MALCOLM PIRNIE

FINAL LONG-TERM MONITORING PLAN WATERVLIET ARSENAL, Watervliet, New York

US Army Corps of Engineers Baltimore District

Prepared by:

Malcolm Pirnie, Inc.
15 Cornell Road
Latham, New York 12110

May 1999
0285-732

US Army Corps of Engineers
Baltimore District
DRIVEN BY A VISION...to be the BEST

RECYCLED PAPER

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

REPLY TO
ATTENTION OF

February 22, 1999

Engineering Division
Military HTRW Section

SUBJECT: Administrative Order on Consent Docket No. II RCRA-3008 (H)-93-0210

U.S. Environmental Protection Agency
ATTN: Mr. Raymond Basso
Chief, RCRA Programs Branch
Division of Environmental Planning and Protection
290 Broadway
New York, New York 10007-1866

Dear Mr. Basso:

On behalf of the Watervliet Arsenal (WVA), the Baltimore District U.S. Army Corps of Engineers (BCOE) is pleased to submit herewith two (2) copies of the Draft Work Plan, Long Term Monitoring, Watervliet Arsenal, Main Manufacturing Area, Watervliet, New York, dated February 1999. We would appreciate your comments within 15 days so that the project stays within schedule.

The WVA point of contact is Ms. Maira Senick at (518) 266 5731. The BCOE point of contact is Mr. Curt Heckelman, P.E. at (410) 962 2783.

Michael A. Davis
for Myron N. Prince
Acting Chief,
Military HTRW Section

Enclosure

New York State Department of Environmental Conservation
Division of Solid and Hazardous Materials
Bureau of Radiation & Hazardous Site Management, Room 460
.0 Wolf Road, Albany, New York, 12233-7252
Phone: (518) 457-9253 FAX: (518) 457-9240

John P. Cahill
Commissioner

April 19, 1999

* COMMENTS ARE PART OF DOCUMENT *

Mr. Myron N. Price
Acting Chief
Military HTRW Section
Department of the Army
Baltimore District, U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

RE: Draft Long-Term Monitoring Plan
EPA I.D. No. NY7213820940
RCRA Order No. II RCRA-3008(h)-93-0210

Dear Mr. Price:

The New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA) have the reviewed "Draft Long-Term Monitoring Plan, Watervliet Arsenal" which was submitted on February 22, 1999.

The Agencies have the following comments on the Plan:

1. We are in agreement with the proposed scope of the Plan (i.e. sample locations, parameters, methods, frequency).

2. The Plan, or the cover letter, should state when the sampling program will commence.

3. The precision of the water-level measurements should be .01 feet. In order to assess the precision of the water-level measurements, a duplicate water level should be collected every 10'th well.

4. The potentiometric surface data should be segregated and separately plotted by monitoring zones (overburden, shallow bedrock, middle bedrock, deep bedrock or some functional equivalent thereof). Note that the data on Plate 1 are not presented in a way that allows the reviewer to distinguish vertical from horizontal gradients, or to know which of the wells were used in constructing the plots.

5. The groundwater monitoring system should be maintained to ensure that all monitoring points yield representative samples of high integrity. During each sampling event, the wells to be sampled shall be inspected for integrity in accordance with the Groundwater Monitoring System Inspection Plan in the attached Table. Should a well be found to be damaged beyond usability, blocked or broken, or fail to recharge properly, it shall be

repaired or abandoned and replaced if necessary. Should any cracking or frost heaving of grout be observed, repairs will be made and the top of the inner well casing resurveyed, to ensure accurate definition of groundwater elevations. All repairs or replacements shall be completed prior to the next scheduled sampling events.

6. If the Army knows that an active monitoring well may not provide representative samples, or accurate potentiometric values, may be damaged, or is inaccessible, the Army shall within seven (7) days of such knowledge notify the Agencies of the problem in writing and propose a remedy. Within fourteen (14) days of such knowledge, the Army shall attempt to remedy the problem and, when appropriate, sample or re-sample the well. Within twenty-one (21) days of such knowledge, the Permittee shall, through written notice to the Agencies, provide information which describes the nature of the problem.

   In addition, the notification shall contain:

   (1) A description of how the problem with the well has been rectified; or

   (2) A schedule for the rehabilitation or replacement of the well.

   If a problem with the well prevented the Army from obtaining a scheduled sample, a sample shall be obtained within fourteen (14) days after the rehabilitation or replacement of the well.

   If the Army knows that an error in either sampling or analytical methods has occurred, the affected samples shall be retaken within fourteen (14) days of such knowledge.

7. All monitoring data shall be provided as hard copy and summarized in an acceptable digital format (such as Microsoft Excel, FoxPro, etc.) for input into the Agencies' computers.

8. The trend analysis described on page 4-1 of the Plan should be used for more than making recommendations "as to the elimination of wells from further sampling." In fact, certain trends may indicate the need for additional monitoring or, in some circumstances, interim corrective measures.

Should you have any questions regarding these issues, please call William Wertz or Victor Valaitis of the NYSDEC at (518) 457-9255, or Dale Carpenter of the EPA at (212) 637-4180.

Sincerely,
WEW
William E. Wertz, Ph.D.
Senior Engineering Geologist
Bureau of Radiation & Hazardous Site Management
Division of Solid & Hazardous Materials

Dale J. Carpenter
EPA Project Manager
RCRA Programs Branch

Division of Environmental Planning and Protection
United States Environmental Protection Agency

cc: R. Fedigan, NYSDOH
C. VanGuilder, NYSDEC - Region 4
P. Mack, NYSDEC - Region 4
V. Valaitis

GROUNDWATER MONITORING SYSTEM
INSPECTION

Well Designation ______________
Date of Inspection ______________(month/day/year)
Time of Inspection ______________
Inspector's Name(s)____

Item	Types of Problems	*Status U	A	Comments	Action	Date
Well Condition	Flagging Visibility (if applicable) Well Number Readable on Outer Casing Integrity of Surface Seal/Apron Integrity of Surface Casing Corrosion Inner Casing/Screen Integrity Measuring Point Visibility Total Depth Siltation Recharge Rate Other					
Security	Security Cap in Place Lock in Place Lock Functional Other					

* Status: U=unacceptable
A=acceptable

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1.0 INTRODUCTION

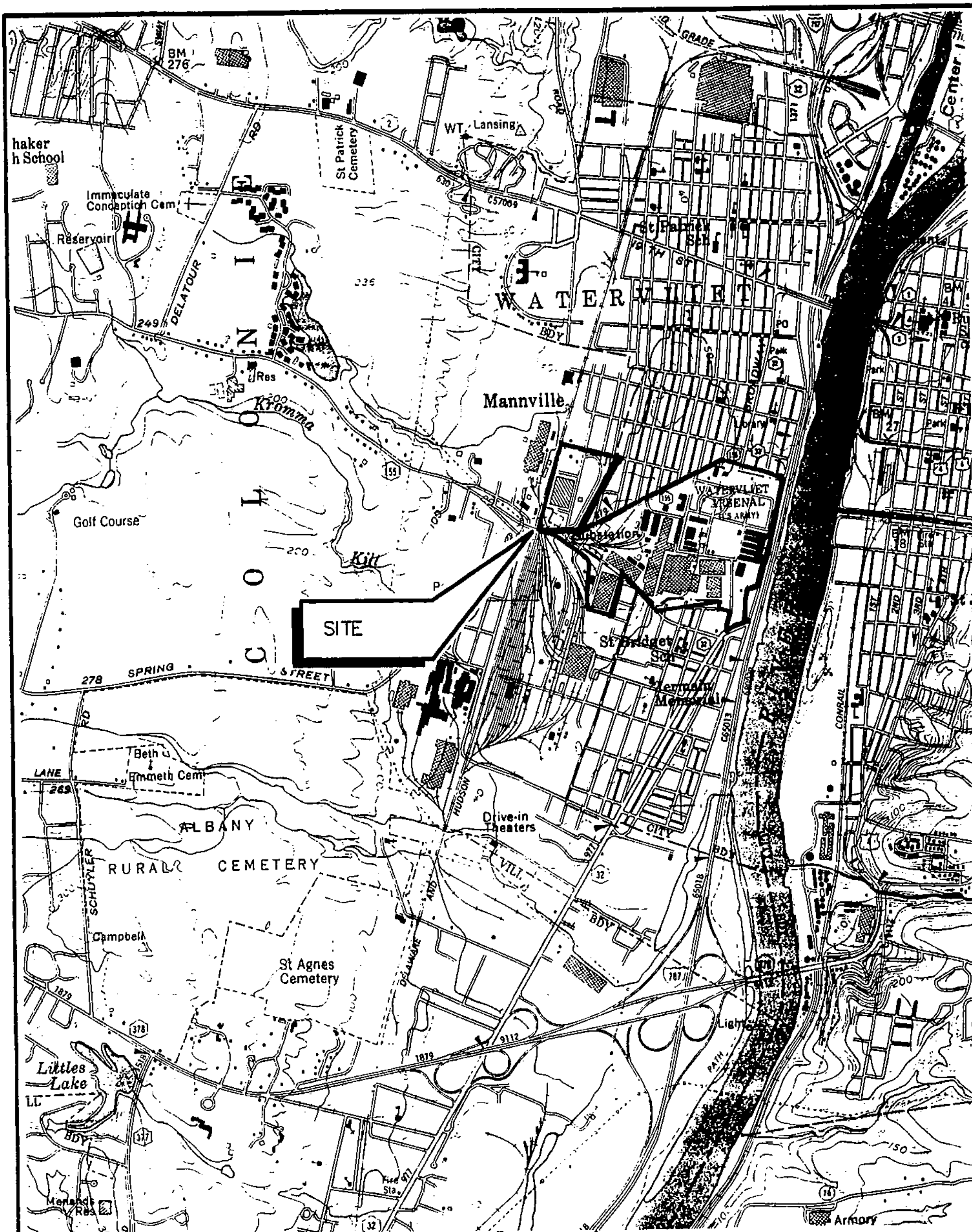
1.1 PURPOSE

Malcolm Pirnie, Inc. (Malcolm Pirnie) has been retained by the Baltimore District of the US Army Corps of Engineers (USACE) to develop a Long-Term Monitoring Plan in support of various site investigations and Interim Corrective Actions (ICAs) completed at the Watervliet Arsenal (WVA) in Watervliet, NY. Each of the site investigations has been under a United States Environmental Protection Agency (USEPA) Administrative Order on Consent (Docket No. II RCRA-3008(h)-93-0210). The purpose of this monitoring plan is to act as an interim/long-term monitoring program for the Main Manufacturing and Siberia Areas of Watervliet Arsenal. This plan was requested by the USEPA and NYSDEC to act as an interim monitoring program following the completion of site investigation activities and prior to the implementation of long-term remedial activities. This long-term monitoring plan for WVA will be updated based on the completion of additional investigations and ICA's through addendums to this document.

1.2 FACILITY DESCRIPTION

The Watervliet Arsenal encompasses approximately 140 acres in and about the City of Watervliet, New York, approximately 3.5 miles northeast of the City of Albany boundary (Figure 1-1). To the east of WVA, Broadway Street and six-lane interstate highway (I-787) separate the WVA from the Hudson River. To the west, WVA extends beyond the limits of the City of Watervliet into the Town of Colonie. Residential areas border WVA to the north and south.

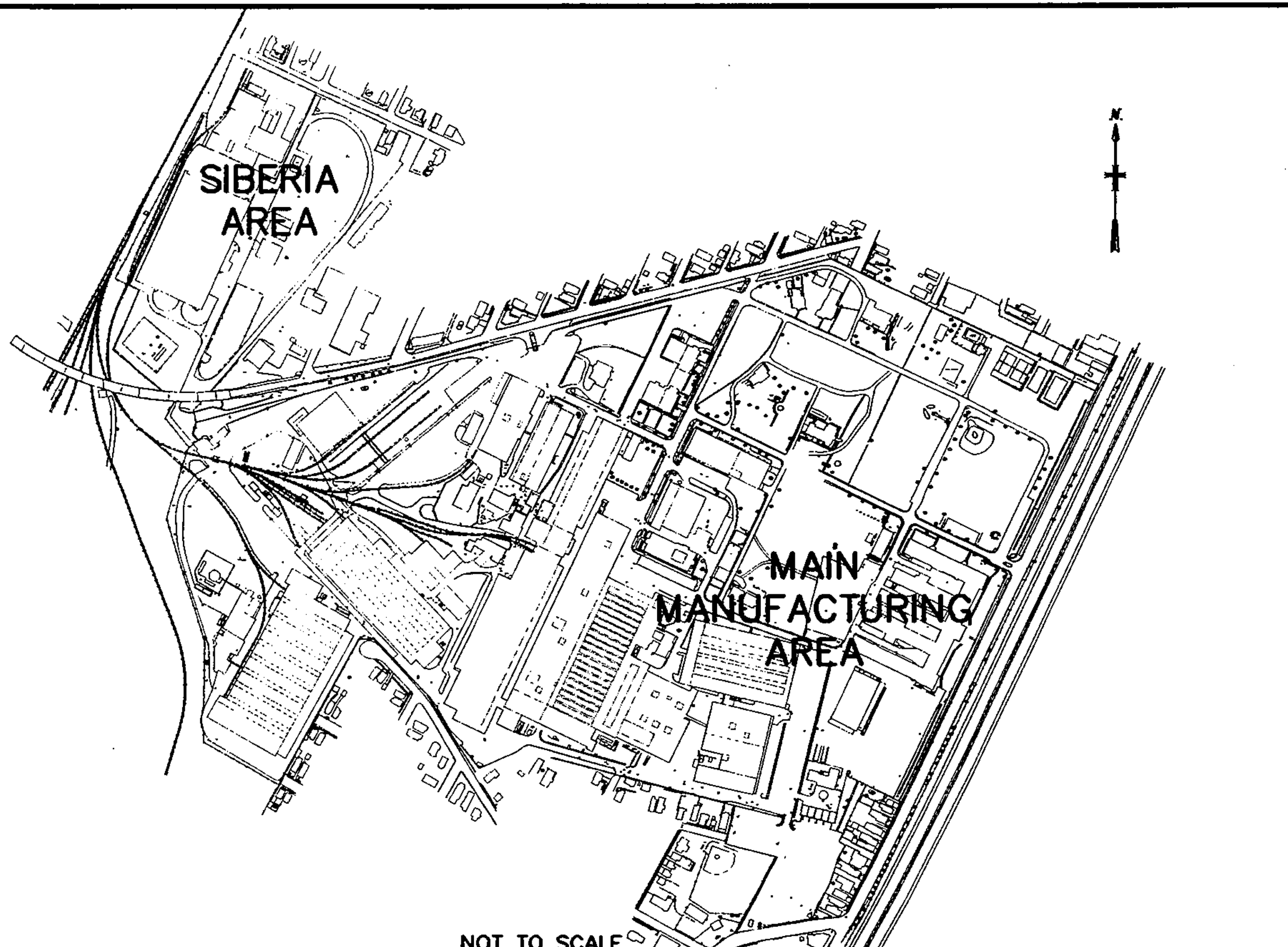
The WVA consists of two primary areas: (1) The "Main Manufacturing Area", where manufacturing and administrative operations occur, comprises about 125 acres, and (2) The "Siberia Area", which is chiefly used for the storage of raw and hazardous materials, comprises about 15 acres. These areas are shown on Figure 1-2.



SOURCE: TROY SOUTH 7.5 MIN QUAD. 1983 EDITION

SCALE: 1" = 2000'

US Army Corps of Engineers	WATERVLIET ARSENAL SITE LOCATION MAP WATERVLIET ARSENAL USACE CONTRACT NO. DACA31-94-D-0017	MALCOLM PIRNIE, INC. FIGURE 1-1



NOT TO SCALE

US Army Corps of Engineers

SITE PLAN

WATERVLIET ARSENAL

USACE CONTRACT NO. DACA31-94-D-0017

FIGURE 1-2

WVA is the United States' oldest, continuously operating cannon manufacturing facility and was established in 1813. The WVA's principal mission during its early years of operation was the production of small arms ammunition, gun carriages, and leather goods. Since 1889 WVA has been producing cannons.

The current activities at the WVA are primarily the manufacture of tubes and tube assemblies for cannons, cannon components, mortars, and recoilless rifles. In terms of hazardous waste volume, the most significant waste streams are those associated with metal finishing operations; chrome electroplating and heat treatment. Spent electropolish rinsewater solution, caustic cleaners, and soluble oils are generated daily and transferred to holding tanks by separate industrial sewers; acid waste line, cyanide-containing waste line, and soluble oil line. These holding tanks ultimately convey to an on-site treatment facility which operates in accordance with a NYSDEC State Pollution Discharge Elimination System (SPDES) Permit No. NY002361.

Treatment at the on-site waste treatment plant is divided into three major subsystems; soluble oil waste treatment, acid waste, and cyanide pre-treatment (to be used eventually as part of the acid treatment). The treated wastewater effluent is discharged to the Hudson River regulated under the aforementioned SPDES permit.

The former Erie Canal transversed the Main Manufacturing Area, but was backfilled in the past. Gibson Street marks the approximate location of the former canal.

1.3 SITE GEOLOGY AND HYDROGEOLOGY

Approximately 2 to 19 feet of fill and unconsolidated deposits (fine sand and silt) overlying bedrock. Bedrock beneath the site is the Ordovician Snake Hill Formation, composed of interbedded slate, thin beds of quartzite, and minor argillites, that has been involved in regional folding during the Taconic Orogeny.

The slate-quartzite bedrock was observed in place at an outcrop at the western edge of the main manufacturing area. The outcrop consists of alternating units of non-competent slate and extremely indurated quartzite, with the bedding planes striking to the north and dipping 75 degrees to the east. The upper 10 feet of slate is characterized by fissile partings and fractures. Beds of resistant, silica-cemented quartzite are conspicuous at the outcrop and is composed of fine-grained orthoquartzite.

Previous studies have indicated the presence of a single, unconfined aquifer, consisting of fill, fluvial sand, silt, clay, gravel, and slate bedrock. No continuous clay or low-permeability layers have been observed. Groundwater flow through the slate bedrock is controlled primarily by secondary fractures formed along and across the foliation and the near-vertical orientation of the bedding planes.

The groundwater table has been recorded at depths of zero to 11 feet below land surface in onsite monitoring wells. A north-south trending water table divide, coincident with a topographic ridge has been postulated in the western half of the main manufacturing area. Groundwater flow east of this divide flows in a southeasterly direction and discharges directly to the Hudson River, while groundwater west of the divide flows to Kromma Kill, which discharges into the Hudson River south of the site.

At least four processing pits have been excavated into bedrock, which may affect groundwater flow in the bedrock; three 35-foot deep processing facilities in Building 35 and the 120-foot deep processing facility in Building 135. Groundwater has been observed to seep into each of these facilities.

2.0 FIELD SAMPLING PLAN

The Field Sampling Plan presents the groundwater sampling locations, sample analyses, sampling frequency, and sampling methodology for the groundwater monitoring program at the WVA.

2.1 SAMPLING LOCATIONS

Monitoring wells selected for inclusion in the long-term groundwater monitoring program are presented on Plate 1. Groundwater sampling locations were selected in both the MMA and Siberia based on the criteria outlined below.

2.1.1 Chemical Detections

Groundwater sampling data from investigations conducted to date in support of the RCRA Facility Investigations (RFI) of the MMA and the Corrective Measures Study (CMS) of the Siberia Area were reviewed to determine the magnitude and frequency of chemical contaminant detections in groundwater at each monitoring well location. Chemical detections were grouped into four categories as follows: Inorganics (filtered and unfiltered); Semi-Volatile Organic Compounds (SVOCs); Volatile Organic Compounds (VOCs); and Pesticides/PCBs. The results of the analysis, for each group, were compared to the previous analytical results for that well and compared to the results of the analysis for groundwater collected from wells in the immediate vicinity and to the applicable groundwater quality standards (i.e., NYS Class GA Standards). Wells which contained elevated concentrations of chemical contaminants were selected for inclusion into the long-term groundwater sampling program.

2.1.2 Source Areas

Each groundwater monitoring well was evaluated spatially using existing groundwater flow data to determine the relationship (i.e., downgradient, upgradient, adjacent) of each well to known or suspected source areas, as well as the site boundaries. Wells located within, or downgradient of, known or suspected source areas or plumes were selected for groundwater monitoring. In addition, several wells located at the upgradient and downgradient site boundary were included in the monitoring program to monitor the quality of the groundwater entering and leaving the site.

2.1.3 Free Product or Sheens

Wells which contained free-product either Dense Non-Aqueous Phase Liquids (DNAPL) or Light Non-Aqueous Phase Liquids (LNAPL) at any time during the investigations to date were included in the groundwater monitoring program. Likewise, any wells in which the groundwater had visible sheens were also included in the monitoring program.

2.1.4 Monitoring Well Coverage

Monitoring well coverage site-wide was also taken into account when selecting wells for the monitoring program. For example, at many locations several wells monitoring the same zone and exhibiting similar contaminant concentrations are located in close proximity to one another. At these locations the well(s) historically containing the highest contaminant concentrations was typically selected for inclusion into the groundwater monitoring program.

2.2 MAIN MANUFACTURING AREA (MMA)

There are a total of 94 groundwater monitoring wells at the MMA. Of these, 22 wells monitor the saturated overburden; 18 wells monitor either the overburden and weathered bedrock saturated zones (hybrid wells) or the weathered bedrock; and 50 wells monitor the bedrock at varying depths. Plate 1 shows groundwater potentiometric surface contours at the MMA. As shown on the plate, groundwater at the MMA generally flows to the east and west from a groundwater divide located in the western portion of the MMA. This information was used in determining the downgradient margins of contaminant plumes and appropriate groundwater sampling locations.

Table 2-1 presents the rationale for well selection at the MMA. As shown in Table 2-1, a total of 49 wells (approximately 52 percent of the total number of wells), consisting of 15 overburden monitoring wells, nine (9) hybrid/weathered bedrock monitoring wells, and 25 bedrock monitoring wells, have been selected for inclusion into the long-term groundwater sampling program. These monitoring wells are summarized in Table 2-2. Analytical data summary tables for the MMA are provided in Appendix A. These data were used to aid in the selection of monitoring wells for the long-term monitoring plan.

Monitoring wells 87GTI-MW-1BP, 87GTI-MW-2BP, 87GTI-MW-3BP, and 87GTI-MW-4BP are currently monitored by WVA personnel as part of a petroleum bulk storage monitoring program. Monitoring results for these wells will be included in the monitoring report as discussed in Section 4.0.

2.3 SIBERIA AREA

There are a total of 46 monitoring wells in the Siberia Area. Of these, 23 wells monitor the saturated overburden, 7 monitor the weathered bedrock, and 16 monitor the bedrock at varying depths. Three of these wells, MPI-SA-MW-43, MPI-SA-MW-44, and MPI-SA-MW-45, will be permanently removed during installation of the Pilot Reactive Barrier Wall remediation system as described in the *Final Work Plan, Permeable Reaction Wall Pilot Treatment System, Watervliet Arsenal, Siberia Area, NE Quadrant, October 1998* (Reactive Wall Work Plan) (Malcolm Pirnie, 1998). An additional 33 wells, consisting of six (6) in-wall wells, 12 overburden wells, 12 weathered bedrock monitoring wells, and three (3) supplemental wells, will be installed in and around the reactive wall as described in the Reactive Wall Work Plan. These additional wells will be sampled as part of both the reactive wall monitoring plan and the long-term facility-wide monitoring plan.

Plate 1 presents the overburden groundwater potentiometric surface contours for the Siberia Area. As shown on Plate 1, overburden groundwater flow in the Siberia Area is generally to the northwest. However, it appears that the groundwater in the northern section of the site drains into the storm sewer and into the disturbed materials surrounding the storm sewer lines running north/south through the site. A groundwater divide, trending

Table 2-1
Main Manufacturing Area Monitoring Well Selection
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?						Sample?	Rationale
		Inorganics (b)		VOCs	SVOCs	PCBs	Pesticides		
		Unfiltered	Filtered						
87GTI-MW-1BP	Hybrid (a)	Yes	No	No	No	No	Yes	(c)	See Notes
87GTI-MW-2BP	Hybrid (a)	No	No	No	No	No	Yes	(c)	See Notes
87GTI-MW-3BP	Hybrid (a)	No	No	No	No	No	No	(c)	See Notes
87GTI-MW-4BP	Hybrid (a)	Yes	No	No	No	No	Yes	(c)	See Notes
83DM-SP-1	Hybrid (a)	Yes	No	No	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
83DM-SP-2	Bedrock	No	No	No	Yes	No	No		Non-detect VOCs, trace SVOCs, adequate well coverage.
83DM-SP-3	Bedrock	No	No	No	No	No	No	✓	Non-detect VOCs, trace SVOCs. Sample for Chromium based on recent spill in area.
83DM-SP-4	Bedrock	No	No	No	No	No	No	✓	VOC and SVOC detections, downgradient Bldg. 25.
86EM-SP-1A	Overburden	No	No	Yes	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
86EM-SP-1B	Overburden	Yes	No	Yes	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
86EM-SP-5	Overburden	No	No	Yes	Yes	No	Yes	✓	VOC/SVOC detections, sheen on groundwater, downgradient Bldg. 25.
86EM-SP-6	Overburden	No	No	No	No	No	Yes	✓	NYSDEC/USEPA Requested (Inorganics filtered and unfiltered)
92EM-SP-7	Overburden	No	No	Yes	Yes	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
92EM-SP-8	Overburden	No	No	Yes	Yes	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
93EM-SP-9	Overburden	Yes	No	No	No	No	No	✓	VOC and SVOC detections, downgradient Bldg. 35, southern boundary.
93EM-SP-10	Hybrid (a)	Yes	No	No	No	No	Yes		Non-detect VOC, trace SVOC, adequate well coverage.
93EM-SP-11	Overburden	Yes	No	No	No	No	No	✓	VOC detections, southern site boundary, adjacent to Bldg. 25.
93EM-SP-12	Overburden	Yes	No	No	No	No	Yes		Non-detect VOC, trace SVOC, adequate well coverage.
93EM-SP-13	Bedrock	No	No	No	Yes	No	Yes	✓	SVOC detections, free product in past sampling events, adjacent Bldg. 135.
93EM-SP-14	Bedrock	No	No	No	No	No	Yes		Non-detect VOC and SVOC, upgradient of source areas.
93EM-SP-15	Bedrock	Yes	No	No	No	No	No		Non-detect VOC and SVOC.
93EM-SP-16	Bedrock	Yes	No	No	No	No	No		Non-detect VOC and SVOC.
94EM-MW-19	Bedrock	Yes	No	No	No	No	No	✓	NYSDEC/USEPA Requested (Inorganics filtered and unfiltered)
94EM-MW-20	Bedrock	Yes	No	No	No	No	Yes	✓	NYSDEC/USEPA Requested (Inorganics filtered and unfiltered)
94EM-MW-21	Bedrock	Yes	No	No	No	No	Yes	✓	NYSDEC/USEPA Requested (Inorganics filtered and unfiltered)
93EM-RW-2	Bedrock	Yes	No	Yes	Yes	No	No	✓	VOC and SVOC detections.
95MPI-135-MW-1	Bedrock	Yes	No	No	No	No	Yes	✓	VOC/SVOC detections, downgradient Bldg. 135, southwestern site boundary.

Table 2-1
Main Manufacturing Area Monitoring Well Selection
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?						Sample?	Rationale
		Inorganics (b)		VOCs	SVOCs	PCBs	Pesticides		
		Unfiltered	Filtered						
95MPI-135-MW-2	Bedrock	Yes	No	No	No	No	Yes	✓	Western site boundary.
95MPI-135-MW-3	Bedrock	No	No	No	No	No	Yes		Trace VOC and SVOC detections, upgradient of source area (Bldg. 135).
95MPI-135-MW-4	Bedrock	Yes	No	No	No	No	Yes	✓	SVOC detections, downgradient Bldg. 135, southwestern site boundary.
95MPI-25-MW-1	Weathered	Yes	No	No	No	No	Yes	✓	VOC and SVOC detections, adjacent to Bldg. 25, downgradient Bldg. 35.
95MPI-25-MW-2	Bedrock	Yes	No	Yes	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
95MPI-25-MW-3	Overburden	Yes	No	Yes	No	No	No	✓	VOC and SVOC detections, downgradient Bldg. 25.
95MPI-25-MW-4	Weathered	Yes	No	No	No	No	No		Non-detect VOC, trace SVOC, adequate well coverage.
95MPI-25-MW-5	Hybrid (a)	Yes	No	No	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
95MPI-25-MW-6	Overburden	Yes	No	Yes	No	No	Yes	✓	VOC and SVOC detections, downgradient Bldg. 25.
95MPI-35-MW-5	Bedrock	Yes	Yes	No	No	No	No	✓	VOC/SVOC/Inorganics Filtered&Unfiltered detections, free product, southern site boundary, adjacent Bldg. 35
95MPI-35-MW-6	Overburden	Yes	No	No	No	No	No		Trace VOC and SVOC detections.
95MPI-35-MW-7	Bedrock	Yes	No	No	No	No	No		Trace VOC and SVOC detections.
95MPI-35-MW-8	Bedrock	Yes	No	No	Yes	No	Yes	✓	SVOC detections, free product, between Bldgs. 110 and 35.
95MPI-AW-MW-20	Overburden	No	No	No	No	No	Yes	✓	Northeastern limit of monitoring well network.
95MPI-AW-MW-21	Overburden	Yes	No	No	No	No	Yes		Non-detect VOCs, trace SVOCs.
95MPI-AW-MW-22	Bedrock	No	No	No	No	No	No	✓	Northern site boundary.
95MPI-AW-MW-23	Weathered	No	No	No	No	No	No	✓	SVOC detections, sheen in past sampling events.
95MPI-AW-MW-24	Overburden	No	No	No	No	No	No	✓	VOC and SVOC detections, sheen on groundwater, adjacent to Bldg. 110.
95MPI-AW-MW-25	Weathered	No	No	No	No	No	No		Trace VOC detections, upgradient of main source areas.
95MPI-AW-MW-26	Bedrock	Yes	No	No	No	No	No	✓	VOC and SVOC detections, northwestern site boundary.
95MPI-AW-MW-27	Overburden	Yes	No	Yes	No	No	No	✓	VOC detections, downgradient Bldgs. 125 and 135, western site boundary.
95MPI-AW-MW-28	Bedrock	Yes	No	No	No	No	No		Non-detect VOC and SVOC.
95MPI-AW-MW-29	Bedrock	Yes	No	No	No	No	No	✓	SVOC detections.
95MPI-AW-MW-30	Weathered	No	No	No	No	No	No	✓	VOC and SVOC detections.
95MPI-AW-MW-31	Overburden	No	No	No	No	No	No		Trace VOC and SVOC detections.
95MPI-AW-MW-32	Weathered	No	No	No	No	No	Yes	✓	Southeastern site boundary.
95MPI-AW-MW-33	Bedrock	No	No	No	No	No	Yes	✓	VOC detections, downgradient of main source areas, eastern site boundary.
95MPI-AW-MW-34	Bedrock	No	No	Yes	No	No	No	✓	VOC detections, downgradient of main source areas, eastern site boundary.

Table 2-1
Main Manufacturing Area Monitoring Well Selection
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?						Sample?	Rationale
		Inorganics (b)							
		Unfiltered	Filtered	VOCs	SVOCs	PCBs	Pesticides		
95MPI-AW-MW-35	Bedrock	No	No	Yes	No	No	No	✓	VOC detections downgradient Bldg. 20.
95MPI-AW-MW-36	Overburden	No	No	Yes	No	No	No	✓	VOC detections downgradient Bldg. 20.
95MPI-AW-MW-37	Bedrock	No	No	No	No	No	No		Non-detect VOC, trace SVOC detections.
95MPI-AW-MW-38	Bedrock	No	No	No	No	No	Yes	✓	SVOC detections, southern site boundary.
95MPI-AW-MW-39	Bedrock	No	No	No	No	No	No		Non-detect VOC, trace SVOC detections, upgradient of main source areas.
95MPI-AW-MW-40	Bedrock	No	No	No	No	No	No		Non-detect VOC, trace SVOC detections, upgradient of main source areas.
95MPI-AW-MW-41	Bedrock	Yes	No	No	No	No	No	✓	Northwestern site boundary.
95MPI-AW-MW-42	Weathered	No	No	No	No	No	No		Trace VOC and SVOC detections, upgradient of main source areas.
95MPI-AW-MW-43	Overburden	Yes	No	Yes	Yes	No	No	✓	VOC and SVOC detections, sheen on groundwater, downgradient Bldg. 25.
95MPI-AW-MW-44	Overburden	No	No	Yes	No	No	No	✓	VOC and SVOC detections, sheen on groundwater, downgradient Bldg. 25.
97MPI-AW-MW-45	Bedrock	No	No	No	No	No	No		Non-detect VOC, trace SVOC detections.
97MPI-AW-MW-46	Bedrock	No	No	No	No	No	No		Non-detect VOC and SVOC.
97MPI-AW-MW-47	Weathered	No	No	Yes	No	No	No	✓	VOC detections, southeastern site boundary, adjacent Bldg 25.
97MPI-AW-MW-48	Bedrock	No	No	No	No	No	No		Non-detect VOC, trace SVOC detections, adequate coverage.
97MPI-AW-MW-49	Weathered	No	No	No	No	No	No		Trace VOC, adequate coverage.
97MPI-AW-MW-50	Bedrock	No	No	No	No	No	No		Non-detect VOC, upgradient.
97MPI-AW-MW-51	Bedrock	No	No	Yes	No	No	No	✓	VOC detections, downgradient of source areas, eastern site boundary.
97MPI-AW-MW-52	Bedrock			Yes		No		✓	VOC detections.
97MPI-AW-MW-53	Bedrock	No	No	No	No	No	No		Non-detect VOC, adequate coverage.
97MPI-AW-MW-54	Bedrock	No	No	No	No	No	No		Non-detect VOC.
97MPI-AW-MW-55	Bedrock	No	No	No	No	No	No		Non-detect VOC and SVOC.
98MPI-AW-MW-56	Overburden	Yes	No	No	No	No	No		Non-detect VOC, trace SVOC detections.
98MPI-AW-MW-57	Overburden	Yes	No	No	No	No	No		Non-detect VOC and SVOC.
98MPI-AW-MW-58	Bedrock	No	No	No	No	No	No	✓	VOC detections, downgradient of source areas, eastern boundary.
98MPI-AW-MW-59	Bedrock	No	No	Yes	No	No	No	✓	VOC detections, downgradient of source areas, eastern boundary.
98MPI-AW-MW-60	Bedrock	No	No	Yes	No	No	No		Non-detect VOC.
98MPI-AW-MW-61	Bedrock	No	No	Yes	No	No	No	✓	VOC detections, downgradient, eastern boundary.
98MPI-AW-MW-62	Bedrock	No	No	Yes	No	No	No		Non-detect VOC.
98MPI-AW-MW-63	Bedrock	Yes	No	No	No	No	No		Non-detect VOC, trace SVOC.
98MPI-AW-MW-64	Bedrock	NS	NS	Yes	NS	NS	NS	✓	VOC detections.
MPI-P-1	—	No	No	No	No	No	No		Water level measurement only.
MPI-P-2	—	No	No	No	No	No	No		Water level measurement only.

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Table 2-1
Main Manufacturing Area Monitoring Well Selection
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?						Sample?	Rationale
		Inorganics (b)		VOCs	SVOCs	PCBs	Pesticides		
		Unfiltered	Filtered						
MPI-P-3	—	No	No	No	No	No	No		Water level measurement only.
MPI-P-4	—	No	No	No	No	No	No		Water level measurement only.
MW-121-NORTH	Hybrid (a)	No	No	Yes	No	No	No	✓	VOC and SVOC detections.
MW-121-SOUTH	Hybrid (a)	No	No	Yes	No	No	Yes	✓	VOC detections.
MW-BLDG110	Bedrock	No	No	No	No	No	No	✓	Free product in past sampling events.
RW-1	Bedrock	Yes	Yes	No	No	No	No		Trace VOC and SVOC detections.
PW-1	Bedrock	NS	NS	Yes	Yes	No	NS	✓	VOC and SVOC detections.

(a) Hybrid wells monitor both the overburden and weathered bedrock units.
(b) Does not include barium, which was detected in background samples as reported in the RFI report.
(c) Wells 87GTI-MW-1BP, 87GTI-MW-2BP, 87GTI-MW-3BP, and 87GTI-MW-4BP will be sampled by WVA personnel as part of their ongoing monitoring program, results will be reported in the semi-annual monitoring report.
(d) Not sampled. Wells will be sampled after October/November well installation event.

(X)

TABLE 2-2

MAIN MANUFACTURING AREA MONITORING WELL SELECTION SUMMARY
Watervliet Arsenal
Watervliet, New York

Monitoring Wells	Monitoring Purpose
Overburden 95MPI-AW-MW-36 *Bedrock* 95MPI-AW-MW-35	Building 20
Overburden 86EM-SP-1A, 86EM-SP-1B, 86EM-SP-5, 92EM-SP-7, 92EM-SP-8, 93EM-SP-9, 93EM-SP-11, 95MPI-25-MW-3 95MPI-25-MW-6, 95MPI-AW-MW-43, 95MPI-AW-MW-44 *Hybrid* 83DM-SP-1, 95MPI-25-MW-5 *Weathered Bedrock* 95MPI-25-MW-1, 97MPI-AW-MW-47 *Bedrock* 83DM-SP-4, 95MPI-25-MW-2	Building 25
Bedrock 95MPI-35-MW-5, 95MPI-35-MW-8	Building 35
Overburden 95MPI-AW-MW-24 *Bedrock* MW-BLDG110	Building 110
Hybrid MW-121-NORTH, MW-121-SOUTH	Building 121
Overburden 95MPI-AW-MW-27 *Bedrock* 95MPI-135-MW-1, 95MPI-135-MW-4, 93EM-SP-13	Building 135
Overburden 95MPI-AW-MW-21, 95MPI-AW-MW-33 *Weathered Bedrock* 95MPI-AW-MW-32 *Bedrock* 95MPI-135-MW-2, 95MPI-AW-MW-22, 95MPI-AW-MW-26, 95MPI-AW-MW-34, 95MPI-AW-MW-38, 95MPI-AW-MW-41, 97MPI-AW-MW-51, 98MPI-AW-MW-58, 98MPI-AW-MW-59, 98MPI-AW-MW-61	Site Boundaries
Weathered Bedrock 95MPI-AW-MW-23, 95MPI-AW-MW-30 *Bedrock* 83DM-SP-3, 94EM-MW-19, -20 -21 93EM-RW-2, 95MPI-AW-MW-29, 97MPI-AW-MW-52, 98MPI-AW-MW-64, PW-1	Miscellaneous (a)

(a) Includes wells in which groundwater contains either sheens/free product or elevated contaminant concentrations not associated with a defined source.

approximately northwest/southeast, is also present at the site. Groundwater to the north of this divide is entering the sewer line and discharged northward from the site. Groundwater to the south of this divide flows northwestward off the site. Figure 2-1 shows the bedrock potentiometric contours in the Siberia Area. Groundwater flow in the bedrock is generally to the northwest.

With the addition of the reactive wall wells, a total of 76 wells will exist in the Siberia Area when the long-term monitoring plan is implemented. Table 2-3 presents the rationale for well selection for the Siberia Area. As shown in Table 2-3, a total of 55 wells (approximately 72 percent of the total number of wells), consisting of 38 overburden monitoring wells, 19 hybrid/weathered zone monitoring wells, 16 bedrock monitoring wells, and the three (3) supplemental wells have been selected for inclusion into the long-term groundwater sampling program.

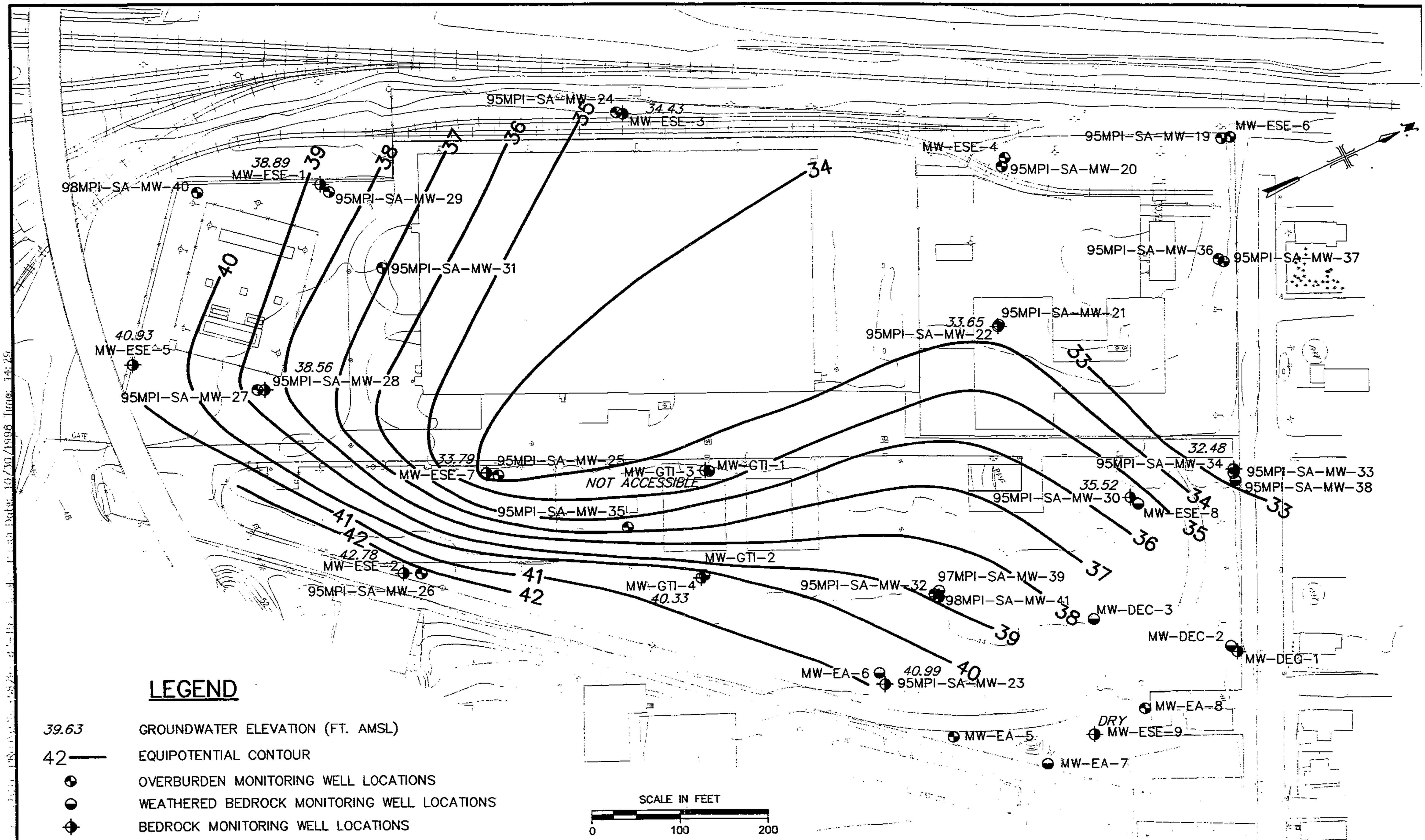
In addition to the monitoring wells, three (3) storm sewer locations and one (1) sanitary sewer bedding monitoring point will be sampled as part of the long-term monitoring program. Elevated concentrations of VOCs were detected at each of these locations during the investigations of the Siberia Area.

The monitoring wells and sewer locations selected for inclusion into the groundwater monitoring program are summarized in Table 2-4 and presented on Plate 1. Analytical data summary tables for the Siberia Area are provided in Appendix B. These summary tables were used to aid in the selection of the monitoring wells for the long-term monitoring plan.

2.4 SAMPLE ANALYSES

2.4.1 Rationale

In general, groundwater samples collected at both the MMA and Siberia Area as part of the various investigations to date were analyzed for inorganic compounds (both filtered and unfiltered metals), and organic compounds (including VOCs, SVOCs, and Pesticide/PCBs). Wells sampled for the long-term monitoring program will be analyzed for Target Compound List (TCL) VOCs and SVOCs, as well as selected "natural attenuation parameters". The rationale for the sample analyses is outlined in Table 2-5.



LEGEND

39.63	GROUNDWATER ELEVATION (FT. AMSL)
42 ——	EQUIPOTENTIAL CONTOUR
	OVERBURDEN MONITORING WELL LOCATIONS
	WEATHERED BEDROCK MONITORING WELL LOCATIONS
	BEDROCK MONITORING WELL LOCATIONS

SCALE IN FEET

0 100 200

US Army Corps of Engineers

SIBERIA AREA

BEDROCK POTENTIOMETRIC CONTOURS 6/22/98

WATERVLIET ARSENAL

USACE CONTRACT NO. DACA31-94-D-0017

FIGURE 2-1

TABLE 2-3
SIBERIA AREA MONITORING WELL SELECTION
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?					Sample?	Rationale
		Inorganics (a)		VOCs	SVOCs	PCBs/Pesticides		
		Unfiltered	Filtered					
MPI-SA-MW- 19	Overburden	No	No	Yes	Yes	No	✓	Downgradient, northwestern boundary, VOC/SVOC detections
MPI-SA-MW- 20	Overburden	Yes	No	Yes	No	No	✓	Downgradient, northwestern boundary, VOC detections
MPI-SA-MW- 21	Overburden	Yes	No	No	No	No		No VOC or SVOC detections
MPI-SA-MW- 22	Bedrock	No	No	No	No	No		No VOC detections, low SVOCs
MPI-SA-MW- 23	Bedrock	No	No	No	Yes	No	✓	Upgradient, eastern boundary, SVOC detections
MPI-SA-MW- 24	Overburden	No	No	No	No	No	✓	Downgradient, western boundary, VOC detections
MPI-SA-MW- 25	Overburden	No	No	No	No	No		Sufficient coverage in area
MPI-SA-MW- 26	Overburden	No	No	No	Yes	No	✓	Upgradient, eastern boundary, SVOC detections
MPI-SA-MW- 27	Overburden	No	No	No	No	No	✓	Southern boundary, some VOC/SVOC detections
MPI-SA-MW- 28	Bedrock	No	No	No	No	No	✓	Southern boundary
MPI-SA-MW- 29	Overburden	Yes	No	No	No	Yes	✓	Downgradient, VOC/SVOC detections, SW quadrant.
MPI-SA-MW- 30	Bedrock	Yes	No	No	No	No		Sufficient coverage in area
MPI-SA-MW- 31	Overburden	No	No	No	No	Yes		Sufficient coverage in area
MPI-SA-MW- 32	Overburden	No	No	Yes	Yes	Yes	✓	VOC and SVOC detections, NE quadrant
MPI-SA-MW- 33	Overburden	Yes	No	No	No	No	✓	VOC detections, northern boundary, downgradient
MPI-SA-MW- 34	Bedrock	No	No	No	Yes	No	✓	VOC/SVOC detections, northern boundary, downgradient
MPI-SA-MW- 35	Overburden	Yes	No	No	Yes	Yes		Sufficient coverage, non-detect VOCs
MPI-SA-MW- 36	Overburden	No	No	No	No	Yes		Sufficient coverage, non-detect VOCs
MPI-SA-MW- 37	Overburden	No	No	No	No	Yes		Sufficient coverage, non-detect VOCs
MPI-SA-MW- 38	Weathered	No	No	No	No	No	✓	VOC detections, northern boundary, downgradient
MPI-SA-MW- 39	Weathered	NA	NA	Yes	NA	NA	✓	VOC detections, NE quadrant
MPI-SA-MW- 40	Bedrock	NA	NA	No	NA	NA		Sufficient coverage in area
MPI-SA-MW- 41	Bedrock	NA	NA	Yes	NA	NA	✓	VOC detections, NE quadrant
MW-DEC- 1	Bedrock	No	No	No	No	No		Low VOCs, sufficient coverage, part of DEC Perfection Plating project
MW-DEC- 2	Weathered	Yes	No	No	No	No		Low VOCs, sufficient coverage, part of DEC Perfection Plating project
MW-DEC- 3	Weathered	Yes	No	No	Yes	No		Low VOCs, sufficient coverage, part of DEC Perfection Plating project
MW-EA- 5	Overburden	Yes	Yes	No	Yes	Yes		Upgradient, non-detect VOCs, sufficient coverage
MW-EA- 6	Weathered	No	No	Yes	Yes	Yes	✓	VOC detections, upgradient, eastern boundary
MW-EA- 7	Weathered	Yes	Yes	No	No	No		No VOC or SVOC detections
MW-EA- 8	Overburden	Yes	Yes	No	Yes	Yes		Sufficient coverage in area
MW-ESE- 1	Bedrock	No	No	No	No	Yes	✓	Downgradient, SW quadrant
MW-ESE- 2	Bedrock	No	No	No	No	Yes	✓	Upgradient, eastern boundary

TABLE 2-3
SIBERIA AREA MONITORING WELL SELECTION
Watervliet Arsenal

Well	Unit	Analyte Detected Above NYS Class GA Standard?					Sample?	Rationale
		Inorganics (a)		VOCs	SVOCs	PCBs/Pesticides		
		Unfiltered	Filtered					
MW-ESE- 3	Bedrock	No	No	No	No	Yes	✓	Downgradient, western site boundary
MW-ESE- 4	Overburden	Yes	No	No	No	No		Sufficient coverage in area
MW-ESE- 5	Bedrock	No	No	No	No	Yes		Sufficient coverage in area
MW-ESE- 6	Overburden	No	No	No	No	Yes	✓	Upgradient, eastern boundary, VOC detections
MW-ESE- 7	Bedrock	No	No	No	No	Yes		Sufficient coverage in area
MW-ESE- 8	Weathered	No	No	Yes	No	Yes	✓	VOC detections, middle of plume, northeast quadrant
MW-ESE- 9	Bedrock	Yes	Yes	No	No	No		No VOC or SVOC detections
MW-GTI- 1	Overburden	Yes	No	No	No	Yes	✓	Middle of site, in flow path
MW-GTI- 2	Overburden	Yes	No	No	No	No		No VOC or SVOC detections
MW-GTI- 3	Bedrock	No	No	No	Yes	No	✓	Middle of site, in flow path, SVOC detections
MW-GTI- 4	Bedrock	No	No	No	No	No		Non-detect VOCs, trace SVOC
STS- 3	Storm Sewer	No	No	Yes	No	No	✓	VOC detections in aqueous samples
STS- 5	Storm Sewer	No	No	Yes	Yes	No	✓	VOC and SVOC detections in aqueous samples
STS- 6	Storm Sewer	No	No	Yes	No	No	✓	VOC detections in aqueous samples
SNS- 6	Sanitary Sewer	No	Yes	Yes	No	Yes	✓	VOC detections in aqueous samples

Note: Wells MPI-SA-MW-42, MPI-SA-MW-43, and MPI-SA-MW-44 will be destroyed during installation of the reactive wall remediation system.
Note 2: Wells MPI-SA-MW-45 through MPI-SA-MW-77 will be installed and sampled as part of the reactive wall monitoring plan and the facility-wide monitoring plan.
(a) Does not include Barium, which was detected in background samples as reported in the CMS Report.

TABLE 2-4

SIBERIA AREA MONITORING WELL SELECTION SUMMARY
Watervliet Arsenal
Watervliet, New York

Monitoring Wells	Monitoring Purpose
Overburden MPI-SA-MW-19, MPI-SA-MW-20, MPI-SA-MW-26, MPI-SA-MW-27, MPI-SA-MW-33, MW-ESE-6 *Weathered Bedrock* MPI-SA-MW-38, MW-EA-6 *Bedrock* MPI-SA-MW-22, MPI-SA-MW-23, MPI-SA-MW-28, MPI-SA-MW-34, MW-ESE-2, MW-ESE-3	Site Boundaries
Overburden MPI-SA-MW-32 *Weathered Bedrock* MPI-SA-MW-39, MW-ESE-8 *Bedrock* MPI-SA-MW-41	Northeast Quadrant (not including reactive wall wells)
Overburden MPI-SA-MW-29 *Bedrock* MW-ESE-1	Southwest Quadrant
MPI-SA-MW-45 through MPI-SA-MW-77	Reactive Wall
Overburden MW-GTI-1 *Bedrock* MW-GTI-3	Miscellaneous (a)
STS-3, STS-5, STS-6	Storm Sewer Samples
SNS-6	Sanitary Sewer Bedding

(a) Includes wells in which groundwater contains either sheens/free product or elevated contaminant concentrations not associated with a defined source.

2.4.2 Analysis

All groundwater samples collected as part of the long-term monitoring program will be analyzed for VOCs and SVOCs by SW-846 Methods 8260 and 8270, respectively, by the analytical laboratory under a standard turnaround time of 30 days with NYSDEC ASP Category B deliverables. Quality Assurance (QA) and Quality Control (QC) samples in the form of blind duplicates, rinsate blanks, matrix spikes (MS) and matrix spike duplicates (MSD) will be collected at a rate of one per 20 environmental samples. Full data validation will be performed on 10 percent of the laboratory data.

Natural attenuation parameters consisting of dissolved oxygen, redox potential, chloride, nitrite, nitrate, sulfate, ferrous iron, alkalinity, dissolved sulfide, dissolved organic carbon, and dissolved gases (methane, ethane, ethene, and carbon dioxide) will also be analyzed. Dissolved sulfide, dissolved organic carbon, and the dissolved gases will be analyzed by an off-site laboratory. The remainder of the natural attenuation parameters will be analyzed using field instrumentation. Sample analysis methods are described in more detail in Section 3.0.

2.5 SAMPLING FREQUENCY

Wells sampled at both the MMA and the Siberia Area as part of the long-term monitoring program will be sampled on a semi-annual basis. Wells included in the program which are also monitored for other purposes (i.e., the Siberia Area reactive wall wells) will be monitored more frequently. The rationale for semi-annual sampling are as follows:

- Concentrations of detected compounds have not varied significantly over time, as demonstrated by the data attached in Appendices A and B;
- Groundwater at the WVA should be monitored twice a year, preferably during periods of relative high and low precipitation (i.e., spring and fall), to account for any seasonal variations in contaminant concentrations.

TABLE 2-5

GROUNDWATER SAMPLE ANALYSES
Watervliet Arsenal
Watervliet, New York

Analyte	Analyze	Rationale
VOCs	Yes	Elevated concentrations of VOCs (including DNAPL) in excess of the Class GA standards have been detected in several wells in both the MMA and the Siberia Area.
SVOCs	Yes	Elevated concentrations of SVOCs (including LNAPL) in excess of the Class GA standards have been detected in several wells in both the MMA and the Siberia Area.
Inorganic (metals)	Yes	Concentrations of inorganic contaminants in unfiltered samples above NYS Class GA standards were detected in 37 of the monitoring wells in the MMA (Table 2-1). However, Class GA standards for inorganics were exceeded in only two (2) of the filtered groundwater samples from monitoring wells. This indicates that dissolved inorganic contaminants are not a significant source of groundwater contamination at the MMA. At the request of the USEPA and NYSDEC, several wells were added for filtered and unfiltered inorganics. Concentrations of inorganic contaminants in unfiltered samples above NYS Class GA standards were detected in 15 of the monitoring wells at the Siberia Area (Table 2-3). However, Class GA standards for inorganics were exceeded in only four (4) of the filtered groundwater samples from monitoring wells, three (3) of which are located in the area of the Perfection Plating chromium plume currently under investigation by the NYSDEC. This indicates that dissolved inorganic contaminants associated with activities in the Siberia Area are not a significant source of groundwater contamination.
Pesticides	No	Trace concentrations of several pesticides have been detected in several groundwater samples at concentrations exceeding the Class GA groundwater standards of non-detect (Tables 2-1 and 2-3). However, the majority of the detections are estimated (i.e., "J" qualified) due to the extremely low concentrations. It is believed that the pesticide detections in groundwater are the result of past grounds maintenance practices at the WVA and do not represent a significant source of groundwater contamination.
PCBs	No	PCBs have not been detected in any of the groundwater samples collected from both the MMA or the Siberia Area.
NA Params.	Yes	The degree to which volatile organic compounds and petroleum compounds can biodegrade, or attenuate, under natural conditions can be evaluated by measuring the concentrations of several "natural attenuation parameters" (NA parameters) in the groundwater. Since both VOCs and petroleum compounds are found in the groundwater at the WVA, NA parameters associated with both VOC and petroleum degradation will be analyzed.

2.6 SAMPLING METHOD

All wells will be sampled according to the United States Environmental Protection Agency (USEPA) protocol for Low Stress (Low Flow) Purging and Sampling (USEPA, 1998). Dedicated, permanently installed bladder pumps will be installed in each of the wells included in the long-term sampling program. The permanent installation of the bladder pumps will eliminate the need for decontamination of pumps and allow for more efficient sampling. A flow-through cell will be used to measure field parameters during well purging and after sample collection. All non-dedicated equipment and instrumentation will be decontaminated before and after use. Sample collection methods and equipment decontamination procedures are described in more detail in Section 3.0.

2.7 WATER LEVEL MEASUREMENTS

Water levels will be measured in all wells and piezometers (i.e., including those wells which will not be sampled for chemical analyses) at both the MMA and the Siberia Area prior to groundwater sampling using a decontaminated water level probe. The water level in the Building 135 process pit will also be measured. Specific locations will also be checked for the presence of DNAPL and LNAPL using a decontaminated interface probe. Water level measurement procedures are described in more detail in Section 3.0

2.8 INVESTIGATION DERIVED WASTE

Groundwater that is purged from monitoring wells will be discharged to the ground surface within 50 feet of each monitoring well location in accordance with the NYSDEC Proposed Technical and Administrative Guidance Memorandum (TAGM) - Disposal of contaminated groundwater generated during Site Investigations, if the following criteria are met:

1. There is a defined site which is the source of the groundwater contamination;

2. There is no free product observed such as DNAPLs or LNAPLs;

3. The infiltrating groundwater is being returned to the same water bearing zone from which it is being purged.

If there is no recharge surface (i.e., grass, uncovered soil, etc.) located within 50 feet of a well, then the purge water will be containerized, brought to the Siberia Area, and discharged to the ground in a designated area upgradient of the pilot reactive wall area.

If the above criteria are not met the materials will be containerized in U.S. Department of Transportation (DOT)-approved, close-topped 55-gallon steel drums and disposed of off-site.

Some disposable personal protective equipment (PPE) and decontamination fluids will be generated. Attempts will be made to wash surface contamination off so that PPE (i.e., gloves and other disposable items) may be disposed of as ordinary solid waste. If contamination is suspected, these materials will be collected and containerized in DOT-approved, 55-gallon steel drums (separately from contaminated groundwater and disposed of off-site). IDW control procedures are discussed in more detail in Section 3.0.

2.9 MONITORING WELL MAINTENANCE

All monitoring wells at the MMA and the Siberia Area will be inspected as part of the monitoring well maintenance program during each semi-annual event. Monitoring well inspection will take place during water level measurement activities. The monitoring well maintenance program will consist of the following:

- Existing padlocks on all wells will be replaced with non-rusting, brass padlocks during the first semi-annual event. Lock integrity and function will be checked during every sampling event thereafter. Any non-functioning locks will be replaced during the same groundwater sampling event.

- Each monitoring well pad will be inspected for cracks, heaving/subsidence, and deterioration of the concrete. Well pads requiring repair will be repaired before the next semi-annual sampling event.

- Monitoring well surface casings or flush-mount casings/covers will be inspected for physical damage, rust, and paint condition. If a casing or flush mount casing/cover is damaged or rusted to the point where well integrity is in question, the casing or flush-mount casing/cover will be replaced prior to the next semi-annual sampling event. Wells which require repainting will be painted prior to the next sampling event.

- The total depth of each well will be measured and compared to the constructed total depth to assess whether the screened or open portion of the well has become filled with silt/sediment. If a significant portion (i.e., more than 25 percent) of the screened or open section of the well has been filled in, then the well will be redeveloped to remove the sediment before the next sampling event.

3.0 QUALITY ASSURANCE PROJECT PLAN

3.1 INTRODUCTION

Watervliet Arsenal (WVA) is being investigated under the terms of a Resource Conservation and Recovery Act (RCRA) 3013 Consent Order Agreement. On behalf of WVA, U.S. Army Corps of Engineers (USACE), Baltimore District, has contracted Malcolm Pirnie to plan and execute a long-term groundwater monitoring program of the Watervliet Arsenal. Malcolm Pirnie will perform all field sampling tasks for this project. The laboratory chosen as the primary analytical laboratory for the project will be a USACE CEMRD-ED-EC validated laboratory.

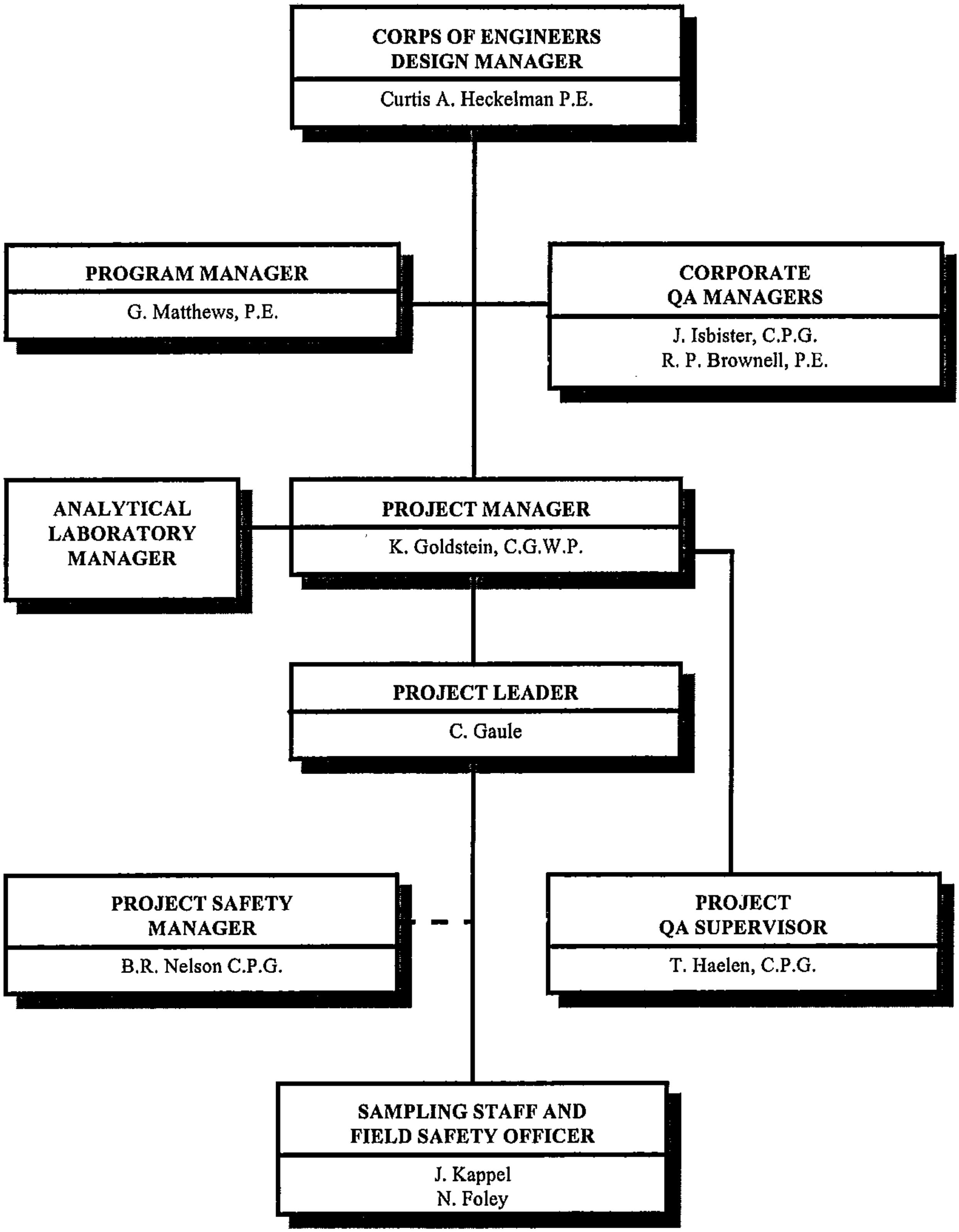
The objective of this QAPP is to ensure that all data collected during the long-term groundwater monitoring program are of acceptable quality. To meet this objective, the following six topics are presented and discussed in this document:

- Project organization and responsibilities;
- Data quality objectives and analytical requirements;
- Sample collection procedures;
- Sample integrity;
- Other field data collection procedures; and
- Field instrument calibration and maintenance.

