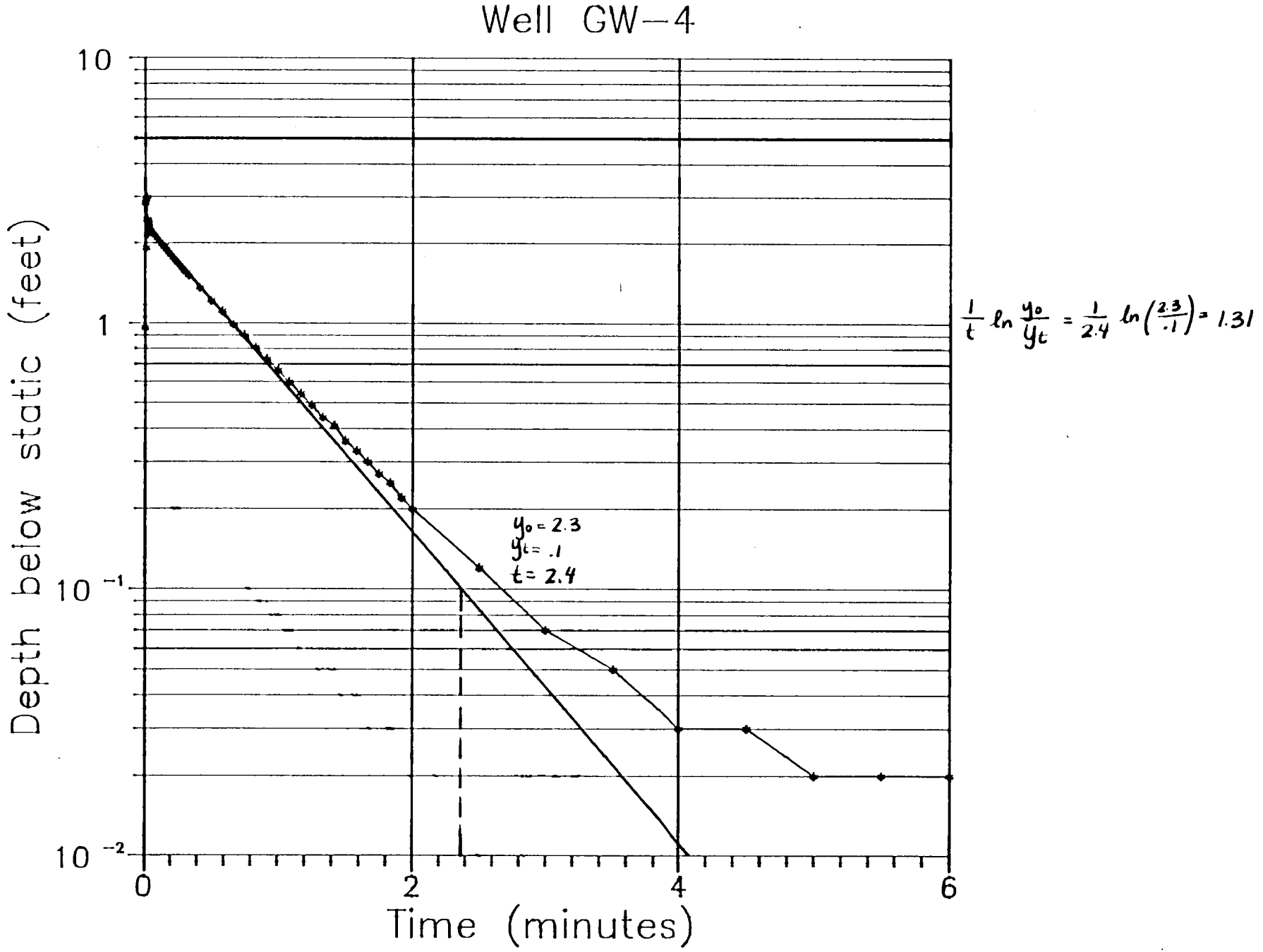
Assume $K_{sandpack} \approx K_{aquifer}$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(12.36/.083)} + \frac{4.8 + .8 \ln[(50-12.36)/.083]}{120.5} \right]^{-1}$$

$$= [.2199 + .0797]^{-1} = 3.338$$

$$K = \frac{(.083)^2(3.338)(1.31)}{2(10)} = 1.51 \times 10^{-3} \text{ ft/min} \text{ or } \underline{\underline{2.51 \times 10^{-5} \text{ ft/sec}}}$$


Well GW-3
Depth below static (feet)
10
1
10 -1
10 -2
0
2
4
6
8
10
Time (minutes)
y_o = 2.3
y_t = .1
t = 2.9
$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{2.9} \ln\left(\frac{2.3}{.1}\right) = 1.08$


Well GW-4
10
1
10^{-1}
10^{-2}
Depth below static (feet)
0
2
4
6
Time (minutes)
$y_o = 2.3$
$y_t = .1$
$t = 2.4$
$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{2.4} \ln\left(\frac{2.3}{.1}\right) = 1.31$

Well GW-5

D = 50
H = 5.04
L = 5.04
r_c = .083
r_w = .083

L/r_w = 60.7
A = 3.4
B = .5

Assume $K_{sand\ pack} \approx K_{aquifer}$

$$\ln \frac{Re}{r_w} = \left[\frac{1.1}{\ln(5.04/.083)} + \frac{3.4 + .5 \ln[(50-5.04)/.083]}{60.7} \right]^{-1}$$

$$= \left[.2679 + .1054 \right]^{-1} = 2.679$$

$$K = \frac{(.083)^2 (2.679)(1.58)}{2(5.04)} = 2.89 \times 10^{-3} \text{ ft/min} \text{ or } \underline{4.82 \times 10^{-5} \text{ ft/sec}}$$

Well GW-6

D = 50
H = 7.16
L = 7.16
r_c = .083
r_w = .083

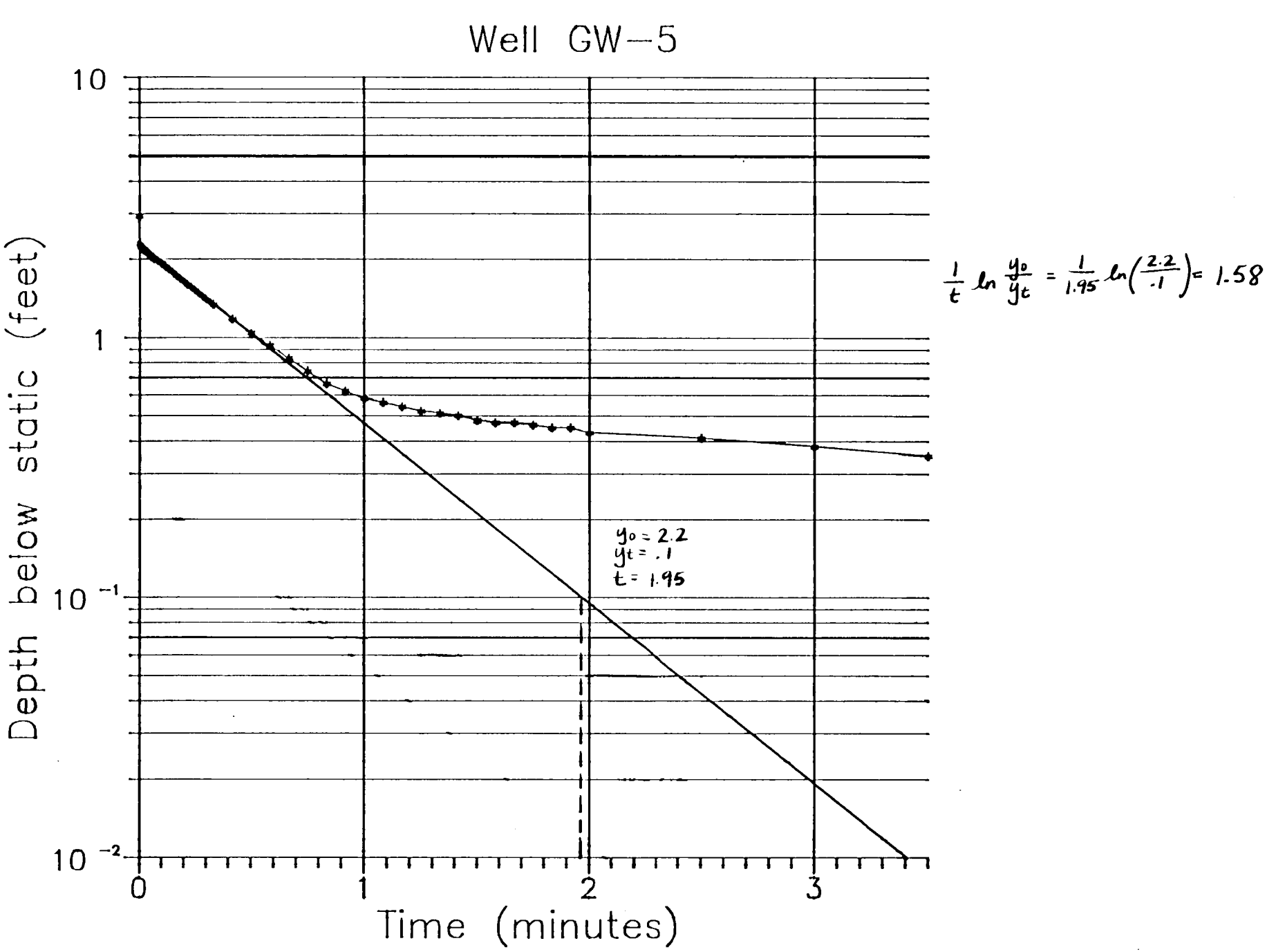
L/r_w = 86.2
A = 4.05
B = .7

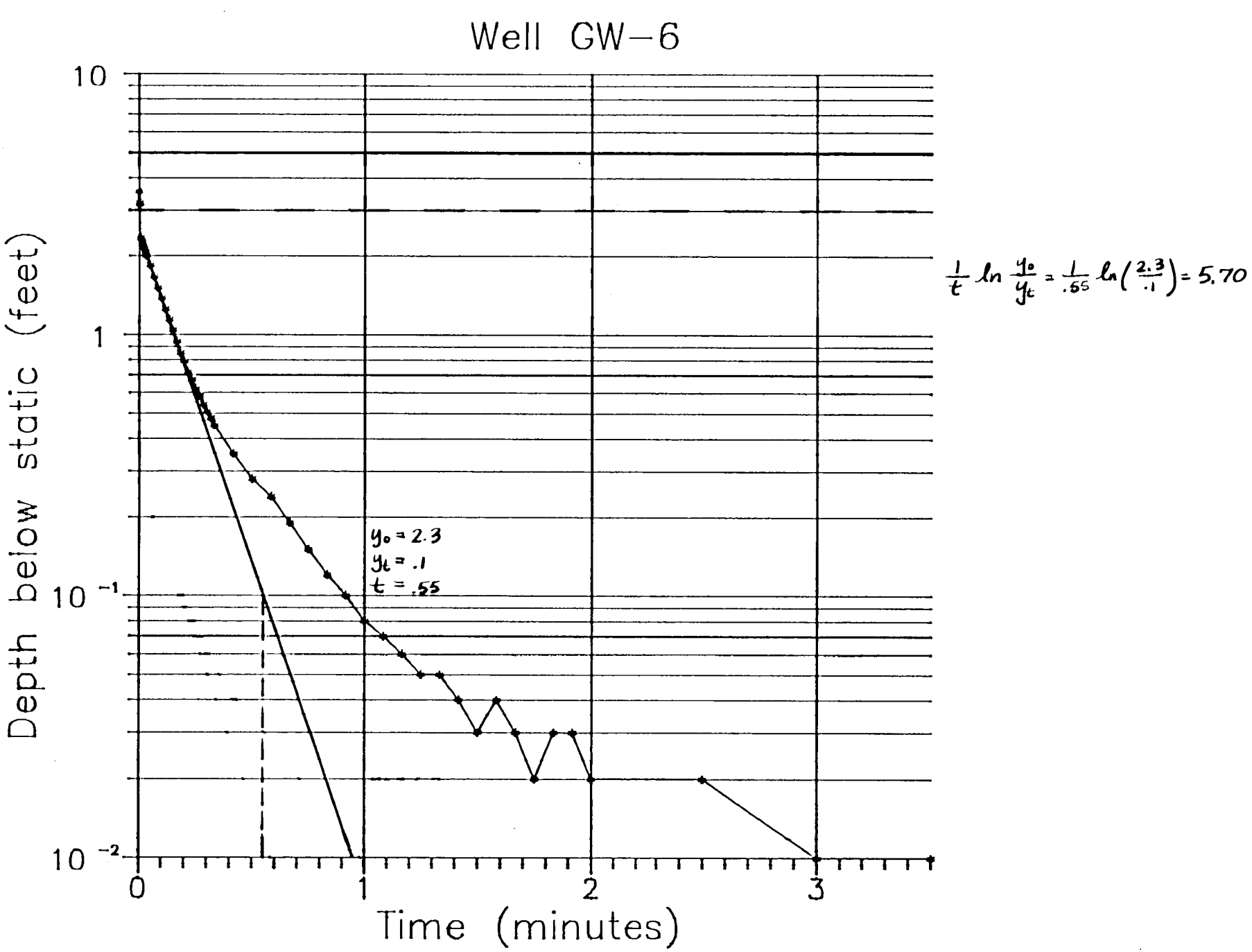
Assume $K_{sand\ pack} \approx K_{aquifer}$

$$\ln \frac{Re}{r_w} = \left[\frac{1.1}{\ln(7.16/.083)} + \frac{4.05 + .7 \ln[(50-7.16)/.083]}{86.2} \right]^{-1}$$

$$= \left[.2468 + .0957 \right]^{-1} = 2.920$$

$$K = \frac{(.083)^2 (2.92)(5.70)}{2(7.16)} = 8.01 \times 10^{-3} \text{ ft/min} \text{ or } \underline{1.33 \times 10^{-4} \text{ ft/sec}}$$


Well GW-5
Depth below static (feet)
10
1
10^{-1}
10^{-2}
0
1
2
3
Time (minutes)
$y_0 = 2.2$
$y_t = .1$
$t = 1.95$
$\frac{1}{t} \ln \frac{y_0}{y_t} = \frac{1}{1.95} \ln\left(\frac{2.2}{.1}\right) = 1.58$



$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{.55} \ln\left(\frac{2.3}{.1}\right) = 5.70$

Well GW-7

$D = 50$
$H = 7.34$
$L = 7.34$
$r_c = .083$
$r_w = .083$

$L/r_w = 88.4$
$A = 4.1$
$B = .7$

Assume $K_{sand\ pack} \approx K_{aquifer}$

$$\ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{\ln(7.34/.083)} + \frac{4.1 + .7\ln[(50-7.34)/.083]}{88.4}\right]^{-1}$$

$$= [.2454 + .0939]^{-1} = 2.947$$

$$K = \frac{(.083)^2(2.947)(4.42)}{2(7.34)} = 6.11 \times 10^{-3}\ ft/min \text{ or } 1.02 \times 10^{-4}\ ft/sec$$

Well GW-8

$D = 50$
$H = 7.02$
$L = 7.02$
$r_c = .083$
$r_w = .083$

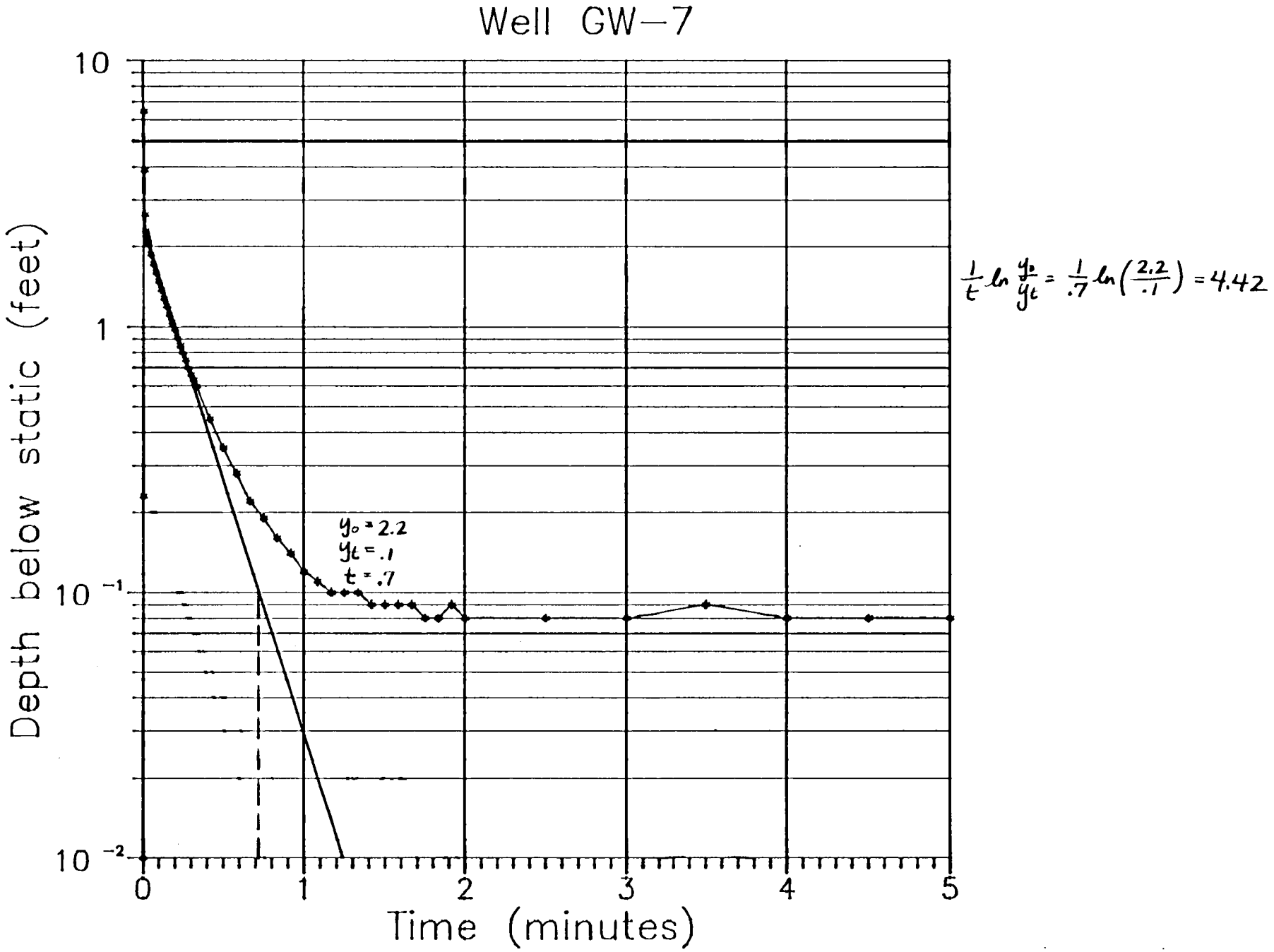
$L/r_w = 84.6$
$A = 4.05$
$B = .67$

Assume $K_{sand\ pack} \approx K_{aquifer}$

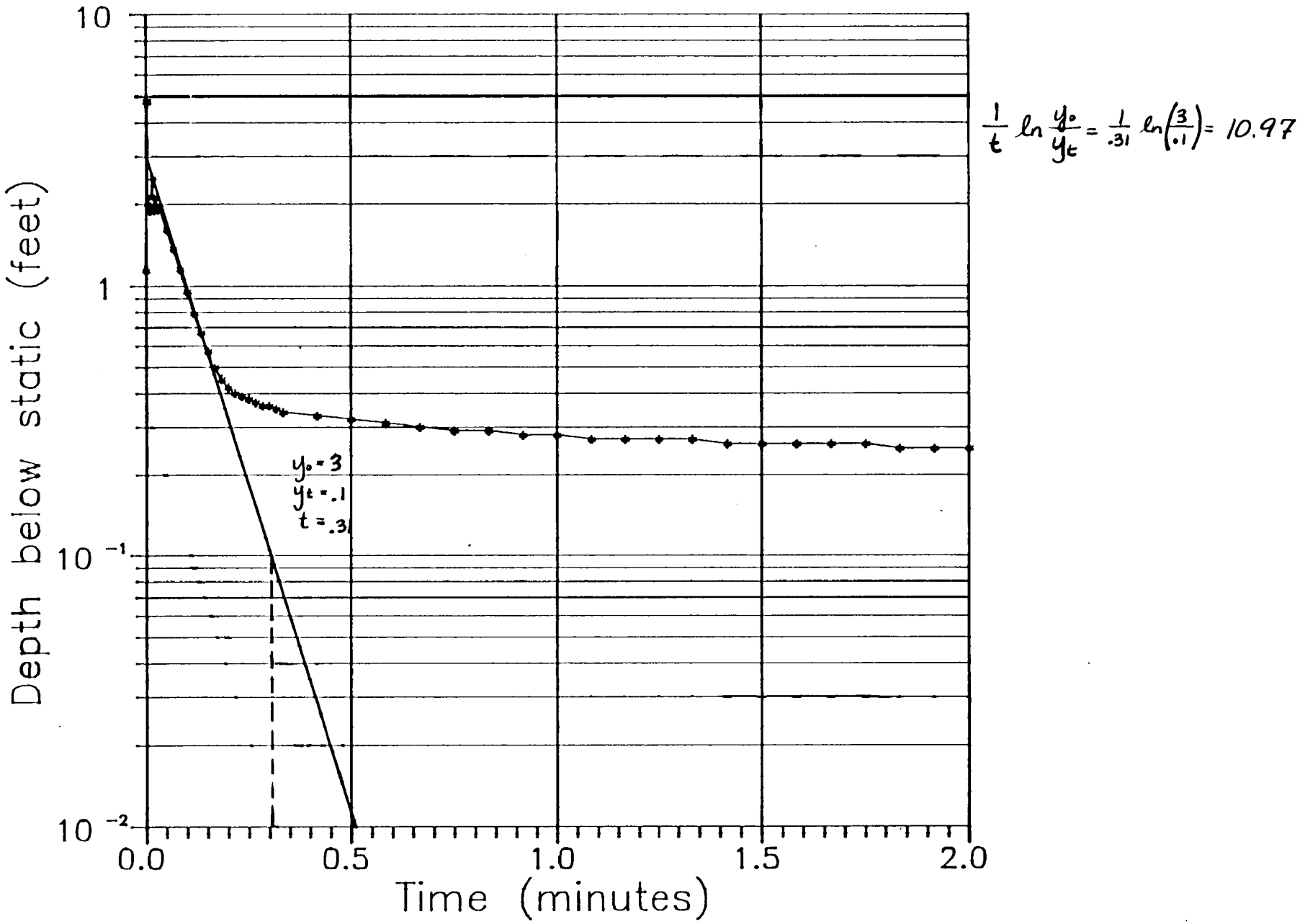
$$\ln\frac{R_e}{r_w} = \left[\frac{1.1}{\ln(7.02/.083)} + \frac{4.05 + .67\ln[(50-7.02)/.083]}{84.6}\right]^{-1}$$

$$= [.2479 + .0954]^{-1} = 2.913$$

$$K = \frac{(.083)^2(2.913)(10.97)}{2(7.02)} = 1.57 \times 10^{-2}\ ft/min \text{ or } 2.61 \times 10^{-4}\ ft/sec$$



$$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{.7} \ln\left(\frac{2.2}{.1}\right) = 4.42$$


Well GW-8
10
1
10^{-1}
10^{-2}
Depth below static (feet)
0.0
0.5
1.0
1.5
2.0
Time (minutes)
$y_o = 3$
$y_t = .1$
$t = .31$
$\frac{1}{t} \ln \frac{y_o}{y_t} = \frac{1}{.31} \ln\left(\frac{3}{.1}\right) = 10.97$

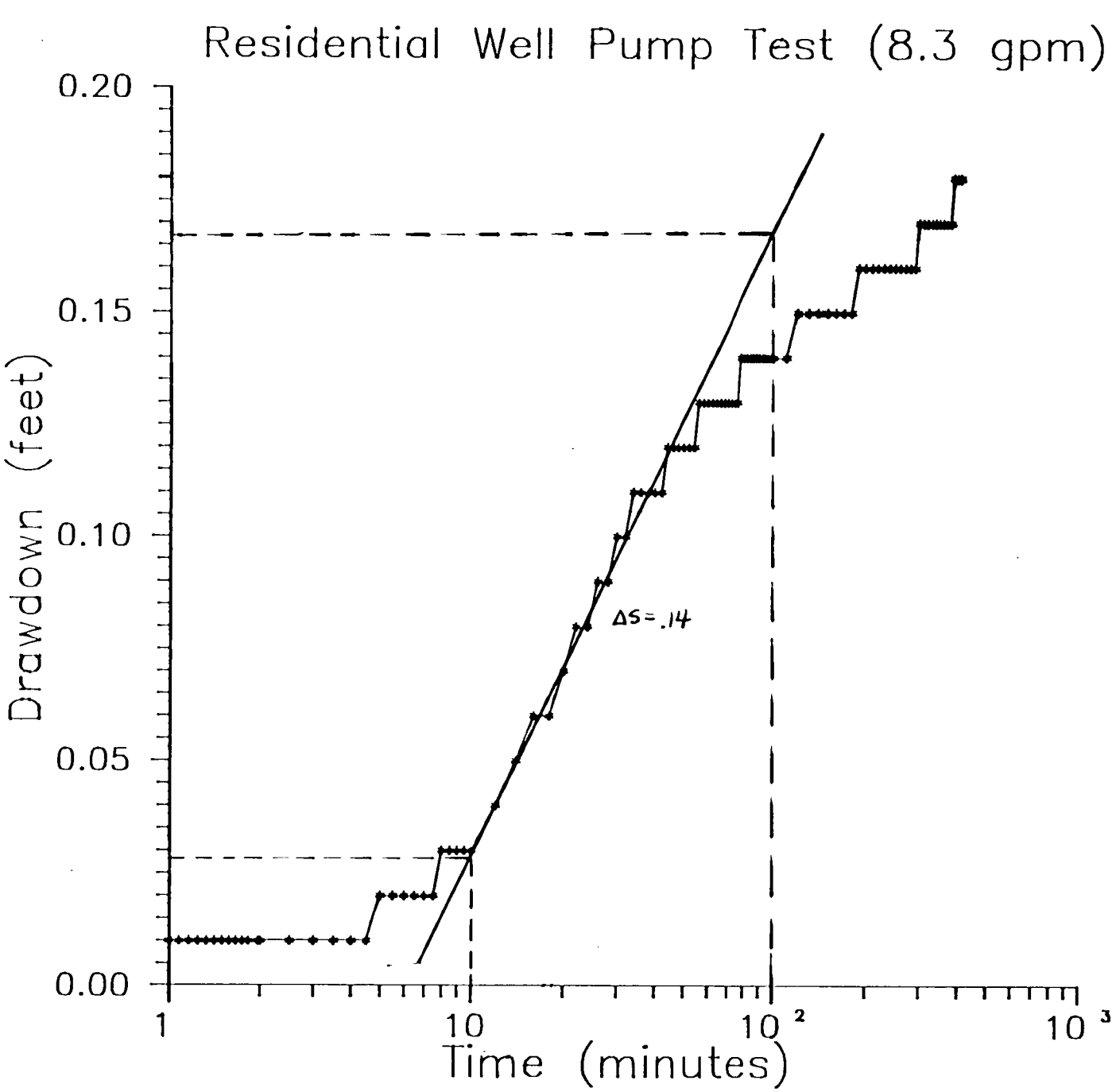
Drawdown

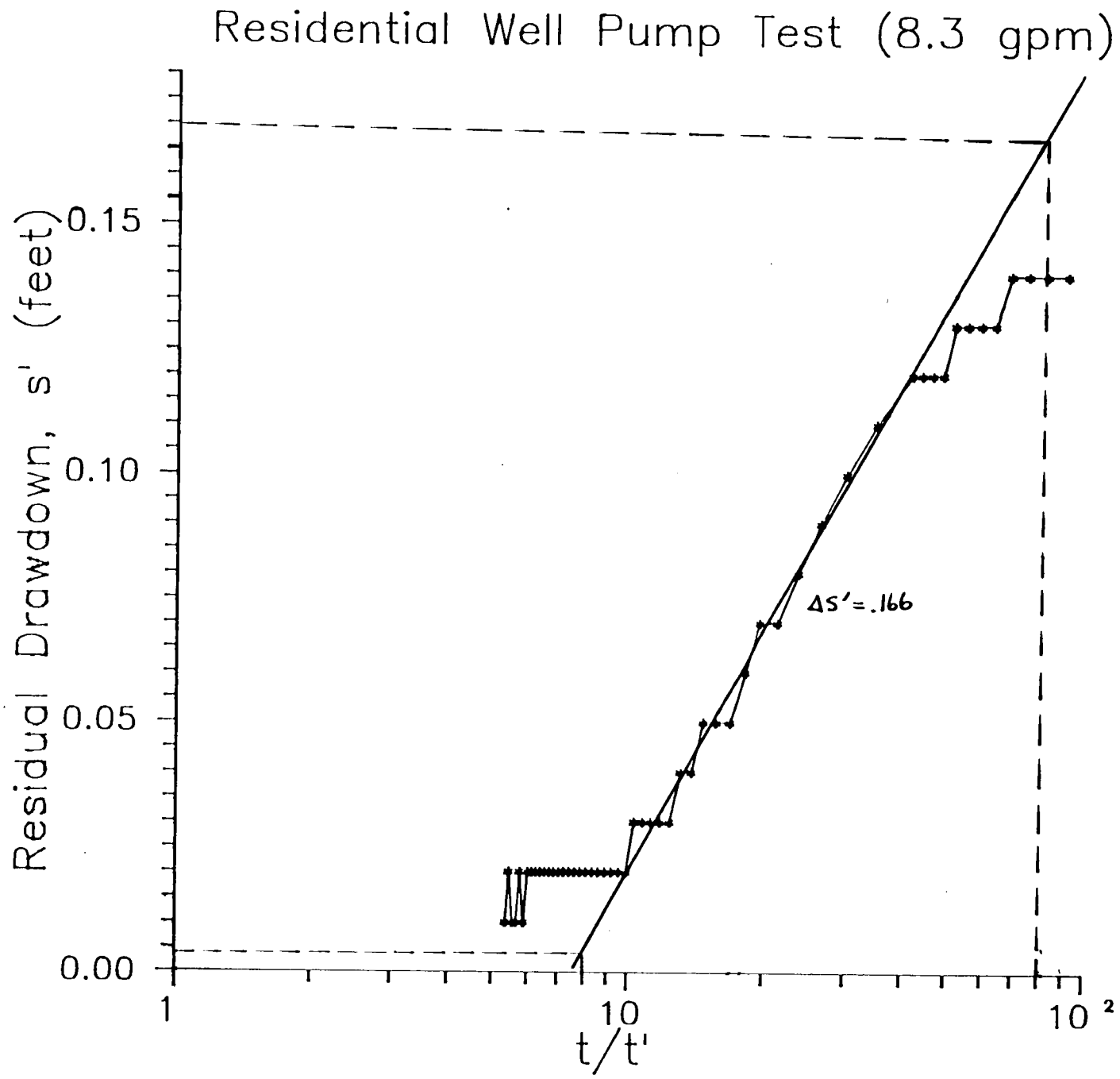
$$T = \frac{264\,(8.3)}{.145} = 15{,}000 \text{ gpd/ft}$$

$$S = \frac{(.3)(15{,}000)(.004)}{(40.5)^2} = 0.011$$

Recovery

$$\frac{264\,(8.3)}{(.15)} = 14{,}608 \text{ gpd/ft}$$


Residential Well Pump Test (8.3 gpm)
0.20
0.15
0.10
0.05
0.00
Drawdown (feet)
ΔS=.14
1
10
10 ²
10 ³
Time (minutes)


Residential Well Pump Test (8.3 gpm)
Residual Drawdown, s' (feet)
0.15
0.10
0.05
0.00
1
10
10 2
t/t'
Δs'=.166

Appendix D

Third Party Data Validation

NUS CORPORATION
ENVIRONMENTAL MANAGEMENT GROUP
PARK WEST TWO
CLIFF MINE ROAD
PITTSBURGH, PA 15275-1071
(412) 788-1080

RECEIVED
FEB 15 1991
Ans'd.....

C-49-2-1-151

February 14, 1991

Mr. Richard Gnat
Hydro-Search, Inc.
350 Indiana Street
Suite 300
Golden, Colorado 80401

Subject: Subcontracted Data Validation Services

Dear Mr. Gnat:

Please find enclosed the completed Data Validation Checklists, associated Attachments #1, #2, and #3, and appended Qualified Sample Results, as required by USEPA Region II and pertaining to the validation of the following Motorola site data packages:

Versar Control #	Fraction(s)	Total Packages
4067	Metals	1
4067	BNA	1
4067/4101	VOA	2
4101/4078	Metals	1
4101/4117/4123/4129	BNA	1
4117/4123/4129	Metals/VOA/Phenols	3
4078	VOA/BNA/Phenols	3

Summary of Qualifications

As indicated in the checklist for the organic fraction analyses of Control #4067/4101 samples, the Relative Percent Difference (RPD) between semivolatile fraction matrix spike and matrix spike duplicate results for acenaphthene (21), exceeded the quality control limit of 19. No qualification of the data was necessary as both the matrix spike and matrix spike duplicate Percent Recoveries (%Rs) for this compound were within acceptable limits and no positive result was reported for this compound in the unspiked sample (MGTP03-01).

In Control #4117, both the Matrix Spike (MS) and Matrix Spike Duplicate (MSD) %Rs for trichloroethene (138% and 158%, respectively), exceeded the 120% upper quality control limit. The positive result for trichloroethene in the unspiked sample (MGGW05-01) was qualified as estimated, "J". Also, the continuing calibration Percent Differences (%Ds) for several volatile compounds exceeded 30% but were less than 50%. No qualifications

to the data were necessary since no positive results were reported for the non-compliant compounds in affected samples.

Review of organic fraction Control #4078 data revealed one base-neutral surrogate (2-fluorobiphenyl) for sample MGSS01-01 (126%), exceeded the 115% upper quality control limit. No qualification to the data is necessary when only one surrogate for the base-neutral fraction is out of compliance.

For metals analyses, the matrix spike %R for lead (215.9%) exceeded the 125% upper quality control limit affecting samples analyzed under Control #4067. All positive results reported for lead in this sample set are rejected, qualified "R", accordingly. In addition, the laboratory duplicate RPD for lead (23.1) exceeded the quality control limit of 20. No further actions were necessary since all lead results were previously rejected because of excessive MS recovery.

One of the CRDL Standard analysis recoveries for chromium (73.4%), was below the 80% lower quality control limit; samples analyzed under Control #4117, 4123, 4129 are affected. Positive results and nondetects for chromium in all samples contained in this set are qualified as estimated, "J" and "UJ", respectively. In addition, the MS %R for iron exceeded the upper quality control limit. No qualifications of the data were necessary, however, because the concentration of iron in the unspiked sample was greater than four times the amount of iron spiked. The laboratory duplicate RPD for iron (132.5%), exceeded the quality control limit of 20. All results reported for iron in this sample set are positive and are qualified as estimated, "J", accordingly.

No qualifications were made to the metals fraction data for Control #4078 as no non-compliances were noted.

Please do not hesitate to contact me at 412-747-7559 if you have any questions regarding these reviews.

Very truly yours,

Debra A. Scheib
Data Validation Coordinator

PACKAGE COMPLETENESS AND DELIVERABLES

CONTROL ~~CASE~~ NUMBER: 4067 / 4101 (VOA) VOA ONLY

LAB: Versar Laboratories / Maryland Spectral Services Inc.

SITE: Motorola

Data Completeness and Deliverables	YES	NO	N/A
1.1 Have any missing deliverables been received and added to the data package.	[ ]	X	
ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.			
1.2 Was SMO CCS checklist included with package?	[ ]	X	
Cover Letter/Case Narrative			
2.1 Is the Narrative or Cover Letter present?	[X]		
2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?	[X]		
Data Validation Checklist			
The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticide/PCBs.			
Does this package contain:			
VOA data?	X		
BNA data?	X		
Pesticide/PCB data?		X	
ACTION: Complete corresponding parts of checklist.			

	YES	NO	N/A

PART A: VOA ANALYSES

Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [X] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [X] ___

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

ACTION: If both VOA vials for a sample have air bubbles, flag all positive results "J" and all non-detects "R".

