OPERATION, MAINTENANCE, AND MONITORING MANUAL

WORK ASSIGNMENT D003825-13

NORTHEAST ALLOYS AND METALS
CITY OF UTICA (C)

SITE NO. 6-33-045
ONEIDA COUNTY, NY

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York

Erin M. Crotty, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION

URS Corporation
282 Delaware Avenue
Buffalo, New York 14202

October 2001

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Prepared By:

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282 DELAWARE AVENUE
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OCTOBER 2001

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1.0 TREATMENT SYSTEM

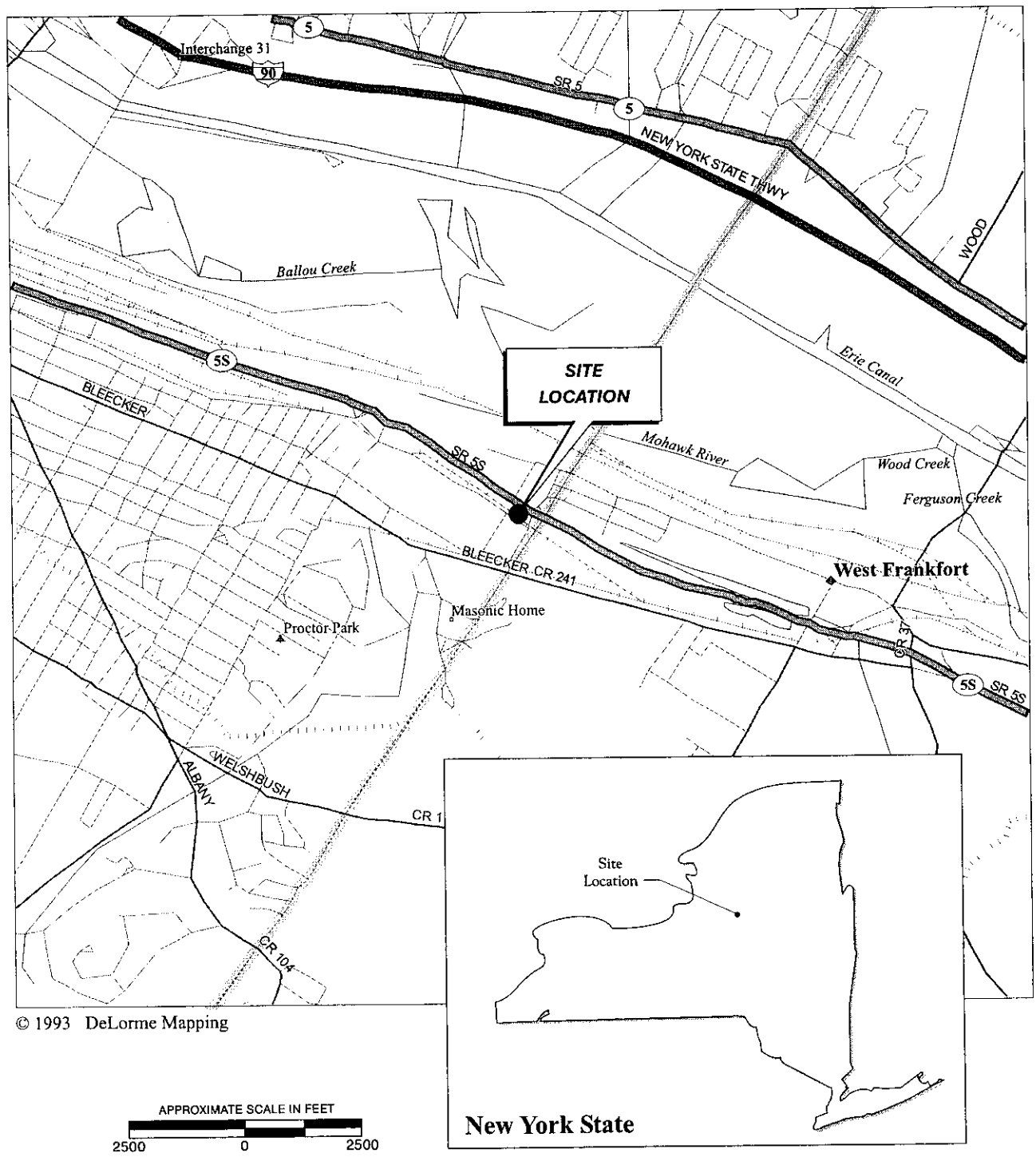
1.1 Introduction

1.1.1 Site Description

Northeast Alloys and Metals is a Class 2 site, listed in the New York State Department of Environmental Conservation (NYSDEC) Registry of Inactive Hazardous Waste Sites (NYSDEC Site No. 6-33-045). The site is located between State Route 5S and Dwyer Street in the City of Utica, Oneida County, New York. The property is located in a mixed industrial/commercial area just inside the city limits, and just inside the boundary between Oneida and Herkimer Counties (Figure 1-1). The CSX Railroad runs in an east-west direction approximately 1500 feet north of the site. The Mohawk River flows in an easterly direction and is located approximately 1800 feet to the north.