3.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

All engineering and field operations shall be conducted by Malcolm Pirnie, Inc. The Organization Chart, showing the Project Manager, Project Leader, and field team personnel is included in Figure 3-1.

The Malcolm Pirnie Program Manager is responsible for appointing the project manager, supervising staff in the performance of project duties, and providing corporate support. The project manager, in turn, is responsible for managing the project staff and



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US Army Corps of Engineers

PROJECT ORGANIZATION
LONG-TERM MONITORING PLAN
WATERVLIET ARSENAL
USACE CONTRACT NO. DACA31-94-D-0017

FIGURE 3-1

communicating with the analytical laboratory and the client, assuring that all project QC procedures are followed, and providing additional authority, when required, to support the project QA supervisor.

The Malcolm Pirnie QA Manager appoints the project QA supervisor, and is responsible for supervision of the project QA supervisor in performance of project duties. The QA manager maintains Malcolm Pirnie's overall corporate QA program and interacts with the corporate officers, division managers, and client QA/QC personnel to correct problem situations as necessary. This director reviews all QA/QC reports to the principal engineer and the client.

The analytical laboratory manager is responsible for the overall management of the analytical laboratory, including the appointment and supervision of departmental managers, and for approving all analytical procedures and associated QC procedures.

The laboratory analytical task manager acts as liaison between Malcolm Pirnie field and laboratory operations and is responsible for the following:

1. Transferring sample custody from field members, verification of sample integrity, and transfer of sample fractions to appropriate analytical departments;

2. Coordination of sample analyses to meet project objectives;

3. Preparation of analytical reports, including coordination with the project QA supervisor to assure that the data are validated prior to release outside of the analytical laboratory;

4. Review of laboratory data for compliance with precision, accuracy, and completeness objectives;

5. Review of any QC deficiencies reported by the analytical department manager; and

6. Coordination of any data changes resulting from review by the QA supervisor and/or project manager.

The project manager and analytical laboratory department managers are responsible for providing consistent and accurate field or laboratory data and technical reports produced by analysts, project scientists or engineers, and sampling personnel under their supervision.

These individuals are responsible to the project manager for ensuring that all personnel under their direction are knowledgeable of the quality assurance/quality control (QA/QC) requirements of the project and that all QC and technical review procedures are followed, and documentation is provided.

The analytical laboratory QA director is responsible for coordination of laboratory work with the Malcolm Pirnie QA Supervisor. The analytical laboratory QA director maintains the overall corporate QA program and interacts with the corporate officers, division managers, and client QA/QC personnel to correct problem situations as necessary. This manager provides satisfaction of all QA/QC reports to the Malcolm Pirnie Project Manager and the client.

The project QA supervisor ensures that specific QA and primary technical operations are coordinated efficiently for a specific project. The analytical laboratory project QA officer is responsible for the approval of all QA/QC procedures on the project. The project QA manager is independent of the project team and is responsible for the following:

1. Performance and/or system audits of laboratory, field, and engineering operations to ensure compliance with the project QA plan;

2. Introduction of performance evaluation samples into the analytical flow scheme, as needed;

3. Notification to the project manager of any QC deficiencies discovered during audits;

4. Provision of guidance and coordination to rapidly resolve any QA/QC problems;

5. Maintenance of all project QA records and assembly of project QA data for inspection by Malcolm Pirnie project management and/or the client;

6. Independent review of QA/QC information to ensure the quality of all deliverables or outputs from the Malcolm Pirnie project team to the client; and

7. Interaction and communication with Malcolm Pirnie project management and/or the client QA personnel to resolve QA/QC problems specific to the project.

It is the responsibility of all project personnel, as well as the laboratory analysts, project scientists, and field team members, to perform and document the required QA/QC procedures. It is the responsibility of laboratory analysts to perform preliminary QC checks to ensure that each batch of data being generated passes all required QC criteria. Field team members must bring any unusual observations or analytical problems to the immediate attention of the project manager.

Ten percent of the samples analyzed by the analytical laboratory shall be data validated.

3.3 DATA QUALITY OBJECTIVES

The overall data quality objective is to ensure that data of known and acceptable quality are generated. The quality of data is measured through qualitative and quantitative parameters, known collectively as the PARCC parameters (Precision, Accuracy, Representativeness, Completeness, and Comparability).

Proper execution of each project task is needed to yield consistent information, results that are representative of the media and conditions being measured, and data that are useful for meeting the intended project objectives.

The analytical laboratory will perform the analyses for specified compounds using standardized methods, thereby generating data to provide a baseline for establishing control limits (for precision, accuracy, reporting limits) for daily analyses. The Quality Assurance Plans and Standard Operating Procedures for the laboratory that will perform the analysis are provided in Appendix C of this document.

- ***Methodology*** - All analytical work shall be conducted using USEPA-approved analytical methods in accordance with NYS Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP), 1989, Revised 1995 and any subsequent modifications. Table 3-1 lists the analytical methods to be used for this investigation.

- ***Units*** - Volume in liters (L) [e.g. micrograms per liter=µg/L] indicates a water matrix; control spikes are added to organic-free laboratory water.

TABLE 3-1

METHODS FOR SAMPLE ANALYSIS
Long-Term Groundwater Monitoring Program
Watervliet Arsenal
Watervliet, New York

Analyte	Method
Volatile Organics	SW-846 8260
Semi-Volatile Organics	SW-846 8270
Metals	SW-846, 6010, 7060, 7470/7471
Dissolved Sulfide	EPA 376.1
Dissolved Organic Carbon	SW-846 9060
Dissolved Gases (a)	AM15.01
Ferrous Iron	Hach® Field Colorimeter
Nitrate	Hach® Field Colorimeter
Nitrite	Hach® Field Colorimeter
Sulfate	Hach® Field Colorimeter
Chloride	Hach® Field Colorimeter
Alkalinity	Hach® Field Titration Kit

(a) Dissolved gases are methane, ethane, ethene, and carbon dioxide.

- ***Precision*** - is a measure of mutual agreement among individuals of the same property, usually under prescribed similar conditions. Precision is expressed in terms of standard deviation and is evaluated based on the calculated relative percent difference (RPD) of standard matrix spikes, sample matrix spikes, and sample duplicates (field duplicates and laboratory duplicates). The evaluation of precision for this project will be based on the RPD between duplicate standard matrix spikes, duplicate sample matrix spikes, and sample duplicates. RPD values of <20 (good), <50 (fair), and >50 (poor) will be used.

- ***Accuracy*** - is the degree of difference between measured or calculated values and true values. The difference is expected to be within the precision interval for the measurement to be deemed accurate. For this project, accuracy will be measured based on the average percent recovery of standard matrix control spikes.

- ***Representativeness*** - expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. To assure that the samples delivered to the laboratory for analysis are representative of the site conditions, quality assurance procedures for sample collection and handling (discussed below) will be followed whenever samples are collected.

- ***Completeness*** - is a measure of the amount of the data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. The goal and objective is 100 percent completeness. However, due to unforeseen field conditions, laboratory conditions and analytical limitations (such as matrix interferences or required dilution) which could result in data qualification, it may not be possible to achieve 100 percent completeness. The minimum level of laboratory completeness is expected to be 95 percent for each analytical parameter. The minimum level of project completeness will be 90 percent. This is expected to be achieved by ensuring proper sample packaging and extraction procedures. Also, for each sample received by the laboratory, especially those shipped in fragile containers, a backup sample will be made available in case breakages occur or in case the analyses criteria (described later in this section) of the QA plan are not met. The project manager has the responsibility of deciding whether resampling and reanalysis are required to meet the data quality objectives. The project manager will then inform the laboratory coordinator and the QA supervisor of the decision.

- ***Comparability*** - is the confidence with which one data set can be compared with another. All data will be calculated and reported in units consistent with standard procedures so that the results of the analyses can be compared with those of other laboratories. The objectives of the analytical laboratory for comparability are to:

1. Demonstrate traceability of standards to NIST or EPA sources;

2. Use standard methodology;

3. Report results from similar matrices in standard units;

4. Apply appropriate levels of quality control within the context of the laboratory QA program;

5. Participate in inter-laboratory studies to document laboratory performance; and

6. Follow NYSDEC data validation process which recommends the use of USEPA Region II data validation guidelines.

3.4 SAMPLE COLLECTION PROCEDURES

The sampling procedures described in this plan are designed to insure collection of representative samples for analysis, and are based on the following sources:

1. USEPA Region II GROUNDWATER SAMPLING PROCEDURE, LOW STRESS (LOW FLOW) PURGING AND SAMPLING, March, 1998.

2. USEPA Region II CERCLA QUALITY ASSURANCE MANUAL, October, 1989.

3. NYS Department of Environmental Conservation Analytical Services Protocol 9/89, Revisions 12/91, and any subsequent modifications.

4. RCRA Quality Assurance Project Plan Guidance, NYS Department of Environmental Conservation, Division of Hazardous Substances Regulation, 3/29/91.

5. USEPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, September 1986.

The objectives for each field team member are to:

1. Collect a sample that is representative of the matrix being sampled, and

2. Maintain sample integrity from the time of sample collection to receipt by the laboratory.

3.4.1 Decontamination of Sampling Equipment

Cross contamination of samples from any source is to be avoided. All sampling equipment must be clean and free from the residue of any previous samples. To accomplish this, the following procedures will be followed:

- All non-dedicated sampling equipment must be cleaned initially and prior to being reused. The following is the procedure for decontamination.
- Wash and scrub with low phosphate detergent;
- Rinse with tap water;
- Rinse with isopropanol, followed by hexane, followed by isopropanol (solvents must be pesticide grade or better);
- Rinse thoroughly with deionized water;
- Air dry; and
- Wrap in aluminum foil for transport.

Field filtration equipment will be decontaminated prior to use using a deionized water rinse.

Field instrumentation should be cleaned per manufacturer's instructions. Probes, such as those used in pH and conductivity meters, and thermometers must be rinsed prior to and after each use with deionized water.

3.4.2 Water Level Measurements

3.4.2.1 Measurement Objectives

Water levels in the groundwater monitoring wells will be measured and used in conjunction with horizontal and vertical ground survey data to determine horizontal components of groundwater flow. Water level measurements will also be used to determine the volume of standing water in the wells for purging activities.

3.4.2.2 Measurement Equipment

The following equipment will be used for the measurement of water levels:

- Electronic water level indicator
- Oil/Water interface probe
- Field logbook and pen
- Photoionization Detector (PID)
- Deionized Water
- Low Phosphate Detergent

3.4.2.3 Measurement Procedure

At each monitoring well, the PVC cap will be removed and the head space and breathing zone's air quality will be monitored with a PID.

The battery of the electric water level indicator will be checked by pushing the battery check button, and waiting for the audible signal to sound or the instrument light to come on. The water level indicator will be decontaminated before collecting a measurement in each well point by using an Alconox wash and deionized water rinse. The instrument will then be turned on and the probe will be slowly lowered into the monitoring well until the audible signal is heard or the instrument light goes on, indicating that the sensor in the probe has made contact with the water surface. The total depth of each well will be measured once the depth to water has been determined.

The depth to water will be recorded to the nearest one-hundredth of a foot, from the top of the measuring mark on the monitoring well or well point riser. The date, time, well number, and depth to water will be recorded in the field book.

Selected wells will also be gauged for the presence of LNAPL or DNAPL using an oil/water interface probe. The procedure for using the oil/water interface probe is identical to that of the electronic water level meter.

3.4.3 Groundwater Sampling

3.4.3.1 Sampling Objectives

Groundwater samples will be collected for chemical quality analysis. Specific sampling objectives are outlined in the Work Plan. Groundwater samples which will be collected at the WVA during each semi-annual groundwater sampling event are summarized in Table 3-2. A summary of the Contract Required Quantitation Limits for the groundwater samples is provided in Table 3-3.

3.4.3.2 Sampling Equipment

The following equipment will be needed to collect groundwater samples for analysis:

- Electric water level indicator
- Bladder pump
- Air compressor
- Generator
- Polyethylene discharge tubing
- Temperature, pH, dissolved oxygen, redox, specific conductivity and turbidity meters
- Photoionization Detector (PID)
- Field logbook and field logs
- Preservatives
- Laboratory prepared sample containers
- Roll of polyethylene sheeting
- Decontamination equipment

3.4.3.3 Sampling Procedures

Groundwater sampling will be conducted in accordance with the USEPA Region II Low-Flow Sampling protocol (USEPA 1998). A piece of polyethylene sheeting will be fitted over the monitoring well and laid on the ground. The sampling equipment will be placed on the polyethylene sheeting. The access port through the well cap will be removed, and the concentration of volatile organic vapors emanating from the monitoring well will be measured with the PID. This step may be omitted in those monitoring wells which have already demonstrated in the previous rounds of water level measurement that they contain no or insignificant amounts of vapors or gases. The PID will be calibrated before the start of each sampling event.

TABLE 3-2

SUMMARY OF GROUNDWATER SAMPLES
Long-Term Groundwater Monitoring Program
Watervliet Arsenal
Watervliet, New York

Location	Total Number of Sampling Locations	SW-846 8260	SW-846 8270	Inorganics	NA Parameters
GROUNDWATER SAMPLES					
Main Manufacturing Area	49	49	49	5	49
Siberia Area	55	55	55		55
QA/QC SAMPLES					
Field Duplicates		6	6	1	6
Field Blanks		6	6	1	6
Trip Blanks		10			
TOTALS	104	126	116	7	116

TABLE 3-3

SUMMARY OF CONTRACT REQUIRED QUANTITATION LIMITS
Long-Term Monitoring Program
Watervliet Arsenal
Watervliet, New York

Analyte	CRQL Water (µg/L)
Volatile Organics (8260)	
Benzene	0.7
Bromodichloromethane	5
Bromoform	5
Bromomethane	5
2-Butanone	10
Carbon disulfide	5
Carbon tetrachloride	5
Chlorobenzene	5
Chloroethane	5
2-Chloroethyl vinyl ether	5
Chloroform	5
Chloromethane	10
Dibromochloromethane	5
1,1-Dichloroethane	5
1,2-Dichloroethane	5
1,1-Dichloroethene	5
trans-1,2-Dichloroethene	5
1,2-Dichloropropane	5
cis-1,3-Dichloropropene	5
trans-1,2-Dichloropropene	5
Ethylbenzene	5
Methylene chloride	5
2-Methyl-2-pentanone	12
1,1,2,2-Tetrachloroethane	5
Tetrachloroethene	5
Toluene	5
1,1,1-Trichloroethane	5
1,1,2-Trichloroethane	5
Trichloroethene	5
Trichlorofluoromethane	4.6
Vinyl chloride	2
Xylene, total	5

TABLE 3-3

SUMMARY OF CONTRACT REQUIRED QUANTITATION LIMITS
Long-Term Monitoring Program
Watervliet Arsenal
Watervliet, New York

Analyte	CRQL Water (μg/L)
Semi-Volatile (8270)	
Acenaphthene	10
Acenaphylene	10
Anthracene	10
Benzidine	15.9
Benzo(a)anthracene	1.4
Benzo(b)fluoranthene	2.5
Benzo(k)fluoranthene	5
Benzo(a)pyrene	1.3
Benzo(ghi)perylene	10
Butylbenzylphthalate	10
bis(2-Chloroethyl)ether	3
bis(2-Chloroethoxy)methane	5
bis(2-Ethylhexyl)phthalate	10
bis(2-Chloroisopropyl)ether	10
4-Bromophenylphenylether	10
2-Chloronapthalene	5
2-Chlorophenol	3.1
4-Chloro-3-methylphenol	2
4-Chlorophenylphenylether	1.9
Chrysene	1.4
Dibenzo(a,h)anthracene	10
di-n-Butylphthalate	10
1,3-Dichlorobenzene	5
1,2-Dichlorobenzene	5
1,4-Dichlorobenzene	5
3,3'-Dichlorobenzene	5
2,4-Dichlorophenol	2.8
Diethylphthalate	10
2,4-Dimethylphenol	2.5
Dimehtylphthalate	10
2,4-Dinitrophenol	15.6
2,4-Dinitrotoluene	5
2,6-Dinitrotoluene	14.9
di-n-Octylphthalate	10

TABLE 3-3

SUMMARY OF CONTRACT REQUIRED QUANTITATION LIMITS
Long-Term Monitoring Program
Watervliet Arsenal
Watervliet, New York

Analyte	CRQL Water (μg/L)
Semi-Volatiles (8270) (Cont'd)	
Fluoranthene	10
Fluorene	10
Hexachlorobenzene	2.5
Hexachlorobutadiene	5
Hexachlorocyclopentadiene	5
Hexachloroethane	10
Indeno(1,2,3-cd)pyrene	1.8
Isophorone	10
2-Methyl-4,6-dinitrophenol	4.6
Naphthalene	10
Nitrobenzene	5
2-Nitrophenol	3.1
4-Nitrophenol Water (ug/l)	8.5
n-Nitrosodimethylamine	1
n-Nitrosodi-n-propylamine	2.8
n-Nitrosodiphenylamine	12.2
Pentachlorophenol	21.9
Phenanthrene	10
Phenol	1
Pyrene	10
1,2,4-Trichlorobenzene	5
2,4,6-Trichlorophenol	2.9
2-Methylnapthalene	10
Metals	
Barium	5
Cadmium	3
Chromium	3
Silver	2
Lead	2.5
Arsenic	2.5
Selenium	1
Mercury	0.2

The well will be purged using the permanent, dedicated bladder pump installed in each well at a steady rate of 200 to 500 milliliters per minute (ml/min) while maintaining a drawdown of no more than 0.3 feet in the well. Measurements of field parameters consisting of pH, specific conductance, temperature, dissolved oxygen, reduction potential, turbidity, and water level will be made in each monitoring well prior to, during, and after purging (just before sampling) through the use of a flow-through cell. Both the pH and the specific conductivity meters will be calibrated for water temperature before each sampling event.

The volume of water removed from each monitoring well will be dependent upon the amount of time required for stabilization of the field parameters. In general, the well will be considered stabilized for sample collection when field parameters have stabilized for three consecutive readings as follows:

- pH: +/- 0.1 standard units
- Specific Conductance: +/- 3%
- Reduction Potential: +/- 10 millivolts
- Dissolved Oxygen +/- 10%
- Turbidity +/- 10%

When the field parameters have stabilized, the volume of water will be recorded, and groundwater in the monitoring well will be sampled through the bladder pump at a flow rate between 100 and 250 ml/min. The purge water will be discharged in accordance with Section 3.7.

The two 40 ml vials for volatile organic analysis will be filled first, without leaving any head space. All other sample bottles will be filled such that some headspace remains in the bottle. The analytical parameters and order of sample collection for groundwater samples will be:

1. In-situ measurements: temperature, pH, specific conductance, turbidity, dissolved oxygen, reduction potential, and PID
2. Volatile organics
3. Semi-volatile organics
4. Inorganics (filtered/unfiltered)
5. Natural attenuation parameters

Aqueous samples to be analyzed for dissolved organic carbon and dissolved sulfide will be field filtered using a filtering apparatus made of polyethylene, polypropylene, or borosilicate glass, and a cellulose-based, 0.45 micron filter. This device will be decontaminated prior to use All paperwork accompanying samples to the analytical laboratory should clearly state that the samples have been field filtered to avoid a second filtration in the laboratory. The sample bottles will be pre-preserved by the laboratory according to the analytical protocols. The sample bottles will be immediately placed in a cooler held at 4°C.

The natural attenuation parameters, chloride, ferrous iron, sulfate, nitrate, and nitrite will be analyzed using a Hach® DR 800 Series colorimeter. Alkalinity will be analyzed using a Hach® drop titration kit. Specific procedures for field analysis of these parameters are presented in the instrument manuals attached in Appendix C.

Disposable gloves will be worn by the sampling personnel and changed between sampling points. While performing any equipment decontamination, phthalate-free gloves (neoprene or natural rubber) will be worn in order to prevent phthalate contamination of the sampling equipment by interaction between the gloves and the organic solvent(s).

Data to be recorded in the field logbook will include the purging and sampling methods, depth to water, volume of water removed during purging, pH, temperature and specific conductivity values, and PID readings.

3.4.4 Containers, Preservatives, and Holding Times

Sample integrity is preserved through the use of proper sample containers, addition of the correct preservatives to the samples, and meeting designated holding times (the time from sample collection to sample analysis).

The field team leader is responsible for proper sample collection, labeling, preservation, and shipment to the laboratory to meet required holding times. Table 3-4 identifies the proper containers, preservation techniques, and maximum holding times.

The analytical laboratory will supply Malcolm Pirnie with commercially-cleaned sample containers. The containers will meet or exceed cleaning and quality control

TABLE 3-4

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIME REQUIREMENTS
Long-Term Monitoring Program
Watervliet Arsenal
Watervliet, New York

Matrix	Analysis	Container	Preservation	Holding Time
Groundwater	Volatiles - 8260	2 - 40 mL glass	HCl to pH < 2 Cool to 4°C	7 days
Groundwater	Semi-Volatiles - 8270	1 - 1L amber glass	Cool to 4°C	7 days
Groundwater	Inorganics	1L - plastic	HNO_3 to pH < 2	6 months
Groundwater	Dissolved Sulfide - EPA 376.1	500 mL - plastic	NaOH to pH > 12 Cool to 4°C	5 days
Groundwater	Dissolved Organic Carbon - 9060	100 mL - plastic	H_2SO_4 to pH < 2 Cool to 4°C	26 days
Groundwater	Dissolved Gases - AM15.01 (a)	4 - 40 mL glass	Cool to 4°C	14 days
Groundwater	Chloride, Nitrate, Nitrite, Sulfate	NA - Hach Field Colorimeter	NA	NA
Groundwater	Alkalinity	NA - Hach Drop Titration Kit	NA	NA

(a) Methane, ethane, ethene, carbon dioxide.

requirements of USEPA OSWER Directive 9240.0-05, Specifications for Obtaining Contaminant-Free Sample Containers. Sample containers will be stored in clean, dust-free areas that are segregated from the analytical laboratory and solvent/reagent storage areas.

3.4.5 Quality Control Samples

Sample blanks and field duplicate samples will be collected to ensure proper QA/QC, and will be prepared and submitted for analysis along with the actual samples. The collection procedures and frequency of collection of these samples are presented below.

- ***Trip Blanks*** - When collecting environmental aqueous samples for volatile organic compound analysis, a trip blank is taken into the field as part of the sampling kit (the set of appropriate containers used to collect the samples). Trip blanks consist of demonstrated analyte-free water sealed in 40 ml Teflon®-lined septum vials. A clean pair of latex gloves must be worn when preparing a trip blank. These blanks are used to determine whether collected samples have been contaminated by outside sources during shipment or storage. One trip blank sample will be prepared and carried with every shipment of aqueous samples that are to be analyzed for volatiles.

- ***Equipment Blanks*** - Equipment blanks are used to determine whether non-dedicated sampling equipment has been properly decontaminated and assure that there is no cross-contamination of samples due to unclean equipment. Equipment blanks are prepared by pouring demonstrated analyte-free water over decontaminated sampling equipment (using a clean pair of latex gloves), and collecting the rinse water in sample bottles. The collected samples are then preserved and handled in the same manner as the samples, and will be analyzed for the same parameters as the actual samples.

- ***Field duplicates*** - are collected in such a manner that they are equally representative of parameters of interest at a given point in space and time. They are separate from laboratory duplicates, which demonstrate analytical precision. Field duplicates will be collected at a rate of one per 20 environmental samples. The field duplicate samples will be "blind" duplicates, meaning that the laboratory must not know that the sample is a duplicate; therefore, the duplicates will be numbered in the same manner as the other samples, and may be numbered randomly. The duplicate samples will be identified in the field notes, but not on the chain-of-custody recorded by the field team at the time of collection.

- ***Matrix Spike/Matrix Spike Duplicates*** - Aqueous VOA and extractable organic samples must be collected at three times their standard volume at the frequency of one per 20 environmental samples for the off-site laboratory. This will provide the laboratory with the required additional volume for performing QC analysis on-site specific samples. The additional sample volume is spiked with a known quantity and quality. The percent recovery will be used to calculate accuracy. The relative current difference (RPD) for each component will be used to calculate precision.

3.5 SAMPLE CUSTODY

An essential part of any program that requires sampling and analysis is ensuring sample integrity from collection to data reporting. This includes the ability to trace the possession and handling of samples from collection through analysis and final disposition. The documentation of the history of the sample is referred to as chain-of-custody. This section addresses the following sample custody procedures:

- Sample Identification and Labeling
- Sample Custody in the Field
- Sample Shipping
- Sample Custody in the Laboratory
- Document Control

3.5.1 Sample Identification and Labeling

All samples collected will be identified by affixing a unique sample label to each sample container. Indelible ink will be used to complete sample labels. After they are affixed to the containers, the labels will be covered with clear plastic waterproof tape.

Each sample will have a unique designation, using an alphanumeric codes, that will identify the site, the type of sample, the sample location, and the series number at the location. The codes to be used and examples of sample designations using the codes are provided below. The labels will not indicate that a sample is a duplicate or a blank.

CODES:

WVA Watervliet Arsenal

GW Groundwater Sample from Monitoring Well

Examples:

Groundwater Sample from Monitoring Well 98MPI-AW-MW-61	WVA-GW-98MPI-AW-MW-61

Each label will contain the following information:

1. Site Name
2. Project Number
3. Sample Number
4. Sample Matrix
5. Company Name
6. Parameters to be Analyzed
7. Date of Collection
8. Time of Collection
9. Preservation Technique Employed
10. Sampler's Name

Figure 3-1 provides an example of a typical sample label.

3.5.2 Sample Custody in the Field

Sample custody in the field consists of documenting all field activities related to sampling and establishing an accurate written record that traces the possession and handling of each sample from the moment of its collection, through shipment to the laboratory, and ultimately through analysis. The custody procedures described herein conform with US Army Corps of Engineers Guidance ER 1100-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities, and are modeled after standard USEPA procedures.

Field activities will be documented in a field notebook. All field notes will be recorded in indelible ink on standard forms or in bound notebooks. All standard forms used during the field investigation will be bound in a notebook and centrally located on-site at the end of each day. The notebook will be signed and dated at the end of each day. Similarly, significant events occurring during the day will be reported to the project manager at the end of each day. All field notes will be reviewed by the project manager.

At a minimum, the notebook will contain the following sample particulars:

- Sample number
- Date and time of sample collection
- Sample location
- Name of collector
- Analytical work to be done
- Type of sample, and whether the sample is a duplicate, quality assurance, or quality control sample
- Volume of sample taken
- Type of container, number of containers/samples
- Any field observations or measurements (e.g. pH, temperature, specific conductance)
- Type of concentration: low, medium, high
- Preservatives used
- Sampling methodology/special features
- Sampler's signature
- Method of shipment to the laboratory

After samples are collected, chain-of-custody records will be used to trace the possession and handling of the samples. A chain-of-custody record is a printed form that accompanies a sample or group of samples as custody is transferred from person to person. Figure 3-2 provides the typical chain-of-custody document.

As soon as practical after sample collection, the following information must be entered, in indelible ink, on the chain-of-custody record:

1. Project number.

2. Project name.

3. Sampler(s) signature(s).

4. Sample identification code for each sample contained in the shipment. This code appears on the sample label.

5. The date-of-collection of each sample, entered as six-digit number indicating the year, month, and day.

6. The time-of-collection of each sample, entered as a four-digit number indicating the military time of collection; for example, the time entered for a sample collected at 1:54 p.m. would be 13:54 hrs.

7. The matrix of each sample (e.g. soil, aqueous, sludge).

8. The analysis and analytical method to be performed for each sample.

9. The number of containers for each sample identification code (when analyzing for several chemical parameters, a number of containers are filled at each sampling location).

10. Remarks. Enter any appropriate remarks.

A person is in custody of a sample if the sample is:

- In that person's physical possession;
- In view after being in that person's physical possession;
- Placed in a locked repository by that person, or;
- Placed in a secure, restricted area by that person.

CHAIN-OF-CUSTODY RECORD

Page ____ of ____

REPORT TO		INVOICE TO		
COMPANY	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	REQUESTED ANALYSES												COMMENTS
	/																				
	/																				
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	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1		/		/		
2		/		/		
3		/		/		

WHITE: LABORATORY COPY **YELLOW**: REPORT COPY **PINK**: CLIENT'S COPY

US Army Corps of Engineers

WATERVLIET ARSENAL
WATERVLIET, NEW YORK

TYPICAL CHAIN-OF-CUSTODY

FIGURE 3-2

Custody of the samples may be transferred several times prior to their arrival at the laboratory. For example, a field team shipper may be designated to receive all samples from field team members. When transferring custody to another responsible individual, perform the following:

1. Enter the date and time of sample transfer on the chain-of-custody form, and sign the form, under the "Relinquished by:" entry.
2. Make certain that the individual receiving custody signs the "Received by:" entry.

When transferring custody to a common carrier (e.g. Federal Express), perform the following:

1. Enter the date and time of sample transfer on the chain-of-custody form, and sign the form, under the "Relinquished by:" entry.
2. Enter the name of the carrier under the "Received by:" entry.
3. Enter the bill-of-lading or Federal Express airbill number under the "Remarks:" entry.
4. Follow the packaging procedures presented in Section 3.5.3

3.5.3 Sample Shipping

The following procedures shall be followed for packaging and shipping of samples:

1. Coolers shall be used to ship samples.
2. All labels shall be written with indelible ink.
3. Approximately 3 inches of inert cushioning material such as vermiculite shall be placed in the bottom of the cooler.
4. Each sample container shall be enclosed in a clear plastic bag through which the labels are visible, and the bag sealed. The containers shall be placed upright in the cooler in such a way that they do not touch, and will not touch during shipping.
5. Additional vermiculite packing material shall be placed in the cooler to partially cover the sample containers (more than halfway). Bags of ice shall then be placed around, among, and on top of the sample containers.

6. The cooler shall then be filled with cushioning material.

7. The original chain-of-custody form shall be placed in a waterproof plastic bag and placed inside the cooler. Retain a copy of the form with the field records.

8. The drain of the cooler shall be taped shut.

9. The cooler lid shall be secured by taping. The cooler shall be wrapped completely with strapping tape at a minimum of two locations in such a way that no labels are covered.

10. The shipping label shall be attached to top of cooler.

11. "This Side Up" labels with arrows and "Fragile" labels shall be placed on at least two sides of the cooler.

12. Numbered and signed custody seals shall be affixed on the front right and back left sides of the cooler, across the lid and body of the cooler. These seals shall be covered with wide, clear tape. A sample custody seal is shown on Figure 3-3.

3.5.4 Sample Custody in the Laboratory

Once the samples arrive at the laboratory, custody of the samples will be maintained by laboratory personnel. Each sample will be identified upon receipt by the laboratory and cross-referenced to the chain-of-custody record. Any inconsistencies will be noted on the custody record. Laboratory personnel will immediately notify the Malcolm Pirnie Quality Control Officer, field manager, or project manager if inconsistencies are identified.

The analytical laboratory will have written SOPs for maintaining security of samples and tracking the work performed on samples through the entire analytical process. The SOP requires that sample receipt, sample extraction/preparation, sample analysis, data reduction and data reporting be documented by the laboratory.

3.5.5 Document Control

Document control consists of maintaining a project file, an analytical laboratory batch file, a project field file, and a QA project file. The project file will be maintained by the Malcolm Pirnie Project Manager and will contain all original documents. Project personnel

CUSTODY SEAL

DATE ______________________________

SIGNATURE ____________________________

PRECLEANED CONTAINERS
FROM
Scientific Specialties Service Inc
P.O. Box 352
Randallstown, MD 21133 USA
over 25 years of service to industry & research

US Army Corps of Engineers

WATERVLIET ARSENAL
WATERVLIET, NEW YORK

SAMPLE CUSTODY SEAL

FIGURE 3-3

may keep their own files; however, all original documents will be kept in the project file. All laboratory records, including batch forms, log sheets, and computerized worksheets, will be kept by the analytical laboratory in a batch file in the sample control center. Field logs will be maintained by the project manager in a project field file. The project QA supervisor will independently maintain a QA project file. At the end of the project, the QA project file will be turned over to the project manager. The following documents will be placed in the QA project file:

1. QA records maintained throughout the investigation;
2. Documentation of QA system and performance audits;
3. Documentation of all unusual findings or observations;
4. Documentation of all QA corrective actions;
5. All official QA correspondence received or issued relating to the investigation, including records of telephone calls;
6. One copy of all QA deliverable review sheets; and
7. Any other QA documents related to the project or followup activities related to the investigation.

3.6 EQUIPMENT CALIBRATION AND MAINTENANCE PROCEDURES

Instruments must be properly calibrated to produce technically valid data. Documented calibration and calibration check results verify that the instruments used for measurement are in proper working order and the data produced is reliable. The calibration requirements described or referenced in this section are necessary to support the data quality objectives for this project. When calibration requirements are met, the data will support the focussed investigation decisions dealing with the nature and extent of contamination and safety concerns. In the event that the data is used in court, documented calibrations are necessary to ensure that the data is legally defensible.

3.6.1 Field Equipment Calibration

The following table provides a list of the tasks that will require field equipment, and the specific field instruments that will be used for each task and which require calibration.

TASK	FIELD INSTRUMENT
Groundwater Sampling	MiniRae Photoionization Detector pH Meter Temperature Probe Specific Conductivity Meter Turbidimeter Hach DR 800 Series Colorimeter Reduction Potential Meter Dissolved Oxygen Probe

3.6.2 General Procedures

The operation and maintenance procedures for the field equipment to be used during groundwater sampling are provided in Appendix C. General calibration procedures and requirements are described below:

- All instruments will be calibrated at least once a month.

- All instruments will have the calibrations checked at a minimum at the start of each day before measurements are made.

- The calibration and calibration checks will indicate that the sensitivity of the instrument (practical detection limit) is adequate to meet project needs and that the instrument is accurate over the working range.

- All calibration information will be recorded in the field log book. This includes date and time, technician signature, calibration procedure, calibration results, calibration problems, recalibration and maintenance, and instrument serial numbers.

- All calibration standards will be of National Bureau of Standards (NBS) quality and their sources listed and documented so that standards are traceable. In addition, only technicians trained in the use of the field instruments will operate them. If the instrument readings are incorrect at the time of the initial calibration, the instrument will either be calibrated by the technician or returned to the manufacturer for calibration. If the instrument readings are incorrect after a continuing calibration check, the preceding sample results will be reviewed for validity, and reanalyzed if necessary.

3.6.3 Laboratory Calibration Procedures

All samples analyzed according to the USEPA standard analytical methods and shall follow the procedures described by the methods. All calibration results shall be recorded and kept on file, and will be reviewed and evaluated by the data validator as part of analytical data validation procedures.

Instrument calibration will be checked with a reference standard prior to the analysis of any sample. The standards used for calibrations will be traceable to the National Bureau of Standards (NBS), and each calibration will be recorded in the laboratory notebook for the particular analysis. Any printouts, chromatograms, etc., generated for the calibration will be kept on file.

3.7 INVESTIGATION DERIVED WASTE

Groundwater that is purged from monitoring wells will be discharged to the ground surface within 50 feet of each monitoring well location in accordance with the NYSDEC Proposed Technical and Administrative Guidance Memorandum (TAGM) - Disposal of contaminated groundwater generated during Site Investigations, if the following criteria are met:

1. There is a defined site which is the source of the groundwater contamination;
2. There is no free product observed such as DNAPLs or LNAPLs;
3. The infiltrating groundwater is being returned to the same water bearing zone from which it is being purged.

If there is no recharge surface (i.e., grass, uncovered soil, etc.) located within 50 feet of a well, then the purge water will be containerized, brought to the Siberia Area, and discharged to the ground upgradient of the reactive wall area.

If the above criteria are not met the materials will be containerized in U.S. Department of Transportation (DOT)-approved, close-topped 55-gallon steel drums for disposal off-site.

Some disposable personal protective equipment (PPE) and decontamination fluids will be generated. Attempts will be made to wash surface contamination off so that PPE (i.e., gloves and other disposable items) may be disposed of as ordinary solid waste. If contamination is suspected, these materials will be collected and containerized in DOT-approved, 55-gallon steel drums (separately from contaminated groundwater for disposal off-site).

4.0 REPORTING

Upon completion of each sampling event Malcolm Pirnie will prepare a summary report and submit the report for review to the USACE - Baltimore District, Watervliet Arsenal, and the appropriate regulatory agencies. The purpose of this report will be to present the field observations from that round of sampling, potentiometric contour maps, and summary tables of the analytical data. The report will present trend analysis of the analytical results for each well sampled. This trend analysis will be used to make recommendations as to the elimination of wells from further sampling. The report will also present the recommendations for site activities to be completed prior to the next sampling event, such as lock replacement, casing repainting, and replacement of protective casings.

HEALTH AND SAFETY PLAN WATERVLIET ARSENAL, Watervliet, New York

Baltimore Corps of Engineers
Baltimore, Maryland

US Army Corps of Engineers
Baltimore District
DRIVEN BY A VISION...to be the BEST

Prepared by:

Malcolm Pirnie, Inc.
15 Cornell Road
Latham, New York 12110

November 1998
0285-732

MALCOLM PIRNIE

SITE SPECIFIC SAFETY AND HEALTH PLAN

SECTION 1: GENERAL INFORMATION & DISCLAIMER

CLIENT NAME: USACE Baltimore	PROJECT NAME: Long-Term Monitoring, Watervliet Arsenal
PROJECT MANAGER: Kenneth Goldstein	
PROJECT LEADER: Christopher Gaule	REVISION DATE:
SITE HEALTH & SAFETY OFFICER: Jason Kappel	
PREPARED BY: Christopher Gaule	DATE: 10/30/98

NOTE: This Site Specific Safety and Health Plan (SSSHP) has been prepared for use by Malcolm Pirnie, Inc. employees for work at this site. Malcolm Pirnie, Inc. is not responsible for its use by others. **The plan is written for the specific site conditions, purposes, tasks, dates and personnel specified and must be amended and reviewed by those named in Section 16 if these conditions change.**

Subcontractors shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. In accordance with 1910.120(b)(1)(iv) and (v), Malcolm Pirnie, Inc. will inform subcontractors of the site emergency response procedures, and any potential fire, explosion, health, safety or other hazards by making this Site Specific Safety and Health Plan and site information obtained by others available during regular business hours. All contractors and subcontractors are responsible for: (1) developing their own Health and Safety Plan including a written Hazard Communication Program and any other written hazard specific programs required by federal, state and local laws and regulations; (2) providing their own personal protective equipment; (3) providing documentation that their employees have been health and safety trained in accordance with applicable federal, state and local laws and regulations; (4) providing evidence of medical surveillance and medical approvals for their employees; and (5) designating their own site safety officer responsible for ensuring that their employees comply with their own Health and Safety plan and taking any other additional measures required by their site activities.

If an upgrade to Level "C" or above is anticipated, this Site Specific Safety and Health Plan must be reviewed/approved by Health and Safety, Corporate.

SECTION 2: PROJECT INFORMATION

(1) SITE INFORMATION

Site Name:	Main Manufacturing/Siberia Areas	Site Project Client Contact:	Curtis A. Heckelman
Address:	Watervliet, New York	Phone No.:	(410) 962-2783
		Site Health & Safety Contact:	Maira Senick
		Phone No.:	266-5731

(2) SITE CLASSIFICATION: (check and circle all that apply)

X	Hazardous (RCRA)
	Construction
	Sanitary or C and D Landfill
	First Entry
	Hazardous (CERCLA/State Superfund)
	UST/LUST
X	Manufacturing
	Previously Characterized
X	Active
	Inactive

_______ Other

Explain:

(3) ENTRY OBJECTIVES AND DATES OF FIELD VISIT(S):

Conduct groundwater sampling activities through-out Watervliet Arsenal during 1999 and 2000

(4) MALCOLM PIRNIE TASKS:

Malcolm Pirnie will conduct groundwater sampling from the monitoring wells identified in the Long-Term Monitoring Plan.

TASKS PERFORMED BY OTHERS:

(5) PROJECT ORGANIZATION AND COORDINATION - The following Malcolm Pirnie personnel are designated to carry out the stated project job functions on site. (Note: One person may carry out more than one job function.)

	PROJECT MANAGER	Kenneth Goldstein
	SITE SAFETY OFFICER	Jason Kappel
	ALTERNATE SITE SAFETY OFFICER	Nicole Foley
	PUBLIC INFORMATION OFFICER	Nicole Foley
	SITE RECORDKEEPER	Jason Kappel
	ON-SITE PERSONNEL WITH CPR/FA	Jason Kappel
	FIELD TEAM LEADER	Jason Kappel
	FIELD TEAM MEMBERS	Jason Kappel
		Nicole Foley
VISITORS:	FEDERAL AGENCY REPS	
	STATE AGENCY REPS	
	LOCAL AGENCY REPS	
SUBCONTRACTORS:-	SUBCONTRACTOR(S) SITE SAFETY OFFICERS	

All personnel arriving or departing the site should log in and out with the Recordkeeper.

(6) ONSITE CONTROL

Jason Kappel has been designated to coordinate access control and security for Malcolm Pirnie operations on site. A safe perimeter has been established at a distance of approximately ten feet from the well being sampled.

No unauthorized person should be within this area.

The onsite Command Post and staging area have been established at the onsite vehicle being used by Malcolm Pirnie personnel, this vehicle will be located outside the sampling exclusion zone.

The prevailing wind conditions are SE. A wind direction indicator is used to determine daily wind direction. The Command Post is located upwind from the Exclusion Zone or at a sufficient distance to prevent exposure should a release occur.

Control boundaries have been established and Exclusion Zone(s) (the contaminated area) have been identified. (Attach site map)

These boundaries are identified by: an area approximately ten feet around the sampling area

SECTION 3: PHYSICAL HAZARDS INFORMATION

(1) IDENTIFY POTENTIAL PHYSICAL HAZARDS TO WORKERS:

____ Confined Space	____ Steep/uneven terrain	____ Surface water
____ Heavy equipment	____ Heat stress	____ Drum handling
____ Moving parts	____ Extreme cold	____ Noise
____ Heavy Lifting	____ Ionizing Radiation	____ Non-Ionizing Radiation
____ Electrical	____ Traffic	____ Falls
____ Overhead Hazards	____ Biological Hazards	

Describe other unsafe environments ____

(2) SAFETY EQUIPMENT REQUIRED FOR MALCOLM PIRNIE EMPLOYEES

____ Explosimeter	X Eye Wash	____ Snake Bite Kit
____ Fall Protection Equipment	____ Emergency Shower	____ Floatation Device (USCG Type III)
	____ Barrier Tape	X Emergency Air Horn
____ Confined Space Equipment	X Traffic Cones	____ Lights
	____ Stretcher	____ Lights - emergency
____ Ladder	X A-B-C Fire Extinguisher	____ Communications - On Site
X First Aid Kit	____ Tick Repellant	____ Communications - Off Site

Describe other ____

SECTION 4: CHEMICAL HAZARDS INFORMATION

(1) IDENTIFIED CONTAMINANTS

Known or suspected hazardous/toxic materials (attach historical information, physical description, map of contamination and tabulated data, if available)

Media	Substances Involved	Characteristics	Estimated Concentrations	PEL
GW	See attached	sampling summary	table.	

Media types: GW (ground water), SW (surface water), WW (wastewater), AIR (air), SL (soil), SD (sediment), WL (waste, liquid), WS (waste, solid), WD (waste, sludge), WG (waste, gas), OT (other).

Characteristics: CA (corrosive, acid), CC (corrosive, caustic), IG (ignitable), RA (radioactive), VO (volatile), TO (toxic), RE (reactive), BIO (infectious), UN (unknown), OT (other, describe)

(2) DESCRIBE POTENTIAL FOR CONTACT WITH EACH MEDIA TYPE FOR EACH OF THE MPI TASKS LISTED IN SECTION 2.4:

MPI TASK #	ROUTE OF EXPOSURE	POTENTIAL FOR CONTACT	METHOD OF CONTROL
Groundwater Samp	Dermal	Low	Safety Equipment

The Site Safety Officer will brief the MPI field team on symptoms and signs of overexposure to chemical hazards.

SECTION 5: HAZARD COMMUNICATION PROGRAM

If chemicals are introduced to the site by Malcolm Pirnie, Inc. (e.g., decontamination liquids, preservatives, etc.), bring a copy of the Malcolm Pirnie, Inc. Hazard Communication Program and Material Safety Data Sheets (MSDSs) to the site. The Site Safety Officer will review this information with all field personnel prior to the start of the project. The Comprehensive List of Chemicals for this site is:

Hexane

Isopropanol

SECTION 6: ENVIRONMENTAL MONITORING

(1) The following environmental monitoring instruments shall be used on site at the specified intervals.

EQUIPMENT		MONITORING PERIOD		PEL/REL/TLV	ACTION LEVEL
Combustible Gas Indicator	-	continuous/hourly/daily/other		25%	10%
O_2 Monitor	-	continuous/hourly/daily/other		19.5 - 25%	19.5
Colorimetric Tubes (type)	-	continuous/hourly/daily/other			
	-				
	-				
	-				
PID (Lamp 10.2___ eV)	-	continuous/hourly/daily/other	continuous		
FID	-	continuous/hourly/daily/other			
Radiation Meter	-	continuous/hourly/daily/other			
Respirable Dust Monitor	-	continuous/hourly/daily/other			
Toxic Gas Indicator	-				
(Type)	-	continuous/hourly/daily/other			
Other	-	continuous/hourly/daily/other			
	-	continuous/hourly/daily/other			

(2) Monitoring equipment is to be calibrated according to manufacturers' instructions. Record calibration data and air concentrations in the Health and Safety on-site log book.

(3) Recommended Action Levels for Upgrade or Downgrade of Respiratory Protection or Site Shutdown and Evacuation. These are average values. Consideration should be given to the potential for release of highly toxic compounds from the waste or from reaction by-products. Levels are for persistent (> 10 min) breathing zone measurements.

	Uncharacterized Airborne Vapors or Gases	Characterized Gases, Vapors, Particulates*
Level D	Background*	Up to 50% of PEL, REL or TLV
Level C	Up to 5 ppm above background	Up to 25 times PEL, REL or TLV
Level B	5 ppm to 500 ppm above background	Up to 500 times PEL, REL or TLV
Level A	500 ppm to 1000 ppm above background	Up to 1000 times PEL, REL or TLV

*Off-site "clean" air measurement.

*Use mixture calculations (% allowed = $\sum C_n / PEL_n$) if more than one contaminant is present.

Oxygen Deficiency

Concentration	Action Taken
< 19.5% O_2	Leave Area. Reenter only with supplied-air respirators.
19.5 % to 25% O_2	Work may continue. Investigate changes from 21%.
> 25% O_2	Work must stop. Ventilate area before returning.

Flammability

Concentration	Action Taken
< 10% of LEL	Work may continue. Consider toxicity potential.
10% to 25% LEL	Work may continue. Increase monitoring frequency.
> 25% LEL	Work must stop. Ventilate area before returning.

Radiation

Intensity	Action Taken
< .5 mR/hr	Work may continue.
< 1 mR/hr	Work may continue. Continue to monitor. Notify Corporate Health and Safety and Corporate Health Physicist.
5 mR/hr	Radiation work zone. Work must stop.

SECTION 7: HEALTH AND SAFETY TRAINING AND MEDICAL MONITORING PROGRAM

The project staff is included in the Malcolm Pirnie Health and Safety training and medical monitoring programs. (See the Health and Safety Procedures Manual, Sections 3, 4 and 5.)

HAZWOPER TRAINING

NAME	MEDICAL (Date)	INITIAL (Hrs/Date)	REFRESHER (Date)	MGR/SUPV (Date)	CPR / FA / BBP (Dates)	FIT TEST (Make/Size/Type/Date)
Jason Kappel	06/98	40 | 10/95	10/97		07/98 | 07/98 |0798	MSA / L / FF / 10/95
Nicole Foley	06/98	40 | 08/97			07/98 | 07/98 |07/98	/ / /
Christopher Gaule	07/97	40 | 05/88	10/97	06/91	03/97 | 3/97 | 3/97	MSA / L / FF /10/95
		|			| |	/ / /
		|			| |	/ / /
		|			| |	/ / /

SECTION 8: PERSONAL MONITORING

The following personal monitoring will be in effect on site:

Personal exposure sampling:

Medical monitoring: The expected air temperature will be 30 - 80 F. If it is determined that heat stress monitoring is required (mandatory for heavy exertion in PPE at temperatures over 70°F) the following procedures shall be followed (describe procedures in effect, i.e., monitoring body temperature, body weight, pulse rate):

A copy of personal monitoring results is to be sent to Corporate Health and Safety for inclusion in the Employee's Confidential Exposure Record File.

SECTION 9: CONFINED SPACE ENTRY

(1) WILL CONFINED SPACE ENTRY TAKE PLACE? Yes ______ No X

If yes, attach **Confined Space Entry Program** available from your Branch Health and Safety Coordinator and complete the **Pre-Entry Inspection Checklist** and **Confined Space Entry Permit** prior to entering each confined space, each work shift. The Confined Space Permit must be posted outside the confined space.

Permits will be saved and logged with project documentation.

SECTION 10: COMMUNICATIONS PROCEDURES

The following standard hand signals will be used in case of failure of radio communications:

Hand gripping throat	-	Out of air, can't breathe
Grip partner's wrist or both hands around wrist	-	Leave area immediately
Hands on top of head	-	Need assistance
Thumbs up	-	OK, I am all right, I understand
Thumbs down	-	No, negative

If applicable, telephone communication to the Command Post should be established as soon as practicable. The stationary and/or mobile phone number(s) are ______________ and ______________.

SECTION 11: DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The Site Safety Officer is responsible for monitoring adherence with this decontamination plan. The standard level D decontamination protocol shall be used with the following decontamination stations*:

(1) Level "D" protection will be provided for all of the professionals working on this project. It will consist of work clothes, gloves,

(2) eye protection devices, and steel-toe shoes for the professionals working at or visiting the site. Upon exiting the work zone,

(3) obviously contaminated boots and gloves will be removed and cleaned or discarded as necessary.

(4) thoroughly wash outer boot covers with detergent-water solution and rinse with copious amounts of water.

(5) ______________

(6) ______________

(7) ______________

(8) ______________

(9) ______________

(10) ______________

Other ______________

*See the Malcolm Pirnie Health and Safety Procedures Manual, Section 8, Personal Protective Equipment, for sample decontamination station descriptions.

The following decontamination equipment is required:

____

____

____

____

______________ will be used as the decontamination solution.

SECTION 12: EMERGENCY PROCEDURES

The following standard emergency procedures will be used by onsite personnel. The Site Safety Officer shall be notified of any onsite emergencies and be responsible for ensuring that the appropriate procedures are followed.

Personnel Injury in the Exclusion Zone: Upon notification of an injury in the Exclusion Zone, the designated emergency signal 3 horn blasts shall be sounded. All site personnel shall assemble at the decontamination line. An outside rescue team summoned by the field team leader or SSO will enter the Exclusion Zone (if required) to remove the injured person to the hotline. The Site Safety Officer and Field Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The onsite CPR/FA personnel shall initiate the appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

Fire/Explosion: Upon notification of a fire or explosion on site, the designated emergency signal 2 horn blasts shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Other Equipment Failure: If any other equipment on site fails to operate properly, the Field Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

The following emergency escape routes are designated for use in those situations where egress from the Exclusion Zone can not occur through the decontamination line (attach map if available):

If during sampling activities escape is required from the site, sampling personnel egress the sampling areas and exit the site at the nearest gate, as shown on the attached figure.

In all situations, when an onsite emergency results in evacuation of the Exclusion Zone, personnel shall not reenter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed by the SSO.
3. The Site Safety Plan has been reviewed by the SSO and Corporate Health and Safety Manager.
4. Site personnel have been briefed on any changes in the Site Safety Plan by the SSO.

SECTION 13. EMERGENCY INFORMATION

TO BE POSTED IN SITE-TRAILER/OFFICE AND IN FIELD VEHICLES

(1) LOCAL RESOURCES

Ambulance (name):	WVA Duty Officer (dial "0")	Phone:	
Hospital (name):	Albany Medical Center	Phone:	(518) 262- 3131
Police (local or state):	WVA Duty Officer (dial "0")	Phone:	
Fire Dept. (name):	WVA Fire/Spill	Phone:	(518) 266-5333
HAZ MAT Responder:	WVA Fire/Spill	Phone:	(518) 266-5333
Nearest phone:			
On-Site CPR/FA(s):	WVA Medical Officer		

The hospital is ____15____ minutes from the site and the ambulance response time is _______ minutes. _________________of ___ __________ was contacted on __/__/__ and briefed on the situation, the potential hazards, and the substances involved. When IDLH conditions exist, arrangements should be made for onsite standby of emergency services.

(2) DIRECTIONS TO NEAREST HOSPITAL - ATTACH MAP:

SEE ATTACHED MAP

(3) CORPORATE RESOURCES

Mark A. McGowan, CIH, CSP Manager, Corporate Health & Safety	914-641-2484 Work
Joseph M. Golden, CET, REMT-P	914-641-2978 Work
Alan Fellman, PhD Corporate Health Physicist	201-529-4700 Work
BRUCE R NELSON (Branch Health & Safety Coordinator)	518-786-7349
Elayne F. Theriault, M.D. Environmental Medicine Resources, Inc. (Corporate Medical Consultant)	800-229-3674 24 Hour Number
Occupational Medical Services (Branch Medical Consultant)	(518) 482-0666
MPI Emergency Contact Number:	**800-478-6870**

(4) WHOM TO NOTIFY IN CASE OF ACCIDENT:
BRUCE R NELSON (518)-786-7349 (W) (518) 861-6345 (H)

Also notify: Brenda Verdesi, MPI Benefits Administrator (914) 641-2551
MPI Legal Department (914) 694-2100

SECTION 14: PROTECTIVE EQUIPMENT LIST

TASK*	RESPIRATORS & CARTRIDGE*	USE	CLOTHING	GLOVES	BOOTS	OTHER
Groundwater Sam	C	UP	C	LT	S	HL

*Same as in Section 4(2).

RESPIRA-TORS	APR CARTRIDGES	USE	CLOTHING	GLOVES	BOOTS	OTHER
B = SCBA	O = Organic vapor	Cont = Continuous	T = Tyvek	B = Butyl	F = Firemans	F = Face Shield
APR = APR	G = Organic vapor/acid gas	UP = Upgrade	P = PE Tyvek	L - Latex	L = Latex	G = Goggles
D = N/A	A = Asbestos (HEPA)		S = Saranex	N = Neoprene	N = Neoprene	L = Glasses
E = Escape	P = Particulate		C = Coveralls	T = Nitrile	S = Safety	H = Hardhat
AL = Airline	C = Combination organic vapor & particulate			V = Viton		N = Hearing Protection
	OTH = Other			CN = Cotton		
				P = PVC		
				PA = Polyvinyl Alcohol		
				SS = Silvershield		

SECTION 15: SAFE WORK PRACTICES

THE FOLLOWING PRACTICES MUST BE FOLLOWED BY PERSONNEL ON SITE

1. Smoking, eating, chewing gum or tobacco, or drinking are forbidden except in clean or designated areas.
2. Ignition of flammable liquids within or through improvised heating devices (e.g., barrels) is forbidden.
3. Contact with samples, excavated materials, or other contaminated materials must be minimized.
4. Use of contact lenses is prohibited at all times.
5. Do not kneel on the ground when collecting samples.
6. If drilling equipment is involved, know where the 'kill switch' is.
7. All electrical equipment used in outside locations, wet areas or near water must be plugged into ground fault circuit interrupter (GFCI) protected outlets.
8. A "Buddy System" in which another worker is close enough to render immediate aid will be in effect.
9. Good housekeeping practices are to be maintained.
10. Where the eyes or body may be exposed to corrosive materials, suitable facilities for quick drenching or flushing shall be available for immediate use.
11. In the event of treacherous weather-related working conditions (i.e., thunderstorm, limited visibility, extreme cold or heat) field tasks will be suspended until conditions improve or appropriate protection from the elements is provided.

Site Specific Safe Work Practices:____

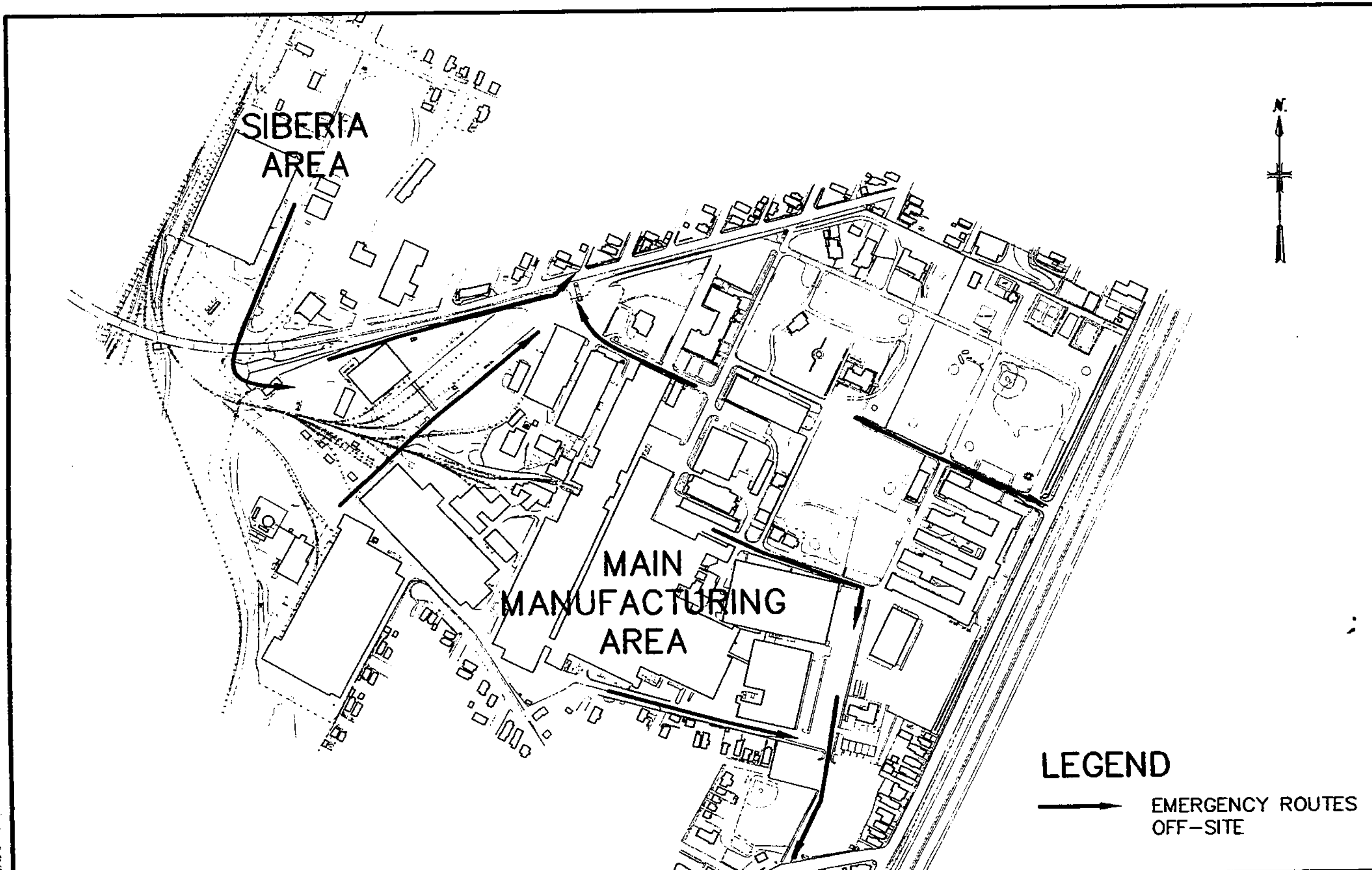
SECTION 16: EMPLOYEE ACKNOWLEDGEMENTS

PLAN REVIEWED BY:

		DATE
Corporate Health & Safety:	____________________	__________
Branch H&S Coordinator:	____________________	__________
Project Manager:	____________________	__________
Project Leader:	____________________	__________

I acknowledge that I have read the information on this Site Safety Plan Short Form and the attached Material Safety Data Sheets (MSDSs). I understand the site hazards as described and agreed to comply with the contents of this Plan.