Holding Times

2.1 Have any VOA holding times, determined from date of collection to date of analysis, been exceeded? ___ [X] ___

If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended.

Table of Holding Time Violations

Sample	Sample Matrix	Preserved ?	(See Traffic Report) Date Sampled	Date Lab Received	Date Analyzed

N/A

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X
3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[___]	___	X

ACTION: Circle all outliers in red.

3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?	___	[X]	___
If yes, were samples reanalyzed?	[___]	___	X
Were method blanks reanalyzed?	[___]	___	X

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A
If any surrogate has a recovery of <10% : 1. Flag all positive results as estimated ("J"). 2. Flag all non-detects as unusable ("R"). Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.			
3.5 Are there any transcription/calculation errors between raw data and Form II? ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".	___	[X]	___

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[X]	___	___
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[___]	___	X
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water	Soils
_____ out of 10	0 out of 10

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 5	0 out of 5

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	___	___
5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	___	___
5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?	[X]	___	___
ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[X]	___
6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	___	[X]	___
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Methylene chloride Acetone Toluene 2-butanone	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] [X] ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

None submitted with sample set

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Bromofluorobenzene (BFB)? [X] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [X] ___ ___

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [X] ___ ___

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

N/A

YES NO N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [X] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [X] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) [X] ___ ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [X] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [X] ___ ___

b. Matrix spikes and matrix spike duplicates [X] ___ ___

c. Blanks [X] ___ ___

	YES	NO	N/A
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	—	—
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[X]	—	—
c. Blanks	[X]	—	—
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[X]	—	—
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability	[X]	—	—
Resolution	[X]	—	—
Peak shape	[X]	—	—
Full-scale graph (attenuation)	[X]	—	—
Other:_____	[ ]	—	X
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[X]	—	—
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[X]	—	—
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	—	—
8.8 Do sample and standard relative ion intensities agree within 20%?	[X]	—	—
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[X]	—	—
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[ ]	—	X
b. Blanks	[ ]	—	X
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?	—	[X]	—
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	—	X
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	—	X
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	—	[X]	—
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]	—	—

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____ N/A

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[X]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
5.0 Field Duplicates			
15.1 Were any field duplicates submitted for VOA analysis?	[X]	—	—

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A

PART B: BNA ANALYSES

Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [X] — —

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? — [X] —

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

Holding Times

2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded? — [X] —

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

Sample	Sample Matrix	Date Sampled	(See Traffic Report) Date Lab Received	Date Extracted	Date Analyzed

N/A

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3) Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[ ]	___	X

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[ ]	___	X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ X

ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank? ___ [X] ___

If yes, were samples reanalyzed? [ ] ___ X

Were method blanks reanalyzed? [ ] ___ X

ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A

If any base-neutral or acid surrogate has a recovery of <10% :
1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J".
2. Flag all non-detects for that fraction "R".

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? — [X] —

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4. Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present? [X] — —

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] — X
b. Med Water [ ] — X
c. Low Soil [X] — —
d. Med Soil [ ] — X

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water	Soils
_____ out of 22	0 out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 11	1 out of 11

→ See Support Documentation Attached (Following page)

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

trix Spike - EPA Sample No.: MGTP03-01 Level:(low/med) LOW

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	0	0	6410	0	-
2-Chlorophenol	0	0	5630	0	-
1,4-Dichlorobenzene	0	0	3170	0	
N-Nitroso-di-n-prop.(1)	0	0	3620	0	
1,2,4-Trichlorobenzene	0	0	3340	0	
4-Chloro-3-methylphenol	0	0	9230	0	
Acenaphthene	5630	0	4060	72	31-137
4-Nitrophenol	0	0	9280	0	-
2,4-Dinitrotoluene	0	0	4450	0	-
Pentachlorophenol	0	0	3080	0	-
Pyrene	5630	265	4400	73	35-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	0	7000	0	0		-
2-Chlorophenol	0	6830	0	0		-
1,4-Dichlorobenzene	0	3690	0	0		
N-Nitroso-di-n-prop.(1)	0	4210	0	0		
1,2,4-Trichlorobenzene	0	4050	0	0		
4-Chloro-3-methylphenol	0	10400	0	0		
Acenaphthene	5640	5000	89	-21 *	19	31-137
4-Nitrophenol	0	11700	0	0		-
2,4-Dinitrotoluene	0	5630	0	0		-
Pentachlorophenol	0	4800	0	0		-
Pyrene	5640	4910	82	-12	36	35-142

1 N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
Values outside of QC limits

D: 1 out of 11 outside limits
ike Recovery: 0 out of 22 outside limits

MMENTS: CLP,HYDROSEA,4067,MGTP03-01,L,S,39712,B,,420.98,1,1UL,
INST W:RESTEK 30M RTX5 45C@2M >290 @13C/M

	YES	NO	N/A
0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	—	—
5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	—	—
5.3 Has a BNA instrument blank been analyzed for each GS/MS system used.	[X]	—	—
ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	—	—
ACTION: Use professional judgement to determine the effect on the data.			
.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are <u>not</u> used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BNAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	—	[X]	—
6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	—	[X]	—
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] [X] —

more submitted with Sample SEI.

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? [X] — —

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [X] — —

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [X] — —

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

			YES	NO	N/A
DATE	TIME	INSTRUMENT	SAMPLE NUMBERS		
					N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [X] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [X] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) [X] ___ ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [X] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [X] ___ ___

b. Matrix spikes and matrix spike duplicates [X] ___ ___

c. Blanks [X] ___ ___

	YES	NO	N/A
8.2 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[X]	___	___
c. Blanks	[X]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[X]	___	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability	[X]	___	___
Resolution	[X]	___	___
Peak shape	[X]	___	___
Full-scale graph (attenuation)	[X]	___	___
Other:_____	[___]	___	X
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample?	[X]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[X]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[ ]	___	X
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[ ]	___	X
b. Blanks	[ ]	___	X
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?	___	[ ]	X
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	X
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	___	X
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[X]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]	___	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____ N/A

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[X]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
Field Duplicates			
15.1 Were any field duplicates submitted for BNA analysis?	[X]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A
PART C: PESTICIDE/PCB ANALYSES			
Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples?	[ ]	___	X
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?	___	[ ]	X
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).			
Holding Times			
2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?	___	[ ]	X
Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.			
Surrogate Recovery (Form II)			
3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[ ]	___	X
d. Med Soil	[ ]	___	X
3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[ ]	___	X
d. Med Soil	[ ]	___	X

	YES	NO	N/A
ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.			
3.3 Were outliers marked correctly with an asterisk?	[___]	___	X
ACTION: Circle all outliers in red.			
3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank?	___	[___]	X
ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).			
3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[___]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[___]	___	X
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[___]	___	X
b. Med Water	[___]	___	X
c. Low Soil	[___]	___	X
d. Med Soil	[___]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soils
_____ out of 12	_____ out of 12

	YES	NO	N/A
4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?			

Water _____ out of 6

Soils _____ out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?	[___]	___	X
5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[___]	___	X
5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?	[___]	___	X

ACTION: Use professional judgement to determine the effect on the data.

Contamination

NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[___]	X
6.2 Do any field/rinse blanks have positive PEST/PCB results?	___	[___]	X

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

YES NO N/A

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ X

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

0 Calibration and QC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A [___] ___ X

b. Evaluation Standard Mix B [___] ___ X

c. Evaluation Standard Mix C [___] ___ X

d. Individual Standard Mix A [___] ___ X

e. Individual Standard Mix B [___] ___ X

f. Multi-component Pesticides Toxaphene & Chlordane [___] ___ √

g. Aroclors 1016/1260 [___] ___ X

h. Aroclors 1221, 1232, 1242, 1248, and 1254 [___] ___ X

ACTION: If no, take action specified in 3.2 above

	YES	NO	N/A
7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?	[ ]	[ ]	X

ACTION: If no, take action specified in 3.2 above.

7.3 Are there any transcription/calculation errors between raw data and Form VIII?	[ ]	[ ]	X

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?	[ ]	[ ]	X
- for Endrin?	[ ]	[ ]	X
or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?	[ ]	[ ]	X

ACTION:

a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	[___]	___	X

ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.

7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	[___]	___	X

ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.

7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	[___]	___	X

ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

Pesticide/PCB Standards Summary

8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	[___]	___	X

ACTION: If no, take action specified in 3.2 above.

8.2 Are there any transcription/calculation errors between raw data and Form IX?	___	[___]	X

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	[___]	___	X

ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".

8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	[___]	___	X

	YES	NO	N/A
ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".			
8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?	[__]	__	X
ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.			
esticide/PCB Identification			
9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[__]	__	X
ACTION: If no, take action specified in 3.2 above.			
.2 Are there any transcription errors between raw data and Form X?	__	[__]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?	[__]	__	X
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?	[__]	__	X
ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).			
9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?	__	[__]	X
ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".			

	YES	NO	N/A
Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Were any errors found?	___	[___]	X
NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.			
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	___	[___]	X
ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.			
.0 Chromatogram Quality			
11.1 Were baselines stable?	[___]	___	X
11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[___]	X
11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?	[___]	___	X
ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.			

	YES	NO	N/A
12.0 Field Duplicates			
12.1 Were any field duplicates submitted for PEST/PCB analysis?	[ ]	___	X

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

APPENDIX A.6

REJECTION SUMMARY FORM
(No. of Compounds/No. of Fractions (Samples)

Type of Review: Data Validation Date: 2/7/91 Case #: 40679 4101

Project: Hydrosearch / Motorola Lab Name: Versar / Maryland Spectral Service

Reviewer's Initials: TCS Number of Samples: 8

Analytes Rejected Due to Exceeding Review Criteria:

	Surrogates	Holding Time	Calibration	LCS Contamination method "Lit Contamination	False +ve False -ve ID	MS, FB, Other	Total # Samples	Total # Rejected/ Total # in all Samples
Acids (15)	←			NA				→
B/N (16/50)	0	0	0	0	0	0	8	0/128
VOA (34/35)	0	0	0	0	0	0	8	0/272
PEST (20)	←			N/A				→
PCB (7)	←			N/A				→
TCDD (1)	←			N/A				→

* "U" qualified due to method blank.

Analytes Estimated Due to Exceeding Review Criteria for:

Acids (15)	←			NA				→
B/N (16/50)	0	0	0	0	0	0	8	0/128
VOA (34/35)	0	0	0	0	0	0	8	0/272
PEST (20)	←			NA				→
PCB (7)	←			NA				→
TCDD (1)	←			N/A				→

Region II

ORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 4067 & 4101 SITE Motorola

LABORATORY Versar & Maryland Spectral Service NO. OF SAMPLES/ MATRIX 8/Soil

SOW# 2/88 REVIEWER (IF NOT ESD) NUS Corporation

REVIEWER'S NAME Thomas L. Sawabe

DPO: ACTION _____ FYI ✓ COMPLETION DATE 2/7/91

DATA ASSESSMENT SUMMARY

		VOA	BNA	PEST	OTHER
1.	HOLDING TIMES	O	O	NA	NA
2.	GC/MS TUNE/INSTR. PERFORM.	O	O		
3.	CALIBRATIONS	O	O		
4.	BLANKS	O	O		
5.	SURROGATES	O	O		
6.	MATRIX SPIKE/DUP	O	X'		
7.	OTHER QC (TB, PB, WB)	NA	NA		
8.	INTERNAL STANDARDS	O	O		
9.	COMPOUND IDENTIFICATION	O	O		
10.	SYSTEM PERFORMANCE	O	O		
11.	OVERALL ASSESSMENT	O	O	↓	↓

O = Data had no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
U = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: X': Acenaphthene RPD outside QC limits, no qualifications necessary as no positive results reported.

AREAS OF CONCERN: _____

NOTABLE PERFORMANCE: _____

Region II
Organic Data Valid.

ATTACHMENT 1
SOP NO. HW-6

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis Version 7

Case No. 4067, 4101 SDG No. — LABORATORY Maryland Spectral Service SITE Mohrela

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's Signature: [signature] Date: 2/7/1991

Verified By: [signature] Date: 2/13/1991

DATA ASSESSMENT:

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

None

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

2. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip field, rinse and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure cross- contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common contaminants), the analytes are qualified as non- detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination None

B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

None

C) Trip blank contamination

None

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

3. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl- phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable, "R". None

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) RESPONSE FACTOR:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both the initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected ("R"). None

DATA ASSESSMENT:

5. CALIBRATION:

A) PERCENT RELATIVE STANDARD DEVIATION (%RSD) AND PERCENT DIFFERENCE (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ" (if %D or RSD >50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R"). None

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column. NA

ATTACHMENT
SOP NO. HW-6

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

None

DATA ASSESSMENT:

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

None

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. None

B) PESTICIDE FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract. NA

DATA ASSESSMENT:

9. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for some additional qualification of the data.

Acenaphthene RPD 21. QC limits 19.

No qualification were nessecary as no positive results for acenaphthene were reported in the original sample, M6TP03-01.

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION:
None

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued on next page if necessary):

No parameters exceed QC limit- No qualifications were necessary

12. CONTRACT PROBLEMS____NON-COMPLIANCE:
None

13. This package contains re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following form I(s) are identified to be used.
None

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued):

NA

APPENDIX A: QUALIFIED LABORATORY RESULTS

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD 8240

CLIENT SAMPLE ID:	MGSB01-01 CONTROL-4101	VBLK1215
LAB SAMPLE ID:	90121428	METHOD_BLANK
SAMPLE DATE:	12/10/90	
VERSAR RECEIVED DATE:	12/13/90	
ANALYSIS DATE:	12/15/90	12/15/90
FILE NAME:	1214280	1215VBLKA1
INSTRUMENT ID:	MSA	MSA
% MOISTURE:	18	N/A
MATRIX:	SOIL	SOIL
UNITS:	UG/KG	UG/KG
DILUTION FACTOR:	1.6	1.0

(These results are reported on a Dry Weight Basis.)

VOLATILE COMPOUNDS		
Acetone	20 U	10 U
Benzene	10 U	5.0 U
Bromodichloromethane	10 U	5.0 U
Bromoform	10 U	5.0 U
Bromomethane	20 U	10 U
2-Butanone	20 U	10 U
Carbon Disulfide	10 U	5.0 U
Carbon Tetrachloride	10 U	5.0 U
Chlorobenzene	10 U	5.0 U
Chloroethane	20 U	10 U
Chloroform	10 U	5.0 U
Chloromethane	20 U	10 U
Dibromochloromethane	10 U	5.0 U
1,2-Dichloroethane	10 U	5.0 U
1,1-Dichloroethane	10 U	5.0 U
1,1-Dichloroethene	10 U	5.0 U
1,2-Dichloroethene (total)	10 U	5.0 U
1,2-Dichloropropane	10 U	5.0 U
trans-1,3-Dichloropropene	10 U	5.0 U
cis-1,3-Dichloropropene	10 U	5.0 U
Ethylbenzene	10 U	5.0 U
2-Hexanone	20 U	10 U
4-Methyl-2-Pentanone	20 U	10 U
Methylene Chloride	10 U	5.0 U
Styrene	10 U	5.0 U
1,1,2,2-Tetrachloroethane	10 U	5.0 U
Tetrachloroethene	10 U	5.0 U
Toluene	10 U	5.0 U
1,1,1-Trichloroethane	27	5.0 U
1,1,2-Trichloroethane	10 U	5.0 U
Trichloroethene	291	5.0 U
Vinyl Acetate	20 U	10 U
Vinyl Chloride	20 U	10 U
Xylene (total)	10 U	5.0 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD 8240

CLIENT SAMPLE ID:	HLDBLK12-14 HOLD_BLANK	VBLK1216B
LAB SAMPLE ID:	HLDBLK12-14	METHOD_BLANK
SAMPLE DATE:	12/14/90	
RECEIVED DATE:	12/14/90	
ANALYSIS DATE:	12/16/90	12/16/90
FILE NAME:	HLDBLK1214	1216VBLKB1
INSTRUMENT ID:	MSB	MSB
MATRIX:	WATER	WATER
UNITS:	UG/L	UG/L
DILUTION FACTOR:	1.0	1.0

VOLATILE COMPOUNDS		
Acetone	10 U	10 U
Benzene	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U
Bromomethane	10 U	10 U
2-Butanone	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U
Chloroethane	10 U	10 U
Chloroform	5.0 U	5.0 U
Chloromethane	10 U	10 U
Dibromochloromethane	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U
1,2-Dichloroethene (total)	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U
2-Hexanone	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U
Methylene Chloride	5.0 U	5.0 U
Styrene	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U
Toluene	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U
Vinyl Acetate	10 U	10 U
Vinyl Chloride	10 U	10 U
Xylene (total)	5.0 U	5.0 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD 8240

CLIENT SAMPLE ID:	MGTP01-01 CONTROL-4067	MGTP02-01 CONTROL-4067	MGTP02-01-DP CONTROL-4067	MGTP03-01 CONTROL-4067	MGTP04-01 CONTROL-4067	MGTP05-01 CONTROL-4067
LAB SAMPLE ID:	90121429	90121430	90121431	90121432	90121433	90121434
SAMPLE DATE:	12/06/90	12/06/90	12/06/90	12/06/90	12/07/90	12/07/90
VERSAR RECEIVED DATE:	12/08/90	12/08/90	12/08/90	12/08/90	12/08/90	12/08/90
ANALYSIS DATE:	12/15/90	12/15/90	12/15/90	12/15/90	12/15/90	12/15/90
FILE NAME:	121429	121430	121431	121432	121433	121434
INSTRUMENT ID:	MSA	MSA	MSA	MSA	MSA	MSA
% MOISTURE:	13	20	21	22	14	19
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
UNITS:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0
VOLATILE COMPOUNDS	(These results are reported on a Dry Weight Basis.)					
Acetone	11 U	13 U	13 U	13 U	12 U	12 U
Benzene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Bromodichloromethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Bromoform	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Bromomethane	11 U	13 U	13 U	13 U	12 U	12 U
2-Butanone	11 U	13 U	13 U	13 U	12 U	12 U
Carbon Disulfide	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Carbon Tetrachloride	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Chlorobenzene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Chloroethane	11 U	13 U	13 U	13 U	12 U	12 U
Chloroform	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Chloromethane	11 U	13 U	13 U	13 U	12 U	12 U
Dibromochloromethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,2-Dichloroethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,1-Dichloroethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,1-Dichloroethene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,2-Dichloroethene (total)	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,2-Dichloropropane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
trans-1,3-Dichloropropene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
cis-1,3-Dichloropropene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Ethylbenzene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
2-Hexanone	11 U	13 U	13 U	13 U	12 U	12 U
4-Methyl-2-Pentanone	11 U	13 U	13 U	13 U	12 U	12 U
Methylene Chloride	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Styrene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,1,2,2-Tetrachloroethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Tetrachloroethene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Toluene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,1,1-Trichloroethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
1,1,2-Trichloroethane	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Trichloroethene	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U
Vinyl Acetate	11 U	13 U	13 U	13 U	12 U	12 U
Vinyl Chloride	11 U	13 U	13 U	13 U	12 U	12 U
Xylene (total)	5.7 U	6.3 U	6.3 U	6.4 U	5.8 U	6.2 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD 8240

CLIENT SAMPLE ID:	MGSB02-01 CONTROL-4067	VBLK1215
LAB SAMPLE ID:	90121435	METHOD_BLANK
SAMPLE DATE:	12/07/90	
VERSAR RECEIVED DATE:	12/08/90	
ANALYSIS DATE:	12/15/90	12/15/90
FILE NAME:	121435	1215VBLKA1
INSTRUMENT ID:	MSA	MSA
% MOISTURE:	5	N/A
MATRIX:	SOIL	SOIL
UNITS:	UG/KG	UG/KG
DILUTION FACTOR:	1.0	1.0

VOLATILE COMPOUNDS	(These results are reported on a Dry Weight Basis.)	
Acetone	11 U	10 U
Benzene	5.3 U	5.0 U
Bromodichloromethane	5.3 U	5.0 U
Bromoform	5.3 U	5.0 U
Bromomethane	11 U	10 U
2-Butanone	11 U	10 U
Carbon Disulfide	5.3 U	5.0 U
Carbon Tetrachloride	5.3 U	5.0 U
Chlorobenzene	5.3 U	5.0 U
Chloroethane	11 U	10 U
Chloroform	5.3 U	5.0 U
Chloromethane	11 U	10 U
Dibromochloromethane	5.3 U	5.0 U
1,2-Dichloroethane	5.3 U	5.0 U
1,1-Dichloroethane	5.3 U	5.0 U
1,1-Dichloroethene	5.3 U	5.0 U
1,2-Dichloroethene (total)	5.3 U	5.0 U
1,2-Dichloropropane	5.3 U	5.0 U
trans-1,3-Dichloropropene	5.3 U	5.0 U
cis-1,3-Dichloropropene	5.3 U	5.0 U
Ethylbenzene	5.3 U	5.0 U
2-Hexanone	11 U	10 U
4-Methyl-2-Pentanone	11 U	10 U
Methylene Chloride	5.3 U	5.0 U
Styrene	5.3 U	5.0 U
1,1,2,2-Tetrachloroethane	5.3 U	5.0 U
Tetrachloroethene	5.3 U	5.0 U
Toluene	5.3 U	5.0 U
1,1,1-Trichloroethane	5.3 U	5.0 U
1,1,2-Trichloroethane	5.3 U	5.0 U
Trichloroethene	5.3 U	5.0 U
Vinyl Acetate	11 U	10 U
Vinyl Chloride	11 U	10 U
Xylene (total)	5.3 U	5.0 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD 8240

CLIENT SAMPLE ID:	HLDBLK12-14 HOLD_BLANK	VBLK1216B
LAB SAMPLE ID:	HLDBLK12-14	METHOD_BLANK
SAMPLE DATE:	12/14/90	
RECEIVED DATE:	12/14/90	
ANALYSIS DATE:	12/16/90	12/16/90
FILE NAME:	HLDBLK1214	1216VBLK81
INSTRUMENT ID:	MSB	MSB
MATRIX:	WATER	WATER
UNITS:	UG/L	UG/L
DILUTION FACTOR:	1.0	1.0

VOLATILE COMPOUNDS		
Acetone	10 U	10 U
Benzene	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U
Bromomethane	10 U	10 U
2-Butanone	10 U	10 U
Carbon Disulfide	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U
Chloroethane	10 U	10 U
Chloroform	5.0 U	5.0 U
Chloromethane	10 U	10 U
Dibromochloromethane	5.0 U	5.0 U
1,2-Dichloroethane	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U
1,2-Dichloroethene (total)	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0 U	5.0 U
Ethylbenzene	5.0 U	5.0 U
2-Hexanone	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U
Methylene Chloride	5.0 U	5.0 U
Styrene	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U
Tetrachloroethene	5.0 U	5.0 U
Toluene	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U
Vinyl Acetate	10 U	10 U
Vinyl Chloride	10 U	10 U
Xylene (total)	5.0 U	5.0 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP01-01

Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39709

Sample wt/vol: 30.1 (g/mL) G Lab File ID: W1491

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 15 dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	390	U
208-96-8	Acenaphthylene	390	U
83-32-9	Acenaphthene	390	U
86-73-7	Fluorene	390	U
85-01-8	Phenanthrene	390	U
120-12-7	Anthracene	390	U
206-44-0	Fluoranthene	390	U
129-00-0	Pyrene	390	U
56-55-3	Benzo(a)anthracene	390	U
218-01-9	Chrysene	390	U
205-99-2	Benzo(b)fluoranthene	390	U
207-08-9	Benzo(k)fluoranthene	390	U
50-32-8	Benzo(a)pyrene	390	U
193-39-5	Indeno(1,2,3-cd)pyrene	390	U
53-70-3	Dibenz(a,h)anthracene	390	U
191-24-2	Benzo(g,h,i)perylene	390	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP02-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39710

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1492

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 18 dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	400	U
208-96-8	Acenaphthylene	400	U
83-32-9	Acenaphthene	400	U
86-73-7	Fluorene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP02-01DP

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39711

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1493

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 18 dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: 7.5 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	400	U
208-96-8	Acenaphthylene	400	U
83-32-9	Acenaphthene	400	U
86-73-7	Fluorene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP03-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39712

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1494

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 41 dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: 7.4 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	560	U
208-96-8	Acenaphthylene	560	U
83-32-9	Acenaphthene	560	U
86-73-7	Fluorene	560	U
85-01-8	Phenanthrene	560	U
120-12-7	Anthracene	560	U
206-44-0	Fluoranthene	340	J
129-00-0	Pyrene	260	J
56-55-3	Benzo(a)anthracene	560	U
218-01-9	Chrysene	560	U
205-99-2	Benzo(b)fluoranthene	560	U
207-08-9	Benzo(k)fluoranthene	560	U
50-32-8	Benzo(a)pyrene	560	U
193-39-5	Indeno(1,2,3-cd)pyrene	560	U
53-70-3	Dibenz(a,h)anthracene	560	U
191-24-2	Benzo(g,h,i)perylene	560	U

NC CC46

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP04-01

Name: VERSAR INC Contract: _____

ode: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

rix: (soil/water) SOIL Lab Sample ID: 39715

ple wt/vol: 30.0 (g/mL) G Lab File ID: W1497

: (low/med) LOW Date Received: 12/08/90

oisture: not dec. 33 dec. ____ Date Extracted: 12/10/90

ction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

Cleanup: (Y/N) N pH: 6.1 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	490	U
208-96-8	Acenaphthylene	490	U
83-32-9	Acenaphthene	490	U
86-73-7	Fluorene	490	U
85-01-8	Phenanthrene	490	U
120-12-7	Anthracene	490	U
206-44-0	Fluoranthene	490	U
129-00-0	Pyrene	490	U
56-55-3	Benzo(a)anthracene	490	U
218-01-9	Chrysene	490	U
205-99-2	Benzo(b)fluoranthene	490	U
207-08-9	Benzo(k)fluoranthene	490	U
50-32-8	Benzo(a)pyrene	490	U
193-39-5	Indeno(1,2,3-cd)pyrene	490	U
53-70-3	Dibenz(a,h)anthracene	490	U
191-24-2	Benzo(g,h,i)perylene	490	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGTP05-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39716

Sample wt/vol: 30.2 (g/mL) G Lab File ID: W1498

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 35 dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: 7.7 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	500	U
208-96-8	Acenaphthylene	280	J
83-32-9	Acenaphthene	500	U
86-73-7	Fluorene	220	J
85-01-8	Phenanthrene	1900	
120-12-7	Anthracene	220	JX
206-44-0	Fluoranthene	1500	
129-00-0	Pyrene	1100	
56-55-3	Benzo(a)anthracene	490	J
218-01-9	Chrysene	500	U
205-99-2	Benzo(b)fluoranthene	570	
207-08-9	Benzo(k)fluoranthene	410	J
50-32-8	Benzo(a)pyrene	470	J
193-39-5	Indeno(1,2,3-cd)pyrene	400	J
53-70-3	Dibenz(a,h)anthracene	500	U
191-24-2	Benzo(g,h,i)perylene	250	JX

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSB02-01

Name: VERSAR INC Contract:

Code: VERSAR Case No.: 4067 SAS No.: SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: 39717

Sample wt/vol: 30.1 (g/mL) G Lab File ID: W1505

Level: (low/med) LOW Date Received: 12/08/90

% Moisture: not dec. 30 dec. Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: 8.5 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	470	U
208-96-8	Acenaphthylene	470	U
83-32-9	Acenaphthene	470	U
86-73-7	Fluorene	470	U
85-01-8	Phenanthrene	470	U
120-12-7	Anthracene	470	U
206-44-0	Fluoranthene	470	U
129-00-0	Pyrene	470	U
56-55-3	Benzo(a)anthracene	470	U
218-01-9	Chrysene	470	U
205-99-2	Benzo(b)fluoranthene	470	U
207-08-9	Benzo(k)fluoranthene	470	U
50-32-8	Benzo(a)pyrene	470	U
193-39-5	Indeno(1,2,3-cd)pyrene	470	U
53-70-3	Dibenz(a,h)anthracene	470	U
191-24-2	Benzo(g,h,i)perylene	470	U

1B

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

MSBLANK

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: MSTD3772

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1506

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	330	U
208-96-8	Acenaphthylene	330	U
83-32-9	Acenaphthene	2300	
86-73-7	Fluorene	330	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
206-44-0	Fluoranthene	330	U
129-00-0	Pyrene	2800	
56-55-3	Benzo(a)anthracene	330	U
218-01-9	Chrysene	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(g,h,i)perylene	330	U

1B

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SBLK24

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4067 SAS No.: _____ SDG No.: 1

Matrix: (soil/water) SOIL Lab Sample ID: SBLK24

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1490

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/10/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/10/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	330	U
208-96-8	Acenaphthylene	330	U
83-32-9	Acenaphthene	330	U
86-73-7	Fluorene	330	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
206-44-0	Fluoranthene	330	U
129-00-0	Pyrene	330	U
56-55-3	Benzo(a)anthracene	330	U
218-01-9	Chrysene	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(g,h,i)perylene	330	U

CKAGE COMPLETENESS AND DELIVERABLES

CONTROL
CASE NUMBER: 4078 VOA/BNA/Total Phenols

LAB: MD Spectral Services, Inc.

SITE: Motorola

0 Data Completeness and Deliverables

	YES	NO	N/A
1.1 Have any missing deliverables been received and added to the data package.	[ ]	___	✓
ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.			
1.2 Was SMO CCS checklist included with package?	[X]	___	___

0 Cover Letter/Case Narrative

2.1 Is the Narrative or Cover Letter present?	[X]	___	___
2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?	[X]	___	___

0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticide/PCBs.

Does this package contain:

VOA data?	X	___
BNA data?	X	___
Pesticide/PCB data?	___	X

ACTION: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [ ] [X] * [ ]
* not provided by contractor

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? [ ] [✓] [ ]

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

ACTION: If both VOA vials for a sample have air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

2.1 Have any VOA holding times, determined from date of collection to date of analysis, been exceeded? [ ] [X] [ ]

If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended.

Table of Holding Time Violations

Sample	Sample Matrix	Preserved ?	(See Traffic Report) Date Sampled	Date Lab Received	Date Analyzed
		N/A			

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

0 Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X
3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[___]	___	X

ACTION: Circle all outliers in red.

3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?	___	[X]	___
If yes, were samples reanalyzed?	[___]	___	X
Were method blanks reanalyzed?	[___]	___	X

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A
If any surrogate has a recovery of <10% : 1. Flag all positive results as estimated ("J"). 2. Flag all non-detects as unusable ("R"). Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.			
3.5 Are there any transcription/calculation errors between raw data and Form II? ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".	___	[X]	___
4.0 Matrix Spikes (Form III)			
4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[___]	___	X
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[___]	___	X
b. Med Water	[___]	___	X
c. Low Soil	[___]	___	X
d. Med Soil	[___]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			
4.3 How many VOA spike recoveries are outside QC limits? Water: _____ out of 10 Soils: _____ out of 10			N/A
4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits? Water: _____ out of 5 Soils: _____ out of 5			N/A
ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.			

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	___	___
5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	___	___
5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?	[X]	___	___
ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[X]	___
6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	___	[X]	___
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Methylene chloride Acetone Toluene 2-butanone	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] [X] [ ]

None submitted

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Bromofluorobenzene (BFB)? [X] [ ] [ ]

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [X] [ ] [ ]

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [X] [ ] [ ]

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.4 Have the ion abundance criteria been met for each instrument used?	[X]	___	___
ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).			
ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.			
7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)	___	[X]	___
7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)	[X]	___	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".			
7.7 Are the spectra of the mass calibration compound acceptable?	[X]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates	[ ]	___	X
c. Blanks	[X]	___	___

	YES	NO	N/A
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[ ]	___	X
c. Blanks	[X]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[ ]	X	___
8.4 Is chromatographic performance acceptable with respect to:			
Baseline stability	[X]	___	___
Resolution	[X]	___	___
Peak shape	[X]	___	___
Full-scale graph (attenuation)	[X]	___	___
Other:_____	[ ]	___	X
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[X]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[X]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[X]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Blanks	[X]	___	___
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?	___	[X]	___
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[X]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]	___	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____ N/A

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[X]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
15.0 Field Duplicates			
15.1 Were any field duplicates submitted for VOA analysis?	[X]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART B: BNA ANALYSES

	YES	NO	N/A
1.0 Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples? * Not provided by contractor	[ ]	X *	
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?		[X]	
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).			
2.0 Holding Times			
2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded?		[X]	

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

Sample	Sample Matrix	Date Sampled	(See Traffic Report) Date Lab Received	Date Extracted	Date Analyzed

N/A

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[X]	___	___

ACTION: Circle all outliers in red. see Support Documentation - following page.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[X]	___
If yes, were samples reanalyzed?	[___]	___	X
Were method blanks reanalyzed?	[___]	___	X

ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

2D

SOIL SEMIVOLATILE SURROGATE RECOVERY

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

el:(low/med) LOW

	EPA SAMPLE NO.	S1 (NBZ) #	S2 (FBP) #	S3 (TPH) #	S4 (PHL) #	S5 (2FP) #	S6 (TBP) #	OTHER	TOT OUT
01	MGSS01-01	96	126 *	107	108	114	115	0	1
02	MGSS02-01	68	79	77	66	66	72	0	0
03	MGSS03-01	25	32	35	30	30	30	0	0
04	SBLK61	69	84	85	71	62	70	0	0

	QC LIMITS
S1 (NBZ) = Nitrobenzene-d5	(23-120)
S2 (FBP) = 2-Fluorobiphenyl	(30-115)
S3 (TPH) = Terphenyl	(18-137)
S4 (PHL) = Phenol-d5	(24-113)
S5 (2FP) = 2-Fluorophenol	(25-121)
S6 (TBP) = 2,4,6-Tribromophenol	(19-122)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out

	YES	NO	N/A
If any base-neutral or acid surrogate has a recovery of <10% : 1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J". 2. Flag all non-detects for that fraction "R". Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.			
3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[X]	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
0 Matrix Spikes (Form III)			
4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[___]	___	X
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[___]	___	X
b. Med Water	[___]	___	X
c. Low Soil	[___]	___	X
d. Med Soil	[___]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			

4.3 How many BNA spike recoveries are outside QC limits?

Water	Soils
_____ out of 22	_____ out of 22

N/A

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
_____ out of 11	_____ out of 11

N/A

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	___	___
5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	___	___
5.3 Has a BNA instrument blank been analyzed for each GS/MS system used.	[X]	___	___
ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BNAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[X]	___
6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	___	[ ]	X
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] [X] ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? [X] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [X] ___ ___

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [X] ___ ___

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS	YES	NO	N/A
						N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [X] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [X] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) [X] ___ ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [X] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [X] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ X

c. Blanks [X] ___ ___

	YES	NO	N/A
8.2 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[ ]	___	X
c. Blanks	[X]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[ ]	X*	___
8.4 Is chromatographic performance acceptable with respect to: * formerly presented areas			
Baseline stability	[X]	___	___
Resolution	[X]	___	___
Peak shape	[X]	___	___
Full-scale graph (attenuation)	[X]	___	___
Other:_____	[ ]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample?	[X]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? * no positive results are reported	[ ]	___	X *
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? * no positive results are reported	[ ]	___	X *
8.8 Do sample and standard relative ion intensities agree within 20%? * no positive results are reported	[ ]	___	X *
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[ ]		X
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[ ]		X
b. Blanks	[ ]		X
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?		[X]	
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]		X
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]		X
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?		[X]	
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]		

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

	YES	NO	N/A
13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____ N/A

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

	YES	NO	N/A
13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[X]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
15.0 Field Duplicates			
15.1 Were any field duplicates submitted for BNA analysis?	[X]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A
PART C: PESTICIDE/PCB ANALYSES			
1.0 Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples?	[ ]	___	[X]
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?	___	[X]	___
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).			
2.0 Holding Times			
2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?	___	[ ]	[X]
Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.			
3.0 Surrogate Recovery (Form II)			
3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[ ]	___	[X]
b. Med Water	[ ]	___	[X]
c. Low Soil	[ ]	___	[X]
d. Med Soil	[ ]	___	[X]
3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[ ]	___	[X]
b. Med Water	[ ]	___	[X]
c. Low Soil	[ ]	___	[X]
d. Med Soil	[ ]	___	[X]

	YES	NO	N/A
ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.			
3.3 Were outliers marked correctly with an asterisk?	[ ]	___	X
ACTION: Circle all outliers in red.			
3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank?	___	[ ]	X
ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).			
3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[ ]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
4.0 Matrix Spikes (Form III)			
4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[ ]	___	X
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[ ]	___	X
d. Med Soil	[ ]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soils
_____ out of 12	_____ out of 12

	YES	NO	N/A
4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?			
Water _____ out of 6 Soils _____ out of 6			
ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.			
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[ ]	___	X
5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[ ]	___	X
5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?	[ ]	___	X
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[ ]	X
6.2 Do any field/rinse blanks have positive PEST/PCB results?	___	[ ]	X
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			

YES NO N/A

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ X

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A [___] ___ X

b. Evaluation Standard Mix B [___] ___ X

c. Evaluation Standard Mix C [___] ___ X

d. Individual Standard Mix A [___] ___ X

e. Individual Standard Mix B [___] ___ X

f. Multi-component Pesticides Toxaphene & Chlordane [___] ___ X

g. Aroclors 1016/1260 [___] ___ X

h. Aroclors 1221, 1232, 1242, 1248, and 1254 [___] ___ X

ACTION: If no, take action specified in 3.2 above

	YES	NO	N/A
7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?	[ ]	___	X
ACTION: If no, take action specified in 3.2 above.			
7.3 Are there any transcription/calculation errors between raw data and Form VIII?	___	[ ]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?	___	[ ]	X
- for Endrin?	___	[ ]	X
or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?	___	[ ]	X

ACTION:

a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	[___]	___	X

ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.

7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	[___]	___	X

ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.

7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	[___]	___	X

ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

8.0 Pesticide/PCB Standards Summary

8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	[___]	___	X

ACTION: If no, take action specified in 3.2 above.

8.2 Are there any transcription/calculation errors between raw data and Form IX?	___	[___]	X

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	[___]	___	X

ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".

8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	[___]	___	X

	YES	NO	N/A
ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".			
8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?	[ ]	___	X
ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.			
9.0 Pesticide/PCB Identification			
9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[ ]	___	X
ACTION: If no, take action specified in 3.2 above.			
9.2 Are there any transcription errors between raw data and Form X?	___	[ ]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?	[ ]	___	X
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?	[ ]	___	X
ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).			
9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?	___	[ ]	X
ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".			

	YES	NO	N/A
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Were any errors found?	___	[___]	X
NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicates the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.			
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	___	[___]	X
ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.			
11.0 Chromatogram Quality			
11.1 Were baselines stable?	[___]	___	X
11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[___]	X
11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?	[___]	___	X
ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.			

	YES	NO	N/A
12.0 Field Duplicates			
12.1 Were any field duplicates submitted for PEST/PCB analysis?	[ ]		X

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Region II
Organic Data Valid.

ATTACHMENT 1
SOP NO. HW-6

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

~~Case~~ Contract No. _____ SDG No. _____ LABORATORY (see below) SITE Motorola

MSS = MD. Spectral Services, Inc. Versar (BNA fraction)

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's Signature: Jean M. Zimmerman Date: 2/7/1991

Verified By: Date: 2/13/1991

DATA ASSESSMENT:

1. HOLDING TIME: All holding times were met

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

2. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip field, rinse and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure cross- contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common contaminants), the analytes are qualified as non- detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination

None

B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

There are no associated field or rinse blanks

C) Trip blank contamination

None

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

3. MASS SPECTROMETER TUNING: All criteria were met

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl- phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable, "R".

DATA ASSESSMENT:

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) RESPONSE FACTOR: All quality control criteria were met.

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both the initial and continuing calibrations. A value $<$ 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected ("R").

DATA ASSESSMENT:

5. CALIBRATION: All quality criteria were met

A) PERCENT RELATIVE STANDARD DEVIATION (%RSD) AND PERCENT DIFFERENCE (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ" (if %D or RSD >50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column.

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

The percent recovery of 2-fluorobiphenyl for Sample MGSS01-01 exceed quality control criteria.

No action was required because only a single surrogate for this fraction didn't meet quality criteria. All surrogate recoveries were greater than 10 percent.

(see attached Form 2D)
insert following page 5 of checklist

DATA ASSESSMENT: All quality criteria were met

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION: All criteria were met

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

B) PESTICIDE FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract.

DATA ASSESSMENT: N/A

9. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for some additional qualification of the data.

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION: Not applicable

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued on next page if necessary):

No problems encountered

12. CONTRACT PROBLEMS____NON-COMPLIANCE:

none

13. This package contains re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following form I(s) are identified to be used.

Not applicable

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued):

No major problems encountered during analyses.

APPENDIX A.6

REJECTION SUMMARY FORM
(No. of Compounds/No. of Fractions (Samples))

Type of Review: Data Validation Date: 2/7/91 Case #: 4078

Project: Motorola Lab Name: MD Spectral Services Inc (VOA Fraction) Versar (BNA Fraction)

Reviewer's Initials: AMZ Number of Samples: 11

Analytes Rejected Due to Exceeding Review Criteria:

	Surrogates	Holding Time	Calibration	Lab Contaminants method "Blk Contamination	False +ve False -ve ID	MS, FB, Other	Total # Samples	Total # Rejected/ Total # in all Samples
Acids (15)	0	0	0	0	0	NA	0	0/0
PAHs 16 B/N (50)	0	0	0	0	0	NA	7	0/112
VOA (35)	0	0	0	0	0	NA	11	0/385
PEST (20)	0	0	0	0	0	NA	0	0/0
PCB (7)	0	0	0	0	0	NA	0	0/0
TCDD (1)	←			N/A				→

* "U" qualified due to associated blank.

Analytes Estimated Due to Exceeding Review Criteria for:

Acids (15)	0	0	0	0	0	0	0	0/0
PAHs 16 B/N (50)	0	0	0	0	0	0	0	0/112
VOA (35)	0	0	0	0	0	0	0	0/385
PEST (20)	0	0	0	0	0	0	0	0/0
PCB (7)	0	0	0	0	0	0	0	0/0
TCDD (1)	←			N/A				→

Region II

ORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 4078 SITE Motorola

LABORATORY Versar (BNA Fraction) NO. OF SAMPLES/
MD. Spectral Services, Inc. (VOA Fraction) MATRIX 3/soil 8/water

SOW# New York State Protocol (ASP 89) REVIEWER (IF NOT ESD) NUS-Pgh
EPA Method 8240 NYS 1989 mod. Statem. REVIEWER'S NAME Jean Zimmerman

DPO: ACTION _____ FYI ✓ COMPLETION DATE 2/7/91

DATA ASSESSMENT SUMMARY

		VOA	BNA (PAHs only)	PEST	OTHER
1.	HOLDING TIMES	O	O	NA	
2.	GC/MS TUNE/INSTR. PERFORM.	O	O		
3.	CALIBRATIONS	O	O		
4.	BLANKS	O	O		
5.	SURROGATES	O	X[1]		
6.	MATRIX SPIKE/DUP	NA	NA		
7.	OTHER QC (MB, PB, WB)	NA	NA		
8.	INTERNAL STANDARDS	O	O		
9.	COMPOUND IDENTIFICATION	O	O		
10.	SYSTEM PERFORMANCE	O	O		
11.	OVERALL ASSESSMENT	O	O	Y	

O = Data had no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
U = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: _____

AREAS OF CONCERN: X[1] - Percent Recovery FBP Surrogate > QC limits

NOTABLE PERFORMANCE: _____

APPENDIX A: QUALIFIED LABORATORY RESULTS

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 90121446

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 121446

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 5 Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS02-01

La Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

La Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Ma rix: (soil/water) SOIL Lab Sample ID: 90121447

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 121447

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 17 Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	12	U
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-35-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-02-6	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
133-02-7	Xylene (total)	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS03-01

La. Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

La. Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Ma.rix: (soil/water) SOIL Lab Sample ID: 90121448

Sa.ple wt/vol: 5.0 (g/mL) G Lab File ID: 121448

Le.el: (low/med) LOW Date Received: 12/11/90

% .oisture: not dec. 19 Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	6	U
67-64-1	Acetone	12	U
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-35-3	1,1-Dichloroethane	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-02-6	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	6	U
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
133-02-7	Xylene (total)	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW02-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121455

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121455

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW02-01_DP

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121454

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121454

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 2.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	25	U
74-83-9	Bromomethane	25	U
75-01-4	Vinyl Chloride	25	U
75-00-3	Chloroethane	25	U
75-09-2	Methylene Chloride	13	U
67-64-1	Acetone	25	U
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-35-3	1,1-Dichloroethane	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	25	U
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	25	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-02-6	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-Pentanone	25	U
591-78-6	2-Hexanone	25	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
133-02-7	Xylene (total)	13	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW03-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121453

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121453D

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column: (pack/cap) CAP Dilution Factor: 2.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	25	U
74-83-9	Bromomethane	25	U
75-01-4	Vinyl Chloride	25	U
75-00-3	Chloroethane	25	U
75-09-2	Methylene Chloride	13	U
67-64-1	Acetone	25	U
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-35-3	1,1-Dichloroethane	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	25	U
71-55-6	1,1,1-Trichloroethane	390	
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	25	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-02-6	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	44	
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	9	J
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-Pentanone	25	U
591-78-6	2-Hexanone	25	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
133-02-7	Xylene (total)	13	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW04-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121449

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121449

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGRW01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121450

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121450

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGRW02-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121451

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121451

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGRW03-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121452

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121452

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121456

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121456

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW02-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) WATER Lab Sample ID: 39835

Sample wt/vol: 870 (g/mL) ML Lab File ID: W1510

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 0.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	6	U
208-96-8	Acenaphthylene	6	U
83-32-9	Acenaphthene	6	U
86-73-7	Fluorene	6	U
85-01-8	Phenanthrene	6	U
120-12-7	Anthracene	6	U
206-44-0	Fluoranthene	6	U
129-00-0	Pyrene	6	U
56-55-3	Benzo(a)anthracene	6	U
218-01-9	Chrysene	6	U
205-99-2	Benzo(b)fluoranthene	6	U
207-08-9	Benzo(k)fluoranthene	6	U
50-32-8	Benzo(a)pyrene	6	U
193-39-5	Indeno(1,2,3-cd)pyrene	6	U
53-70-3	Dibenz(a,h)anthracene	6	U
191-24-2	Benzo(g,h,i)perylene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW02-01DP

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) WATER Lab Sample ID: 39834

Sample wt/vol: 910 (g/mL) ML Lab File ID: W1509

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 0.50

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
91-20-3	Naphthalene	5	U
208-96-8	Acenaphthylene	5	U
83-32-9	Acenaphthene	5	U
86-73-7	Fluorene	5	U
85-01-8	Phenanthrene	5	U
120-12-7	Anthracene	5	U
206-44-0	Fluoranthene	5	U
129-00-0	Pyrene	5	U
56-55-3	Benzo(a)anthracene	5	U
218-01-9	Chrysene	5	U
205-99-2	Benzo(b)fluoranthene	5	U
207-08-9	Benzo(k)fluoranthene	5	U
50-32-8	Benzo(a)pyrene	5	U
193-39-5	Indeno(1,2,3-cd)pyrene	5	U
53-70-3	Dibenz(a,h)anthracene	5	U
191-24-2	Benzo(g,h,i)perylene	5	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW03-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) WATER Lab Sample ID: 39833

Sample wt/vol: 1000 (g/mL) ML Lab File ID: W1508

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 0.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	5	U
208-96-8	Acenaphthylene	5	U
83-32-9	Acenaphthene	5	U
86-73-7	Fluorene	5	U
85-01-8	Phenanthrene	5	U
120-12-7	Anthracene	5	U
206-44-0	Fluoranthene	5	U
129-00-0	Pyrene	5	U
56-55-3	Benzo(a)anthracene	5	U
218-01-9	Chrysene	5	U
205-99-2	Benzo(b)fluoranthene	5	U
207-08-9	Benzo(k)fluoranthene	5	U
50-32-8	Benzo(a)pyrene	5	U
193-39-5	Indeno(1,2,3-cd)pyrene	5	U
53-70-3	Dibenz(a,h)anthracene	5	U
191-24-2	Benzo(g,h,i)perylene	5	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW04-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) WATER Lab Sample ID: 39832

Sample wt/vol: 950 (g/mL) ML Lab File ID: W1507

Level: (low/med) LOW Date Received: 12/11/90

Moisture: not dec. ____ dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 0.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	5	U
208-96-8	Acenaphthylene	5	U
83-32-9	Acenaphthene	5	U
86-73-7	Fluorene	5	U
85-01-8	Phenanthrene	5	U
120-12-7	Anthracene	5	U
206-44-0	Fluoranthene	5	U
129-00-0	Pyrene	5	U
56-55-3	Benzo(a)anthracene	5	U
218-01-9	Chrysene	5	U
205-99-2	Benzo(b)fluoranthene	5	U
207-08-9	Benzo(k)fluoranthene	5	U
50-32-8	Benzo(a)pyrene	5	U
193-39-5	Indeno(1,2,3-cd)pyrene	5	U
53-70-3	Dibenz(a,h)anthracene	5	U
191-24-2	Benzo(g,h,i)perylene	5	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS01-01

Name: VERSAR INC Contract:

Code: VERSAR Case No.: 4078 SAS No.: SDG No.: 2

Matrix: (soil/water) SOIL Lab Sample ID: 39829

Sample wt/vol: 30.6 (g/mL) G Lab File ID: W1536

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 10 dec. Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/14/91

GPC Cleanup: (Y/N) N pH: 7.7 Dilution Factor: 4.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	1400	U
208-96-8	Acenaphthylene	1400	U
83-32-9	Acenaphthene	1400	U
86-73-7	Fluorene	1400	U
85-01-8	Phenanthrene	1400	U
120-12-7	Anthracene	1400	U
206-44-0	Fluoranthene	1400	U
129-00-0	Pyrene	1400	U
56-55-3	Benzo(a)anthracene	1400	U
218-01-9	Chrysene	1400	U
205-99-2	Benzo(b)fluoranthene	1400	U
207-08-9	Benzo(k)fluoranthene	1400	U
50-32-8	Benzo(a)pyrene	1400	U
193-39-5	Indeno(1,2,3-cd)pyrene	1400	U
53-70-3	Dibenz(a,h)anthracene	1400	U
191-24-2	Benzo(g,h,i)perylene	1400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS02-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) SOIL Lab Sample ID: 39830

Sample wt/vol: 30.5 (g/mL) G Lab File ID: W1514

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 19 dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: 6.8 Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	400	U
208-96-8	Acenaphthylene	400	U
83-32-9	Acenaphthene	400	U
86-73-7	Fluorene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSS03-01

Name: VERSAR INC Contract: _____

Code: VERSAR Case No.: 4078 SAS No.: _____ SDG No.: 2

Matrix: (soil/water) SOIL Lab Sample ID: 39831

Sample wt/vol: 30.7 (g/mL) G Lab File ID: W1515

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 19 dec. ____ Date Extracted: 12/12/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/11/91

GPC Cleanup: (Y/N) N pH: 6.6 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	400	U
208-96-8	Acenaphthylene	400	U
83-32-9	Acenaphthene	400	U
86-73-7	Fluorene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
206-44-0	Fluoranthene	400	U
129-00-0	Pyrene	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U

Versar Laboratories INC.

ANALYSIS REPORT
General Inorganic Chemistry Section

DATE: 04-JAN-91
CODE / CONTROL #: HYDROSEA / 4078
CLIENT / SITE: HYDROSEARCH / MOTOROLA
PROJECT / BATCH: 420.98.0 / 2

Lab#	Field #	TOTAL PHENOL (mg/L)		
39847	MGGW04-01	< 0.010		
39848	MGGW03-01	0.060		
39849	MGGW02-01DP	< 0.010		
39850	MGGW02-01	< 0.010		

C. Thompson
Laboratory Manager

APPENDIX B: TICs

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGSS01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 90121446

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 121446

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 5 Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGSS02-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 90121447

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 121447

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 17 Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGSS03-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 90121448

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 121448

Level: (low/med) LOW Date Received: 12/11/90

% Moisture: not dec. 19 Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW04-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121449

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121449

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

MGRW01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121450

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121450

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGRW02-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121451

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121451

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGRW03-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121452

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121452

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW03-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121453

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121453D

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/15/90

Column (pack/cap) CAP Dilution Factor: 2.5

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	10.50	50	J

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW02-01_DP

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121454

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121454

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 2.5

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW02-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121455

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121455

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4078

Lab Code: MSS Case No.: VR4078 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121456

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121456

Level: (low/med) Date Received: 12/11/90

% Moisture: not dec. Date Analyzed: 12/16/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

Contract No. 4078/4101 - Ketchel

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.1: Data Assessment - Contract Compliance (Total Review - Inorganics)

Date: Feb. 1990
Number: HW-2
Revision: 10

	YES	NO	N/A
A.1.1 Contract Compliance Screening Report (CCS) - Present?	[ ]	✓*	
ACTION: If no, contact RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR			
A.1.2 Record of Communication (from RSCC) - Present?	[ ]	✓*	
ACTION: If no, request from RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR			
A.1.3 Trip Report - Present and complete?	[ ]	✓*	
ACTION: If no, contact RSCC for trip report.			
* NOT PROVIDED BY CONTRACTOR.			
A.1.4 Sample Traffic Report - Present or on file?	[ ]	✓*	
Legible?	[ ]	--	✓
ACTION: If no, request from Regional Sample Control Center (RSCC).			
* NOT PROVIDED BY CONTRACTOR.			
A.1.5 Cover Page - Present?	[✓]	--	
Is cover page properly filled in and signed by the lab manager or the manager's designee?	[✓]	--	
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[ ]		✓*
* RSCC NOT PROVIDED BY CONTRACTOR.			
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[ ]	--	✓*
* TRAFFIC REPORT NOT PROVIDED BY CONTRACTOR.			
(b) Form I's?	[✓]	--	
ACTION: If no for any of the above, contact RSCC for clarification.			

	YES	NO	N/A
Other Metals analysis (6 months). . . . exceeded?	—	[✓]	—

NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist.

ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.

A.1.8 Raw Data

A.1.8.1	Digestion Log* for flame AA/ICP (Form XIII) present?	[✓]	—	—
	Digestion Log for furnace AA Form XIII present?	[✓]	—	—
	Distillation Log for mercury Form XIII present?	[—]	—	✓
	Distillation Log for cyanides Form XIII present?	[—]	—	✓
	Are pH values (pH<2 for all metals, pH>12 for cyanide) present?	[—]	—	✓
	*Weights, dilutions and volumes used to obtain values.			
	Percent solids calculation present for soils/sediments?	[✓]	—	—
	Are preparation dates present on Digestion Log?	[✓]	—	—
A.1.8.2	Measurement read out record present? ICP	[✓]	—	✓
	Flame AA	[—]	—	✓
	Furnace AA	[✓]	—	—
	Mercury	[—]	—	✓
	Cyanides	[—]	—	✓

	YES	NO	N/A
ACTION: Flag associated data as estimated if standards are not within ±10% of true values (except CRDL calibration standard). Do not flag the data as estimated in linear range indicated by good recovery of standard.			
A.1.9.1.3 Is correlation *coefficient less than 0.995 for:			
Mercury Analysis?	___	[__]	✓
Cyanide Analysis? (Not applicable to Titrimetric Method)	___	[__]	✓
Atomic Absorption Analysis?	___	[✓]	___
ACTION: If yes, flag the associated data as estimated.			
A.1.9.2 Form II A (Initial and Continuing Calibration Verification)-			
A.1.9.2.1 Present and complete for every metal and cyanide?	[✓]	__	___
Present and complete for AA and ICP when both are used for same analyte?	[__]	__	✓
ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.			
A.1.9.2.2 Circle all values on data summary sheet that are outside contract windows. Are all calibration standards (initial and continuing) within control limits?			
Metals 90-110%	[✓]	___	___
Hg - 80-120%	[__]	__	✓
Cyanides 85-115%	[__]	___	✓

* The reviewer will calculate correlation coefficient.

		YES	NO	N/A
A.1.9.3.2	Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and for every four hours of ICP run?	[✓]		
	ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.9.3.3	Circle all values on summary sheet that are outside acceptance windows.			
	Are CRA and CRI standards within control limits: Metals 80 - 120%R?	[✓]		
	Is mid-range standard within control limits: Cyanide 80 - 120%R?	[ ]		✓
	ACTION: Flag as estimated all data within the affected ranges if the recovery of the standard is between 50-79%; flag only positive data if the recovery is between 121-150%; reject (red line) all data if the recovery is less than 50%; reject only positive data if the recovery is greater than 150%.			
A.1.9.4	Form III (Initial and Continuing Calibration Blanks)			
A.1.9.4.1	Present and complete?	[✓]		
	For both AA and ICP when both are used for same analyte?	[ ]		✓
	Was an initial calibration blank analyzed?	[✓]		
	Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	[✓]		
	ACTION: If no, prepare Telephone Record Log, contact laboratory and write in the contract-problems/ non-compliance section of the Data Assessment Narrative.			

		YES	NO	N/A
	ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value found in the raw data.			
A.1.9.5.3	Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	[ ]	--	✓
	ACTION: If no, reject (red-line) all positive data that has a concentration less than 10 times the prep. blank value in the raw data.			
A.1.9.5.4	Is concentration of prep. blank below the negative CRDL?	--	[✓]	--
	ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.9.6	Form IV (ICP Interference Check Sample)			
A.1.9.6.1	Present and complete?	[✓]	--	--
	(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
	Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[✓]	--	--
	ACTION: If no, flag as estimated (J) all samples for which AL, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.6.2	Circle all values on Data Summary Sheet that are more than + 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (+ 20%)?	[✓]	--	--
	If no, is concentration of Al, Ca, Fe, or Mg lower than in ICS?	[ ]	--	✓
	ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			

	YES	NO	N/A
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	[__]	__	✓

ACTION: If no, write in the Contract - Problem/Non - Compliance section of "Data Assessment Narrative".

A.1.9.7.4 Aqueous

Are any spike recoveries:

(a) less than 30%?	__	[__]	✓
(b) between 30-74%?	__	[__]	✓
(c) between 126-150%?	__	[__]	✓
(d) greater than 150%?	__	[__]	✓

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

A.1.9.7.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	__	[__]	✓
(b) between 10-74%?	__	[__]	✓
(c) between 126-200%?	__	[__]	✓
(d) greater than 200%?	__	[__]	✓

ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".

		YES	NO	N/A
	2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria.			
A.1.9.8.4	Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL?	___	[__]	✓ ___
	ACTION: If yes, flag the associated data as estimated (J).			
A.1.9.8.5	Aqueous Circle all values on Data Summary Sheet that are: RPD > 50%, or Difference > ± CRDL*			
	Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[__]	___ ✓
	Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[__]	✓ ___
	ACTION: If yes, flag the associated data as estimated.			
A.1.9.8.6	Soil/Sediment Circle all values on Data Summary Sheet that are: RPD > 100%, or Difference > 2 x CRDL*			
	Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) : > 100%?	___	[__]	✓ ___
	Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) : > 2x*CRDL?	___	[__]	✓ ___

* Substitute IDL for CRDL when IDL > CRDL.
** Use absolute values of sample and duplicate to calculate the difference.

6

FIELD DUPLICATES

MGGW02-01 and MGGW02-01DP

ANALYTE	SAMPLE (S)	DUPLICATE (D)	RPD
Cr	53.5	47.4	12.1
Fe	120000	125000	4.1
Pb	131	154	16.1
Ni	155	161	3.8

MGGW02-01F and MGGW0 DP F

ANALYTE	SAMPLE (S)	DUPLICATE (D)	RPD
Cr	6.0 U	6.1	
Pb	1.0 U	1.0 U	—
Ni	12.0 U	12.0 U	—

	YES	NO	N/A

A.1.9.9.4 Soil/Sediment

Circle all values on Form VI for field duplicates that are:
RPD >100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than 5 times *CRDL) :

>100%? ___ [_] ✓

Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x *CRDL):

>2x *CRDL? ___ [_] ✓

ACTION: If yes, flag the associated data as estimated.

A.1.9.10 Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg and cyanide analyses.)

A.1.9.10.1 Was one LCS prepared and analyzed for:

every 20 water samples? [✓] _ _ ___

every 20' solid samples? [✓] _ _ ___

both AA and ICP when both are used for same analyte? [___] _ _ ✓

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory for submittal of results of LCS. Flag as estimated (J) all data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

**Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
A.1.9.11	Form IX (ICP Serial Dilution) -			
	NOTE: Serial dilution analysis is required only for initial concentrations equal to or greater than 10 x IDL.			
A.1.9.11.1	Was Serial Dilution analysis performed for: each 20 samples?	[___]	__	✓*
	* Serial Dilution analysis was not required for this SDG. each matrix type?	[___]	__	✓
	each concentration range (i.e. low, med.)?	[___]	__	✓
	ACTION: If no for any of the above, flag all positive data greater than or equal to 10xIDLs as estimated (J) for which Serial Dilution Analysis was not performed, and summarize the deficiency on the DPO report.			
A.1.9.11.2	Was field blank(s) used for Serial Dilution Analysis?	___	[___]	✓
	ACTION: If yes, flag all associated data ≥ 10 x IDL as estimated (J).			
	NOTE: Serial dilution analysis should be performed on a field blank when it is the only aqueous sample in SDG.			
A.1.9.11.3	Are results outside control limit flagged with an "E" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.	[___]	___	✓
	ACTION: If no, write in the contract-problem/non-compliance section of the "Data Assessment Narrative".			
A.1.9.11.4	Circle all values on Data Summary Sheet that are outside control limit for initial concentrations equal to or greater than 10 x IDLs only. Are any % difference values: > 10%?	___	[___]	✓
	≥ 100%?	___	[___]	✓

		YES	NO	N/A
A.1.9.13	Form VIII (Method of Standard Addition Results)			
A.1.9.13.1	Present?	[✓]	__	__
	If no, is any Form I result coded with "S" or a "+"?	__	[__]	✓
	ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.9.13.2	Is coefficient of correlation for MSA less than 0.990 for any sample?	__	[✓]	__
	ACTION: If yes, reject (red-line) affected data.			
A.1.9.13.3	Was *MSA required for any sample but not performed?	__	[✓]	__
	Is coefficient of correlation for MSA less than 0.995?	__	[✓]	__
	Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	__	[✓]	__
	ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.9.13.4	Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	[✓]	__	__
	ACTION: If no, note exception under contract problem/ non-compliance of data assessment narrative, or prepare a separate list.			
A.1.9.14	Dissolved/Total or Inorganic/Total Analytes -			
A.1.9.14.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s).	✓	[__]	__
	Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	__	[✓]	__

* MSA is not required on LCS and prep. blank.

	YES	NO	N/A
A.1.9.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:			
(NOTE: Check all forms against raw data.)			
(a) all analytes analyzed by ICP?	___	[✓]	___
(b) all analytes analyzed by GFAA?	___	[✓]	___
(c) all analytes analyzed by AA Flame?	___	[ ]	✓
(d) Mercury?	___	[ ]	✓
(e) Cyanide?	___	[ ]	✓

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

A.1.9.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than CRDL, 2 x IDL when IDL > CRDL.

Do concentrations of field blank(s) fall below CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?	[___]	__	✓
If no, was field blank value already rejected due to other QC criteria?	[___]	__	✓

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value.

	YES	NO	N/A
A.1.9.17.3 Form XI (Linear Ranges)			
Was any sample result higher than high linear range of ICP.	___	[✓]	___
Was any sample result higher than the highest calibration standard for non-ICP parameters?	___	[✓]	___
If yes for any of the above, was the sample diluted to obtain the result on Form I?	[___]	___	✓
ACTION: If no, flag the result reported on Form I as estimated(J).			
A.1.9.18 Percent Solids of Sediments			
Is soil content in sediment(s) less than 50%?	___	[✓]	___
ACTION: If yes, qualify as estimated all data not previously rejected or flagged due to other QC criteria.			

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.2: Data Assessment Narrative

Date: Feb. 1990
Number: HW-2
Revision: 10

Case# 4078 Site Motorola-Machesney Matrix: Soil ✓

SDG# MGGW02 Lab Versar Labs. Water ✓

Contractor Hydrosearch Reviewer Karen Smecker Other ____

A.2.1 The case description and exceptions, if any, are noted below with reason(s) for rejection or qualification as estimated value(s) J.

Eight water samples (including two field duplicate pairs) and 4 soil samples were analyzed for Chromium, lead and nickel. Four unfiltered water samples were also analyzed for iron and hardness. Samples designated "F" are filtered samples. No field or rinsate blanks were included in this sample set. Data for these analytes were evaluated according to Region II validation guidelines. No qualifications were made to the data.

A.2.1 (continuation)

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.3: Contract Non-Compliance (SMO Report)

Date: Feb. 1990
Number: HW-2
Revision: 10

CONTRACT NON-COMPLIANCE
(SMO REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CASE NO. 4078

The hardcopied (laboratory name) Versar Laboratories Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:

SMO Sample No.: 1-12

Conc. & Matrix:

Contract No. WA87-K025,K026,K027(SOW787) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Matrix Spike Results
- Calibration Standards Results
- Duplicate Analysis Results
- Blank Analysis Results
- MSA Results

Items of non-compliance with the above contract are described below.

Comments:

DAS KMS
Reviewer's Initial

2/14/91
Date

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.7: CLP Data Assessment Checklist
Inorganic Analysis

Date: Feb. 1990
Number: HW-2
Revision: 10

INORGANIC REGIONAL DATA ASSESSMENT

Region II

CASE NO. 4078

SITE Motorola - Minois

LABORATORY Versar Laboratories

NO. OF SAMPLES/
MATRIX 8/water 4/soils

SDG# MGGW02

REVIEWER (IF NOT ESD) TMS Corp.

SOW# 7/88

REVIEWER'S NAME Karen Smachin

DPO: ACTION _____ FYI ✓

COMPLETION DATE 02/07/91

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES	O	O	NA	NA
2.	CALIBRATIONS	O	O		
3.	BLANKS	O	O		
4.	ICS	O			
5.	LCS	O	O		
6.	DUPLICATE ANALYSIS	O	O		
7.	MATRIX SPIKE	NA	NA		
8.	MSA		O		
9.	SERIAL DILUTION	NA			
10.	SAMPLE VERIFICATION	O			
11.	OTHER QC	O	O		
12.	OVERALL ASSESSMENT	O	O		

O = Data has no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: _____

AREAS OF CONCERN: _____

NOTABLE PERFORMANCE: _____

APPENDIX A.5 SUMMARY OF INORGANICS QUALITY CONTROL DATA

LABORATORY: Versar Labs CASE NO. 4078 SOW NO. 7/88 SAMPLE TYPE/SDG: Soils Waters / MGGWC2

SITE/STUDY DESCRIPTION: Motorola – Mesa SAMPLE NOS: MGGWC2-01, MGGWC2-01F, MGGWC2-01DP, MGGWC2-01DPF, MGGWC3-01, MGGWC3-01F, MGGWC4-01, MGGWC4-01F, MGSBC1-01, MGSBC1-01F, MGSBC2-01, MGSBC3-01, MGSBC3-01F

Waters & soils for Cr, Ni & Pb. (Fe & Hardness for waters)

FIELD DUP. #'S: MGGWC2-01F & MGGWC2-01DP Field Blank NA

LAB DUP. #'S: NA MATRIX SPIKE #: NA

SERIAL DILUTION SAMPLE NO. NA COMPLETION DATE: 08/07/91 REVIEWERS INITIALS: KMS

	X	I	IIA				IIB		III				IV		V		VI	VII	IX	
Parameter	Detection Limits UG/L CRDL	IDL	Field Blank	Calib. Ver. %R Init	Continued 1	2	3	CRDL Std Ver. Init	% R Fin	Calibration Blanks Init	Continued 1	2	3	PB RL EA PN	ICP ICS % R Init	Fin	Mtrx	Spik	Lab Dup RPD/Diff	LCS %R	Ser Dil %D	Meth
Al	200		NA																			
Sb	60																					
As	10																					
Ba	200																					
Be	5																					
Cd	5																					
Ca	5000																					
Cr	10	6.0	← ALL DATA MET QC REQUIREMENTS (SEE ATTACHED SUPPORT DOC.) →												NA	NA	NA	NA	NA	ICP
Co	50																					
Cu	25																					
Fe	100	5.0	← ALL DATA MET QC REQUIREMENTS (See attached support doc.) →												NA	NA	NA	NA	NA	ICP
Pb	3	1.0	← " →												NA	NA	NA	NA	NA	GFAA
Mg	5000																					
Mn	15																					
Hg	0.2																					
Ni	40	12.0	← ALL DATA MET QC CRITERIA (See attached support doc.) →												NA	NA	NA	NA	NA	ICP
K	5000																					
Se	5																					
Ag	10																					
Na	5000																					
Tl	10																					
V	50																					
Zn	20																					
CN	10		V																			

APPENDIX A: QUALIFIED LABORATORY RESULTS

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGSS01-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39836_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: __90.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9-	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	2.5	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____		_		NR
7439-92-1_	Lead_____	608	_		P_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	11.7	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		__

Color Before: BROWN____ Clarity Before: _____ Texture: COARSE

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

ARTIFACTS-_ROCKS;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGSS02-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39837_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: __82.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	4.6	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____		_		NR
7439-92-1_	Lead_____	19.7	_		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	10.2	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		___

Color Before: BROWN____ Clarity Before: _____ Texture: COARSE

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

ARTIFACTS-_ROCKS;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGSS03-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39838_

Level (low/med): LOW_____ Date Received: 12/11/90

Solids: __80.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	6.0	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron____		_		NR
7439-92-1_	Lead____	13.6	_		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	13.3	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		___

Color Before: BROWN____ Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

_____

_____

_____

_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGSB01-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): SOIL_____ Lab Sample ID: 40129_

Level (low/med): LOW_____ Date Received: 12/13/90

% Solids: __87.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	1.1	B		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	5.5			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	9.6			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: FINE__

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

_____

_____

_____

_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW04-01 F

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39839_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	6.0	U		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron____		_		NR
7439-92-1_	Lead____	1.0	U	W	F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc____		_		NR
_____	Cyanide__		_		NR
_____	_____		__		__

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_THIS_IS_A_FILTERED_WATER_ALIQUOT;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW04-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39843_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	50.0	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____	120000	_		P_
7439-92-1_	Lead_____	16.4	_	S	F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	96.8	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		__

Color Before: GREY_____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS=_635_mg_equivalent_$CaCO_3$/L;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW03-01 F

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39840_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	6.0	U		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____		_		NR
7439-92-1_	Lead_____	1.0	U		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
	Cyanide__		_		NR
			_		

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_THIS_IS_A_FILTERED_WATER_ALIQUOT;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW03-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39844_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	6.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	16500			P
7439-92-1	Lead	21.3			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	18.3	B		P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: GREY_____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS=_399_mg_equivalent_$CaCO_3$/L;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW02-01DP F

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39841_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	6.1	B		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____		_		NR
7439-92-1_	Lead_____	1.0	U	W	F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		__

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_THIS_IS_A_FILTERED_WATER_ALIQUOT;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW02-01DP

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39845_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	47.4	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____	125000	_		P_
7439-92-1_	Lead_____	154	_		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	161	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		___

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS=_730_mg_equivalent_$CaCO_3$/L;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW02-01 F

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39842_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_				NR
7440-36-0_	Antimony_				NR
7440-38-2_	Arsenic__				NR
7440-39-3_	Barium___				NR
7440-41-7_	Beryllium				NR
7440-43-9_	Cadmium__				NR
7440-70-2_	Calcium__				NR
7440-47-3_	Chromium_	6.0	U		P_
7440-48-4_	Cobalt___				NR
7440-50-8_	Copper___				NR
7439-89-6_	Iron_____				NR
7439-92-1_	Lead_____	1.0	U	W	F_
7439-95-4_	Magnesium				NR
7439-96-5_	Manganese				NR
7439-97-6_	Mercury__				NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium				NR
7782-49-2_	Selenium_				NR
7440-22-4_	Silver___				NR
7440-23-5_	Sodium___				NR
7440-28-0_	Thallium_				NR
7440-62-2_	Vanadium_				NR
7440-66-6_	Zinc_____				NR
_____	Cyanide__				
_____	_____				

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_THIS_IS_A_FILTERED_WATER_ALIQUOT;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW02-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4078__ SAS No.: _____ SDG No.: MGGW02

Matrix (soil/water): WATER_____ Lab Sample ID: 39846_

Level (low/med): LOW_____ Date Received: 12/11/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	53.5	_		P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____	120000	_		P_
7439-92-1_	Lead_____	131	_		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	155	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		___

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS=_680_mg_equivalent_$CaCO_3$/L;_____

Centre No. 4987 - Metals

	YES	NO	N/A
A.1.1 Contract Compliance Screening Report (CCS) - Present?	[__]	✓*	__
ACTION: If no, contact RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.2 Record of Communication (from RSCC) - Present?	[__]	✓*	__
ACTION: If no, request from RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.3 Trip Report - Present and complete?	[__]	✓*	__
ACTION: If no, contact RSCC for trip report.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.4 Sample Traffic Report - Present or on file?	[__]	✓*	__
Legible?	[__]	✓*	__
ACTION: If no, request from Regional Sample Control Center (RSCC).			
* NOT PROVIDED BY CONTRACTOR.			
A.1.5 Cover Page - Present?	[✓]	--	__
Is cover page properly filled in and signed by the lab manager or the manager's designee?	[✓]	--	__
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[__]	✓*	__
* RSCC NOT PROVIDED BY CONTRACTOR			
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[__]	✓*	__
* TRAFFIC REPORT NOT PROVIDED BY CONTRACTOR			
(b) Form I's?	[✓]	--	__
ACTION: If no for any of the above, contact RSCC for clarification.			