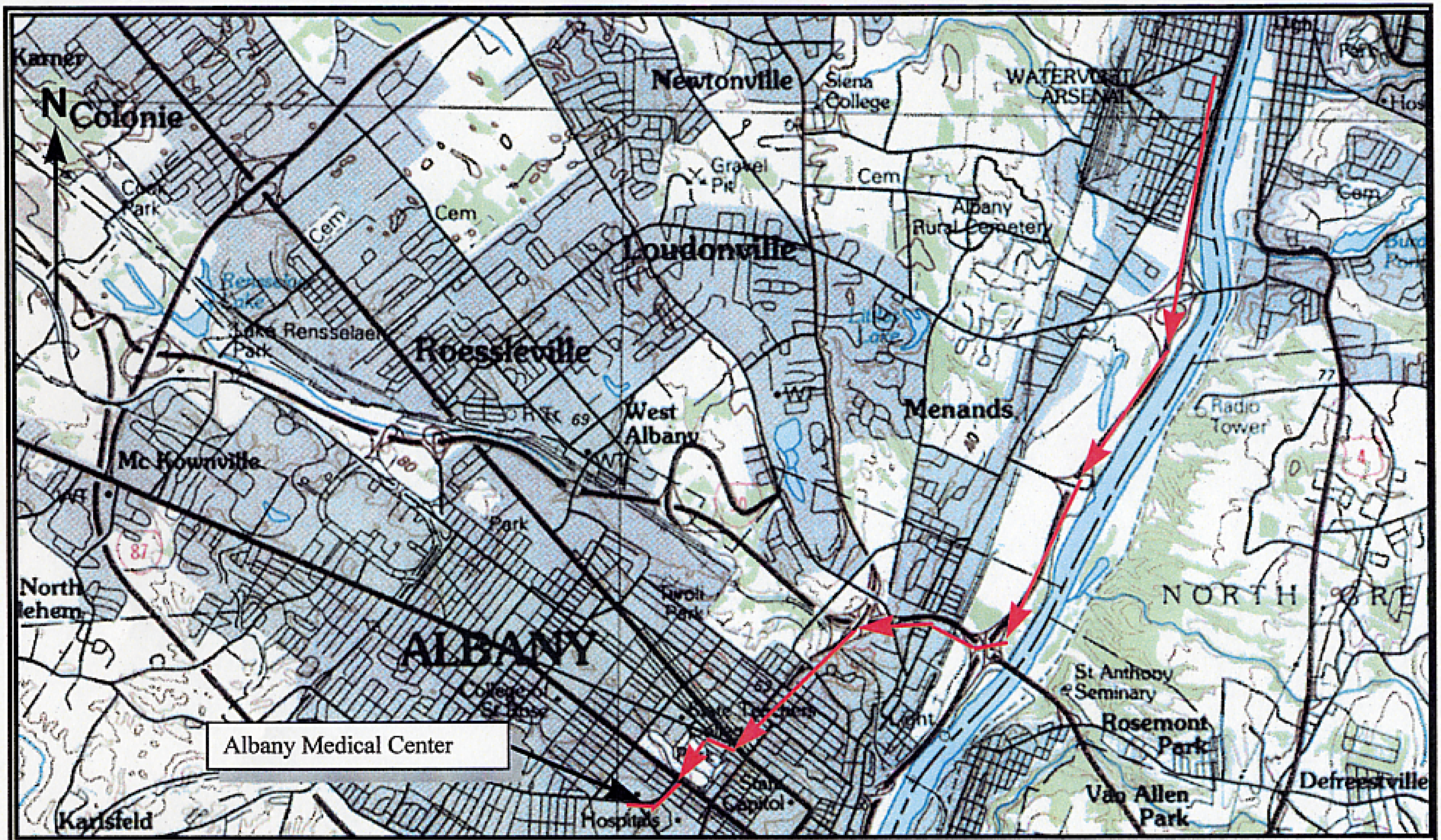
EMPLOYEE (print name)	SIGNATURE	DATE



US Army Corps of Engineers

EMERGENCY ROUTES
LONG-TERM MONITORING PLAN
WATERVLIET, NEW YORK
WATERVLIET ARSENAL

MALCOLM PIRNIE, INC.



SOURCE: U.S.G.S 1:100,000 ALBANY QUAD

MALCOLM PIRNIE

LONG-TERM MONITORING PLAN
WATERVLIET, NEW YORK

Hospital Route Map

Figure 1

Chemical Hazards Information, Waterviiet Arsenal

Substance	Characteristics	PEL
Semi-Volatile Organic Compounds		
4-Chloro-3-methylphenol		
Diethylphthalate	TO	5mg/m3
Dimethyl phthalate	TO	5mg/m3
Acenaphthene		
Fluorene	TO	0.1ppm
Phenanthrene		
Anthracene		
Napthalene		
Di-n-butylphthalate	TO	10ppm
Fluoranthene		
Pyrene		
Butylbenzylphthalate		
Benzo(a)anthracene		
Chrysene	TO	0.2ppm
bis(2-Ethylhexyl)phthalate		
Di-n-octylphthalate		
Benzo(b)fluoranthene		
Benzo(a)Pyrene	TO	0.2ppm
Volatile Organic Compounds		
Vinyl Chloride	VO	1ppm
Chloroethane	VO	1000ppm
Methylene Chloride	VO	25ppm
Carbon Disulfide	VO	20ppm
1,1-Dichloroethane	VO	100ppm
cis-1,2-Dichloroethene	VO	50ppm
trans-1,2-Dichloroethene	VO	50ppm
1,2-Dichloroethene (total)	VO	50ppm
Chloroform		
2-Butanone	VO	200ppm
Trichloroethene	VO	100ppm
Benzene	VO	1ppm
Tetrachloroethene	VO	100ppm
Toluene	VO	200ppm
1,1-Dichloroethene		
1,1,1-Trichloroethane	VO	350ppm
Acetone	VO	1000ppm
Bromodichloromethane		
Chlorobenzene	VO	75ppm
Ethylbenzene	VO	100ppm
Xylene (total)	VO	100ppm
Pesticides and PCBs		
alpha-BHC		
beta-BHC		
delta-BHC		
gamma-BHC (Lindane)	TO	0.5mg/m3
Heptachlor	TO	0.5mg/m3
Aldrin	TO	0.25mg/m3
Heptachlor Epoxide	TO	0.5mg/m3
Endosulfan I		
Dieldrin	TO	0.25mg/m3
4,4'-DDE		
Endrin	TO	0.1mg/m3
Endosulfan II		
4,4'-DDD		
Endosulfan Sulfate		
4,4'-DDT	TO	1mg/m3
Methoxychlor	TO	15mg/m3
Endrin Ketone		
Endrin Aldehyde		
alpha-Chlordane	TO	0.5mg/m3
Gamma-Chlordane	TO	0.5mg/m3
Aroclor-1254		
Aroclor-1260		
Inorganic Compounds		
Arsenic	TO	0.01mg/m3
Barium	TO	0.5mg/m3
Cadmium	TO	0.005mg/m3
Chromium	TO	0.5mg/m3
Cyanide	TO	5mg/m3
Iron		
Lead	TO	0.05mg/m3
Mercury	TO	0.1mg/m3
Selenium	TO	0.2mg/m3
Silver	TO	0.01mg/m3

APPENDIX A

Main Manufacturing Groundwater Data

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	87GTI-MW-1BP 9/14/95 Aqueous ug/L	87GTI-MW-2BP 9/14/95 Aqueous ug/L	87GTI-MW-MW-100 *duplicate of BP2* ug/L	87GTI-MW-3BP RE 9/14/95 Aqueous ug/L	87GTI-MW-4BP 9/14/95 Aqueous ug/L	WVA-AW-MW20 Aqueous ug/L	WVA-AW-MW21 9/18/95 Aqueous ug/L	WVA-AW-MW22 9/18/95 Aqueous ug/L	WVA-AW-MW23 RE 9/21/95 Aqueous ug/L
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	No sample collected due to inadequate recharge	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND	ND	ND		ND	ND	0.5 J
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND		ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND		ND	ND	ND
Di-n-butylphthalate		50		ND	0.8 JB	0.9 JB	ND	0.9 JB		ND	ND	0.7 JB
Fluoranthene		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND		ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND		ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	1 JB	0.9 JB	ND	0.8 JB		ND	ND	0.6 J
Di-n-octylphthalate		50		ND	ND	ND	ND	ND		ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND		ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND		ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND		ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW24 9/21/95 Aqueous ug/L	WVA-AW- MW25 9/18/95 Aqueous ug/L	WVA-AW- MW26 9/18/95 Aqueous ug/L	WVA-AW- MW27 RE 9/18/95 Aqueous ug/L	WVA-AW- MW28 9/19/95 Aqueous ug/L	WVA-AW- MW29 9/21/95 Aqueous ug/L	WVA-AW- MW30 RE 9/19/95 Aqueous ug/L	WVA-AW- MW31 RE 9/19/95 Aqueous ug/L	WVA-AW- MW32 9/13/95 Aqueous ug/L
4-Chloro-3-methylphenol		50		R	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND	ND	0.6 J	7 JB	ND	ND	0.5 JB
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		ND	ND	0.4 J	ND	0.3 J	0.4 J	ND	0.8 J	0.3 J
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	ND	ND	ND	ND	12	18	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-
Location	Maximum	Maximum	Class GA	MW-33	MW34 RE	MW35	MW36	MW37 RE	MW38 RE	MW39 RE	MW40 RE	MW41
Date Sampled	Contaminant	Contaminant	Groundwater	9/14/95	9/13/95	9/22/95		9/22/95	9/21/95	9/20/95	9/20/95	9/19/95
Matrix	Level	Level	Standards	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
4-Chloro-3-methylphenol		50		ND	R	ND	No sample collected due to inadequate recharge	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND		ND	ND	ND	ND	0.8 J
Dimethyl phthalate		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND		ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND		ND	ND	ND	ND	ND
Di-n-butylphthalate		50		2 JB	ND	0.5 J		0.5 JB	ND	ND	ND	ND
Fluoranthene		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND		ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND		ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND		ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	2 JB	ND	0.5 J		6 JB	**300**	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND		ND	ND	0.6 J	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND		ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND		ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND		ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW42 RE 9/20/95 Aqueous ug/L	WVA-AW MW-43 12/21/95 Aqueous ug/L	WVA-AW MW-60 *duplicate of* *MW-43* ug/L	WVA-AW MW-44 12/13/95 Aqueous ug/L	RW1 RE 9/21/95 Aqueous ug/L	93-EM- RW2 9/22/95 Aqueous ug/L	WVA-AW- MW300 *duplicate of* *RW2* ug/L	83DM- SP-1 Aqueous ug/l 9/14/95	86EM- SP1A Aqueous ug/l 9/14/95
4-Chloro-3-methylphenol		50		ND	240	280	4	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	2 J	ND	4 J	ND	ND	ND	ND	ND
Dimethyl phthalate		50	50	ND	ND	ND	2 J	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	10 J	31 J	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	10 J	38 J	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	2 J	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.9 J	ND	ND	0.3 J	0.5 J	ND	ND	3 BJ	3 BJ
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	5 J	16 J	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	2 J	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	1 J	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	3 J	ND	0.3 J	ND	6 J	16 J	2 J	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	86EM- SP1B Aqueous ug/l 9/14/95	83EM- SP2 RE 9/19/95 Aqueous ug/L	WVA-AW- MW200 RE *duplicate of* *SP2* ug/L	83DM- SP-3 RE 9/18/95 Aqueous ug/L	83DM- SP-4 RE 9/13/95 Aqueous ug/L	86EM- SP5 Aqueous ug/l 9/12/95	86EM- SP6 Aqueous ug/l 9/12/95	92EM- SP-7 9/13/95 Aqueous ug/L	92EM- SP-8 9/12/95 Aqueous ug/L
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	**890**	ND	ND	**110**
Diethylphthalate		5	50	ND	ND	ND	4 J	4 J	ND	ND	ND	ND
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		5 BJ	0.5 J	ND	ND	0.9 J	ND	2 BJ	ND	0.3 J
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	**96**	ND	ND	ND	ND J	ND	0.7 J	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	93EM- SP9 Aqueous ug/l 9/19/95	93EM- SP10 Aqueous ug/l 9/20/95	93EM- SP-11 RE 9/13/95 Aqueous ug/L	93EM- SP12 Aqueous ug/l 9/20/95	93EM- SP13 Aqueous ug/l 9/20/95	93EM- SP14 Aqueous ug/l 9/20/95	93EM- SP15 RE 9/20/95 Aqueous ug/L	94EM- SP16 RE 9/20/95 Aqueous ug/L	94EM- SP19 9/21/95 Aqueous ug/L
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	3 JB	ND	ND	ND	ND	ND	7 JB
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	1 J	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	2 J	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	1 J	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	1 J	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		ND	6 BJ	ND	11 B	12 B	8 BJ	ND	ND	0.4 J
Fluoranthene		50	50	ND	ND	ND	ND	13	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	12	ND	ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	2 J	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	3	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	3	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	1 J	0.5 J	ND	5 J	1 J	ND	ND	1 J
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	1 J	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	2 J	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	1 J	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	94EM- SP20 RE 9/21/95 Aqueous ug/L	94EM- SP21 9/22/95 Aqueous ug/L	WVA-B25- MW-1 Aqueous ug/l 9/13/95	WVA-B25- MW-2 Aqueous ug/l 9/12/95	WVA-B25- MW-DUP *this sample is* *a duplicate of* *MW-2*	WVA-B25- MW-3 Aqueous ug/l 9/13/95	WVA-B25- MW-4 Aqueous ug/l 9/13/95	WVA-B25- MW-5 Aqueous ug/l 9/12/95	WVA-B25- MW-6 Aqueous ug/l 9/13/95
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.5 J	0.5 J	3 BJ	5 BJ	2 BJ	ND	ND	3 BJ	2 BJ
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	0.8 J	ND	ND	0.9 J	4 J	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B135- MW1 Aqueous ug/l 9/21/95	WVA-B135- MW2 Aqueous ug/l 9/14/95	WVA-B135- MW3 Aqueous ug/l 9/14/95	WVA-B135- MW4 Aqueous ug/l 9/20/95	WVA-B135- PW1 Aqueous ug/l 9/21/95	WVA-B135- PW1(Dup) Aqueous ug/l 9/21/95	WVA-B135- PW1 Product ug/l 9/21/95	WVA-B135- PW1(Dup) Product ug/l 9/21/95	WVA-B35- MW5 Aqueous ug/l 9/14/95
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		34 B	ND	2 BJ	8 BJ	ND	63 B	ND	ND	4 BJ
Fluoranthene		50	50	ND	ND	ND	ND	2 J	1 J	64000 J	13000 J	ND
Pyrene		50	50	ND	ND	ND	ND	4 J	3 J	100000 J	24000 J	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	2 J	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	3 J	ND	ND	3 J	99	31	200000 J	43000 J	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrogeologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B35- MW6 Aqueous ug/l 9/19/95	WVA-B35- MW7 Aqueous ug/l 9/19/95	WVA-B35- MW8 Aqueous ug/l 9/19/95	WVA-B35- MW8(Dup) Aqueous ug/l 9/19/95	WVA-B35- PW2 Aqueous ug/l 9/21/95	WVA-B35- PW2 (RE) Product ug/l 9/21/95	WVA-B35- PW3 Aqueous ug/l 9/21/95	WVA-B35- PW4 Aqueous ug/l 9/21/95
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		5	50	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	1 J
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	1600 J	130000 J	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	2600 J	190000 J	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	99000 J	ND	ND
Napthalene			10	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		7 BJ	22 B	ND	11 BJ	ND	ND	50 B	60 B
Fluoranthene		50	50	ND	ND	ND	ND	6900 J	530000 J	ND	ND
Pyrene		50	50	ND	ND	13 J	12 J	5300 J	370000 J	ND	ND
Butylbenzylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	10 J	8 J	ND	85000 J	ND	ND
Chrysene			0.002	ND	ND	14 J	12 J	ND	87000 J	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	ND	ND	ND	4200 J	100000 J	2 J	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene		50	0.002	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	87GTI-MW- 1BP 9/14/95 Aqueous ug/L	87GTI-MW- 2BP 9/14/95 Aqueous ug/L	87GTI-MW- MW-100 *duplicate of* *BP2* ug/L	87GTI-MW- 3BP RE 9/14/95 Aqueous ug/L	87GTI-MW- 4BP 9/14/95 Aqueous ug/L	WVA-AW- MW20 9/18/95 Aqueous ug/L	WVA-AW- MW21 9/18/95 Aqueous ug/L	WVA-AW- MW22 9/18/95 Aqueous ug/L	WVA-AW- MW23 RE 9/21/95 Aqueous ug/L
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	7	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)		50										
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	WVA-AW- MW24 9/21/95 Aqueous ug/L	WVA-AW- MW25 9/18/95 Aqueous ug/L	WVA-AW- MW26 9/18/95 Aqueous ug/L	WVA-AW- MW27 RE 9/18/95 Aqueous ug/L	WVA-AW- MW28 9/19/95 Aqueous ug/L	WVA-AW- MW29 9/21/95 Aqueous ug/L	WVA-AW- MW30 RE 9/19/95 Aqueous ug/L	WVA-AW- MW31 RE 9/19/95 Aqueous ug/L	WVA-AW- MW32 9/13/95 Aqueous ug/L
Vinyl Chloride	2	2	2	ND	ND	ND	3 J	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	1 J	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)		50										
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	2 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	4 J	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	1 J	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples
Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	WVA-AW- MW-33 9/13/95 Aqueous ug/L	WVA-AW- MW34 RE 9/13/95 Aqueous ug/L	WVA-AW- MW35 9/22/95 Aqueous ug/L	WVA-AW- MW36 9/22/95 Aqueous ug/L	WVA-AW- MW37 RE 9/21/95 Aqueous ug/L	WVA-AW- MW38 RE 9/21/95 Aqueous ug/L	WVA-AW- MW39 RE 9/20/95 Aqueous ug/L	WVA-AW- MW40 RE 9/20/95 Aqueous ug/L	WVA-AW- MW41 9/19/95 Aqueous ug/L
Vinyl Chloride	2	2	2	ND	**89 J**	ND	**32 J**	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	**7 J**	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	**2000**	ND	**460**	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	**10 J**	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)		50										
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	**250**	ND	**200**	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	**2 J**	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	4 J	**350**	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW	WVA-AW	WVA-AW		93-EM-	WVA-AW-	83DM-	86EM-
Location	Maximum	Maximum	Class GA	MW42 RE	MW-43	MW-60	MW-44	RW1 RE	RW2	MW300	SP-1	SP1A
Date Sampled	Contaminant	Contaminant	roundwater	9/20/95	Aqueous	*duplicate of*	Aqueous	9/21/95	9/22/95	*duplicate of*	Aqueous	Aqueous
Matrix	Level	Level	Standards	Aqueous	12/21/95	*MW-43*	12/13/95	Aqueous	Aqueous	*RW2*	ug/l	ug/l
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	9/27/95	9/14/95
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	**42**	**36**	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	0.3 J	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	**22**	**21**	**7**	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	**38**	**36**		
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND		
1,2-Dichloroethene (total)		50			ND	ND	ND				5	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	7	**300 D**
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	0.7 J	ND	ND	ND	ND	4 J	4 J	**120**	**19 D**
Benzene	5		0.7	ND	ND	ND	ND	ND	**2**	**2**	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	**33**	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	1 J	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	86EM- SP1B Aqueous ug/l 9/27/95	83EM- SP2 RE 9/19/95 Aqueous ug/L	WVA-AW- MW200 RE *duplicate of* *SP2* ug/L	83DM- SP-3 RE 9/12/95 Aqueous ug/L	83DM- SP-4 RE 9/13/95 Aqueous ug/L	86EM- SP-5 Aqueous ug/l 9/12/95	86EM- SP-6 Aqueous ug/l 9/12/95	92EM- SP-7 9/13/95 Aqueous ug/L	92EM- SP-8 9/12/95 Aqueous ug/L
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	7 J	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	0.9 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	26	2 J	ND	6
cis-1,2-Dichloroethene	70	5	5		ND	ND	ND	ND			ND	3 J
trans-1,2-Dichloroethene	100		5		ND	ND	ND	ND			ND	ND
1,2-Dichloroethene (total)		50		2 J					ND	ND		
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	630	ND
2-Butanone		50	5	ND	ND	3 J	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	16	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	0.4 J	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples
Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	93EM-	93EM-	93EM-	93EM-	93EM-	93EM-	93EM-	94EM-	94EM-
Location	Maximum	Maximum	Class GA	SP9	SP10	SP-11 RE	SP12	SP13	SP14	SP15 RE	SP16 RE	SP19
Date Sampled	Contaminant	Contaminant	roundwater	Aqueous	Aqueous	Aqueous	9/13/95	Aqueous	Aqueous	9/20/95	9/20/95	9/21/95
Matrix	Level	Level	Standards	ug/l	ug/l	ug/l	Aqueous	ug/l	ug/l	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	9/19/95	9/20/95	9/20/95	ug/L	9/20/95	9/20/95	ug/L	ug/L	ug/L
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5				ND			ND	ND	ND
trans-1,2-Dichloroethene	100		5				ND			ND	ND	ND
1,2-Dichloroethene (total)		50		ND	ND	ND		ND	ND			
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	1 J	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	2 J	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples
Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	94EM- SP20 RE 9/21/95 Aqueous ug/L	94EM- SP21 9/22/95 Aqueous ug/L	WVA-B25- MW-1 Aqueous ug/l 9/13/95	WVA-B25- MW-2 Aqueous ug/l 9/12/95	WVA-B25- MW-DUP *this sample is a duplicate of MW-2*	WVA-B25- MW-3 Aqueous ug/l 9/13/95	WVA-B25- MW-4 Aqueous ug/l 9/13/95	WVA-B25- MW-5 Aqueous ug/l 9/12/95	WVA-B25- MW-6 Aqueous ug/l 9/13/95
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	4 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	4 J	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	2 J							
trans-1,2-Dichloroethene	100		5	ND	ND							
1,2-Dichloroethene (total)		50				ND	2 J	3 J	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	3 J	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	**37**	**40**	**410 D**	ND	ND	**240**
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	3 J	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	**21**	**23**	**100**	ND	ND	3 J
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	30 B
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	WVA-B135- MW1 Aqueous ug/l 9/21/95	WVA-B135- MW2 Aqueous ug/l 9/14/95	WVA-B135- MW3 Aqueous ug/l 9/14/95	WVA-B135- MW4 Aqueous ug/l 9/20/95	WVA-B135- PW1 Aqueous ug/l 9/21/95	WVA-B135- PW1(Dup) Aqueous ug/l 9/21/95	WVA-B135- PW1 Product ug/l 9/21/95	WVA-B135- PW1(Dup) Product ug/l 9/21/95	WVA-B35- MW5 Aqueous ug/l 9/14/95
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5									
trans-1,2-Dichloroethene	100		5									
1,2-Dichloroethene (total)		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	**8**	**9**	**79 J**	**62 J**	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	1 J	ND	1 J	ND	**98 J**	**72 J**	1 J
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	2 J	2 J	ND	ND	ND
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	**260**	**210 J**	ND

Volatile Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA roundwater Standards ug/L	WVA-B35- MW6 Aqueous ug/l 9/19/95	WVA-B35- MW7 Aqueous ug/l 9/19/95	WVA-B35- MW8 Aqueous ug/l 9/19/95	WVA-B35- MW8(Dup) Aqueous ug/l 9/19/95	WVA-B35- PW2 Aqueous ug/l 9/21/95	WVA-B35- PW2 (RE) Product ug/l 9/21/95	WVA-B35- PW3 Aqueous ug/l 9/21/95	WVA-B35- PW4 Aqueous ug/l 9/21/95
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride		5	5	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	2 J	ND	2 J	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5								
trans-1,2-Dichloroethene	100		5								
1,2-Dichloroethene (total)		50		ND	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	3 J	ND	ND	ND	ND	ND	**8**	**15**
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	5 J	**17**
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	50	5	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Acetone		50	50	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	80	50	5	ND	ND	ND	ND	ND	ND	2 J	4 J
Chlorobenzene		5	5	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	87GTI-MW-1BP 9/14/95 Aqueous ug/L	87GTI-MW-2BP 9/14/95 Aqueous ug/L	87GTI-MW-MW-100 *duplicate of BP2* ug/L	87GTI-MW-3BP RE 9/14/95 Aqueous ug/L	87GTI-MW-4BP 9/14/95 Aqueous ug/L	WVA-AW-MW20 Aqueous ug/L	WVA-AW-MW21 9/18/95 Aqueous ug/L	WVA-AW-MW22 9/18/95 Aqueous ug/L	WVA-AW-MW23 RE 9/21/95 Aqueous ug/L
alpha-BHC				ND	ND	ND	ND	ND	No sample collected due to inadequate recharge	ND	ND	ND
beta-BHC		50		ND	ND	ND	ND	ND		ND	ND	ND
delta-BHC		50		ND	ND	ND	ND	ND		ND	ND	ND
gamma-BHC (Lindane)		4		ND	ND	ND	ND	ND		ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND		ND	ND	ND
Aldrin		5	ND	ND	ND	ND	ND	ND		ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	ND	ND	ND		ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND	ND	ND		ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND		ND	ND	ND
4,4'-DDE			ND	**0.0085 J**	**0.012**	**0.0033 J**	ND	**0.0021 J**		**0.0084 J**	ND	ND
Endrin	2	0.2	ND	ND	ND	ND	ND	ND		ND	ND	ND
Endosulfan II		5		ND	ND	ND	ND	ND		ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND		ND	ND	ND
Endosulfan Sulfate				ND	ND	ND	ND	ND		ND	ND	ND
4,4'-DDT		50	ND	**0.011 J**	**0.014**	**0.0056 J**	ND	**0.0043 J**		ND	ND	ND
Methoxychlor	40	40	35	ND	ND	ND	ND	ND		ND	ND	ND
Endrin Ketone		50		ND	ND	ND	ND	ND		ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND		ND	ND	ND
alpha-Chlordane	0.2	2	0.1	ND	ND	ND	ND	ND		ND	ND	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND	ND	ND		ND	ND	ND
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND		ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND		ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-
Location	Maximum	Maximum	Class GA	MW24	MW25	MW26	MW27 RE	MW28	MW29	MW30 RE	MW31 RE	MW32
Date Sampled	Contaminant	Contaminant	Groundwater	9/18/95	9/18/95	9/18/95	9/18/95	9/19/95	9/21/95	9/19/95	9/19/95	9/13/95
Matrix	Level	Level	Standards	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
alpha-BHC				ND	ND	ND	0.0025 J	ND	ND	ND	ND	ND
beta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)		4		R	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin		5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0017 J
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate				ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	40	40	35	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	0.2	2	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW-33 9/13/95 Aqueous ug/L	WVA-AW- MW34 RE 9/13/95 Aqueous ug/L	WVA-AW- MW35 9/22/95 Aqueous ug/L	WVA-AW- MW36 Aqueous ug/L	WVA-AW- MW37 RE 9/21/95 Aqueous ug/L	WVA-AW- MW38 RE 9/21/95 Aqueous ug/L	WVA-AW- MW39 RE 9/20/95 Aqueous ug/L	WVA-AW- MW40 RE 9/20/95 Aqueous ug/L	WVA-AW- MW41 9/19/95 Aqueous ug/L
alpha-BHC				ND	ND	ND	No sample collected due to inadequate recharge	ND	ND	ND	ND	ND
beta-BHC		50		ND	ND	ND		ND	ND	ND	ND	ND
delta-BHC		50		ND	ND	ND		ND	ND	ND	ND	ND
gamma-BHC (Lindane)		4		ND	ND	ND		ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND		ND	ND	ND	ND	ND
Aldrin		5	ND	ND	ND	ND		ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	ND		ND	ND	ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND		ND	ND	ND	ND	ND
Dieldrin			ND	**0.016**	ND	ND		ND	**0.0019 J**	ND	ND	ND
4,4'-DDE			ND	**0.002 J**	ND	ND		ND	ND	ND	ND	ND
Endrin	2	0.2	ND	ND	ND	ND		ND	**0.0065 J**	ND	ND	ND
Endosulfan II		5		ND	ND	ND		ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	R	ND		ND	ND	ND	ND	ND
Endosulfan Sulfate				ND	ND	ND		ND	ND	ND	ND	ND
4,4'-DDT		50	ND	ND	R	ND		ND	ND	ND	ND	ND
Methoxychlor	40	40	35	ND	ND	ND		ND	ND	ND	ND	ND
Endrin Ketone		50		ND	ND	ND		ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND		ND	ND	ND	ND	0.0058 J
alpha-Chlordane	0.2	2	0.1	ND	ND	ND		ND	ND	ND	ND	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND		ND	ND	ND	ND	ND
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND		ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND		ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW42 RE 9/20/95 Aqueous ug/L	RW1 RE 9/21/95 Aqueous ug/L	93-EM- RW2 9/22/95 Aqueous ug/L	WVA-AW- MW300 *duplicate of* *RW2* ug/L	83DM- SP-1 9/14/95 Aqueous ug/l	86EM- SP1A 9/14/95 Aqueous ug/l	86EM- SP1B 9/14/95 Aqueous ug/l	83EM- SP2 RE 9/19/95 Aqueous ug/L	WVA-AW- MW200 RE *duplicate of* *SP2* ug/L
alpha-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC		50		ND	ND	ND	ND	ND	0.0018 J	0.0012 J P	ND	ND
gamma-BHC (Lindane)		4		ND	ND	0.024	0.053	ND.	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin		5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	**0.0011 J**	ND	**0.0021 J P**	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	**0.0023 J**	ND	ND	ND	ND
Endrin	2	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	**0.0022 J**	**0.0021 J**	**0.0013 J P**	ND	ND
Endosulfan Sulfate				ND	ND	ND	ND	0.0039 J	ND	ND	ND	ND
4,4'-DDT		50	ND	ND	ND	ND	ND	ND	**0.0025 J**	ND	ND	ND
Methoxychlor	40	40	35	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	0.2	2	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	83DM-	83DM-	86EM-	86EM-	92EM-	92EM-	93EM-	93EM-	93EM-
Location	Maximum	Maximum	Class GA	SP-3 RE	SP-4 RE	SP-5	SP-6	SP-7	SP-8	SP9	SP10	SP-11 RE
Date Sampled	Contaminant	Contaminant	Groundwater	9/12/95	9/13/95	9/12/95	12/14/95	9/13/95	9/12/95	9/19/95	9/20/95	9/13/95
Matrix	Level	Level	Standards	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/l	ug/l	ug/L	ug/L	ug/l	ug/l	ug/L
alpha-BHC				ND	ND	ND	ND	ND	ND	0.005 UJ	ND	ND
beta-BHC		50		ND	ND	R	ND	ND	ND	ND	ND	ND
delta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin		5	ND	ND	ND	ND	ND	**0.015 J**	**0.047 J**	ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	**0.022**	ND	ND	ND	ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	R	ND	R	ND	ND	**0.0011 JP**	ND
4,4'-DDE			ND	ND	ND	**0.045**	**0.0017 J P**	ND	ND	ND	**0.003 J**	ND
Endrin	2	0.2	ND	ND	ND	R	**0.00061 J P**	ND	ND	ND	**0.0034 JP**	ND
Endosulfan II		5		ND	ND	R	ND	ND	ND	ND	0.0029 JP	ND
4,4'-DDD			ND	ND	ND	**0.038**	ND	ND	R	ND	ND	ND
Endosulfan Sulfate				ND	0.0037 J	0.018 J	ND	ND	ND	ND	ND	ND
4,4'-DDT		50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	40	40	35	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone		50		ND	ND	ND	ND	ND	ND	ND	0.001 JP	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	0.0053 JP	ND
alpha-Chlordane	0.2	2	0.1	ND	ND	ND	ND	ND	ND	ND	0.0017 JP	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND	0.00071 J P	ND	ND	ND	0.001 JP	ND
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	0.065 JP	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	93EM- SP12 9/20/95 Aqueous ug/l	93EM- SP13 9/20/95 Aqueous ug/l	93EM- SP14 9/20/95 Aqueous ug/l	93EM- SP15 RE 9/20/95 Aqueous ug/L	94EM- SP16 RE 9/20/95 Aqueous ug/L	94EM- SP19 9/21/95 Aqueous ug/L	94EM- SP20 RE 9/21/95 Aqueous ug/L	94EM- SP21 9/21/95 Aqueous ug/L	WVA-B25- MW-1 9/13/95 Aqueous ug/l
alpha-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC		50		ND	0.039 P	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)		4		ND	ND	ND	ND	ND	ND	ND	0.013	ND
Heptachlor	0.4		ND	ND	**0.069 P**	**0.012 P**	ND	ND	ND	ND	ND	ND
Aldrin		5	ND	ND	**0.0052 P**	ND	ND	ND	ND	ND	ND	**0.00095 J P**
Heptachlor Epoxide	0.2	0.2	ND	ND	**0.048 P**	ND	ND	ND	ND	ND	ND	ND
Endosulfan I		50	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	**0.0033 J**	**0.0041 JP**	ND	ND	ND	ND	**0.00082 J**	**0.02 J**	ND
4,4'-DDE			ND	ND	**0.036 P**	ND	ND	ND	ND	**0.0028 J**	ND	ND
Endrin	2	0.2	ND	**0.0035 JP**	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II		5		0.0034 JP	0.016	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate				ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT		50	ND	**0.0035 BJ**	**0.0035 JP**	ND	ND	ND	ND	**0.0025 J**	**0.0047 J**	**0.0026 BJ**
Methoxychlor	40	40	35	ND	0.017 JP	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone		50		0.0011 JP	ND	0.001 JP	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				0.0024 JP	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	0.2	2	0.1	ND	0.018	ND	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	0.2	0.2		0.0012 J	0.018 P	0.00053 JP	ND	ND	ND	ND	ND	0.0013 J P
Aroclor-1254	0.5	0.5	0.1	ND	ND	0.022 JP	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	0.059 JP	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B25- MW-2 9/12/95 Aqueous ug/l	WVA-B25- MW-DUP *this sample is* *a duplicate of* *MW-2*	WVA-B25- MW-3 9/13/95 Aqueous ug/l	WVA-B25- MW-4 9/13/95 Aqueous ug/l	WVA-B25- MW-5 9/12/95 Aqueous ug/l	WVA-B25- MW-6 9/13/95 Aqueous ug/l	WVA-B135- MW1 9/21/95 Aqueous ug/l	WVA-B135- MW2 9/14/95 Aqueous ug/l	WVA-B135- MW3 9/14/95 Aqueous ug/l
alpha-BHC				ND	ND	ND	ND	ND	ND	ND	0.01 UJ	ND
beta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC		50		ND	ND	ND	ND	ND	ND	ND	ND	0.0024 JP
gamma-BHC (Lindane)		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin		5	ND	ND	ND	ND	ND	ND	ND	**0.0014 JP**	ND	**0.0025 JP**
Heptachlor Epoxide	0.2	0.2	ND	**0.00072 J P**	**0.00085 J P**	ND	ND	ND	ND	ND	ND	**0.001 JP**
Endosulfan I		50	0.1	ND	ND	ND	ND	ND	ND	ND	ND	0.0017 JP
Dieldrin			ND	ND	ND	ND	ND	ND	**0.0014 BJ**	ND	ND	**0.0035 BJ**
4,4'-DDE			ND	**0.0011 BJ**	**0.0018 BJ**	ND	ND	ND	ND	ND	ND	ND
Endrin	2	0.2	ND	ND	ND	ND	ND	**0.0018 J P**	**0.0021 J**	ND	ND	ND
Endosulfan II		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	**0.0022 J P**	**0.0024 J P**	ND	ND	ND	ND	ND	ND	**0.0019 JP**
Endosulfan Sulfate				ND	ND	ND	R	ND	ND	ND	ND	ND
4,4'-DDT		50	ND	**0.0028 BJ**	**0.001 BJ**	ND	ND	ND	**0.002 BJ**	ND	R	**0.0011 BJ**
Methoxychlor	40	40	35	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	0.2	2	0.1	ND	ND	ND	ND	ND	ND	ND	ND	0.0017 JP
Gamma-Chlordane	0.2	0.2		0.0016 J P	0.0025 J P	0.0013 J	ND	0.00059 J P	ND	ND	ND	0.0021 JP
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

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Watervliet Arsenal

Study	USEPA	NYSDOH	NYSDEC	WVA-B135-	WVA-B135-	WVA-B135-	WVA-B135-	WVA-B135-	WVA-B35-	WVA-B35-	WVA-B35-
Location	Maximum	Maximum	Class GA	MW4	PW1	PW1(Dup)	PW1	PW1(Dup)	MW5	MW6	MW7
Date Sampled	Contaminant	Contaminant	Groundwater	9/20/95	9/21/95	9/21/95	9/21/95	9/21/95	9/14/95	9/19/95	9/19/95
Matrix	Level	Level	Standards	Aqueous	Aqueous	Aqueous	Product	Product	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
alpha-BHC				ND	0.01 UJ	ND			ND	ND	ND
beta-BHC		50		ND	ND	ND			ND	ND	ND
delta-BHC		50		ND	0.01 UJ	ND			ND	ND	ND
gamma-BHC (Lindane)		4		ND	ND	ND			ND	ND	ND
Heptachlor	0.4		ND	**0.0091 P**	R	**0.052 P**			ND	ND	ND
Aldrin		5	ND	ND	**0.0057 J**	**0.003 JP**			ND	ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	**0.0022 JP**			ND	ND	ND
Endosulfan I		50	0.1	0.0022 J	ND	ND			ND	ND	ND
Dieldrin			ND	**0.0025 JP**	ND	ND			ND	ND	ND
4,4'-DDE			ND	ND	ND	ND			ND	ND	ND
Endrin	2	0.2	ND	ND	ND	**0.0067 JP**			ND	ND	ND
Endosulfan II		5		0.0041 JP	R	0.0063 JP			ND	ND	ND
4,4'-DDD			ND	ND	**0.026**	**0.0087 JP**			ND	ND	ND
Endosulfan Sulfate				ND	ND	ND			ND	ND	ND
4,4'-DDT		50	ND	ND	0.02 UJ	0.012 P			ND	ND	ND
Methoxychlor	40	40	35	ND	0.1 UJ	0.035 JP			ND	ND	ND
Endrin Ketone		50		0.0015 JP	0.009 J	0.0028 JP			ND	ND	ND
Endrin Aldehyde				0.024	ND	ND			ND	0.003 J	ND
alpha-Chlordane	0.2	2	0.1	0.0024 JP	ND	0.0061 P			0.00072 JP	ND	ND
Gamma-Chlordane	0.2	0.2		ND	ND	ND			0.00073 JP	ND	ND
Aroclor-1254	0.5	0.5	0.1	ND	**0.31 J**	**0.16 P**	**4800 P**	**4800 P**	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	**0.15 P**	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B35- MW8 9/19/95 Aqueous ug/l	WVA-B35- MW8(Dup) 9/19/95 Aqueous ug/l	WVA-B35- PW2 9/21/95 Aqueous ug/l	WVA-B35- PW2 (RE) 9/21/95 Product ug/l	WVA-B35- PW3 9/21/95 Aqueous ug/l	WVA-B35- PW4 9/21/95 Aqueous ug/l
alpha-BHC				0.02 UJ	ND	ND		ND	ND
beta-BHC		50		ND	ND	ND		ND	ND
delta-BHC		50		ND	ND	ND		0.0032 JP	0.0061 P
gamma-BHC (Lindane)		4		ND	ND	ND		ND	ND
Heptachlor	0.4		ND	ND	ND	**6.6 P**		ND	**0.0014 J**
Aldrin		5	ND	R	ND	ND		ND	ND
Heptachlor Epoxide	0.2	0.2	ND	ND	ND	ND		ND	**0.00073 JP**
Endosulfan I		50	0.1	ND	ND	ND		ND	0.0013 JP
Dieldrin			ND	R	**0.025 BJ**	ND		**0.0013 JP**	ND
4,4'-DDE			ND	ND	ND	**2.6 P**		ND	ND
Endrin	2	0.2	ND	**0.15 NJ**	**0.084 B**	ND		ND	ND
Endosulfan II		5		ND	0.079 B	ND		ND	ND
4,4'-DDD			ND	R	**0.03 J**	**14**		**0.0011 JP**	ND
Endosulfan Sulfate				ND	ND	ND		ND	ND
4,4'-DDT		50	ND	R	ND	**3.9**		ND	ND
Methoxychlor	40	40	35	0.2 UJ	ND	ND		ND	ND
Endrin Ketone		50		R	0.03 JP	ND		ND	ND
Endrin Aldehyde				R	ND	ND		ND	0.0015 JP
alpha-Chlordane	0.2	2	0.1	0.036 J	0.015 BJ	**3 P**		ND	ND
Gamma-Chlordane	0.2	0.2		0.022 J	0.0046 JP	**2 P**		ND	0.0011 JP
Aroclor-1254	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5	0.5	0.1	ND	ND	ND	ND	ND	ND

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Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	87GTI-MW-1BP 9/14/95 Aqueous ug/L	87GTI-MW-2BP 9/14/95 Aqueous ug/L	87GTI-MW-MW-100 9/14/95 *duplicate of BP2*	87GTI-MW-3BP RE 9/14/95 Aqueous ug/L	87GTI-MW-4BP 9/14/95 Aqueous ug/L	WVA-AW-MW20 Aqueous ug/L	WVA-AW-MW21 9/18/95 Aqueous ug/L	WVA-AW-MW22 9/18/95 Aqueous ug/L	WVA-AW-MW23 RE 9/21/95 Aqueous ug/L
Arsenic (unfiltered)	50	50	25	19	ND	ND	ND	21.6	No sample collected due to inadequate recharge	7.2 B	ND	4.6 B
Barium (unfiltered)	2000	1000	1000	594	178 B	214	83.1 B	311		249	3320	409
Cadmium (unfiltered)	5	10	10	ND	ND	ND	ND	ND		ND	1.1 B	ND
Chromium (unfiltered)	100	50	50	16.3	1.6 B	3.5 B	4.3 B	23.2		8.1 B	ND	15.6
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND		ND	ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	38.9 J	5.4	10.3	7.6	25.6		49	9.2	19.9
Mercury (unfiltered)	2	10	2	ND	ND	ND	ND	ND		ND	ND	ND
Selenium (unfiltered)	50	10	10	2.7 B	ND	2.2 B	ND	3.4 B		2.1 B	ND	ND
Silver (unfiltered)		50	50	ND	ND	ND	ND	ND		ND	ND	ND
Arsenic (filtered)	50	50	25	ND	ND	ND	ND	ND		ND	ND	ND
Barium (filtered)	2000	1000	1000	130 B	173 B	174 B	56.1 B	65.7 B		198 B	2700	180 B
Cadmium (filtered)	5	10	10	1 B	ND	ND	ND	ND		ND	ND	ND
Chromium (filtered)	100	50	50	1.4 B	ND	ND	1.1 B	ND		ND	ND	1.2 B
Lead (filtered)		50	25	3.2 J	2.9 B	ND	2.8 B	2.4 B		5.7	7.1	5.2
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND		ND	ND	ND
Selenium (filtered)	50	10	10	ND	ND	ND	ND	ND		2.4 B	ND	ND
Silver (filtered)		50	50	ND	ND	ND	ND	ND		ND	ND	ND

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Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW24 9/21/95 Aqueous ug/L	WVA-AW- MW25 9/18/95 Aqueous ug/L	WVA-AW- MW26 9/18/95 Aqueous ug/L	WVA-AW- MW27 RE 9/18/95 Aqueous ug/L	WVA-AW- MW28 9/19/95 Aqueous ug/L	WVA-AW- MW29 9/21/95 Aqueous ug/L	WVA-AW- MW30 RE 9/19/95 Aqueous ug/L	WVA-AW- MW31 RE 9/19/95 Aqueous ug/L	WVA-AW- MW32 9/13/95 Aqueous ug/L
Arsenic (unfiltered)	50	50	25	4.2 B	ND	ND	3.1 B	ND	4.8 B	ND	7.2 B	3.9 B
Barium (unfiltered)	2000	1000	1000	538 J	100 B	**1870**	450	494	405	69.6 B	95.4 B	251
Cadmium (unfiltered)	5	10	10	ND	ND	ND	1.1 B	ND	1.2 B	ND	ND	ND
Chromium (unfiltered)	100	50	50	6.1 B	2.7 B	7.5 B	5.2 B	3.5 B	14.5	2.1 B	6.8 B	8.3 B
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	16.2 J	9.3	13.8	11.3	14.1	15.3	7.2	13.6	13.3
Mercury (unfiltered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (unfiltered)	50	10	10	ND	ND	ND	ND	ND	ND	ND	ND	3.2 B
Silver (unfiltered)		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (filtered)	50	50	25	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium (filtered)	2000	1000	1000	398	58.3 B	126 B	368	42.3 B	63.7 B	22.7 B	63.8 B	183 B
Cadmium (filtered)	5	10	10	ND	1.1 B	ND	ND	1.1 B	ND	ND	ND	ND
Chromium (filtered)	100	50	50	ND	ND	ND	1.4 B	ND	1.1 B	ND	ND	ND
Lead (filtered)		50	25	4.7	8.1	9.2	7.4	7.2	4.2	5.3	6.9	ND
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (filtered)	50	10	10	ND	2.3 B	ND	ND	ND	ND	ND	ND	2.5 B
Silver (filtered)		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Arsenalwide Hydrologic Investigation

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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-MW-33 Aqueous ug/L	WVA-AW-MW34 RE 9/13/95 Aqueous ug/L	WVA-AW-MW35 9/22/95 Aqueous ug/L	WVA-AW-MW36 Aqueous ug/L	WVA-AW-MW37 RE 9/21/95 Aqueous ug/L	WVA-AW-MW38 RE 9/21/95 Aqueous ug/L	WVA-AW-MW39 RE 9/20/95 Aqueous ug/L	WVA-AW-MW40 RE 9/20/95 Aqueous ug/L	WVA-AW-MW41 9/19/95 Aqueous ug/L
Arsenic (unfiltered)	50	50	25	No sample	5.7 B	ND	No sample	ND	ND	ND	ND	ND
Barium (unfiltered)	2000	1000	1000	collected	**1100**	224	collected	119 B	129 B	91 B	98.1 B	113 B
Cadmium (unfiltered)	5	10	10	due to	ND	ND	due to	ND	2.9 B	ND	ND	ND
Chromium (unfiltered)	100	50	50	inadequate	ND	5.5 B	inadequate	2.2 B	ND	ND	1.5 B	1.3 B
Cyanide (unfiltered)	200		100	recharge	ND	ND	recharge	ND	ND	ND	ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25		ND	5.7		4.7	13.8	6.4	8.6	10.8
Mercury (unfiltered)	2	10	2		ND	ND		ND	ND	ND	ND	ND
Selenium (unfiltered)	50	10	10		ND	ND		ND	ND	ND	ND	ND
Silver (unfiltered)		50	50		ND	ND		ND	ND	ND	ND	ND
Arsenic (filtered)	50	50	25		6.3 B	ND		ND	ND	ND	ND	ND
Barium (filtered)	2000	1000	1000		**1200**	166 B		120 B	81.4 B	77.7 B	41.2 B	83.7 B
Cadmium (filtered)	5	10	10		ND	ND		ND	1.6 B	ND	ND	ND
Chromium (filtered)	100	50	50		ND	ND		ND	ND	ND	ND	ND
Lead (filtered)		50	25		2.8 J	3.3		3.8	10.7	6.4	5.6	25
Mercury (filtered)	2	10	2		ND	ND		ND	ND	ND	ND	ND
Selenium (filtered)	50	10	10		ND	ND		ND	ND	ND	ND	ND
Silver (filtered)		50	50		ND	ND		ND	ND	ND	ND	ND

Inorganic Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-MW42 RE 9/20/95 Aqueous ug/L	WVA-AW MW-43 Aqueous 12/21/95 ug/L	WVA-AW MW-60 *duplicate of MW-43* ug/L	WVA-AW MW-44 Aqueous 12/13/95 ug/L	RW1 RE 9/21/95 Aqueous ug/L	93-EM-RW2 9/22/95 Aqueous ug/L	WVA-AW-MW300 9/22/95 *duplicate of RW2*	83DM-SP-1 Aqueous ug/l 9/14/95	86EM-SP1A Aqueous ug/l 9/14/95
Arsenic (unfiltered)	50	50	25	6.4 B	8.9 B	9 B	7 BN	ND	**62**	**25.3**	ND	10.8
Barium (unfiltered)	2000	1000	1000	226	247	245	199 B	130 B	**4060**	**2120**	379	306
Cadmium (unfiltered)	5	10	10	ND	ND	ND	1.7 BN	ND	1.9 B	ND	ND	ND
Chromium (unfiltered)	100	50	50	13.6	2.7 B	2.4 B	3.3 B	**94.9**	45.6	24.4	14.3	15.3
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND	ND	ND		
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	18.3	10.8	9.6	19 N	6.6	**41.1**	18.8	**39.9**	20.9
Mercury (unfiltered)	2	10	2	0.42 B	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (unfiltered)	50	10	10	ND	3.2 B	ND	ND	ND	5.7	3.3 B	ND	ND
Silver (unfiltered)		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (filtered)	50	50	25	ND	9.3 B	9.4 B	4.9 B	ND	ND	ND	ND	7.3 B
Barium (filtered)	2000	1000	1000	55.3 B	232	227	149 B	62.7 B	552	492	68.7 B	75.2 B
Cadmium (filtered)	5	10	10	ND	ND	ND	2 B	1.4 B	ND	ND	ND	ND
Chromium (filtered)	100	50	50	2.3 B	1.8 B	1.3 B	1.2 B	2.2 B	1.3 B	1.2 B	2.1 B	2.7 B
Lead (filtered)		50	25	5.9	ND	ND	ND	**32.3**	13.4	2.8 B	ND	2.6 B
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (filtered)	50	10	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (filtered)		50	50	ND	ND	ND	ND	ND	ND	ND	ND	1.8 B

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Arsenalwide Hydrologic Investigation
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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	86EM- SP1B Aqueous ug/l 9/14/95	83EM- SP2 RE 9/19/95 Aqueous ug/L	WVA-AW- MW200 RE 9/19/95 *duplicate of* *SP2*	83DM- SP-3 RE 9/12/95 Aqueous ug/L	83DM- SP-4 RE 9/13/95 Aqueous ug/L	86EM- SP5 Aqueous ug/l 9/12/95	86EM- SP6 Aqueous ug/l 9/12/95	92EM- SP-7 9/13/95 Aqueous ug/L	92EM- SP-8 9/12/95 Aqueous ug/L
Arsenic (unfiltered)	50	50	25	**26.0**	ND	ND	3.9 B	5.8 B	15.6	ND	ND	22.1
Barium (unfiltered)	2000	1000	1000	805	254	297	132 B	60.5 B	293 J	63.7 BE	82.8 B	123 B
Cadmium (unfiltered)	5	10	10	**8.3**	ND	ND	ND	ND	ND	0.92 B	ND	ND
Chromium (unfiltered)	100	50	50	**66.4**	5 B	6.2 B	8.1 B	5.4 B	ND	22.4	37.3	23.6
Cyanide (unfiltered)	200		100		ND	ND	ND	ND			ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	**149**	11.7	9.1	7.2	2.8 B	2.8 J	6.5 N	6.9 J	4.3
Mercury (unfiltered)	2	10	2	0.04	ND	ND	ND	ND	0.3	0.27	ND	ND
Selenium (unfiltered)	50	10	10	ND	4 B	2.7 B	ND	ND	ND	ND	ND	ND
Silver (unfiltered)		50	50	3.5 B	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic (filtered)	50	50	25	10.5	ND	ND	ND	5.8 B	11.8	ND	ND	6.3 B
Barium (filtered)	2000	1000	1000	131 B	119 B	107 B	36.6 B	59.5 B	311 J	40.3 BE	95 B	55.5 B
Cadmium (filtered)	5	10	10	ND	1 B	ND	ND	ND	ND	ND	1.5 B	ND
Chromium (filtered)	100	50	50	2.7 B	2.2 B	2.3 B	1 B	3.5 B	2.1 B	11	14	1.2 B
Lead (filtered)		50	25	ND	13	6.7	ND	ND	ND	ND	2.4 J	ND
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (filtered)	50	10	10	ND	6.3	6.2	ND	ND	5.2	ND	ND	ND
Silver (filtered)		50	50	ND	ND	ND	ND	ND	ND	3.4 B	ND	ND

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Arsenalwide Hydrologic Investigation

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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	93EM- SP9 Aqueous ug/L 9/19/95	93EM- SP10 Aqueous ug/L 9/20/95	93EM- SP-11 RE 9/13/95 Aqueous ug/L	93EM- SP12 Aqueous ug/L 9/20/95	93EM- SP13 Aqueous ug/L 9/20/95	93EM- SP14 Aqueous ug/L 9/20/95	93EM- SP15 RE 9/20/95 Aqueous ug/L	94EM- SP16 RE 9/20/95 Aqueous ug/L	94EM- SP19 9/21/95 Aqueous ug/L
Arsenic (unfiltered)	50	50	25	**37.6 J**	ND	5.7 B	ND	6.3 B	ND	ND	ND	ND
Barium (unfiltered)	2000	1000	1000	827	84.8 B	105 B	122 B	212	**2750**	113 B	112 B	85.1 B
Cadmium (unfiltered)	5	10	10	ND	ND	ND	ND	ND	ND	1.8 B	ND	ND
Chromium (unfiltered)	100	50	50	**17600**	**383 E**	**545**	**165 E**	7.5 BE	29.6 E	**149**	**927**	**3250**
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	ND	3.3	3 B	ND	ND	ND	6.1	6.9	4.7
Mercury (unfiltered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (unfiltered)	50	10	10	R	ND	ND	ND	ND	ND	ND	ND	ND
Silver (unfiltered)		50	50	4.2 B	ND	ND	ND	ND	1.6 B	ND	ND	ND
Arsenic (filtered)	50	50	25	5.3 UJ	ND	3.8 B	ND	ND	ND	ND	ND	ND
Barium (filtered)	2000	1000	1000	79.1 B	75.9 B	87 B	60.9 B	167 B	165 B	122 B	80.4 B	67.8 B
Cadmium (filtered)	5	10	10	ND	ND	ND	ND	ND	ND	1.6 B	ND	ND
Chromium (filtered)	100	50	50	1.8 B	38.4	7 B	ND	ND	ND	4.2 B	6 B	1.3 B
Lead (filtered)		50	25	ND	ND	ND	ND	ND	ND	6.6	7.3	4.5
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (filtered)	50	10	10	R	ND	ND	ND	ND	ND	ND	ND	ND
Silver (filtered)		50	50	1.8 B	2.5 B	ND	ND	ND	ND	ND	ND	ND

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Arsenalwide Hydrologic Investigation
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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	94EM- SP20 RE 9/21/95 Aqueous ug/L	94EM- SP21 9/22/95 Aqueous ug/L	WVA-B25- MW-1 Aqueous ug/l 9/13/95	WVA-B25- MW-2 Aqueous ug/l 9/12/95	WVA-B25- MW-DUP *this sample is a duplicate of MW-2*	WVA-B25- MW-3 Aqueous ug/l 9/13/95	WVA-B25- MW-4 Aqueous ug/l 9/13/95	WVA-B25- MW-5 Aqueous ug/l 9/12/95	WVA-B25- MW-6 Aqueous ug/l 9/13/95
Arsenic (unfiltered)	50	50	25	3.2 B	ND	ND	ND	ND	ND	ND	ND	ND
Barium (unfiltered)	2000	1000	1000	380	266	308 E	103 BE	104 BE	489 J	683 J	694 E	156 BE
Cadmium (unfiltered)	5	10	10	1.2 B	ND	**8.5**	ND	ND	2.1 B	2.5 B	1.3 B	**427**
Chromium (unfiltered)	100	50	50	**1170**	**2250**	13.9	1.6 B	ND	15.1	**57.1**	ND	21.5
Cyanide (unfiltered)	200		100	ND	ND							
Iron (unfiltered)		300	300				**880**	**818**	**17900**	**57100**		
Lead (unfiltered)		50	25	**38.7**	13.4	20.8 N	ND	2.8 BN	R	R	3.3 N	**111 N**
Mercury (unfiltered)	2	10	2	ND	ND	ND	ND	ND	ND	0.4	0.21	0.33
Selenium (unfiltered)	50	10	10	ND	5.3	ND	ND	ND	R	R	6.0	ND
Silver (unfiltered)		50	50	ND	ND	ND	2.3 B	ND	2.5 B	ND	2.3 B	2.0 B
Arsenic (filtered)	50	50	25	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium (filtered)	2000	1000	1000	412	120 B	20.5 BE	70.1 BE	66 BE	115 J	116 J	664 E	40.3 BE
Cadmium (filtered)	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium (filtered)	100	50	50	1.8 B	2.5 B	ND	ND	ND	ND	ND	ND	ND
Lead (filtered)		50	25	4.4	3.2	3.4 N	ND	2.9 BN	ND	4.2 J	4.0 N	ND
Mercury (filtered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	0.23 N
Selenium (filtered)	50	10	10	ND	8.3	ND	ND	ND	ND	ND	ND	ND
Silver (filtered)		50	50	ND	ND	ND	ND	ND	ND	ND	3.0 B	ND

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Arsenalwide Hydrologic Investigation
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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B135- MW1 Aqueous ug/L 9/21/95	WVA-B135- MW2 Aqueous ug/L 9/14/95	WVA-B135- MW3 Aqueous ug/L 9/14/95	WVA-B135- MW4 Aqueous ug/L 9/20/95	WVA-B135- PW1 Aqueous ug/L 9/21/95	WVA-B135- PW1(Dup) Aqueous ug/L 9/21/95	WVA-B135- PW1 Product ug/L 9/21/95	WVA-B135- PW1(Dup) Product ug/L 9/21/95	WVA-B35- MW5 Aqueous ug/L 9/14/95
Arsenic (unfiltered)	50	50	25	ND	15.7	10.1	10 B	ND	ND	1.9	2.2	**97.5**
Barium (unfiltered)	2000	1000	1000	**2640**	928	176 B	**15300**	173 B	156 B	10.7 B	11.2 B	**31400**
Cadmium (unfiltered)	5	10	10	ND	2 B	ND	3.9 B	ND	ND	0.29 B	0.29 B	**7.2**
Chromium (unfiltered)	100	50	50	**58.5**	24.9	3 B	**143** E	2.2 B	5 B	2.8	2.9	**330**
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (unfiltered)		300	300									
Lead (unfiltered)		50	25	5.5	22.9	ND	**66.8**	R	6.2	3.8	3.9	**161**
Mercury (unfiltered)	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (unfiltered)	50	10	10	ND	5 UJ	ND	ND	5 UJ	ND	ND	ND	ND
Silver (unfiltered)		50	50	ND	**104**	ND	ND	ND	ND	ND	0.19 N	2.7 B
Arsenic (filtered)	50	50	25	ND	6.9 B	10.1	ND	ND	ND			9.4 B
Barium (filtered)	2000	1000	1000	**1240** E	317	79.2 B	568	164 BE	162 BE			249
Cadmium (filtered)	5	10	10	ND	ND	ND	ND	ND	ND			ND
Chromium (filtered)	100	50	50	1.8 B	ND	2.4 B	ND	ND	3.8 B			2.6 B
Lead (filtered)		50	25	ND	ND	ND	3.1	R	3.2			ND
Mercury (filtered)	2	10	2	0.2 B	ND	ND	ND	ND	ND			ND
Selenium (filtered)	50	10	10	ND	5 UJ	ND	ND	5 UJ	ND			ND
Silver (filtered)		50	50	ND	ND	1.7 B	ND	ND	ND			ND

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Arsenalwide Hydrologic Investigation

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Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B35- MW6 Aqueous ug/L 9/19/95	WVA-B35- MW7 Aqueous ug/L 9/19/95	WVA-B35- MW8 Aqueous ug/L 9/19/95	WVA-B35- MW8(Dup) Aqueous ug/L 9/19/95	WVA-B35- PW2 Aqueous ug/L 9/21/95	WVA-B35- PW2 (RE) Product ug/L 9/21/95	WVA-B35- PW3 Aqueous ug/L 9/21/95
Arsenic (unfiltered)	50	50	25	22.4	13.8	7.8 J	ND	**55.9**	ND	ND
Barium (unfiltered)	2000	1000	1000	874.0	**10000**	**1780**	**1890**	185 B	0.88 B	20.3 B
Cadmium (unfiltered)	5	10	10	2.4 B	1.6 B	ND	ND	4.5 B	ND	ND
Chromium (unfiltered)	100	50	50	2.5 B	48.8	2.2 B	3.0 B	**1220**	2	41.4
Cyanide (unfiltered)	200		100	ND	ND	ND	ND	ND	ND	ND
Iron (unfiltered)		300	300							
Lead (unfiltered)		50	25	**85.1**	**32.5**	ND	ND	**130**	ND	2.6 B
Mercury (unfiltered)	2	10	2	0.41	ND	ND	0.38	ND	ND	ND
Selenium (unfiltered)	50	10	10	ND	ND	R	ND	ND	ND	ND
Silver (unfiltered)		50	50	2.4 B	2.9 B	ND	ND	ND	ND	ND
Arsenic (filtered)	50	50	25	5.8 B	9.3 B	6.5 J	9.7 B	ND		ND
Barium (filtered)	2000	1000	1000	96.3 B	594	**1630**	**1680**	92 BE		16.8 BE
Cadmium (filtered)	5	10	10	ND	ND	ND	ND	ND		ND
Chromium (filtered)	100	50	50	3.6 B	ND	ND	2.6 B	**62.4**		**64**
Lead (filtered)		50	25	ND	ND	ND	ND	14.6		**57.1**
Mercury (filtered)	2	10	2	ND	0.05	ND	ND	ND		ND
Selenium (filtered)	50	10	10	ND	ND	R	ND	ND		ND
Silver (filtered)		50	50	1.8 B	2.6 B	ND	ND	ND		ND

Inorganic Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-B35-PW4 Aqueous ug/L 9/21/95
Arsenic (unfiltered)	50	50	25	ND
Barium (unfiltered)	2000	1000	1000	31.2 B
Cadmium (unfiltered)	5	10	10	ND
Chromium (unfiltered)	100	50	50	**19600**
Cyanide (unfiltered)	200		100	ND
Iron (unfiltered)		300	300	
Lead (unfiltered)		50	25	**5570**
Mercury (unfiltered)	2	10	2	ND
Selenium (unfiltered)	50	10	10	ND
Silver (unfiltered)		50	50	3.3 B
Arsenic (filtered)	50	50	25	14.2
Barium (filtered)	2000	1000	1000	22.7 BE
Cadmium (filtered)	5	10	10	ND
Chromium (filtered)	100	50	50	**14700**
Lead (filtered)		50	25	**191**
Mercury (filtered)	2	10	2	ND
Selenium (filtered)	50	10	10	ND
Silver (filtered)		50	50	ND

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	87GTI-MW- 1BP 9/14/95 Aqueous mg/L	87GTI-MW- 2BP 9/14/95 Aqueous mg/L	87GTI-MW- MW-100 *duplicate of* *BP2* mg/L	87GTI-MW- 3BP RE 9/14/95 Aqueous mg/L	87GTI-MW- 4BP 9/14/95 Aqueous mg/L	WVA-AW- MW21 9/18/95 Aqueous mg/L	WVA-AW- MW22 9/18/95 Aqueous mg/L	WVA-AW- MW23 RE 9/21/95 Aqueous mg/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-AW- MW24 9/21/95 Aqueous mg/L	WVA-AW- MW25 9/18/95 Aqueous mg/L	WVA-AW- MW26 9/18/95 Aqueous mg/L	WVA-AW- MW27 RE 9/18/95 Aqueous mg/L	WVA-AW- MW28 9/19/95 Aqueous mg/L	WVA-AW- MW29 9/21/95 Aqueous mg/L	WVA-AW- MW30 RE 9/19/95 Aqueous mg/L	WVA-AW- MW31 RE 9/19/95 Aqueous mg/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-AW- MW32 9/13/95 Aqueous mg/L	WVA-AW- MW34 RE 9/13/95 Aqueous mg/L	WVA-AW- MW35 9/22/95 Aqueous mg/L	WVA-AW- MW37 RE 9/21/95 Aqueous mg/L	WVA-AW- MW38 RE 9/21/95 Aqueous mg/L	WVA-AW- MW39 RE 9/20/95 Aqueous mg/L	WVA-AW- MW40 RE 9/20/95 Aqueous mg/L	WVA-AW- MW41 9/19/95 Aqueous mg/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	0.1	ND	ND	ND	ND	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-AW- MW42 RE 9/20/95 Aqueous mg/L	RW1 RE 9/21/95 Aqueous mg/L	93-EM- RW2 9/22/95 Aqueous mg/L	WVA-AW- MW300 *duplicate of* *RW2* mg/L	83DM- SP-1 9/14/95 Aqueous mg/L	86EM- SP-1A 9/14/95 Aqueous mg/L	86EM- SP-1B 9/14/95 Aqueous mg/L	83EM- SP2 RE 9/19/95 Aqueous mg/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	**0.05**	ND	ND	ND	ND	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/l	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-AW- MW200 RE *duplicate of* *SP2* mg/L	83DM- SP-3 RE 9/12/95 Aqueous mg/L	83DM- SP-4 RE 9/13/95 Aqueous mg/L	86EM- SP-5 9/12/95 Aqueous mg/l	86EM- SP-6 9/12/95 Aqueous mg/l	92EM- SP-7 9/13/95 Aqueous mg/L	92EM- SP-8 9/12/95 Aqueous mg/L	93EM- SP9 9/19/95 Aqueous ug/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	ND	ND	*	ND	0.03	*
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	93EM- SP10 9/20/95 Aqueous ug/L	93EM- SP-11 RE 9/13/95 Aqueous mg/L	93EM- SP12 9/20/95 Aqueous ug/L	93EM- SP13 9/20/95 Aqueous ug/L	93EM- SP14 9/20/95 Aqueous ug/L	93EM- SP15 RE 9/20/95 Aqueous mg/L	94EM- SP16 RE 9/20/95 Aqueous mg/L	94EM- SP19 9/21/95 Aqueous mg/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	94EM- SP20 RE 9/21/95 Aqueous mg/L	94EM- SP21 9/22/95 Aqueous mg/L	WVA-B25- MW-1 9/13/95 Aqueous mg/l	WVA-B25- MW-2 9/12/95 Aqueous mg/l	WVA-B25- MW-DUP *this sample is a duplicate of MW-2*	WVA-B25- MW-3 9/13/95 Aqueous mg/l	WVA-B25- MW-4 9/13/95 Aqueous mg/l	WVA-B25- MW-5 9/12/95 Aqueous mg/l
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	0.03	ND	0.01 *	0.007 *	ND	ND	0.009 *
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	ND

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation
Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-B25- MW-6 9/13/95 Aqueous mg/l	WVA-B135- MW1 9/21/95 Aqueous ug/L	WVA-B135- MW2 9/14/95 Aqueous ug/L	WVA-B135- MW3 9/14/95 Aqueous ug/L	WVA-B135- MW4 9/20/95 Aqueous ug/L	WVA-B135- PW1 9/21/95 Aqueous ug/L	WVA-B135- PW1(Dup) 9/21/95 Aqueous ug/L	WVA-B135- PW1 9/21/95 Product ug/L
Hexavalent Chromium (total)	0.1	0.05	0.05	ND	5 **	ND	ND	ND	ND	ND	
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	ND	ND	ND	R

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-B135- PW1(Dup) 9/21/95 Product ug/L	WVA-B35- MW5 9/14/95 Aqueous ug/L	WVA-B35- MW6 9/19/95 Aqueous ug/L	WVA-B35- MW7 9/19/95 Aqueous ug/L	WVA-B35- MW8 9/19/95 Aqueous ug/L	WVA-B35- MW8(Dup) 9/19/95 Aqueous ug/L	WVA-B35- PW2 9/21/95 Aqueous ug/L	WVA-B35- PW2 (RE) 9/21/95 Product ug/L
Hexavalent Chromium (total)	0.1	0.05	0.05		*	*	*	18 J	13	*	ND
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	ND	ND	ND	ND	13	8	*	

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Hexavalent Chromium Concentrations in Round One Monitoring Well Groundwater Samples

Arsenalwide Hydrologic Investigation

Watervliet Arsenal

Study Location Date Sampled Matrix Units	USEPA Maximum Contaminant Level mg/L	NYSDOH Maximum Contaminant Level mg/L	NYSDEC Class GA Groundwater Standards mg/L	WVA-B35- PW3 9/21/95 Aqueous ug/L	WVA-B35- PW4 9/21/95 Aqueous ug/L
Hexavalent Chromium (total)	0.1	0.05	0.05	**85**	**17410**
Hexavalent Chromium (dissolved)	0.1	0.05	0.05	**54**	**10500**

* = The turbidity was so high that no meaningful reading could be taken; no color development could be seen in any of these samples.