	YES	NO	N/A
Other Metals analysis (6 months). . . . exceeded?	—	[✓]	—

NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist.

ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.

A.1.8 Raw Data

A.1.8.1	Digestion Log* for flame AA/ICP (Form XIII) present?	[✓]	—	—
	Digestion Log for furnace AA Form XIII present?	[✓]	—	—
	Distillation Log for mercury Form XIII present?	[ ]	—	✓
	Distillation Log for cyanides Form XIII present?	[ ]	—	✓
	Are pH values (pH<2 for all metals, pH>12 for cyanide) present?	[ ]	—	✓
	*Weights, dilutions and volumes used to obtain values.			
	Percent solids calculation present for soils/sediments?	[✓]	—	—
	Are preparation dates present on Digestion Log?	[✓]	—	—
A.1.8.2	Measurement read out record present? ICP	[✓]	—	—
	Flame AA	[ ]	—	✓
	Furnace AA	[✓]	—	—
	Mercury	[ ]	—	✓
	Cyanides	[ ]	—	✓

	YES	NO	N/A
ACTION: Flag associated data as estimated if standards are not within ±10% of true values (except CRDL calibration standard). Do not flag the data as estimated in linear range indicated by good recovery of standard.			
A.1.9.1.3 Is correlation *coefficient less than 0.995 for:			
Mercury Analysis?	___	[__]	✓
Cyanide Analysis? (Not applicable to Titrimetric Method)	___	[__]	✓
Atomic Absorption Analysis?	___	[✓]	___
ACTION: If yes, flag the associated data as estimated.			
A.1.9.2 Form II A (Initial and Continuing Calibration Verification)-			
A.1.9.2.1 Present and complete for every metal and cyanide?	[✓]	__	___
Present and complete for AA and ICP when both are used for same analyte?	[__]	__	✓
ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.			
A.1.9.2.2 Circle all values on data summary sheet that are outside contract windows. Are all calibration standards (initial and continuing) within control limits?			
Metals 90-110%	[✓]	___	___
Hg - 80-120%	[__]	__	✓
Cyanides 85-115%	[__]	___	✓

* The reviewer will calculate correlation coefficient.

		YES	NO	N/A
A.1.9.3.2	Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and for every four hours of ICP run?	[✓]		
	ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.9.3.3	Circle all values on summary sheet that are outside acceptance windows.			
	Are CRA and CRI standards within control limits: Metals 80 - 120%R?	[✓]		
	Is mid-range standard within control limits: Cyanide 80 - 120%R?	[ ]		✓
	ACTION: Flag as estimated all data within the affected ranges if the recovery of the standard is between 50-79%; flag only positive data if the recovery is between 121-150%; reject (red line) all data if the recovery is less than 50%; reject only positive data if the recovery is greater than 150%.			
A.1.9.4	Form III (Initial and Continuing Calibration Blanks)			
A.1.9.4.1	Present and complete?	[✓]		
	For both AA and ICP when both are used for same analyte?	[ ]		✓
	Was an initial calibration blank analyzed?	[✓]		
	Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	[✓]		
	ACTION: If no, prepare Telephone Record Log, contact laboratory and write in the contract-problems/ non-compliance section of the Data Assessment Narrative.			

		YES	NO	N/A
	ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value found in the raw data.			
A.1.9.5.3	Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	[__]	__	✓
	ACTION: If no, reject (red-line) all positive data that has a concentration less than 10 times the prep. blank value in the raw data.			
A.1.9.5.4	Is concentration of prep. blank below the negative CRDL?	__	[__]	✓
	ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.9.6	Form IV (ICP Interference Check Sample)			
A.1.9.6.1	Present and complete?	[✓]	__	__
	(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
	Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[✓]	__	__
	ACTION: If no, flag as estimated (J) all samples for which Al, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.6.2	Circle all values on Data Summary Sheet that are more than + 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (+ 20%)?	[✓]	__	__
	If no, is concentration of Al, Ca, Fe, or Mg lower than in ICS?	[__]	__	✓
	ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			

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5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

MGTP03-01S

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Level (low/med): LOW___

% Solids for Sample: __58.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium	75-125	61.5000		6.4600		57.18	96.3		P
Cobalt									NR
Copper									NR
Iron									NR
Lead	75-125	35.3000		20.9200		6.66	215.9	N	F
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel	75-125	153.1100		14.0400		142.94	97.3		P
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:
_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39711;_ARTIFACTS_-_STICKS;__

FORM V (Part 1) - IN

	YES	NO	N/A
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	[✓]	__	__

ACTION: If no, write in the Contract - Problem/Non - Compliance section of "Data Assessment Narrative".

A.1.9.7.4 Aqueous

Are any spike recoveries:

(a) less than 30%?	__	[__]	✓
(b) between 30-74%?	__	[__]	✓
(c) between 126-150%?	__	[__]	✓
(d) greater than 150%?	__	[__]	✓

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

A.1.9.7.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	__	[✓]	__
(b) between 10-74%?	__	[✓]	__
(c) between 126-200%?	__	[✓]	__
(d) greater than 200%?	✓	[__]	__

ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".

See Support Documentation (previous page)

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6
DUPLICATES

EPA SAMPLE NO.

MGTP03-01D

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Level (low/med): LOW___

Solids for Sample: __58.3 % Solids for Duplicate: __58.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony								NR
Arsenic								NR
Barium								NR
Beryllium								NR
Cadmium								NR
Calcium								NR
Chromium	3.1	6.4600		5.3600		18.6		P
Cobalt								NR
Copper								NR
Iron								NR
Lead		20.9200		26.3800		23.1	*	F
Magnesium								NR
Manganese								NR
Mercury								NR
Nickel	12.5	14.0400		15.3600		9.0		P
Potassium								NR
Selenium								NR
Silver								NR
Sodium								NR
Thallium								NR
Vanadium								NR
Zinc								NR
Cyanide								NR

All lead data are rejected because of excessive matrix spike 3 no further action necessary.

		YES	NO	N/A
	2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria.			
A.1.9.8.4	Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL?	___	[✓]	___
	ACTION: If yes, flag the associated data as estimated (J).			
A.1.9.8.5	Aqueous Circle all values on Data Summary Sheet that are: RPD > 50%, or Difference > ± CRDL*			
	Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[_ _]	✓
	Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	___	[_ _]	✓
	ACTION: If yes, flag the associated data as estimated.			
A.1.9.8.6	Soil/Sediment Circle all values on Data Summary Sheet that are: RPD > 100%, or Difference > 2 x CRDL*			
	Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) : > 100%?	___	[✓]	___
	Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) : > 2x*CRDL?	___	[✓]	___

* Substitute IDL for CRDL when IDL > CRDL.
** Use absolute values of sample and duplicate to calculate the difference.

	YES	NO	N/A

A.1.9.9.4 Soil/Sediment

Circle all values on Form VI for field duplicates that are:
RPD >100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than 5 times *CRDL) :

>100%? ___ [_] ✓

Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x *CRDL):

>2x *CRDL? ___ [✓] ___

ACTION: If yes, flag the associated data as estimated.

A.1.9.10 Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg and cyanide analyses.)

A.1.9.10.1 Was one LCS prepared and analyzed for:

every 20 water samples? [___] _ _ ✓

every 20 solid samples? [✓] _ _ ___

both AA and ICP when both are used for same analyte? [___] _ _ ✓

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory for submittal of results of LCS. Flag as estimated (J) all data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

**Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
A.1.9.11	Form IX (ICP Serial Dilution) -			
	NOTE: Serial dilution analysis is required only for initial concentrations equal to or greater than 10 x IDL.			
A.1.9.11.1	Was Serial Dilution analysis performed for:			
	each 20 samples?	[✓]	__	__
	each matrix type?	[✓]	__	__
	each concentration range (i.e. low, med.)?	[✓]	__	__
	ACTION: If no for any of the above, flag all positive data greater than or equal to 10xIDLs as estimated (J) for which Serial Dilution Analysis was not performed, and summarize the deficiency on the DPO report.			
A.1.9.11.2	Was field blank(s) used for Serial Dilution Analysis?	__	[✓]	__
	ACTION: If yes, flag all associated data ≥ 10 x IDL as estimated (J).			
	NOTE: Serial dilution analysis should be performed on a field blank when it is the only aqueous sample in SDG.			
A.1.9.11.3	Are results outside control limit flagged with an "E" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.	[__]	__	✓
	ACTION: If no, write in the contract-problem/non-compliance section of the "Data Assessment Narrative".			
A.1.9.11.4	Circle all values on Data Summary Sheet that are outside control limit for initial concentrations equal to or greater than 10 x IDLs only. Are any % difference values:			
	> 10%?	__	[__]	✓
	≥ 100%?	__	[__]	✓

		YES	NO	N/A
A.1.9.13	Form VIII (Method of Standard Addition Results)			
A.1.9.13.1	Present?	[✓]	__	__
	If no, is any Form I result coded with "S" or a "+"?	__	[__]	✓
	ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.9.13.2	Is coefficient of correlation for MSA less than 0.990 for any sample?	__	[✓]	__
	ACTION: If yes, reject (red-line) affected data.			
A.1.9.13.3	Was *MSA required for any sample but not performed?	__	[✓]	__
	Is coefficient of correlation for MSA less than 0.995?	__	[✓]	__
	Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	__	[✓]	__
	ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.9.13.4	Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	[✓]	__	__
	ACTION: If no, note exception under contract problem/ non-compliance of data assessment narrative, or prepare a separate list.			
A.1.9.14	Dissolved/Total or Inorganic/Total Analytes -			
A.1.9.14.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s).	__	[__]	✓
	Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	__	[__]	✓

* MSA is not required on LCS and prep. blank.

	YES	NO	N/A
A.1.9.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:			
(NOTE: Check all forms against raw data.)			
(a) all analytes analyzed by ICP?	___	[✓]	___
(b) all analytes analyzed by GFAA?	___	[✓]	___
(c) all analytes analyzed by AA Flame?	___	[ ]	✓
(d) Mercury?	___	[ ]	✓
(e) Cyanide?	___	[ ]	✓

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

A.1.9.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than CRDL, 2 x IDL when IDL > CRDL.

Do concentrations of field blank(s) fall below CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?	[___]	___	✓
If no, was field blank value already rejected due to other QC criteria?	[___]	___	✓

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value.

	YES	NO	N/A
A.1.9.17.3 Form XI (Linear Ranges)			
Was any sample result higher than high linear range of ICP.	___	[✓]	___
Was any sample result higher than the highest calibration standard for non-ICP parameters?	___	[✓]	___
If yes for any of the above, was the sample diluted to obtain the result on Form I?	[___]	___	___
ACTION: If no, flag the result reported on Form I as estimated(J).			
A.1.9.18 Percent Solids of Sediments			
Is soil content in sediment(s) less than 50%?	___	[✓]	___
ACTION: If yes, qualify as estimated all data not previously rejected or flagged due to other QC criteria.			

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.2: Data Assessment Narrative

Date: Feb. 1990
Number: HW-2
Revision: 10

CONTROL Case# 4067 Site Motorola - Waukegan Matrix: Soil ✓

SDG# MGSB02 Lab Versar Laboratories Water ____

Contractor HRResearch Reviewer Karen Smeeton Other ____

A.2.1 The case description and exceptions, if any, are noted below with reason(s) for rejection or qualification as estimated value(s) J.

Six soil samples (including one field duplicate pair) were analyzed for chromium, lead and nickel. No field blanks or rinsate blanks were included in the sample set. The data was evaluated according to Region II Data Validation protocols. The data is acceptable for all analytes, except lead. Positive lead results are rejected (R), due to extremely high matrix spike recovery (%R was > 200.)

A.2.1 (continuation)

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.3: Contract Non-Compliance (SMO Report)

Date: Feb. 1990
Number: HW-2
Revision: 10

CONTRACT NON-COMPLIANCE
(SMO REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CASE NO. 4067

The hardcopied (laboratory name) Versar Laboratories Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:

SMO Sample No.: _____

Conc. & Matrix: MA

Contract No. WA87-K025,K026,K027(SOW787) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Matrix Spike Results
- Calibration Standards Results
- Duplicate Analysis Results
- Blank Analysis Results
- MSA Results

Items of non-compliance with the above contract are described below.

Comments: _____

BAS for KMS
Reviewer's Initial

2/14/91
Date

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.7: CLP Data Assessment Checklist
Inorganic Analysis

Date: Feb. 1990
Number: HW-2
Revision: 10

INORGANIC REGIONAL DATA ASSESSMENT

Region 2

CASE NO. 4067

SITE Motorola - Machais

LABORATORY Versar Laboratories

NO. OF SAMPLES/
MATRIX 6 / SOILS

SDG# MGSB02

REVIEWER (IF NOT ESD) NUS Corp.

SOW# 7/88

REVIEWER'S NAME Karen Smeltzer

DPO: ACTION _____ FYI ✓

COMPLETION DATE 02/07/91

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES	O	O	NA	NA
2.	CALIBRATIONS	O	O		
3.	BLANKS	O	O		
4.	ICS	O			
5.	LCS	O			
6.	DUPLICATE ANALYSIS	O	O		
7.	MATRIX SPIKE	O	Z'		
8.	MSA		O		
9.	SERIAL DILUTION	O			
10.	SAMPLE VERIFICATION	O			
11.	OTHER QC	O	O		
12.	OVERALL ASSESSMENT	O	Z		

O = Data has no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: Z' - The Pb %R was >200.

AREAS OF CONCERN:

NOTABLE PERFORMANCE:

APPENDIX A.5 SUMMARY OF INORGANICS QUALITY CONTROL DATA

LAZOR.ICRY: Versar Labs CASE NO. 4167 SOW NO. 7/88 SAMPLE TYPE/SDG: SOIL / MGSB02

SITE/STUDY DESCRIPTION: Motorola - Machais SAMPLE NOS: MGSB02-01, MGTP01-01, MGTP02-01, MGTP02-01DP, MGTP03-01, MGTP04-01, MGTP05-01

Cr, Ni & Pb analyses

Field Blank 7190

FIELD DUP. #'S: MGTP02-01 & MGTP02-01DP LAB DUP. #'S: MGTP03-01 & MGTP03-01D MATRIX SPIKE #: MGTP03-01S

SERIAL DILUTION SAMPLE NO. MGTP03-01 COMPLETION DATE: 12/07/91 REVIEWERS INITIALS: MC

	X	I	IIA				IIB		III				IV		V	VI	VII	IX	
Parameter	Detection Limits UG/L CRDL	IDL	Field Blank	Calib. Ver. %R Init	Continued 1	2	3	CRDL Std Ver. %R Init	Fin	Calibration Blanks Init	Continued 1	2	3	PB RL EA PN	ICP ICS %R Init	Fin	MS tr ix	Lab Dup RPD Dif	LCS %R	Ser Dil %D	Meth
Al	200		NA																		
Sb	60																				
As	10																				
Ba	200																				
Be	5																				
Cd	5																				
Ca	5000																				
Cr	10	6.0		← all data met QC requirements (see support documentation attached) →																	ICP
Co	50																				
Cu	25																				
Fe	100																				
Pb	3	1.0		← ALL DATA MET QC CRITERIA (See support documents attached) →											NA	NA	215S	← all data met QC requirements → (see attached support documentation)		NA	GFAA
Mg	5000																				
Mn	15																				
Hg	0.2																				
Ni	40	12.0		← all data met QC requirements (see support documentation attached) →																	ICP
K	5000																				
Se	5																				
Ag	10																				
Na	5000																				
Tl	10																				
V	50																				
Zn	20																				
CN	10		↓																		

APPENDIX A: QUALIFIED LABORATORY RESULTS

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGSB02-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39726_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __69.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	3.1			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~7.2~~	R	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	13.3			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: COARSE

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39717;_ARTIFACTS_-_ROCKS;___

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP01-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39718_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __84.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	3.7			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~56.9~~	R	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	11.0			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: FINE__

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39709;_ARTIFACTS_-_ROCKS;___

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP02-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39719_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __81.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	5.0			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~14.4~~	B	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	13.2			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: FINE__

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39710;_ARTIFACTS_-_ROCKS;___

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP02-01 DP

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39720_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __81.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	4.8			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~14.2~~	R	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	13.3			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: FINE__

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39711;_ARTIFACTS_-_ROCKS;___

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP03-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39721_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __58.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	6.5			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~20.9~~	R	SN*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	14.0			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BLACK____ Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39712;_ARTIFACTS_-_STICKS;__

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP04-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39724_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __67.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	8.2			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~9.9~~	R	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	23.0			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: FINE__

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39715;_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGTP05-01

Lab Name: VERSAR_LABORATORIES_INC.___ Contract: MACHAIS__

Lab Code: VERSAR Case No.: 4067__ SAS No.: _____ SDG No.: MGSB02

Matrix (soil/water): SOIL_____ Lab Sample ID: 39725_

Level (low/med): LOW_____ Date Received: 12/08/90

% Solids: __64.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	5.5			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	~~43.7~~	R	N*	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	17.3			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: _____ Texture: COARSE

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: YES___

Comments:

_THE_PERCENT_SOLIDS_LAB_SAMPLE_ID_NUMBER_IS_39716;_ARTIFACTS_-_ROCKS;___

Comm. No. 4117, 4123, 7127 - Metals

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.1: Data Assessment - Contract Compliance (Total Review - Inorganics)

Date: Feb. 1990
Number: HW-2
Revision: 10

	YES	NO	N/A
A.1.1 Contract Compliance Screening Report (CCS) - Present?	[ ]		✓*
ACTION: If no, contact RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.2 Record of Communication (from RSCC) - Present?	[ ]		✓*
ACTION: If no, request from RSCC.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.3 Trip Report - Present and complete?	[ ]		✓*
ACTION: If no, contact RSCC for trip report.			
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
A.1.4 Sample Traffic Report - Present or on file?	[ ]		✓*
Legible?	[ ]		✓*
* DOCUMENT NOT PROVIDED BY CONTRACTOR.			
ACTION: If no, request from Regional Sample Control Center (RSCC).			
A.1.5 Cover Page - Present?	[✓]		
Is cover page properly filled in and signed by the lab manager or the manager's designee?	[✓]		
ACTION: If no, prepare Telephone Record Log, and contact laboratory.			
Do numbers of samples correspond to numbers on Record of Communication?	[ ]		✓*
* RSCC NOT PROVIDED BY CONTRACTOR.			
Do sample numbers on cover page agree with sample numbers on:			
(a) Traffic Report Sheet?	[ ]		✓*
* TRAFFIC REPORT NOT PROVIDED BY CONTRACTOR.			
(b) Form I's?	[✓]		
ACTION: If no for any of the above, contact RSCC for clarification.			

	YES	NO	N/A
Other Metals analysis (6 months). . . . exceeded?	—	[✓]	—

NOTE: Prepare a list of all samples and analytes for which holding times have been exceeded. Specify the number of days from date of collection to the date of preparation (from raw data). Attach to checklist.

ACTION: If yes, reject (red-line) values less than Instrument Detection Limit (IDL) and flag as estimated (J) the values above IDL even though sample(s) was preserved properly.

A.1.8 Raw Data

A.1.8.1	Digestion Log* for flame AA/ICP (Form XIII) present?	[✓]	--	—
	Digestion Log for furnace AA Form XIII present?	[✓]	--	—
	Distillation Log for mercury Form XIII present?	[___]	--	✓
	Distillation Log for cyanides Form XIII present?	[___]	--	✓
	Are pH values (pH<2 for all metals, pH>12 for cyanide) present?	[___]	--	✓
	*Weights, dilutions and volumes used to obtain values.			
	Percent solids calculation present for soils/sediments?	[___]	--	✓
	Are preparation dates present on Digestion Log?	[✓]	--	—
A.1.8.2	Measurement read out record present? ICP	[✓]	—	—
	Flame AA	[___]	—	✓
	Furnace AA	[✓]	—	—
	Mercury	[___]	—	✓
	Cyanides	[___]	--	✓

	YES	NO	N/A

ACTION: Flag associated data as estimated if standards are not within ±10% of true values (except CRDL calibration standard). Do not flag the data as estimated in linear range indicated by good recovery of standard.

A.1.9.1.3 Is correlation *coefficient less than 0.995 for:

Mercury Analysis?	—	[ ]	✓
Cyanide Analysis? (Not applicable to Titrimetric Method)	—	[ ]	✓
Atomic Absorption Analysis?	—	[✓]	—

ACTION: If yes, flag the associated data as estimated.

A.1.9.2 Form II A (Initial and Continuing Calibration Verification)-

A.1.9.2.1 Present and complete for every metal and cyanide?	[✓]	—	—
Present and complete for AA and ICP when both are used for same analyte?	[ ]	—	✓

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory.

A.1.9.2.2 Circle all values on data summary sheet that are outside contract windows. Are all calibration standards (initial and continuing) within control limits?			
Metals 90-110%	[✓]	—	—
Hg - 80-120%	[ ]	—	✓
Cyanides 85-115%	[ ]	—	✓

* The reviewer will calculate correlation coefficient.

		YES	NO	N/A
A.1.9.3.2	Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and for every four hours of ICP run?	[✓]		
	ACTION: If no, write in Contract Problem/Non-Compliance Section of the "Data Assessment Narrative".			
A.1.9.3.3	Circle all values on summary sheet that are outside acceptance windows.			
	Are CRA and CRI standards within control limits: Metals 80 - 120%R?	[ ]	✓	
	Is mid-range standard within control limits: Cyanide 80 - 120%R? See Support Documentation (Following page)	[ ]		✓
	ACTION: Flag as estimated all data within the affected ranges if the recovery of the standard is between 50-79%; flag only positive data if the recovery is between 121-150%; reject (red line) all data if the recovery is less than 50%; reject only positive data if the recovery is greater than 150%.			
A.1.9.4	Form III (Initial and Continuing Calibration Blanks)			
A.1.9.4.1	Present and complete?	[✓]		
	For both AA and ICP when both are used for same analyte?	[ ]		✓
	Was an initial calibration blank analyzed?	[✓]		
	Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (whichever is more frequent)?	[✓]		
	ACTION: If no, prepare Telephone Record Log, contact laboratory and write in the contract-problems/ non-compliance section of the Data Assessment Narrative.			

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2B
CRDL STANDARD FOR AA AND ICP

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-91_____

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

AA CRDL Standard Source: INOR._VENT._____

ICP CRDL Standard Source: INOR._VENT._____

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Final Found	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium				20.0	14.68	73.4	17.02	85.1
Cobalt								
Copper								
Iron								
Lead	3.0	2.72	90.7					
Magnesium								
Manganese								
Mercury								
Nickel				80.0	89.87	112.3	79.16	99.0
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

		YES	NO	N/A
	ACTION: If yes, reject (red-line) all associated data greater than CRDL concentration but less than ten times the prep. blank value found in the raw data.			
A.1.9.5.3	Do concentrations of prep. blank fall below two times IDL when IDL is greater than CRDL?	[ ]	--	✓
	ACTION: If no, reject (red-line) all positive data that has a concentration less than 10 times the prep. blank value in the raw data.			
A.1.9.5.4	Is concentration of prep. blank below the negative CRDL?	--	[✓]	--
	ACTION: If yes, reject (red-line) all associated data that has a concentration less than 10xCRDL.			
A.1.9.6	Form IV (ICP Interference Check Sample)			
A.1.9.6.1	Present and complete?	[✓]	--	--
	(NOTE: Not required for furnace AA, flame AA, mercury, cyanide and Ca, Mg, K and Na.)			
	Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	[✓]	--	--
	ACTION: If no, flag as estimated (J) all samples for which AL, Ca, Fe, or Mg is higher than in ICS.			
A.1.8.6.2	Circle all values on Data Summary Sheet that are more than + 20% of true or established mean value. Are all Interference Check Sample results inside of control limits (+ 20%)?	[✓]	--	--
	If no, is concentration of Al, Ca, Fe, or Mg lower than in ICS?	[ ]	--	✓
	ACTION: If no, flag as estimated (J) those positive results for which ICS recovery is between 121-150%; flag all sample results as estimated if ICS recovery falls within 50-79%; reject (red-line) those sample results for which ICS recovery is less than 50%; if ICS recovery is above 150%, reject positive results only (not flagged with a "U").			

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5A
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.
MGGW05-01 S

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Level (low/med): LOW___

% Solids for Sample: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium	75-125	220.0100		37.8200		200.00	91.1		P
Cobalt									NR
Copper									NR
Iron		140143.9500		136880.2700		1000.00	326.4		P
Lead	75-125	97.1100		75.7400		20.00	106.8		F
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel	75-125	564.4800		119.5800		500.00	89.0		P
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:

No actions required
Since Fe in unspiked sample exceeds 4X amount Spiked.

	YES	NO	N/A
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?	[__]	__	✓

ACTION: If no, write in the Contract - Problem/Non - Compliance section of "Data Assessment Narrative".

A.1.9.7.4 Aqueous

Are any spike recoveries:

(a) less than 30%?	__	[✓]	__
(b) between 30-74%?	__	[✓]	__
(c) between 126-150%?	__	[✓]	__
(d) greater than 150%?	__	[✓]	__

ACTION: If less than 30%, reject all associated aqueous data; if between 30-74%, flag all associated aqueous data as estimated (J); if between 126-150%, flag as estimated (J) all associated aqueous data not flagged with a "U"; if greater than 150%, reject (red-line) all associated aqueous data not flagged with a "U".

A.1.9.7.5 Soil/Sediment

Are any spike recoveries:

(a) less than 10%?	__	[__]	✓
(b) between 10-74%?	__	[__]	✓
(c) between 126-200%?	__	[__]	✓
(d) greater than 200%?	__	[__]	✓

ACTION: If less than 10%, reject all associated data; if between 10-74%, flag all associated data as estimated; if between 126-200%, flag as estimated all associated data was not flagged with a "U"; if greater than 200%, reject all associated data not flagged with a "U".

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6
DUPLICATES

EPA SAMPLE NO.

MGGW05-01FD

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Level (low/med): LOW___

% Solids for Sample: ___0.0 % Solids for Duplicate: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								NR
Antimony								NR
Arsenic								NR
Barium								NR
Beryllium								NR
Cadmium								NR
Calcium								NR
Chromium		6.0000	U	6.0000	U			P
Cobalt								NR
Copper								NR
Iron		86.2000	B	424.8000		132.5	*	P
Lead		2.0000	U	2.0000	U			F
Magnesium								NR
Manganese								NR
Mercury								NR
Nickel		12.0000	U	12.0000	U			P
Potassium								NR
Selenium								NR
Silver								NR
Sodium								NR
Thallium								NR
Vanadium								NR
Zinc								NR
Cyanide								NR

		YES	NO	N/A
	2. If lab duplicate result is rejectable due to coefficient of correlation of MSA, analytical spike recovery, or duplicate injections criteria, do not apply precision criteria.			
A.1.9.8.4	Is any value for sample duplicate pair less than CRDL* and other value greater than or equal to 10 x *CRDL?	___	[✓]	___
	ACTION: If yes, flag the associated data as estimated (J).			
A.1.9.8.5	Aqueous Circle all values on Data Summary Sheet that are: RPD > 50%, or Difference > ± CRDL*			
	Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times *CRDL?	___	[✓]	___
	Is any **difference between sample and duplicate greater than *CRDL where sample and/or duplicate is less than 5 times *CRDL?	✓	[___]	___
	ACTION: If yes, flag the associated data as estimated.			
A.1.9.8.6	Soil/Sediment Circle all values on Data Summary Sheet that are: RPD > 100%, or Difference > 2 x CRDL*			
	Is any RPD (where sample and duplicate are both greater than or equal to 5 times *CRDL) : > 100%?	___	[___]	✓
	Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x*CRDL) : > 2x*CRDL?	___	[___]	✓

* Substitute IDL for CRDL when IDL > CRDL.
** Use absolute values of sample and duplicate to calculate the difference.

	YES	NO	N/A

A.1.9.9.4 Soil/Sediment

Circle all values on Form VI for field duplicates that are:
RPD >100%, or

Difference > 2 x CRDL*

Is any RPD (where sample and duplicate are both greater than 5 times *CRDL) :

>100%? ___ [_ _] ✓

Is any **difference between sample and duplicate (where sample and/or duplicate is less than 5x *CRDL):

>2x *CRDL? ___ [_ _] ✓

ACTION: If yes, flag the associated data as estimated.

A.1.9.10 Form VII (Laboratory Control Sample) (Note: LCS - not required for aqueous Hg and cyanide analyses.)

A.1.9.10.1 Was one LCS prepared and analyzed for:

every 20 water samples? [✓] _ _ ___

every 20' solid samples? [___] _ _ ✓

both AA and ICP when both are used for same analyte? [___] _ _ ✓

ACTION: If no for any of the above, prepare Telephone Record Log and contact laboratory for submittal of results of LCS. Flag as estimated (J) all data for which LCS was not analyzed.

NOTE: If only one LCS was analyzed for more than 20 samples, then first 20 samples close to LCS do not have to be flagged as estimated.

* Substitute IDL for CRDL when IDL > CRDL.

**Use absolute values of sample and duplicate to calculate the difference.

		YES	NO	N/A
A.1.9.11	Form IX (ICP Serial Dilution) -			
	NOTE: Serial dilution analysis is required only for initial concentrations equal to or greater than 10 x IDL.			
A.1.9.11.1	Was Serial Dilution analysis performed for: each 20 samples?	[✓]	__	__
	each matrix type?	[✓]	__	__
	each concentration range (i.e. low, med.)?	[✓]	__	__
	ACTION: If no for any of the above, flag all positive data greater than or equal to 10xIDLs as estimated (J) for which Serial Dilution Analysis was not performed, and summarize the deficiency on the DPO report.			
A.1.9.11.2	Was field blank(s) used for Serial Dilution Analysis?	__	[✓]	__
	ACTION: If yes, flag all associated data ≥ 10 x IDL as estimated (J).			
	NOTE: Serial dilution analysis should be performed on a field blank when it is the only aqueous sample in SDG.			
A.1.9.11.3	Are results outside control limit flagged with an "E" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.	[__]	__	✓
	ACTION: If no, write in the contract-problem/non-compliance section of the "Data Assessment Narrative".			
A.1.9.11.4	Circle all values on Data Summary Sheet that are outside control limit for initial concentrations equal to or greater than 10 x IDLs only. Are any % difference values: > 10%?	__	[✓]	__
	≥ 100%?	__	[✓]	__

		YES	NO	N/A
A.1.9.13	Form VIII (Method of Standard Addition Results)			
A.1.9.13.1	Present?	[___]	__	✓
	If no, is any Form I result coded with "S" or a "+"?	___	[__]	✓
	ACTION: If yes, write request on Telephone Record Log and contact laboratory for submittal of Form VIII.			
A.1.9.13.2	Is coefficient of correlation for MSA less than 0.990 for any sample?	___	[__]	✓
	ACTION: If yes, reject (red-line) affected data.			
A.1.9.13.3	Was *MSA required for any sample but not performed?	___	[__]	✓
	Is coefficient of correlation for MSA less than 0.995?	___	[__]	✓
	Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?	___	[__]	✓
	ACTION: If yes for any of the above, flag all the associated data as estimated (J).			
A.1.9.13.4	Was proper quantitation procedure followed correctly as outlined in the SOW on page E-16 through E-17?	[___]	__	✓
	ACTION: If no, note exception under contract problem/ non-compliance of data assessment narrative, or prepare a separate list.			
A.1.9.14	Dissolved/Total or Inorganic/Total Analytes -			
A.1.9.14.1	Were any analyses performed for dissolved as well as total analytes on the same sample(s).	✓	[__]	___
	Were any analyses performed for inorganic as well as total (organic + inorganic) analytes on the same sample(s)?	___	[✓]	___

* MSA is not required on LCS and prep. blank.

	YES	NO	N/A
A.1.9.15.2 Do any computation/transcription errors exceed 10% of reported values on Forms I-IX for:			
(NOTE: Check all forms against raw data.)			
(a) all analytes analyzed by ICP?	___	[✓]	___
(b) all analytes analyzed by GFAA?	___	[✓]	___
(c) all analytes analyzed by AA Flame?	___	[ ]	✓
(d) Mercury?	___	[ ]	✓
(e) Cyanide?	___	[ ]	✓

ACTION: If yes, prepare Telephone Log, contact laboratory for corrected data and correct errors with red pencil and initial.

A.1.9.16 Form I (Field Blank) -

Circle all field blank values on Data Summary Sheet that are greater than CRDL, 2 x IDL when IDL > CRDL.

Do concentrations of field blank(s) fall below CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?	[___]	___	✓
If no, was field blank value already rejected due to other QC criteria?	[___]	___	✓

ACTION: If no, reject (except field blank results) all associated positive sample data less than or equal to five times the field blank value.

	YES	NO	N/A
A.1.9.17.3 Form XI (Linear Ranges)			
Was any sample result higher than high linear range of ICP.	___	[✓]	___
Was any sample result higher than the highest calibration standard for non-ICP parameters?	___	[✓]	___
If yes for any of the above, was the sample diluted to obtain the result on Form I?	[___]	___	✓
ACTION: If no, flag the result reported on Form I as estimated(J).			
A.1.9.18 Percent Solids of Sediments			
Is soil content in sediment(s) less than 50%?	___	[___]	✓
ACTION: If yes, qualify as estimated all data not previously rejected or flagged due to other QC criteria.			

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.2: Data Assessment Narrative

Date: Feb. 1990
Number: HW-2
Revision: 10

CONTRACT Case# 4117, 4123, 4129 Site Motorola-Machesney Matrix: Soil ____

SDG# MGGW01 Lab Versar Labs Water ✓

Contractor Hydrosearch Reviewer Karen Smeltzer Other ____

A.2.1 The case description and exceptions, if any, are noted below with reason(s) for rejection or qualification as estimated value(s) J.

Eighteen water samples were analyzed for chromium, iron lead and nickel. Samples designated "F" are filtered samples. No field duplicates, field blanks or rinsate blanks were analyzed with this sample set. Nine unfiltered samples were also analyzed for hardness. The data were validated according to Region II (Data Validation protocol. Positive results and non-detects for chromium are qualified, (J) and (UJ), respectively, since the CRDL Standard analyzed recovery was low (<75%). Positive results for iron are qualified as estimated, (J), due to non-compliant lab duplicate RPD (>20%).

A.2.1 (continuation)

CONTRACT NON-COMPLIANCE
(S·D REPORT)

Regional Review of Uncontrolled Hazardous Waste
Site Contract Laboratory Data Package

CONTR. 4117
CASE NO. 4123, 4124

The hardcopied (laboratory name) Versar Laboratories Inorganic data package received at Region II has been reviewed and the quality assurance and performance data summarized. The data reviewed included:

S·D Sample No.: _____

Conc. & Matrix: N/A

Contract No. WA87-K025,K026,K027(SOW787) requires that specific analytical work be done and that associated reports be provided by the contractor to the Regions, EMSL-LV, and S·D. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Matrix Spike Results
- Calibration Standards Results
- Duplicate Analysis Results
- Blank Analysis Results
- MSA Results

Items of non-compliance with the above contract are described below.

Comments: _____

DAS for KMS
Reviewer's Initial

2/14/91
Date

Title: Evaluation of Metals Data for the Contract Laboratory Program
Appendix A.7: CLP Data Assessment Checklist
Inorganic Analysis

Date: Feb. 1990
Number: HW-2
Revision: 10

CONTROL 4117

INORGANIC REGIONAL DATA ASSESSMENT

Region II

CASE NO. 4123, 4129

SITE Motorola - Machesney

LABORATORY Versar Laboratories

NO. OF SAMPLES/
MATRIX 18/Waters

SDG# MG61N01

REVIEWER (IF NOT ESD) NUS Corp.

SOW# 7/88

REVIEWER'S NAME Karen Smeltzer

DPO: ACTION _____ FYI ✓

COMPLETION DATE 02/07/91

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES	O	O	NA	NA
2.	CALIBRATIONS	O	O		
3.	BLANKS	O	O		
4.	ICS	O			
5.	LCS	O			
6.	DUPLICATE ANALYSIS	O²	O		
7.	MATRIX SPIKE	O	O		
8.	MSA		O		
9.	SERIAL DILUTION	O			
10.	SAMPLE VERIFICATION	O	O		
11.	OTHER QC	O	O		
12.	OVERALL ASSESSMENT	O	O		

O = Data has no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: O¹ - CRDL STD ANALYSIS %R for Cr was < 75.

O² - Lab dup. RPD for Fe was > 20.

AREAS OF CONCERN: _____

NOTABLE PERFORMANCE: _____

APPENDIX A.5 SUMMARY OF INORGANICS QUALITY CONTROL DATA

LABORATORY: Versar Labs CASE NO. 4123 SOW NO. 7/88 SAMPLE TYPE/SDG: water / MGGW01

SITE/STUDY DESCRIPTION: Motorola - Mesa AZ SAMPLE NOS: MGGW01-01, MGGW03D-01, MGGW05-01, MGGW06-01, MGGW07-01, MGGW08-01, MGGW09-01 and corresponding filtered samples designated "F"

(8 waters for Cr, Pb, Fe & Ni (9 waters for hardness))

FIELD DUP. #'S: NA Field Blank NA

LAB DUP. #'S: MGGW05-01 & MGGW05-01F MATRIX SPIKE #: MGGW05-01S & MGGW05-01FS

SERIAL DILUTION SAMPLE NO. MGGW05-01F COMPLETION DATE: 02/07/91 REVIEWERS INITIALS: KH

	X	I	IIA	IIB	III	IV	V	VI	VII	IX

Parameter	Detection Limits UG/L CRDL	Detection Limits UG/L IDL	Field Blank	Calib. Ver. %R Init	Calib. Ver. %R Continued 1	Calib. Ver. %R Continued 2	Calib. Ver. %R Continued 3	CRDL Std Ver. %R Init	CRDL Std Ver. %R Fin	Calibration Blanks Init	Calibration Blanks Continued 1	Calibration Blanks Continued 2	Calibration Blanks Continued 3	PB/RL/EA/PN	ICP ICS %R Init	ICP ICS %R Fin	MS tpix	Lab Dup RPD Diff	LCS %R	Ser Dil %D	Meth
Al	200		NA																		
Sb	60																				
As	10																				
Ba	200																				
Be	5																				
Cd	5																				
Ca	5000																				
Cr	10	6.0		← all data met QC criteria →				73.4	← all data met QC criteria												ICP
Co	50																				
Cu	25																				
Fe	100	5.0		← all data met QC criteria													132.5	← all data met QC criteria →	ICP		
Pb	3	2.0		← all data met QC criteria															GFAA		
Mg	5000																				
Mn	15																				
Hg	0.2																				
Ni	40	12.0		← all data met QC criteria															ICP		
K	5000																				
Se	5																				
Ag	10																				
Na	5000			For all data meeting QC criteria,																	
Tl	10			(See support documentation																	
V	50			attached.																	
Zn	20																				
CN	10		V																		

APPENDIX A: QUALIFIED LABORATORY RESULTS

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW01-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40535_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	54.4		J	P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	53700		J*	P
7439-92-1	Lead	69.0			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	41.3			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_546_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW01-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40539_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	6.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	23.3	B	*	P
7439-92-1	Lead	2.0	U		F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

_____

_____

_____

_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW03D-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40533_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	37.6		J	P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	150000		*	P
7439-92-1	Lead	124			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	133			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_913_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW03D-01F

e: VERSAR_LABS._INC._____ Contract: 9101211-9

e: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

(soil/water): WATER_____ Lab Sample ID: 40537_

low/med): LOW_____ Date Received: 12/15/90

is: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum		-		NR
7440-36-0	Antimony		-		NR
7440-38-2	Arsenic		-		NR
7440-39-3	Barium		-		NR
7440-41-7	Beryllium		-		NR
7440-43-9	Cadmium		-		NR
7440-70-2	Calcium		-		P
7440-47-3	Chromium	7.3	B	J	P
7440-48-4	Cobalt		-		NR
7440-50-8	Copper		-		NR
7439-89-6	Iron	41.3	B	J *	P
7439-92-1	Lead	2.0	U	W	F
7439-95-4	Magnesium		-		NR
7439-96-5	Manganese		-		NR
7439-97-6	Mercury		-		NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium		-		NR
7782-49-2	Selenium		-		NR
7440-22-4	Silver		-		NR
7440-23-5	Sodium		-		NR
7440-28-0	Thallium		-		NR
7440-62-2	Vanadium		-		NR
7440-66-6	Zinc		-		NR
	Cyanide		-		
			-		

or Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

ments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW05-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40395_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9_	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	37.8	_	J	P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____	137000	_	J*	P_
7439-92-1_	Lead_____	75.7	_		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	120	_		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
	Cyanide__		_		NR
			_		

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_643_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW05-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40396_

Level (low/med): LOW_____ Date Received: 12/15/90

Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_				NR
7440-36-0_	Antimony_				NR
7440-38-2_	Arsenic__				NR
7440-39-3_	Barium___				NR
7440-41-7_	Beryllium				NR
7440-43-9_	Cadmium__				NR
7440-70-2_	Calcium__				NR
7440-47-3_	Chromium_	6.0	U		P_
7440-48-4_	Cobalt___				NR
7440-50-8_	Copper___				NR
7439-89-6_	Iron_____	86.2		*	P_
7439-92-1_	Lead_____	2.0	U	W	F_
7439-95-4_	Magnesium				NR
7439-96-5_	Manganese				NR
7439-97-6_	Mercury__				NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium				NR
7782-49-2_	Selenium_				NR
7440-22-4_	Silver___				NR
7440-23-5_	Sodium___				NR
7440-28-0_	Thallium_				NR
7440-62-2_	Vanadium_				NR
7440-66-6_	Zinc_____				NR
_____	Cyanide__				NR
_____	_____				__

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW06-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40345_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	51.2		J	P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	85400		J*	P
7439-92-1	Lead	54.9			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	83.9			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_682_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW06-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40339_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_				NR
7440-36-0_	Antimony_				NR
7440-38-2_	Arsenic__				NR
7440-39-3_	Barium___				NR
7440-41-7_	Beryllium				NR
7440-43-9_	Cadmium__				NR
7440-70-2_	Calcium__				NR
7440-47-3_	Chromium_	6.0	U		P_
7440-48-4_	Cobalt___				NR
7440-50-8_	Copper___				NR
7439-89-6_	Iron_____	83.1		J*	P_
7439-92-1_	Lead_____	2.0	U		F_
7439-95-4_	Magnesium				NR
7439-96-5_	Manganese				NR
7439-97-6_	Mercury__				NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium				NR
7782-49-2_	Selenium_				NR
7440-22-4_	Silver___				NR
7440-23-5_	Sodium___				NR
7440-28-0_	Thallium_				NR
7440-62-2_	Vanadium_				NR
7440-66-6_	Zinc_____				NR
_____	Cyanide__				NR
_____	_____				___

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW07-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40344_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	31.3		J	P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	106000		J*	P
7439-92-1	Lead	82.9			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	90.5			P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_616_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW07-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40338_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_		_		NR
7440-36-0_	Antimony_		_		NR
7440-38-2_	Arsenic__		_		NR
7440-39-3_	Barium___		_		NR
7440-41-7_	Beryllium		_		NR
7440-43-9-	Cadmium__		_		NR
7440-70-2_	Calcium__		_		NR
7440-47-3_	Chromium_	6.0	U	UR	P_
7440-48-4_	Cobalt___		_		NR
7440-50-8_	Copper___		_		NR
7439-89-6_	Iron_____	27.2	B	J*	P_
7439-92-1_	Lead_____	2.0	U		F_
7439-95-4_	Magnesium		_		NR
7439-96-5_	Manganese		_		NR
7439-97-6_	Mercury__		_		NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium		_		NR
7782-49-2_	Selenium_		_		NR
7440-22-4_	Silver___		_		NR
7440-23-5_	Sodium___		_		NR
7440-28-0_	Thallium_		_		NR
7440-62-2_	Vanadium_		_		NR
7440-66-6_	Zinc_____		_		NR
_____	Cyanide__		_		NR
_____	_____		_		__

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW08-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40532_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	7.2	B	J	P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	61700		J*	P
7439-92-1	Lead	29.0			F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	39.6	B		P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: BROWN____ Clarity Before: OPAQUE Texture: _____

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_569_MG_EQUIVALENTS_CACO3/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW08-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40536_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5_	Aluminum_				NR
7440-36-0_	Antimony_				NR
7440-38-2_	Arsenic__				NR
7440-39-3_	Barium___				NR
7440-41-7_	Beryllium				NR
7440-43-9_	Cadmium__				NR
7440-70-2_	Calcium__				NR
7440-47-3_	Chromium_	6.0	U	UJ	P_
7440-48-4_	Cobalt___				NR
7440-50-8_	Copper___				NR
7439-89-6_	Iron_____	68.5	B	J*	P_
7439-92-1_	Lead_____	2.0	U		F_
7439-95-4_	Magnesium				NR
7439-96-5_	Manganese				NR
7439-97-6_	Mercury__				NR
7440-02-0_	Nickel___	12.0	U		P_
7440-09-7_	Potassium				NR
7782-49-2_	Selenium_				NR
7440-22-4_	Silver___				NR
7440-23-5_	Sodium___				NR
7440-28-0_	Thallium_				NR
7440-62-2_	Vanadium_				NR
7440-66-6_	Zinc_____				NR
_____	Cyanide__				NR
_____	_____				

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW09-01

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40534_

Level (low/med): LOW_____ Date Received: 12/15/90

Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	6.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	36.7	B		P
7439-92-1	Lead	2.5	B		F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

HARDNESS_=_0.78_MG_EQUIVALENTS_CAC03/L_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MGGW09-01F

Lab Name: VERSAR_LABS._INC._____ Contract: 9101211-9

Lab Code: VERSAR Case No.: 4123__ SAS No.: _____ SDG No.: MGGW01

Matrix (soil/water): WATER_____ Lab Sample ID: 40538_

Level (low/med): LOW_____ Date Received: 12/15/90

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium	6.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron	26.4	B		P
7439-92-1	Lead	2.0	U	W	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
7440-02-0	Nickel	12.0	U		P
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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CONTROL

CKAGE COMPLETENESS AND DELIVERABLES CASE NUMBER: 4117, 4123, 4129 (VOA) / 4101 (BNAS *

LAB: ND Spectral Services Inc (VOAs)
versars (BNA)

SITE: Motorola

1.0 Data Completeness and Deliverables	YES	NO	N/A
1.1 Have any missing deliverables been received and added to the data package.	[ ]	X	
ACTION: Call lab for explanation / resubmittal of any missing deliverables. If lab cannot provide them, note the effect on review of the package under the "Contract Problems/Non-compliance" section of reviewer narrative.			
1.2 Was SMO CCS checklist included with package?	[X]		
2.0 Cover Letter/Case Narrative			
2.1 Is the Narrative or Cover Letter present?	[X]		
2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?	[X]		

3.0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticide/PCBs.

Does this package contain:

VOA data?	X	
BNA data?	X	
Pesticide/PCB data?		X

ACTION: Complete corresponding parts of checklist.

* 4117, 4123, 4129 data also included as well as results for 4117, 4123, 4129 Total Phenols

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

	YES	NO	N/A
a. Low Water	[X]		
b. Med Water	[ ]		X
c. Low Soil	[ ]		X
d. Med Soil	[ ]		X

3.2 Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

	YES	NO	N/A
a. Low Water	[X]		
b. Med Water	[ ]		X
c. Low Soil	[ ]		X
d. Med Soil	[ ]		X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

	YES	NO	N/A
3.3 Were outliers marked correctly with an asterisk?	[ ]		X

ACTION: Circle all outliers in red.

	YES	NO	N/A
3.4 Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?		[X]	
If yes, were samples reanalyzed?	[ ]		X
Were method blanks reanalyzed?	[ ]		X

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A
If any surrogate has a recovery of <10% : 1. Flag all positive results as estimated ("J"). 2. Flag all non-detects as unusable ("R"). Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.			
3.5 Are there any transcription/calculation errors between raw data and Form II? ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".	___	[X]	___

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[X]	___	___
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[___]	___	X
d. Med Soil	[___]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			

4.3 How many VOA spike recoveries are outside QC limits?

Water	Soils
1 out of 10	N/A out of 10

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
0 out of 5	N/A out of 5

see Support Documentation (following page)

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix Spike - EPA Sample No.: MGGW05-01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	250	0	226	90	61-145
Trichloroethene	250	715	1060	138 *	71-120
Benzene	250	0	253	101	76-127
Toluene	250	0	245	98	76-125
Chlorobenzene	250	0	233	93	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	250	224	90	0	14	61-145
Trichloroethene	250	1110	158 *	-14	14	71-120
Benzene	250	249	100	1	11	76-127
Toluene	250	256	102	-4	13	76-125
Chlorobenzene	250	239	96	-3	13	75-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 2 out of 10 outside limits

COMMENTS: MGGW05-01 121490 CTR 4117, X5 DILUTION
35(5)/240/10, EM 1250V

	YES	NO	N/A
5.0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	___	___
5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	___	___
5.3 Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?	[X]	___	___
ACTION: If any method blank data are missing, call lab for explanation / resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
6.0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[X]	___
6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	___	[X]	___
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.4 Have the ion abundance criteria been met for each instrument used?	[X]		
ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).			
ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.			
7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		[X]	
7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.)	[X]		
ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".			
7.7 Are the spectra of the mass calibration compound acceptable?	[X]		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 Target Compound List (TCL) Analytes			
8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	[X]		
b. Matrix spikes and matrix spike duplicates	[X]		
c. Blanks	[X]		

	YES	NO	N/A
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[X]	___	___
c. Blanks	[X]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[___]	X*	___
8.4 Is chromatographic performance acceptable with respect to: * found present area			
Baseline stability	[X]	___	___
Resolution	[X]	___	___
Peak shape	[X]	___	___
Full-scale graph (attenuation)	[X]	___	___
Other:_____	[___]	___	___
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[X]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[___]	X	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[X]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Blanks	[X]	___	___
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?	___	[X]	___
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[X]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]	___	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____ N/A

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	X	[___]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

See Support Documentation (following pages)

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Instrument ID: MSB Calibration date: 12/19/90 Time: 1136

Lab File ID: 1219V2B1 Init. Calib. Date(s): 12/15/90 12/15/90

Matrix:(soil/water) WATER Level:(low/med) Column:(pack/cap) CAP

Min RRF50 for SPCC(#) = 0.300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0%

	COMPOUND	$\overline{RRF}$	RRF50	%D	
#	Chloromethane	0.775	0.762	1.7	#
	Bromomethane	1.369	1.477	-7.9	
*	Vinyl Chloride	1.486	1.364	8.2	*
	Chloroethane	0.561	0.573	-2.1	
	Methylene Chloride	1.430	1.324	7.4	
	Acetone	0.284	0.228	19.7	
	Carbon Disulfide	3.696	3.073	16.9	
*	1,1-Dichloroethene	1.176	1.135	3.5	*
#	1,1-Dichloroethane	2.471	1.872	24.2	#
	1,2-Dichloroethene (total)	1.440	1.367	5.1	
*	Chloroform	2.760	2.392	13.3	*
	1,2-Dichloroethane	1.509	1.189	21.2	
	2-Butanone	0.084	0.082	2.4	
	1,1,1-Trichloroethane	0.572	0.553	3.3	
	Carbon Tetrachloride	0.570	0.567	0.5	
	Vinyl Acetate	0.483	0.338	30.0	
	Bromodichloromethane	0.871	0.778	10.7	
*	1,2-Dichloropropane	0.463	0.357	22.9	*
	cis-1,3-Dichloropropene	0.693	0.582	16.0	
	Trichloroethene	0.467	0.483	-3.4	
	Dibromochloromethane	0.807	0.849	-5.2	
	1,1,2-Trichloroethane	0.455	0.443	2.6	
	Benzene	0.899	0.729	18.9	
	trans-1,3-Dichloropropene	0.490	0.409	16.5	
#	Bromoform	0.548	0.675	-23.2	#
	4-Methyl-2-Pentanone	0.574	0.402	30.0	
	2-Hexanone	0.272	0.177	34.9	
	Tetrachloroethene	0.465	0.502	-8.0	
#	1,1,2,2-Tetrachloroethane	0.965	0.849	12.0	#
*	Toluene	0.614	0.531	13.5	*
#	Chlorobenzene	0.998	0.974	2.4	#
*	Ethylbenzene	0.410	0.374	8.8	*
	Styrene	0.820	0.771	6.0	
	Xylene (total)	0.478	0.438	8.4	
	Toluene-d8	0.980	0.838	14.5	
	Bromofluorobenzene	0.834	0.767	8.0	
	1,2-Dichloroethane-d4	1.206	0.985	18.3	

Affects Samples

MGGW05-01
MGGW06-01
MGGW07-01
MGGW08-01
MGGW09-01
MGGW030-01

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Instrument ID: MSB Calibration date: 12/20/90 Time: 1545

Lab File ID: 1220V2B1 Init. Calib. Date(s): 12/15/90 12/15/90

Matrix:(soil/water) WATER Level:(low/med) Column:(pack/cap) CAP

Min RRF50 for SPCC(#) = 0.300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0%

	COMPOUND	$\overline{RRF}$	RRF50	%D	
	Chloromethane	0.775	0.805	-3.9	#
	Bromomethane	1.369	1.471	-7.5	
*	Vinyl Chloride	1.486	1.527	-2.8	*
	Chloroethane	0.561	0.574	-2.3	
	Methylene Chloride	1.430	1.598	-11.8	
	Acetone	0.284	0.302	-6.3	
	Carbon Disulfide	3.696	3.485	5.7	
*	1,1-Dichloroethene	1.176	1.244	-5.8	*
#	1,1-Dichloroethane	2.471	2.018	18.3	#
	1,2-Dichloroethene (total)	1.440	1.476	-2.5	
*	Chloroform	2.760	2.507	9.2	*
	1,2-Dichloroethane	1.509	1.323	12.3	
	2-Butanone	0.084	0.088	-4.8	
	1,1,1-Trichloroethane	0.572	0.582	-1.7	
	Carbon Tetrachloride	0.570	0.590	-3.5	
	Vinyl Acetate	0.483	0.416	13.9	
	Bromodichloromethane	0.871	0.829	4.8	
*	1,2-Dichloropropane	0.463	0.384	17.1	*
	cis-1,3-Dichloropropene	0.693	0.601	13.3	
	Trichloroethene	0.467	0.481	-3.0	
	Dibromochloromethane	0.807	0.871	-7.9	
	1,1,2-Trichloroethane	0.455	0.482	-5.9	
	Benzene	0.899	0.861	4.2	
	trans-1,3-Dichloropropene	0.490	0.431	12.0	
#	Bromoform	0.548	0.621	-13.3	#
	4-Methyl-2-Pentanone	0.574	0.429	25.3	
	2-Hexanone	0.272	0.196	27.9	
	Tetrachloroethene	0.465	0.467	-0.4	
#	1,1,2,2-Tetrachloroethane	0.965	0.917	5.0	#
*	Toluene	0.614	0.598	2.6	*
#	Chlorobenzene	0.998	1.004	-0.6	#
*	Ethylbenzene	0.410	0.364	11.2	*
	Styrene	0.820	0.795	3.0	
	Xylene (total)	0.478	0.443	7.3	
	Toluene-d8	0.980	0.885	9.7	
	Bromofluorobenzene	0.834	0.789	5.4	
	1,2-Dichloroethane-d4	1.206	1.103	8.5	

Affects Samples

MGGW01-01

Trip Blank

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
15.0 Field Duplicates			
15.1 Were any field duplicates submitted for VOA analysis?	[ ]	X	

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

PART B: BNA ANALYSES

	YES	NO	N/A
1.0 Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples? * Not provided by contractor	[ ]	X *	
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?		[X]	
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).			
2.0 Holding Times			
2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded?		[X]	

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

Sample	Sample Matrix	Date Sampled	(See Traffic Report) Date Lab Received	Date Extracted	Date Analyzed

N/A

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

	YES	NO	N/A

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	[___]	___	X

ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[X]	___
If yes, were samples reanalyzed?	[___]	___	X
Were method blanks reanalyzed?	[___]	___	X

ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, <u>for the affected fraction only (i.e. base-neutral OR acid compounds)</u>:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

	YES	NO	N/A
If any base-neutral or acid surrogate has a recovery of <10% : 1. Flag all positive results for that fraction (i.e. all acid or base-neutral compounds) "J". 2. Flag all non-detects for that fraction "R". Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.			
3.5 Are there any transcription/calculation errors between raw data and Form II?	___	[X]	___
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
4.0 Matrix Spikes (Form III)			
4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	[X]	___	___
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a. Low Water	[X]	___	___
b. Med Water	[___]	___	X
c. Low Soil	[X]	___	___
d. Med Soil	[___]	___	X
ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.			

4.3 How many BNA spike recoveries are outside QC limits?

Water	Soils
0 out of 22	0 out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
0 out of 11	0 out of 11

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

	YES	NO	N/A
0 Blanks (Form IV)			
5.1 Is the Method Blank Summary (Form IV) present?	[X]	___	___
5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[X]	___	___
5.3 Has a BNA instrument blank been analyzed for each GS/MS system used.	[X]	___	___
ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all associated positive data ("R").			
5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[X]	___	___
ACTION: Use professional judgement to determine the effect on the data.			
0 Contamination			
NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.			
6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BNAs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[X]	___
6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	___	[ ]	X
ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			
NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.			

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & >10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] [X] ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? [X] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [X] ___ ___

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? [X] ___ ___

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

	YES	NO	N/A

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

N/A

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? [X] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription / calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [X] ___

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found check more values.) [X] ___ ___

ACTION: If large errors exist, call lab for explanation / resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? [X] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [X] ___ ___

b. Matrix spikes and matrix spike duplicates [X] ___ ___

c. Blanks [X] ___ ___

	YES	NO	N/A
8.2 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	[X]	___	___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[X]	___	___
c. Blanks	[X]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
8.3 Are the response factors shown in the Quant Report?	[ ]	X *	___
8.4 Is chromatographic performance acceptable with respect to: * formal procedure exists			
Baseline stability	[X]	___	___
Resolution	[X]	___	___
Peak shape	[X]	___	___
Full-scale graph (attenuation)	[X]	___	___
Other:_____	[ ]	___	X
ACTION: Use professional judgement to determine the acceptability of the data.			
8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample?	[X]	___	___
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".			
8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[X]	___	___
8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[X]	___	___
8.8 Do sample and standard relative ion intensities agree within 20%?	[X]	___	___
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).			

	YES	NO	N/A
9.0 Tentatively Identified Compounds (TIC)			
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?	[ ]	___	X
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate	[ ]	___	X
b. Blanks	[ ]	___	X
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.			
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene—a VOA TCL—and should not be reported as a TIC)?	___	___	X
ACTION: Flag with "R" any TCL compound listed as a TIC.			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	___	X
9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?	[ ]	___	X
ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
10.0 Compound Quantitation and Reported Detection Limits			
10.1 Are there any transcription / calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?	___	[X]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[X]	___	___

	YES	NO	N/A

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? [X] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [X] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD <30%)? [X] ___ ___

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have a RRF < 0.05? ___ [X] ___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

	YES	NO	N/A
12.4 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	___	[X]	___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?	[X]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[X]	___	___

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____

_____

N/A

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation / resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?	___	[X]	___

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?	___	[X]	___

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

YES NO N/A

% DIFFERENCE

25-50	50-90	>90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription / calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.) ___ [X] ___

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration? [X] ___ ___

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

N/A

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [X] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

	YES	NO	N/A
5.0 Field Duplicates			
15.1 Were any field duplicates submitted for BNA analysis?	[ ]	X	

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

	YES	NO	N/A
PART C: PESTICIDE/PCB ANALYSES			
1.0 Traffic Reports and Laboratory Narrative			
1.1 Are the Traffic Report Forms present for all samples?	[ ]	___	X
ACTION: If no, contact lab for replacement of missing or illegible copies.			
1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?	___	[ ]	X
ACTION: Use professional judgement to evaluate the effect on the quality of the data.			
ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).			
2.0 Holding Times			
2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?	___	[ ]	X
Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.			
3.0 Surrogate Recovery (Form II)			
3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[ ]	___	X
d. Med Soil	[ ]	___	X
3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water	[ ]	___	X
b. Med Water	[ ]	___	X
c. Low Soil	[ ]	___	X
d. Med Soil	[ ]	___	X

	YES	NO	N/A

ACTION: Call lab for explanation / resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ X

ACTION: Circle all outliers in red.

3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank? ___ [ ] X

ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [ ] X

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present? [ ] ___ X

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ X

b. Med Water [ ] ___ X

c. Low Soil [ ] ___ X

d. Med Soil [ ] ___ X

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soils
_____ out of 12	_____ out of 12

	YES	NO	N/A
4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?			

Water	Soils
_____ out of 6	_____ out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

	YES	NO	N/A
5.1 Is the Method Blank Summary (Form IV) present?	[___]	___	X
5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	[___]	___	X
5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?	[___]	___	X

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

	YES	NO	N/A
6.1 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.	___	[___]	X
6.2 Do any field/rinse blanks have positive PEST/PCB results?	___	[___]	X

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

YES NO N/A

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL & > 5x blank value
Flag sample result with a "U"; cross out "B" flag	Reject sample result and report CRQL; cross out "B" flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample? [___] ___ X

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards not required if there are no positive results above CRQL) column present:

a. Evaluation Standard Mix A [___] ___ X

b. Evaluation Standard Mix B [___] ___ X

c. Evaluation Standard Mix C [___] ___ X

d. Individual Standard Mix A [___] ___ X

e. Individual Standard Mix B [___] ___ X

f. Multi-component Pesticides Toxaphene & Chlordane [___] ___ X

g. Aroclors 1016/1260 [___] ___ X

h. Aroclors 1221, 1232, 1242, 1248, and 1254 [___] ___ X

ACTION: If no, take action specified in 3.2 above

	YES	NO	N/A
7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?	[ ]	___	X

ACTION: If no, take action specified in 3.2 above.

7.3 Are there any transcription/calculation errors between raw data and Form VIII?	___	[ ]	X

ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".

7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?	___	[ ]	X
- for Endrin?	___	[ ]	X
or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?	___	[ ]	X

ACTION:

a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:

1. Flag all positive DDT results "J".
2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
3. Flag positive DDD and DDE results "JN".
4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").

b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:

1. Flag all positive Endrin results "J".
2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
3. Flag Endrin Ketone positive results "JN".
4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").

c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is >20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

	YES	NO	N/A
7.5 Is the linearity check RSD of all four calibration factors <10% for the quantitation column?	[___]	___	X
ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.			
7.6 Is the % difference between the EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < I.D. < 2 mm]) ?	[___]	___	X
ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.			
7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW).	[___]	___	X
ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject it accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.			

8.0 Pesticide/PCB Standards Summary

8.1 Is Form IX present and complete for each GC column and 72 hr sequence of analyses?	[___]	___	X
ACTION: If no, take action specified in 3.2 above.			
8.2 Are there any transcription/calculation errors between raw data and Form IX?	___	[___]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)?	[___]	___	X
ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".			
8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses?	[___]	___	X

	YES	NO	N/A
ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and, DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".			
8.5 Are the continuing calibration standard calibration factors within 15% (for quantitation column) or 20% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors?	[ ]	___	X
ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.			
9.0 Pesticide/PCB Identification			
9.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[ ]	___	X
ACTION: If no, take action specified in 3.2 above.			
9.2 Are there any transcription errors between raw data and Form X?	___	[ ]	X
ACTION: If large errors exist, call lab for explanation / resubmittal, make any necessary corrections and note errors under "Conclusions".			
9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses?	[ ]	___	X
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)?	[ ]	___	X
ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).			
9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?	___	[ ]	X
ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".			

	YES	NO	N/A
12.0 Field Duplicates			
12.1 Were any field duplicates submitted for PEST/PCB analysis?	[___]	___	X

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

APPENDIX A: QUALIFIED LABORATORY RESULTS

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121908

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121908

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/20/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121907

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121907

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/20/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW03D-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121905

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121905

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	13	
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	160	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	7	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW05-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121903

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121903DD

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 5.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50	U
74-83-9	Bromomethane	50	U
75-01-4	Vinyl Chloride	50	U
75-00-3	Chloroethane	50	U
75-09-2	Methylene Chloride	25	U
67-64-1	Acetone	50	U
75-15-0	Carbon Disulfide	25	U
75-35-4	1,1-Dichloroethene	25	U
75-35-3	1,1-Dichloroethane	25	U
540-59-0	1,2-Dichloroethene (total)	25	U
67-66-3	Chloroform	25	U
107-06-2	1,2-Dichloroethane	25	U
78-93-3	2-Butanone	50	U
71-55-6	1,1,1-Trichloroethane	120	
56-23-5	Carbon Tetrachloride	25	U
108-05-4	Vinyl Acetate	50	U
75-27-4	Bromodichloromethane	25	U
78-87-5	1,2-Dichloropropane	25	U
10061-02-6	cis-1,3-Dichloropropene	25	U
79-01-6	Trichloroethene	720	J
124-48-1	Dibromochloromethane	25	U
79-00-5	1,1,2-Trichloroethane	25	U
71-43-2	Benzene	25	U
10061-02-6	trans-1,3-Dichloropropene	25	U
75-25-2	Bromoform	25	U
108-10-1	4-Methyl-2-Pentanone	50	U
591-78-6	2-Hexanone	50	U
127-18-4	Tetrachloroethene	25	U
79-34-5	1,1,2,2-Tetrachloroethane	25	U
108-88-3	Toluene	25	U
108-90-7	Chlorobenzene	25	U
100-41-4	Ethylbenzene	25	U
100-42-5	Styrene	25	U
133-02-7	Xylene (total)	25	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW06-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121902

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121902

Level: (low/med) Date Received: 12/15/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	51	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW07-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121901

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121901

Level: (low/med) Date Received: 12/15/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	13	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	33	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW08-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121904

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121904

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW09-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121906

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121906

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column: (pack/cap) CAP Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-02-6	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	5	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
133-02-7	Xylene (total)	5	U

DATA ASSESSMENT:

10. OTHER QC DATA OUT OF SPECIFICATION:

not applicable

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued on next page if necessary):

good

12. CONTRACT PROBLEMS____NON-COMPLIANCE:

none

13. This package contains re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following form I(s) are identified to be used.

Not applicable

DATA ASSESSMENT:

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT (continued):

APPENDIX A.6

REJECTION SUMMARY FORM
(No. of Compounds/No. of Fractions (Samples)

Type of Review: Data Validation Date: 2/7/91 Case #: 4117/4101

Project: Motorola Lab Name: A.D. Spectral Services, Inc. (VOA) Versar (BNA)

Reviewer's Initials: JMZ lmz Number of Samples: 8

Analytes Rejected Due to Exceeding Review Criteria:

	Surrogates	Holding Time	Calibration	Lab Contamination method. "U" Contamination	False +ve False -ve. ID	FB, TB, Other	Total # Samples	Total # Rejected/ Total # in all Samples
Acids (15)	0	0	0	0	0	0	0	0/0
PAHS 16 B/N (50)	0	0	0	0	0	0	8	0/128
VOA (35)	0	0	0	0	0	0	8	0/280
PEST (20)	0	0	0	0	0	0	0	0/0
PCB (7)	0	0	0	0	0	0	0	0/0
TCDD (1)	←			N/A				→

* "U" qualified due to method blank.

Analytes Estimated Due to Exceeding Review Criteria for:

						MS/MSD		
Acids (15)	0	0	0	0	0	0	0	0/0
PAHS 16 B/N (50)	0	0	0	0	0	0	8	0/128
VOA (35)	0	0	0	0	0	1	7	1/280
PEST (20)	0	0	0	0	0	0	0	0/0
PCB (7)	0	0	0	0	0	0	0	0/0
TCDD (1)	←			N/A				→

Region II

ORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 4117 / 4101 SITE Motorola

LABORATORY MD Spectral Services Inc (MDAS) NO. OF SAMPLES/
Versar (BNA) MATRIX 8 / waters ; 1 soil

SOW# NYS ASP / 1989 REVIEWER (IF NOT ESD) NUS - Pgh
EPA method 8240 NYS 1989 modifications REVIEWER'S NAME Jean Zimmerman

DPO: ACTION _____ FYI ✓ COMPLETION DATE 2/7/91

DATA ASSESSMENT SUMMARY

		VOA	BNA	PEST	OTHER
1.	HOLDING TIMES	O	O	NA	
2.	GC/MS TUNE/INSTR. PERFORM.	O	O		
3.	CALIBRATIONS	X[1]	O		
4.	BLANKS	O	O		
5.	SURROGATES	O	O		
6.	MATRIX SPIKE/DUP	O[1]	O		
7.	OTHER QC (MB, PB, WB)	O	O		
8.	INTERNAL STANDARDS	O	O		
9.	COMPOUND IDENTIFICATION	O	O		
10.	SYSTEM PERFORMANCE	O	O		
11.	OVERALL ASSESSMENT	O	O	✓	

O = Data had no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
U = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: _____

AREAS OF CONCERN: X[1] - Continuing calibration %DS > 25;
O[1] - %Rec trichloroethene exceeded quality criteria

NOTABLE PERFORMANCE: _____

Versar Laboratories INC.