** = For these turbid samples, absorbance from blank sample without color reagent was subtracted from the absorbance after color development. The QC sample was a 50 ug/L standard.

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	83DM-	86EM-	86EM-	83EM-	83DM-	83DM-	86EM-	86EM-	92EM-
Location				SP-1	SP-1A	SP-1B	SP-2	SP-3	SP-4	SP-5	SP-6	SP-7
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units				ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled				05/30/96	05/30/96	05/30/96	05/23/96	05/23/96	05/23/96	05/23/96	05/23/96	06/03/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	310	ND	1 J
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	0.4 J	ND	ND	ND	ND	0.6 J
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	0.5 J
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	0.4 J
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	0.2 J
Di-n-butylphthalate		50		0.5 JB	ND	ND	0.4 JB	0.4 JB	0.4 JB	ND	0.7 JB	1 J
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	0.6 J
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	1 J
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	ND	0.8 J
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	0.8 J
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	0.9 J
bis(2-Ethylhexyl)phthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	65
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	0.9 J
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	0.9 J
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	1 J
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7 J
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	92EM-SP-8 Aqueous ug/L 05/23/96	93EM-SP-9 Aqueous ug/L 05/29/96	93EM-SP-11 Aqueous ug/L 05/31/96	93EM-SP-12 Aqueous ug/L 05/29/96	93EM-SP-13 Aqueous ug/L 05/31/96	94EM-SP-19 Aqueous ug/L 05/30/96	94EM-SP-20 Aqueous ug/L 05/30/96	94EM-SP-21 Aqueous ug/L 05/30/96	WVA-AW-MW-20 Aqueous ug/L 05/28/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		15	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	0.5 JB	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.5 JB	0.2 J	ND	0.3 J	ND	0.5 JB	0.4 JB	ND	0.4 JB
Fluoranthene		50	50	ND	ND	ND	ND	2 J	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	1 J	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	2 J	ND	ND	ND	2 JB	ND	ND	ND	0.7 J
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-MW-21 Aqueous ug/L 05/28/96	WVA-AW-MW-22 Aqueous ug/L 05/24/96	WVA-AW-MW-23 Aqueous ug/L 05/22/96	WVA-AW-MW-24 Aqueous ug/L 05/22/96	WVA-AW-MW-25 Aqueous ug/L 05/24/96	WVA-AW-MW-26 Aqueous ug/L 05/21/96	WVA-AW-MW-27 Aqueous ug/L 05/22/96	WVA-AW-MW-45 *duplicate of MW-27* 05/22/96	WVA-AW-MW-28 Aqueous ug/L 05/21/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	ND	ND	0.2 JB	ND	ND	0.2 JB
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.5 JB	ND	0.2 J	0.6 JB	ND	0.8 JB	ND	ND	0.8 JB
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	0.3 J	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	0.2 J	ND	0.9 J	ND	0.8 J	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-MW-29 Aqueous ug/L 05/31/96	WVA-AW-MW-30 Aqueous ug/L 06/03/96	WVA-AW-MW-31 Aqueous ug/L 05/31/96	WVA-AW-MW-32 Aqueous ug/L 05/30/96	WVA-AW-MW-33 Aqueous ug/L 05/31/96	WVA-AW-MW-34 Aqueous ug/L 05/31/96	WVA-AW-MW-35 Aqueous ug/L 05/31/96	WVA-AW-MW-36 Aqueous ug/L 05/31/96	WVA-AW-MW-37 Aqueous ug/L 05/29/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	0.4 JB	0.6 JB	ND	ND	0.9 JB	0.3 JB	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		ND	ND	0.3 JB	0.4 JB	0.5 JB	ND	ND	0.6 JB	0.2 JB
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	0.3 J	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	3 JB	0.8 JB	ND	ND	ND	ND	ND	0.4 JB	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-Bldg25	WVA-Bldg25
Location	Maximum	Maximum	Class GA	MW-38	MW-39	MW-40	MW-41	MW-42	MW-43	MW-44	MW-1	MW-2
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	05/29/96	05/29/96	05/29/96	05/21/96	05/24/96	05/30/96	05/30/96	05/29/96	05/24/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	120	18	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	0.2 JB	ND	ND	0.6 JB	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.2 JB	0.3 J	0.3 J	0.6 JB	0.3 JB	0.8 JB	ND	0.3 J	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	6 J	ND	ND	ND	ND	1 JB	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-Bldg25	WVA-Bldg25	WVA-Bldg25	WVA-Bldg25	WVA-Bldg25	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35
Location	Maximum	Maximum	Class GA	MW-7	MW-3	MW-4	MW-5	MW-6 RE	MW-5	MW-6	MW-7	MW-8 RE
Matrix	Contaminant	Contaminant	Groundwater	*duplicate of*	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	*25-MW-2*	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	05/24/96	05/29/96	05/23/96	05/24/96	05/24/96	05/30/96	05/23/96	05/30/96	05/31/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND	ND	ND	16 J
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND	12 J
Diethylphthalate		50	50	ND	ND	ND	ND	ND	ND	ND	ND	8 JB
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	9 J
Anthracene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.3 JB	ND	0.3 JB	ND	0.2 JB	0.6 JB	0.5 JB	0.4 JB	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	22 J
Pyrene		50	50	ND	ND	ND	ND	ND	ND	ND	ND	21 J
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	**18 J**
Chrysene			0.002	ND	ND	ND	ND	ND	ND	ND	ND	**40**
bis(2-Ethylhexyl)phthalate		50	50	ND	ND	ND	ND	ND	0.5 J	ND	ND	9 JB
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
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Site	USEPA	NYSDOH	NYSDEC	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135
Location	Maximum	Maximum	Class GA	PW-2RE	PW-2F	PW-3	PW-4	MW-1	MW-2	MW-3	MW-4	PW-1
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Product	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	05/22/96	05/22/96	05/29/96	05/29/96	05/30/96	05/22/96	05/23/96	05/23/96	05/22/96
Naphthalene		50	10	R	R	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		R	R	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	R	0.8 J	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	R	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	R	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	R	ND	ND	ND	ND	ND	ND	ND
Fluorene		50	50	230 J	130000 J	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	590 J	120000 J	0.9 J	ND	ND	ND	ND	ND	ND
Anthracene		50	50	300 J	69000 J	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		ND	ND	0.7 J	0.4 J	0.5 JB	0.4 JB	0.3 JB	0.4 JB	ND
Fluoranthene		50	50	1700 J	340000 J	0.6 J	ND	ND	ND	ND	ND	ND
Pyrene		50	50	1300 J	290000	0.3 J	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	360 J	93000 J	ND	ND	ND	ND	ND	ND	ND
Chrysene			0.002	310 J	46000 J	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	400 JB	68000 J	14	ND	1 J	ND	ND	ND	10 B
Di-n-octylphthalate		50		240 J	5900 J	1 J	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	190 J	56000 J	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	200 J	28000 J	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	140 J	27000 J	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	86 J	14000 J	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	6300 J	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	12000 J	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-RW-1 Aqueous ug/L 06/03/96	WVA-AW-RW-2 Aqueous ug/L 06/03/96	WVA-AW-B110RE Aqueous ug/L 06/04/96	WVA-AW-MW-46 *duplicate of MW-B110* 06/04/96	WVA-AW-B121N Aqueous ug/L 06/04/96	WVA-AW-B121S Aqueous ug/L 06/04/96
Naphthalene		50	10	ND	ND	0.8 J	0.7 J	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Dimethylphthalate			50	ND	ND	ND	ND	ND	ND
Acenaphthylene			20	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	1 J	ND
Diethylphthalate		50	50	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	0.7 J	ND
N-Nitrosodiphenylamine (1)			50	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	2 J	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50		0.6 J	ND	2 J	0.7 J	0.6 J	0.8 J
Fluoranthene		50	50	ND	ND	0.6 J	ND	ND	ND
Pyrene		50	50	ND	1 J	1 J	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	1 J	2 J	2 J	ND	2 J	1 J
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene		0.4	0.002	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene		0.3	50	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene			50	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
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Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	83DM- SP-1 Aqueous ug/L 05/30/96	86EM- SP-1A Aqueous ug/L 05/30/96	86EM- SP-1B Aqueous ug/L 05/30/96	83EM- SP-2 Aqueous ug/L 05/23/96	83DM- SP-3 Aqueous ug/L 05/23/96	83DM- SP-4 Aqueous ug/L 05/23/96	86EM- SP-5 Aqueous ug/L 05/23/96	86EM- SP-6 Aqueous ug/L 05/23/96	92EM- SP-7 Aqueous ug/L 06/03/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	0.8 J	0.8 J	0.7 J	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	0.7 J	ND	ND	ND	ND	ND	**11**	ND	2 J
cis-1,2-Dichloroethene	70	5	5	2 J	3 J	0.3 J	ND	ND	ND	ND	ND	0.8 J
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	2 J
1,1,1-Trichloroethane		200	5	9	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	**42**	**14**	2 J	ND	ND	ND	ND	ND	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	0.7 J	0.6 J	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	92EM-SP-8 Aqueous ug/L 05/23/96	93EM-SP-9 Aqueous ug/L 05/29/96	93EM-SP-11 Aqueous ug/L 05/31/96	93EM-SP-12 Aqueous ug/L 05/29/96	93EM-SP-13 Aqueous ug/L 05/31/96	94EM-SP-19 Aqueous ug/L 05/30/96	94EM-SP-20 Aqueous ug/L 05/30/96	94EM-SP-21 Aqueous ug/L 05/30/96	WVA-AW-MW-20 Aqueous ug/L 05/28/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	2 JB	ND	0.4 J	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	**28**	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	4 J	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site **Location** **Matrix** **Units** Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW-21 Aqueous ug/L 05/28/96	WVA-AW- MW-22 Aqueous ug/L 05/24/96	WVA-AW- MW-23 Aqueous ug/L 05/22/96	WVA-AW- MW-24 Aqueous ug/L 05/22/96	WVA-AW- MW-25 Aqueous ug/L 05/24/96	WVA-AW- MW-26 Aqueous ug/L 05/21/96	WVA-AW- MW-27 Aqueous ug/L 05/22/96	WVA-AW- MW-45 *duplicate of* *MW-27* 05/22/96	WVA-AW- MW-28 Aqueous ug/L 05/21/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	**4 J**	**4 J**	ND
Methylene Chloride			5	ND	2 JB	ND	ND	2 JB	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	1 J	1 J	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	0.4 J	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
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Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-
Location	Maximum	Maximum	Class GA	MW-29	MW-30	MW-31	MW-32	MW-33	MW-34	MW-35	MW-36	MW-37
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	05/31/96	06/03/96	05/31/96	05/30/96	05/31/96	05/31/96	05/31/96	05/31/96	05/29/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	**22 J**	ND	**9 J**	ND
Methylene Chloride			5	0.4 JB	2 JB	0.4 JB	0.4 JB	0.4 JB	**48 JB**	ND	2 JB	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	**1100**	**16**	**230**	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	**100**	**120**	**52**	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	2 J	**120**	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	10 J	2 J	3 J	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	2 J	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW-38 Aqueous ug/L 05/29/96	WVA-AW- MW-39 Aqueous ug/L 05/29/96	WVA-AW- MW-40 Aqueous ug/L 05/29/96	WVA-AW- MW-41 Aqueous ug/L 05/21/96	WVA-AW- MW-42 Aqueous ug/L 05/24/96	WVA-AW- MW-43 Aqueous ug/L 05/30/96	WVA-AW- MW-44 Aqueous ug/L 05/30/96	WVA-Bldg25 MW-1 Aqueous ug/L 05/29/96	WVA-Bldg25 MW-2 Aqueous ug/L 05/24/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	ND	ND	1 JB	0.6 JB	0.4 JB	ND	2 JB
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	0.8 J
1,1-Dichloroethane			5	ND	ND	ND	ND	ND	**12**	**6**	ND	1 J
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND	ND	4 J
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND	ND	ND	**20**
Trichloroethene	5	5	5	ND	ND	ND	ND	0.7 J	ND	ND	ND	**51**
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	0.6 J	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/l	NYSDOH Maximum Contaminant Level ug/l	NYSDEC Class GA Groundwater Standards ug/l	WVA-Bldg25 MW-7 *duplicate of* *25-MW-2* 05/24/96	WVA-Bldg25 MW-3 Aqueous ug/L 05/29/96	WVA-Bldg25 MW-4 Aqueous ug/L 05/23/96	WVA-Bldg25 MW-5 Aqueous ug/L 05/24/96	WVA-Bldg25 MW-6 Aqueous ug/L 05/24/96	WVA-Bldg35 MW-5 Aqueous ug/L 05/30/96	WVA-Bldg35 MW-6 Aqueous ug/L 05/23/96	WVA-Bldg35 MW-7 Aqueous ug/L 05/30/96	WVA-Bldg35 MW-8 Aqueous ug/L 05/31/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	1 JB	ND	ND	ND	2 JB	1 J	ND	0.7 J	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	1 J	ND	ND	ND
1,1-Dichloroethene		7	5	0.9 J	2 J	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	1 J	4 J	ND	0.6 J	0.8 J	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	4 J	**19**	ND	0.5 J	3 J	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	**19**	**82**	ND	ND	**6 J**	ND	ND	ND	ND
Trichloroethene	5	5	5	**52**	**310**	ND	ND	**280**	0.5 J	ND	2 J	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135
Location	Maximum	Maximum	Class GA	PW-2	PW-2F	PW-3	PW-4	MW-1	MW-2	MW-3	MW-4	PW-1
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Product	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled				05/22/96	05/22/96	05/29/96	05/29/96	05/30/96	05/22/96	05/23/96	05/23/96	05/22/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	ND	ND	0.8 J	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	**10**	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene		5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene		100	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/l	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- RW-1 Aqueous ug/L 06/03/96	WVA-AW- RW-2 Aqueous ug/L 06/03/96	WVA-AW- B110 Aqueous ug/L 06/04/96	WVA-AW- MW-46 *duplicate of* *MW-B110* 06/04/96	WVA-AW- B121N Aqueous ug/L 06/04/96	WVA-AW- B121S Aqueous ug/L 06/04/96
Vinyl Chloride	2	2	2	ND	**40**	ND	ND	**160 J**	**48**
Methylene Chloride			5	0.8 JB	0.8 JB	0.8 J	ND	ND	2 JB
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		7	5	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane			5	ND	0.5 J	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	**38**	ND	ND	**140**	**82**
Chloroform		100	7	ND	ND	ND	ND	ND	ND
2-Butanone				ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane		200	5	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	2 J	ND	ND	ND	1 J
Benzene		5	0.7	ND	**0.8**	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	0.7 J	ND
trans-1,2-Dichloroethene		100	5	ND	0.7 J	ND	ND	2 J	1 J
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	83DM-	86EM-	86EM-	83EM-	83DM-	83DM-	86EM-	86EM-	92EM-
Location	Maximum	Maximum	Class GA	SP-1	SP-1A	SP-1B	SP-2	SP-3	SP-4	SP-5	SP-6	SP-7
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/l			05/30/96	05/30/96	05/30/96	05/23/96	05/23/96	05/23/96	05/23/96	05/23/96	06/04/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	0.007	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	**0.013**	ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level	NYSDOH Maximum Contaminant Level	NYSDEC Class GA Groundwater Standards ug/L	92EM-SP-8 Aqueous ug/L 05/23/96	93EM-SP-9 Aqueous ug/L 05/29/96	93EM-SP-11 Aqueous ug/L 05/31/96	93EM-SP-12 Aqueous ug/L 05/29/96	93EM-SP-13 Aqueous ug/L 05/31/96	94EM-SP-19 Aqueous ug/L 05/30/96	94EM-SP-20 Aqueous ug/L 05/30/96	94EM-SP-21 Aqueous ug/L 05/30/96	WVA-AW-MW-20 Aqueous ug/L 05/28/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	ND	**0.0017** J	**0.0094** J	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND	**0.0022** J	ND	**0.0034** J
4,4'-DDD			ND	**0.017**	ND	ND	ND	ND	ND	**0.01**	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.0029** J
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW-21 Aqueous ug/L 05/28/96	WVA-AW- MW-22 Aqueous ug/L 05/24/96	WVA-AW- MW-23 Aqueous ug/L 05/22/96	WVA-AW- MW-24 Aqueous ug/L 05/22/96	WVA-AW- MW-25 Aqueous ug/L 05/21/96	WVA-AW- MW-26 Aqueous ug/L 05/21/96	WVA-AW- MW-27 Aqueous ug/L 05/22/96	WVA-AW- MW-45 *duplicate of* *MW-27* 05/22/96	WVA-AW- MW-28 Aqueous ug/L 05/21/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	**0.00089** J	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level	NYSDOH Maximum Contaminant Level	NYSDEC Class GA Groundwater Standards	WVA-AW-MW-29 Aqueous ug/L	WVA-AW-MW-30 Aqueous ug/L 06/03/96	WVA-AW-MW-31 Aqueous ug/L 05/31/96	WVA-AW-MW-32 Aqueous ug/L 05/30/96	WVA-AW-MW-33 Aqueous ug/L	WVA-AW-MW-34 Aqueous ug/L 05/31/96	WVA-AW-MW-35 Aqueous ug/L 05/31/96	WVA-AW-MW-36 Aqueous ug/L	WVA-AW-MW-37 Aqueous ug/L 05/28/96
beta-BHC				Not sampled due to inadequate recharge	ND	ND	ND	Not sampled due to inadequate recharge	ND	ND	Not sampled due to inadequate recharge	ND
delta-BHC					ND	ND	ND		ND	ND		ND
gamma-BHC (Lindane)					ND	ND	ND		ND	ND		ND
Heptachlor	0.4		ND		ND	ND	ND		ND	ND		ND
Aldrin			ND		ND	ND	ND		ND	ND		ND
Dieldrin			ND		ND	ND	ND		ND	ND		ND
4,4'-DDE			ND		ND	ND	ND		ND	ND		ND
4,4'-DDD			ND		ND	ND	ND		ND	ND		ND
4,4'-DDT			ND		ND	ND	ND		ND	ND		ND
Endrin Ketone					ND	ND	ND		ND	ND		ND
Endrin Aldehyde					ND	ND	ND		ND	ND		ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-Bldg25	WVA-Bldg25
Location	Maximum	Maximum	Class GA	MW-38	MW-39	MW-40	MW-41	MW-42	MW-43	MW-44	MW-1	MW-2
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	05/29/96	05/29/96	05/29/96	05/21/96	05/24/96	05/30/96	05/30/96	05/29/96	05/24/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	0 0045 J
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-Bldg25 MW-7 *duplicate of* *25-MW-2* 05/24/96	WVA-Bldg25 MW-3 Aqueous ug/L 05/29/96	WVA-Bldg25 MW-4 Aqueous ug/L 05/23/96	WVA-Bldg25 MW-5 Aqueous ug/L 05/24/96	WVA-Bldg25 MW-6 Aqueous ug/L 05/24/96	WVA-Bldg35 MW-5 Aqueous ug/L 05/30/96	WVA-Bldg35 MW-6 Aqueous ug/L 05/23/96	WVA-Bldg35 MW-7 Aqueous ug/L 05/30/96	WVA-Bldg35 MW-8 Aqueous ug/L 05/31/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	0.15
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.061**
Dieldrin			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	**0.0018** J	ND	ND	ND	ND	**0.1**
4,4'-DDD			ND	ND	ND	ND	**0.0015** J	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	0.22

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg35	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135	WVA-Bldg135
Location	Maximum	Maximum	Class GA	PW-2	PW-2F	PW-3	PW-4	MW-1	MW-2	MW-3	MW-4	PW-1
Matrix	Contaminant	Contaminant	Groundwater	Product	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/l	ug/l	ug/L	05/22/96	05/22/96	05/29/96	05/29/96	05/30/96	05/22/96	05/23/96	05/23/96	05/22/96
beta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	**0.049**	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	**0.0078**	ND	ND	ND
Dieldrin			ND	ND	ND	ND	ND	ND	**0.019**	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	**0.016**	ND	ND	**0.032**
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone				ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW-RW-1 Aqueous ug/L 06/03/96	WVA-AW-RW-2 Aqueous ug/L 06/03/96	WVA-AW-B110 Aqueous ug/L 06/04/96	WVA-AW-MW-46 *duplicate of MW-B110* 06/04/96	WVA-AW-B121N Aqueous ug/L 06/04/96	WVA-AW-B121S Aqueous ug/L 06/04/96
beta-BHC				ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	0.016 J	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	**0.0083**
Dieldrin			ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	**0.0021** J
Endrin Ketone				ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	83DM-	86EM-	86EM-	83EM-	83DM-	83DM-	86EM-	86EM-	92EM-
Location	Maximum	Maximum	Class GA	SP-1	SP-1A	SP-1B	SP-2	SP-3	SP-4	SP-5	SP-6	SP-7
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered
Date Sampled	ug/L	ug/L	ug/L	05/30/96	05/30/96	05/30/96	05/23/96	05/23/96	05/23/96	05/23/96	05/23/96	06/03/96
Arsenic	50	50	25	ND	1.8 B	8.4 B	ND	ND	4.3 B	11.5	1.8 B	ND
Barium	2000	1000	1000	95.5 B	99.5 B	154 B	116 B	26.2 B	47.9 B	278	80.1 B	98.5 B
Cadmium	5	10	10	ND	ND	1.1 B	ND	ND	ND	ND	1.2 B	3.1 B
Chromium	100	50	50	3.3 B	4.2 B	13.5	ND	1.4 B	ND	1.2 B	9.3 B	8.7 B
Lead		50	25	3.7 E	5.9 E	**31.8 E**	ND	ND	ND	ND	4.5	2.2 B
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	3.2 B	ND	ND	5.8 N	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	92EM-SP-7	93EM-SP-8	93EM-SP-9	93EM-SP-11	93EM-SP-12	94EM-SP-13	94EM-SP-13	94EM-SP-19	WVA-AW-SP-20
Location	Maximum	Maximum	Class GA									
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered
Date Sampled	ug/L	ug/L	ug/L	06/03/96	05/23/96	05/29/96	05/31/96	05/29/96	05/31/96	05/31/96	05/30/96	05/30/96
Arsenic	50	50	25	ND	5.5 B	1.7 B	5.8 B	3.9 B	1.6 B	ND	ND	16.5
Barium	2000	1000	1000	80.8 B	47.7 B	229	149	147 B	204	179 B	92.4 B	352
Cadmium	5	10	10	3.2 B	ND	ND	ND	ND	ND	ND	ND	2.9 B
Chromium	100	50	50	18.2	30.9	**1060**	**1520**	**1440**	4.7 B	ND	**1860**	**2270**
Lead		50	25	ND	ND	9 E	9.6	5.5 E	ND	ND	2 UE	**131** E
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND	ND	ND	2.2 B	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-
Location	Maximum	Maximum	Class GA	SP-20	SP-21	SP-21	MW-20	MW-20	MW-21	MW-21	MW-22	MW-23
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Unfiltered
Date Sampled	ug/L	ug/L	ug/L	05/30/96	05/30/96	05/30/96	05/28/96	05/29/96	05/28/96	05/29/96	05/24/96	05/22/96
Arsenic	50	50	25	ND	1.9 B	ND	3.4 B	ND	ND	ND	ND	5.6 B
Barium	2000	1000	1000	280	77.6 B	94.5 B	129 B	219	99.9 B	131 B	**3910**	237 NE
Cadmium	5	10	10	ND	ND	ND	4.3 B	ND	ND	ND	ND	ND
Chromium	100	50	50	ND	**2570**	ND	9.2 B	ND	1.1 B	ND	1.9 B	3.5 B
Lead		50	25	5.6 E	ND	ND	11.7	ND	2.4 B	ND	6.7	2.5 B
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	**14**	ND	ND	ND	4.9 B	4.2 B	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Filtered/Unfiltered Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-AW- MW-24 Aqueous ug/L Unfiltered 05/22/96	WVA-AW- MW-25 Aqueous ug/L Unfiltered 05/24/96	WVA-AW- MW-26 Aqueous ug/L Unfiltered 05/21/96	WVA-AW- MW-27 Aqueous ug/L Unfiltered 05/22/96	WVA-AW- MW-45 *duplicate of* *MW-27* Unfiltered 05/22/96	WVA-AW- MW-27 Aqueous ug/L Filtered 05/22/96	WVA-AW- MW-28 Aqueous ug/L Unfiltered 05/21/96	WVA-AW- MW-29 Aqueous ug/L Unfiltered 05/31/96	WVA-AW- MW-30 Aqueous ug/L Unfiltered 06/03/96
Arsenic	50	50	25	12.9	ND	13.9	**176** B	4.4 B	2.5 B	**36.1**	**44.4**	ND
Barium	2000	1000	1000	493 NE	136 B	**2940** NE	**3800**	540	612	939 NE	**1860**	86.4 B
Cadmium	5	10	10	ND	ND	1.6 B	**29.2**	**13.7**	ND	2.3 B	**12.8**	1.9 B
Chromium	100	50	50	10.1	2.3 B	12.6	**357**	1.5 B	2.3 B	22.3	**68.6**	2.4 B
Lead		50	25	24.8	2.2 B	**71.9**	**320**	ND	ND	**121**	**76.8**	ND
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	0.32 B	ND
Selenium	50	10	10	ND	1.8 B	ND	6.6 NS	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-
Location	Maximum	Maximum	Class GA	MW-31	MW-32	MW-33	MW-34	MW-35	MW-36	MW-37	MW-38	MW-38
Matrix	Contaminant	Contaminant	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered
Date Sampled	ug/L	ug/L	ug/l	05/31/96	05/30/96	05/31/96	05/31/96	05/31/96	05/31/96	05/29/96	[illegible]	05/29/96
Arsenic	50	50	25	1.8 B	ND	1.9 B	ND	4.7 B	Not sampled	ND	ND	ND
Barium	2000	1000	1000	76.4 B	282	107 B	642	196 B	due to	105 B	668	400
Cadmium	5	10	10	ND	ND	ND	ND	ND	inadequate	ND	ND	ND
Chromium	100	50	50	1.5 B	2.7 B	8.6 B	ND	14.6	recharge	ND	ND	ND
Lead		50	25	ND	2.2 B	6.3	ND	10.6		ND	3 B	ND
Mercury	2	10	2	ND	ND	ND	ND	ND		ND	ND	ND
Selenium	50	10	10	ND	ND	2.7 B	ND	ND		ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND		ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-AW-	WVA-Bldg25-	WVA-Bldg25-	WVA-Bldg25-
Location	Maximum	Maximum	Class GA	MW-39	MW-40	MW-41	MW-42	MW-43	MW-44	MW-1	MW-2	MW-7
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	*duplicate of*
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	*25-MW-2*
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered
Date Sampled	ug/L	ug/L	ug/L	05/29/96	05/29/96	05/21/96	05/24/96	05/30/96	05/30/96	05/29/96	05/24/96	05/24/96
Arsenic	50	50	25	ND	ND	11	ND	11.4 BS	11.4 BS	3.7 B	ND	ND
Barium	2000	1000	1000	88.7 B	49.6 B	296 NE	130 B	338	314	367	79.5 B	76.4 B
Cadmium	5	10	10	ND	ND	**6.7**	ND	ND	2.2 B	**6.9**	ND	ND
Chromium	100	50	50	ND	2.9 B	8.9 B	1.1 B	6.3 B	23.6	19.2	ND	ND
Lead		50	25	2 UE	2 UE	**28.4**	ND	**41.7**	19.5	21.3 E	ND	2.3 B
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	2.8 B	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Filtered/Unfiltered Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-Bldg25- MW-3 Aqueous ug/L Unfiltered 05/29/96	WVA-Bldg25- MW-4 Aqueous ug/L Unfiltered 05/23/96	WVA-Bldg25- MW-5 Aqueous ug/L Unfiltered 05/24/96	WVA-Bldg25- MW-6 Aqueous ug/L Unfiltered 05/24/96	WVA-Bldg35- MW-5 Aqueous ug/L Unfiltered 05/30/96	WVA-Bldg35- MW-5 Aqueous ug/L Filtered 05/30/96	WVA-Bldg35- MW-6 Aqueous ug/L Unfiltered 05/23/96	WVA-Bldg35- MW-7 Aqueous ug/L Unfiltered 05/30/96	WVA-Bldg35- MW-8 Aqueous ug/L Unfiltered 05/31/96
Arsenic	**50**	**50**	**25**	ND	**183**	15.4	**53.6 S**	**744**	13.7	**48.9**	ND	7.5 B
Barium	**2000**	**1000**	**1000**	136 B	**3920**	**1400**	756	**1340**	847	**1400**	**3760**	**8220**
Cadmium	**5**	**10**	**10**	ND	**24.2**	**117**	**8.2**	**127**	1.3 B	**7.7**	ND	**14.9**
Chromium	100	50	50	5.2 B	**352**	**53.2**	**88.7**	**1390**	26.2	**119**	2.4 B	18.7
Lead		50	25	2.9 BE	**336**	**114**	**133**	**810 E**	**64.4 E**	**119**	2.6 BE	**71.8**
Mercury	2	10	2	ND	0.49 BN	ND	ND	0.78 B	0.2	0.45 B	ND	ND
Selenium	50	10	10	ND	2.5 S+	1.1 B	1.8 B	**23 B**	2	2.7 BN	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	2	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-Bldg35-	WVA-Bldg35-	WVA-Bldg35-	WVA-Bldg35-	WVA-Bldg135-	WVA-Bldg135-	WVA-Bldg135-	WVA-Bldg135-	WVA-Bldg135-
Location	Maximum	Maximum	Class GA	PW-2	PW-2F	PW-3	PW-4	MW-1	MW-1	MW-2	MW-3	MW-4
Matrix	Contaminant	Contaminant	Groundwater	Product	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered	Unfiltered
Date Sampled	ug/L	ug/L	ug/L	05/22/96	05/22/96	05/29/96	05/29/96	05/30/96	05/30/96	05/22/96	05/23/96	05/23/96
Arsenic	**50**	**50**	**25**	ND	ND	ND	ND	4.1 B	ND	5.4 B	ND	3.1 B
Barium	**2000**	**1000**	**1000**	112 NE	0.61 B	24.2 B	803	**2090**	**1520**	846 NE	120 B	571
Cadmium	**5**	**10**	**10**	3.9 J	ND	ND	4 B	ND	ND	1.2 B	ND	**12.6**
Chromium	**100**	**50**	**50**	**612**	2.2	**14500**	**4010**	27.8	ND	12	3.9 B	2.1 B
Lead		50	25	**124**	0.47 B	**463 E**	**342 E**	7.2 E	2 UE	10.2	3.5	2.2 B
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	3.4 JB	ND	ND	ND	ND	ND	ND	2.3 B	1 B
Silver		50	50	1.1 B	ND	2.2 B	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Filtered/Unfiltered Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-Bldg135- PW-1 Aqueous ug/L Unfiltered 05/22/96	WVA-AW- RW-1 Aqueous ug/L Unfiltered 06/03/96	WVA-AW- RW-2 Aqueous ug/L Unfiltered 06/03/96	WVA-AW- RW-2 Aqueous ug/L Filtered 06/03/96	WVA-AW- B110 Aqueous ug/L Unfiltered 06/04/96	WVA-AW- MW-46 *duplicate of* *MW-B110* Unfiltered 06/04/96	WVA-AW- B121N Aqueous ug/L Unfiltered 06/04/96	WVA-AW- B121S Aqueous ug/L Unfiltered 06/04/96
Arsenic	50	50	25	ND	1.5 B	5.8 B	5.4 B	2 B	2.5 B	ND	ND
Barium	2000	1000	1000	64.6 NE	117 B	720	697	**1190**	**1300**	993	321
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	2.5 B	1 B
Chromium	100	50	50	ND	**738**	1.7 B	ND	4.4 B	6.5 B	3.8 B	1 B
Lead		50	25	ND	13.3	ND	8.7	9.9	22	15.5	ND
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Diesel Range Organic Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	WVA-AW- MW-27 Aqueous ug/L 05/22/96	WVA-AW- MW-24 Aqueous ug/L 05/22/96	WVA-AW- MW-30 Aqueous ug/L 06/03/96	WVA-AW- B121S Aqueous ug/L 06/04/96	WVA-AW- RW-2 Aqueous ug/L 06/03/96
Diesel Range Organics	ND	ND	ND	ND	7100

Glycol Concentrations in Second Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Site	Wva-Bldg35
Location	PW-2F
Matrix	Product
Units	mg/L
Date Sampled	05/22/96
Ethylene Glycol	ND

Semi-Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	93EM-SP-13	93EM-SP-13DL	93EM-SP-14	93EMRW2	95MPIAWMW41	97MPIAWMW45
Date Sampled	MCL	MCL	Class GA	10/22/97	10/22/97	10/22/97	10/28/97	10/24/97	10/28/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
bis(2-Chloroethoxy)methane		50		ND	ND	ND	ND	ND	ND
Dimethylphthalate		50	50	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	0.4 JB	0.4 JB	1 J	0.5 JB
Fluorene		50	50	5 J	ND	ND	ND	ND	ND
Phenanthrene		50	50	26	ND	ND	ND	ND	ND
Anthracene		50	50	25	12 JD	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	ND	0.3 J	ND	ND	0.3 J
Fluoranthene		50	50	63	65 JD	ND	ND	ND	ND
Pyrene		50	50	44	49 JD	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	**26**	**18 D**	ND	ND	ND	ND
Chrysene	0.2	50	0.002	**6**	**23 D**	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	48	45 JD	0.5 J	ND	0.6 J	0.5 J
Benzo(b)fluoranthene	0.2	50	0.002	**14**	**13 JD**	ND	ND	ND	ND
Benzo(a)pyrene	0.2	50	ND	**10**	**13 JD**	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.4	50	0.002	ND	**9 JD**	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.3	50	50	ND	**4 JD**	ND	ND	ND	ND
Benzo(g,h,i)perylene		50	50	ND	11 JD	ND	ND	ND	ND

Semi-Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW45A	97MPIAWMW48	97MPIAWMW55	97MPIAWMW55A	95MPI35MW8	95MPI35MW8RE
Date Sampled	MCL	MCL	Class GA	10/28/97	10/23/97	10/29/97	10/29/97	10/29/97	10/29/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
bis(2-Chloroethoxy)methane		50		ND	ND	ND	ND	ND	ND
Dimethylphthalate		50	50	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	0.6 JB	0.5 J	0.4 JB	0.4 JB	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	0.8 J	3 J
Anthracene		50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	0.4 J	ND	0.3 JB	0.4 JB	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	5 J	8 J
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	**10**	**6**
Chrysene	0.2	50	0.002	ND	ND	ND	ND	**5**	**14**
bis(2-Ethylhexyl)phthalate		50	50	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND	**4**	**5**
Benzo(a)pyrene	0.2	50	ND	ND	ND	ND	ND	**5**	**4**
Indeno(1,2,3-cd)pyrene	0.4	50	0.002	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.3	50	50	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene		50	50	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	RB102297	RB102397	RB102497	RB102897
Date Sampled	MCL	MCL	Class GA	10/22/97	10/23/97	10/24/97	10/28/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous
bis(2-Chloroethoxy)methane		50		5	ND	ND	ND
Dimethylphthalate		50	50	ND	0.6 J	ND	ND
Diethylphthalate		50	50	0.4 JB	4 J	ND	0.4 JB
Fluorene		50	50	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND
Anthracene		50	50	ND	ND	ND	ND
Di-n-butylphthalate		50	50	0.3 J	2 JB	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	0.8 J	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND
Chrysene	0.2	50	0.002	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	0.4 J	ND	ND
Benzo(b)fluoranthene	0.2	50	0.002	ND	ND	ND	ND
Benzo(a)pyrene	0.2	50	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.4	50	0.002	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.3	50	50	ND	ND	ND	ND
Benzo(g,h,i)perylene		50	50	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	EM-SP1	86EM-SP1A	86EM-SP1B	86EM25-SP-5	92EM-SP-7	92EM-SP-8
Date Sampled	MCL	MCL	Class GA	10/21/97	10/21/97	10/21/97	10/22/97	10/22/97	10/22/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	2 J
Methylene Chloride	5	5	5	ND	ND	1 JB	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	8	3 J	4 J
cis-1,2-Dichloroethene	70	5	5	3 J	3 J	ND	ND	2 J	3 J
Chloroform	100	50	7	1 J	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	10	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	50	19	5	ND	ND	1 J
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	0.7 J	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	93EM-SP-13	93EM-SP-14	95MPIAWMW2	95MPIAWMW24	95MPIAWMW25	95MPIAWMW26
Date Sampled	MCL	MCL	Class GA	10/22/97	10/22/97	10/21/97	10/24/97	10/23/97	10/23/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	5	5	ND	1 JB	2 JB	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	1 J	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	4 J	ND	ND	ND
Chloroform	100	50	7	ND	ND	ND	ND	1 J	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	19	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	74	0.9 J	1 J	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	95MPIAWMW27	95MPIAWMW33	95MPIAWMW34	95MPIAWMW35	95MPIAWMW36	95MPIAWMW39
Date Sampled	MCL	MCL	Class GA	10/22/97	10/30/97	10/29/97	10/23/97	10/23/97	10/22/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	**3 J**	ND	**24 J**	**2 J**	**28 J**	ND
Methylene Chloride	5	5	5	ND	ND	ND	ND	**10 JB**	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	2 J	4 J	950	19	360	ND
Chloroform	100	50	7	ND	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	11 J	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	1 J	150	98	12 J	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	**10 B**	**120**	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	2 J	4 J	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	95MPIAWMW40	95MPIAWMW41	95MPIAWMW42	95MPIAWMW43	95MPIAWMW44	97MPIAWMW45
Date Sampled	MCL	MCL	Class GA	10/22/97	10/24/97	10/22/97	10/21/97	10/21/97	10/28/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	5	5	ND	ND	ND	1 JB	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	14	6	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND
Chloroform	100	50	7	ND	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	1 J	2 J	1 J	ND	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW45A	97MPIAWMW46	97MPIAWMW47	97MPIAWMW48	97MPIAWMW49	97MPIAWMW50
Date Sampled	MCL	MCL	Class GA	10/28/97	10/28/97	10/21/97	10/23/97	10/22/97	10/29/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	2 J	ND	ND	ND
Methylene Chloride	5	5	5	ND	ND	2 JB	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND
cis-1,2 Dichloroethene	70	5	5	ND	ND	8	ND	ND	ND
Chloroform	100	50	7	ND	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	34	ND	0.5 J	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW51	97MPIAWMW53	97MPIAWMW55	97MPIAWMW55A	95MPI25MW1	95MPI25MW5
Date Sampled	MCL	MCL	Class GA	10/30/97	10/21/97	10/29/97	10/29/97	10/24/97	10/23/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	5	5	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	0.8 J
cis-1,2-Dichloroethene	70	5	5	1200 J	ND	ND	ND	ND	1 J
Chloroform	100	50	7	ND	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	10000	ND	ND	ND	ND	1 J
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	**110000**	ND	ND	ND	ND	ND
Chlorobenzene		5		**600 JB**	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	95MPI25MW6	97MPI25MW54	95MPI35MW7	95MPI35MW8	93EMRW2	RB102297
Date Sampled	MCL	MCL	Class GA	10/23/97	10/24/97	10/24/97	10/29/97	10/28/97	10/22/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	2 J	ND
Methylene Chloride	5	5	5	4 JB	ND	ND	ND	1 J	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	2 J	ND	ND	ND	6	ND
Chloroform	100	50	7	ND	ND	ND	ND	19	2 J
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	3 J	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	4 J	ND
Trichloroethene	5	5	5	240	ND	ND	ND	7	ND
Dibromochloromethane		50		ND	ND	ND	ND	0.8 J	ND
Tetrachloroethene	5	5	5	ND	ND	ND	1 J	3 J	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	3 J

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	RB102397	RB102497	RB102897	TB102197	TB102297	TB102397
Date Sampled	MCL	MCL	Class GA	10/23/97	10/24/97	10/28/97	10/21/97	10/22/97	10/23/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	5	5	ND	**10**	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND
Chloroform	100	50	7	ND	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	TB102497	TB102897#1	TB102897#2	TB102997	TB103097
Date Sampled	MCL	MCL	Class GA	10/24/97	10/28/97	10/28/97	10/29/97	10/30/97
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Matrix				Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND
Methylene Chloride	5	5	5	ND	ND	ND	**10**	**9**
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND
cis 1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND
Chloroform	100	50	7	ND	ND	ND	ND	ND
2-Butanone		50		ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND
Bromodichloromethane	100	50		ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND
Dibromochloromethane		50		ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND
Chlorobenzene		5		ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	ND	ND
Trichlorofluoromethane		5	5	ND	ND	ND	2 J	1 J

Inorganic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW45	97MPIAWMW45	97MPIAWMW46	97MPIAWMW46	97MPIAWMW47	97MPIAWMW47	97MPIAWMW48
Date Sampled	MCL	MCL	Class GA	10/28/97	10/28/97	10/28/97	10/28/97	10/21/97	10/21/97	10/23/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Units	ug/L	ug/L	ug/l	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	50	50	25	ND	ND	ND	ND	ND	ND	6.2 B
Barium	2000	1000	1000	**3910**	**3450**	**1180**	125 B	151 B	255	550
Chromium	100	50	50	2.3 B	ND	29.7	1.3 B	ND	ND	27.3
Lead	15**	50	25	5.4 *	2 B*	6.4 *	2.2 B*	ND	ND	**19.4**

NOTE: ** NYSDOH Action Level

Inorganic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW48	97MPIAWMW49	97MPIAWMW49	97MPIAWMW50	97MPIAWMW50	97MPIAWMW51	97MPIAWMW51
Date Sampled	MCL	MCL	Class GA	10/23/97	10/22/97	10/22/97	10/29/97	10/29/97	10/30/97	10/30/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	50	50	25	ND	ND	ND	ND	ND	**43.7**	ND
Barium	2000	1000	1000	218	422	252	444	196 B	**2230**	539
Chromium	100	50	50	1.1 B	2.3 B	ND	24.6	1.7 B	**155**	1.2 B
Lead	15**	50	25	ND	8.4	2.9 B	4.7 *	2 U*	**256** *	3.5 *

NOTE: ** NYSDOH Action Level

Inorganic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW53	97MPIAWMW53	97MPI25MW54	97MPI25MW54	97MPIAWMW55	97MPIAWMW55	97MPIAWMW55A
Date Sampled	MCL	MCL	Class GA	10/23/97	10/23/97	10/24/97	10/24/97	10/29/97	10/29/97	10/29/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	50	50	25	7 B	ND	21.9	3.1 B	3 B	ND	3.7 B
Barium	2000	1000	1000	**1420**	727	**2360**	875	334	270	350
Chromium	100	50	50	**63.3**	1.2 B	46.1	ND	2.4 B	ND	6.2 B
Lead	15**	50	25	**23.6**	3.3	**56.8**	ND	8.4 *	2 U*	9.3 *

NOTE: ** NYSDOH Action Level

Inorganic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	97MPIAWMW55A	RB-1	RB102297	RB102297	RB102397	RB102397	RB102497
Date Sampled	MCL	MCL	Class GA	10/29/97	10/21/97	10/22/97	10/22/97	10/23/97	10/23/97	10/24/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	50	50	25	3.1 B	ND	ND	ND	ND	ND	ND
Barium	2000	1000	1000	254	6.5 B	ND	22.3 B	ND	9.5 B	1.6 B
Chromium	100	50	50	ND	ND	ND	1.2 B	ND	ND	ND
Lead	15**	50	25	2 U*	ND	ND	3.4	ND	3.8	ND

NOTE: ** NYSDOH Action Level

Inorganic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	USEPA	NYSDOH	NYSDEC	RB102497	RB102897	RB102897
Date Sampled	MCL	MCL	Class GA	10/24/97	10/28/97	10/28/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Filtered/Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Filtered
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	50	50	25	ND	ND	ND
Barium	2000	1000	1000	27.8 B	ND	11.6 B
Chromium	100	50	50	ND	ND	ND
Lead	15**	50	25	14	2.4 B*	2.5 B*

NOTE: ** NYSDOH Action Level

Diesel Range Organic Concentrations in Third Round Groundwater Samples
Main Manufacturing Area, Watervliet Arsenal

Sample ID	93EM-SP-13	93EM-SP-14	93EMRW2	95MPIAWMW24	95MPIAWMW41	97MPIAWMW45	97MPIAWMW45A	97MPIAWMW48
Date Sampled	10/22/97	10/22/97	10/28/97	10/24/97	10/24/97	10/28/97	10/28/97	10/29/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Diesel Range Organics	5500	500 BQL	1300	500 BQL	500 BQL	500 BQL	500 BQL	500 BQL

Sample ID	97MPIAWMW55	97MPIAWMW55A	95MPI35MW8	RB102297	RB102397	RB102497	RB102897
Date Sampled	10/29/97	10/29/97	10/29/97	10/22/97	10/23/97	10/24/97	10/28/97
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Diesel Range Organics	500 BQL	560 BQL	41000	560 BQL	500 BQL	500 BQL	500 BQL

NOTES: BQL = Below Quantitation Limit

APPENDIX B

Siberia Area Groundwater Data

Semi-Volatile Concentrations in M ,oring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW19 Aqueous ug/l 6/28/95	WVA-SA-MW20 Aqueous ug/l 6/28/95	WVA-SA-MW21 Aqueous ug/l 6/29/95	WVA-SA-MW22 Aqueous ug/l 6/29/95	WVA-SA-MW23 Aqueous ug/l 8/22/95	WVA-SA-MW24 Aqueous ug/l 6/27/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND
Anthracene		50		ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	140 EB	ND	1 JB	40 B	0.8 J	1 JB
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	0.9 J	ND	ND	ND	ND
Dimethylphthalate		5	50	ND	ND	ND	ND	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND
N-nitrosodimethyl amine		50	50	ND	ND	ND	ND	ND	ND
Naphthalene		50	10	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND
Phenol		50	1	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in M[illegible]oring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW25 Aqueous ug/l 6/27/95	WVA-SA-MW26 Aqueous ug/l 6/27/95	WVA-SA-MW27 Aqueous ug/l 2/26/95	WVA-SA-MW28 Aqueous ug/l 6/29/95	WVA-SA-MW29 Aqueous ug/l 6/27/95	WVA-SA-MW30 Aqueous ug/l 7/5/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	1 J	ND	2 J	8 J	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	2 J	ND
Anthracene		50		ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	0.6 J	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	2 JB	2 JB	4 JB	1 JB	13 B	11 B
Butylbenzylphthalate	100	50	50	ND	0.7 J	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	0.6 J	ND	ND	ND	0.7 J
Dimethylphthalate		5	50	ND	ND	ND	ND	0.8 J	ND
Fluoranthene		50	50	ND	2 J	ND	ND	2 J	ND
Fluorene		50	50	ND	ND	ND	ND	2 J	ND
N-nitrosodimethyl amine		50	50	ND	ND	ND	ND	ND	ND
Naphthalene		50	10	ND	0.6 J	ND	ND	5 J	ND
Phenanthrene		50	50	ND	2 J	ND	ND	3 J	ND
Phenol		50	1	ND	ND	ND	ND	ND	0.8 J
Pyrene		50	50	ND	2 J	ND	ND	1 J	ND

Semi-Volatile Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW31 Aqueous ug/l 6/26/95	WVA-SA- MW32 Aqueous ug/l 6/28/95	WVA-SA- MW33 Aqueous ug/l 10/11/95	WVA-SA- MW34 Aqueous ug/l 7/5/95	WVA-SA- MW35 Aqueous ug/l 7/5/95	WVA-SA- MW36 Aqueous ug/l 6/28/95
1,2-Dichlorobenzene	600	5	4.7	ND	1 J	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND
Anthracene		50		ND	1 J	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	0.2 J	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	0.2 J	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	11 B	ND	4 JB	40 B	2 JB	11 B
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	0.5 J	0.6 J	ND	ND	ND	0.9 J
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	8 JB	ND	ND	0.6 J
Dimethylphthalate		5	50	ND	ND	ND	ND	ND	ND
Fluoranthene		50	50	ND	1 J	0.4 J	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND
N-nitrosodimethyl amine		50	50	ND	ND	ND	ND	ND	ND
Naphthalene		50	10	ND	8 J	ND	ND	ND	ND
Phenanthrene		50	50	ND	0.9 J	ND	ND	ND	ND
Phenol		50	1	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	0.6 J	0.4 J	ND	ND	ND

Semi-Volatile Concentrations in M .oring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW50	MW37	MW38	MW-DEC-1	MW-DEC-2	MW-DEC-3
Matrix	Contaminant	Contaminant	Groundwater	*this sample is*	Aqueous	Aqueous		Aqueous	Aqueous
Units	Level	Level	Standards	*a duplicate of*	ug/l	ug/l		ug/l	ug/l
Date Sampled	ug/L	ug/L	ug/L	*MW-36*	6/28/95	11/21/95		7/11/95	7/11/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND		ND	ND
2-Methylnaphthalene		50		ND	3 J	ND		ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND		ND	2 JB
Acenaphthene		50	20	ND	ND	ND		ND	ND
Anthracene		50		ND	ND	ND		ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	A groundwater	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	sample from	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	this location	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	1 JB	ND	ND	was not	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	analyzed for	ND	ND
Di-n-butylphthalate		50	50	ND	0.6 J	ND	semi-volatiles	ND	ND
Di-n-octylphthalate		50		ND	ND	ND		ND	ND
Diethylphthalate		50	50	ND	ND	ND		ND	ND
Dimethylphthalate		5	50	ND	ND	ND		ND	ND
Fluoranthene		50	50	ND	ND	ND		ND	ND
Fluorene		50	50	ND	0.6 J	ND		0.7 JB	0.6 JB
N-nitrosodimethyl amine		50	50	ND	ND	ND		0.5 JB	0.5 JB
Naphthalene		50	10	ND	ND	ND		ND	ND
Phenanthrene		50	50	ND	ND	ND		ND	ND
Phenol		50	1	ND	ND	ND		ND	ND
Pyrene		50	50	ND	ND	ND		ND	ND

Semi-Volatile Concentrations in M[illegible]oring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW-EA-5 Aqueous ug/l 7/10/95	WVA-SA- MW-EA-6 Aqueous ug/l 7/11/95	WVA-SA- MW-EA-7 Aqueous ug/l 7/10/95	WVA-SA- MW-EA-8 Aqueous ug/l 7/10/95	WVA-SA- MW-ESE-1 Aqueous ug/l 7/12/95	WVA-SA- MW-ESE-2 Aqueous ug/l 7/12/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND
Anthracene		50		ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
bis(2 Ethylhexyl)phthalate		50	50	3 JB	ND	14 B	0.9 JB	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	0.7 J	ND	ND	ND	ND	ND
Dimethylphthalate		5	50	ND	ND	ND	ND	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	3 JB	ND	ND	2 JB	2 JB
N-nitrosodimethyl amine		50	50	ND	3 JB	ND	ND	1 JB	2 JB
Naphthalene		50	10	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND
Phenol		50	1	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW-ESE-3 Aqueous ug/l 7/12/95	WVA-SA- MW-ESE-4 Aqueous ug/l 7/12/95	WVA-SA- MW-ESE-5 Aqueous ug/l 7/12/95	WVA-SA- MW-ESE-6 Aqueous ug/l 7/13/95	WVA-SA- MW-ESE-7 Aqueous ug/l 7/13/95	WVA-SA- MW-ESE-8 Aqueous ug/l 7/13/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND
Anthracene		50		ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	ND	1 J	ND	ND	ND	ND
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	0.4 J	ND	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	ND	ND	ND
Dimethylphthalate		5	50	ND	ND	ND	ND	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND
Fluorene		50	50	3 JB	ND	2 JB	3 JB	ND	0.5 JB
N-nitrosodimethyl amine		50	50	2 JB	ND	1 JB	2 JB	0.4 JB	0.4 JB
Naphthalene		50	10	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND
Phenol		50	1	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	[illegible] Standards ug/L	WVA-SA- MW-ESE-9 Aqueous ug/l 7/10/95	WVA-SA- MW-51 *this sample* *is a duplicate* *of MW-ESE-9*	WVA-SA- MW-GTI-1 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-2 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-3 DL Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-4 Aqueous ug/l 7/6/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol		50		ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND
Anthracene		50		ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	1 JB	2 JB	2 JB	20 B	210 BD	29 B
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate		50	50	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	ND	ND	ND	ND	ND	ND
Dimethylphthalate		5	50	ND	ND	ND	ND	ND	ND
Fluoranthene		50	50	ND	ND	ND	ND	ND	ND
Fluorene		50	50	ND	ND	ND	ND	ND	ND
N-nitrosodimethyl amine		50	50	ND	ND	ND	ND	ND	ND
Naphthalene		50	10	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	ND	ND	ND
Phenol		50	1	ND	ND	ND	ND	ND	ND
Pyrene		50	50	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in M oring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	FB-19DL	FB20
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous
Units	Level	Level	Standards	ug/l	ug/l
Date Sampled	ug/L	ug/L	ug/L	6/26/95	7/5/95
1,2-Dichlorobenzene	600	5	4.7	ND	ND
2-Methylnaphthalene		50		ND	ND
4-Chloro-3-methylphenol		50		ND	ND
Acenaphthene		50	20	ND	ND
Anthracene		50		ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND
Benzo(b)fluoranthene	0.2	50		ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND
bis(2-Ethylhexyl)phthalate		50	50	**160 BD**	2 JB
Butylbenzylphthalate	100	50	50	ND	ND
Di-n-butylphthalate		50	50	ND	ND
Di-n-octylphthalate		50		ND	0.9 J
Diethylphthalate		50	50	ND	ND
Dimethylphthalate		5	50	ND	ND
Fluoranthene		50	50	ND	ND
Fluorene		50	50	ND	ND
N-nitrosodimethyl amine		50	50	ND	ND
Naphthalene		50	10	ND	ND
Phenanthrene		50	50	ND	ND
Phenol		50	1	ND	ND
Pyrene		50	50	ND	ND

Volatile Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	[illegible] Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW19 Aqueous ug/l 6/28/95	WVA-SA- MW20 Aqueous ug/l 6/28/95	WVA-SA- MW21 Aqueous ug/l 6/29/95	WVA-SA- MW22 Aqueous ug/l 6/29/95	WVA-SA- MW23 Aqueous ug/l 8/22/95	WVA-SA- MW24 Aqueous ug/l 6/27/95	WVA-SA- MW25 Aqueous ug/l 6/27/95
Bromomethane		5	5	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	**42**	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	7	ND
2-Butanone		50	5	**11**	R	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Moni ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW26 Aqueous ug/l 6/27/95	WVA-SA- MW27 Aqueous ug/l 6/26/95	WVA-SA- MW28 Aqueous ug/l 6/29/95	WVA-SA- MW29 Aqueous ug/l 6/27/95	WVA-SA- MW30 Aqueous ug/l 7/5/95	WVA-SA- MW31 Aqueous ug/l 6/26/95	WVA-SA- MW32 Aqueous ug/l 6/28/95
Bromomethane		5	5	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	1100 D
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	4200 D
Chloroform		100	7	ND	4 J	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	R	ND	R	ND	ND	R
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	1500 D
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	500 D
Xylene (total)	10000	5	5	ND	ND	ND	4 J	ND	ND	43
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	7
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	11
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	8
Toluene	1000		5	ND	ND	ND	ND	ND	ND	8
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	7

Volatile Concentrations in Mon ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum [illegible] Level ug/L	NYSDOH Maximum [illegible] Level ug/L	NYSDEC Class GA [illegible] Standards ug/L	WVA-SA- MW33 Aqueous ug/l 9/20/95	WVA-SA- MW34 Aqueous ug/l 7/5/95	WVA-SA- MW35 Aqueous ug/l 7/5/95	WVA-SA- MW36 Aqueous ug/l 6/28/95	WVA-SA- MW50 *this sample is* *a duplicate of* *MW-36*	WVA-SA- MW37 Aqueous ug/l 6/28/95	WVA-SA- MW38 Aqueous ug/l 11/21/95
Bromomethane		5	5	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	R	ND	R	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	2	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	1 JB
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Moni ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW-DEC-1 Aqueous ug/l 7/11/95	WVA-SA-MW-DEC-2 Aqueous ug/l 7/11/95	WVA-SA-MW-DEC-3 Aqueous ug/l 7/11/95	WVA-SA-MW-EA-5 Aqueous ug/l 7/10/95	WVA-SA-MW-EA-6 Aqueous ug/l 7/11/95	WVA-SA-MW-EA-7 Aqueous ug/l 7/10/95	WVA-SA-MW-EA-8 Aqueous ug/l 7/10/95
Bromomethane		5	5	2 J	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	ND	2 J	ND	ND	ND	ND	ND
Carbon Disulfide		50		2 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	2 J	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Mon[illegible]ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW-ESE-1	MW-ESE-2	MW-ESE-3	MW-ESE-4	MW-ESE-5	MW-ESE-6	MW-ESE-7
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Date Sampled	ug/L	ug/L	ug/L	7/12/95	7/12/95	7/12/95	7/13/95	7/12/95	7/13/95	7/13/95
Bromomethane		5	5	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	0.9 J	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	1 J
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW-ESE-8 Aqueous ug/l 7/13/95	WVA-SA- MW-ESE-9 Aqueous ug/l 7/10/95	WVA-SA- MW-51 *this sample* *is a duplicate* *of MW-ESE-9*	WVA-SA- MW-GTI-1 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-2 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-3 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-4 Aqueous ug/l 7/6/95
Bromomethane		5	5	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	**290**	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	**1800**	ND	ND	ND	ND	ND	ND
Chloroform		100	7	**18 JB**	ND	ND	ND	ND	ND	ND
2-Butanone		50	5	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	22 J	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	10000	5	5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	7		5	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND	ND	ND	ND	ND	ND
Benzene	5		0.7	ND	ND	ND	ND	ND	ND	ND
Toluene	1000		5	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700		5	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Moni ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	FB-19	FB-20
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous
Units	Level	Level	Standards	ug/l	ug/l
Date Sampled	ug/L	ug/L	ug/L	6/26/95	7/5/95
Bromomethane		5	5	ND	ND
Vinyl Chloride	2	2	2	ND	ND
Carbon Disulfide		50		ND	ND
1,1-Dichloroethane		5	5	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND
Chloroform		100	7	ND	ND
2-Butanone		50	5	**11**	ND
1,1,1-Trichloroethane	200	5	5	ND	ND
Trichloroethene	5	5	5	ND	ND
Tetrachloroethene	5	5	5	ND	ND
Xylene (total)	10000	5	5	ND	ND
1,1-Dichloroethene	7		5	ND	ND
trans-1,2-Dichloroethene	100		5	ND	ND
Benzene	5		0.7	ND	ND
Toluene	1000		5	ND	ND
Ethylbenzene	700		5	ND	ND