ANALYSIS REPORT
General Inorganic Chemistry Section

DATE: 04-JAN-91 PAGE: 1
CODE / CONTROL #: HYDROSEA / 4117,4123,4129
CLIENT / SITE: HYDROSEARCH / MOTOROLA
PROJECT / BATCH: 420.98.0 / 4,5,6

Lab#	Field #	TOTAL PHENOL (mg/L)		
40340	MGGW06-01	< 0.010		
40341	MGGW07-01	< 0.010		
40394	MGGW05-01	< 0.010		
40524	MGGW08-01	< 0.010		
40527	MGGW01-01	< 0.010		

C. Thomson
Laboratory Manager

Appendix E

Analytical Model Computer Output

DATA BASE:

Number of simulation periods for which contaminant
concentration distribution is to be calculated 1

Simulation period number= 1
Simulation period duration in days= 1000.00
Number of grid columns= 12
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft= 30.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 1000.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .3
Number of monitor wells for which time-
concentration tables are desired= 4
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3
I-coordinate of monitor well= 6
J-coordinate of monitor well= 5
Monitor well number= 4
I-coordinate of monitor well= 6
J-coordinate of monitor well= 7

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1000.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.02	0.06	0.02	0.00	0.00	0.00	0.00
5	0.02	0.506	1.71	0.65	0.030	0.00	0.00	0.00
6	0.00	0.02	0.06	0.02	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00				
2	0.00	0.00	0.00	0.00				
3	0.00	0.00	0.00	0.00				
4	0.00	0.00	0.00	0.00				
5	0.00	0.00	0.00	0.00				
6	0.00	0.00	0.00	0.00				
7	0.00	0.00	0.00	0.00				
8	0.00	0.00	0.00	0.00				
9	0.00	0.00	0.00	0.00				
10	0.00	0.00	0.00	0.00				
11	0.00	0.00	0.00	0.00				

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.50

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.03

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00

MONITOR WELL NUMBER: 4

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00

concentration distribution is to be calculated 8

Simulation period number= 1
Simulation period duration in days= 1000.00
Simulation period number= 2
Simulation period duration in days= 1365.00
Simulation period number= 3
Simulation period duration in days= 1730.00
Simulation period number= 4
Simulation period duration in days= 2095.00
Simulation period number= 5
Simulation period duration in days= 2461.00
Simulation period number= 6
Simulation period duration in days= 2826.00
Simulation period number= 7
Simulation period duration in days= 3191.00
Simulation period number= 8
DATA BASE:

Number of simulation periods for which contaminant
concentration distribution is to be calculated 8

Simulation period number= 1
Simulation period duration in days= 1000.00
Simulation period number= 2
Simulation period duration in days= 1365.00
Simulation period number= 3
Simulation period duration in days= 1730.00
Simulation period number= 4
Simulation period duration in days= 2095.00
Simulation period number= 5
Simulation period duration in days= 2461.00
Simulation period number= 6
Simulation period duration in days= 2826.00
Simulation period number= 7
Simulation period duration in days= 3191.00
Simulation period number= 8
Simulation period duration in days= 3556.00
Number of grid columns= 16
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 2
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 3
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 4
Aquifer thickness in ft= 90.00