Pesticide and PCB Concentrations in [illegible]nitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW19 Aqueous ug/l 6/28/95	WVA-SA- MW20 Aqueous ug/l 6/28/95	WVA-SA- MW21 Aqueous ug/l 6/29/95	WVA-SA- MW22 Aqueous ug/l 6/29/95	WVA-SA- MW23 Aqueous ug/l 6/29/95	WVA-SA- MW24 Aqueous ug/l 6/27/95	WVA-SA- MW25 Aqueous ug/l 6/27/95
alpha-BHC				ND	ND	ND	ND	ND	ND	ND
beta-BHC				ND	0.02 J	ND	ND	ND	0.02 J	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I				ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW26 Aqueous ug/l 6/27/95	WVA-SA-MW27 Aqueous ug/l 2/26/95	WVA-SA-MW28 Aqueous ug/l 6/29/95	WVA-SA-MW29 Aqueous ug/l 6/27/95	WVA-SA-MW30 Aqueous ug/l 7/5/95	WVA-SA-MW-31 Aqueous ug/l 6/26/95	WVA-SA-MW32 Aqueous ug/l 6/28/95
alpha-BHC				ND	ND	ND	ND	ND	ND	ND
beta-BHC				ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	0.04 J	ND	0.02 J	ND
Aldrin			ND	ND	ND	ND	ND	ND	**0.02 J**	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	**0.009 J**	ND	ND	ND
Endosulfan I				0.04 J	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				0.08 J	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations ir. nitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW34	WVA-SA-MW34 Aqueous ug/l 7/5/95	WVA-SA-MW35 Aqueous ug/l 7/5/95	WVA-SA-MW36 Aqueous ug/l 6/28/95	WVA-SA-MW50 *this sample is a duplicate of MW-36*	WVA-SA-MW37 Aqueous ug/l 6/28/95	WVA-SA-MW38 Aqueous ug/l 11/21/95
alpha-BHC				A groundwater sample from this location was not analyzed for Pesticides/ PCBs	ND	ND	ND	ND	ND	ND
beta-BHC					ND	ND	ND	ND	0.008 J	ND
delta-BHC					ND	ND	ND	ND	ND	0.0051
Aldrin			ND		ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND		ND	ND	ND	ND	ND	ND
Endosulfan I					ND	ND	ND	ND	0.01 J	ND
4,4'-DDD			ND		ND	ND	ND	ND	**0.06 J**	ND
4,4'-DDT			ND		ND	ND	ND	ND	ND	ND
Endrin Aldehyde					ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in nitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	[illegible] Contaminant [illegible] ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW-DEC-1	WVA-SA- MW-DEC-2 Aqueous ug/l 7/11/95	WVA-SA- MW-DEC-3 Aqueous ug/l 7/11/95	WVA-SA- MW-EA-5 Aqueous ug/l 7/10/95	WVA-SA- MW-EA-6 Aqueous ug/l 7/11/95	WVA-SA- MW-EA-7 Aqueous ug/l 7/10/95	WVA-SA- MW-EA-8 Aqueous ug/l 7/10/95
alpha-BHC				A groundwater sample from this location was not analyzed for Pesticides/ PCBs	ND	ND	0.002 J	ND	ND	ND
beta-BHC					ND	ND	ND	ND	ND	ND
delta-BHC					ND	ND	ND	ND	ND	ND
Aldrin			ND		ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND		ND	ND	ND	ND	ND	ND
Endosulfan I					ND	ND	ND	ND	ND	ND
4,4'-DDD			ND		ND	ND	ND	ND	ND	ND
4,4'-DDT			ND		ND	ND	ND	ND	ND	ND
Endrin Aldehyde					ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA-MW-ESE-1 Aqueous ug/l 7/12/95	WVA-SA-MW-ESE-2 Aqueous ug/l 7/12/95	WVA-SA-MW-ESE-3 Aqueous ug/l 7/12/95	WVA-SA-MW-ESE-4 Aqueous ug/l 7/13/95	WVA-SA-MW-ESE-5 Aqueous ug/l 7/12/95	WVA-SA-MW-ESE-6 Aqueous ug/l 7/13/95	WVA-SA-MW-ESE-7 Aqueous ug/l 7/13/95
alpha-BHC				ND	ND	ND	ND	ND	ND	ND
beta-BHC				ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I				ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	0.009 J	0.01 J	0.01 J	ND	0.007 J	0.007 J	0.007 J
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in [illegible]nitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA [illegible] Contaminant [illegible] ug/L	NYSDOH [illegible] Contaminant [illegible] ug/L	NYSDEC Class GA Groundwater [illegible] ug/L	WVA-SA- MW-ESE-8 Aqueous ug/l 7/13/95	WVA-SA- MW-ESE-9 Aqueous ug/l 7/10/95	WVA-SA- MW-51 *this sample* *is a duplicate* *of MW-ESE-9*	WVA-SA- MW-GTI-1 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-2 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-3 Aqueous ug/l 7/6/95	WVA-SA- MW-GTI-4 Aqueous ug/l 7/6/95
alpha-BHC				ND	ND	ND	ND	ND	ND	ND
beta-BHC				ND	ND	ND	ND	ND	ND	ND
delta-BHC				ND	ND	ND	ND	ND	ND	ND
Aldrin			ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I				ND	ND	ND	ND	ND	ND	ND
4,4'-DDD			ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	0.005 J	ND	ND	ND	ND	ND	ND
Endrin Aldehyde				ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations ir nitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- FB-19 Aqueous ug/l 6/26/95	WVA-SA- FB20 Aqueous ug/l 7/5/95
alpha-BHC				ND	ND
beta-BHC				ND	ND
delta-BHC				ND	ND
Aldrin			ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND
Endosulfan I				ND	ND
4,4'-DDD			ND	ND	ND
4,4'-DDT			ND	ND	ND
Endrin Aldehyde				ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled Filtered/Unfiltered	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW19 Aqueous ug/L 6/29/95 Filtered	WVA-SA- MW19 Aqueous ug/L 6/29/95 Unfiltered	WVA-SA- MW20 Aqueous ug/L 6/28/95 Filtered	WVA-SA- MW20 Aqueous ug/L 6/28/95 Unfiltered	WVA-SA- MW21 Aqueous ug/L 6/29/95 Filtered	WVA-SA- MW21 Aqueous ug/L 6/29/95 Unfiltered	WVA-SA- MW22 Aqueous ug/L 6/29/95 Filtered	WVA-SA- MW22 Aqueous ug/L 6/29/95 Unfiltered
Arsenic	50	50	25	ND	ND	ND	10.8 B	4.3 B	11 B	ND	ND
Barium	2000	1000	1000	118 B	118 B	105 B	497	265	562	**5240**	**6170**
Cadmium	5	10	10	7.1	**72.6**	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	1.8 B	6.4 B	1.6 B	**60.7**	2.8 B	47.3	1.6 B	5.2 B
Lead		50	25	4.8 *	4.2	20 *	**25.6**	5.3 *	**34.2**	6.5 *	7.9
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	6.8	ND	6	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Mo[illegible]ing Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW23	MW23	MW24	MW24	MW25	MW25	MW26	MW26
Matrix	[illegible]	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	6/22/95	6/22/95	6/27/95	6/27/95	6/27/95	6/27/95	6/27/95	6/27/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	ND	ND	1.8 B	ND	ND
Barium	2000	1000	1000	486 N	481 N	193 B	222	307	278	199 B	200 B
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	1.7 B	1.7 B	2.4 B	3.9 B	3.1 B	2.8 B	2.8 B	4.3 B
Lead		50	25	3.3	3.2	ND	5	1.2 B	3.3 B	1.6 B	11.8
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	2 N	ND	5.2 B	ND	5.9	ND	ND	ND
Silver		50	50	1 N	ND	2 B	ND	2.3 B	ND	2.3 B	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW27	MW27	MW28	MW28	MW29	MW29	MW30	MW30
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	6/26/95	6/26/95	6/28/95	6/27/95	6/27/95	6/27/95	7/5/95	6/26/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	ND	ND	2.8 B	ND	**82.6**
Barium	2000	1000	1000	237	295	**8180**	**8450**	182 B	488	**1770**	**19900**
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	3.6 B
Chromium	100	50	50	2.9 B	8.8 B	1.5 B	2.6 B	3.8 B	**66.1**	2.4 B	**242**
Lead		50	25	1.4 B	14.3	3.9 *	6.2	ND	**83.1**	4.5 *	**190**
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	3.5 B	ND	3.8 B	7.7	ND	9.1
Silver		50	50	1.7 B	ND	ND	ND	2.1 B	ND	ND	ND

Inorganic Concentrations in Mo[illegible]ing Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-MW-31	WVA-SA-MW31	WVA-SA-MW32	WVA-SA-MW32	WVA-SA-MW33	WVA-SA-MW33	WVA-SA-MW34	WVA-SA-MW34
Location	[illegible]	[illegible]	[illegible]								
Matrix		[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	[illegible]	[illegible]	[illegible]	6/28/95	6/28/95	6/28/95	6/28/95	10/11/95	10/11/95	7/5/95	7/5/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	3 B	3.3 B	4.1 B	ND	**56.3**	ND	ND
Barium	2000	1000	1000	106 B	170 B	596	693	112 B	**2940**	**5820**	**5380**
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	3.4 B	9.5 B	2.9 B	13.5	2.4 B	**256**	1.5 B	3.7 B
Lead		50	25	ND	15.1	1.3 B	17.3	ND	**898**	3.7 *	7.2
Mercury	2	10	2	ND	ND	ND	ND	ND	1.5 B	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	2.1 B	**17.7**	ND	ND
Silver		50	50	2.1 B	ND	2 B	ND	ND	ND	ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW35	MW35	MW36	MW36	MW50	MW50	MW37	MW37
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	*this sample is*	*this sample is*	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	*a duplicate of*	*a duplicate of*	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	7/5/95	7/5/95	6/28/95	6/28/95	*MW-36*	*MW-36*	6/28/95	6/28/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	1.6 B	ND	2.2 B	ND	1.2 B	ND	ND
Barium	2000	1000	1000	302	303	**7940**	**8120**	**7660**	**7870**	376	368
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	ND	6.7 B	3.4 B	13.8	2 B	9.9 B	3.9 B	3.8 B
Lead		50	25	5	**275**	1.3 B	8	3.6	8.5	2.2 B	4.2
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	4.7 B	ND	3.6 B	ND	ND
Silver		50	50	ND	ND	2.3 B	ND	ND	ND	1.6 B	ND

Inorganic Concentrations in Mor ing Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	[illegible]	[illegible]	MW38	[illegible]	MW-DEC-1	MW-DEC-1	MW DEC 2	MW-DEC-2	MW-DEC-3	MW-DEC-3
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous			Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L			ug/l	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	11/21/95	[illegible]			7/11/95	7/11/95	7/11/95	7/11/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	18.7			ND	5.2 B	ND	3.6 B
Barium	2000	1000	1000	374	2060	Neither a filtered nor an		**2100**	**2570**	342	564
Cadmium	5	10	10	ND	ND	unfiltered groundwater sample		ND	ND	ND	ND
Chromium	100	50	50	ND	44.6 B	from this location		4 B	20.1	3.9 B	**56.8**
Lead		50	25	ND	25.7	was analyzed		ND	**34.5**	ND	15.9
Mercury	2	10	2	ND	ND	for Inorganic Compounds		ND	ND	ND	ND
Selenium	50	10	10	ND	7.8			ND	2.1 B	ND	ND
Silver		50	50	2 BN	2.5 BN			ND	ND	ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	[illegible]	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	[illegible]	Class GA	MW-E[illegible]	MW-EA 5	MW-EA 6	MW-EA 6	MW-EA-7	MW-EA 7	MW-EA-8	MW-EA 8
Matrix	[illegible]	[illegible]	Standards	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	Standards	ug/l	ug/l	ug/l	ug/l	ug/L	ug/l	ug/L	ug/l
Date Sampled	ug/l	ug/L	ug/L	7/10/[illegible]	7/10/95	7/11/95	7/11/95	7/10/95	7/10/95	7/10/95	7/10/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	ND	ND	1.4 B	ND	ND
Barium	2000	1000	1000	141 B	147 B	156 B	168 B	130 B	159 B	150 B	180 B
Cadmium	5	10	10	**9.3**	**13.7**	ND	ND	1.4 B	2.2 B	ND	ND
Chromium	100	50	50	20.4	19.2	4.8 B	4.2 B	**4800**	**4890**	**2380**	**2180**
Lead		50	25	ND	2 B	ND	5.3	3.7	6.8	ND	5.6
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	3.5 B	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Mo[illegible]ing Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-MW-ESE-1	WVA-SA-MW-ESE-1	WVA-SA-MW-ESE-2	WVA-SA-MW-ESE-2	WVA-SA-MW-ESE-3	WVA-SA-MW-ESE-3	WVA-SA-MW-ESE-4	WVA-SA-MW-ESE-4
Location	[illegible]	[illegible]	[illegible]								
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	7/12/95	7/12/95	7/12/95	7/12/95	7/12/95	7/12/95	7/13/95	7/13/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	5 B	ND	3.6 B	ND	8.6 B
Barium	2000	1000	1000	**2760**	**2940**	**1190**	**4230**	375	615	**1680**	**1410**
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	1.2 B	1.8 B	1.3 B	6.1 B	1.2 B	5.8 B	1.4 B	19.7
Lead		50	25	ND	ND	ND	8.1	ND	7.5	ND	**34.1**
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND	ND	ND	2.1 B
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-MW-ESE-5	WVA-SA-MW-ESE-5	WVA-SA-MW-ESE-6	WVA-SA-MW-ESE-6	WVA-SA-MW-ESE-7	WVA-SA-MW-ESE-7	WVA-SA-MW-ESE-8	WVA-SA-MW-ESE-8
Location	[illegible]	[illegible]	[illegible]								
Matrix			[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]		[illegible]	ug/l	ug/l	ug/L	ug/l	ug/L	ug/l	ug/L	ug/l
Date Sampled	[illegible]	[illegible]	[illegible]	7/12/95	7/12/95	7/13/95	7/13/95	7/13/95	7/13/95	7/13/95	7/13/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	3.7 B	6.1 B	ND	ND	ND	5.1 B	ND	ND
Barium	2000	1000	1000	118 B	166 B	**1080**	**1800**	**4240**	**6640**	**5160**	**7600**
Cadmium	5	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	1.4 B	2.1 B	ND	1.7 B	1.1 B	22.2	2.2 B	3.5 B
Lead		50	25	ND	2.6 B	ND	3.7	ND	9.1	3.4	2 B
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	Maximum	Class GA	MW-ESE-9	MW-ESE-9	MW-51	MW-51	MW-GTI-1	MW-GTI-1	MW-GTI-2	MW-GTI-2
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	this sample	this sample	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	is a duplicate	is a duplicate	ug/L	ug/L	ug/L	ug/L
Date Sampled	[illegible]	ug/L	ug/L	7/10/95	7/10/95	of MW-ESE-9	of MW-ESE-9	7/6/95	7/6/95	7/6/95	7/6/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	ND	1.6 B	8.3 B	4 B	6.2 B
Barium	2000	1000	1000	65.7 B	61.2 B	67.8 B	62 B	229	291	306	336
Cadmium	5	10	10	ND	ND	ND	ND	**5.5 B**	**24.4**	ND	ND
Chromium	[illegible]	50	50	39500	41800	37300	42100	1.8 B	13.3	1.8 B	6.9 B
Lead		50	25	ND	ND	ND	ND	4.7	23.9	4.9	**47.5**
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	4.2 B	ND	6.1	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Monitoring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	[illegible]	Class GA	MW-GTI-3	MW-GTI-3	MW-GTI-4	MW-GTI-4	FB-19	FB-19	FB20	FB20
Matrix	Conc.			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units				ug/l	ug/l	ug/l	ug/l	ug/L	ug/L	ug/l	ug/L
Date Sampled	ug/L	ug/L	ug/L	7/7/95	7/7/95	7/6/95	7/6/95	6/26/95	6/26/95	7/5/95	7/5/95
Filtered/Unfiltered				Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
Arsenic	50	50	25	ND	ND	ND	ND	ND	ND	ND	ND
Barium	2000	1000	1000	186 B	212 B	**5030**	**5310**	6.5 B	ND	12.4 B	11.4 B
Cadmium	5	10	10	1.7 B	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	1.7 B	2 B	1.9 B	2.6 B	3.2 B	1.6 B	1.6 B	4 B
Lead		50	25	3.4 *	4.7	4.3 *	4.1	1.2 B	3.2 B	3.9 *	4.4
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	3.6 B	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	2.4 B	ND	ND	ND

Chromium Concentrations in Mo ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	[illegible]	[illegible]	WVA-SA-MW19	WVA-SA-MW20	WVA-SA-MW21	WVA-SA-MW22	WVA-SA-MW23	WVA-SA-MW24	WVA-SA-MW25
Location	Maximum	[illegible]	[illegible]							
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units				mg/L	mg/L	mg/L	mg/L		mg/L	
Date Sampled	mg/L	mg/L	mg/L	7/6/95	6/29/95	6/29/95	6/29/95	8/22/95	6/27/95	6/27/95
Hexavalent Chromium (total)	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <
Hexavalent Chromium (dissolve	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <

Chromium Concentrations in Mo ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	[illegible]	[illegible]	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	[illegible]	WVA-SA-	WVA-SA	WVA-SA-
Location	[illegible]	[illegible]	[illegible]	MW26	MW27	MW28	[illegible]	MW30	MW-31	MW32
[illegible]			[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
[illegible]				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Date Sampled	mg/L	mg/L	mg/L	6/27/95	6/26/95	6/29/95	6/27/95	7/5/95	6/26/95	6/28/95
Hexavalent Chromium (total)	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <
Hexavalent Chromium (dissolve	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <

Chromium Concentrations in Mo[illegible]ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	[illegible]	[illegible]	[illegible]	MW34	[illegible]	MW36	[illegible]	MW37	MW37
Matrix	[illegible]	[illegible]	[illegible]		Aqueous	[illegible]	Aqueous	[illegible]	Aqueous	[illegible]
Units	[illegible]	[illegible]	[illegible]		mg/L	[illegible]	mg/L	[illegible]	mg/L	[illegible]
Date Sampled	mg/L	mg/L	mg/L		7/5/95	7/5/95	6/28/95	*MW-36*	6/28/95	11/21/95
Hexavalent Chromium (total)	0.1	0.05	0.05	A groundwater sample from this location was not analyzed for Hexavalent Chromium	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <
Hexavalent Chromium (dissolve	0.1	0.05	0.05		0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <

Chromium Concentrations in Mc[illegible]ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	[illegible]	[illegible]	MW EA 5	MW E[illegible]	MW EA-7	MW EA 1	MW-ESE-1	MW-ESE 2	MW ESE-3
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Date Sampled	mg/L	mg/L	mg/L	7/10/95	7/11/95	7/10/95	7/10/95	7/12/95	7/12/95	7/12/95
Hexavalent Chromium (total)	0.1	0.05	0.05	0.01 <	0.01 <	**5.22**	**2.45**	0.01 <	0.01 <	0.01 <
Hexavalent Chromium (dissolve	0.1	0.05	0.05	0.01 <	0.01 <	**5.05**	**2.45**	0.01 <	0.01 <	0.01 <

Chromium Concentrations in Mo… …ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	MW-51
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	*this sample*
[illegible]			[illegible]	[illegible]	mg/L	[illegible]	[illegible]	[illegible]	[illegible]	*is a duplicate*
Date Sampled	mg/L	mg/L	mg/L	7/13/95	7/12/95	7/13/95	7/13/95	7/13/95	7/10/95	*of MW-ESE-9*
Hexavalent Chromium (total)	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	**0.07**	**0.14**
Hexavalent Chromium (dissolve	0.1	0.05	0.05	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	**0.07**	**0.1**

Chromium Concentrations in Mo ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-MW-DEC-1	WVA-SA-MW-DEC-2	WVA-SA-MW-DEC-3	WVA-SA-MW-GTI-1	WVA-SA-MW-GTI-2	WVA-SA-MW-GTI-3	WVA-SA-[illegible]
Location	[illegible]	[illegible]								
Matrix	Contaminant	Contaminant	Groundwater		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Date Sampled	mg/L	mg/L	mg/L		7/11/95	7/11/95	7/6/95	7/6/95	7/10/95	7/6/95
Hexavalent Chromium (total)	0.1	0.05	0.05	A groundwater sample from this location was not analyzed for Hexavalent Chromium	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <
Hexavalent Chromium (dissolve	0.1	0.05	0.05		0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <

Chromium Concentrations in Mo[illegible]ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-
[illegible]	[illegible]	[illegible]	SA	[illegible]	[illegible]
Matrix	[illegible]	Contaminant	[illegible]	Aqueous	Aqueous
[illegible]			[illegible]	[illegible]	[illegible]
Date Sampled	mg/L	mg/L	mg/L	6/26/95	7/5/95
Hexavalent Chromium (total)	0.1	0.05	0.05	0.01 <	0.01 <
[illegible] (dissolve	0.1	[illegible]	[illegible]	[illegible]	0.01 <

Volatile Concentrations in Sec[illegible] Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location	USEPA Maximum	NYSDOH Maximum	NYSDEC Class GA	WVA-SA-MW19	WVA-SA-MW20	WVA-SA-MW21	WVA-SA-MW22	WVA-SA-MW23	WVA-SA-MW24	WVA-SA-MW25	WVA-SA-MW26
[illegible]			[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units		[illegible]	[illegible]	ug/l	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
[illegible]				[illegible]	[illegible]	4/24/96	[illegible]	[illegible]	4/23/96	4/29/96	[illegible]
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	**29**	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	ND	ND	ND

Volatile Concentrations in Sec[illegible] Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site / Location	USEPA Maximum	NYSDOH Maximum	NYSDEC Class GA	WVA-SA-MW27	WVA-SA-MW28	WVA-SA-MW29	WVA-SA-MW30	WVA-SA-MW31	WVA-SA-MW32	WVA-SA-MW33	WVA-SA-MW34
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled				[illegible]	[illegible]	4/29/96	4/29/96	[illegible]	4/25/96	4/29/96	4/26/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	**730 J**	ND	ND
Methylene Chloride			5	ND	ND	ND	1 J	ND	ND	2 J	ND
Carbon Disulfide		50		ND	ND	11 J	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	1 J	ND	ND	**3500 J**	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	**660 J**	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	**700 J**	ND	ND
Trichlorofluoromethane			5	ND	ND	10 J	ND	ND	ND	ND	ND

Volatile Concentrations in Secc Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location	USEPA Maximum	NYSDOH Maximum	NYSDEC Class GA	WVA-SA-MW35	WVA-SA-MW36	WVA-SA-MW37	WVA-SA-MW38	WVA-SA-MW40	WVA-SA-MW41	WVA-SA-MWDEC1	WVA-SA-MWDEC2
[illegible]				[illegible]	[illegible]	Aqueous	[illegible]	Duplicate	[illegible]	Aqueous	[illegible]
Units	[illegible]		[illegible]	ug/l	ug/L	ug/L	ug/L		of MW38	ug/L	ug/L
[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	4/23/96	[illegible]	04/25/96	04/26/96
Vinyl Chloride	2	2	2	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND	ND	ND	1 J	ND	ND

Volatile Concentrations in Sec[illegible] Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MWDEC3	MWEA5	MWEA6	MWEA7	MWEA8	MWESE1	MWESE2	MWESE3
Matrix		[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units		[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
[illegible]				[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Vinyl Chloride	2	2	2	ND	ND	ND	Not Sampled	ND	ND	ND	ND
Methylene Chloride			5	ND	ND	ND		ND	ND	ND	ND
Carbon Disulfide		50		ND	ND	ND		ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	ND		ND	ND	ND	ND
Chloroform		100	7	ND	ND	ND		ND	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	9		ND	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND		ND	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND		ND	ND	ND	ND

Volatile Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]		[illegible]	MWESE4	MWESE5	MWESE6	MWESE7	MWESE8	MWESE9	MWGTI1	MWGTI2
Matrix	[illegible]			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units				ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
[illegible]				[illegible]		[illegible]	4/25/96	[illegible]		[illegible]	4/25/96
Vinyl Chloride	2	2	2	ND	Not Sampled	ND	ND	130	Not Sampled	ND	ND
Methylene Chloride			5	ND		ND	ND	ND		ND	ND
Carbon Disulfide		50		ND		ND	ND	ND		ND	ND
cis-1,2-Dichloroethene	70	5	5	ND		ND	ND	570		ND	ND
Chloroform		100	7	ND		ND	ND	ND		ND	ND
Trichloroethene	5	5	5	ND		ND	ND	ND		ND	ND
Tetrachloroethene	5	5	5	ND		ND	ND	ND		ND	ND
Trichlorofluoromethane			5	ND		ND	ND	ND		ND	ND

Volatile Concentrations in Secc Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MWGTI3	MWGTI4	SNS6
Matrix	[illegible]	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L
[illegible]		[illegible]	[illegible]	[illegible]	1/25/[illegible]	[illegible]
Vinyl Chloride	[illegible]	2	2	ND	ND	17
Methylene Chloride			5	ND	ND	ND
Carbon Disulfide		50		[illegible]	ND	ND
cis-1,2-Dichloroethene	70	5	5	ND	ND	4 J
Chloroform		100	7	ND	ND	ND
Trichloroethene	5	5	5	ND	ND	ND
Tetrachloroethene	5	5	5	ND	ND	ND
Trichlorofluoromethane			5	ND	ND	ND

Semi-Volatile Concentrations in S[illegible]ond Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-MW19	WVA-SA-MW20	WVA-SA-MW21	WVA-SA-MW22	WVA-SA-MW23RE	WVA-SA-MW24	WVA-SA-MW25	WVA-SA-MW26
Location	Maximum	Maximum	Class Ga								
Matrix	Contamina[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
[illegible]				[illegible]	[illegible]	[illegible]	4/21/96	[illegible]	4/23/96	[illegible]	4/23/96
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate		50	50	0.3 JB	0.2 JB	0.3 JB	0.1 JB	1 J	0.3 J	0.3 J	0.3 J
Fluorene		50	50	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND	0.2 J	0.2 J	ND	ND	ND
Anthracene		50		ND	ND	ND	ND	0.2 J	ND	ND	ND
Di-n-butylphthalate		50	50	0.6 JB	0.4 JB	0.7 JB	0.6 JB	1 JB	0.9 JB	0.4 JB	0.9 JB
Fluoranthene		50	50	ND	ND	ND	0.4 J	0.3 J	ND	ND	0.3 J
Pyrene		50	50	ND	ND	ND	0.2 J	0.3 J	ND	ND	0.4 J
Butylbenzylphthalate	100	50	50	ND	0.7 J	ND	ND	0.2 J	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	0.2 J	ND	ND	ND
Chrysene			0.002	ND	ND	ND	ND	0.2 J	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	0.6 JB	0.5 JB	0.8 JB	2 JB	0.8 JB	0.3 JB	0.4 J	0.7 JB
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND	ND	0.2 J
Benzo(b)fluoranthene	0.2	50		ND	ND	ND	0.2 J	ND	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		ND	ND	ND	0.1 J	ND	ND	ND	ND
Benzo(a)pyrene	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND

Semi-Volatile Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	[illegible] Maximum	[illegible]	[illegible] Class GA	WVA-SA- MW27 Aqueous ug/L [illegible]	WVA-SA- MW28 Aqueous ug/L [illegible]	WVA-SA- MW29 Aqueous ug/L 4/29/96	WVA-SA- MW30 Aqueous ug/L [illegible]	WVA-SA- MW31 Aqueous ug/L 4/23/96	WVA-SA- MW32 Aqueous ug/L [illegible]	WVA-SA- MW33 Aqueous ug/L 4/29/96	WVA-SA- MW34 Aqueous ug/L [illegible]
Naphthalene		50	10	ND	ND	2 J	Insufficient	ND	16	Insufficient	ND
2-Methylnaphthalene		50		ND	ND	3 J	Volume	ND	2 J	Volume	ND
Acenaphthene		50	20	ND	ND	1 J		ND	2 J		ND
Diethylphthalate		50	50	0.3 J	0.2 J	0.8 J		0.2 J	ND		ND
Fluorene		50	50	ND	ND	1 J		ND	2 J		ND
Phenanthrene		50	50	ND	ND	0.9 J		ND	1 J		ND
Anthracene		50		ND	ND	0.3 J		ND	0.3 J		ND
Di-n-butylphthalate		50	50	0.9 JB	2 JB	ND		2 JB	ND		0.8 JB
Fluoranthene		50	50	ND	ND	0.4 J		ND	0.7 J		ND
Pyrene		50	50	ND	ND	0.3 J		ND	0.6 J		ND
Butylbenzylphthalate	100	50	50	ND	0.2 J	ND		ND	ND		0.2 J
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND		ND	ND		0.1 J
Chrysene			0.002	ND	ND	ND		ND	ND		0.1 J
bis(2-Ethylhexyl)phthalate		50	50	0.8 JB	0.7 JB	ND		0.6 JB	ND		0.7 JB
Di-n-octylphthalate		50		ND	0.4 J	ND		ND	ND		0.2 J
Benzo(b)fluoranthene	0.2	50		ND	ND	ND		ND	ND		0.1 J
Benzo(k)fluoranthene	0.2	50		ND	ND	ND		ND	ND		0.1 J
Benzo(a)pyrene	0.2		ND	ND	ND	ND		ND	ND		ND

Semi-Volatile Concentrations in S[illegible]nd Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW35	MW36	MW37	MW38	MW40	MW41	MWDEC1	MWDEC2
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled				[illegible]	[illegible]	[illegible]	1/23/96	[illegible]	[illegible]	[illegible]	[illegible]
Naphthalene		50	10	ND	ND	ND	ND	ND	ND	Insufficient	ND
2-Methylnaphthalene		50		0.2 J	ND	ND	ND	ND	ND	Volume	ND
Acenaphthene		50	20	ND	ND	ND	ND	ND	ND		ND
Diethylphthalate		50	50	[illegible]	0.4 JB	ND	ND	0.2 J	0.2 J		0.2 J
Fluorene		50	50	ND	ND	ND	ND	ND	ND		ND
Phenanthrene		50	50	0.2 J	ND	ND	ND	ND	ND		0.1 J
Anthracene		50		ND	ND	ND	ND	ND	ND		ND
Di-n-butylphthalate		50	50	1 JB	1 JB	ND	0.4 JB	0.8 JB	0.4 JB		0.4 JB
Fluoranthene		50	50	0.2 J	ND	ND	ND	ND	ND		0.09 J
Pyrene		50	50	0.2 J	ND	ND	ND	ND	ND		0.08 J
Butylbenzylphthalate	100	50	50	ND	ND	ND	ND	ND	ND		0.08 J
Benzo(a)anthracene	0.1	50	0.002	ND	ND	ND	ND	ND	ND		ND
Chrysene			0.002	0.2 J	ND	ND	ND	ND	ND		0.1 J
bis(2-Ethylhexyl)phthalate		50	50	0.9 JB	0.5 JB	ND	0.2 J	0.5 JB	0.1 J		0.2 JB
Di-n-octylphthalate		50		ND	ND	ND	ND	ND	ND		0.1 J
Benzo(b)fluoranthene	0.2	50		0.1 J	ND	ND	ND	ND	ND		ND
Benzo(k)fluoranthene	0.2	50		0.2 J	ND	ND	ND	ND	ND		ND
Benzo(a)pyrene	0.2		ND	0.1 J	ND	ND	ND	ND	ND		ND

Semi-Volatile Concentrations in S[illegible]nd Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location [illegible] [illegible] [illegible]	USEPA Maximum	[illegible]	NYSDEC [illegible]	WVA-SA- MWDEC3 Aqueous ug/L [illegible]	WVA-SA- MWEA5 Aqueous ug/L [illegible]	WVA-SA- MWEA6 Aqueous ug/L [illegible]	WVA-SA- MWEA7 Aqueous ug/L	WVA-SA- MWEA8 Aqueous ug/L [illegible]	WVA-SA- MWESE1 Aqueous ug/L [illegible]	WVA-SA- MWESE2 Aqueous ug/L [illegible]	WVA-SA- MWESE3 Aqueous ug/L [illegible]
Naphthalene		50	10	ND	ND	ND	Not Sampled	ND	ND	ND	ND
2-Methylnaphthalene		50		ND	ND	ND		ND	ND	ND	ND
Acenaphthene		50	20	ND	ND	ND		ND	ND	ND	ND
Diethylphthalate		50	50	0.2 J	0.4 J	ND		0.3 J	0.1 J	0.2 J	0.2 J
Fluorene		50	50	ND	ND	ND		R	ND	ND	ND
Phenanthrene		50	50	ND	ND	ND		ND	ND	ND	ND
Anthracene		50		ND	ND	ND		ND	ND	ND	ND
Di-n-butylphthalate		50	50	0.5 JB	0.6 JB	0.7 JB		ND	0.6 JB	0.7 JB	1 JB
Fluoranthene		50	50	0.1 J	ND	ND		0.1 J	ND	ND	ND
Pyrene		50	50	0.09 J	ND	ND		0.2 J	ND	ND	ND
Butylbenzylphthalate	100	50	50	0.08 J	0.1 J	ND		0.3 J	ND	ND	ND
Benzo(a)anthracene	0.1	50	0.002	**0.1 J**	**0.08 J**	ND		**0.2 J**	ND	ND	ND
Chrysene			0.002	**0.1 J**	ND	ND		**0.2 J**	ND	ND	ND
bis(2-Ethylhexyl)phthalate		50	50	0.2 JB	0.4 JB	0.4 JB		ND	3 JB	0.6 JB	13 B
Di-n-octylphthalate		50		0.1 J	0.1 J	ND		0.3 J	ND	ND	ND
Benzo(b)fluoranthene	0.2	50		0.1 J	ND	ND		0.1 J	ND	ND	ND
Benzo(k)fluoranthene	0.2	50		0.2 J	ND	ND		0.2 J	ND	ND	ND
Benzo(a)pyrene	0.2		ND	**0.1 J**	ND	ND		**0.1 J**	ND	ND	ND

Semi-Volatile Concentrations in S[illegible]ond Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	[illegible]	[illegible]	MWESE4	MWESE5	MWESE6	MWESE7	MWESE8RE	MWESE9	MWGTI1	MWGTI2
Matrix		[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units		[illegible]	[illegible]	ug/l	ug/l	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled				[illegible]		[illegible]	[illegible]	[illegible]		4/29/96	[illegible]
Naphthalene		50	10	ND	Not Sampled	ND	ND	ND	Not Sampled	ND	ND
2-Methylnaphthalene		50		ND		ND	ND	ND		ND	ND
Acenaphthene		50	20	ND		ND	ND	ND		ND	ND
Diethylphthalate		50	50	0.[illegible] JB		0.2 JB	0.2 JB	ND		0.5 J	0.2 JB
Fluorene		50	50	ND		ND	ND	ND		ND	ND
Phenanthrene		50	50	ND		ND	ND	ND		ND	ND
Anthracene		50		ND		ND	ND	ND		ND	ND
Di-n-butylphthalate		50	50	0.6 J		0.4 JB	0.4 JB	1 JB		0.6 JB	0.7 JB
Fluoranthene		50	50	ND		ND	ND	ND		ND	ND
Pyrene		50	50	ND		ND	ND	ND		ND	ND
Butylbenzylphthalate	100	50	50	ND		ND	ND	ND		ND	ND
Benzo(a)anthracene	0.1	50	0.002	ND		ND	ND	ND		ND	ND
Chrysene			0.002	ND		ND	ND	ND		ND	ND
bis(2-Ethylhexyl)phthalate		50	50	0.5 J		0.8 JB	0.2 JB	ND		0.5 J	0.3 JB
Di-n-octylphthalate		50		ND		ND	ND	ND		ND	ND
Benzo(b)fluoranthene	0.2	50		ND		ND	ND	ND		ND	ND
Benzo(k)fluoranthene	0.2	50		ND		ND	ND	ND		ND	ND
Benzo(a)pyrene	0.2		ND	ND		ND	ND	ND		ND	ND

Semi-Volatile Concentrations in S[illegible]ond Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Media Units Date Sampled	USEPA Maximum [illegible]	NYSDOH Maximum [illegible]	NYSDEC Class GA [illegible]	WVA-SA- MWGTI3 Aqueous ug/L 4/29/96	WVA-SA- MWGTI4 Aqueous ug/L 4/25/96	WVA-SA- SNS6 Aqueous ug/L 04/25/96
Naphthalene		50	10	Insufficient	ND	ND
2-Methylnaphthalene		50		Volume	ND	ND
Acenaphthene		50	20		ND	ND
Diethylphthalate		50	50		0.3 JB	0.2 J
Fluorene		50	50		ND	ND
Phenanthrene		50	50		ND	ND
Anthracene		50			ND	ND
Di-n-butylphthalate		50	50		1 JB	0.4 JB
Fluoranthene		50	50		ND	ND
Pyrene		50	50		ND	0.06 J
Butylbenzylphthalate	100	50	50		ND	ND
Benzo(a)anthracene	0.1	50	0.002		ND	ND
Chrysene			0.002		ND	ND
bis(2-Ethylhexyl)phthalate		50	50		0.4 JB	0.2 JB
Di-n-octylphthalate		50			0.09 J	0.2 J
Benzo(b)fluoranthene	0.2	50			ND	ND
Benzo(k)fluoranthene	0.2	50			ND	ND
Benzo(a)pyrene	0.2		ND		ND	ND

Inorganic Concentrations in Sec[illegible]d Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	[illegible]	[illegible]	[illegible]	MW19	MW20	MW21	MW22	MW23	MW24	MW25	MW25
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	[illegible]	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered
Date Sampled	[illegible]		[illegible]	4/24/96	[illegible]/24/96	4/24/96	4/2[illegible]/96	4/26/96	4/23/96	4/29/96	4/29/96
Arsenic	50	[illegible]	25	3.3 B	ND	2.8 B	[illegible] B	ND	[illegible] B	1.1 B	1.8 B
Barium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	134 B	[illegible]	440	[illegible] B	90.[illegible] B	1[illegible]7 B
Cadmium	5	10	10	3.3 B	ND	ND	ND	ND	ND	ND	ND
Chromium	100	50	50	10.7	ND	1.4 B	2.5 B	ND	2.2 B	1.2 B	5.2 B
Lead		50	25	8.6	ND	ND	2.7 B	ND	ND	5.5	6.0
Mercury	2	10	2	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND	ND	ND	ND
Silver		50	50	ND	ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Sec[illegible]d Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-MW26	WVA-SA-MW27	WVA-SA-MW28	WVA-SA-MW29	WVA-SA-MW29	WVA-SA-MW30	WVA-SA-MW31	WVA-SA-MW32
Location	[illegible]	[illegible]	[illegible]								
Matrix	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered	Unfiltered	Unfiltered
Date Sampled	[illegible]	[illegible]	[illegible]	4/23/96	4/23/96	4/23/96	04/29/96	04/29/96	4/29/96	4/23/96	4/25/96
Arsenic	[illegible]	50	25	ND	3 B	ND	ND	ND	[illegible]	2.5 B	[illegible] B
Barium	2000	1000	1000	[illegible]	132 B	8220	[illegible] J	[illegible]	[illegible]	120 B	[illegible]
Cadmium	5	10	10	ND	ND	ND	ND	ND		ND	ND
Chromium	100	50	50	ND	5.2 B	ND	ND	3.5 B		6.6 B	[illegible] B
Lead		50	25	ND	5.6	ND	ND	8.2		10.6	3.6 J
Mercury	2	10	2	ND	ND	ND	ND	ND		ND	ND
Selenium	50	10	10	ND	ND	ND	ND	ND		ND	ND
Silver		50	50	ND	ND	ND	ND	ND		ND	ND

Inorganic Concentrations in Sec d Round Groundwater Samples
Siberia Area, Watervliet Arsenal

[illegible]	[illegible]		[illegible]	WVA-SA-MW33	[illegible]	WVA-SA-MW35	WVA-SA-MW3[illegible]	WVA-SA-MW37	WVA-SA-MW38	WVA-SA-MW33	WVA-SA-MW40
Location	[illegible]										
Matrix				Aqueous	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	[illegible]	Unfiltered	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered
Date Sampled	[illegible]	[illegible]		4/29/96	4/29/96	4/23/96	4/25/96	4/25/96	4/29/96	4/29/96	4/23/96
[illegible]	50	[illegible]	[illegible]	Insufficient	[illegible]	[illegible] B	ND	1.1 B	ND	[illegible] B	3.3 B
Barium	2000	1000	1000	Volume	[illegible]	[illegible]	6480	[illegible]	160 B	[illegible]	276
Cadmium	5	10	10		ND	[illegible] B	1.1 B	ND	ND	ND	1.3 B
Chromium	100	50	50		1.1 B	10.6	6.5 B	1 B	ND	23.8	7.3 B
Lead		50	25		ND	**144**	5.6	ND	ND	12.9	**94.6**
Mercury	2	[illegible]	2		ND	ND	ND	ND	ND	ND	ND
Selenium	50	10	10		ND	ND	ND	1.5 B	ND	ND	ND
Silver		50	50		ND	ND	ND	ND	ND	ND	ND

Inorganic Concentrations in Sec[illegible]d Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location				[illegible]	[illegible]	[illegible]	MWDEO2	MW[illegible]EO3	MWEA5	MWEA6	MWEA7
Matrix				[illegible]	[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Filtered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered
Date Sampled	[illegible]		[illegible]	4/26/96	[illegible]	04/26/96	04/26/96	04/26/96	04/26/96	04/26/96	
Arsenic	[illegible]	[illegible]	25	ND	[illegible]	Insufficient	[illegible] B	5.3 B	ND	ND	Not Sampled
Barium	2000	1000	1000	150 [illegible]	[illegible] B	Volume	2100	666	[illegible] B	68.1 B	
Cadmium	5	10	10	ND	[illegible]		[illegible]	ND	2.6 B	ND	
Chromium	100	50	50	ND	[illegible] B		[illegible] B	127	6.7 B	2.3 B	
Lead		50	25	ND	3.4		6.1	16.2	ND	10.8	
Mercury	2	[illegible]	2	ND	ND		ND	ND	ND	ND	
Selenium	50	10	10	ND	ND		ND	ND	ND	2.7 B	
Silver		50	50	ND	7.6 B		ND	ND	ND	ND	

Inorganic Concentrations in Sec[illegible]d Round Groundwater Samples
Siberia Area, Watervliet Arsenal

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WVA-SA-MWESE3	[illegible]	WVA-SA-MWESE5	WVA-SA-MWESE6	WVA-SA-MWESE7
[illegible]				[illegible]	[illegible]	[illegible]	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	[illegible]	[illegible]	[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Untiltered	Unfiltered
Date Sampled				04/26/96	4/23/96	4/23/96	4/23/96	4/24/96		4/24/96	4/25/96
Arsenic	50	50	25	ND	ND	ND	ND	ND	Not Sampled	4.1 B	ND
Barium	2000	1000	[illegible]	[illegible] B	2560	1590	370	1580		1080	4820
Cadmium	5	10	10	ND	ND	ND	ND	ND		ND	ND
Chromium	100	50	50	4280 J	ND	2.4 B	ND	ND		10.8	9.6 B
Lead		50	25	ND	ND	2.8 B	ND	2 B		14.9	4
Mercury	2	10	2	ND	ND	ND	ND	ND		ND	ND
Selenium	50	10	10	3 B	ND	ND	ND	ND		ND	ND
Silver		50	50	ND	ND	ND	ND	ND		ND	ND

Inorganic Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	[illegible]	[illegible]	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
						[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Units			[illegible]	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Filtered/Unfiltered				Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	Unfiltered	
Date Sampled				4/20/96		4/29/96	4/25/96	4/29/96	4/25/96	04/26/96	04/29/96
[illegible]	50	50	25	ND	[illegible]	6.7 B	[illegible]	Insufficient	2.9 B	ND	ND
Barium	2000	1000	1000	700		144 BN	[illegible]	Volume	4200	155 B	1.6 BN
[illegible]	5	[illegible]	[illegible]	ND		11.7	[illegible]		ND	1.6 B	ND
Chromium	100	[illegible]	50	2 B		19.1	ND		ND	2.2 B	ND
Lead		50	25	ND		53.3	2.4 B		ND	12.5	ND
[illegible]	2	[illegible]	2	ND		ND	[illegible]		ND	ND	ND
[illegible]	50	10	10	ND		1 B	1.4 B		1.4 [illegible]	ND	ND
Silver		50	50	ND		ND	ND		ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant [illegible] ug/L	NYSDOH Maximum Contaminant [illegible] ug/L	NYSDEC Class GA Groundwater Standard ug/L	WVA-SA- MW19 Aqueous ug/L 4/24/96	WVA-SA- MW20 Aqueous ug/L 4/24/96	WVA-SA- MW21 Aqueous ug/L 4/24/96	WVA-SA- MW22 Aqueous ug/L 4/24/96	WVA-SA- MW23 Aqueous ug/L 4/26/96	WVA-SA- MW24 Aqueous ug/L 4/23/96	WVA-SA- MW25 Aqueous ug/L 4/29/96	WVA-SA- MW26 Aqueous ug/L 4/23/96
alpha-BHC				ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC				ND	ND	ND	ND	ND	ND	0.0022 J	ND
delta-BHC				ND	ND	ND	ND	ND	ND	0.0016 J	ND
gamma-BHC (Lindane)				ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I				ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE			ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	0.5		0.1	ND	ND	ND	ND	ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW27	MW28	MW29	MW30	MW31	MW32	MW33	MW34
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Date Sampled	ug/L	ug/L	ug/L	4/23/96	5/28/96	4/29/96	4/29/96	5/28/96	4/25/96	4/29/96	4/26/96
alpha-BHC				ND	ND	ND	Insufficient	ND	ND	Insufficient	ND
beta-BHC				ND	ND	ND	Volume	ND	ND	Volume	ND
delta-BHC				ND	ND	ND		0.0028 J	ND		ND
gamma-BHC (Lindane)				ND	ND	ND		ND	ND		ND
Heptachlor	0.4		ND	ND	ND	ND		ND	ND		ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND		ND	ND		ND
Endosulfan I				ND	ND	ND		ND	ND		ND
4,4'-DDE			ND	ND	ND	ND		ND	ND		ND
4,4'-DDT			ND	ND	ND	ND		ND	**0.0068 J**		ND
Aroclor-1260	0.5		0.1	ND	ND	ND		ND	**0.16 J**		ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MW35 Aqueous ug/L 4/23/96	WVA-SA- MW36 Aqueous ug/L 4/29/96	WVA-SA- MW37 Aqueous ug/L 5/28/96	WVA-SA- MW38 Aqueous ug/L 4/29/96	WVA-SA- MW40 Aqueous ug/L 4/23/96	WVA-SA- MW41 Aqueous ug/L 4/29/96	WVA-SA- MWDEC1 Aqueous ug/L 04/26/96	WVA-SA- MWDEC2 Aqueous ug/L 04/26/96
alpha-BHC				ND	ND	0.018 J	ND	ND	ND	Insufficient	ND
beta-BHC				ND	ND	ND	ND	ND	ND	Volume	ND
delta-BHC				ND	ND	ND	ND	ND	ND		ND
gamma-BHC (Lindane)				ND	ND	0.0[illegible]	ND	ND	ND		ND
Heptachlor	0.4		ND	ND	0.014	ND	ND	ND	ND		ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND	ND	ND	ND		ND
Endosulfan I				ND	ND	ND	ND	ND	ND		ND
4,4'-DDE			ND	0.00097 J	ND	ND	ND	ND	ND		ND
4,4'-DDT			ND	ND	ND	ND	ND	ND	ND		ND
Aroclor-1260	0.5		0.1	ND	ND	ND	ND	ND	ND		ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MWDEC3 Aqueous ug/L 04/26/96	WVA-SA- MWEA5 Aqueous ug/L 04/26/96	WVA-SA- MWEA6 Aqueous ug/L 04/26/96	WVA-SA- MWEA7 Aqueous ug/L	WVA-SA- MWEA8 Aqueous ug/L 04/26/96	WVA-SA- MWESE1 Aqueous ug/L 4/23/96	WVA-SA- MWESE2 Aqueous ug/L 4/23/96	WVA-SA- MWESE3 Aqueous ug/L 4/23/96
alpha-BHC				ND	ND	ND	Not Sampled	ND	ND	0.0042 J	ND
beta-BHC				ND	ND	ND		ND	ND	ND	ND
delta-BHC				ND	0.0074 J	ND		ND	ND	ND	ND
[illegible]				ND	ND	ND		ND	ND	ND	ND
Heptachlor	0.4		ND	ND	ND	ND		ND	ND	ND	ND
Heptachlor Epoxide	0.2		ND	ND	ND	ND		ND	ND	ND	ND
Endosulfan I				ND	ND	0.00033 J		ND	ND	ND	ND
[illegible]			[illegible]	ND	0.0031 J	ND		0.00051 J	ND	ND	ND
4,4'-DDT			ND	ND	ND	0.0034 J		ND	ND	ND	ND
Aroclor-1260	0.5		0.1	ND	ND	ND		ND	ND	ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/l	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MWESE4 Aqueous ug/L 4/24/96	WVA-SA- MWESE5 Aqueous ug/L	WVA-SA- MWESE6 Aqueous ug/L 4/24/96	WVA-SA- MWESE7 Aqueous ug/L 4/25/96	WVA-SA- MWESE8 Aqueous ug/L 4/26/96	WVA-SA- MWESE9 Aqueous ug/L	WVA-SA- MWGTI1 Aqueous ug/L 4/29/96	WVA-SA- MWGTI2 Aqueous ug/L 5/28/96
alpha-BHC				ND	Not Sampled	ND	ND	ND	Not Sampled	0.0019 J	ND
beta-BHC				ND		ND	ND	ND		ND	ND
delta-BHC				ND		ND	ND	ND		ND	ND
gamma-BHC (Lindane)				ND		ND	ND	ND		ND	ND
Heptachlor	0.4		ND	ND		ND	ND	ND		ND	ND
Heptachlor Epoxide	0.2		ND	ND		ND	ND	**0.0004 J**		ND	ND
Endosulfan I				ND		ND	ND	ND		ND	ND
[illegible]			ND	ND		ND	ND	ND		ND	ND
4,4'-DDT			ND	ND		ND	ND	ND		**0.0076 J**	ND
Aroclor-1260	0.5		0.1	ND		ND	ND	ND		ND	ND

Pesticide and PCB Concentrations in Second Round Groundwater Samples
Siberia Area, Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level ug/L	NYSDOH Maximum Contaminant Level ug/L	NYSDEC Class GA Groundwater Standards ug/L	WVA-SA- MWGTI3 Aqueous ug/L 4/29/96	WVA-SA- MWGTI4 Aqueous ug/L 4/29/96	WVA-SA- SNS6 Aqueous ug/L 04/26/96
alpha-BHC				Insufficient	ND	ND
beta-BHC				Volume	ND	0.0017 J
delta-BHC					ND	ND
gamma-BHC (Lindane)					ND	ND
Heptachlor	0.4		ND		ND	ND
Heptachlor Epoxide	0.2		ND		ND	ND
Endosulfan I					ND	ND
4,4'-DDE			ND		ND	ND
4,4'-DDT			ND		ND	ND
Aroclor-1260	0.5		0.1		ND	ND

GRO Concentrations in Monit g Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	MW32	MW34	MW38	MW39	MW-ESE-8	FB-1
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Date Sampled	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97
Gasoline Range Organics	547	ND	ND	54	ND	ND

Volatile Concentrations in Mon[illegible]ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	NYSDEC	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	Maximum	Maximum	Class GA	MW32	MW34	MW38	MW39	MW-ESE-8	FB-1
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	Level	Level	Standards	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Date Sampled	ug/L	ug/L	ug/L	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97
Bromomethane		5	5	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	540	[illegible] J	0.8	1700	220	ND
Carbon Disulfide		[illegible]		ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5	5	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	1800	ND	ND	2100 J	700	ND
Chloroform		100	7	[illegible]	ND	ND	[illegible]	ND	[illegible] J
2-Butanone		50	5	ND	ND	0.3 J	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Trichloroethene	**5**	**5**	**5**	**100**	**ND**	**ND**	**45 J**	**ND**	**ND**
Tetrachloroethene	**5**	**5**	**5**	**10 J**	**ND**	**ND**	**78 J**	**ND**	**ND**
Xylene (total)	**10000**	**5**	**5**	**25 J**	**ND**	**ND**	**ND**	**ND**	**ND**
1,1-Dichloroethene	**7**		**5**	**ND**	**ND**	**ND**	**9 J**	**ND**	**ND**
trans-1,2-Dichloroethene	**100**		**5**	**ND**	**ND**	**ND**	**14 J**	**ND**	**ND**
Benzene	**5**		**0.7**	**ND**	**ND**	**ND**	**20**	**ND**	**ND**
Toluene	**1000**		**5**	**10 J**	**ND**	**ND**	**ND**	**ND**	**ND**
Ethylbenzene	**700**		**5**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

GRO 0997 Concentrations in Mo ring Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-
Location	MW32	MW34	MW38	MW39	MW-ESE-6	FB-1
Matrix	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Date Sampled	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97	9/3/97
Gasoline Range Organics	347	ND	ND	64	ND	ND

Volatile Concentrations in Mon[illegible]ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site Location Matrix Units Date Sampled	USEPA Maximum Contaminant Level	NYSDOH Maximum Contaminant Level	NYSDEC Class GA Groundwater Standards	WVA-SA- MW32 Aqueous ug/l 9/3/97	WVA-SA- MW34 Aqueous ug/l 9/3/97	WVA-SA- MW38 Aqueous ug/l 9/3/97	WVA-SA- MW39 Aqueous ug/l 9/3/97	WVA-SA- MW-ESE-8 Aqueous ug/l 9/3/97	WVA-SA- FB-1 Aqueous ug/l 9/3/97
	[illegible]	[illegible]	[illegible]						
Bromomethane	--	5	5	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	2	2	**540**	1 J	0.8 J	**1700**	**220**	ND
Carbon Disulfide	--	50		ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	--	5	5	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	70	5	5	**1800**	ND	ND	**2100 J**	**700**	ND
Chloroform	100	100	7	ND	ND	ND	ND	ND	2 J
2-Butanone	--	50	5	ND	ND	0.3 J	ND	ND	ND
1,1,1-Trichloroethane	200	5	5	ND	ND	ND	ND	ND	ND
Trichloroethene	5	5	5	**100**	ND	ND	**45 J**	ND	ND
Tetrachloroethene	5	5	5	**10 J**	ND	ND	**78 J**	ND	ND
Xylene (total)	10000	5	5	**25 J**	ND	ND	ND	ND	ND
1,1-Dichloroethene	7	5	5	ND	ND	ND	**9 J**	ND	ND
trans-1,2-Dichloroethene	100	5	5	ND	ND	ND	**14 J**	ND	ND
Benzene	5	5	0.7	ND	ND	ND	**20**	ND	ND
Toluene	1000	5	5	**10 J**	ND	ND	ND	ND	ND
Ethylbenzene	700	5	5	ND	ND	ND	ND	ND	ND
Diesel Range Organics	--	--	--	NS	NS	NS	NS	NS	NS

Notes:
ND = Not Detected
NS = Not Sampled
J = Estimated Value

Volatile Concentrations in Mon[illegible]ng Well Groundwater Samples
Siberia Area
Watervliet Arsenal

Site	USEPA	NYSDOH	[illegible]	WVA-SA-	WVA-SA-	WVA-SA-	WVA-SA-	
Location	Maximum	Maximum	Class GA	MW41 (14'-34')	MW41 (34'-54')	MW41 (54'-74')	MW41 (74'-94')	
Matrix	Contaminant	Contaminant	Groundwater	Aqueous	Aqueous	Aqueous	Aqueous	
Units	Level	Level	Standards	ug/l	ug/l	ug/l	ug/l	
Date Sampled	[illegible]	[illegible]	[illegible]	3/26/98	[illegible]	4/2/98	[illegible]	
Vinyl Chloride	2	2	[illegible]	2400	[illegible]	ND	19	
cis-1,2-Dichloroethene	70	5	5	950	1300	50	ND	
Chloroform	100	100	7	88	ND	ND	ND	
Trichloroethene	5	5	5	140	900	1.1	ND	
Tetrachloroethene	5	5	5	1100	170	1.7	ND	
1,1-Dichloroethene	7	5	5	5	ND	ND	ND	
trans-1,2-Dichloroethene	100	5	5	4.9	ND	ND	ND	
Benzene	5	5	0.7	11	ND	ND	ND	
1,2,4-Trimethylbenzene	-	5	5	3.5	ND	ND	ND	
1,3,5-Trimethylbenzene	-	5	5	1.7	ND	ND	ND	
Acetone	-	50	50	ND	ND	ND	10	B
Methylene Chloride	5	5	5	ND	ND	ND	13	
1,2-Dichloroethene	7	5	5	ND	ND	ND	9	
Diesel Range Organics	-	-	-	1.7	NS	NS	NS	

Notes:
ND = Not Detected
NS = Not Sampled
B = Present in Sample Blank

APPENDIX C

Field Equipment Manuals

SPECTROPHOTOMETERS

DR/2000 SPECTROPHOTOMETER

Combines Stored Programs and Advanced Optics

Saving time, saving money. That's the whole idea behind the DR/2000.

When you use the DR/2000, you can forget about constructing calibration curves. And mixing standards. And measuring reagents. Because we've done all that for you.

Hach Company took 40 years of chemistry experience, combined it with microprocessor technology and created a spectrophotometer that gives you fast results, without tedious calculations.

Using our convenient, premeasured reagents will save you more time. And money. You'll appreciate the economy of ready-to-use solutions, PermaChem powder pillows, single-dose polyethylene powder pillows and vacuum-sealed ampuls.

More than 120 Preprogrammed Calibrations

Calibrations for over 120 commonly performed analyses are permanently stored in the DR/2000's ROM (read-only memory). Manual conversion of absorbance data to concentration values are eliminated. That means you won't have to prepare calibration curves. Enter the three-digit program number of the test you want to perform, insert the sample and read the results in concentration units on the digital display.

Store Your Own Calibrations

Customize your DR/2000 by adding up to 50 of your own calibrations to the instrument's permanent memory.

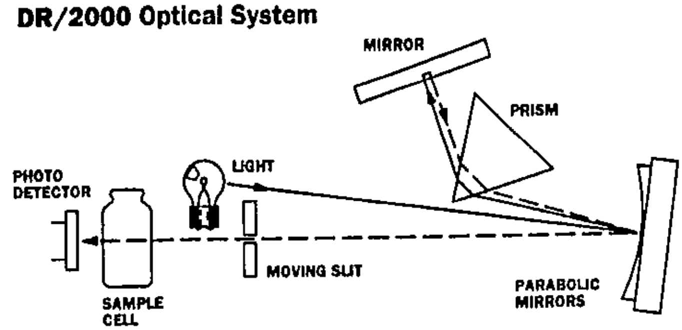
Update Capability

A few simple keystrokes is all it takes to add new Hach methods to your software. As new tests become available, you can add new testing procedures to your DR/2000.

Rugged, High Quality Optics

The DR/2000 is rugged and compact enough to be a field instrument yet accurate and stable enough to satisfy the most exacting analyst. The optical system uses a high-dispersion prism and provides outstanding precision in the 400/900 nm range.

DR/2000 Optical System



Light from a long-life tungsten bulb is reflected off a unique parabolic mirror and dispersed with a double pass through the high-dispersion prism. The selected wavelength is imaged onto a moving slit, ensuring more uniform spectral bandwidth. The factory-calibrated optical system provides accurate readings to 2 absorbance units with excellent wavelength accuracy.

Operates on Battery or Line Power

Use line power when you're in the laboratory. Or switch to battery operation for testing anywhere, anytime. An optional rechargeable battery provides added convenience.

Computer Interface Capability

Connect the DR/2000 to a computer using a RS-232 serial interface. Then use commonly available software to make permanent records of your data and generate written reports of your results.

Multi-language Prompting

Prompting messages in 14 languages (including English, French, German, Spanish and Japanese) guide you step-by-step through stored procedures.

Do-It-Yourself Calibration Adjustment

To help you consistently obtain the best possible analytical answers, a Lamp Recalibration Filter Assembly is included with each new DR/2000 Spectrophotometer. Easy-to-follow instructions permit you to periodically verify the monochromator calibration accuracy and make adjustments if necessary.

New 3.1 Software Improves Operation

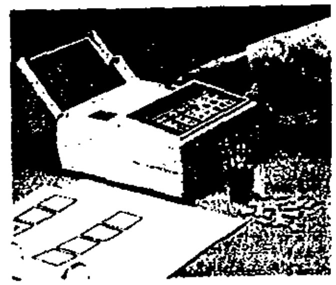
All new DR/2000 Spectrophotometers are now preprogrammed with version 3.1 software, an important update that has made the instrument easier to use without changing its operating methodology.

Outdoor Light Shield

To ensure optimum performance, each DR/2000 Spectrophotometer is supplied with a specially-designed Outdoor Light Shield. The light shield slips over the sample cell and will prevent bright sunlight from interfering with test results.

Selectable Modes

Choose the photometric readout mode that suits your needs: concentration, absorbance or % transmittance.



Complete System for Analysis

A spectrophotometer is only as good as the system that supports it. That's why every DR/2000 is backed by Hach's simplified methods, premeasured reagents, step-by-step instructions and technical support after the sale.

Options Add Speed, Convenience

Pour-Thru Cell

The Pour-Thru Cell (Cat. No. 45215-00) speeds measurement of multiple samples, eliminates errors caused by using different, unmatched sample cells, and contributes to accurate measurement of very low concentrations when high sensitivity is required. Ideal for handling large numbers of samples, the Pour-Thru Cell's low volume design helps prevent contamination or dilution between successive samples. If you're spending too much time handling and washing glassware, supplement a DR/2000 with a Pour-Thru Cell.