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Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day=   0.56
Number of point sources= 1
Simulation period number= 5
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day=   0.56
Number of point sources= 1
Simulation period number= 6
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day=   0.56
Number of point sources= 1
Simulation period number= 7
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day=   0.56
Number of point sources= 1
Simulation period number= 8
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day=   0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft=     0.00
Y-coordinate of point source in ft=   400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 1000.00
Simulation period number= 2
Point source number 1
X-coordinate of point source in ft=     0.00
Y-coordinate of point source in ft=   400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 1365.00
Simulation period number= 3
Point source number 1
X-coordinate of point source in ft=     0.00
Y-coordinate of point source in ft=   400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 1730.00
Simulation period number= 4
Point source number 1
X-coordinate of point source in ft=     0.00
Y-coordinate of point source in ft=   400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 2095.00
Simulation period number= 5
Point source number 1
X-coordinate of point source in ft=     0.00
Y-coordinate of point source in ft=   400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 2461.00
Simulation period number= 6
Point source number 1
X-coordinate of point source in ft=     0.00
```

Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 2828.00
Simulation period number= 7
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 3191.00
Simulation period number= 8
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 3556.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .3
Number of monitor wells for which time-
concentration tables are desired= 5
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3
I-coordinate of monitor well= 6
J-coordinate of monitor well= 5
Monitor well number= 4
I-coordinate of monitor well= 6
J-coordinate of monitor well= 7
Monitor well number= 5
I-coordinate of monitor well= 10
J-coordinate of monitor well= 5

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1000.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.02	0.03	0.03	0.01	0.00	0.00	0.00
5	0.23	0.65	0.94	0.70	0.27	0.05	0.01	0.00
6	0.01	0.02	0.03	0.03	0.01	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1365.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.03	0.05	0.06	0.04	0.02	0.01	0.00
5	0.10	0.31	0.59	0.68	0.49	0.21	0.06	0.01
6	0.01	0.03	0.05	0.06	0.04	0.02	0.01	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1730.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.02	0.05	0.08	0.08	0.05	0.03	0.01
5	0.05	0.16	0.34	0.51	0.53	0.37	0.17	0.06
6	0.01	0.02	0.05	0.08	0.08	0.05	0.03	0.01
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2095.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.02	0.04	0.07	0.09	0.09	0.06	0.03
5	0.02	0.08	0.15	0.34	0.44	0.42	0.35	0.14
6	0.00	0.02	0.04	0.07	0.09	0.09	0.06	0.03
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00
6	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2461.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

7	0.00	0.01	0.03	0.06	0.09	0.10	0.09	0.06
8	0.01	0.04	0.11	0.22	0.33	0.36	0.34	0.23
9	0.00	0.01	0.03	0.06	0.09	0.10	0.09	0.06
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
5	0.12	0.05	0.01	0.00	0.00	0.00	0.00	0.00
6	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2826.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.01	0.02	0.04	0.07	0.10	0.10	0.09
5	0.01	0.02	0.06	0.13	0.23	0.31	0.33	0.28
6	0.00	0.01	0.02	0.04	0.07	0.10	0.10	0.09
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00
5	0.19	0.10	0.04	0.01	0.00	0.00	0.00	0.00
6	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 3191.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN 1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.01	0.03	0.05	0.08	0.10	0.10
5	0.00	0.01	0.03	0.08	0.15	0.23	0.29	0.29
6	0.00	0.00	0.01	0.03	0.05	0.08	0.10	0.10
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN 9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.08	0.06	0.03	0.01	0.00	0.00	0.00	0.00
5	0.34	0.16	0.09	0.04	0.01	0.00	0.00	0.00
6	0.08	0.06	0.03	0.01	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 3556.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN 1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
4	0.00	0.00	0.01	0.02	0.04	0.06	0.09	0.10
5	0.00	0.01	0.02	0.05	0.10	0.16	0.23	0.25
6	0.00	0.00	0.01	0.02	0.04	0.06	0.09	0.10
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN 9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.10	0.08	0.05	0.03	0.01	0.01	0.00	0.00
5	0.25	0.20	0.13	0.07	0.03	0.01	0.00	0.00
6	0.10	0.08	0.05	0.03	0.01	0.01	0.00	0.00
7	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.65
1365.000	0.31
1730.000	0.16
2095.000	0.08
2461.000	0.04
2826.000	0.02
3191.000	0.01
3556.000	0.01

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.27
1365.000	0.49
1730.000	0.53
2095.000	0.44
2461.000	0.33
2826.000	0.23
3191.000	0.15
3556.000	0.10

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.05
1365.000	0.21
1730.000	0.37
2095.000	0.42
2461.000	0.38
2826.000	0.31
3191.000	0.23
3556.000	0.16

MONITOR WELL NUMBER: 4

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00
1365.000	0.00
1730.000	0.00
2095.000	0.00
2461.000	0.00
2826.000	0.00
3191.000	0.00
3556.000	0.00

MONITOR WELL NUMBER: 5

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00
1365.000	0.00
1730.000	0.00
2095.000	0.00
2461.000	0.00

3191.000 0.04
3556.000 0.07
DATA BASE:

Number of simulation periods for which contaminant concentration distribution is to be calculated 7

Simulation period number= 1
Simulation period duration in days= 3922.00
Simulation period number= 2
Simulation period duration in days= 4287.00
Simulation period number= 3
Simulation period duration in days= 4652.00
Simulation period number= 4
Simulation period duration in days= 5017.00
Simulation period number= 5
Simulation period duration in days= 5383.00
Simulation period number= 6
Simulation period duration in days= 5748.00
Simulation period number= 7
Simulation period duration in days= 6113.00
Number of grid columns= 16
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 2
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 3
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 4
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 5
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 6
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 7

Aquifer longitudinal dispersivity in ft=110.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 3928.00
Simulation period number= 2
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 4287.00
Simulation period number= 3
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 4652.00
Simulation period number= 4
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 5017.00
Simulation period number= 5
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 5383.00
Simulation period number= 6
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 5748.00
Simulation period number= 7
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 6113.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .3
Number of monitor wells for which time-
concentration tables are desired= 5
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3

Monitor well number= 4
I-coordinate of monitor well= 6
J-coordinate of monitor well= 7
Monitor well number= 5
I-coordinate of monitor well= 12
J-coordinate of monitor well= 5

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 3922.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
4	0.00	0.00	0.00	0.01	0.03	0.05	0.07	0.09
5	0.00	0.00	0.01	0.03	0.06	0.11	0.17	0.22
6	0.00	0.00	0.00	0.01	0.03	0.05	0.07	0.09
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
4	0.10	0.10	0.08	0.05	0.03	0.01	0.01	0.00
5	0.24	0.22	0.17	0.12	0.06	0.03	0.01	0.00
6	0.10	0.10	0.08	0.05	0.03	0.01	0.01	0.00
7	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 4287.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
4	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.08
5	0.00	0.00	0.01	0.02	0.04	0.07	0.12	0.17
6	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.08
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
4	0.10	0.10	0.09	0.07	0.05	0.03	0.01	0.01
5	0.21	0.22	0.20	0.15	0.10	0.06	0.03	0.01
6	0.10	0.10	0.09	0.07	0.05	0.03	0.01	0.01
7	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 4652.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
4	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.06
5	0.00	0.00	0.00	0.01	0.02	0.05	0.08	0.13
6	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.06
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
4	0.08	0.10	0.10	0.09	0.07	0.04	0.02	0.01
5	0.17	0.20	0.20	0.17	0.13	0.09	0.05	0.02
6	0.08	0.10	0.10	0.09	0.07	0.04	0.02	0.01
7	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5017.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.09
6	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.05
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
4	0.07	0.09	0.10	0.09	0.08	0.06	0.04	0.02
5	0.13	0.17	0.19	0.18	0.16	0.12	0.08	0.04
6	0.07	0.09	0.10	0.09	0.08	0.06	0.04	0.02
7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5383.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
4	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03
5	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.06
6	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.03
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4	0.05	0.07	0.09	0.09	0.09	0.08	0.06	0.04
5	0.10	0.13	0.16	0.18	0.17	0.14	0.10	0.07
6	0.05	0.07	0.09	0.09	0.09	0.08	0.06	0.04
7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5748.00

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
5	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04
6	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01
4	0.04	0.06	0.08	0.09	0.09	0.08	0.07	0.05
5	0.07	0.10	0.14	0.16	0.16	0.15	0.12	0.09
6	0.04	0.06	0.08	0.09	0.09	0.08	0.07	0.05
7	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 6113.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
5	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01
4	0.03	0.05	0.06	0.08	0.09	0.09	0.08	0.07
5	0.05	0.08	0.11	0.14	0.15	0.15	0.14	0.11
6	0.03	0.05	0.06	0.08	0.09	0.09	0.08	0.07
7	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
3922.000	0.00
4287.000	0.00
4652.000	0.00
5017.000	0.00
5383.000	0.00
5748.000	0.00
6113.000	0.00

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
3922.000	0.06
4287.000	0.04
4652.000	0.02
5017.000	0.01
5383.000	0.01
5748.000	0.00
6113.000	0.00

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
3922.000	0.11
4287.000	0.07
4652.000	0.05
5017.000	0.03
5383.000	0.02
5748.000	0.01
6113.000	0.01

MONITOR WELL NUMBER: 4

TIME(DAYS)	CONCENTRATION(MG/L)
3922.000	0.00
4287.000	0.00
4652.000	0.00
5017.000	0.00
5383.000	0.00
5748.000	0.00
6113.000	0.00

MONITOR WELL NUMBER: 5

TIME(DAYS)	CONCENTRATION(MG/L)
3922.000	0.12
4287.000	0.15
4652.000	0.17
5017.000	0.18
5383.000	0.18
5748.000	0.16
6113.000	0.14

DATA BASE:

Number of simulation periods for which contaminant
concentration distribution is to be calculated 6

Simulation period number= 1
Simulation period duration in days= 6478.00
Simulation period number= 2
Simulation period duration in days= 6844.00
Simulation period number= 3
Simulation period duration in days= 7209.00
Simulation period number= 4
Simulation period duration in days= 7574.00
Simulation period number= 5
Simulation period duration in days= 7939.00
Simulation period number= 6
Simulation period duration in days= 8305.00
Number of grid columns= 16
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 2
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 3
Aquifer thickness in ft= 90.00

Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 4
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 5
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 6
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 6476.00
Simulation period number= 2
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 6844.00
Simulation period number= 3
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 7209.00
Simulation period number= 4
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 7574.00
Simulation period number= 5
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 7939.00
Simulation period number= 6
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 1100.000
Time after slug contaminant injection in days= 8305.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .3

Monitor well number= 1
I-coordinate of monitor well= 12
J-coordinate of monitor well= 5

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 6479.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
5	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
4	0.02	0.03	0.05	0.07	0.08	0.09	0.09	0.08
5	0.03	0.06	0.08	0.11	0.13	0.14	0.14	0.13
6	0.02	0.03	0.05	0.07	0.08	0.09	0.09	0.08
7	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 6844.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
5	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
4	0.01	0.02	0.04	0.05	0.07	0.08	0.08	0.08
5	0.02	0.04	0.06	0.09	0.11	0.13	0.14	0.13
6	0.01	0.03	0.04	0.05	0.07	0.08	0.08	0.08
7	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 7209.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
4	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.08
5	0.02	0.03	0.05	0.07	0.09	0.11	0.13	0.13
6	0.01	0.02	0.03	0.04	0.06	0.07	0.08	0.08
7	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 7574.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
4	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.08
5	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.12
6	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.08
7	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 7939.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
4	0.00	0.01	0.01	0.02	0.04	0.05	0.06	0.07
5	0.01	0.01	0.02	0.04	0.05	0.08	0.10	0.11
6	0.00	0.01	0.01	0.02	0.04	0.05	0.06	0.07
7	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 8305.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
4	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06
5	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10
6	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06
7	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
6478.000	0.11
6844.000	0.09
7209.000	0.07
7574.000	0.05
7939.000	0.04
8305.000	0.03

DATA BASE:

Number of simulation periods for which contaminant concentration distribution is to be calculated 4

Simulation period number= 1
Simulation period duration in days= 6844.00
Simulation period number= 2
Simulation period duration in days= 7209.00
Simulation period number= 3
Simulation period duration in days= 7574.00
Simulation period number= 4
Simulation period duration in days= 7939.00
Number of grid columns= 16
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00

DATA BASE:

Number of simulation periods for which contaminant
concentration distribution is to be calculated 1

Simulation period number= 1
Simulation period duration in days= 1000.00
Number of grid columns= 12
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft= 30.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 1000.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .23
Number of monitor wells for which time-
concentration tables are desired= 4
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3
I-coordinate of monitor well= 6
J-coordinate of monitor well= 5
Monitor well number= 4
I-coordinate of monitor well= 6
J-coordinate of monitor well= 7

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1000.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.02	0.10	0.09	0.02	0.00	0.00	0.00
5	0.01	0.25	1.10	0.97	0.17	0.01	0.00	0.00
6	0.00	0.02	0.10	0.09	0.02	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00				
2	0.00	0.00	0.00	0.00				
3	0.00	0.00	0.00	0.00				
4	0.00	0.00	0.00	0.00				
5	0.00	0.00	0.00	0.00				
6	0.00	0.00	0.00	0.00				
7	0.00	0.00	0.00	0.00				
8	0.00	0.00	0.00	0.00				
9	0.00	0.00	0.00	0.00				
10	0.00	0.00	0.00	0.00				
11	0.00	0.00	0.00	0.00				

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.25

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.17

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.01

MONITOR WELL NUMBER: 4

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00

DATA BASE:

Number of simulation periods for which contaminant concentration distribution is to be calculated 1

Simulation period number= 1
Simulation period duration in days= 1200.00
Number of grid columns= 12
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft= 30.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1

Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 1200.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .23
Number of monitor wells for which time-
concentration tables are desired= 4
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3
I-coordinate of monitor well= 6
J-coordinate of monitor well= 5
Monitor well number= 4
I-coordinate of monitor well= 6
J-coordinate of monitor well= 7

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1200.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.01	0.08	0.14	0.06	0.01	0.00	0.00
5	0.00	0.09	0.61	1.05	0.47	0.06	0.00	0.00
6	0.00	0.01	0.08	0.14	0.06	0.01	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00				
2	0.00	0.00	0.00	0.00				
3	0.00	0.00	0.00	0.00				
4	0.00	0.00	0.00	0.00				
5	0.00	0.00	0.00	0.00				
6	0.00	0.00	0.00	0.00				
7	0.00	0.00	0.00	0.00				
8	0.00	0.00	0.00	0.00				
9	0.00	0.00	0.00	0.00				
10	0.00	0.00	0.00	0.00				
11	0.00	0.00	0.00	0.00				

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
1200.000	0.09

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
1200.000	0.47

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
1200.000	0.06

MONITOR WELL NUMBER: 4

TIME(DAYS)	CONCENTRATION(MG/L)
1200.000	0.00

DATA BASE:

Number of simulation periods for which contaminant concentration distribution is to be calculated 15

Simulation period number= 1
Simulation period duration in days= 1000.00
Simulation period number= 2
Simulation period duration in days= 1730.00
Simulation period number= 3
Simulation period duration in days= 2095.00
Simulation period number= 4
Simulation period duration in days= 2461.00
Simulation period number= 5
Simulation period duration in days= 2826.00
Simulation period number= 6
Simulation period duration in days= 3191.00
Simulation period number= 7
Simulation period duration in days= 3556.00
Simulation period number= 8

Simulation period number= 9
Simulation period duration in days= 4287.00
Simulation period number= 10
Simulation period duration in days= 4652.00
Simulation period number= 11
Simulation period duration in days= 5017.00
Simulation period number= 12
Simulation period duration in days= 5383.00
Simulation period number= 13
Simulation period duration in days= 5748.00
Simulation period number= 14
Simulation period duration in days= 6113.00
Simulation period number= 15
Simulation period duration in days= 6478.00
Number of grid columns= 16
Number of grid rows= 11
Grid spacing in ft= 100.00
X-coordinate of upper-left grid node in ft= 0.00
Y-coordinate of upper-left grid node in ft= 0.00
Aquifer actual porosity as a decimal= 0.400
Aquifer effective porosity as a decimal= 0.350
Simulation period number= 1
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft= 30.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 2
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 3
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 4
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 5
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 6
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 7
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 8
Aquifer thickness in ft= 90.00

Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 9
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 10
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 11
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 12
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 13
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 14
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 15
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 1000.00
Simulation period number= 2
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 1730.00
Simulation period number= 3
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000

Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 2461.00
Simulation period number= 5
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 2828.00
Simulation period numoer= 6
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 3191.00
Simulation period number= 7
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 3536.00
Simulation period number= 8
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 3922.00
Simulation period number= 9
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 4287.00
Simulation period number= 10
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 4652.00
Simulation period number= 11
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 5017.00
Simulation period number= 12
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 5383.00
Simulation period number= 13
Point source number 1

Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 5748.00
Simulation period number= 14
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 6113.00
Simulation period number= 15
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 6478.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .23
Number of monitor wells for which time-
concentration tables are desired= 5
Monitor well number= 1
I-coordinate of monitor well= 2
J-coordinate of monitor well= 5
Monitor well number= 2
I-coordinate of monitor well= 5
J-coordinate of monitor well= 5
Monitor well number= 3
I-coordinate of monitor well= 6
J-coordinate of monitor well= 5
Monitor well number= 4
I-coordinate of monitor well= 8
J-coordinate of monitor well= 7
Monitor well number= 5
I-coordinate of monitor well= 12
J-coordinate of monitor well= 5

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1000.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.02	0.10	0.05	0.02	0.00	0.00	0.00
5	0.01	0.26	1.11	0.96	0.17	0.01	0.00	0.00
6	0.00	0.02	0.10	0.05	0.02	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 1730.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.02	0.05	0.08	0.10	0.09	0.06	0.03
5	0.04	0.10	0.21	0.33	0.40	0.36	0.25	0.13
6	0.01	0.02	0.05	0.08	0.10	0.09	0.06	0.03
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00
6	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2095.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.01	0.02	0.04	0.06	0.09	0.10	0.09	0.07
5	0.02	0.05	0.11	0.20	0.25	0.33	0.30	0.21
6	0.01	0.02	0.04	0.06	0.09	0.10	0.09	0.07
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00
5	0.12	0.06	0.02	0.01	0.00	0.00	0.00	0.00
6	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2461.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
4	0.00	0.01	0.02	0.05	0.07	0.10	0.11	0.09
5	0.01	0.03	0.06	0.12	0.20	0.35	0.35	0.35
6	0.00	0.01	0.02	0.05	0.07	0.10	0.11	0.09
7	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.07	0.04	0.02	0.01	0.00	0.00	0.00	0.00
5	0.19	0.11	0.06	0.02	0.01	0.00	0.00	0.00
6	0.07	0.04	0.02	0.01	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 2826.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
4	0.00	0.01	0.01	0.03	0.05	0.08	0.10	0.10
5	0.00	0.01	0.03	0.07	0.13	0.19	0.23	0.24
6	0.00	0.01	0.01	0.03	0.05	0.08	0.10	0.10
7	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
4	0.09	0.07	0.04	0.02	0.01	0.00	0.00	0.00
5	0.22	0.16	0.10	0.06	0.02	0.01	0.00	0.00
6	0.09	0.07	0.04	0.02	0.01	0.00	0.00	0.00
7	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 3191.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
4	0.00	0.00	0.01	0.02	0.04	0.06	0.08	0.10
5	0.00	0.01	0.02	0.04	0.08	0.13	0.18	0.21
6	0.00	0.00	0.01	0.02	0.04	0.06	0.08	0.10
7	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
4	0.10	0.09	0.07	0.04	0.03	0.01	0.01	0.00
5	0.22	0.19	0.15	0.10	0.05	0.03	0.01	0.00
6	0.10	0.09	0.07	0.04	0.03	0.01	0.01	0.00
7	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
4	0.00	0.00	0.01	0.01	0.02	0.04	0.06	0.08
5	0.00	0.00	0.01	0.02	0.05	0.08	0.12	0.17
6	0.00	0.00	0.01	0.01	0.02	0.04	0.06	0.08
7	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
4	0.10	0.10	0.09	0.07	0.04	0.03	0.01	0.01
5	0.13	0.13	0.17	0.13	0.09	0.05	0.03	0.01
6	0.10	0.10	0.05	0.07	0.04	0.03	0.01	0.01
7	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 3988.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
4	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.07
5	0.00	0.00	0.01	0.01	0.03	0.05	0.09	0.12
6	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.07
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
4	0.08	0.09	0.09	0.08	0.06	0.04	0.03	0.01
5	0.16	0.17	0.17	0.15	0.12	0.08	0.05	0.03
6	0.08	0.09	0.09	0.08	0.06	0.04	0.03	0.01
7	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00

9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 4287.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
4	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.05
5	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.09
6	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.05
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01
4	0.07	0.08	0.09	0.09	0.08	0.06	0.04	0.03
5	0.12	0.15	0.16	0.16	0.14	0.11	0.08	0.05
6	0.07	0.08	0.09	0.09	0.08	0.06	0.04	0.03
7	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 4653.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
4	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
5	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.06
6	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16

1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01
4	0.05	0.07	0.08	0.09	0.09	0.08	0.06	0.04
5	0.09	0.12	0.14	0.15	0.14	0.13	0.10	0.07
6	0.05	0.07	0.08	0.09	0.09	0.08	0.06	0.04
7	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5017.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
4	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
5	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
6	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01
4	0.04	0.05	0.07	0.08	0.09	0.08	0.07	0.06
5	0.06	0.09	0.11	0.13	0.14	0.13	0.12	0.09
6	0.04	0.05	0.07	0.08	0.09	0.08	0.07	0.06
7	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5383.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
5	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02

8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
4	0.03	0.04	0.06	0.07	0.08	0.08	0.08	0.07
5	0.04	0.06	0.09	0.11	0.12	0.13	0.12	0.11
6	0.03	0.04	0.06	0.07	0.08	0.08	0.08	0.07
7	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5748.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN							
	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
5	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
6	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN							
	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
4	0.02	0.03	0.04	0.06	0.07	0.08	0.08	0.08
5	0.03	0.04	0.06	0.09	0.10	0.12	0.12	0.11
6	0.02	0.03	0.04	0.06	0.07	0.08	0.08	0.08
7	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 6113.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
5	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
4	0.01	0.02	0.03	0.04	0.06	0.07	0.07	0.08
5	0.02	0.03	0.05	0.07	0.08	0.10	0.11	0.11
6	0.01	0.02	0.03	0.04	0.06	0.07	0.07	0.08
7	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 5478.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
4	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.07
5	0.01	0.02	0.03	0.05	0.07	0.08	0.10	0.11
6	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.07
7	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.26
1730.000	0.10
2095.000	0.05
2461.000	0.03
2826.000	0.01
3191.000	0.01
3556.000	0.00
3922.000	0.00
4287.000	0.00
4652.000	0.00
5017.000	0.00
5383.000	0.00
5748.000	0.00
6113.000	0.00
6478.000	0.00

MONITOR WELL NUMBER: 2

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.17
1730.000	0.40
2095.000	0.29
2461.000	0.20
2826.000	0.13
3191.000	0.08
3556.000	0.05
3922.000	0.03
4287.000	0.02
4652.000	0.01
5017.000	0.01
5383.000	0.00
5748.000	0.00
6113.000	0.00
6478.000	0.00

MONITOR WELL NUMBER: 3

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.01
1730.000	0.36
2095.000	0.33
2461.000	0.26
2826.000	0.19
3191.000	0.13
3556.000	0.08
3922.000	0.05
4287.000	0.03
4652.000	0.02
5017.000	0.01
5383.000	0.01
5748.000	0.00
6113.000	0.00
6478.000	0.00

MONITOR WELL NUMBER: 4

TIME(DAYS) CONCENTRATION(MG/L)

1730.000	0.00
2095.000	0.00
2461.000	0.01
2826.000	0.01
3191.000	0.01
3556.000	0.01
3922.000	0.00
4287.000	0.00
4652.000	0.00
5017.000	0.00
5383.000	0.00
5748.000	0.00
6113.000	0.00
6478.000	0.00

MONITOR WELL NUMBER: 5

TIME(DAYS)	CONCENTRATION(MG/L)
1000.000	0.00
1730.000	0.00
2095.000	0.01
2461.000	0.02
2826.000	0.06
3191.000	0.10
3556.000	0.13
3922.000	0.15
4287.000	0.16
4652.000	0.15
5017.000	0.13
5383.000	0.11
5748.000	0.09
6113.000	0.07
6478.000	0.05

Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 2
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 3
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 4
Aquifer thickness in ft= 90.00
Aquifer longitudinal dispersivity in ft=100.00
Aquifer transverse dispersivity in ft= 10.00
Seepage velocity in ft/day= 0.56
Number of point sources= 1
Simulation period number= 1