Dot Matrix Printer

Record your test results with the economical Citizen Model iDP-560RS L Dot Matrix Printer. Simply connect the DR/2000 to the printer via the RS-232 serial interface. For more details see page 245.

DR/2000 Specifications

See page 30 for complete specifications.

How To Order

44800-00 DR/2000 Spectrophotometer complete with matched pair of sample cells, AccuVac Adapter, 1-inch AccuVac Zeroing Cell, COD Adapter Kit, 13 mm Adapter Kit, 1-inch sample cell, Outdoor Light Shield, Lamp Recalibration Filter Assembly, Battery Holder, Battery Eliminator/Charger $1495.00

Accessories

45215-00 Pour-Thru Cell Kit 225.00
44895-00 1-cm Cell Adapter 10.00
20951-00 1-cm Cells, matched pair 75.00
20950-00 1" Sample Cells, matched pair 55.00
45185-00 Rechargeable Battery 40.00
45192-00 Printer, 120 V ...365.00
45192-02 Printer, 230 V ...365.00
45193-00 Printer Connecting Cable 25.00
16084-00 Phone Jack for RS-232 (out) 3.50
45194-00 Phone Jack for Recorder (out) 5.00
46646-00 Lamp Recalibration Filter Assembly (for use with software versions 2.0 or greater) 50.00
46878-00 DR/2000 Outdoor Light Shield 10.00
25624-00 DR/2000 Dust Cover.10.00

Circle 4173 for more information.

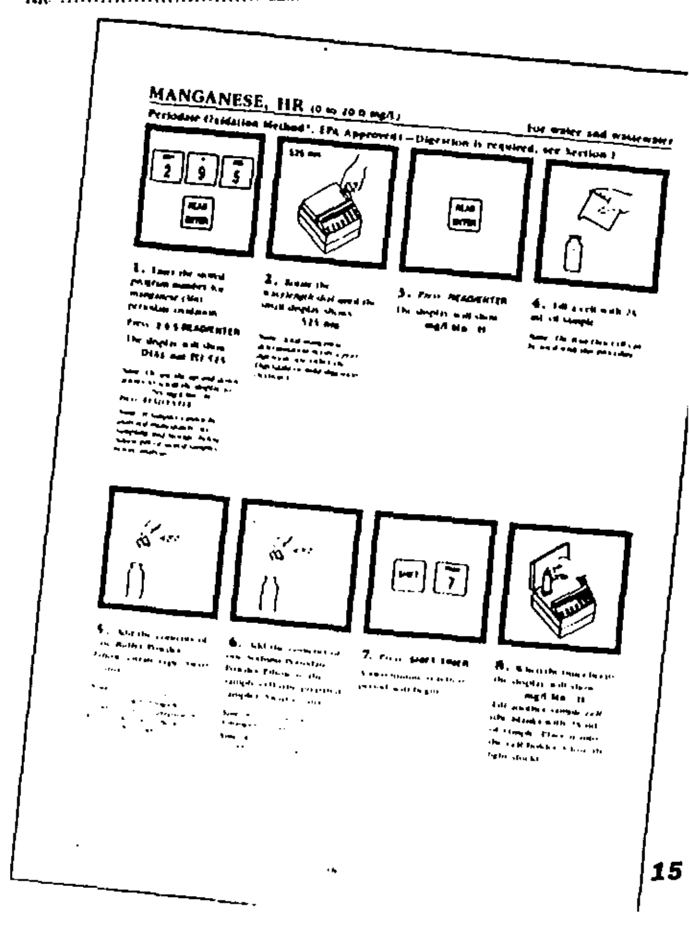
Complete Procedures Manual*

Get accurate answers easily with step-by-step instructions. Each DR/2000 is accompanied by a 400-page procedures manual with step-by-step instructions for performing each test. The easy-to-follow directions are accompanied by over 1500 drawings, illustrating each step. These detailed instructions enable even inexperienced operators to get accurate results.

Each procedure also includes information on sampling and storage, checking accuracy, adjusting for interferences, and a listing of all the reagents and apparatus needed to run the test. Procedures for soil extraction, plant extraction, and other pretreatment procedures are also included.

*Available in English, French, Spanish and German.

1 Procedure name
2 Range with units of measure
3 Approval of method by United States EPA if applicable
4 Type of samples analyzed
5 Clarification of EPA approval (if needed)
6 Name of method used
7 Procedure step
8 Keystrokes required
9 Instrument display
10 Additional information that may be applicable
11 Illustration of procedure steps and instrument keystrokes required



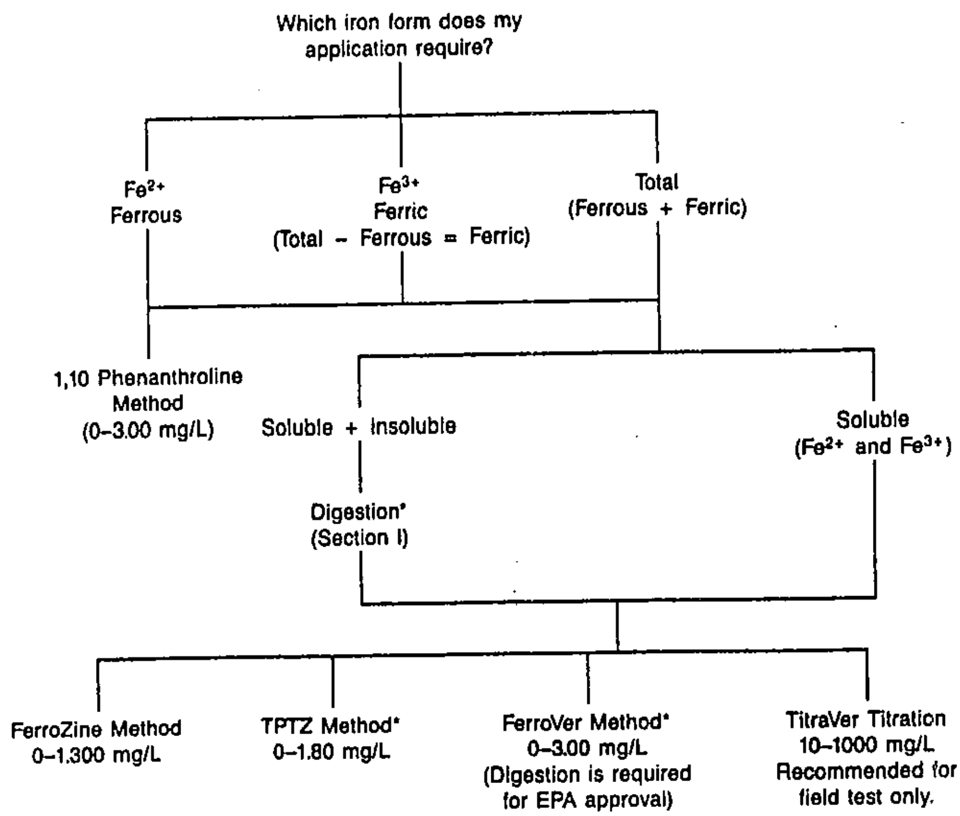
How to Select the Right Iron Procedure

Attachment 2

Pg 1

APPENDIX B-5

Because there are several iron procedures, the following decision tree will help you select the appropriate procedure for your application.

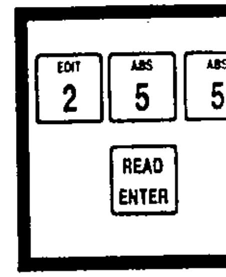


*Note: TPTZ and FerroVer will recover most insoluble iron oxides without digestion.

IRON, FERI

1,10 Phenanthroli

USING POWDE



1. Enter the stored program number for ferrous iron, (Fe^{2+})– powder pillows.

Press: **2 5 5 READ/EN**

The display will sho
DIAL nm TO 51

Note: DR/2000s with so versions 3.0 and greater w display "P" and the prog number.

Note: Instruments with so versions 3.0 and greater w not display "DIAL nm TO message if the wavelength already set correctly. The display will show the me in Step 3. Proceed with S

Note: Analyze samples as as possible to prevent air oxidation of ferrous iron ferric, which is not deter

5. Add the conten one Ferrous Iron Re Powder Pillow to th sample cell (the pre sample). Swirl to mi

Note: An orange color w form if ferrous iron is pr

Note: Undissolved powd not affect accuracy

*Adapted from Standard Met

IRON, FERROUS (0 to 3.00 mg/L)

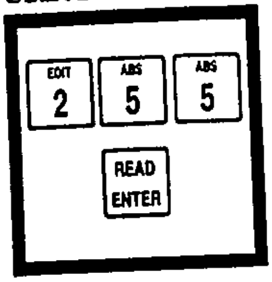
For water, wastewater and seawater

1,10 Phenanthroline Method* (Powder Pillows or AccuVac Ampuls)

ATTACHMENT 2
Pg 2

APPENDIX B

USING POWDER PILLOWS



1. Enter the stored program number for ferrous iron, (Fe^{2+})– powder pillows.

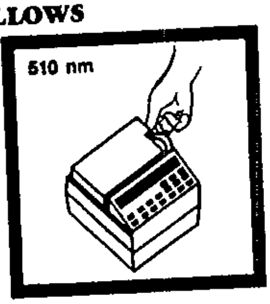
Press: **2 5 5 READ/ENTER**

The display will show:
DIAL nm TO 510

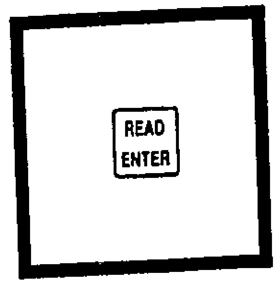
Note: DR/2000s with software versions 3.0 and greater will display "P" and the program number.

Note: Instruments with software versions 3.0 and greater will not display "DIAL nm TO" message if the wavelength is already set correctly. The display will show the message in Step 3. Proceed with Step 4.

Note: Analyze samples as soon as possible to prevent air oxidation of ferrous iron to ferric, which is not determined

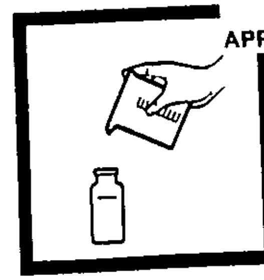


2. Rotate the wavelength dial until the small display shows:
510 nm



3. Press: **READ/ENTER**

The display will show:
mg/l Fe^{2+}



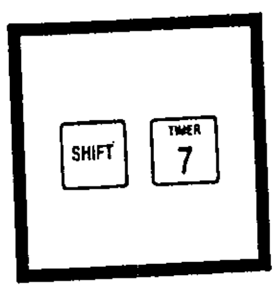
4. Fill a sample cell with 25 mL of sample.

Note: For proof of accuracy, use a 1.0 mg/L ferrous iron standard solution (preparation given in the Accuracy Check) in place of the sample.

5. Add the contents of one Ferrous Iron Reagent Powder Pillow to the sample cell (the prepared sample). Swirl to mix

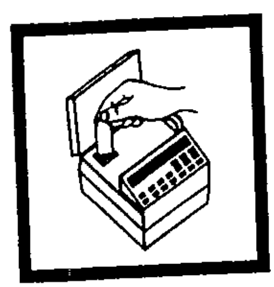
Note: An orange color will form if ferrous iron is present

Note: Undissolved powder does not affect accuracy



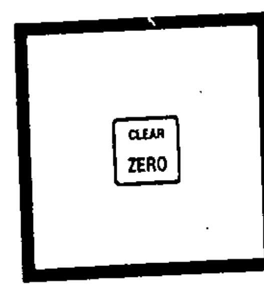
6. Press. **SHIFT TIMER**

A three-minute reaction period will begin



7. When the timer beeps, the display will show
mg/l Fe^{2+}
Fill a second sample cell (the blank) with 25 mL of sample. Place it into the cell holder

Note: The Pour-Thru Cell can be used with this procedure



8. Press: **ZERO**

The display will show:
WAIT

then:
0.00 mg/l Fe^{2+}

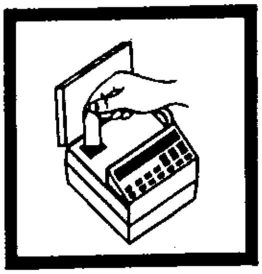
*Adapted from Standard Methods for the Examination of Water and Wastewater

Soluble
(Fe^{2+} and Fe^{3+})

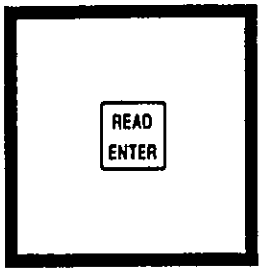
TitraVer Titration
10–1000 mg/L
Recommended for
field test only.

Attachment 2
Pg 3

APPENDIX B-5



9. Place the prepared sample into the cell holder. Close the light shield.

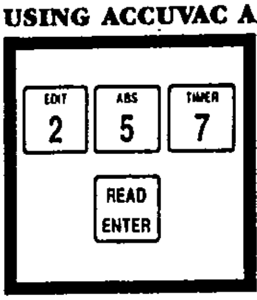


10. Press: **READ/ENTER**

The display will show:
WAIT
then the result in mg/L Fe^{2+} will be displayed.

Note: In the constant-on mode, pressing READ/ENTER is not required. WAIT will not appear. When the display stabilizes, read the result.

USING ACCUVAC AMPULS



1. Enter the stored program number for ferrous iron (Fe^{2+})– AccuVac ampuls.

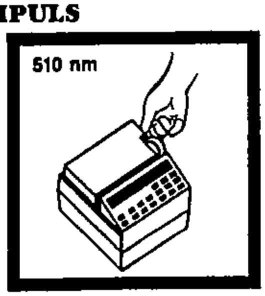
Press: **2 5 7 READ/ENTER**

The display will show:
DIAL nm TO 510

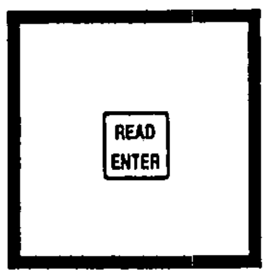
Note: DR/2000s with software versions 3.0 and greater will display "P" and the program number

Note: Instruments with software versions 3.0 and greater will not display "DIAL nm TO" message if the wavelength is already set correctly. The display will show the message in Step 3. Proceed with Step 4

Note: Analyze samples as soon as possible to prevent air oxidation of ferrous iron to ferric, which is not determined

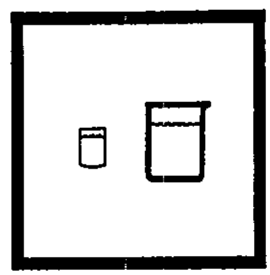


2. Rotate the wavelength dial until the small display shows:
510 nm



3. Press: **READ/ENTER**

The display will show:
mg/l Fe^{2+} AV



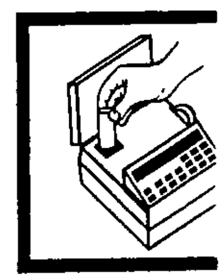
4. Fill a zeroing vial (the blank) with at least 10 mL of sample. Collect at least 40 mL of sample in a 50-mL beaker.

Note: For proof of accuracy, a 1.0 mg/L ferrous iron standard solution (preparation given in the Accuracy Check) can be used in place of the sample.

IRON, FERRO

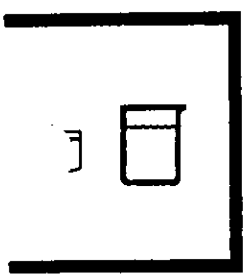
5. Fill a Ferrous Ir
AccuVac Ampul with
sample.

*Note: Keep the tip imme
while the ampul fills
completely.*



9. When the timer
the display will sho
mg/l Fe^{2+} AV
Place the blank into
cell holder. Close th
light shield.

Attachment 2
Pg 4

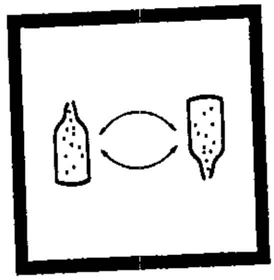


:. Fill a zeroing vial
ıe blank) with at least
ı mL of sample. Collect
least 40 mL of sample
a 50-mL beaker.

*ıte: For proof of accuracy, a
· mg/L ferrous iron standard
ution (preparation given in
Accuracy Check) can be
·d in place of the sample.*

5. Fill a Ferrous Iron AccuVac Ampul with sample.

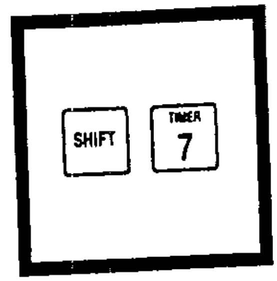
Note: Keep the tip immersed while the ampul fills completely.



6. Quickly invert the ampul several times to mix. Wipe off any liquid or fingerprints.

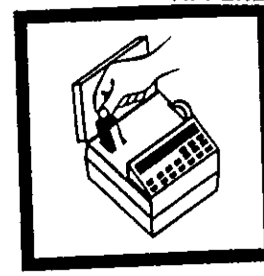
Note: An orange color will form if ferrous iron is present.

Note: Undissolved powder does not affect accuracy.



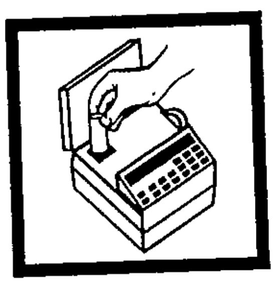
7. Press: **SHIFT TIMER**

A three-minute reaction period will begin.



8. Place the AccuVac Vial Adapter into the cell holder.

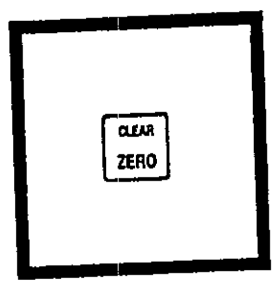
Note: Place the grip tab at the rear of the cell holder.



9. When the timer beeps, the display will show:

mg/l Fe^{2+} AV

Place the blank into the cell holder. Close the light shield.



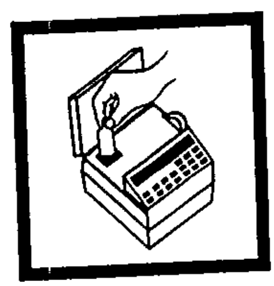
10. Press: **ZERO**

The display will show:

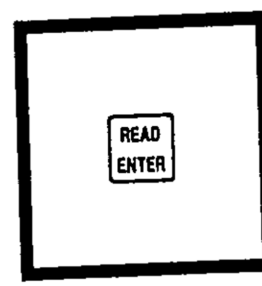
WAIT

then:

0.00 mg/l Fe^{2+} AV



11. Place the AccuVac ampul into the cell holder. Close the light shield.



12. Press: **READ/ENTER**

The display will show:

WAIT

then the result in mg/L Fe^{2+} will be displayed.

Note: In the constant-on mode, pressing READ/ENTER is not required. WAIT will not appear. When the display stabilizes, read the result.

ATTACHMENT 2
Pg 5

APPENDIX B-5

ACCURACY CHECK

Standard Solution Method

Prepare a ferrous iron stock solution (100 mg/L Fe) by dissolving 0.7022 grams of ferrous ammonium sulfate, hexahydrate, in deionized water. Dilute to 1 liter. Prepare immediately before use. Dilute 1.00 mL of this solution to 100 mL with deionized water to make a 1.0 mg/L standard solution. Prepare this immediately before use.

PRECISION

In a single laboratory using an iron standard solution of 1.000 mg/L Fe^{2+} and two representative lots of reagent with the DR/2000, a single operator obtained a standard deviation of ± 0.006 mg/L Fe^{2+}.

In a single laboratory using a standard solution of 1.000 mg/L Fe^{2+} and two representative lots of AccuVac ampuls with the DR/2000, a single operator obtained a standard deviation of ± 0.009 mg/L Fe^{2+}.

SUMMARY OF METHOD

The 1,10 phenanthroline indicator in Ferrous Iron Reagent reacts with ferrous iron in the sample to form an orange color in proportion to the iron concentration. Ferric iron does not react. The ferric iron (Fe^{3+}) concentration can be determined by subtracting the ferrous iron concentration from the results of a total iron test. See *Chemical Procedures Explained*, Appendix A, for more information.

REQUIRED REAGENTS (Using Powder Pillows)

Description	Quantity Required Per Test	Unit	Cat. No.
Ferrous Iron Reagent Powder Pillows	1 pillow	100/pkg	1037-69

REQUIRED REAGENTS (Using AccuVac Ampuls)

Description	Quantity Required Per Test	Unit	Cat. No.
Ferrous Iron Reagent AccuVac Ampuls	1 ampul	25/pkg	25140-25

REQUIRED APPARATUS (Using Powder Pillows)

Description	Quantity Required Per Test	Unit	Cat. No.
Clippers, for opening powder pillows	1	each	968-00

REQUIRED APPARATUS (Using AccuVac Ampuls)

Description	Quantity Required Per Test	Unit	Cat. No.
Adapter, AccuVac Vial	1	each	43784-00
Beaker, 50 mL	1	each	500-41
Sample Cell, 10-mL, with cap	1	each	21228-00

OPTIONAL REAGENTS

Description	Unit	Cat. No.
Ferrous Ammonium Sulfate, hexahydrate	113 g	11256-14
Water, deionized	3.78 L	272-17

OPTIONAL APPARATUS

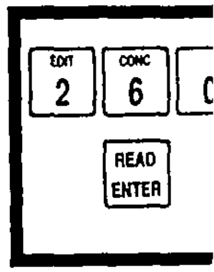
Description	Unit	Cat. No.
AccuVac Snapper Kit	each	24052-00
Clippers, shears, 7-1/4"	each	23694-00
Flask, volumetric, 100 mL, Class B	each	547-42
Flask, volumetric, 1000 mL, Class B	each	547-53
Pipet, volumetric, 1 mL	each	515-35
Pipet Filler, safety bulb	each	14651-00
Pour-Thru Cell Assembly Kit	each	45215-00

For Technical Assistance, Price and Ordering

In the U.S.A.—Call 800-227-4224 toll-free for more information
Outside the U.S.A.—Contact the Hach office or distributor serving you.

IRON (0 to 1.

FerroZine Method



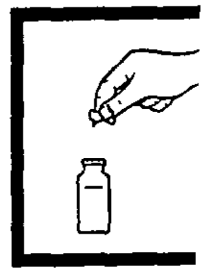
1. Enter the stored program number for iron (Fe), FerroZine method.

Press: 2 6 0 READ/E

The display will sho
DIAL nm TO 5

Note: DR/2000s with so versions 3.0 and greater display "P" and the pro number.

Note: Instruments with versions 3.0 and greater not display "DIAL nm T message if the wavelengt already set correctly. Th display will show the m in Step 3. Proceed with



5. Add the conte one FerroZine Iron Reagent Solution P to the cell (the pre sample). Swirl to

Note: Do not allow th to come into contact w contents of the pillow.

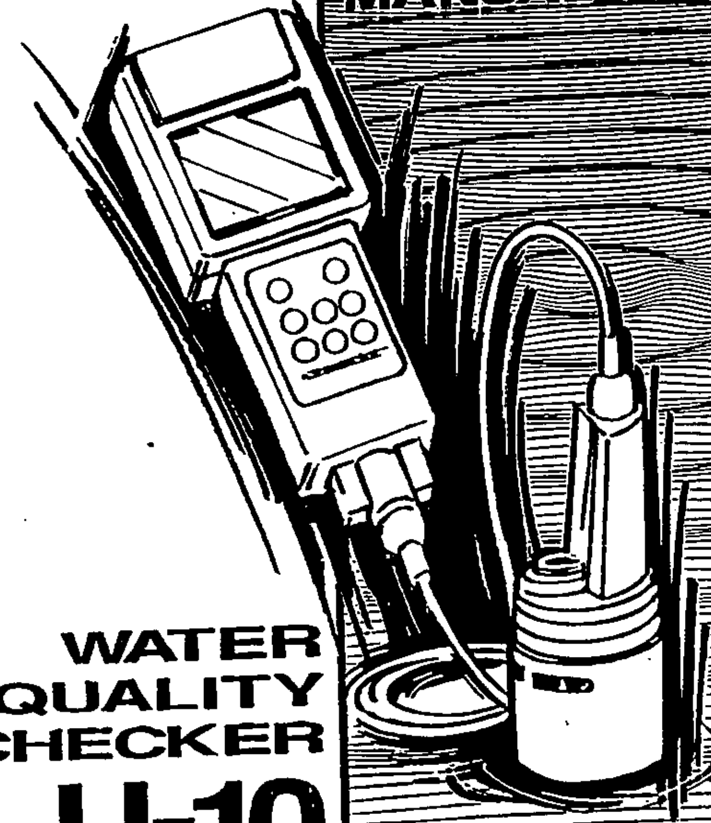
Note: 0.5 mL of Ferro Reagent Solution can b place of the solution p preferred.

Note: If the sample co rust, see Interferences

*Adapted from Stookey, L

HORIBA

INSTRUCTION MANUAL



WATER QUALITY CHECKER
U-10

CODE: 040801000HK-5

WARNING

The DO sensor contains a strong alkaline solution. Should any of this solution come in contact with your clothing or skin, wash it away immediately with plenty of water.

Be especially careful not to allow any of the alkaline liquid in the DO sensor to get in your eyes.

⚠CAUTION

Insert the battery with ample care to the polarity. Reverse insertion on the polarity will make damage to the inner PCB.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provede reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The U-10 Water Quality Checker is a state-of-the-art instrument for simultaneous multiparameter measurement of water quality. The HORIBA U-10 measures six different parameters of water samples: *pH, conductivity, turbidity, dissolved oxygen, temperature*, and *salinity*.

The U-10 is compact enough to be held in one hand while taking measurements. It has a large easy-to-read LCD readout. Measurements are taken simply by immersing the probe right into the water sample.

The U-10 is extremely versatile and sophisticated, yet easy to use. You will find it a valuable addition to on-site water control operations, whatever your needs – from testing factory discharges to urban drainage, river water, lake and marsh water, aquatic culture tanks, agricultural water supplies, and sea water.

To get the most out of your Water Quality Checker, please read this *Instruction Manual* carefully before you begin to take measurements.

Note that Horiba cannot be held responsible for any equipment malfunction or failure should the U-10 Water Quality Checker be operated incorrectly or in a manner other than specified in this *Instruction Manual*.

Horiba's aim is to produce the best possible equipment and documentation for our products. We welcome comments, questions, or suggestions for improvement concerning both our products and the accompanying documentation, such as this *Instruction Manual*.

Note that the contents of this Instruction Manual are subject to change without prior notice as design changes are made on the instrument.

Second edition: November, 1991
First edition: July, 1991

CONTENTS

Contents of Tables

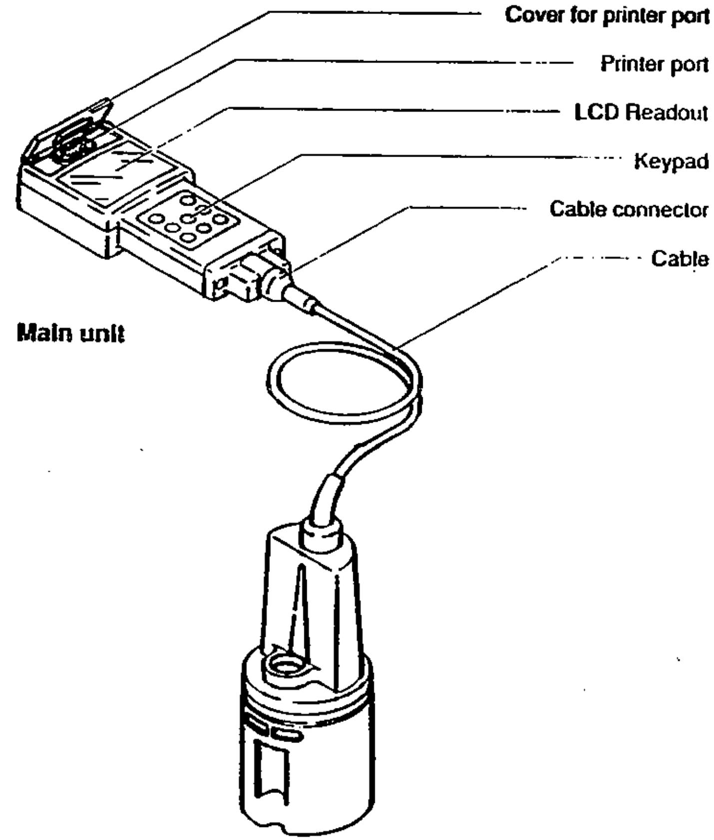
Section 1

Getting Started

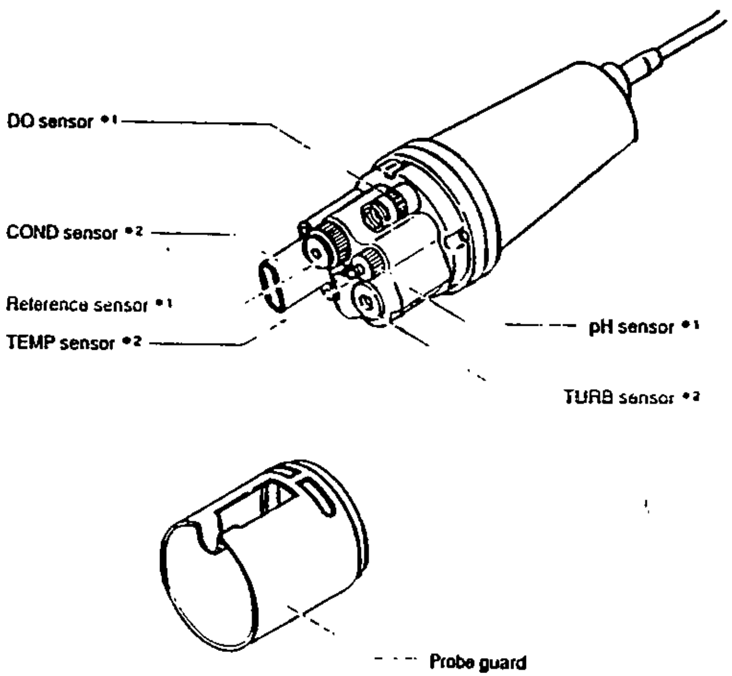
This section first gives an overview of the U-10. It then shows how to set up your U-10 by inserting the DO sensor and the battery.

Configuration of the U-10

Main unit



Probe

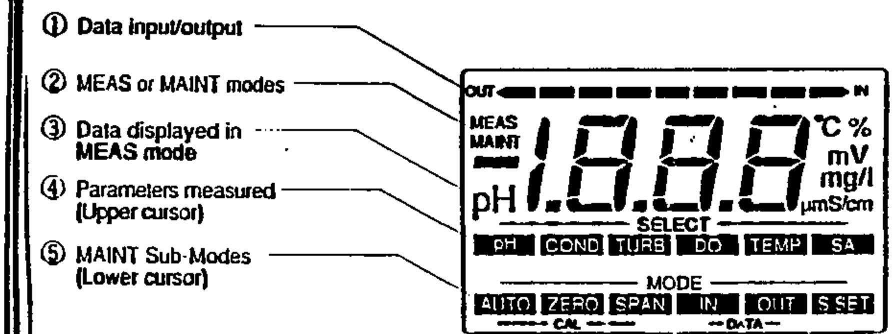


*1. Removable
DO (Dissolved oxygen)
Reference
pH

*2. Non-removable
COND (Conductivity)
TEMP (Temperature)
TURB (Turbidity)

The Readout

The readout has two main functions: (1) it displays the results of measurements, and (2) it serves as a message board to show the operating status of the U-10.



① Data input/output

OUT --- Data output

--- IN Data input

② MEAS or MAINT modes

The U-10 may be used in one of two modes: Measurement (MEAS) mode or Maintenance mode.

MEAS the U-10 is ready to make 6-parameter measurements

MAINT the U-10 is ready for other operations, e.g., calibration, data input/recall, or salinity setting

③ **Data displayed in MEAS mode**

- 6-parameter results:
  pH, conductivity, turbidity, DO, temperature, and salinity
- Designated value for salinity setting
- Error codes

④ **Parameters measured**

Value displayed on readout is highlighted by upper cursor.

pH	pH
COND	Conductivity
TURB	Turbidity
DO	Dissolved-Oxygen
TEMP	Temperature
SAL	Salinity

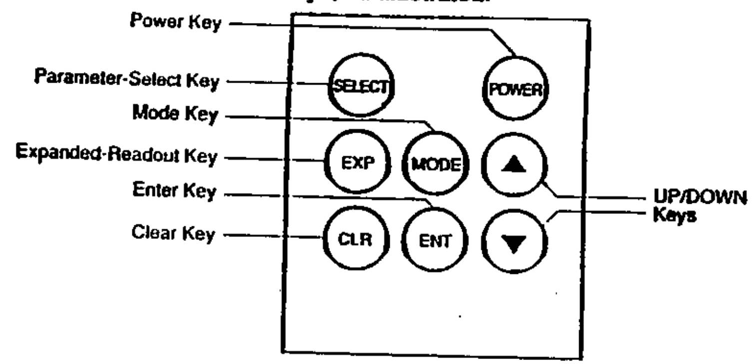
⑤ **MAINT Sub-Modes**

One of six Sub-Modes selected is highlighted by lower cursor.

AUTO	Automatic 1-point calibration
ZERO	Manual zero calibration
SPAN	Manual span calibration
IN	Data input
OUT	Data output (recall)
S.SET	Salinity setting correction

The Keypad

The U-10 is operated by the keypad on the main unit, which has eight surface-sealed keys, as illustrated.



Power Key (POWER)
Turns the main unit ON/OFF.

When this key is pressed to turn the U-10 ON, the readout comes in the MEAS mode, showing the parameter last displayed in the previous measurement. If the U-10 is left with the power ON for 30 minutes without any of the keys being activated, the power will be turned OFF automatically.

Parameter-Select Key (SELECT)
Use this key to move the upper cursor to the measured parameter you want to show on the readout. It toggles through the six parameters in order:

pH – COND – TURB – DO – TEMP – SAL

Mode Key (MODE)
Toggles back and forth between MEAS and MAINT modes. When in the MAINT mode, this key toggles the lower cursor through the six maintenance Sub-Modes.

AUTO – ZERO – SPAN – IN – OUT – S.SET

Expanded-Readout Key (EXP)
Toggles between (1) standard readout value and (2) expanded readout, for greater resolution, with decimal point moved one digit to the left.

Enter Key (ENT)
This acts like the RETURN Key or Enter Key on a computer keyboard. The U-10 Enter Key has four main functions, depending on which mode the unit is in.

1. In the AUTO Sub-Mode: Press this key to start automatic calibration.
2. In either the ZERO or SPAN Sub-Modes: Used in manual calibration to set the value for the standard solution being used.
3. In the IN Sub-Mode: Inputs data being measured to memory.
4. In the OUT Sub-Mode: Recalls values from one of the 20 Data-Set Nos. that is now shown on the readout. Prints data when a printer is connected.

Clear Key (CLR)
This acts like the ESCAPE Key on a computer keyboard. It has three main functions, depending on which mode the unit is in.

1. In the AUTO Sub-Mode: Aborts the auto-calibration now in progress.
2. In the IN Sub-Mode: Deletes data in memory from all 20 Data-Sets.
3. When the readout shows an error code: Clears the error code from the readout.

UP/DOWN keys
Use these keys to select values when in one of the MAINT Sub-Modes. They have two main functions.

1. In either the ZERO or SPAN Sub-Modes: Use these keys to select value for the standard solution.
2. In the OUT mode: Used to toggle through the 20 Data-Set Nos. to select the one you wish to recall.

Setting up the U-10

Preparations of the pH sensor and the reference sensor

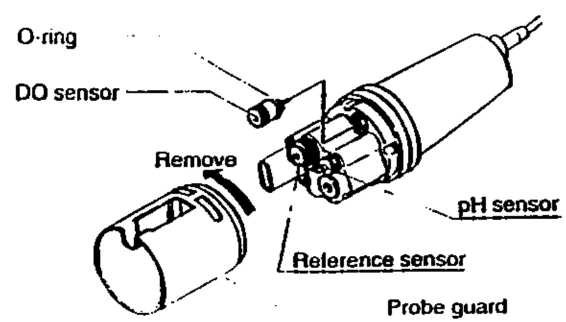
1. Remove the protective rubber cap from the pH sensor.
2. Remove the sealing tape from the reference sensor.

Inserting the DO sensor

WARNING
The DO sensor contains a strong alkaline solution. Should any of this solution come in contact with your clothing or skin, wash it away immediately with plenty of water. Be especially careful not to allow any of the liquid in the DO sensor to get in your eyes.

The Dissolved-Oxygen (DO) sensor has a delicate membrane that can easily be ruptured. For safety's sake, the U-10 is shipped to you with the DO sensor packed separately. You should insert the DO sensor when you unpack your U-10 unit.

1. Make sure that the DO sensor has the correct O-ring, as shown.
2. First, fit the DO sensor lightly into its socket, and then put on the probe guard to align it correctly.
3. Then, tighten the DO sensor securely to the probe body. When doing this, be especially careful not to damage the membrane, which is located in the front of the DO sensor.



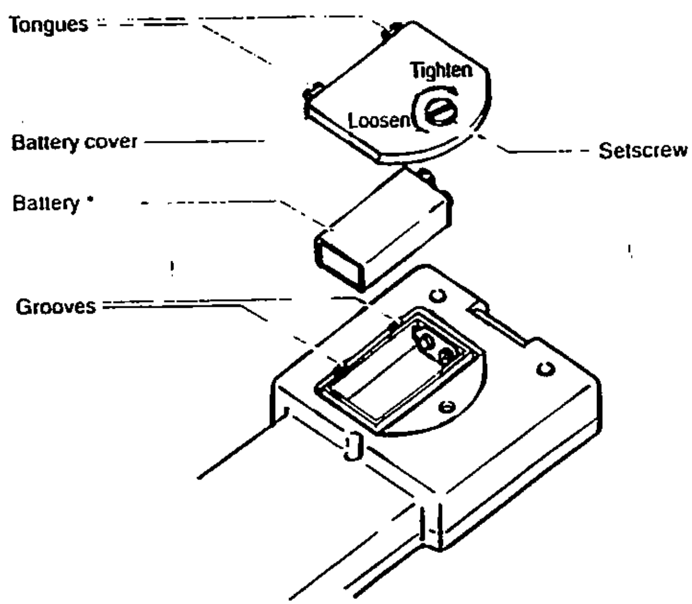
Inserting the battery

The U-10 is shipped from the factory with the battery packed separately.

The battery may be inserted by loosening the set-screw on the battery cover and pulling up the cover. Make sure that the plus and minus poles of the battery match the terminals correctly.

If the readout shows the message Er 1, it means that the battery is defective or exhausted and should be replaced.

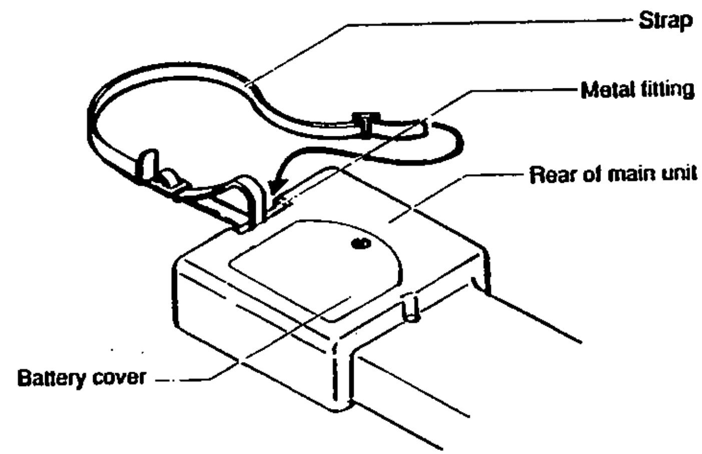
If you are replacing the battery and already have data stored in the U-10 memory that you wish to save, be sure to turn OFF the POWER Key before you remove the old battery. This will assure that data stored in memory will be maintained by the internal backup battery.



* Use a 9V-battery

Attaching the carrying strap

Hook both ends of the strap through the metal fitting on back of the main unit, as illustrated.



Section **2**

Making Measurements

Making a measurement with the U-10 Water Checker is extremely simple. Just turn on the power and place the probe in the sample of water you wish to measure.

All six parameters are measured simultaneously. These parameters may be stored in memory, printed out, or viewed one-by-one on the LCD readout. For printing and data storage, see the appropriate sections following this one. To view the parameters one-by-one on the readout, use the SELECT Key to toggle the upper cursor through them.

While the U-10 is both rugged and precise, the key to accurate measurements is cleanliness and frequent calibration. It is essential to clean the U-10 thoroughly after each measurement, and it is recommended that you re-calibrate your U-10 as frequently as possible. For best results, you should recalibrate it before each measurement session. Cleaning and calibration procedures are described below in this section and in the following one.

How to make a measurement

POWER **1** Turn the power on.

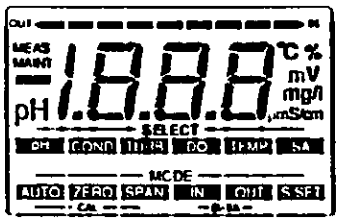
2 Gently place the probe into the water sample.

Basically, that's all there is to it: just turn it on and put the probe in the sample. Of course, the U-10 can do many sophisticated things with the sample data, and for best results, you should be careful about calibrating the unit and maintaining it in good condition. This is explained in detail below and in the next section.

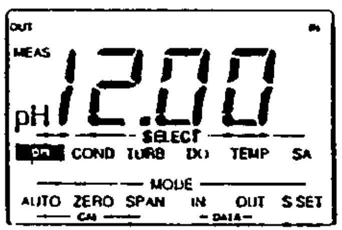
Be careful!
Never drop or throw the probe into the water. It is a precision instrument containing five delicate sensors and five pre-amps; you can damage it beyond repair by unnecessary rough handling.

Initial readout

When you first turn the power on, the U-10 will be in the MEAS mode, the readout will look like this, with all the LCD segments activated.



After about two seconds, the readout will change to show that a new measurement is being made. The readout will show the last parameter that the upper cursor was on when the previous measurement was made, i.e., pH as illustrated here.



(Expanded readout shown)

The display of the decimal point in the readout mode will also be in the same format as was selected with the EXP Key in the previous measurement, i.e., standard or expanded (as illustrated here).

Select the parameter you want shown on the readout of the measured data

All six parameters are automatically measured at once. Use the SELECT Key to toggle the upper cursor to the parameter you want.

pH	: pH
COND	: Conductivity
TURB	: Turbidity
DO	: Dissolved oxygen
TEMP	: Temperature
SAL	: Salinity

To get a uniform reading, slowly move the probe up and down to circulate the water through it. (Move it 1 foot (30 cm) per sec.) Then wait for the readout to stabilize while doing this.

Expanded readout

Use the EXP readout mode when you wish to see the results with one additional decimal place of accuracy. The EXP Key toggles the readout back and forth between standard to expanded display. The table below shows the result of using the EXP readout mode for each of the six parameters.

Table 1. Accuracy of expanded readout

Parameter	Range of measurement	Accuracy	
		Standard readout	Expanded readout
pH	0-14 pH	0.1 pH	0.01 pH
COND	0-1 mS/cm 1-10 mS/cm 10-100 mS/cm	0.01 mS/cm 0.1 mS/cm 1 mS/cm	0.001 mS/cm 0.01 mS/cm 0.1 mS/cm
TURB	0-800 NTU	10 NTU	1 NTU
DO	0-19.9 mg/l	0.1 mg/l	0.01 mg/l
TEMP	0-50°C	1°C	0.1°C
SAL	0-4%	0.1%	0.01%

Note that the salinity parameter is the only value not measured directly with its own sensor. The U-10 obtains salinity by converting the conductivity value. If large amounts of conductive ions other than salt-water components are present in the sample, an error may occur. Be cautious when interpreting the salinity results.

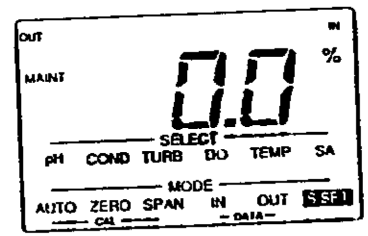
Measuring fresh water or salt water?

The U-10 can be set to the salinity for either fresh water or salt water when measuring DO. This is done by using the S.SET Sub-Mode.

Measuring fresh water

1. First, use the MODE Key to put the U-10 in the MAINT mode. Keep pressing the MODE Key to toggle the lower cursor to the S.SET Sub-Mode.

2. Once you are in the S.SET Sub-Mode, use the UP/DOWN Keys to select the salinity value. For fresh water, set the salinity to 0.0%.



3. Finally, press the ENT Key to complete the salinity setting while in the S.SET Sub-Mode.

4. When the salinity setting has been made, switch back to the MEAS mode by pressing the the MODE Key.

Measuring salt water

1. First, use the MODE Key to put the U-10 in the MAINT mode. Keep pressing the MODE Key to toggle the lower cursor to the S.SET Sub-Mode.
2. For salt water, set it to A *i.e.*, for auto-salinity.
   The A setting should be sufficient for measurements of normal sea water with a salinity value close to 3.3%. For sea water of an unusual salinity, however, and where the value is otherwise known, you may wish set the value manually to any salinity within the range of 0.0%-4.0%. (You may also possibly want to use a manual setting if, for example, the COND sensor is malfunctioning but it is still desirable to take readings of the other parameters.)
3. Finally, press the ENT Key to complete the salinity setting while in the S.SET Sub-Mode.
4. When the salinity setting has been made, switch back to the MEAS mode by pressing the the MODE Key.

After measurement: Cleaning and storing the U-10

1. Turn OFF the power.
2. Wash the probe thoroughly with tap water. Be sure to flush off all of sample solution from the probe.

Storing the U-10 for brief periods, *i.e.*, about 1 week or less:
Fill the calibration beaker with tap water and fit the probe over it.

For longer storage
The pH sensor must always be kept moist. Fill the small rubber cap with water and use it to cover the pH sensor.
The KCl internal solution in the reference sensor may seep out over time. Place vinyl tape around the O-ring portion to prevent this.
If you are going to store the U-10 for a prolonged period without using it, remove the battery from the main unit.

Section **3**

Calibrating the U-10

The U-10 Water Checker may be calibrated either manually or automatically. The 4-parameter auto-calibration procedure is quite handy and should be sufficient for most measurement operations.

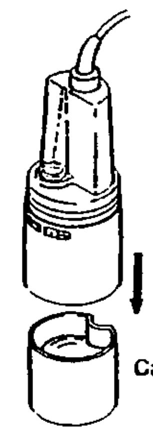
Manual calibration for each of the four parameters is more accurate but, of course, also more time-consuming. This method should be used for more precise measurement. The manual calibration procedure is explained below in detail, following the description of the auto-calibration procedure.

The auto-calibration procedure is extremely simple. The U-10 Water Checker uses just a single solution to do a simultaneous calibration of four parameters: *pH*, *COND*, *TURB*, and *DO*. Your U-10 comes with a bottle of standard phthalate pH solution and a calibration beaker for this purpose.

Auto-calibration procedure

Fill the calibration beaker to about 2/3 with the standard solution. Note the line on the beaker.

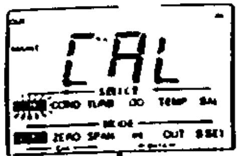
Fit the probe over the beaker, as illustrated. Note that the beaker is specially shaped to prevent the DO sensor from being immersed in the standard solution. This is because the DO auto-calibration is done using atmospheric air.



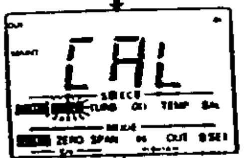
MODE With the power on, press the MODE Key to put the unit into the MAINT mode. The lower cursor should be on the AUTO Sub-Mode; if it is not, use the MODE Key to move the lower cursor to AUTO.

ENT With the lower cursor on AUTO, press the ENT Key. The readout will show *CAL*. Wait a moment, and the upper cursor will gradually move across the four auto-calibration parameters one-by-one: *pH*, *COND*, *TURB*, and *DO*. When the calibration is complete, the readout will briefly show *End* and then will switch to the MEAS mode.

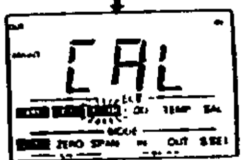
The upper cursor will blink while the auto-calibration is being made. When the auto-calibration has stabilized, the upper cursor will stop blinking.



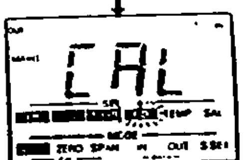
First, pH is being auto-calibrated



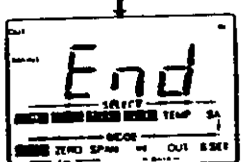
Then, COND is being auto-calibrated



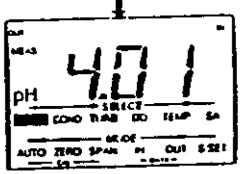
Next, TURB is being auto-calibrated



Finally, DO is being auto-calibrated



Auto-calibration now ends

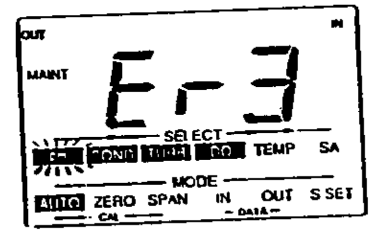


And the readout switches to the MEAS mode

Note: If you wish to abort the auto-calibration for any reason, press the CLR Key. The parameters auto-calibrated so far will be stored in memory.

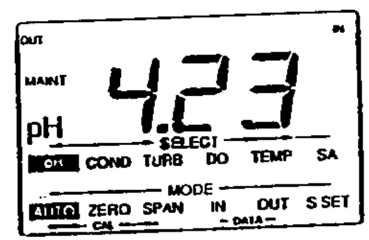
Auto-calibration error

After the DO auto-calibration, if the unit does not switch to the MEAS mode as it should, and the readout shows either Er-3 or Er-4, an auto-calibration error has occurred. Parameters will blink where an error occurred.



pH auto-calibration error

If this happens, re-do the auto-calibration. First, press the CLR Key to cancel the error code.



Then press the ENT Key to re-start the auto-calibration. Restart the auto-calibration beginning again with pH.

Manual (2-point) calibration procedures

For normal measurements, the 4-parameter auto-calibration described above is sufficiently accurate. However, you may wish to do a parameter-by-parameter, 2-point manual calibration of one or more of the four parameters. This is recommended either for high-accuracy measurements, especially when using the expanded readout mode. It is necessary if a new probe is being used for the *first time*.

Parameters to be calibrated manually.

pH	• Zero	(see page 24.)
	• Span	(see page 25.)
COND	• Zero	(see page 28.)
	• Span	(see page 29.)
TURB	• Zero	(see page 31.)
	• Span	(see page 31.)
DO	• Zero	(see page 32.)
	• Span	(see page 33.)

Parameters not to be calibrated.

Sample temperature
Salinity

pH calibration

pH calibration on the U-10 is done using two commercially-available standard solutions of different pH values, one for the zero calibration, the other for the span calibration. Note that the temperature characteristics of the various standard solutions that are available may differ; therefore, before using these two solutions to make the pH calibration, carefully measure the temperature and determine the temperature characteristics of each.

Preparation

Wash the probe 2-3 times, using de-ionized or distilled water. Place it in a beaker of each standard solution.

1. Zero calibration

Use a pH7 standard solution for the zero calibration.

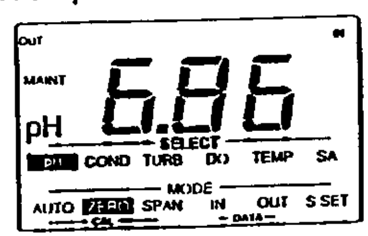
Operation

1. With the power on, press the MODE Key to put the unit into the MAINT mode.

2. Press the MODE Key again to move the lower cursor to ZERO.

3. Use the SELECT Key to move the upper cursor to pH.


4. When the readout has stabilized, use the UP/DOWN Keys to select the value of the pH 7 standard solution at the temperature of the sample. Refer to Table 2 for pH values of standard solutions at various temperatures.



5. Press the ENT Key to complete the zero calibration for pH.

2. Span calibration

Use either a pH4 or a pH9(10) standard solution for the span calibration.

Operation

MODE

1. Use the MODE Key to move the lower cursor to SPAN.

▲ ▼

2. As in Step 4. above in zero calibration, when the readout has stabilized, use the UP/DOWN Keys to select the value of the standard solution (i.e., either pH4 or pH9) at the temperature of the sample. Again, refer to Table 2 for pH values of standard solutions at various temperatures.

ENT

3. Press the ENT Key to complete the span calibration for pH.

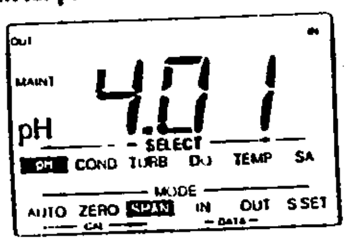


Table 2 pH values of standard solutions at various temperatures*

Temperature °C / °F	pH2[a]	pH4[b]	pH7[c]	pH9[d]	pH10[e]	pH12[f]
0 / 32	1.67	4.01	6.98	9.46	10.32	13.43
5 / 41	1.67	4.01	6.95	9.39	10.25	13.21
10 / 50	1.67	4.00	6.92	9.33	10.18	13.00
15 / 59	1.67	4.00	6.90	9.27	10.12	12.81
20 / 68	1.68	4.00	6.88	9.22	10.06	12.63
25 / 77	1.68	4.01	6.86	9.18	10.01	12.45
30 / 86	1.69	4.01	6.85	9.14	9.97	12.30
35 / 95	1.69	4.02	6.84	9.10	9.93	12.14
40 / 104	1.70	4.03	6.84	9.07	9.89	11.99
45 / 113	1.70	4.04	6.83	9.04	9.86	11.84
	1.71	4.06	6.83	9.01	9.83	11.70

a : oxalate, b : phthalate, c : neutral phosphate, d : borax,
e : carbonate, f : Sat.calcium hydroxide solution

* These pH valves are for Japanese standard solutions. Should you prefer to use different standard solutions, be sure to make the proper adjustments in calibration

COND calibration

The U-10 can measure conductivity in the range of 0-100 mS/cm. Depending on the sample concentration, however, the U-10 automatically selects the proper range out of its three possible ranges of 0-1 mS/cm, 1-10 mS/cm, and 10-100 mS/cm.

Therefore, if you are doing a manual calibration for COND, this must be done for each of the three ranges. However, since the zero point is common for all three ranges, only the three one-point span calibrations need be done separately.

Preparing the standard solution for COND span calibration

This solution uses a potassium chloride as a reagent. For greater accuracy, the solution should be freshly prepared each time. If it is unavoidable to use a stored solution, be sure to keep it tightly capped in a polyethylene or hard glass bottle. The shelf life of this solution is six months. Date-stamp the bottle for reference. Never use a KCl standard solution that has been stored for more than six months: the calibration accuracy may be adversely affected.

Use potassium chloride powder of the best quality commercially available. Dry the powder for two hours at 105°C, and cool it down, in a desiccator. Weigh out an appropriate amount of dried and cooled potassium chloride powder according to the table below. Make the potassium chloride standard solution as shown.

Table 3 Making the potassium chloride standard solution

KCl standard solution	KCl weight g	Conductivity* mS/cm	Range to be calibrated mS/cm
0.005N	0.373	0.718	0-1
0.05N	3.73	6.67	1-10
0.5N	37.28	58.7	10-100

* Value at the temperature, 25°C

To prepare the standard solution, use a 1-liter volumetric flask. First, dissolve the KCl in a small amount of de-ionized or distilled water. Then fill the flask with de-ionized or distilled water up to the 1-liter line. Finally, shake the solution to mix it thoroughly.

1. Zero calibration

This calibration is carried out in atmospheric air; no solution is needed.

Preparation

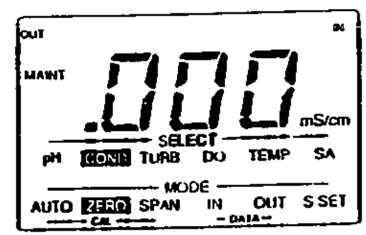
Wash the probe 2-3 times, using de-ionized or distilled water. Shake the probe to remove any water droplets from the COND sensor. Then allow it to dry by exposing it to fresh air.

Operation

MODE
1. Use the MODE Key to move the lower cursor to ZERO.

SELECT
2. Use the SELECT Key to move the upper cursor to COND.

▲ ▼
3. Use the UP/DOWN Keys to set the readout to zero.



ENT
4. Press the ENT Key. This completes the zero calibration for COND.

2. Span calibration

This procedure uses a standard solution of potassium chloride. For best results, a fresh batch of the solution should be prepared each time. See page 27 for details.

Preparation

Wash the probe 2-3 times using de-ionized or distilled water. Following this, wash it 2-3 times in the KCl standard solution you have prepared. Then place the probe in a beaker of the KCl solution maintained at a temperature of 25±5°C.

Operation

1. Use the MODE Key to move the lower cursor to SPAN.
2. After the readout stabilizes, as you did for the pH calibration, use the UP/DOWN Keys to select set the value of the KCl standard solution, referring to the KCl table.
3. Press the ENT Key to complete the span calibration for this COND range.
4. Repeat this procedure for the three ranges, using each of three values of KCl standard solutions.

TURB calibration

Use good-quality de-ionized water, which may be considered as having a turbidity of zero. If that is not readily available, distilled water may be used instead. When doing the turbidity zero calibration, it is particularly crucial that you clean the probe thoroughly. Never use a dirty probe; otherwise the calibration will be unreliable.

Preparing the standard solution for TURB span calibration

1. Weigh out 5.0 g of hydrazine sulfate.
2. Dissolve this in 400 m*l* of de-ionized or distilled water.
3. Then weigh out 50 g of hexamethylenetetramine, and dissolve it in 400 m*l* of de-ionized or distilled water.
4. Mix these two solutions, add enough de-ionized or distilled water to make 1,000 m*l*, and stir the mixed solution thoroughly.
5. Allow this solution to stand for 24 hours at a temperature of 25 ±3°C.

   The turbidity of this solution is equivalent to 4000 NTUs. The shelf-life of this solution is six months; i.e., this 4,000-NTU value will remain accurate for a maximum of six months.

   Each time you carry out this calibration, it is necessary to dilute the 4,000-NTU standard solution to prepare an 800-NTU standard solution for calibration. To do this, measure out 50 m*l* of the 4,000-NTU solution into a 250-m*l* measuring flask.

   It is recommended that you use a rubber pipette aspirator for this. Then add de-ionized or distilled water up to the 250-m*l* line.

   The standard solution used here for the turbidity calibration will precipitate easily. Therefore, be sure to stir the solution thoroughly before use.

1. Zero calibration

Preparation

Wash the probe thoroughly 2-3 times using de-ionized or distilled water. Shake off excess water droplets, and then place it in a beaker of de-ionized or distilled water.

Operation

1. Use the MODE Key to move the lower cursor to ZERO.
2. Use the SELECT Key to move the upper cursor to TURB.
3. After the readout has stabilized, set it to 0.0, using the UP/DOWN Keys.
4. Press the ENT Key to complete the zero calibration for TURB.

2. Span calibration

Preparation

Wash the probe thoroughly, using de-ionized or distilled water. Shake off excess water droplets. Then place it in a beaker of the 800-NTU solution you have prepared for this purpose.

Operation

1. Stir this 800-NTU span standard solution thoroughly.
2. Use the MODE Key to move the lower cursor to SPAN.
3. After readout has stabilized, i.e., about 60 to 90 seconds, set the readout to "800" NTU, which is the value for this standard solution.
4. Press the ENT Key to complete the span calibration for TURB.

DO calibration

Unlike the other calibration procedures, the solution for the DO calibration cannot be stored for use; because the amount of dissolved oxygen in the solution is crucial, a fresh batch must be prepared each time, just before it is used in the DO calibration.

1. Zero calibration

Use a solution of sodium sulfite dissolved in either de-ionized water or tap water.

Preparation

1. Add about 50g of sodium sulfite to 1,000 ml of water (either de-ionized water or tap water will do). Stir this mixtuer to dissolve.
2. Wash the probe 2-3 times in tap water, and place it in the zero standard solution.

Operation

1. Use the MODE Key to move the lower cursor to ZERO.
2. Use the SELECT Key to move the upper cursor to DO.
3. After the readout has stabilized, set it to 0.0, using the UP/DOWN Keys.
4. Press the ENT Key. This completes the zero calibration for DO.

2. Span calibration

Use either de-ionized water or tap water that has been saturated with oxygen in air.

Preparation

1. Put 1 or 2 liters of water in a container (either de-ionized water or tap water will do). Use an air pump to bubble air through the solution until it is oxygen-saturated.

2. Wash the probe 2-3 times in tap water, and put it in the span calibration solution.

Operation

1. First, be sure the U-10 is set for fresh water readings. To do this, set the S.SET Sub-Mode to 0.0%.

MODE

2. Then, use the MODE Key to move the lower cursor to SPAN.

3. After the readout has stabilized, while slowly moving the probe up and down in the solution, set the readout value to the appropriate DO value for the temperature of this solution. For DO values at various temperatures, refer to Table 4.

ENT

4. Press the ENT Key to complete the span calibration for DO.

Table 4 Amounts of saturated dissolved oxygen in water at various temperatures, salinity = 0.0%

Temperature	DO	Temperature	DO
0 °C	14.16 mg/l	21 °C	8.68 mg/l
1	13.77	22	8.53
2	13.40	23	8.39
3	13.04	24	8.25
4	12.70	25	8.11
5	12.37	26	7.99
6	12.06	27	7.87
7	11.75	28	7.75
8	11.47	29	7.64
9	11.19	30	7.53
10	10.92	31	7.42
11	10.67	32	7.32
12	10.43	33	7.22
13	10.20	34	7.13
14	9.97	35	7.04
15	9.76	36	6.94
16	9.56	37	6.86
17	9.37	38	6.76
18	9.18	39	6.68
19	9.01	40	6.59
20	8.84		

Section **4**

Data Storage and Printout

The U-10 can store up to 20 sets of data, 120 data points, of the values measured for each of the six parameters: pH, COND, TURB, DO, TEMP, and SALINITY. Values stored in memory can be recalled to the readout as desired.

If a printer is connected to the U-10 printer port, whenever a Data-Set is either stored in memory or recalled to the readout, it can also be simultaneously output to the printer.

Storing data

MODE

1. Press the MODE Key to put the U-10 in the MAINT mode.

MODE

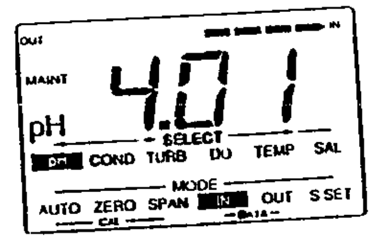
2. Continue to press the MODE Key to move the lower cursor to IN, the *Input* Sub-Mode.

SELECT

3. Use the SELECT Key to move the upper cursor to the parameter you wish to see on the readout.

ENT

4. When the readout stabilizes on a value, press the ENT Key. This will automatically input the set of six parameters for this measurement into memory.



The readout will first show the Data-Set No. for about two seconds. At the top right-hand corner, a dashed arrow points to IN, showing that data is being input. Then each parameter is automatically read into memory, one-by-one from pH to salinity. The upper cursor skips along to show this. If a printer is connected, these six values will also be printed out at the same time.

The upper cursor then returns to pH, with the U-10 still in the IN Sub-Mode.

ENT

5. You may now continue and input another set of data: simply press the ENT Key again.

The Data-Set No. will automatically advance one digit, and the next set of six parameters will be read into memory in the same manner. This procedure can be repeated for up to a total of 20 Data-Sets.

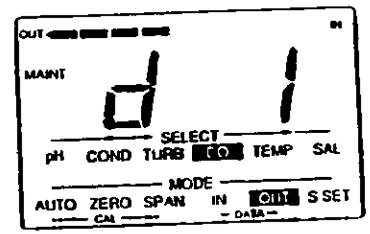
If 20 Data-Sets have been read into memory, the storage capacity is full and no more data may be input. The U-10 will beep three times to indicate the memory is full.

6. To return the readout to the previous setting in the MEAS mode, press the MODE Key again.

...ecalling data

1. Press the MODE Key to put the U-10 in the MAINT mode.

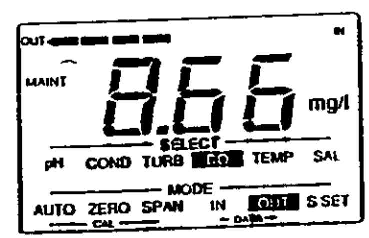
2. Continue to press the MODE Key to move the lower cursor to OUT, the *Output* Sub-Mode. The readout will show d.1, meaning Data-Set No. 1.
   At the top left-hand corner, a dashed arrow points to OUT, showing that data can be output now to the readout.



3. Use the UP/DOWN Keys to display the Data-Set No. of the values you wish to recall.

4. Use the SELECT Key to move the upper cursor to the parameter you wish to view.

5. Press the ENT Key to display the data on the readout.

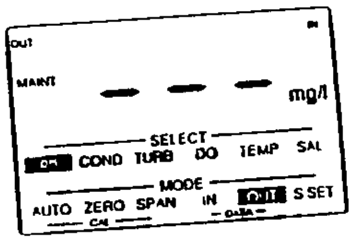


If a printer is connected, all six parameters in this Data-Set will also be printed out at the same time.

ENT

6. When the ENT Key is pressed again, the next Data-Set No. is displayed in order, i.e., d2, if two data sets are in memory. At this point, you can either press the ENT Key again to view the contents of this Data-Set, or you can use the UP/DOWN Keys to go up or down to another Data-Set No.

If a particular Data-Set is empty, three dashes appear on the readout.



MODE

7. To return the readout to the previous setting in the MEAS mode, press the MODE Key again.

Deleting data

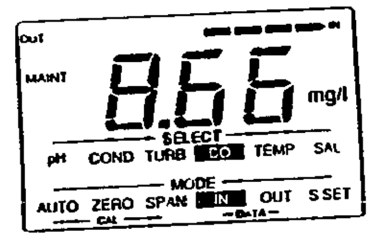
Set the U-10 as if you were going to input data:

MODE

1. Press the MODE Key to put the U-10 in the MAINT mode.

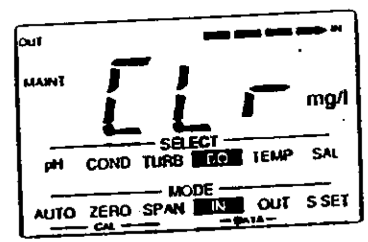
MODE

2. Continue to press the MODE Key to move the lower cursor to IN, the Input Sub-Mode.



CLR

3. Then, to erase all the data from all the Data-Sets in memory, press the CLR Key. The readout will show the message CLr for about two seconds.

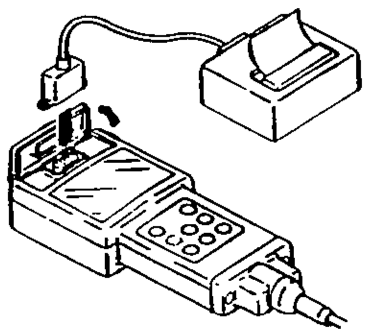


Be carefull
You cannot delete individual Data-Sets. The CLR Key always erases all data from memory.

Printing out data

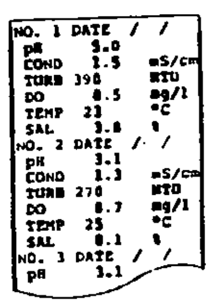
If a printer is connected to the U-10 printer port, whenever a Data-Set is either stored in memory or recalled to the readout, it is also simultaneously output to the printer.

The U-10 printer port is a standard Centronics parallel port. To connect a parallel printer to the U-10: Open the rubber printer-port cover, located directly over the readout on the main unit, and connect the printer cable.



Note:
When a printer is not being used, disconnect the cable from the U-10 printer port, and close the cover tightly.

- Sample printout



Section **5**

Daily Maintenance and Troubleshooting

For accurate measurements and prevention of malfunction, routine careful maintenance of the U-10 is important. In particular, failure to maintain the sensors properly can lead to serious trouble or incorrect measurements. The U-10 is provided with error-code functions for the ready detection of potential problems.

Error Codes

The U-10 has an easy-to-understand error message function so you can spot trouble readily. Error codes are displayed on the readout and the unit will beep if an error occurs.
(Note that if you press an incorrect sequence of keys, the unit will beep three times to indicate you have pushed the wrong key.)

Error Code	Cause	Action
Bad battery Er 1	• Defective or low battery	• Replace battery
Failure in main unit Er 2	• Malfunction of memory backup IC	• Push POWER Key to turn the U-10 ON again. If this error code is still displayed, contact your Horiba dealer for repair or replacement.
Zero-calibration error Er 3	*for all parameters* • Poor connection in probe-to-main unit cable	• Connect the cable securely.
	• Water in one of the sensor sockets	• Dry out the sensor sockets
	• Temperature of sample exceeds maximum scale of U-10	• Replace the probe.
	for pH • Contaminated pH sensor. • Improper concentration of reference solution in reference sensor	• Clean the pH sensor. • Replace the reference solution.
	for COND • Contaminated COND sensor	• Clean the sensor, using tooth brush and neutral detergent.

Error Code	Cause	Action
	for TURB • Contaminated or defective LED sensor	• Clean out the tube containing the LED turbidity sensor, using test tube brush and neutral detergent. Never use an abrasives or cleansers for this.
	for DO • Broken DO sensor membrane.	• Check the LED turbidity sensor. If it defective, the entire probe must be replaced. Check DO sensor. If defective, replace.
Span-calibration error Er 4	*for all parameters* • Poor connection in probe-to-main unit cable	• Connect the cable securely.
	• Water in one of the sensor sockets	• Dry out the sensor sockets.
	• Temperature of sample exceeds maximum scale of U-10	• Replace the probe.
	for pH • Contaminated pH sensor. • Improper concentration of reference solution in reference sensor	• Clean the pH sensor. • Replace the reference solution.
	for COND • Contaminated COND sensor	• Clean the sensor, using tooth brush and neutral detergent.
	for TURB • Contaminated or defective LED sensor	• Clean out the tube containing the LED turbidity sensor, using test tube brush and neutral detergent. Never use an abrasives or cleansers for this. • Check the LED turbidity sensor. If it defective, the entire probe must be replaced.

Error Code	Cause	Action
Span-calibration error Er-4	*DO Auto-calibration* • Broken DO sensor membrane. • Excessive difference between DO sensor temperature and atmospheric temperature.	• Check DO sensor membrane. If defective, replace. • Leave DO sensor in atmosphere for 30-60 min.
	DO aqueous solution calibration • Broken DO sensor membrane.	• Check DO sensor membrane. If defective, replace.
	• Contaminated electrode.	• Clean the electrode using a soft brush, taking care not to scratch membrane.
	• Insufficient agitation of solution.	• Agitate solution thoroughly.
Memory full Er-5	• Data-sets for 20 samples are already in memory.	• To delete all data from memory, put the U-10 in the IN Sub-Mode mode and press the CLR Key.
Printer error Er-6	• Jammed printer paper.	• Eliminate jamming of printer paper.
	• Poor cable connection.	• Replace the cable.
	• Wrong printer.	• Use proper parallel Centronics printer.
	• Defective printer.	• Replace the printer as necessary.

Normal probe maintenance

Washing the turbidity sensor

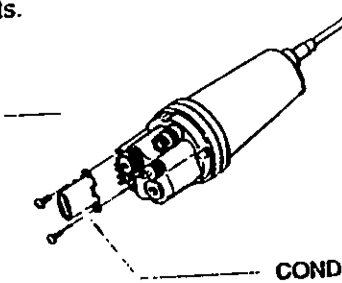
The sensor is a glass tube. Wash out the tube and remove stains carefully, using tap water and a test tube brush.

Be careful not to scratch the inside of the glass tube. Never use abrasives or cleansers.

Cleaning the conductivity sensor

Remove COND sensor guard, and carefully use a soft brush to clean off any dust from the sensor unit.

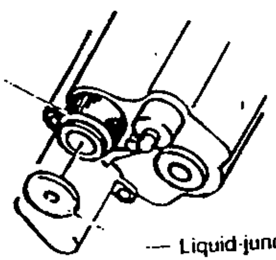
Be sure to replace the COND sensor guard before taking measurements.



Recharging the reference sensor with reference solution

Recharge the reference sensor with reference solution about once every two months, as follows.

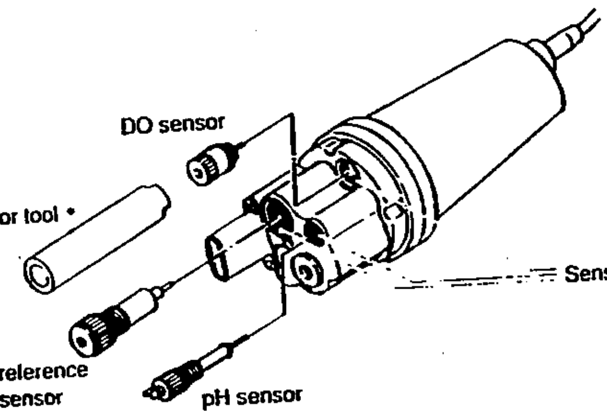
1. Remove the liquid-junction rubber cap from the reference sensor, and pour out the old solution.
2. Fill the reference sensor completely with new reference solution. Make sure there are no air bubbles.
3. Replace the liquid-junction rubber cap.
4. Carefully wash off all excess reference solution from the probe.



Replacing faulty sensors

Three of the U-10's sensors are replaceable: the *pH sensor*, the *reference sensor*, and the *DO sensor*.
These may be replaced as follows.

1. Wipe off any water droplets from the probe.
2. Remove faulty sensor.
3. Insert the new sensor carefully with your fingers.
4. Be careful not to let the sensor sockets get wet.

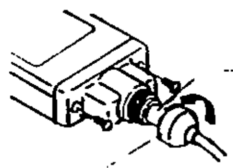


* When replacing the DO sensor, use the sensor tool provided as an accessory.

Replacing a faulty probe

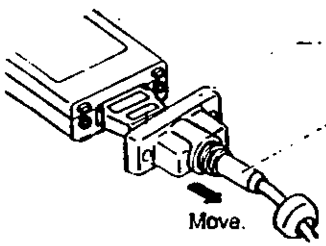
Disconnect the cable from the main unit

1. Loosen the cable gasket cap, and remove cap from gasket.



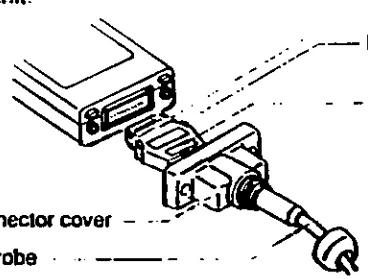
2. Slide back the gasket.

3. Back off the two screws on the cable-connector cover.



4. Slide off the cable-connector cover to expose the connector lock claws.

5. Press lock claws on both sides with your fingers to release the connector. Pull out the connector from the main unit.



Connect the new probe

1. Insert the connector until it clicks.

2. Re-attach the cable-connector cover to the main unit.

3. Slide the cable gasket toward the cable-connector cover, and screw on the cable gasket cap.

   Before you use a new probe for the first time, it is necessary to calibrate it manually for all four parameters. Refer to Section 3, "Calibrating the U-10," for instructions on manual calibration.

WELL WIZARD®

Dedicated sampling systems

Installation, Operation, and Maintenance User's Guide

Part No. 34999

QED

Ground Water Specialists™

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A QUICKSTART GUIDE TO THIS BOOK

This book contains a lot of information about the Well Wizard components, what they do, and how to install them. You probably won't need all of that information every time you pick up the book. Feel free to read only what you need—the information is structured so you can do that. The following table shows where to go to find the types of information you want.

Where to Go to Find What You Want

For Information About...	Look Here...
The Well Wizard components and what they do	Chapter 1: "Introducing Well Wizard"
How to install the Well Wizard components	If you received *pre-assembled* components, Chapter 2: "Installing the Components;" if you received *unassembled* components and bulk tubing, Chapter 5: "Installing a Pump Using Bulk Tubing"
How to purge excess water from a well	Chapter 3: "Purging the Well"
How to collect a sample	Chapter 4: "Collecting a Sample"
How to maintain (sometimes replace) some components of your system	Chapter 6: "Maintaining Your Well Wizard System"
What your pump configuration looks like	Appendix A: "Specifications"
How to help QED troubleshoot your system	Appendix B: "My Well Wizard is Broken: What to Do"
Drawings and parts	Appendix C: "Drawings & Parts"
The Well Wizard Warranty	Appendix D: "Well Wizard Warranty"

CONTENTS

1

INTRODUCING WELL WIZARD

To monitor the quality of ground water, you need an efficient way to collect unbiased samples. Well Wizard is a total system for meeting all your ground water monitoring needs–with the flexibility to meet your special requirements. This chapter describes the components of the Well Wizard system.

The Well Wizard system includes both *dedicated* and *portable* components. The water-contacting components are dedicated; you permanently install them in each well. The control elements are portable; you transport them from well to well.

Dedicated Components

Dedicated Well Wizard components include:

- A sampling pump.
- Pump tubing.
- An optional inlet screen.
- A well cap.
- An optional pneumatic static water-level probe.
- An optional packer.
- An optional purge pump.

The following sections describe these components.

Sampling Pump

A Well Wizard sampling pump is an air-actuated bladder pump that you permanently position in the well.

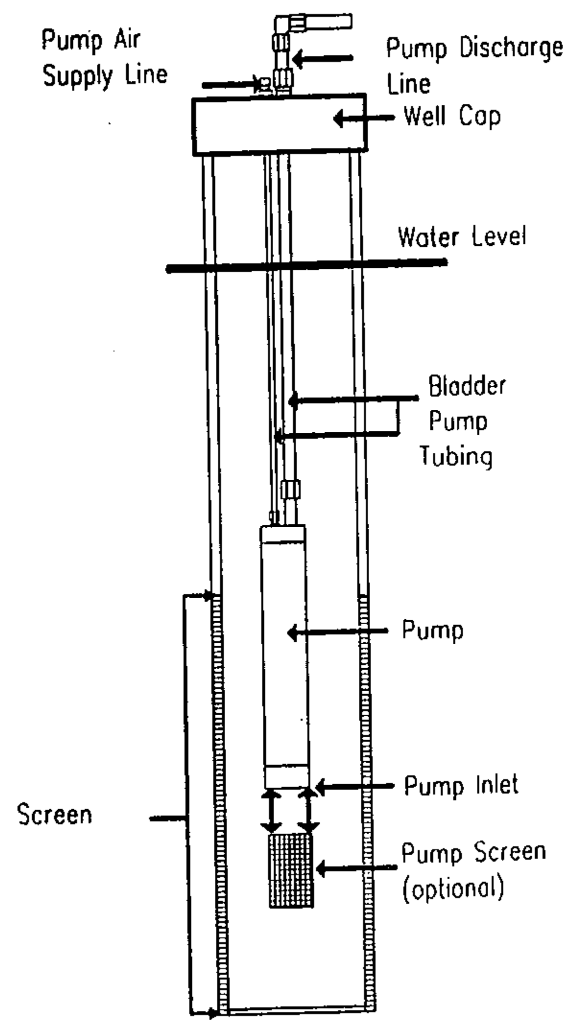

Figure 1-1: Well Wizard Pump Installed in a Well

As Figure 1-1 shows, you normally position the pump inlet midway in the screen section of the well, suspending it by two tubes that supply air to the pump and convey the water sample to the well cap. Whenever possible, pumps are shipped already preassembled to the tubing and the well cap assembly.

Several types of Well Wizard bladder pumps are available.

1100 Series Pumps

The 1100 series pumps include four major components:

- Upper-end check valve assembly (polyvinyl chloride (PVC) or Teflon™).
- Lower-end check valve assembly (PVC or Teflon).
- Bladder cartridge (Teflon).
- Pump body (PVC or Teflon).

You can totally disassemble this pump without tools by unscrewing each end cap and pushing the bladder cartridge out of the pump body (for more information, refer to the instructions included with the field-replaceable bladder kit). The weep hole on the water-discharge fitting aids cold-weather operation by allowing the water discharge line to drain after use.

1200 Series Pumps

The 1200 series pumps include two major components:

- Bladder cartridge assembly (either Teflon and stainless steel or PVC and stainless steel).
- Pump body (stainless steel).

You can partially disassemble this pump (for more information, refer to the instructions included with the field-replaceable bladder kit). The pump body covers the weep hole on the upper portion of the bladder cartridge to aid cold-weather operation, so you may sometimes see water dribble from the pump body.

1500 Series Pumps

The 1500 series pumps are the same as the 1200 series Well Wizard pumps except that they are much longer. They're available in stainless steel with PVC or stainless steel with Teflon. Also known as *Power Pumps*, these pumps save you from needing both a purge pump and a sampling pump in deep wells with moderate purge volumes, by delivering higher flow rates.

How Bladder Pumps Work

The bladder pump has two alternating cycles (refer to Figure 1-2):

- **During the discharge cycle**, air forced into the space between the pump body and the pump bladder squeezes the water inside the bladder into the exit/entrance holes of the fill rod. As air pressure increases, liquid–having no place else to go–is forced up the discharge line and to the surface. The bottom check ball is forced down by the air pressure in the pump; this seals the inlet so that no water can enter the bladder chamber.
- **During the refill cycle**, with no air pressure holding it down, the water pressure pushes the bottom check ball up, allowing the water to reenter the bladder chamber. The bladder expands as it refills with water. The top check ball seals because of the force of the water pressure in the discharge tubing.

> **Caution:** Although you can operate a Well Wizard pump *dry* without damaging it, the bladder can be punctured if you pump sand. So be sure to use an inlet screen in wells with high sand and sediment content, or when the inlet of the pump is placed within 2 feet of the bottom of the well. Remember, the Well Wizard 10-year warranty is void if you don't use an inlet screen.

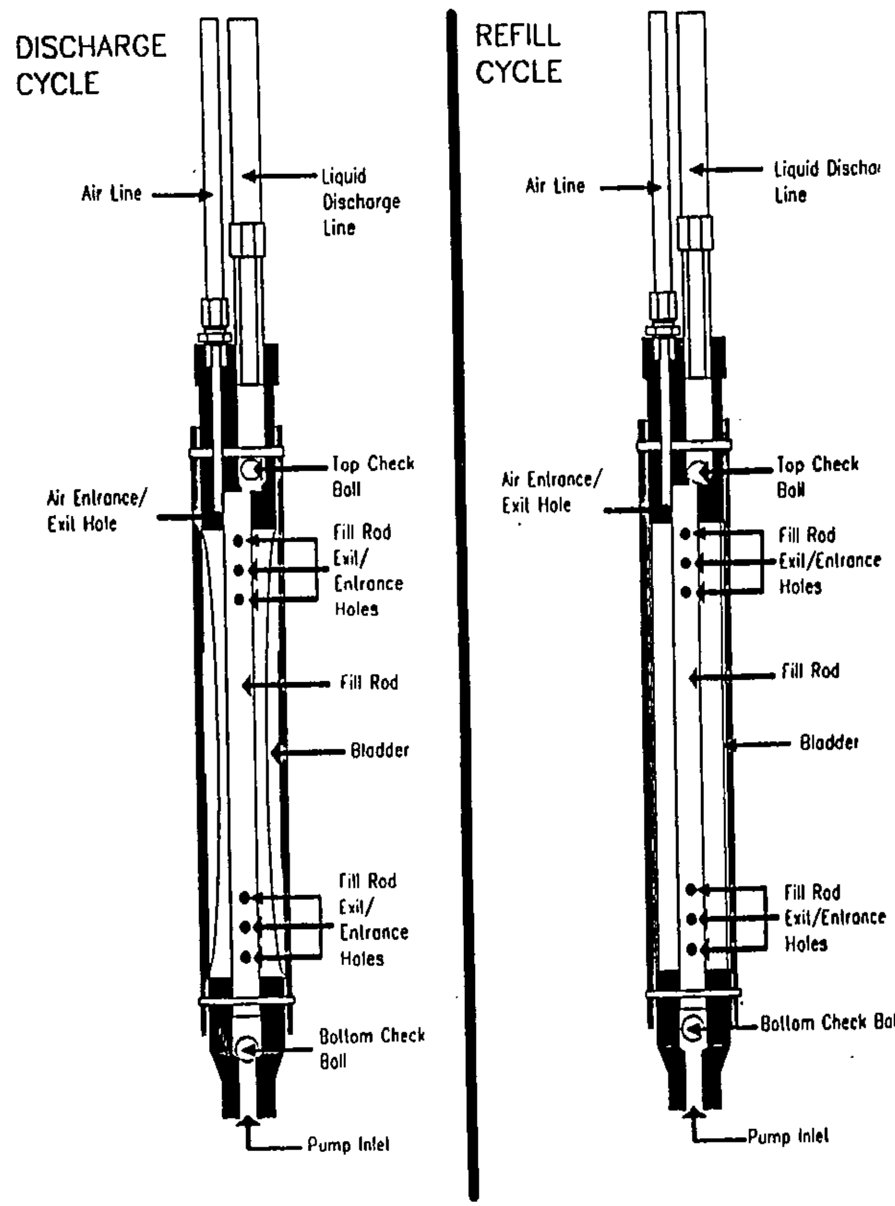

Figure 1-2: Bladder Pump Cycles

Pump Tubing

A ground water sample is only as good as the tubing it runs through. Your Well Wizard was shipped with one of the following types of superior-quality tubing:

- Polyethylene.
- Teflon-lined polyethylene.
- Teflon.

Most tubing is supplied as a bonded pair (air supply and discharge), to save time and avoid tube entanglement.

Unless your order specified that you wanted *bulk* tubing, the tubing for your Well Wizard bladder pump is pre-cut to the correct length for your well. If you also have a Purge Mizer, you'll need to fit and trim its tubing; if you have a Purge Master, that tubing is pre-cut but not connected to the pump or cap. Instructions for these procedures are in Chapter 2, "Installing the Components."

Inlet Screen

An inlet screen can protect the bladder in your Well Wizard pump by preventing sand from contacting the bladder. If you install a screen on your dedicated Well Wizard bladder pump, QED warrantees the pump for a full 10 years.

Well Cap

You fit a well cap to the top of the well casing to suspend the pump and tubing. There are two terminal fittings inside the basic well cap (see Figure 1-3):

- A compression *through fitting* for the discharge line.

- A short brass *quick-connect nipple* for the pump air-supply line.

The *protected* well cap has a lid with a lock pin. You can record well identification and reference date information on the cap label. The *unprotected* well cap is meant for wells located within a user-supplied protected standpipe.

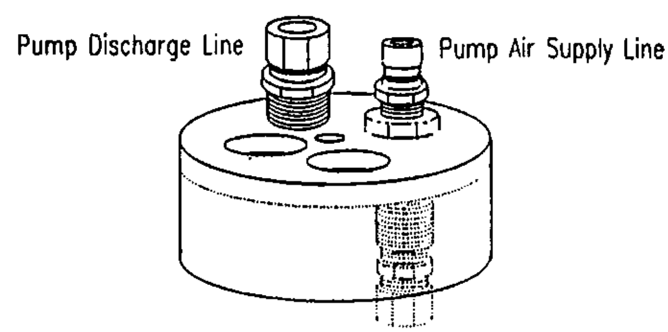

Figure 1-3: Well Cap

Pneumatic Static Water-Level Probe

You can permanently mount an *optional* static water-level probe inside the well. Then you can use a portable instrument to pneumatically measure the submergence of the probe.

Packer & Purge Pump

In conjunction with dedicated Well Wizard sampling pumps, you can install an *optional* packer (Purge Mizer) or purge pump (Purge Master) to shorten well purge times in any size well over 2 inches in diameter:

- A **Purge Mizer** packer inflates to seal off the sampling zone from the remainder of the water column. A *tandem* Purge Mizer combined with a standard Purge Mizer and a sampling pump lets you seal off both *above* and *below* the sampling zone.

- A **Purge Master** purge pump saves purge time in wells that contain a large volume of water to be purged before ground water sampling. This pump operates on a gas-displacement principal that results in high flow rates. However, because drive air contacts the well water, you don't also use this pump for sampling–you use the Well Wizard bladder pump instead.

Portable Components

Portable Well Wizard components include a cycle controller, water-level meter, disposable sample filters, and a flow-through cell.

Cycle Controller

A cycle controller controls operation of the Well Wizard pump by regulating the air flow from a compressed-gas source to the pump. Figure 1-4 shows the control panel from a typical Well Wizard cycle controller. Several controllers are available.

Model 3013 Automatic Controller

When connected to an appropriate compressed-gas source, the Model 3013 Automatic Controller alternately pressurizes then vents the air-supply line to the pump, allowing the pump to discharge, then fill with water. Using two timers, you can separately adjust the duration of the discharge pumping and venting cycles to maximize the pumping rate. The timers have a range of a fraction of 1 second to 2 minutes. A separate control lets you reduce the flow rate for sample collection.

Because this controller is pneumatically operated, it requires no electrical power supply. QED recommends that the compressed-gas sources be of high quality, such as breathing air or air from an oil-less compressor like the one offered in the Well Wizard product line.

WARNING! Do **not** apply pressure greater than 120 psi to the standard controller. Higher pressures may create hazardous conditions and will void your Well Wizard system warranties. However, higher air-flow-rate and higher pressure versions are available.

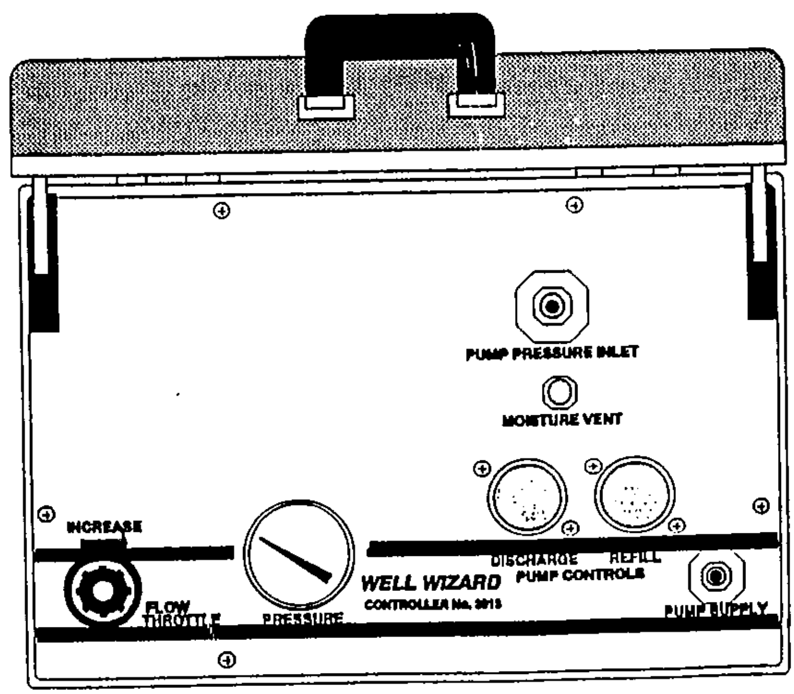

Figure 1-4: Typical Well Wizard Cycle Controller Control Panel

Model 3111 Automatic Controller/Compressor

The Model 3111 Automatic Controller/Compressor is a self-contained, cart-mounted unit that combines a compressor with a 3013 Automatic Controller. Its air-cooled gasoline engine drives a 100 psi oil-less compressor. This is a convenient, easily transportable compressed-air source.

> **WARNING!** Do not apply pressure greater than 120 psi to the controller. Higher pressures may create hazardous conditions and will void your Well Wizard system warranties. However, higher air-flow-rate and higher pressure versions are available.

Model 350 Electronic Controller

Because the Model 350 Electronic Controller is electronic, it's also lightweight. Beyond that, this controller works essentially the same as the 3013 Automatic Controller, except that its timers have a narrower range.

Water-Level Meter

QED offers two approaches to portable static water-level measurement:

- **The pneumatic water-level approach** uses a portable battery-operated meter to measure the submergence of the dedicated probe. You calibrate the meter when you install it, and periodically after that. Batteries and a refillable compressed-gas charge from the pump controller output power the meter.
- **The electronic water-level approach** uses a portable conductivity probe attached to a calibrated tape. A light shines and a buzzer sounds when the probe touches the water surface. You lower this probe into each successive well.

Flow-Through Cell

Purge Saver is QED's *optional* flow-through cell. It simultaneously uses four probes to measure the pH balance, conductivity, temperature, and dissolved oxygen content of purge water. Purge Saver lets you know when it's okay to sample—generally saving you from spending a lot of time and from removing large volumes of water. If you have Purge Saver, for information about how to operate and maintain it, refer to the separate Purge Saver documentation.

QuickFilter

To ensure accurate samples of dissolved metals, you can use an *optional* QED QuickFilter. It removes solids larger than 0.45 micron. Because QuickFilters are disposable—you use one for each sampling event—there's no need to try to clean or decontaminate the filter from well to well.

2

Installing the Components

If you've received a set of preassembled dedicated components, you'll find that unpacking them and installing them is easy when you follow the instructions in this chapter. Because not everyone needs to read the whole chapter, the first section helps you decide which of the other sections you need to read.

If, instead of preassembled components, you've received unassembled components and bulk tubing, read Chapter 5, "Installing a Pump Using Bulk Tubing."

Before You Begin...

How many of the installation procedures in this chapter you need to follow depends entirely on which components you have. But *everyone* needs to refer to these sections:

- "Unpack the Components."
- "Install the Basic Sampling Pump."

To find out which of the other sections to read, take stock of what you have by referring to the stapled sheets titled "Downwell Equipment Build/Specifications Sheet(s)." These sheets–and any other instructions–are inside a box labelled "Instructions Enclosed," which is inside Box 1.

When you know what you have, refer to Table 2-1 to find out which sections of this chapter you need to read to install your specific set of components—and in what order:

Table 2-1: What to Read & In What Order

If you have	Read this	In this sequence
A sampling pump	"Unpack the Components"	First
Inlet screen	"Install the Inlet Screen"	*After* unpacking the components
Packer (Purge Mizer)	"Install an Optional Packer–Purge Mizer"	*Before* installing the basic pump
Purge pump (Purge Master)	"Install an Optional Packer–Purge Pump"	*Before* or *after* installing the basic sampling pump–refer to the "Downwell Equipment Build/Specifications Sheet(s)"
Water-level meter	"Install an Optional Water-Level Meter Probe"	*After* installing the basic pump and any packer or purge pump

Unpack the Components

Here's how to unpack the Well Wizard dedicated components.

1. If you need to install a Well Wizard system in more than one well, decide which well you want to do first. Then find the box of components with the correct well-identification number written on the outside of the box.

2. If you *don't* have a Purge Mizer, skip to Step 3; if you *do* have a Purge Mizer, get the following tools ready:

   2   8" adjustable crescent wrenches.

   2   12" adjustable crescent wrenches.

   1   Tubing cutter (supplied by QED).

3. Carry the box to the well site, then open the box, but don't touch anything yet.
4. Open the box, then, before unpacking the rest of the box, put on a pair of the latex gloves you find inside the box.

   > **Caution:** Touching well components with your bare hands can contaminate the components and degrade the quality of the samples obtained using the Well Wizard system. Always wear clean latex gloves when unpacking and installing a Well Wizard system, and at any other time when your hands might touch a water-contacting component.

5. Taking care to *not kink the tubing*, gently remove the plastic-wrapped pump and tubing from the box. A label on the package provides the well ID, cap, and tubing length. You may need this information later, so save the label.

   > **Note:** The plastic bag also contains the lab-clean certificate on which is recorded the pump batch serial number. Keep this tag *for each pump* you install. It's your proof that the pump is contaminant free–if you need to, you can call QED with the serial number to find out which lab certified the pump.

6. Open the plastic wrapping, then gently slide the pump out of the bag.

Install the Inlet Screen

Well Wizard bladder pumps have a 10-year warranty that is valid *only* if you use the appropriate inlet screen.

There are two types of inlet screen: one that you *thread* onto the pump inlet for 1100 series pumps, and one that you secure with *set screws* for 1200, 1300, and 1500 series pumps. The correct screen for each pump is usually included with the other components for the well–the box label tells you where to find the screen. The following sections describe how to install the two types of inlet screen.

Screens for 1100 Series Pumps

To install a screen on an 1100 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove the screen.
2. Thread the screen onto the male-threaded pump inlet, making sure the screen is firmly tight.

Screens for 1200, 1300, & 1500 Series Pumps

To install a screen on a 1200, 1300, or 1500 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove from the bag both the screen and the small plastic bag that contains spare set screws and a small Allen wrench.
2. Find the groove around the inlet end of the stainless steel pump body (the end opposite the air and water connectors), then slide the screen onto the bottom of the pump assembly, aligning the top rim of the screen with the top groove.

> **Note:** If you have difficulty installing the screen, use the Allen wrench to loosen the set screws a little.

3. Using the Allen wrench, *lightly* tighten each of the set screws, then make sure the screws have engaged the groove.
4. Using the Allen wrench, *firmly* tighten each of the set screws.
5. Check to make sure the screen is secure.

Install an Optional Packer–Purge Mizer

If you have a Well Wizard sampling system with Purge Mizer, it was shipped with the Purge Mizer *support cable* and *three tubing connections* loose at the cap, to allow you to adjust the length of the various tubes to exactly fit your well. To finish installing these, complete the steps in the following sections **before** completing the steps in "Install the Basic Sampling Pump," later in this chapter. As a guideline, at the end of Purge Mizer installation, you want to have the Purge Mizer cable *taut* and the tubing just slightly *slack*–so the cable bears the weight of the pump. Note that there are always several inches of inflation tubing left that must later be trimmed, but still left slack, to avoid kinking.

> **Note:** If you don't understand how to use the compression style fittings described in the following sections, refer to the instructions in "Install or Replace Pump Connectors" in Chapter 6, "Maintaining Your Well Wizard System."

Attach the Purge Mizer Cable to the Well Cap

How you attach the Purge Mizer support cable to the well cap depends on whether you have a standard cap or a 2120A 2-inch cap. The following sections describe both procedures.

Standard Cap

If you have a Purge Mizer and a standard cap (with support bar), follow these steps to attach the support cable to the cap.

1. Push the threaded terminal through the cap far enough that the support bar can spin freely on it.
2. Spin the bar down to the bottom threads of the terminal.
3. Lower the bar onto the cap, between the cap fittings.

   The result should resemble Figure 2-1.

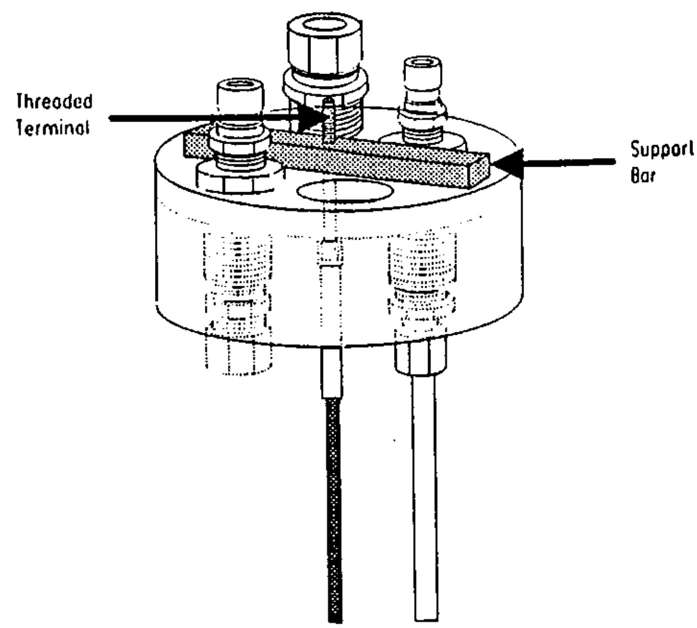

Figure 2-1: Installing Cable on a Standard Cap

2120A 2-Inch Cap

If you have a Purge Mizer and a 2120A 2-inch cap, follow these steps to attach the Purge Mizer support cable to the cap.

1. With the support bracket between the sides of the strap fork, slide the clevis pin through the holes.
2. Slide the cotter pin through the clevis pin.
3. Secure the cotter pin by bending the ends.

   The result should resemble Figure 2-2.

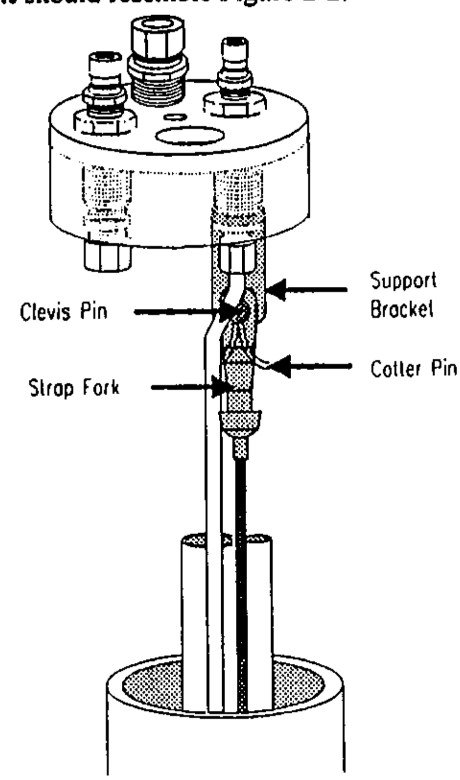

Figure 2-2: Installing Cable on a 2120A 2-Inch Cap

Install the Discharge Tubing

To install the discharge tubing, follow these steps.

1. Pull or push the 1/2-inch discharge tubing through its fitting, adjusting it until it's slightly *less* taut than the Purge Mizer support cable–leaving about *1-1/2 feet* extending above the well cap.

   > **Caution:** For now, **don't** cut off the approximately 1-1/2 feet of excess tubing that extends above the well cap. Wait until Step 3 in "Install the Well Cap," later.

2. With a wrench, hold the base of the through fitting and, with another wrench, tighten the fitting nut until firm.

Install the Inflation Tubing

To install the Purge Mizer inflation tubing, follow these steps.

1. Determine the length of 1/8-inch Purge Mizer inflation tubing needed to extend completely into the compression style fitting on the underside of the cap or cap plate while leaving the tubing *less* taut than the Purge Mizer support cable.

   > **Caution:** Measure with care. It's better to leave a little extra tubing prior to cutting than to cut off too much.

2. Use the tubing cutter to cut off the excess tubing.
3. Push the tubing fully into the fitting until it contacts the shoulder inside the fitting.
4. On the top of the cap or cap plate, with a wrench, hold the brass anchor fitting in which the 1/8-inch Purge Mizer inflation tube fitting is installed.
5. Tighten the tubing fitting with the wrench until it's firm.

6. Turn the tubing fitting about three-quarters of a turn past hand tight—but don't tighten it enough to crush the Purge Mizer tubing.

Install the Air-Supply Tubing

To install the air-supply tubing, follow these steps.

1. Determine the length of 1/4-inch air-supply tubing needed to extend completely into the brass 1/4-inch compression fitting on the underside of the cap or cap plate while leaving the tubing *less* taut than the Purge Mizer support cable.

   Caution: Measure with care. It's better to leave a little extra tubing prior to cutting than to cut off too much.

2. Use the tubing cutter to cut off the excess tubing.
3. Push the tubing into the fitting until it contacts the shoulder inside the fitting.
4. On the top of the cap or cap plate, with a wrench, hold the brass anchor fitting in which the 1/4-inch air-supply tubing is installed.
5. Tighten the tubing fitting with another wrench until it's hand tight.
6. Turn the tubing fitting one and one-quarter turns *past* hand tight.

Install the Basic Sampling Pump

Depending on the length of the tubing and whether your pump includes a Purge Mizer or a Purge Master, it may be easiest for two people to install the pump–but one person often can do it. To install the pump, follow these steps.

> **Caution:** Make sure that you don' bring the tubing or other pump components in contact with the ground or any other surface. It's often helpful to spread out a polypropylene tarp next to the well during installation.

1. Still wearing the latex gloves, if you have a protected well cap, mark any necessary information–such as well ID and depth–on the label inside the well cap.
2. Slowly lower the pump into the well while uncoiling the tubing bundle, until the entire length of tubing is in the well.

   > **Note:** If you don't have a Purge Mizer, skip Step 3.

3. What you do in this step depends on which components you have:
   - **If you have just the basic sampling pump**, either anchor the well cap in position or leave it loosely attached.
   - **If you have a** ***Purge Mizer***, lower the cap on the well. Then, leaving 1 inch or a little more, cut off the remaining tubing (about 1-1/2 feet) and attach it to the sample elbow. You can store the elbow and tubing in one of the unused holes in the cap plate.
   - **If you have a** ***Purge Master that you haven't yet installed***, proceed with the instructions in "Install an Optional Purge Pump–Purge Master."

Install an Optional Purge Pump–Purge Master

If you have a Well Wizard sampling system with Purge Master, although the tubing is cut to the correct length for your well, you need to install the tubing when you install the pump. Refer to the "Downwell Equipment Build/ Specifications Sheet(s)" to see whether to install your sampling pump or your purge pump first.

The following sections tell you how to install Purge Master.

Attach the Tubing Bundle to the Pump

Follow these steps to install the Purge Master tubing bundle.

1. Get the following tools ready:

   2 12"/300 mm adjustable crescent wrenches

   1 Tubing cutter (supplied by QED)
2. Make sure that both the 3/4-inch and the 1/2-inch fitting nuts on the top of the pump are loose.
3. Holding one end of the tubing bundle, press a 1/2-inch and a 3/4-inch tubing insert into the corresponding tubing.
4. Loosening the nuts as necessary, push the tubing into the 3/4-inch and 1/2-inch fittings on the top of the pump, as follows:
   - Push the larger tubing into the 3/4-inch fitting until it contacts the shoulder inside the fitting.
   - Push the smaller tubing into the 1/2-inch fitting until it contacts the shoulder inside the fitting.
5. With a wrench, tighten the 3/4-inch fitting nut hand tight.
6. With a wrench, hold the fitting base, then turn the 3/4-inch fitting nut one additional turn *past* hand tight.

7. With a wrench, tighten the 1/2-inch fitting nut hand tight.
8. With a wrench, hold the fitting base, then turn the 1/2-inch fitting nut one additional turn *past* hand tight.

Lower Purge Master into the Well

To lower the Purge Master into the well, follow these steps.

1. Lift the cap plate or unprotected cap out of the well and let it hang off to one side.
2. Lower the pump into the well slowly while uncoiling the tubing bundle–until there's about 3 feet of tubing left.

Attach the Discharge Tubing to the Well Cap

To attach the discharge tubing to the well cap, follow these steps.

1. With the large fitting nut on the *top* of the cap plate or unprotected cap loose, push the discharge tubing through its fitting–leaving about 1-1/2 feet extending above the cap.

> **Caution:** For now, **don't** cut off the approximately 1-1/2 feet of excess tubing that extends above the fitting. Wait until Step 3 in "Install the Well Cap," later.

2. If you have a cap that has a fitting nut on the underside, with a wrench, tighten the fitting nut on the underside hand tight.
3. With a wrench, hold the fitting base.
4. Turn the fitting nut one additional turn *past* hand tight.

Attach the Air-Supply Tubing to the Well Cap

To attach the air-supply tubing to the well cap, follow these steps.

1. Loosen the 1/2-inch fitting nut on the top of the cap or cap plate.
2. Referring to Figure 2-3, estimate where to cut the air-supply tubing so that it contacts the shoulder inside the 1/4-inch air fitting on the underside of the cap or plate—leaving a little bit of slack (the 3/4-inch tubing should provide the main support for the pump).

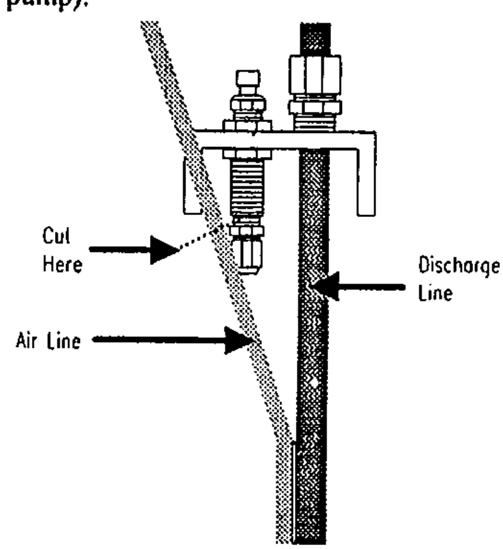

Figure 2-3: Where to Cut the Tubing

3. Cut the air-supply tubing according to your calculation in Step 2.
4. Push the air-supply tubing into the fitting until it contacts the shoulder inside the fitting.
5. With a wrench, tighten the fitting nut hand tight.
6. With a wrench, hold the fitting base.
7. Turn the fitting nut one additional turn *past* hand tight.

Install the Well Cap

To install the well cap, follow these steps.

1. If you want to prevent debris (such as rust from the protective casing) from getting on the well cap and into the well, fit a plastic bag over the well cap.
2. Lower the cap or cap plate on the well.
3. Making sure that you allow room to install the discharge elbow so that the elbow clears the top edge of any unprotected cap or protective casing, trim off the excess 1-1/2 feet of discharge tubing using the tubing cutter.
4. Store the sample elbow and tubing in the spare hole in the cap, if you want to.

Install the Optional Water-Level Meter Probes

If your Well Wizard system includes the Model 6010E Electronic/Pneumatic Water-Level meter, the following steps describe how to install the probe. Refer to Figure 2-4 as you follow the steps.

> **Caution:** Ensure that the static water level in the well has returned to its natural level after any recent purging or sampling or displacement due to equipment installation. In wells that recover very slowly, water displacement during new-equipment installation may temporarily alter the true static water level of the well.

1. Measure the current static water level in the well (C in Figure 2-4), then record it using your traditional method.

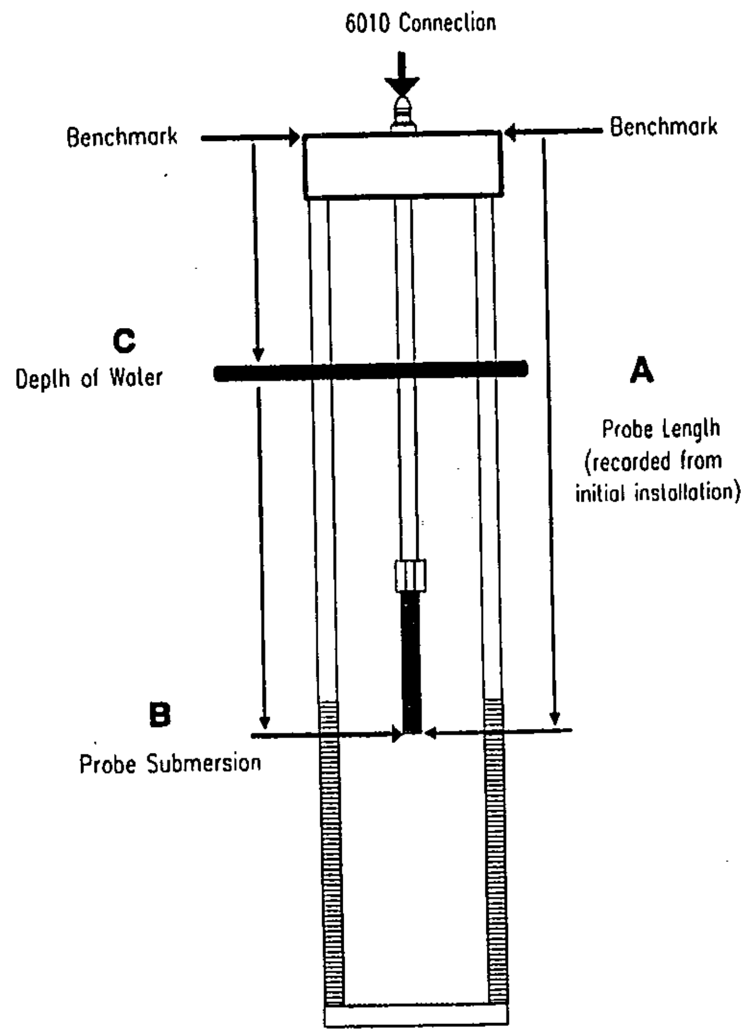

Figure 2-4: Measurements for Probe Installation

2. Review the historic static water-level fluctuations to determine whether the current reading reflects a good starting point for water-level probe location. Ideally, the probe should be submerged about 10 to 12 feet below the *mean static level.*
3. Decide where you want to locate the water-level probe.

> **Caution:** Although 10 to 12 feet below the mean static level is an *ideal* submergence for the probe, you *must* submerge the probe at least 1 foot but not more than 25 feet, because the meter can't display depths outside this range.

4. Measure and cut the 1/4-inch probe tubing to the length you calculated.
5. Attach the tubing to the probe assembly, then, to avoid an air leak and false readings, tighten it carefully using two wrenches.
6. Lift up the cap or plate, then lower the probe and tubing into the well.
7. Attach the probe tubing to the 1/4-inch compression fitting under the cap or plate, then tighten it using two wrenches.
8. Lower the cap or plate back into position on the well casing.
9. Determine the probe submergence. To find out how to do that, refer to Chapter 3, "Purging the Well," and read the section about measuring the water level with a dedicated water-level meter.
10. Add the static water level depth you measured in Step 1 to the submergence reading you determined in Step 9 (A in the drawing), to determine the probe location.
11. Record the probe length (A) and the measured calibration static water level determined in Step 1, for use in all future water-level depth calculations.
12. Apply the new probe submergence readings to the calibration to determine the new static water level.

3
PURGING THE WELL

Before sampling, you need to purge the well according to your approved sampling plan. This chapter tells you how to:

- Measure the water level using either a dedicated or a portable water-level meter.
- Purge the well using:
  - Just the sampling pump.
  - The sampling pump *and* Purge Mizer (packer).
  - Just Purge Master (purge pump).
- Maximize the pumping rate for both a sampling pump and Purge Master.

Measure the Water Level

Before you purge the well, you normally check the static water level. You can do that with either a dedicated or a portable water-level meter, as described in the following sections.

With a Dedicated Water-Level Meter

If you have a Model 6010E Electronic/Pneumatic Water-Level meter, to measure the water level, first you charge the air tank, then you use the water-level meter to measure the water level. The following sections tell you how.

> **Note:** Rapid temperature changes adversely affect water-level meter operation. The best approach is to store the meter at the temperature in which you will use it. If this isn't possible, move the unit to the appropriate temperature at least 45 minutes before you want to use it to allow the temperature to stabilize. Then you can expect the accuracy to be as follows:
>
> - 40 to 120° F ambient air temperatures: +/-0.01 feet.
> - -20 to 40° F ambient air temperatures: +/-0.02 feet.

Charge the Tank

1. As shown in Figure 3-1, attach the black driver-controller hose to the controller.
2. As also shown in the figure, attach the red air-supply line from the PUMP SUPPLY connector on the controller to the TANK RECHARGE fitting, to charge the internal air tank to 100 psi.
3. Set the controller DISCHARGE timer for the maximum discharge time (F on the Model 3013 and 5 O'CLOCK on the Model 350).
4. Set the REFILL timer for the minimum refill time (A on the Model 3013 and about 9 O'CLOCK for the Model 350).
5. Start the compressed-air source.
6. Let the controller cycle until the 6010E pressure gage reads 80 to 100 psi.

   > **Caution:** Do **not** apply pressure greater than 120 psi to the controller. Higher pressures may create hazardous conditions and will void your Well Wizard system warranties.

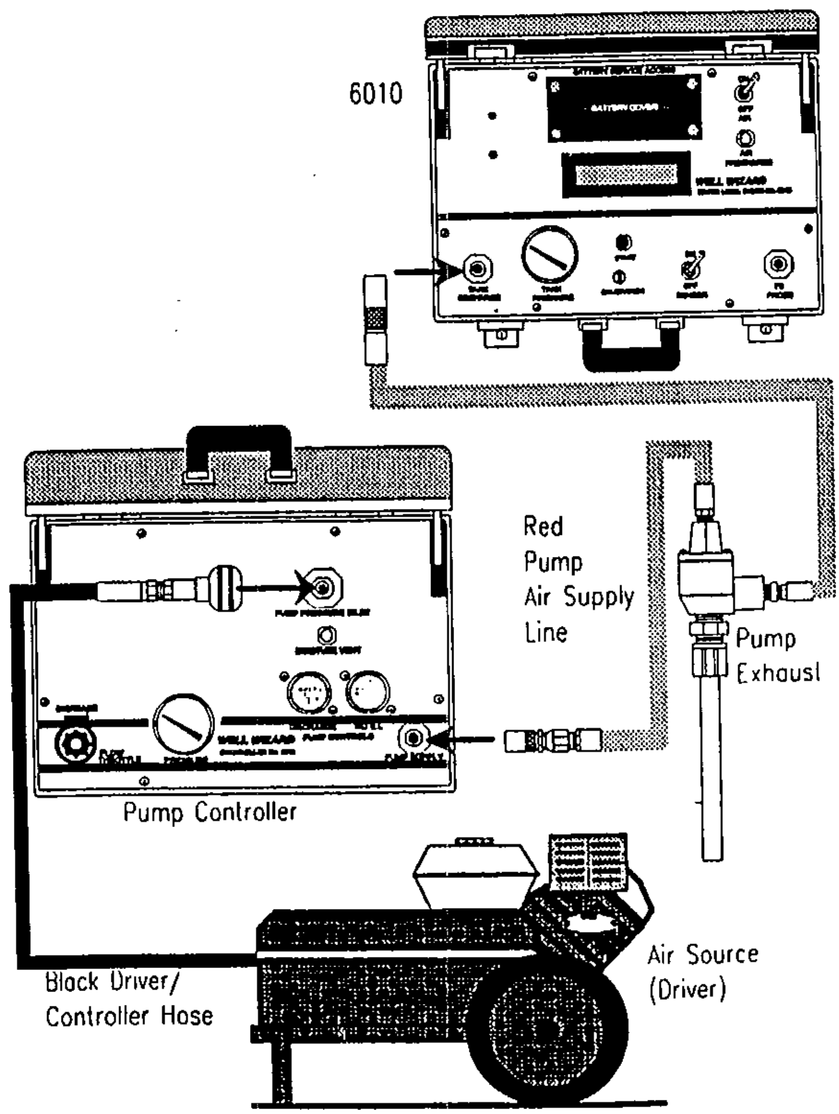

Figure 3-1: Attaching the Hoses

Operate the Meter to Measure Water Levels

1. Set the **SENSOR** switch to **ON**.
2. When the message reads **Attach to Well**, attach the clear air tubing from the **TO PROBE** fitting to the mating well cap connection.
3. Set the **AIR** switch to **ON**.
4. Press **START** once.
5. Press **AIR PRE-CHARGE** until the display shows the highest reading–you see the numbers increase, then stabilize at the highest reading.
6. Wait for the message to read **Probe Submersion Depth** (this is "B" in the diagram on the face of the meter), then record the reading when the depth stabilizes.
7. Move the **AIR** and the **SENSOR** switches to **OFF**.
8. Subtract the reading for Probe Submersion Depth ("B" in the diagram on the meter) from the known Probe Submergence ("A" in the diagram on the meter), established during probe installation (read about installing an optional water-level meter probe in Chapter 2, "Installing the Components"). The result is the depth of the static water-level probe.

With a Portable Water-Level Meter

If you have a portable water-level meter, follow these steps to measure the water level.

1. Still wearing the latex gloves, remove the black 1/2-inch square-head hole plug from the well cap.

   Note: If you don't see the black square-head screw, the sample tube may be stored in the opening. If so, remove it instead.

2. Insert the probe of the water-level meter through the opening, then unreel the probe tape into the well.

3. When the light shines and the buzzer sounds, the probe has contacted water. Write down or remember the depth to the static water level by reading the length shown on the tape, so you can refer to it when you're purging the well.
4. Remove the probe from the well, then replace the black square-head screw (or the sample tube and elbow).

Purge Using the Sampling Pump

To purge the well using just a Well Wizard sampling pump, you can follow either the general procedure described in the next section, *or* the steps in the more-detailed sections that follow.

Note: If you have a Purge Mizer (packer) as well as a sampling pump, follow the steps in "Purge Using Purge Mizer (packer)," before proceeding with these steps. If you have a Purge Master (purge pump), follow the steps in "Purge Using Purge Master (purge pump);" you don't need the steps in this section.

General Procedure for Purging

Here are the general steps to follow for purging.

1. Start the compressor.
2. Hook up the hoses.
3. Set both timers on **C** for the Model 3013 or about **9 O'CLOCK** for the Model 350.
4. Turn the yellow FLOW THROTTLE control knob completely clockwise, to make sure the pressure is as high as it will go.

If Steps 1 through 4 don't give you enough information, you may want to follow the steps in the following section *instead*, because they provide much more detail.

Detailed Procedure for Purging

The following sections provide the detailed steps for purging.

Get Purging Started

1. Considering the depth and size (diameter) of the well, calculate the number of gallons to be purged to comply with your approved sampling plan.
2. Start the compressor engine.

   But don't connect the red air-supply line to the Well Wizard controller yet. Instead, follow Steps 3 and 4 carefully.

3. As shown in Figure 3-2, connect the short end of the red pump air-supply line to the pump connector on the well cap.
4. Connect the long end of the red pump air-supply line to the **PUMP SUPPLY** connector on the Well Wizard controller.
5. Point the pump discharge line away from you.
6. Set both timers on **C** on the Model 3013 or at about **9 O'CLOCK** on the Model 350.
7. Connect the black driver/controller hose to the **PUMP PRESSURE INLET** connector on the Well Wizard controller.

   You'll notice **loud hissing and honking sounds** as air releases through the side of the Well Wizard controller housing and as air releases through the exhaust valve. This is *normal*.

   Note: If the controller doesn't sound as though it is alternating between cycles (pressurizing then venting), shorten the cycle times by setting the **REFILL** and **DISCHARGE** timer knobs to **A** on the Model 3013 or at about **9** O'CLOCK on the Model 350.

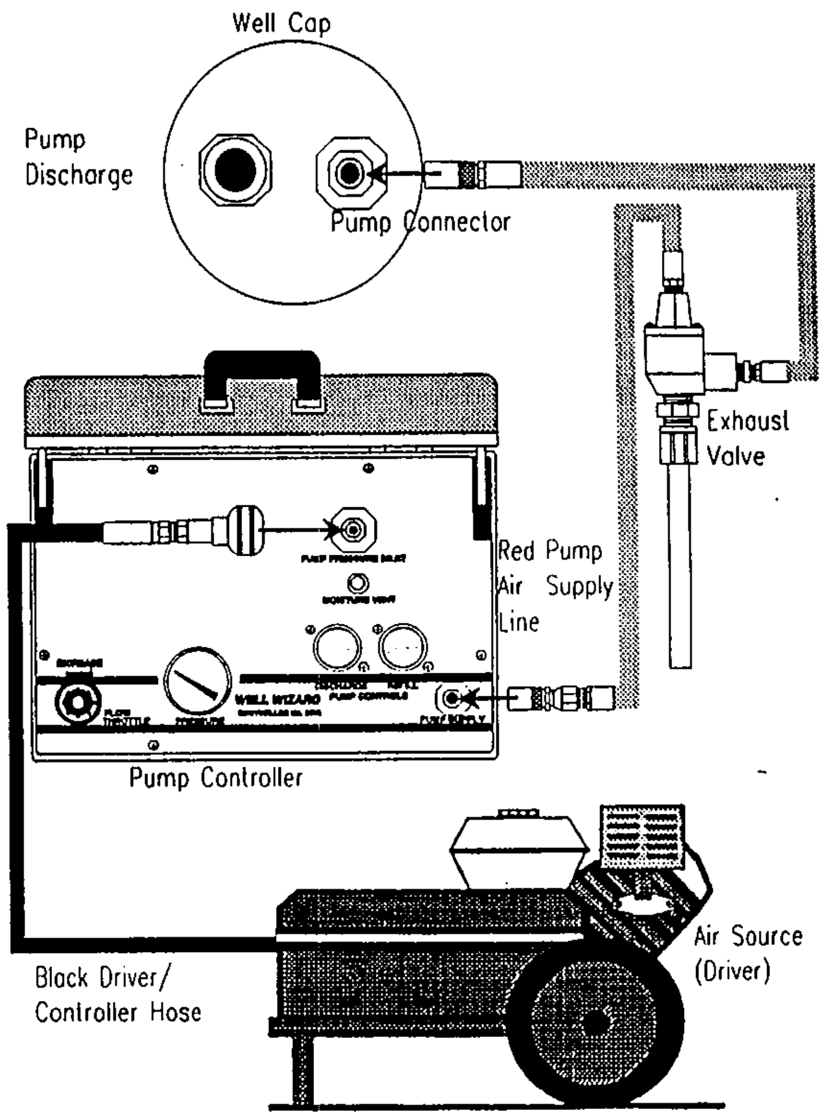

Figure 3-2: Connecting the Red Pump Air-Supply Line

After the venting noises stop, water flows from the pump discharge line as you begin to purge the well. The time required to actually begin discharge of water depends on the depth to the water–it may take several *seconds* or several *minutes*.

8. Check the air pressure on the PRESSURE gage on the Well Wizard controller. The pressure–which controls the flow rate–should be between 60 and 120 psi. If necessary, adjust the pressure using the FLOW THROTTLE control knob. Pull up on the yellow outer ring to unlock the throttle, adjust the setting, then push down to lock the throttle.

   Turning the FLOW THROTTLE knob clockwise increases pressure; turning it counterclockwise decreases pressure.