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 6844.00
Simulation period number= 2
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 7209.00
Simulation period number= 3
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 7574.00
Simulation period number= 4
Point source number 1
X-coordinate of point source in ft= 0.00
Y-coordinate of point source in ft= 400.00
Slug point source solute inject. vol. in gal= 16500.00
Slug point source solute concentration in mg/l= 950.000
Time after slug contaminant injection in days= 7939.00
Bulk density of dry aquifer skeleton in g/cu cm= 2.30
Aquifer distribution coefficient in ml/g= .23
Number of monitor wells for which time-
concentration tables are desired= 1
Monitor well number= 1
I-coordinate of monitor well= 12
J-coordinate of monitor well= 5

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 6844.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
4	0.01	0.01	0.02	0.02	0.03	0.05	0.06	0.07
5	0.01	0.01	0.02	0.03	0.05	0.07	0.08	0.09
6	0.01	0.01	0.02	0.02	0.03	0.05	0.06	0.07
7	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 7209.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW I-COLUMN

	1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW I-COLUMN

	9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
4	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06
5	0.01	0.01	0.02	0.02	0.04	0.05	0.07	0.08
6	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06
7	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SIMULATION PERIOD DURATION IN DAYS: 7574.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN 1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN 9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
4	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.05
5	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07
6	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.05
7	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NODAL COMPUTATION RESULTS:

SIMULATION PERIOD DURATION IN DAYS: 7939.00

VALUES OF CONTAMINANT CONCENTRATION (MG/L) AT NODES:

J-ROW	I-COLUMN 1	2	3	4	5	6	7	8
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

J-ROW	I-COLUMN 9	10	11	12	13	14	15	16
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
4	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.04

5	0.02	0.02	0.01	0.01	0.02	0.03	0.04	0.03
6	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.04
7	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MONITOR WELL COMPUTATION RESULTS:

TIME-CONCENTRATION TABLE

MONITOR WELL NUMBER: 1

TIME(DAYS)	CONCENTRATION(MG/L)
5844.000	0.03
7209.000	0.02
7574.000	0.02
7939.000	0.01
8305.000	0.01
8670.000	0.01
9035.000	0.00

Appendix F

Modified HRS Scoring Sheets

Facility name: Town of Machias Gravel Pit

Location: Very Road, Town of Machias, Cattaraugus County

EPA Region: 2

Person(s) in charge of the facility: Town of Machias

Name of Reviewer: Machias Gravel Pit Steering Committee Date: 3 April 1991

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The Town of Machias gravel pit is an active sand and gravel quarry located on Very Road in the Town of Machias. Approximately 600 55-gallon drums of wastes including epoxy resins, acids, cutting oils, and flammable and non-flammable liquids generated by the Motorola Corporation of Arcade, New York, were transported to the Machias Gravel Pit. About one half of the drums were dumped or had leaked onto the ground surface prior to being hauled off site. Analyses of groundwater samples collected from monitoring well have detected volatile organic compound contamination.

Scores: $S_M = 13.86$ ($S_{gw} = 22.37$ $S_{sw} = 8.62$ $S_a = 0$)

S_{FE} = Not scored

$S_{DC} = 12.50$

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line [4]. If observed release is given a score of 0, proceed to line [2].					
[2] Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
[3] Containment	0 1 2 3	1		3	3.3
[4] Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 (12) 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 (3) 4 5 6 7 8	1	3	8	
Total Waste Characteristics Score			15	26	
[5] Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 (10) / 12 16 18 20 / 24 30 32 35 40	1	10	40	
Total Targets Score			19	49	
[6] If line [1] is 45, multiply [1] x [4] x [5]. If line [1] is 0, multiply [2] x [3] x [4] x [5]			12825	57,330	
[7] Divide line [6] by 57,330 and multiply by 100		S_{gw} =	22.37		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	22.37	500.42
Surface Water Route Score (S_{sw})	8.62	74.30
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		574.72
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		23.97
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		13.86

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Appendix G

Site Characterization Fact Sheet

(1)

1. SITE IDENTIFICATION -

   a. NAME: Machias Gravel Pit
   b. I.D.NO.: 905013
   c. LOCATION-TOWN/CITY: Machias
   d. COUNTY: Cattaraugus
   e. REGION: 9

2. SITE CLASSIFICATION -

   FEDERAL SUPERFUND: ☐ STATE SUPERFUND: ☐ PRP SITE: ☒

3. PROJECT MANAGER - SECTION CHIEF/RHWRE -

   a. Name: Gerald Pietraszek Martin Doster
   b. Regional Office: Buffalo
   c. Telephone: 716/847-4585

4. GENERAL SITE CHARACTERISTICS(2)(3) -

   a. Description of Area(4): Gravel Pit
   b. Area (acres): 20 Acres
   c. Site Topography: Rolling Hills
   d. Adjacent Waterbody Within One-Half Mile: Ischua Creek
      Yes X Distance from the site: 1500 Feet
      No ___
   e. Adjacent Wetlands Within One-Half Mile: Bird Swamp
      Yes X Distance from the site: 2000 Feet
      No ___
   f. Source of Water Supply: Local residences get water from upper aquifer
   g. Distance To Nearest Residential Area: 1000 Feet

(1) To be provided upon conclusion of detailed Remedial Investigation. The SCFS must be updated by the Project Manager to incorporate new data as the data becomes available.
(2) Attach a letter size or legal size locator site map to include sensitive receptors such as schools, hospitals, nursing homes, agricultural areas, etc.
(3) This form is to be used for each operable unit. This form may be photocopied for use with other sites and operable units.
(4) Residential, industrial, park, etc.

5. GEOLOGY -

a. Soil in Overburden:
   Type: Sand and gravel with interlayered silt
   Thickness: Approximately 90 Feet
   Permeability: 1.3×10^{-4} ft/sec
b. Depth of Contaminant Migration: + 75 Feet
c. Depth to Water Table: 60-15 Feet
d. Depth to Bedrock: Approximately 90 Feet
e. Range of Permeability of Bedrock: Estimate for shale 10^{-9} to 10^{-3} ft/sec
f. Depth to Clay Layer: N/A
g. Permeability of Clay Layer: N/A

6. PHYSICAL CHARACTERISTICS OF WASTE -
Not Applicable - Source removed

	Non-Aqueous Phase Liquid (gal)	Soil (cu yd)
a. Waste Volume of contaminated area		
b. BTU/lb		
c. Viscosity (units)		---
d. Ash Content (%)		---
e. Density (g/cc or lbs/cu ft)		

7. BIOLOGICAL NUTRIENTS INFORMATION (ppm) - Not applicable

	Range High	Range Low	Pts(5)
a. Total Ammonia			
b. Total Nitrogen			
c. Organic Nitrogen			
d. Nitrate Nitrogen			
e. Total BOD			
f. Total Phosphorus			
g. Total Organic Carbon			
h. Total Suspended Solids			
i. Total Volatile Suspended Solids			
j. Dissolved Oxygen			
k. Total COD			

(5) Total number of data points for the stated parameter.
(6) Specify whether groundwater, surface water, etc.

APR 0 3 1990

8. CHEMICAL ANALYSIS - LIQUID MEDIUM

	Aqueous Phase(6) Range High	Range Low	Pts(5)	Non-Aqueous Phase Range High	Range Low	Pts(5)
a. TVOC (ppm,%)	Not Applicable					
b. TSVOC (ppm,%)						
c. Total Metals (ppm,%)						
d. Total Pesticides (ppm,%)						
e. PCBs (ppm,%)						
f. Dioxins (ppb)						
g. Total Phenols (ppm, %)						
h. Cyanides (ppm)						
i. Total Sulfur (%)						
j. Total Chlorine (%)						

A. AQUEOUS PHASE(6) Groundwater

Major Constituents	Volatile Organics Range High	Range Low	Pts	Semivolatile Organics Range High	Range Low	Pts	Heavy Metals Range High	Range Low	Pts
(1) First: TCE Conc (ppb,ppm,%)	720ppb	ND	9						
(2) Second: Conc (ppb,ppm,%)	390ppb	ND	9						
(3) Third: Conc (ppb,ppm,%)	60ppb	ND	9						

ND - Not Detected

B. NON-AQUEOUS PHASE Not Applicable - no evidence of non-aqueous phase on site

Major Constituents	Volatile Organics Range High	Range Low	Pts	Semivolatile Organics Range High	Range Low	Pts	Heavy Metals Range High	Range Low	Pts
(1) First: Conc (ppb,ppm,%)									
(2) Second: Conc (ppb,ppm,%)									
(3) Third: Conc (ppb,ppm,%)									

9. CHEMICAL ANALYSIS - SOLID MEDIUM(7) Soil

	Range High	Range Low	Pts(5)
a. TVOC (ppm,%)	.318 ppm	ND	10
b. TSVOC (ppm,%)	7.810 ppm*	ND	10
c. Total Metals (ppm,%)	.622 ppm	.015 ppm	10
d. Total Pesticides (ppm,%)	N/A		
e. PCBs (ppm,%)	N/A		
f. Dioxins (ppb)	N/A		
g. Cyanides (ppb)	N/A		
h. Total Phenols (ppm,%)	N/A		10
i. Total Sulfur (%)	N/A		
j. Total Chlorine (%)	N/A		

Major Constituents	Volatile Organics Range High	Volatile Organics Range Low	Volatile Organics Pts	Semivolatile Organics Range High	Semivolatile Organics Range Low	Semivolatile Organics Pts	Heavy Metals Range High	Heavy Metals Range Low	Heavy Metals Pts
(1) First: TCE Conc (ppb,ppm,%)	291 ppb	ND							
(2) Second: Conc (ppb,ppm,%)	27 ppb	ND							
(3) Third: Conc (ppb,ppm,%)							608 ppb	13.6 ppb	10

10. PUBLIC HEALTH CONCERNS - Potential ground water recepter identified as cabin well approx. 450 feet north of Cole residence.

11. HISTORY OF FIRES AND EXPLOSIONS - No

12. OTHER INFORMATION -

(7) Specify whether soil, sediment, etc.

*Polyaromatic hydrocarbons detected in two test pit fill/soil samples which included pieces of asphalt.

13. LISTING OF TECHNOLOGIES BY WASTE CATEGORY PROPOSED OR CONSIDERED TO DATE -

Groundwater	Soil	Sediment
Air Stripping	N/A	N/A
Carbon Absorption		
Biodegradation		
Steam Stripping		

14. BACKGROUND LEVELS

	A Soil #5503-01 (ppm)	B Sediment (ppm)	C Groundwater GW01-01 (ppb)	D Surface Water (ppb)
a. LISTING OF CONTAMINANTS AND THEIR CLEANUP LEVELS WHICH HAVE BEEN PROPOSED BY PRP's, CONSULTANTS, OR THE USEPA.				
(1) Trichloroethene	BDL*	N/A	BDL*	N/A
(2) 1,1,1-Trichloroethane	BDL*	N/A	BDL*	N/A
(3)				
(4)				

*Below Detection Limit, N/A=not applicable

15. CLEANUP LEVELS

	A Soil (ppm)	B Sediment (ppm)	C Groundwater (ppb)	D Surface Water (ppb)
a. LISTING OF CONTAMINANTS AND THEIR CLEANUP LEVELS WHICH HAVE BEEN PROPOSED BY PRP's, CONSULTANTS, OR THE USEPA.				
(1) Trichloroethene	N/A	N/A	0.005 mg/l	N/A
(2) 1,1,1-Trichloroethane	N/A	N/A	0.005 mg/l	N/A
(3)				
(4)				

N/A=Not Applicable

b. LISTING OF CONTAMINANTS FOR WHICH CLEANUP LEVELS ARE REQUESTED FROM THE TECHNOLOGY SECTION.

(1) None

(2)

(3)

(4)

APR 03 1990

Appendix H

Geotechnical Results

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0101

Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40531

Sample wt/vol: 1020 (g/mL) ML Lab File ID: W1601

Level: (low/med) LOW Date Received: 12/17/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/18/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	10	U
208-96-8	Acenaphthylene	10	U
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
	Total Phenols	10	U

R1000

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW03D01

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40529

Sample wt/vol: 1040 (g/mL) ML Lab File ID: W1592

Level: (low/med) LOW Date Received: 12/17/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	10	U
208-96-8	Acenaphthylene	10	U
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
	Total Phenols	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0501

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40393

Sample wt/vol: 1060 (g/mL) ML Lab File ID: W1588

Level: (low/med) LOW Date Received: 12/17/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	9	U
208-96-8	Acenaphthylene	9	U
83-32-9	Acenaphthene	9	U
86-73-7	Fluorene	9	U
85-01-8	Phenanthrene	9	U
120-12-7	Anthracene	9	U
206-44-0	Fluoranthene	9	U
129-00-0	Pyrene	9	U
56-55-3	Benzo(a)anthracene	9	U
218-01-9	Chrysene	9	U
205-99-2	Benzo(b)fluoranthene	9	U
207-08-9	Benzo(k)fluoranthene	9	U
50-32-8	Benzo(a)pyrene	9	U
193-39-5	Indeno(1,2,3-cd)pyrene	9	U
53-70-3	Dibenz(a,h)anthracene	9	U
191-24-2	Benzo(g,h,i)perylene	9	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0601

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40342

Sample wt/vol: 1020 (g/mL) ML Lab File ID: W1586

Level: (low/med) LOW Date Received: 12/15/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	10	U
208-96-8	Acenaphthylene	10	U
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0701

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40343

Sample wt/vol: 970 (g/mL) ML Lab File ID: W1587

Level: (low/med) LOW Date Received: 12/15/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 1.00

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
91-20-3	Naphthalene	10	U
208-96-8	Acenaphthylene	10	U
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0801

Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40528

Sample wt/vol: 1060 (g/mL) ML Lab File ID: W1591

Level: (low/med) LOW Date Received: 12/17/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	9	U
208-96-8	Acenaphthylene	9	U
83-32-9	Acenaphthene	9	U
86-73-7	Fluorene	9	U
85-01-8	Phenanthrene	9	U
120-12-7	Anthracene	9	U
206-44-0	Fluoranthene	9	U
129-00-0	Pyrene	9	U
56-55-3	Benzo(a)anthracene	9	U
218-01-9	Chrysene	9	U
205-99-2	Benzo(b)fluoranthene	9	U
207-08-9	Benzo(k)fluoranthene	9	U
50-32-8	Benzo(a)pyrene	9	U
193-39-5	Indeno(1,2,3-cd)pyrene	9	U
53-70-3	Dibenz(a,h)anthracene	9	U
191-24-2	Benzo(g,h,i)perylene	9	U
	Total Phenols	9	U

R 100073

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGGW0901

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) WATER Lab Sample ID: 40530

Sample wt/vol: 970 (g/mL) ML Lab File ID: W1600

Level: (low/med) LOW Date Received: 12/17/90

% Moisture: not dec. ____ dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/18/91

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
91-20-3	Naphthalene	10	U
208-96-8	Acenaphthylene	10	U
83-32-9	Acenaphthene	10	U
86-73-7	Fluorene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
	Total Phenols	10	U

3-4-91

R100085

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MGSB0101

Lab Name: VERSAR INC Contract: _____

Lab Code: VERSAR Case No.: 4101 SAS No.: _____ SDG No.: 3-6

Matrix: (soil/water) SOIL Lab Sample ID: 40127

Sample wt/vol: 30.0 (g/mL) G Lab File ID: W1584

Level: (low/med) LOW Date Received: 12/13/90

% Moisture: not dec. 28 dec. ____ Date Extracted: 12/18/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 01/17/91

GPC Cleanup: (Y/N) N pH: 8.2 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	460	U
208-96-8	Acenaphthylene	460	U
83-32-9	Acenaphthene	460	U
86-73-7	Fluorene	460	U
85-01-8	Phenanthrene	460	U
120-12-7	Anthracene	460	U
206-44-0	Fluoranthene	460	U
129-00-0	Pyrene	460	U
56-55-3	Benzo(a)anthracene	460	U
218-01-9	Chrysene	460	U
205-99-2	Benzo(b)fluoranthene	460	U
207-08-9	Benzo(k)fluoranthene	460	U
50-32-8	Benzo(a)pyrene	460	U
193-39-5	Indeno(1,2,3-cd)pyrene	460	U
53-70-3	Dibenz(a,h)anthracene	460	U
191-24-2	Benzo(g,h,i)perylene	460	U

APPENDIX B: TICs

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TRIP-BLANK

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER

Lab Sample ID: 90121908

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: 121908

Level: (low/med)

Date Received: 12/17/90

% Moisture: not dec.

Date Analyzed: 12/20/90

Column (pack/cap) CAP

Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW01-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121907

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121907

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/20/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW03D-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121905

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121905

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	10.43	20	J

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW05-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121903

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121903DD

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 5.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW06-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121902

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121902

Level: (low/med) Date Received: 12/15/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	10.42	20	J

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW07-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121901

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121901

Level: (low/med) Date Received: 12/15/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

MGGW08-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121904

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121904

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

MGGW09-01

Lab Name: MD. SPECTRAL SERVICES, INC. Contract: CTRL-4117

Lab Code: MSS Case No.: VR4117 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 90121906

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 121906

Level: (low/med) Date Received: 12/17/90

% Moisture: not dec. Date Analyzed: 12/19/90

Column (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

Region II
Organic Data Valid.

ATTACHMENT 1
SOP NO. HW-6

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case No. 4117 SDG No. _____ LABORATORY mss (VOA) SITE Motorola
Versar (BNA)

DATA ASSESSMENT:

The current functional guidelines (1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Reviewer's
Signature: Jan M Zimmerman Date: 2 / 7 /1991

Verified By: _____ Date: ___/_____/19___

DATA ASSESSMENT:

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

All holding times were met.

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

2. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip field, rinse and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure cross- contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for the common contaminants), the analytes are qualified as non- detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method blank contamination

none

B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

Not applicable

C) Trip blank contamination

none

ATTACHMENT 1
SOP NO. HW-6

DATA ASSESSMENT:

3. MASS SPECTROMETER TUNING: All quality criteria were met

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl- phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable, "R".

DATA ASSESSMENT:

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) RESPONSE FACTOR:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both the initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected ("R").

All response factors were > 0.05

DATA ASSESSMENT:

5. CALIBRATION:

A) PERCENT RELATIVE STANDARD DEVIATION (%RSD) AND PERCENT DIFFERENCE (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ" (if %D or RSD >50%). If there is a gross deviation of %RSD and %D, the non-detects may be rejected ("R").

For the PCB/PESTICIDE fraction, %RSD for aldrin, endrin, DDT, and dibutylchlorendate must not exceed 10%. Percent D must be within 15% on the quantitation column and 20% on the confirmation column.

The following quality criteria were not met.

See attached Form 7As, insert after pp. 12 & 13 of Checklist

1) Calibration Date: 12/19/90

- Vinyl acetate %D = 30.0
- 4-methyl-2-pentanone %D = 30.0
- 2-hexanone %D = 34.9

2) Calibration Date: 12/20/90

- 2-hexanone %D = 27.9
- 4-methyl-2-pentanone %D = 25.3

- No action taken because no positive results were reported

DATA ASSESSMENT:

6. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

All quality criteria were met.

DATA ASSESSMENT:

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ±30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated, "J", and all non-detects as "UJ", or "R" if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgment to determine either partial or total rejection of the data for that sample fraction.

All quality criteria were met

DATA ASSESSMENT:

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

B) PESTICIDE FRACTION:

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract.

For all samples with positive results, the sample peaks were not within ± 0.06 RRT units of the standard compounds. However, the sample mass spectra did match well with the standard spectra. Compound identification was not adversely affected; therefore, no action was taken.

DATA ASSESSMENT:

9. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for some additional qualification of the data.

For MS/MSD Sample MGGW05-01, the percent recovery of trichloroethene exceeded quality control criteria. The positive result for trichloroethene for sample MGGW05-01 was qualified as estimated, "J".

see insert following page 6 of checklist

EMPIRE
SOILS INVESTIGATIONS INC.

February 15, 1991

Hydro-Search Inc.
350 Indiana Street, Suite 300
Golden, CO 80401

Attention: Larry Gardner

Reference: Machias Gravel Pit
Testing Results

Gentlemen:

As per your request, we have completed the laboratory tests on the recovery split spoon samples for the Machias Gravel Pit.

Enclosed please find Table 1, which summarizes the results from the testing program.

We appreciated the opportunity to perform this work for your firm. If we can be of further service, or there are any questions, please contact our office.

Sincerely,

EMPIRE SOILS INVESTIGATIONS, INC.

Frank R. Minnolera, Jr.
Geologist

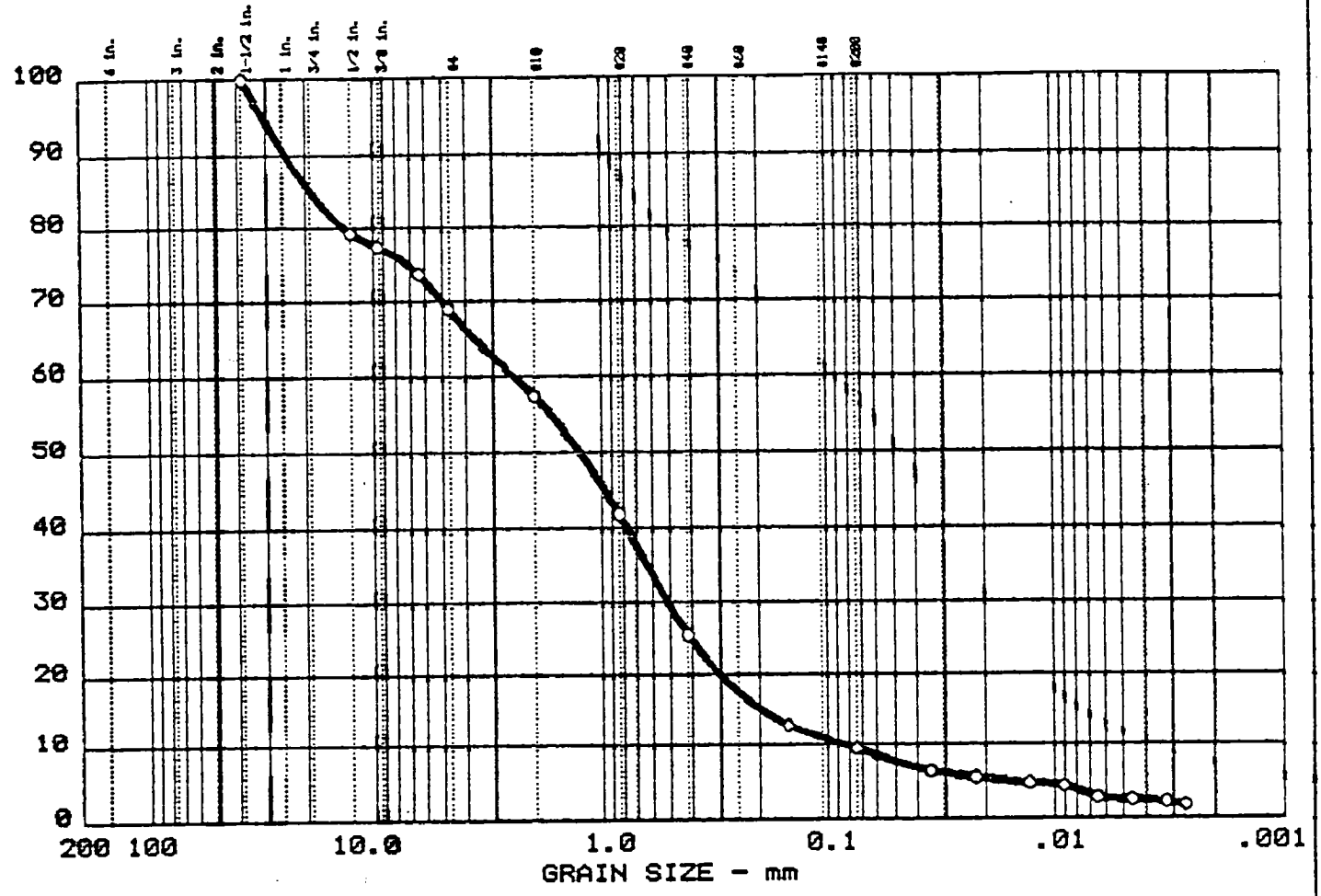
FRM:clc

5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075, 716-649-8110, TELEFAX 716-649-8051

TABLE 1
LABORATORY TEST RESULTS
MACHIAS GRAVEL PIT

BORING NO.	DEPTH (FT)	NATURAL WATER CONTENT	GRAIN SIZE % GRAVEL	% SAND	% SILT	% CLAY	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC INDEX
GW-7	10-12'	4.5%	31.1	59.5	6.9	2.5	NP	NP
GW-7	24-26'	4.2%	43.1	47.0	6.6	3.3	NP	NP
GW-7	40-42'	9.8%	34.7	57.5	6.1	1.7	NP	NP
P-1	14-16'	23.1%	0	9.5	67.0	23.5	23	5
P-1	18-20'	11.5%	26.4	46.8	20.4	6.5	NP	NP
GW-8	8-10'	9.5%	55.7	37.5	5.3	1.5	NP	NP
GW-8	16-18'	24.1%	0	9.8	74.7	15.6	NP	NP
GW-8	20-22'	10.3%	11.2	46.8	32.9	9.2	NP	NP
GW-3D	8-10'	16.3%	18.6	44.7	30.4	6.3	NP	NP
GW-3D	18-20'	5.5%	27.00	69.7	2.5	0.8	NP	NP
GW-5	8-10'	8.8%	0	81.9	15.8	2.4	NP	NP
GW-5	24-26'	7.5%	0	69.3	27.1	3.7	NP	NP
GW-5	36-38'	4.0%	38.0	48.8	8.4	4.8	NP	NP
GW-6	48-50	12.1%	38.3	48.1	10.8	2.9	NP	NP
GW-6	54-56	20.1%	2.2	86.4	8.8	2.6	NP	NP

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
o	20	0.0	31.1	59.5	6.9	2.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	NP	NP	19.05	2.43	1.24	0.513	0.1950	0.0832	1.30	29.2

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND AND GRAVEL, TRACE SILT, TRACE CLAY N.W.C. = 4.5%	SW-SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-7, 10-12

Date: 2/12/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

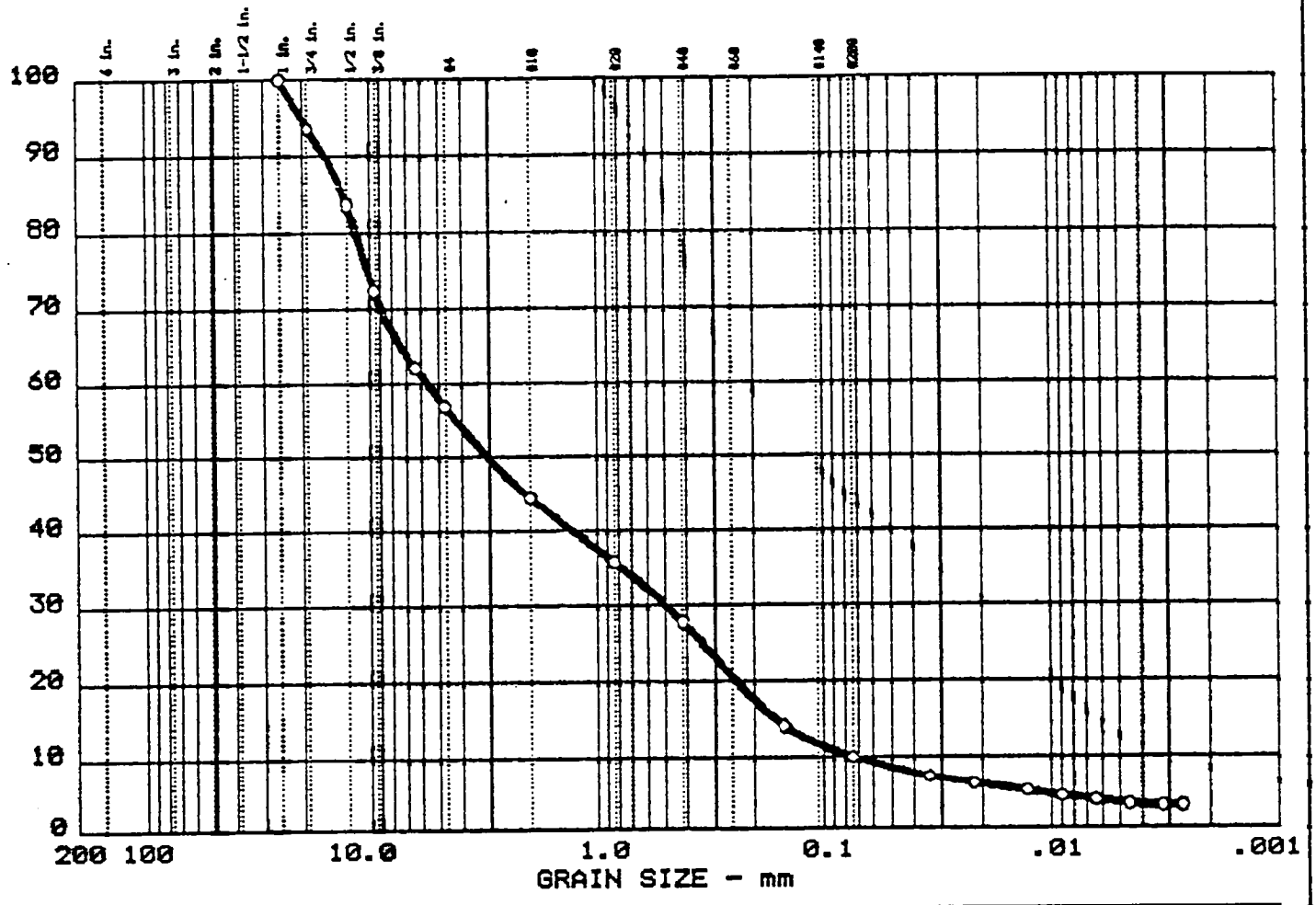
MGP-1

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
17	0.0	43.1	47.0	6.6	3.3

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	13.18	5.62	3.05	0.495	0.1622	0.0741	0.59	75.9

MATERIAL DESCRIPTION	USCS	AASHTO
SAND AND GRAVEL, TRACE SILT TRACE CLAY N.W.C.=4.2%	SP-SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: GW-7, 24-26

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

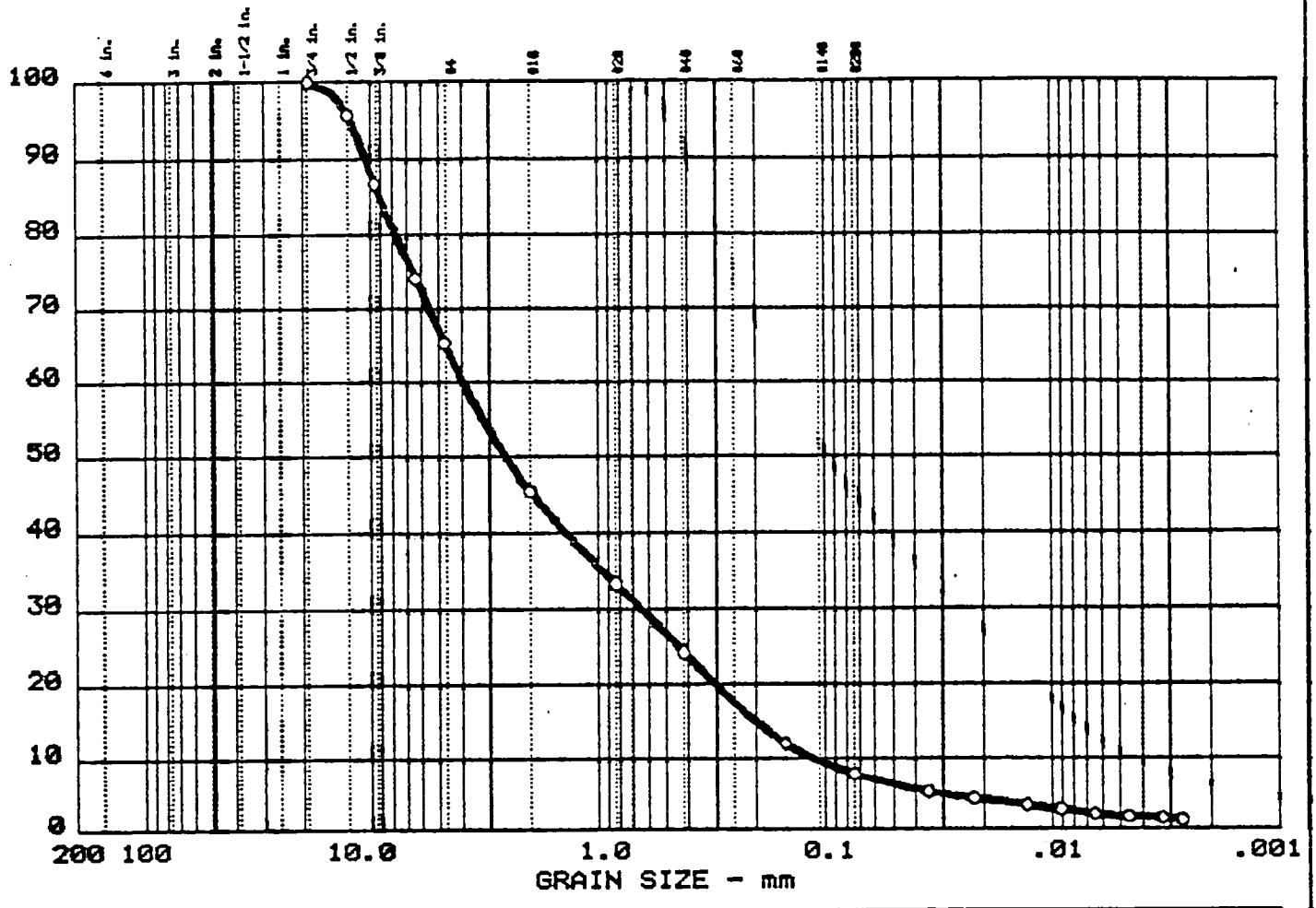
MGP-2

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
14	0.0	34.7	57.5	6.1	1.7

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	9.19	3.92	2.53	0.651	0.2011	0.1131	0.95	34.7

MATERIAL DESCRIPTION	USCS	AASHTO
SAND SOME GRAVEL, TRACE SILT, TR. CLAY N.W.C. = 9.8%	SP-SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: GW-7, 40-42

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

MGP-3

GRAIN SIZE DISTRIBUTION TEST REPORT

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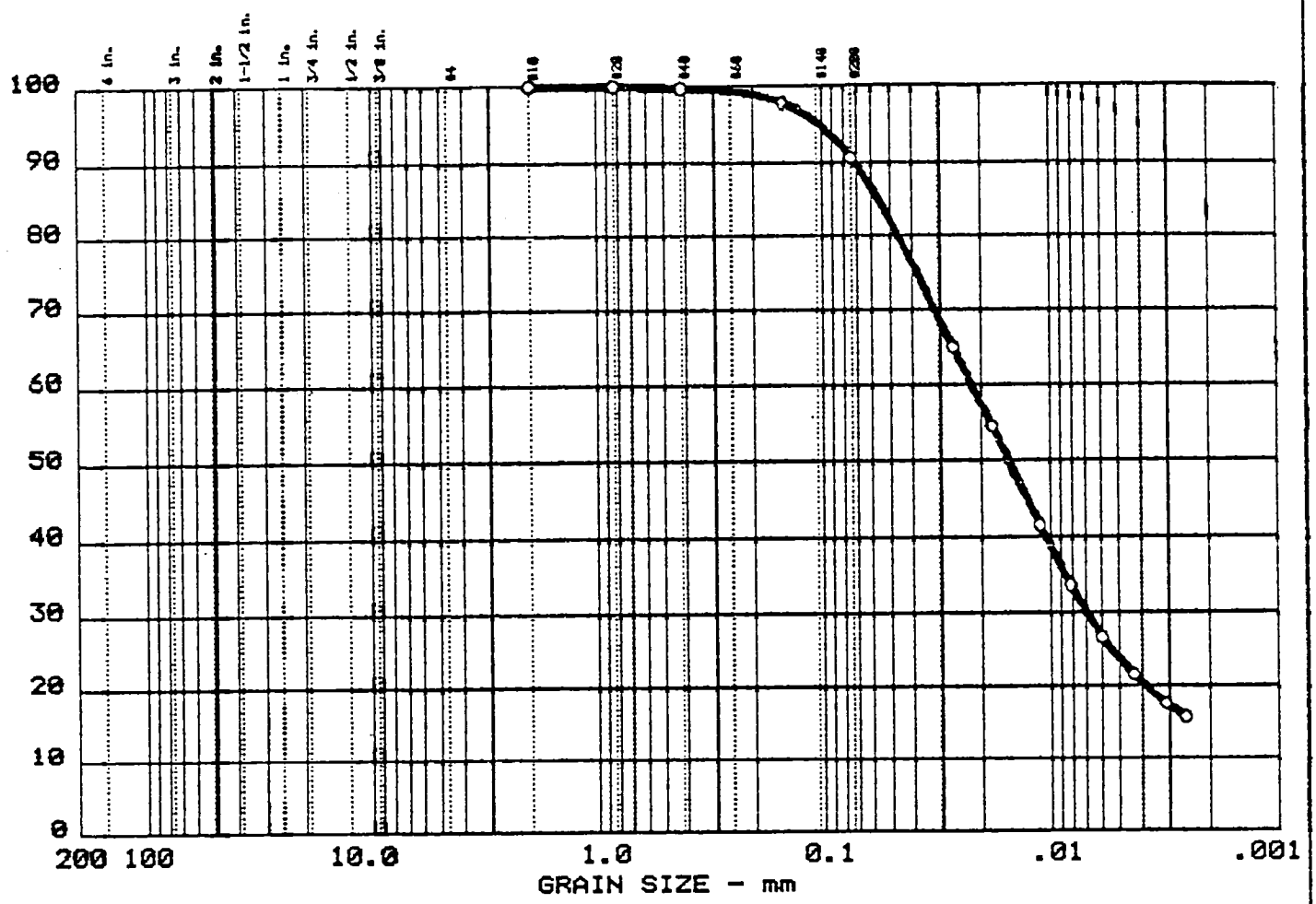
Fig. No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
2	0.0	0.0	9.5	67.0	23.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
23	5			0.02	0.007				

MATERIAL DESCRIPTION	USCS	AASHTO
SILT, SOME CLAY TRACE SAND N.W.C. = 23.1%	CL-ML	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: P-1, 14-16

Date: 2/12/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

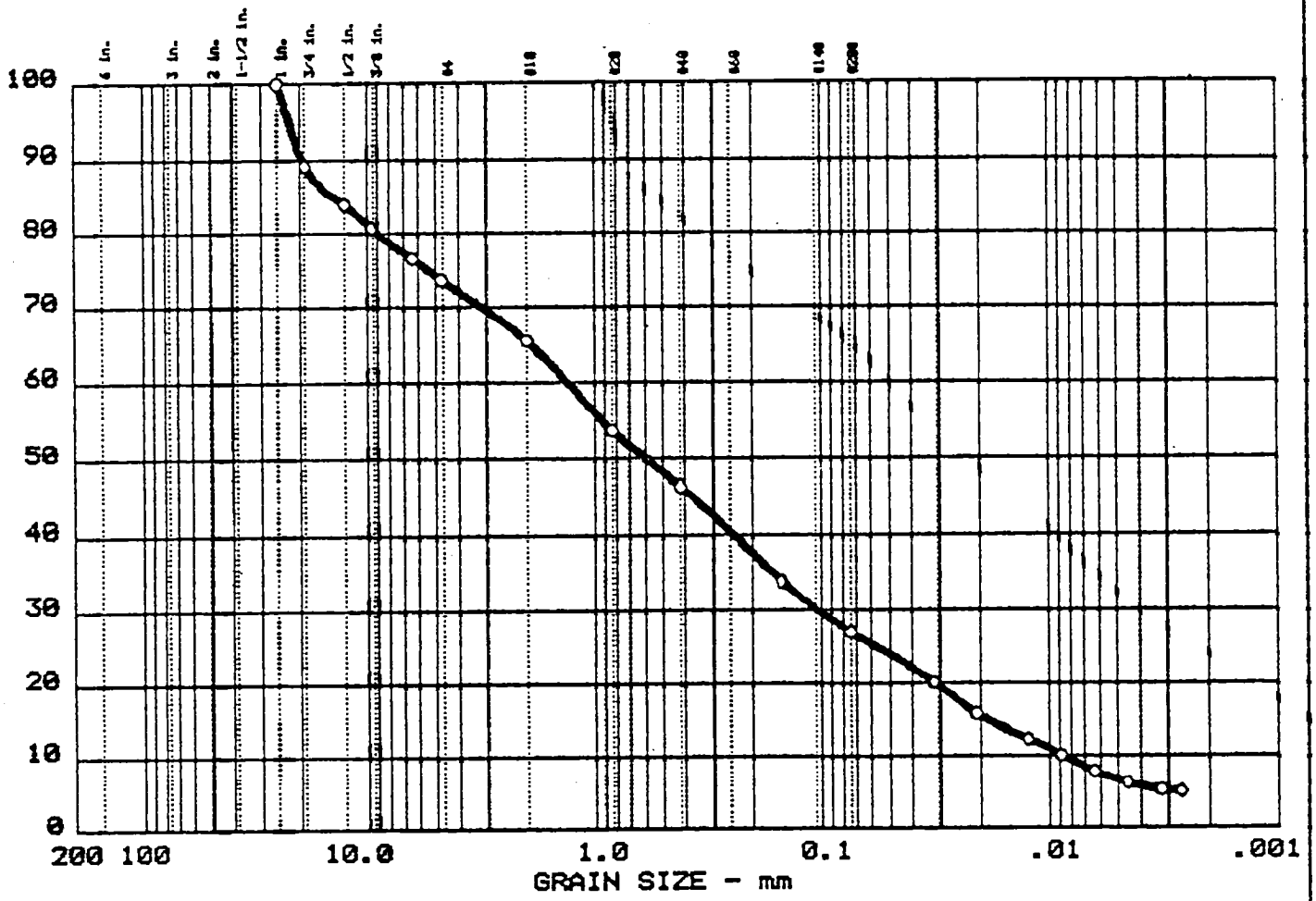
MGP-4

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
6	0.0	26.4	46.8	20.4	6.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	14.29	1.32	0.59	0.105	0.0191	0.0088	0.94	149.6

MATERIAL DESCRIPTION	USCS	AASHTO
SAND, SOME GRAVEL, SOME SILT TRACE CLAY N.W.C. = 11.5%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: P-1, 18-20

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

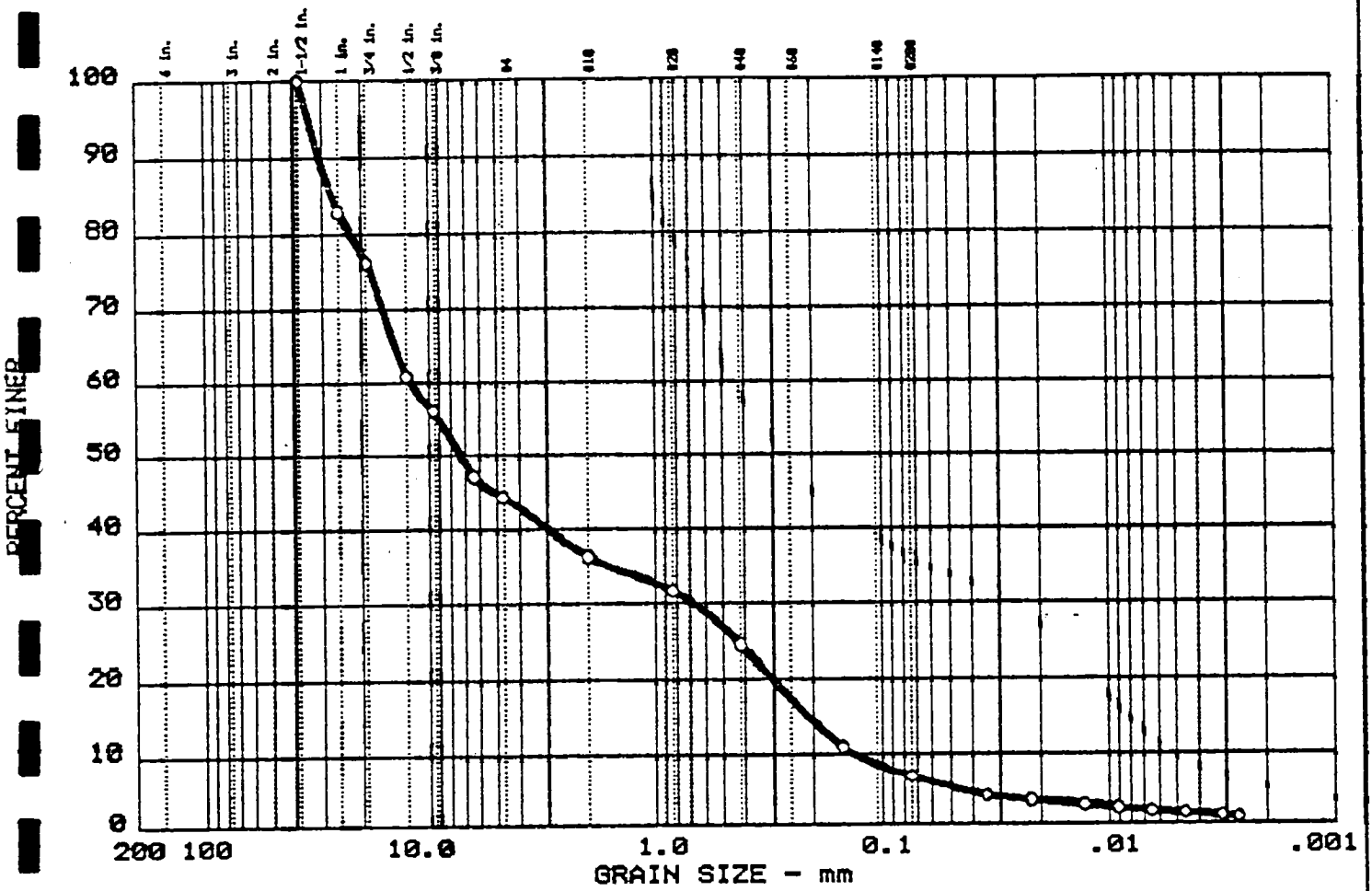
MGP-5

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 5

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
11	0.0	55.7	37.5	5.3	1.5

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	27.23	12.16	7.32	0.675	0.2136	0.1317	0.28	92.4

MATERIAL DESCRIPTION	USCS	AASHTO
GRAVEL, SOME SAND TRACE SILT, TR. CLAY N.W.C. = 9.5%	GP-GM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: GW-8, 8-10

Date: 2/11/91

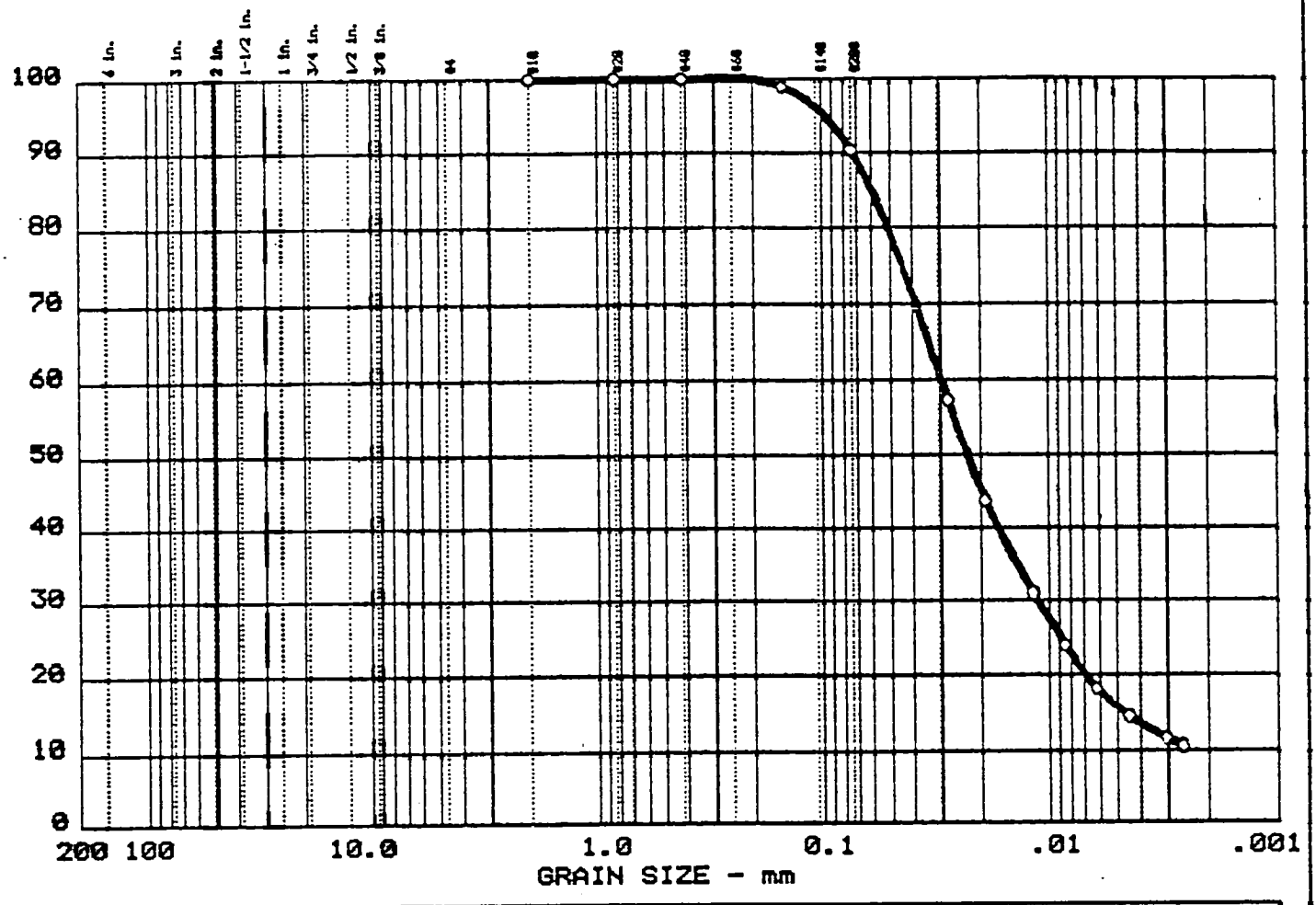
Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

MGP-6

GRAIN SIZE DISTRIBUTION TEST REPORT
EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
13	0.0	0.0	9.8	74.7	15.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP			0.02	0.011	0.0047			

MATERIAL DESCRIPTION	USCS	AASHTO
o SILT, LITTLE CLAY TRACE SAND N.W.C. = 24.1%	ML	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-8, 16-18

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

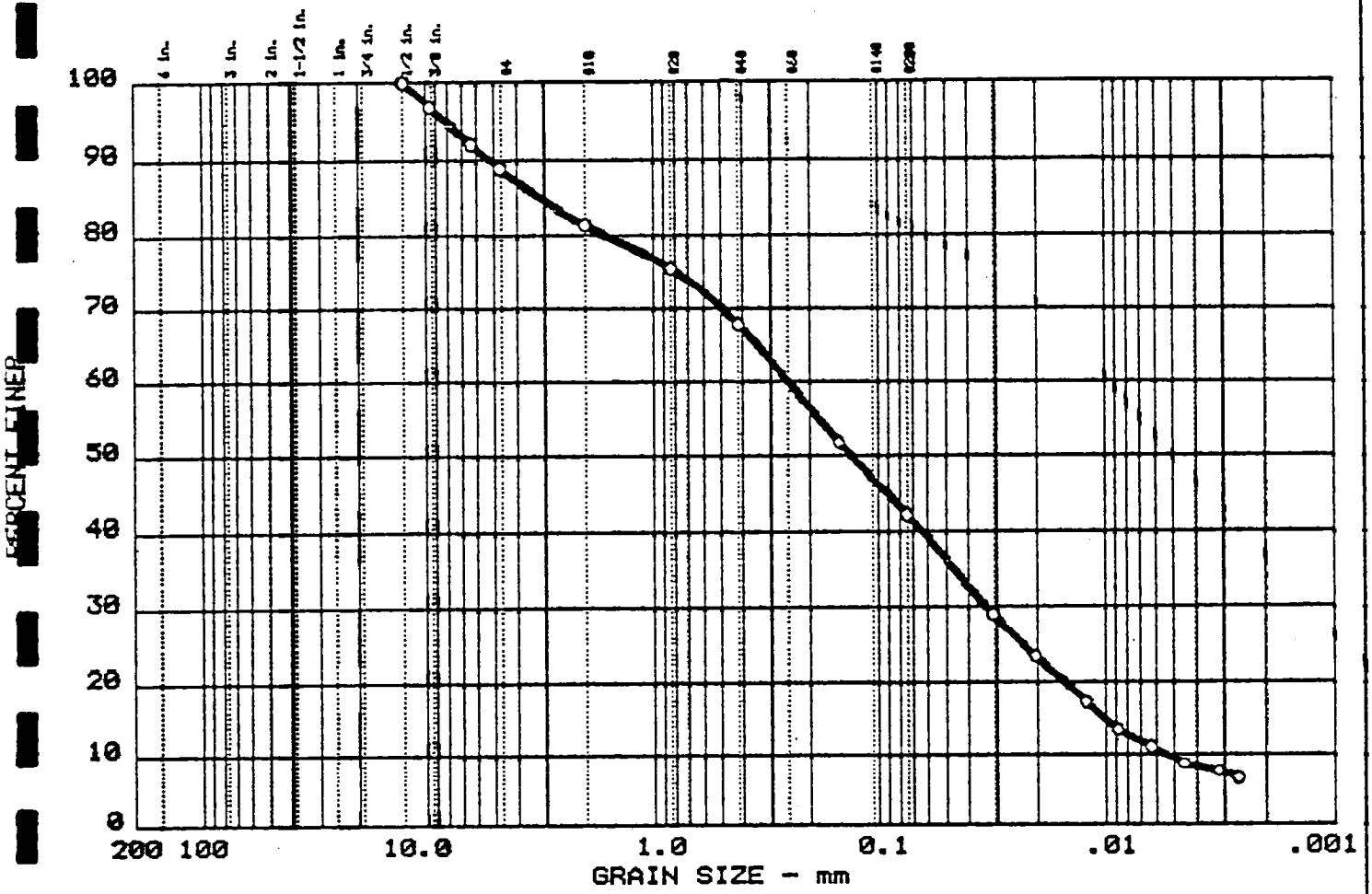
MGP-7

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 7

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
8	0.0	11.2	46.8	32.9	9.2

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	N/A	3.20	0.25	0.13	0.033	0.0102	0.0055	0.81	45.7

MATERIAL DESCRIPTION	USCS	AASHTO
SAND, SOME SILT, LITTLE GRAVEL, TRACE CLAY N.W.C. = 10.3%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
Location: GW-8, 20-22

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

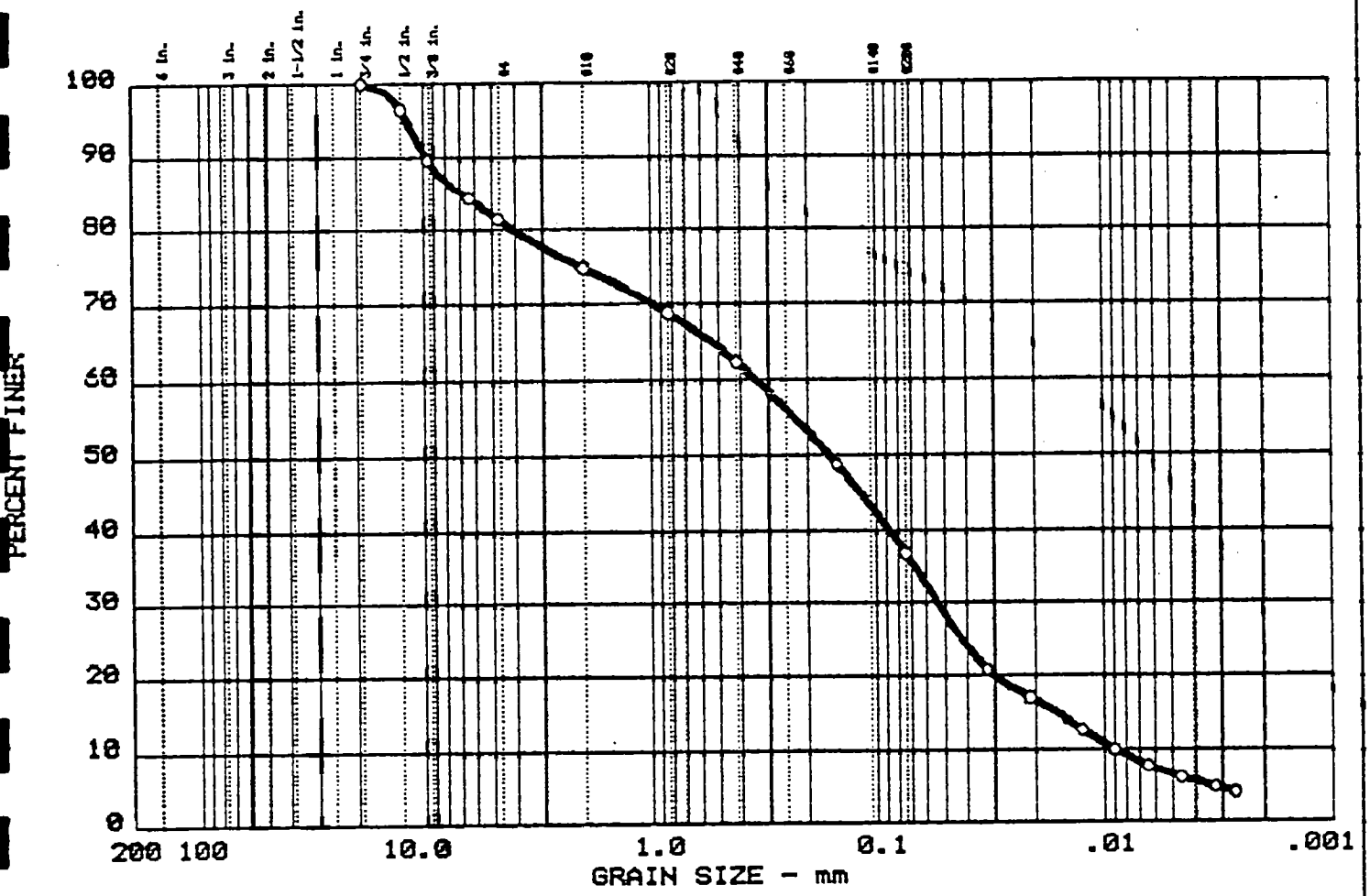
MGP-8

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 8

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
10	0.0	18.6	44.7	30.4	6.3

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	6.76	0.34	0.16	0.054	0.0164	0.0091	0.92	37.6

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, SOME SILT LITTLE GRAVEL TRACE CLAY N.W.C. = 16.3%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-CD, 8-10

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

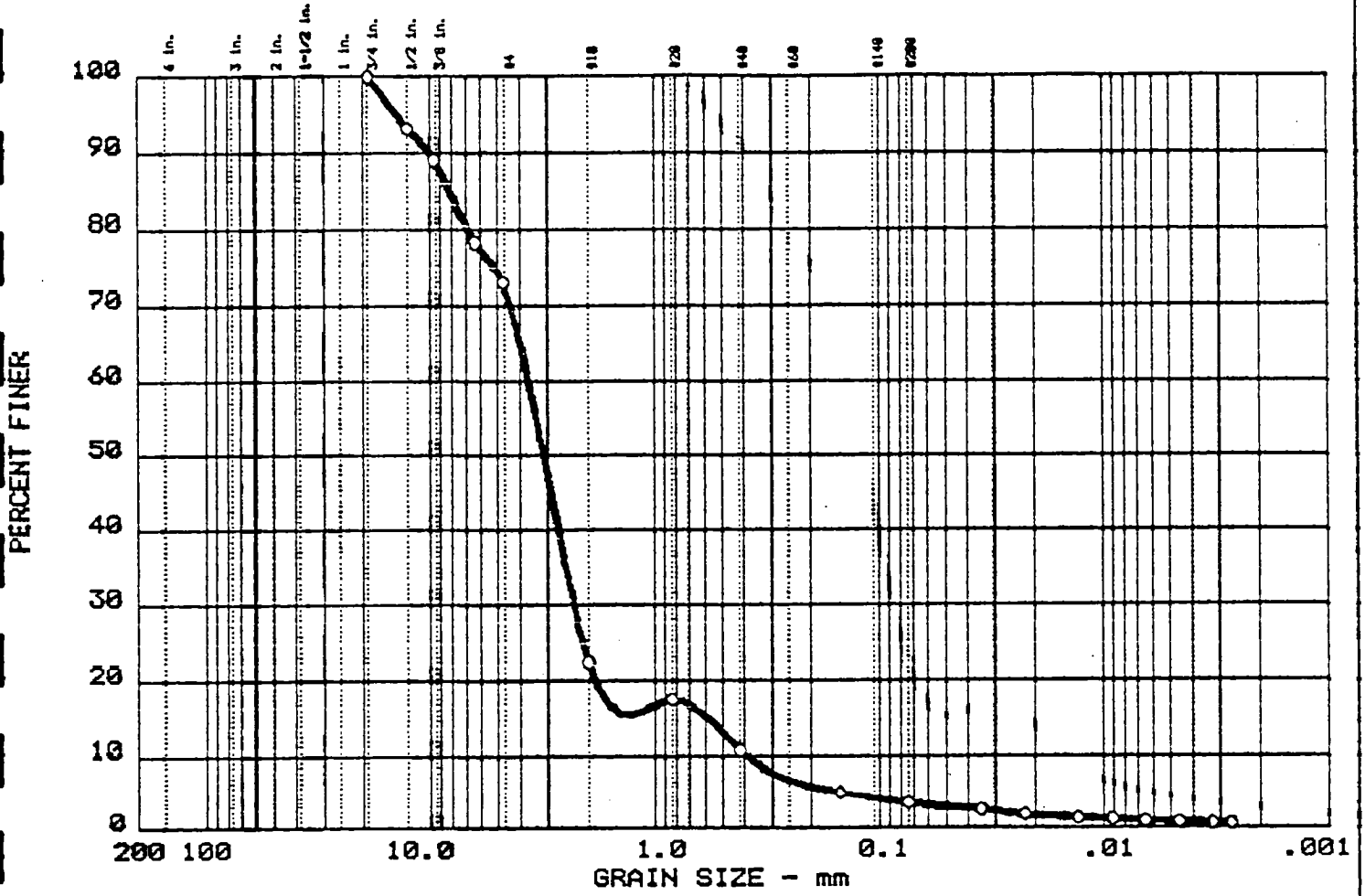
MGP-9

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 9

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
18	0.0	27.0	69.7	2.5	0.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	8.22	3.64	3.13	2.323	0.5834	0.3899	3.80	9.3

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND SOME GRAVEL, TRACE SILT, TR. CLAY N.W.C. = 5.5%	SP	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-3D, 18-20

Date: 2/12/91

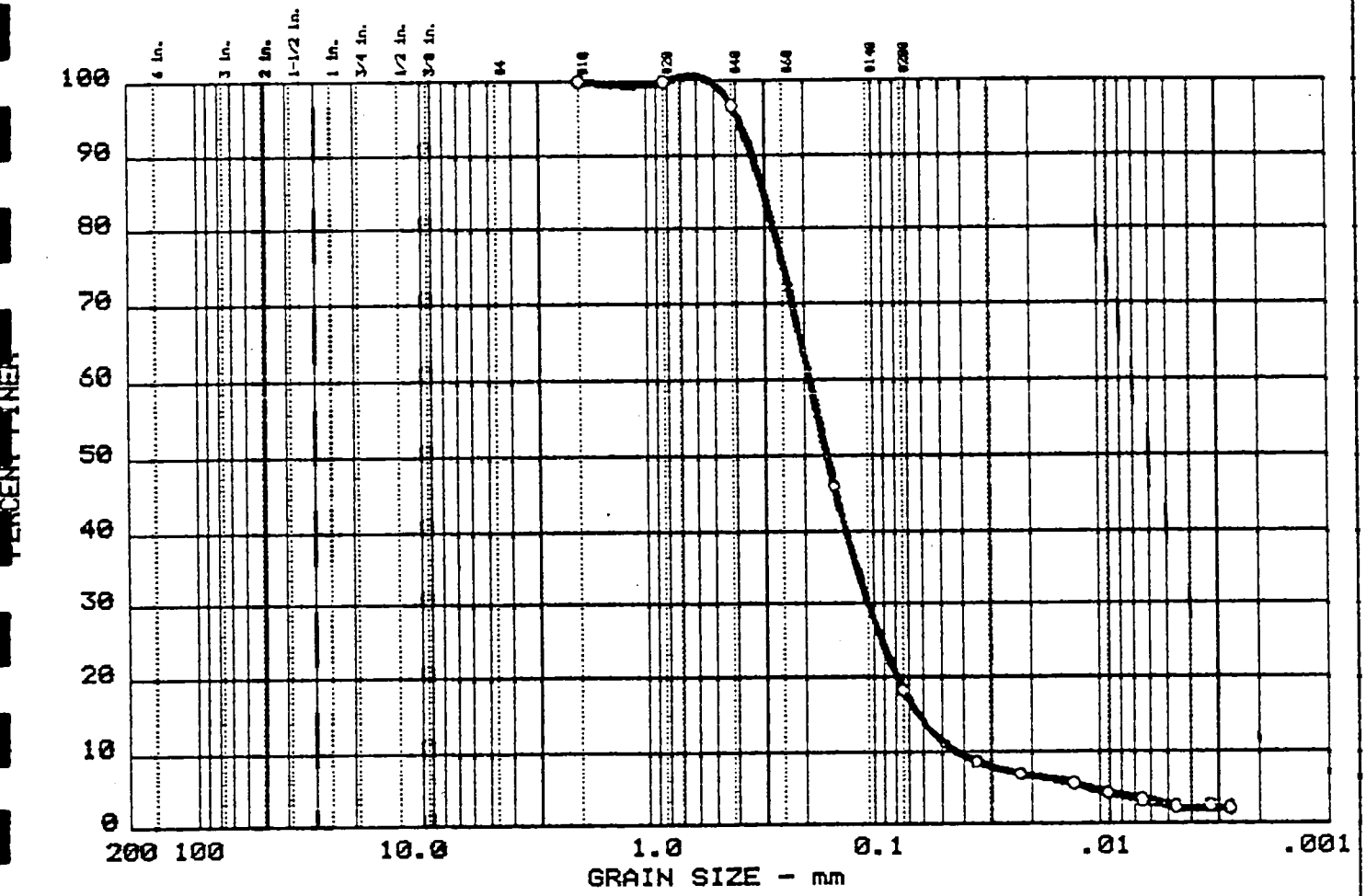
Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

MGP-10

GRAIN SIZE DISTRIBUTION TEST REPORT
EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 10

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
1	0.0	0.0	81.9	15.8	2.4

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	0.30	0.19	0.16	0.106	0.0637	0.0431	1.36	4.4

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, LITTLE SILT TRACE CLAY N.W.C. = 8.8%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-5, 8-10

Date: 2/12/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

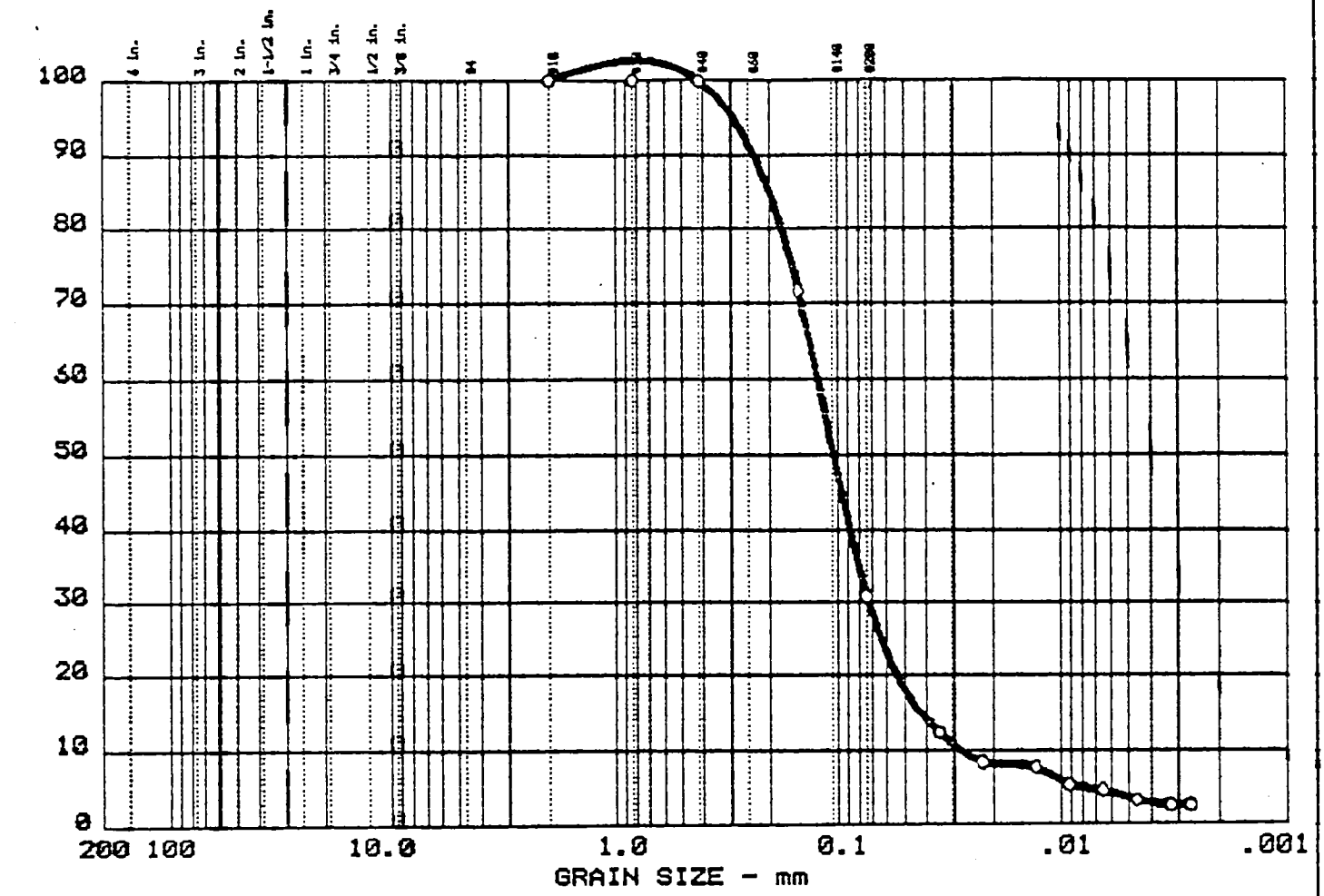
MGP-13

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 13

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
o 19	0.0	0.0	69.3	27.1	3.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	NP	NP	0.20	0.12	0.10	0.073	0.0423	0.0283	1.54	4.3

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, SOME SILT, TRACE CLAY N.W.C. = 7.5%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-5, 24-26

Date: 2/12/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

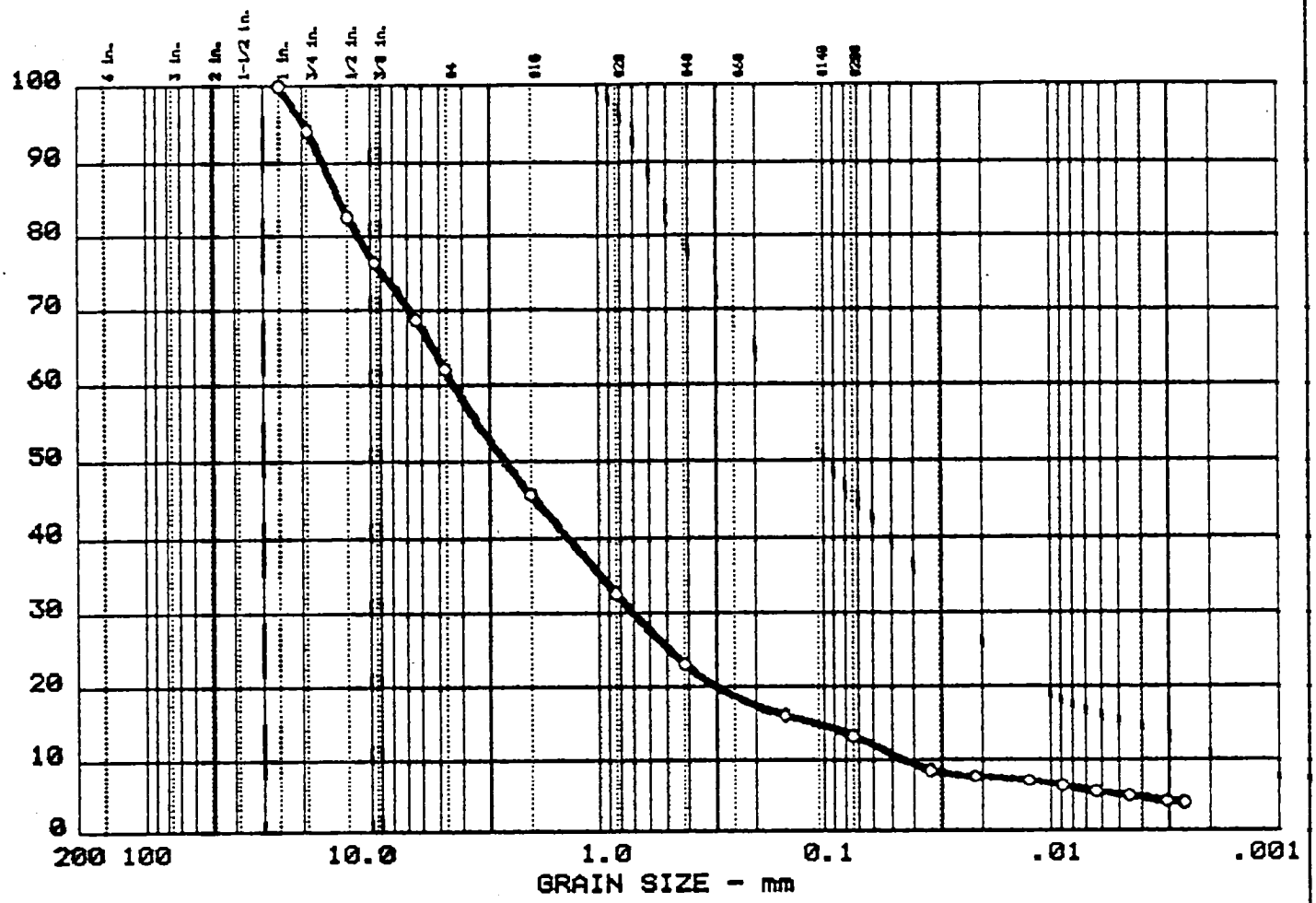
MGP-11

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 11

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
12	0.0	38.0	48.8	8.4	4.8

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	13.80	4.32	2.57	0.708	0.1122	0.0447	2.60	96.6

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, AND GRAVEL, TRACE SILT, TR.CLAY N.W.C. = 4.0%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-5, 36-38

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

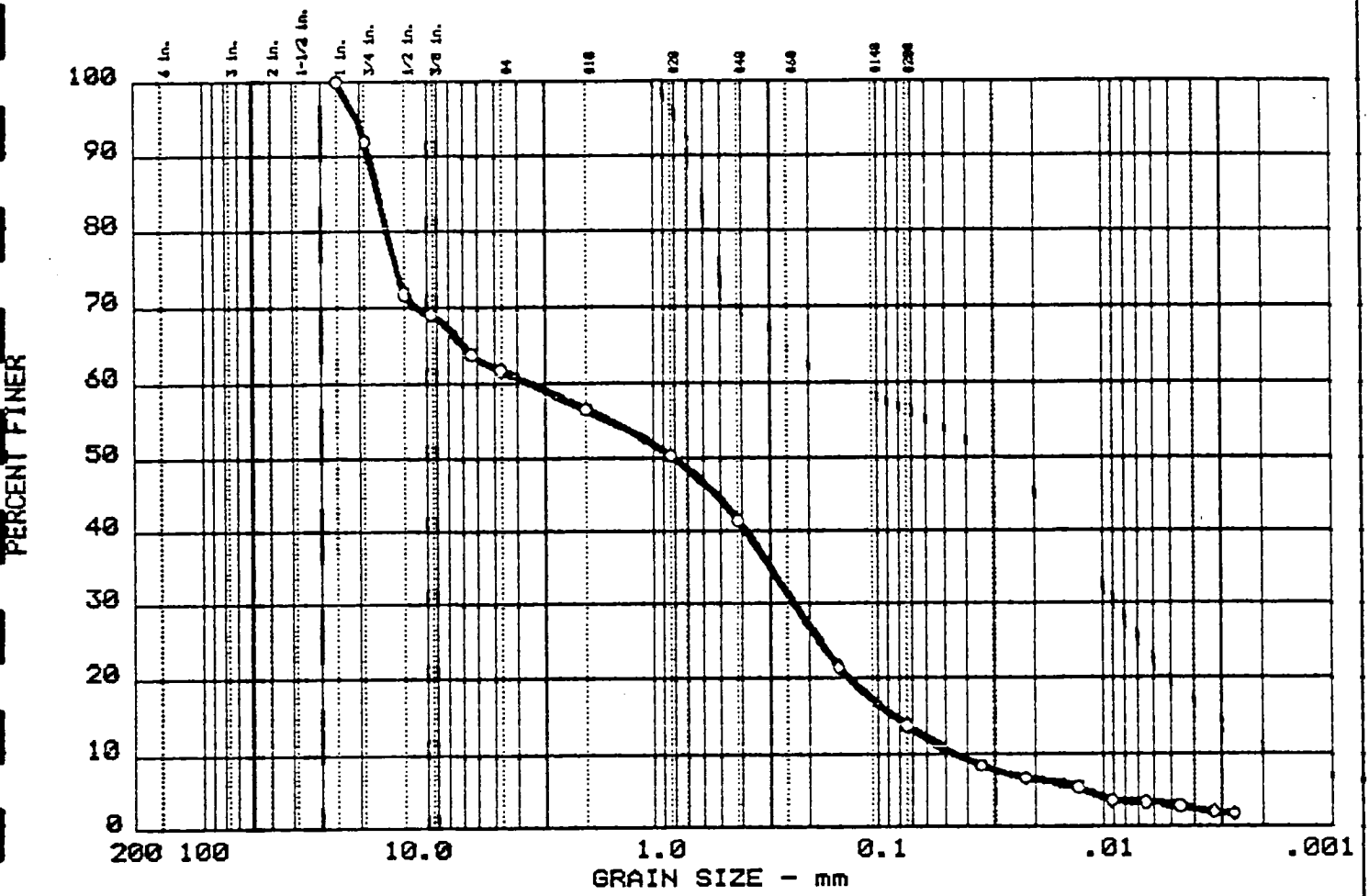
MGP-12

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 12

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○ 19	0.0	38.3	48.1	10.8	2.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NP	NP	16.65	3.48	0.81	0.235	0.0864	0.0459	0.35	75.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL, LITTLE SILT, TRACE CLAY N.W.C.=12.1%	SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
○ Location: GW-6, 48-50

Date: 2/12/91

Remarks:
SAMPLE COLLECTED BY
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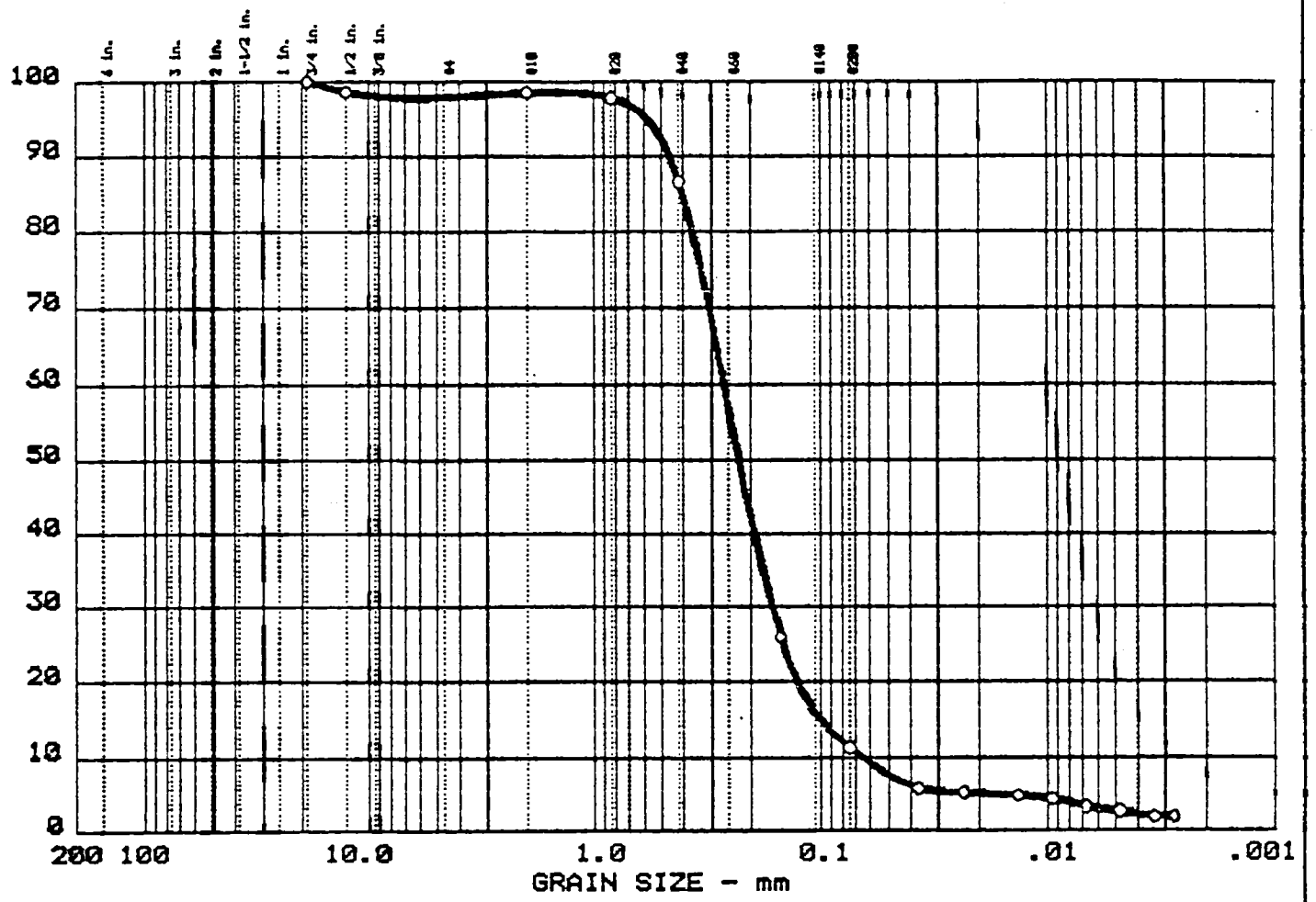
MGP-14

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 14

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
7	0.0	2.2	86.4	8.8	2.6

LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
NP	NP	0.41	0.26	0.23	0.163	0.1002	0.0647	1.55	4.1

MATERIAL DESCRIPTION	USCS	AASHTO
o SAND, TRACE SILT, TR. CLAY, TR. GRAVEL N.W.C.=20.1%	SP-SM	

Project No.: BD-90-151
Project: MACHIAS GRAVEL PIT
o Location: GW-6, 54-56

Date: 2/11/91

Remarks:
SAMPLE COLLECTED BY
EMPIRE SOILS

MGP-15

GRAIN SIZE DISTRIBUTION TEST REPORT

EMPIRE SOILS INVESTIGATIONS, INC.

Fig. No. 15