9. To make well purging as efficient as possible, refer to the steps in "Maximize the Pumping Rate," next.
10. Every 15 minutes, press down (and hold down for 5 seconds) the silver MOISTURE VENT button on the Well Wizard controller. This expels accumulated moisture from the side of the controller. It's especially important to vent the moisture during humid conditions and very cold conditions.

Maximize the Pumping Rate

Purging a well can be a time-consuming process. By adjusting the REFILL and DISCHARGE timers, you can make well purging as efficient as possible–so that as soon as the venting cycle ends, the pump is completely full and the discharge begins, and vice versa.

To do that, as detailed in the following steps, you first make both cycle times *long*, to ensure that the pump will completely fill then completely empty. Then you shorten one time until you see an effect on volume; then you shorten the second time the same way.

1. Lift the yellow outer ring of the FLOW THROTTLE control, turn the knob fully clockwise, then push down to lock the control.

2. Turn the DISCHARGE and the REFILL timer knobs to D on the Model 3013 or 12 O'CLOCK for the Model 350–a *long cycle time*.
3. Using a 1,000 ml graduated cylinder for measuring (1,500 ml for Model 1500 pumps), measure the volume of water discharged in one cycle. This is the maximum pump volume–remember what it is.

> **Note:** For 1100 Series pumps, discharge volume should be 250 - 350 ml; for 1200 Series pumps it should be 350 - 450 ml. If your discharge volume is less than this, try increasing the refill cycle time. If that doesn't work, try shortening the refill cycle time, especially in deeper wells. (In deeper wells with very little water, if the cycle is too long, the water may actually have time to bleed through the weep hole before it can be discharged.)

4. To achieve as short a refill time as possible *without losing any refill volume*, slightly decrease the REFILL timer setting (turn the knob *counter*clockwise about half a setting). Then measure the volume of water discharged in the next three cycles. Repeat this step until you notice a decrease in discharge water volume.
5. Increase the REFILL timer setting (turn the knob *clock*wise) enough to regain full discharge volume. Refill is now set for maximum flow.
6. To achieve as short a discharge time as possible *without losing any discharge volume*, slightly decrease the DISCHARGE timer setting (turn the knob *counter*clockwise). Then measure the volume of water discharged in the next three cycles. Repeat this step until you notice a decrease in discharge water volume.
7. Increase the DISCHARGE timer setting (turn the knob *clock*wise) enough to regain full discharge volume. Discharge is now set for maximum flow.

Now you're purging efficiently.

Purge Using Purge Mizer (packer)

If you have a Purge Mizer, after you measure the water in the well, you inflate Purge Mizer, purge the well, then prepare for sampling.

> **Warning!** *Never* inflate Purge Mizer outside of the well. Inflate Purge Mizer *only* when positioned at full depth in the well casing. Always deflate Purge Mizer after use.

To purge using Purge Mizer, follow these steps.

1. Couple the Purge Mizer control unit to the Purge Mizer air tubing fitting on the well cap (see Figure 3-3).
2. Couple the control unit to the short end of the red pump air-supply line connected to the Well Wizard controller.
3. Turn the PRESSURE REGULATOR knob fully counterclockwise.
4. Activate the compressed-gas source.

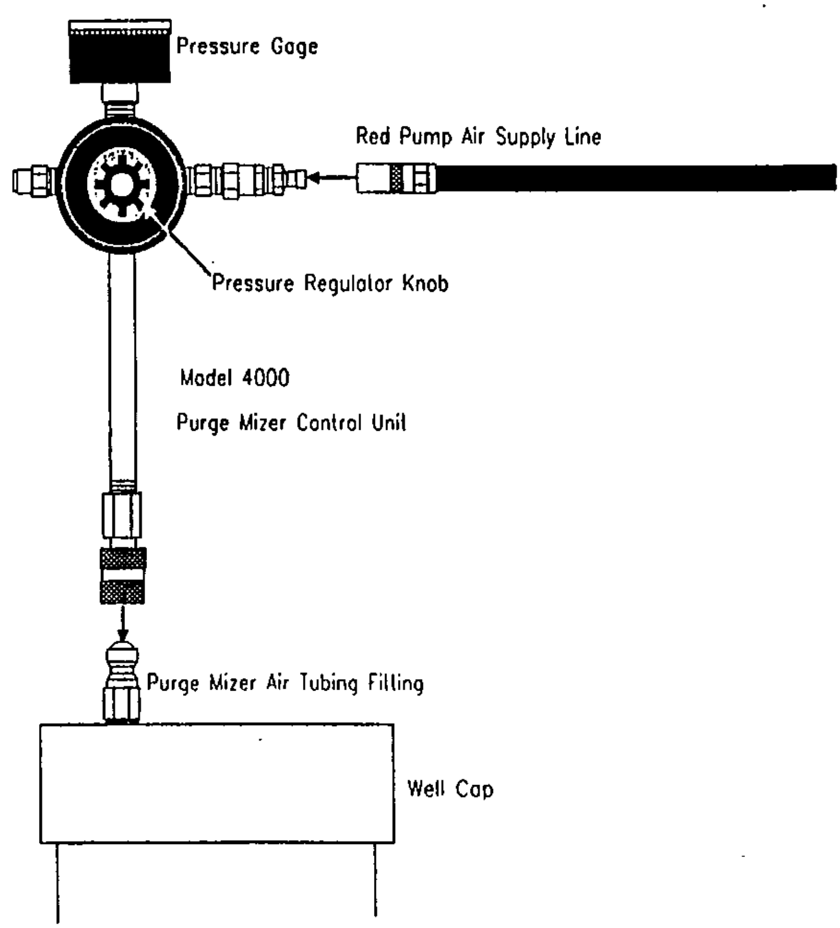

Figure 3-3: Coupling the Purge Mizer Control Unit

5. To fully inflate the Purge Mizer, slowly turn the **PRESSURE REGULATOR** knob on the Purge Mizer control unit clockwise to increase the pressure to the level recommended in Table 3-1.

Table 3-1: Recommended Pressure Levels

Purge Mizer Submergence (feet)	Inflation pressure (psi)
20	50
40	60
60	70
80	80
100	90

Note: The Purge Mizer inflates during the controller discharge cycle. To speed inflation, you can lengthen that cycle.

6. When you reach the correct pressure, disconnect the red air-supply hose. The Purge Mizer control unit check valve maintains the pressure.
7. Purge the well with the sampling pump as described in "Purge Using the Sampling Pump." If the pressure reading on the Purge Mizer control unit pressure gage remains steady, you know that Purge Mizer is operating correctly.

Purge Using Purge Master (purge pump)

If you have a Purge Master (purge pump), follow the steps in the following sections for high-rate purging.

Connect the Discharge Tubing Elbow

1. Connect the discharge tubing elbow to the 3/4-inch tubing protruding from the cap or cap plate.
2. Tighten the fitting nut with a wrench.
3. Direct the end of the tubing on the discharge elbow into the collection vessel.

Connect Purge Master

1. If you have a locking well cap, make sure the cap pin is engaged.
2. To achieve a short discharge cycle to start with, set the **DISCHARGE** timer knob at **A** on the Model 3013 or at about **9 O'CLOCK** on the Model 350.
3. Connect the short end of the red pump air-supply line to the quick-connect nipple on the cap or cap plate nearest to the white high-rate discharge fitting (see Figure 3-4).

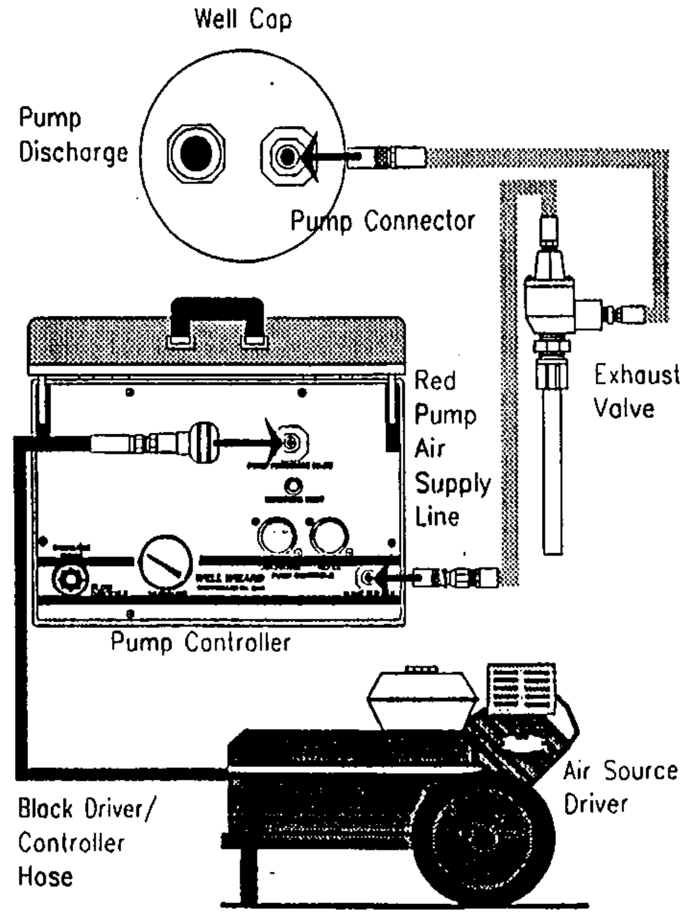

Figure 3-4: Connecting Purge Master

4. Connect the other end of the red pump air-supply line to the PUMP SUPPLY connector on the controller.
5. Not exceeding 125 psi, connect the black driver/controller hose to the PUMP PRESSURE INLET connector on the controller.

As purging begins, you'll notice **loud hissing and honking sounds** as air releases through the side of the Well Wizard controller housing and as air releases through the exhaust valve. This is *normal*. After the venting noises stop–from several seconds to several minutes–water flows from the pump discharge line as you begin to purge the well.

> **Note:** If the controller doesn't sound as though it's alternating between cycles (pressurizing then venting), turn the **REFILL** and **DISCHARGE** timer knobs to shorten the cycles.

Set the Cycles

1. Use Tables 3-2 and 3-3 as guides to setting the **REFILL** and **DISCHARGE** timers, depending on the depth and submergence of the Purge Master in the well.

Table 3-2: Recommended Discharge Times

Pump Depth (ft.)	Discharge Time (sec.)
50	2.5
75	3.5
100	4.5

Table 3-3: Recommended Refill Times

Pump Depth (ft.)	Pump Submergence (ft)	Refill Time (sec.)
50	25	5.5
75	25	6.0
100	25	7.5
50	50	5.0
75	50	5.5
100	50	7.0

2. Turn the **FLOW THROTTLE** knob on the controller fully clockwise.

Maximize the Pumping Rate

Even with Purge Master, purging a well can be a time-consuming process. By adjusting the discharge and refill cycles, you can make well purging as efficient as possible.

1. With the pump operating, set the refill time *long* (about **11 O'CLOCK** for Model 350 or **C** for Model 3013 in most cases—a higher setting if the well is shallow).
2. Referring to Table 3-4, set the discharge time *short* (1 second for wells shallower than 50 feet; 3 seconds for wells 50 to 100 feet, and 5 seconds for wells deeper than 100 feet). Water should begin to flow through the discharge line after 5 to 15 pumping cycles, depending on the depth of the well.

Table 3-4: Approximate Settings Versus Times

Model 350 Setting	Seconds	Model 3013 Setting
7 o'clock	1	A
-	3	B
8 o'clock	3.5	-
9 o'clock	7	-
-	9	C
10 o'clock	13	-
11 o'clock	16.5	-
12 o'clock	19.5	-
-	20	D
1 o'clock	22.5	-
2 o'clock	26.5	-
-	31	E
3 o'clock	32	-
4 o'clock	35.5	-
5 o'clock	37	-
-	42	F

3. Measure the liquid discharged during one cycle. The volume of the liquid is less than the internal volume capacity of the pump.
4. Increase the discharge time *gradually* (turning the knob less than a full setting), letting the pump go through its cycle three to five times after each adjustment.
5. Repeat Step 4 until you see air bubbles coming through the discharge line.
6. Decrease the discharge time slightly to eliminate the air bubbles. The amount discharged per cycle is now close to the internal volume capacity of the pump—the *discharge* cycle is maximized.

> **Note:** If air and water begin to shoot out *hard*, the discharge cycle time is too long. Set the discharge time short again, then repeat Step 4 using even smaller timer adjustments.

7. Decrease the refill time *gradually*, letting the pump cycle three to five times after each adjustment.
8. Repeat Step 6 until you see air bubbles coming through the discharge line.
9. Increase the refill time slightly to eliminate the bubbles. The amount of water discharged per cycle should still be close to the internal volume capacity of the pump—the *refill* cycle is maximized.

> **Note:** If air and water begin to shoot out *hard*, the refill cycle time is too short. Set the discharge time long again, then repeat Step 4 using very small timer adjustments.

Clear the Discharge Line

During the winter in northern climates, to prevent the discharge tubing of your Purge Master from *freezing*, you need to clear the discharge line of standing water above the static water level.

1. Before disconnecting the air supply from Purge Master, set the discharge cycle time on the controller long enough to cause air to exit from the Purge Master discharge line.
2. Wait until all the water is blown out of the discharge tubing.

4
COLLECTING A SAMPLE

After you've purged the well, you're ready to sample. A slow flow rate is recommended in most sampling protocols. When you *slow* the flow from the pump, you also avoid spurts, sprays, and drips.

The following sections tell you how to adjust the rate of flow for sampling and how to collect the sample.

Adjust the Rate of Flow

When you collect a sample, you want a smooth, non-aerated flow. To get that kind of flow, follow these steps.

1. Turn the FLOW THROTTLE knob on the controller *counter*-clockwise to slow the flow.
2. If you want to use a QuickFilter to filter your sample, disconnect the air supply on the controller to stop the pump, attach the QuickFilter to the tubing following the instructions on the box, then re-connect the air-supply on the controller to re-start the pump.

   Caution: To avoid housing or membrane failure and sample contamination, make sure the pressure does **not** exceed 60 psi.

3. If you purged the well using a Purge Master purge pump, reconnect the red pump air-supply line to the sampling pump, then make sure that you purge 1/2 to 1 gallon of water through the sampling pump. This ensures that you sample fresh well water.
4. Turn the DISCHARGE timer knob to **D** for the Model 3013 or to **12 o'clock** for the Model 350, to lengthen the cycle (because it will take longer to get the full volume of the pump at the slower flow).
5. Continue adjusting the FLOW THROTTLE knob until the flow is completely smooth.

Collect the Sample

To collect the sample, follow these steps.

1. If you're using a QuickFilter, discard the initial volume of filtered sample (500 ml for Model FF8100; 1,000 ml for Model FF8200).
2. Direct the flow into the sample vessel.
3. Turn off the driver engine, then disconnect the hoses from the well cap.
4. If you have a Purge Mizer, turn down the regulator to relieve the pressure, then remove the Purge Mizer control unit. The Purge Mizer deflates automatically.

5

Installing a Pump Using Bulk Tubing

This chapter is for you if you ordered your Well Wizard components and tubing unassembled. The following sections tell you how to assemble the components and tubing.

Get Ready

It's important to not contaminate pump components. Doing so can degrade the quality of the samples obtained using your Well Wizard system. Always wear latex gloves when unpacking and installing Well Wizard components, and at any other time when your hands might touch a water-contacting component.

Cut Tubing to Length

To cut the tubing to the correct lengths, follow these steps.

1. Attach the bulk tubing to the pump.
2. Lower the pump into the well until the pump touches the bottom of the well.
3. Raise the pump up, as follows:
   - 1 foot, for low-recovery wells.
   - To the middle of the screen, for high-recovery wells.

4. Estimate where to cut the tubing so that the air-supply (smaller) tubing terminates at the proper position below the cap.
5. Cut both tubes at about 1 to 1-1/2 feet longer than the length you estimated in Step 4.
6. Separate the tubing 1 to 2 feet, then cut the air-supply (smaller) tubing at the length you estimated in Step 4.

> **Caution: Don't** pull the tubing apart *sideways*–it may *tear.* Instead, hold the larger tube stationary with one hand. Then, with the smaller tube in the other hand, either push or pull directly toward or away from you.

7. Attach the tubing to the well cap.

Connect the Pump to the Tubing

To connect the pump to the tubing, follow these steps.

1. Separate the discharge (larger) tubing from the air-supply (smaller) tube for 8 to 12 inches from one end.
2. Loosen the nut-and-ferrule assembly as much as possible without actually removing the nut.
3. Push the air-supply tube into the matching fitting on the top end of the pump.
4. Tighten the nut.
5. Cut off a short length from the end of the discharge tubing to compensate for the offset height of the discharge tube fitting.

> **Note:** This is usually 3 to 4 inches. You determine the exact length by checking both fitting nuts for full tube insertion after loose assembly.

6. Make sure that the tube-to-pump fit is correct before proceeding.

7. Tighten both fitting nuts finger tight.
8. For each fitting nut, hold the fitting base with *one* wrench and the fitting nut with *another* wrench, then tighten the fitting nut one additional turn.

Connect the Well Cap to the Tubing

The following sections describe how to connect the discharge and air-supply tubing to the well cap.

Discharge Tubing

To connect the well cap to the discharge (larger) tubing, follow these steps.

1. At the free end of the tubing pair, push the discharge tubing up through all casing adapting fittings and well-cap components.
2. Push the discharge tubing up through the bottom of the matching fitting in the well cap until the tubing extends above the fitting by the amount you want to leave for ease of sample collection.
3. Tighten the discharge tube fitting nut finger tight.

Air-Supply Tubing

To connect the well cap to the air-supply (smaller) tubing, follow these steps.

1. Trim the length of the air-supply tubing to allow connection to the matching tubing fitting beneath the well cap panel.
2. Insert the air-supply tubing into the fitting, then check for full engagement.

3. With a wrench, hold the anchor nut on the top of the well cap, then tighten the nut one turn past finger tight.

Fittings

To make final adjustments and tighten the tubing in its fittings, follow these steps.

1. Push the discharge and air-supply tubing though the well cap panel slightly–as necessary to provide final, even alignment of the tubing.
2. Tighten the discharge tubing nut one full turn past finger tight.
3. Tighten the air-supply tubing nut one full turn past finger tight.

Install the Optional Components

The following sections provide information to help you as you install optional Well Wizard components.

Inlet Screen

If you want to install an inlet screen on your sampling pump (the Well Wizard 10-year warranty is *void* without it), follow the instructions in Chapter 2, "Installing the Components."

Purge Mizer

If you're installing a Purge Mizer along with your sampling pump, remember that you must install Purge Mizer before you install the pump. You need to position it above the *top of the well screen,* rather than in the screen section of the well. Refer to the installation instructions included with Purge Mizer and, if necessary, to the instructions in Chapter 2 of this book, "Installing the Components."

Purge Master

Refer to the installation instructions included with Purge Master and, if necessary, to the instructions in Chapter 2 of this book, "Installing the Components."

Install the Pump

To install the assembled pump, follow these steps.

1. If you have a protected well cap, attach the well cap base to the well casing; otherwise, skip to Step 2.
2. Lower the sample pump down the well.
3. If you want to prevent debris (such as rust from the protective casing) from getting on the well cap and into the well, fit a plastic bag over the well cap.
4. Close the well cap.

6

Maintaining Your Well Wizard System

This chapter tells you how to:

- Maintain the water-level meter.
- Maintain Purge Master.
- Install or replace well-cap tubing ferrules.
- Install or replace pump connectors.

If you'd prefer to *not* do these things yourself, or if you have questions, call QED. If you need to replace an 1100 or 1200 series pump bladder, refer to the instructions included with the field-replaceable bladder kit.

Maintain the Model 6010E Water-Level Meter

The Model 6010E Electronic Pneumatic water-level meter needs little maintenance. However, you need to change the batteries from time to time. You may also want to check the calibration prior to each sampling event. The following sections tell you how.

Change the Batteries

The water-level meter comes with eight size AA alkaline batteries. They're located under the black BATTERY SERVICE ACCESS panel. The batteries should provide about 40 hours of continuous operation. When you press the START button, if you see the message **Warning! Low Batteries**, you can press the START button again to make the batteries last a little longer, but you need to replace them *soon*.

If you see the message **Battery Too Low! Turn System Off**, you can't use the water-level meter until you replace the batteries.

Calibrate the Water-Level Meter

To calibrate the water-level meter, follow these steps.

1. Set up the optional calibration test tube in its stand.
2. Add water to the calibration test tube, to a convenient level on the scale.
3. Attach the red pump air-supply line to the TANK RECHARGE fitting.
4. To charge the internal air tank to 100 psi, set the cycle timers for *maximum discharge* time and *minimum refill* time, as follows:
   - **For the Model 3013**, set the DISCHARGE timer at C and the REFILL timer at A.
   - **For the Model 350**, set the DISCHARGE timer at 9 O'CLOCK and the REFILL timer at 7 O'CLOCK.
5. Disconnect the red pump air-supply line.
6. Move the SENSOR switch to ON.
7. Attach the meter air hose from the TO PROBE fitting to the mating well cap connection.
8. Move the AIR switch to ON, then press START once.

9. Watch the display until it shows the highest reading–you see the numbers increase, then stabilize at the highest reading.
10. When the message **Probe Submersion Depth...** appears, compare the meter reading to the actual level in the test tube inside the calibration tube.
11. Move the **AIR** switch to **OFF**.
12. If the meter reading and the actual level match, meter calibration is correct and you can skip the following steps; otherwise, remove the **CALIBRATION** panel screw, then use a small screwdriver or other tool to remove the epoxy seal from the internal adjustment screw.
13. Slowly adjust the internal screw until the meter reading matches the actual level.
14. Repeat Steps 6 through 12 to re-check calibration.
15. Apply a dab of paint or epoxy to the lock-calibration screw to lock it in position, then reinstall the **CALIBRATION** panel screw.

Maintain Purge Master

During the winter in northern climates, to prevent the discharge tubing of your Purge Master from *freezing*, you need to clear the discharge line of standing water above the static water level. To do that, before disconnecting the air supply from Purge Master, set the discharge cycle time on the controller long enough to cause air to exit from the Purge Master discharge line—blowing all the water out of the discharge tubing.

Maintain the Model 350 Electronic Controller

The following sections describe how to maintain your Model 350 Electronic Controller.

General Care & Storage

Although the controller is protected from moisture, QED recommends that you protect the unit from direct rain. A dry storage area in the 40 to 100°F temperature range is best. If you plan to store the controller for an extended period, remove the batteries.

Cold-Weather Usage

You can use the controller in sub-freezing temperatures but, if you let the controller sit in a sub-freezing environment without cycling, condensed water in the valve may freeze. If that happens, warm the controller to above freezing to make it resume cycling. Once you have it cycling, you can return it to the freezing conditions for use.

Batteries

The Model 350 Electronic controller is powered by eight size AA batteries (QED recommends alkaline). Battery life depends largely on controller use and the temperature in which you use the controller. Batteries last longer at room temperature than at lower temperatures; intermittent controller use provides longer battery life than continuous use. You can typically obtain 130,000 cycles from a set of batteries–that's about 14 days of continuous 24-hour-per-day use.

Battery Testing

You can press the BATTERY TEST button to find out the condition of the batteries.

- A continuous green light indicates fresh batteries.
- A split-second flash of green light–or no light–indicates that you will soon need to replace the batteries.

It isn't unusual to obtain an additional 30,000 cycles (about 4 days of continuous operation) of battery life after the battery test light fails to remain continuous.

Notes:

- If you press the BATTERY TEST button often, you'll need to replace the batteries more often.
- If the controller doesn't start spontaneously when you connect the air source, press the BATTERY TEST button to start the controller.

Battery Replacement

To replace the eight size AA batteries, follow these steps.

1. Remove the four screws that hold the battery case panel on the controller front panel.
2. Remove the panel to expose the battery holder.
3. To remove the battery holder from the case, *gently* unclasp the transistor-battery-type connector panel.
4. Remove the old batteries, saving them to recycle.
5. Insert the new batteries.
6. Insert the battery holder in the case, then reconnect the transistor-battery-type connector panel.
7. Reinstall the battery case panel, replacing the four set screws.

Install or Replace Well-Cap Tubing Ferrules in a Typical Well Cap

The following sections describe how to replace or install well-cap tubing ferrules. Most people never need to perform either of these procedures. You may need them, however, if you want to re-position the pump or replace kinked tubing.

Unscrew Fitting Caps & Expose Ferrules

Refer to Figure 6-1 as you follow these steps.

1. Using a wrench, loosen the pump discharge fitting cap by turning it counterclockwise.

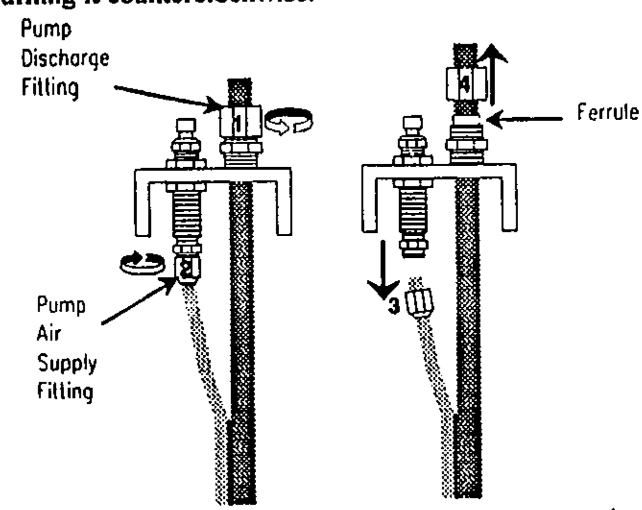

Figure 6-1: Unscrew Fitting Caps & Expose Ferrules

2. Using a wrench, loosen the pump air-supply fitting cap by turning it counterclockwise.
3. Pull the pump air-supply tubing down and out of the fitting.

4. Slide the pump discharge fitting cap up the tube to expose the ferrule.

Discard Tubing & Ferrule, Save Cap for Re-Use

Refer to Figure 6-2 as you follow these steps.

1. Pull the pump discharge tubing up through the cap to allow access to the ferrule.

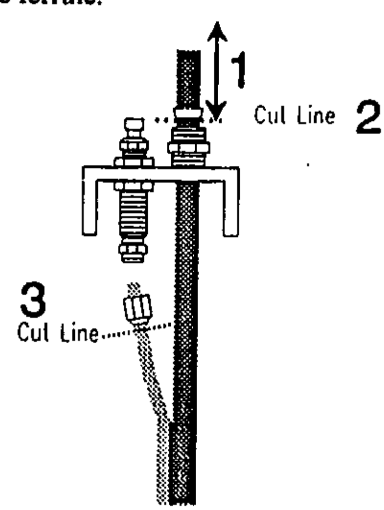

Figure 6-2: Discard Tubing & Ferrule

2. Cut the pump discharge tubing just behind the ferrule.
3. Cut the pump air-supply tubing just behind the fitting cap.
4. Discard the portions you just cut off, saving the fitting caps for re-use.

Re-Attach the Fitting Caps

Refer to Figure 6-3 as you follow these steps.

1. Re-attach the pump discharge fitting cap with the new ferrule (smaller end down)—leaving it slightly loose to allow the tube to pass through.
2. Attach a new nut to the pump air-supply tubing—leaving it slightly loose to allow tubing to pass through.

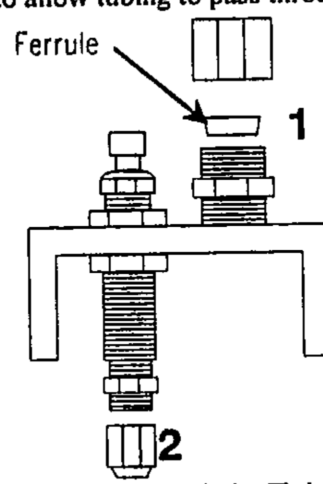

Figure 6-3: Re-Attach the Fitting Caps

Re-Connect the Tubing

Refer to Figure 6-4 as you follow these steps.

1. Separate the tubing for about 6 to 12 inches.

> **Caution: Don't** pull tubing apart *side*ways—it may tear. Instead, hold the larger tube stationary with one hand. Then, with the smaller tube in the other hand, either push or pull directly toward or away from you.

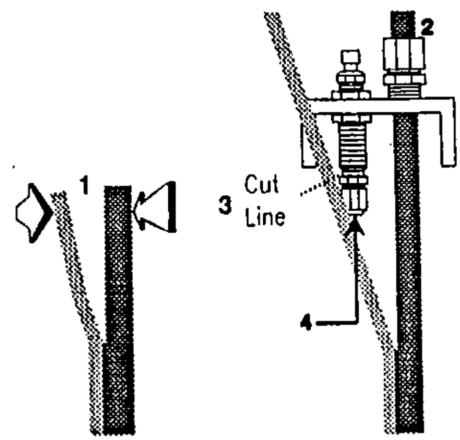

Figure 6-4: Re-Connect the Tubing

2. Push the pump discharge tubing through the pump discharge fitting to the desired length, then tighten the nut.

> **Note:** The length you want depends on the clearance required for any protective casing. You typically need about 1-1/2 feet.

3. Cut the air-supply tubing to size, to allow it to reach *all* the way into the fitting.
4. Push the air-supply tubing all the way into the fitting until it contacts the shoulder inside the fitting, then tighten the nut.

Install or Replace Pump Connectors

The following sections described how to install or replace the three types of connectors that may be included in your Well Wizard system.

Stainless Steel Connectors

Swagelok™ tube fittings, which include four pieces (see Figure 6-5), come to you completely assembled, finger tight.

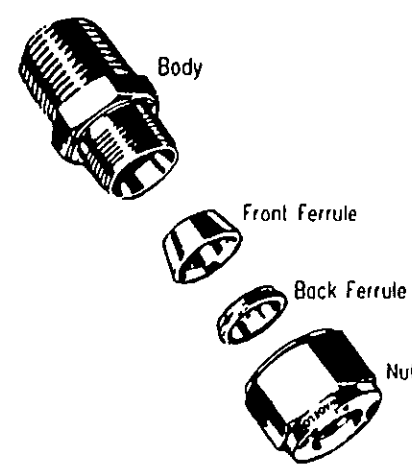

Figure 6-5: Parts of the Swagelok Tube Fitting

Caution: If you disassemble a connector before you use it, dirt or foreign material can get into the fitting and later cause a leak.

To install a stainless steel connector, follow these steps.

1. If you're working with a 1/2- or a 3/4-inch connector, wrap the male threads under the nut with Teflon tape.

2. Insert the tubing into the Swagelok tube fitting as follows:
   - **For 1/4-inch tubing,** insert it approximately 5/8 inch.
   - **For 3/4-inch tubing,** insert it up to 7/8 inch.

   Make sure that the tubing firmly contacts the shoulder of the fitting and that the nut is finger tight.

   > **Note:** If the tubing is 3/8 inch or larger, you must use a tubing insert. Just push the stainless steel insert into the tubing before inserting the tubing into the tube fitting.

3. Referring to Figure 6-6, scribe or mark the nut at the 6 o'clock position.

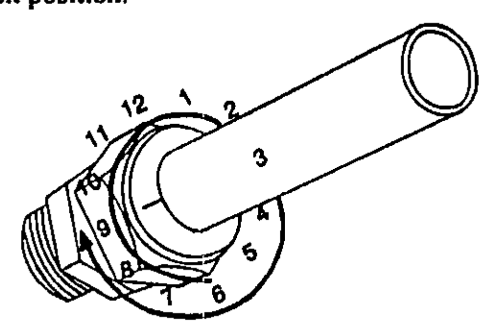

Figure 6-6: Clock Positions

4. While holding the fitting body steady with a backup wrench or vise, tighten the nut as follows, depending on the size of the tube fitting:
   - **For fittings larger than 3/16 inch,** turn the fitting one and one-quarter turns (watch the scribe mark make one complete turn, then continue to 3-o'clock).
   - **For fitting sizes 1/6, 1/8, and 3/16 inch,** turn the fitting three-quarters of a turn (watch the scribe mark turn to 9 o'clock).

   > **Note:** These are guidelines, you may need to further tighten the nut.

Purge Master Barb-and-Clamp Connectors

To install Purge Master barb-and-clamp connectors, follow these steps, referring to Figure 6-7. Have handy the 2-inch purge pump clamp tool (Part Number 35188) that's available from QED.

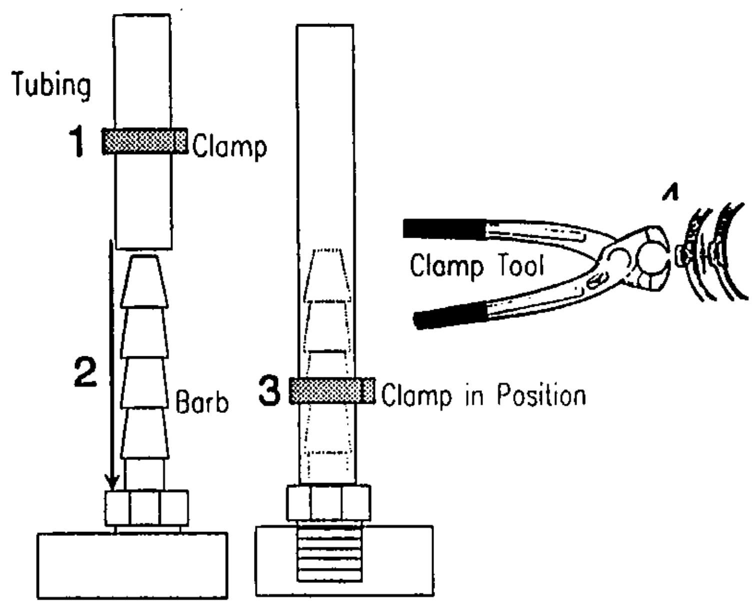

Figure 6-7: Barb & Clamp Connector

1. If you're replacing an old connection, remove the old clamp by cutting through its ear with the clamp tool; otherwise, skip to Step 2.
2. Cut the tubing cleanly and squarely to length.
3. Slide the clamp onto the tubing, then push the tubing onto the barb fitting until the tube contacts the body hex.
4. Position the clamp on the tubing outside of where the barb is positioned in the tube, making sure the hooks on the clamp band are engaged.
5. Squeeze the ear closed with the clamp tool.

Polypropylene Connectors

To install a polypropylene connector, follow these steps.

1. Cut the tubing cleanly and squarely to length.
2. If the tubing is larger than 1/2 inch, push an insert into the tube.
3. Push the tubing into the completely assembled connector until it contacts the shoulder inside the fitting (see the illustration on the left in Figure 6-8).
4. Tighten the nut with a wrench, but be careful to not over tighten it; the nut should **not** come in contact with the shoulder of the body (see the illustration on the right in Figure 6-8).

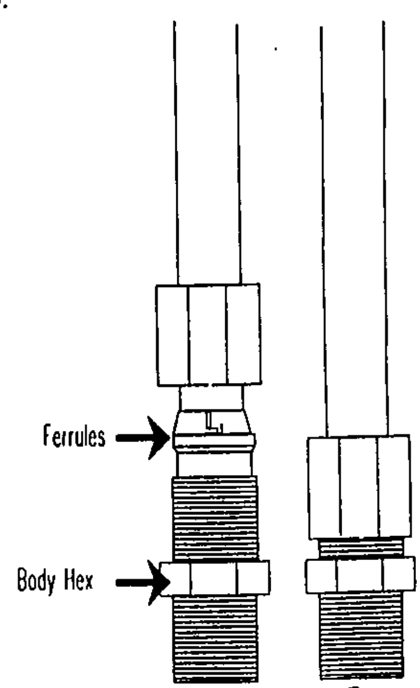

Figure 6-8: Polypropylene Connector

APPENDIX A
SPECIFICATIONS

The following sections provide specifications for Well Wizard controllers and the various Well Wizard sampling system types.

Standard Controller/Compressor

Table A-1 shows compressor performance for the standard controller/compressor cart, Model 3111HR/LR.

Table A-1: Model 3111HR/LR Performance

Air Flow (scfm)	Pressure (psig)
6.0	0
5.5	25
4.7	50
4.3	100

Other specifications are as follows:

- 200 feet maximum lift with *compressor* air source.
- 250 feet maximum lift with *compressed-gas cylinder* air source (regulator set at 125 psi).
- 2.5 hours of operation on a full tank of gasoline.

High-Pressure Controller/Compressor

Table A-2 shows compressor performance for the high-pressure controller/compressor cart, Model 3111HP/LH.

Table A-2: Model 3111HP/LH Performance

Compression (scfm)	Pressure (psig)
2.4	0
2.27	70
2.2	125
2.1	165

Other specifications are as follows:

- 320 feet maximum lift with the supplied *compressor* air source.
- 600 feet maximum lift with *compressed-gas cylinder* air source (regulator set at 300 psi).
- 2.5 hours of operation on a full tank of gasoline.

Well Wizard Equipment Configurations

Well Wizard sampling systems are available in Types A through L, as shown in the following figures. Type A is the basic sampling pump; the other types include options using Purge Mizer and Purge Master in various positions relative to the sampling pump. The diagram letters appear on the "Downwell Equipment Build/Specification Sheet(s)" supplied with your Well Wizard system.

Sampling System Type A

Figure A-1 shows the Type A sampling system, the basic bladder pump.

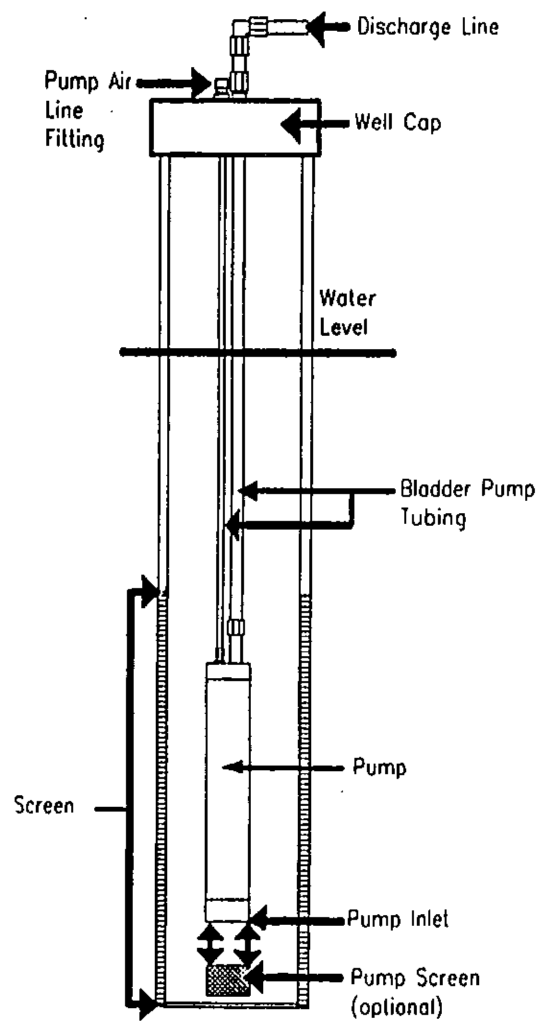

Figure A-1: Type A—Bladder Pump Only

Sampling System Type B

Figure A-2 shows the Type B sampling system, the bladder pump *below* a Purge Master.

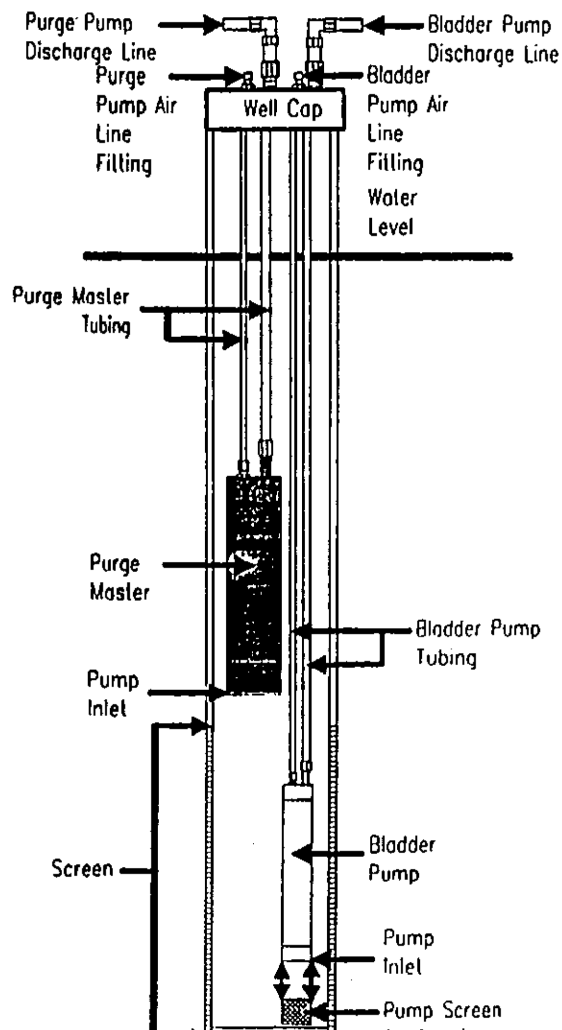

Figure A-2: Type B—Bladder Pump Below a Purge Master

Sampling System Type C

Figure A-3 shows the Type C sampling system, a bladder pump *above* a Purge Master.

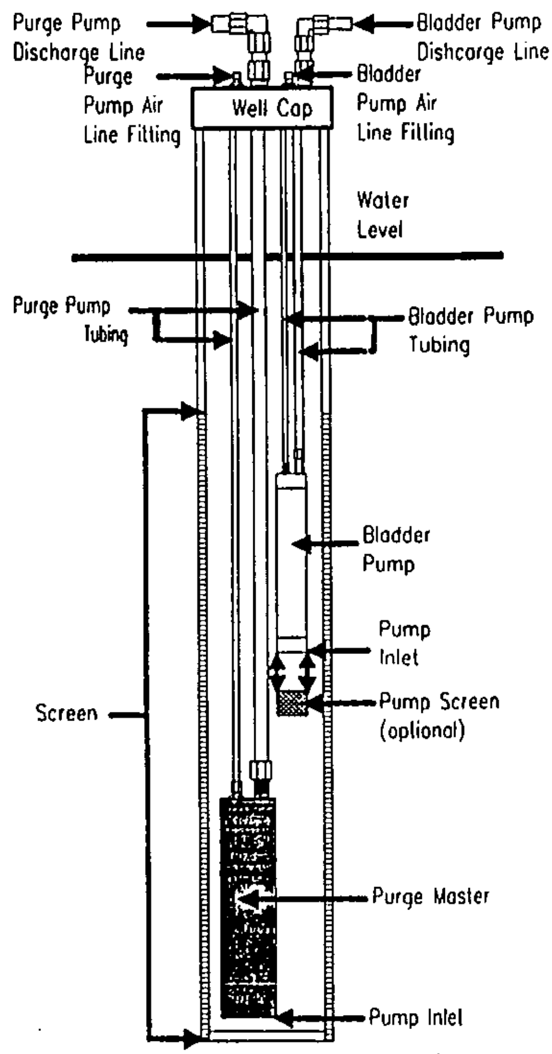

Figure A-3: Type C—Bladder Pump Above a Purge Master

Sampling System Type D

Figure A-4 shows the Type D sampling system, a bladder pump above a Purge Mizer with an inlet extension.

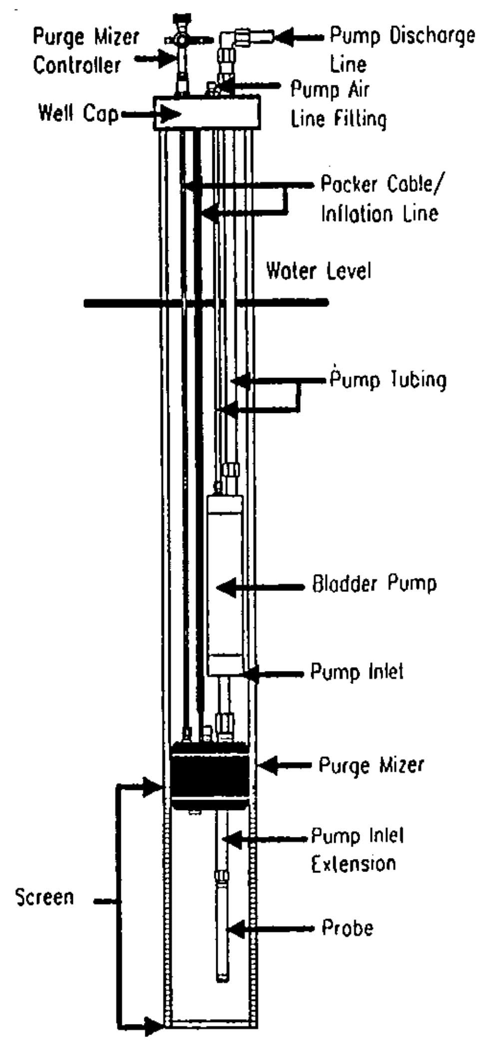

Figure A-4: Type D—Bladder Pump Above Purge Mizer with Extension

Sampling System Type E

Figure A-5 shows the Type E sampling system, a bladder pump *below* a Purge Mizer.

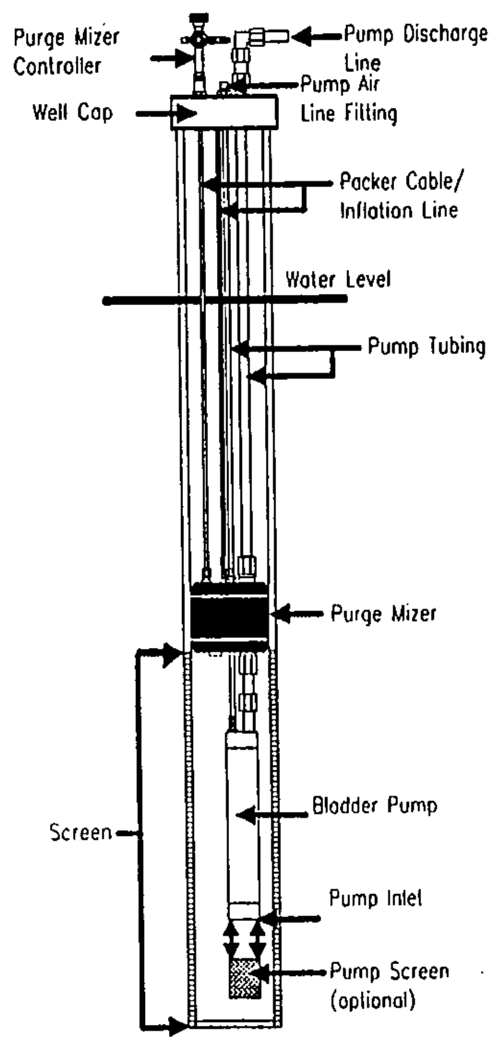

Figure A-5: Type E—Bladder Pump Below a Purge Mizer

Sampling System Type F

Figure A-6 shows the Type F sampling system, a bladder pump with electric submersible *above*.

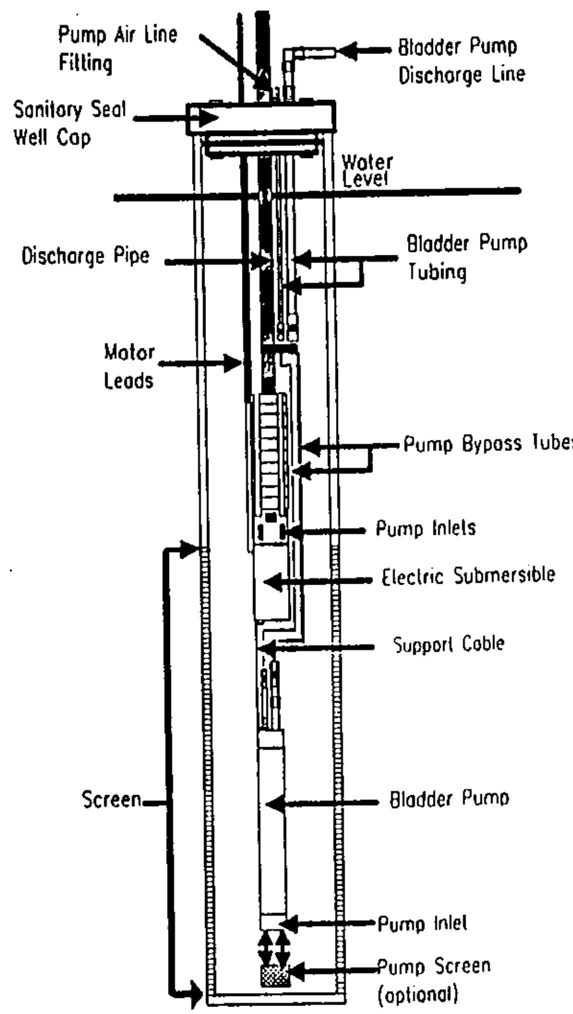

Figure A-6: Type F—Bladder Pump with Electric Submersible Above

Sampling System Type G

Figure A-7 shows the Type G sampling system, a bladder pump with electric submersible *below*.

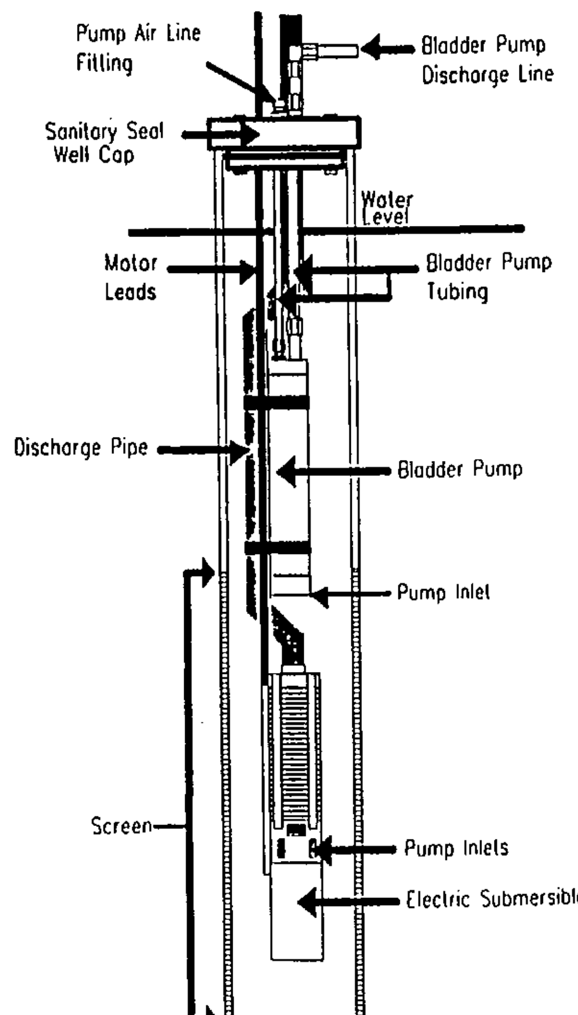

Figure A-7: Type G—Bladder Pump with Electric Submersible Below

Sampling System Type H

Figure A-8 shows the Type H sampling system, a bladder pump with Purge Master and Purge Mizer.

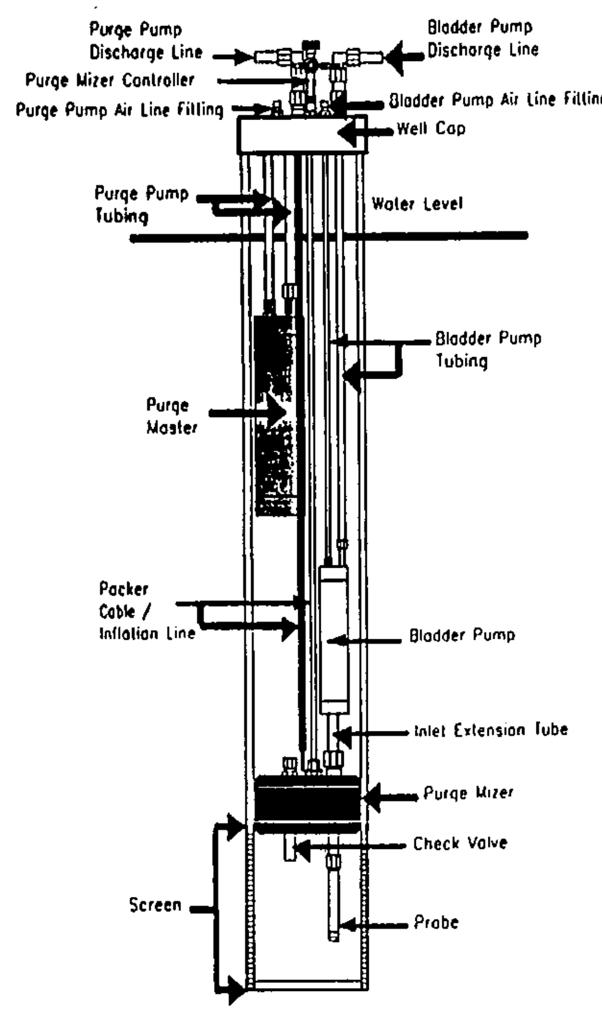

Figure A-8: Type H—Bladder Pump with Purge Master and Purge Mizer

Sampling System Type I

Figure A-9 shows the Type I sampling system, a bladder pump with tandem Purge Mizers.

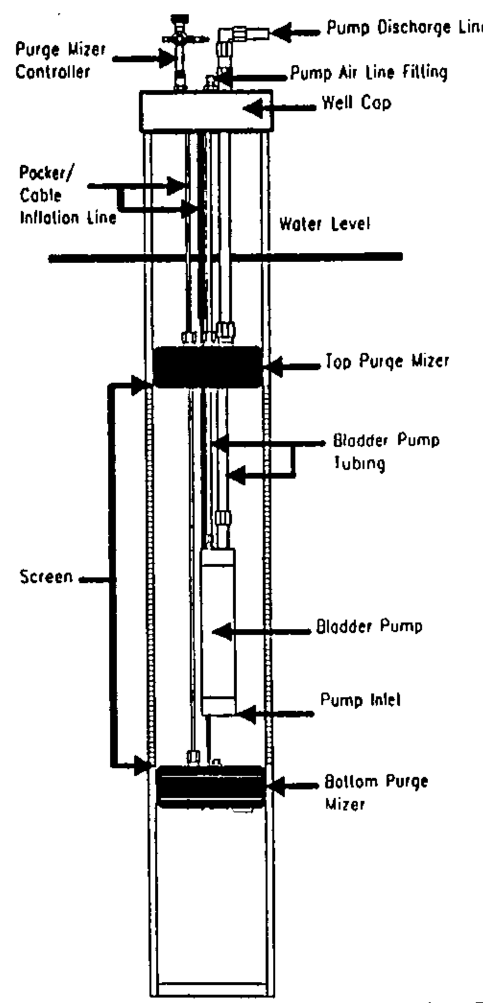

Figure A-9: Type I—Bladder Pump with Tandem Purge Mizers

Sampling System Type J

Figure A-10 shows the Type J sampling system, a bladder pump with Purge Master and Purge Mizer.

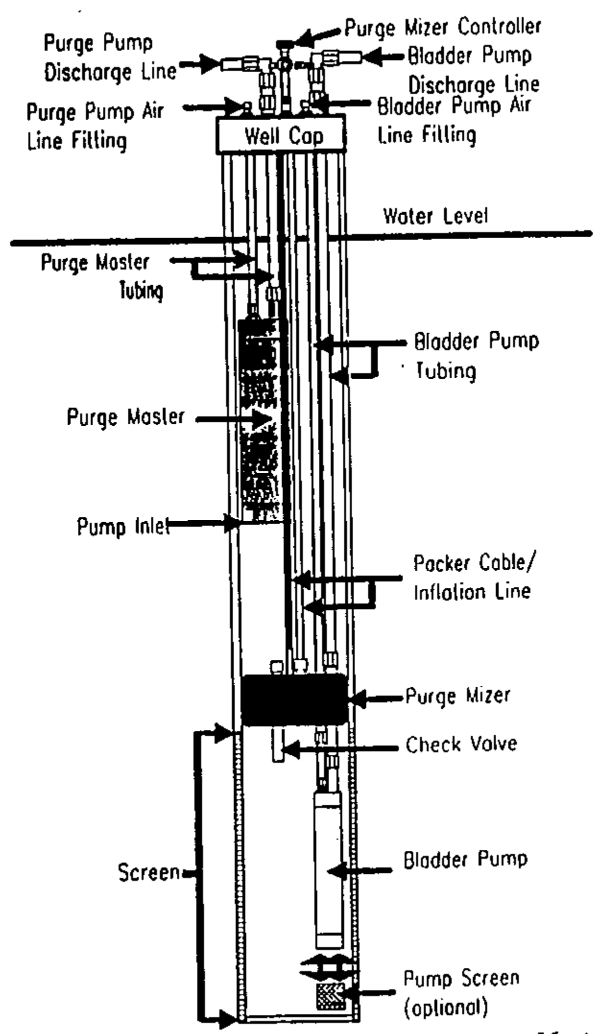

Figure A-10: Type J—Bladder Pump with Purge Master and Purge Mizer

Sampling System Type K

Figure A-11 shows the Type K sampling system, a bladder pump below a Purge Mizer with a vent line.

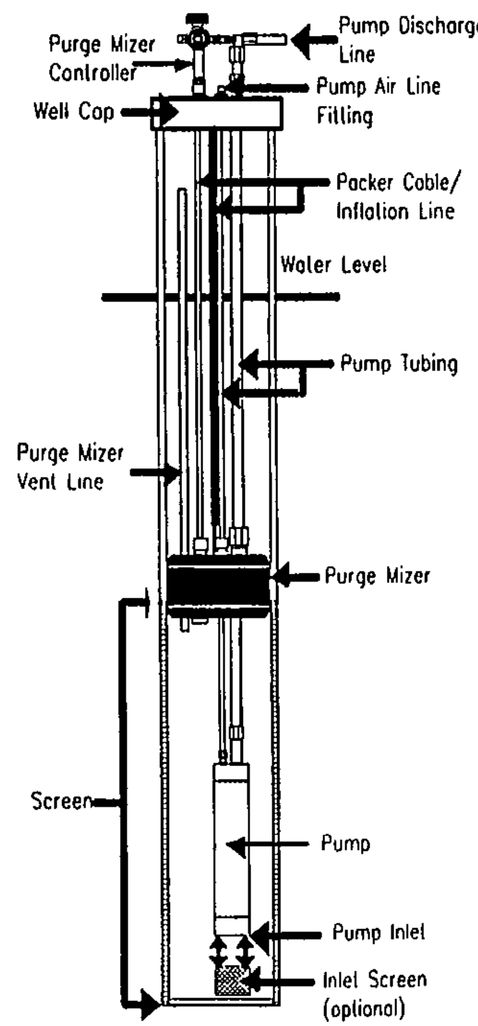

Figure A-11: Type K—Bladder Pump Below a Purge Mizer with a Vent Line

Sampling System Type L

Figure A-12 shows the Type L sampling system, a bladder pump with an inlet extension.

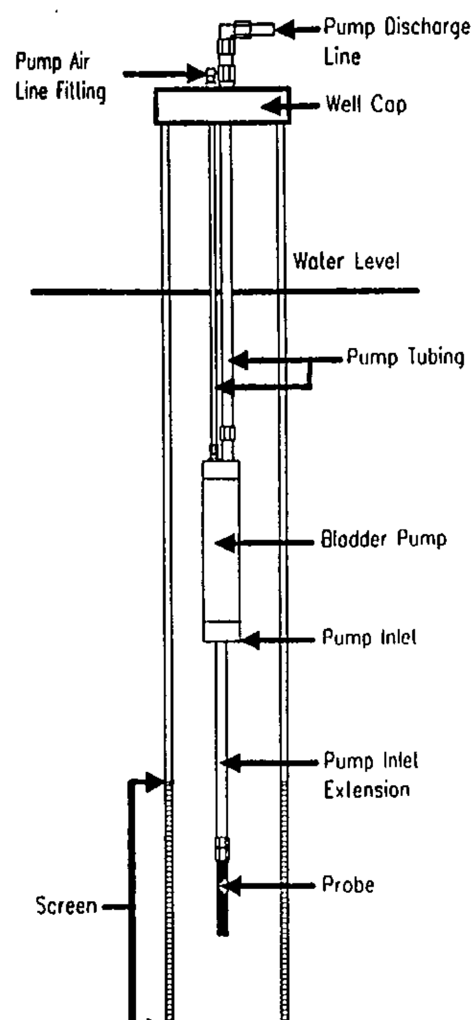

Figure A-12: Type L—Bladder Pump with an Inlet Extension

APPENDIX B
MY WELL WIZARD IS BROKEN: WHAT TO DO

QED sometimes gets calls from customers who say, "My Well Wizard is broken. What should I do?" We *want* to help–and we *will* help–but first we need to know the symptoms. As described in this book, your Well Wizard is a *system* that includes many components. Together we can discover the problem, solve it, and have your system up and running again before long. The following sections provide the trouble-shooting information you need to get a solution started.

> **Warning!** Don't disassemble any component of your Well Wizard system. Doing that could void your warranty coverage.

Perform These Three Checks

If you have a problem, the following three checks will help to either locate the problem or assist in our diagnosis and repair. In case you later have to call QED, write down your findings as you perform these checks–so you can tell us what happened when you performed them.

> **Note:** The components of your Well Wizard system and the correct ways to use them are described earlier in this book. If you're new to Well Wizard, before you decide that you have a problem, please take a few minutes to become familiar with the system and how to operate it.

Check Controller Cycling and Pressure

Make sure the controller is cycling and attaining a pressure of at least 80 psi in 60 seconds. You *may* have to turn the FLOW THROTTLE control knob fully clockwise and set the DISCHARGE timer knob on F for the Model 3013 or 5 O'CLOCK for the Model 350 to achieve this pressure.

Check Cycle Length Adjustment

Make sure that you can change the cycle length by adjusting the REFILL and DISCHARGE timer knob positions.

Check for Sufficient Discharge Volume

Make sure that the discharge volume is as high as it should be. To do that, follow these steps.

1. Set the REFILL and DISCHARGE timer knobs to F for the Model 3013 or 5 O'CLOCK for the Model 350.
2. Measure the volume of one discharge cycle. The volume should be as follows:
   - For 1100 series pumps, the volume should be greater than 300 ml.
   - For 1200 series pumps, the volume should be greater than 400 ml.
3. If the volume is low, check for the following:
   - Insufficient submergence of the pump.
   - A well-water recovery rate that's too slow.
   - A leaky discharge fitting or leaky tubing.

Call QED, if Necessary

If the three checks didn't reveal a minor problem that you can easily fix–such as a loose fitting–please call our Customer Service department at one of the following numbers for assistance.

- **Monday through Friday, 8:00 a.m. to 5:00 p.m. EST:** (313) 995-2547.
- **After hours and weekends:** 1-800-272-9559 (*or* 1-313-746-8045 if you're outside the U.S.).

The person you talk to may ask you to look at a schematic drawing or to refer to a parts list. The schematic drawings and parts lists are in Appendix C.