The facility occupies about 3.9 acres and consists of a plant building, asphalt parking area, and loading dock area which occupy the southwest portion of the property. The plant building, which occupies approximately 21,000 square feet, is a one-story masonry brick structure. A small portion of the paved parking lot area, which formerly contained an underground storage tank (UST) and drum storage area, is referred to as the "courtyard." The site layout is shown in Figure 1-2.

Contamination at the Northeast Alloys and Metals Site is primarily chlorinated solvents in the groundwater, specifically trichloroethene and its breakdown products. The use of chlorinated solvents was prevalent at the site, particularly in the metal degreasing operations. Spent solvents may also have been released when a drum of spent solvent was accidentally punctured. The groundwater at the courtyard area of the site is the most highly contaminated, with a plume that follows the groundwater flow to the north. Low concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) contaminants have also been detected in some of the downgradient wells. A system to intercept, collect, and treat the contaminated groundwater has been installed downgradient of the courtyard area.



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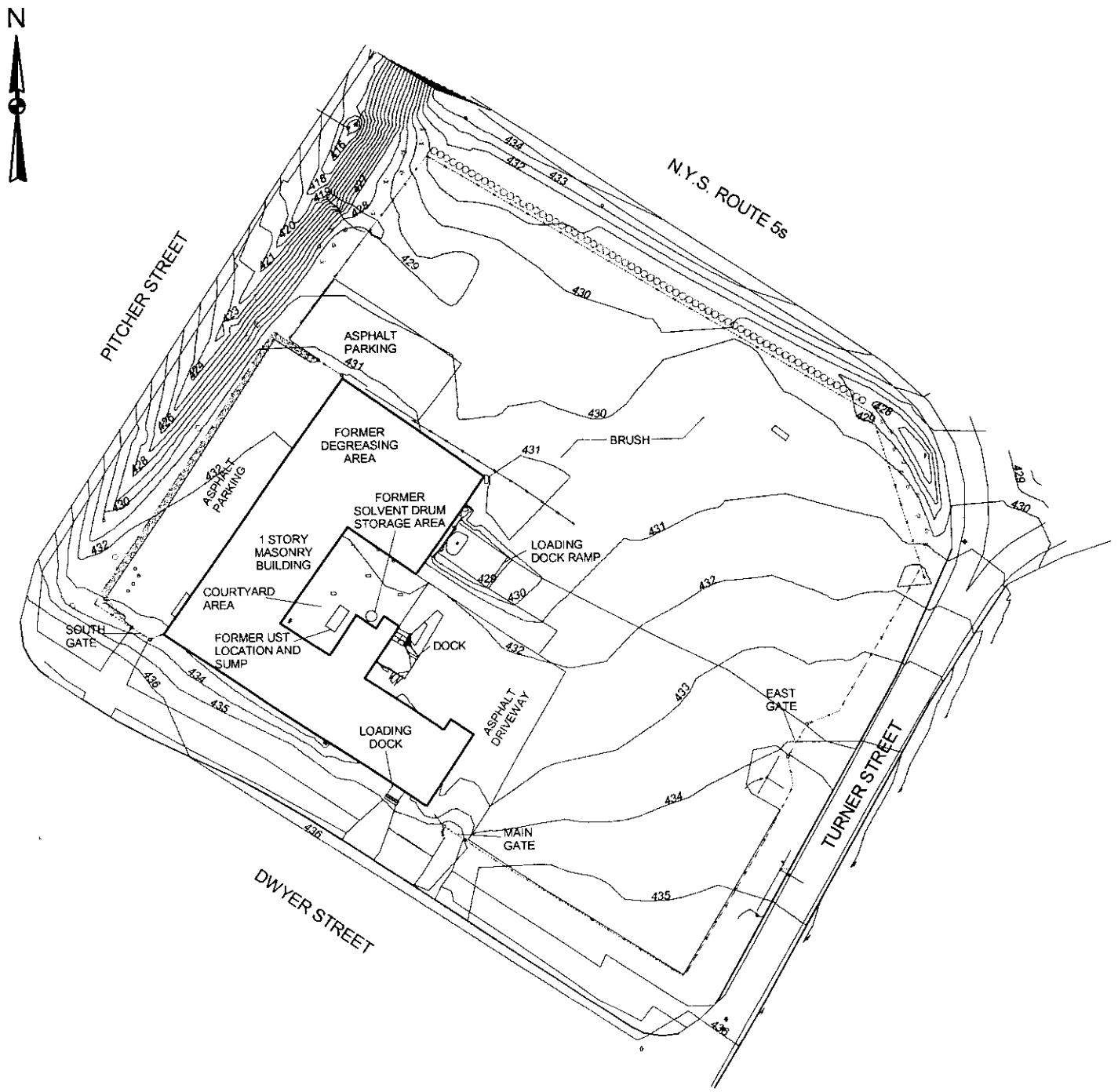
SITE LOCATION MAP
NORTHEAST ALLOYS AND METALS

FIGURE 1-1



URS	NORTH EAST ALLOYS AND METALS SITE PLAN	FIGURE 1-2

i:\35618.02\dbgis\2001\northeast.apr SITEPLAN
10/3/2001

1.1.2 Site History

The property and buildings were used for the manufacture of electronic components in the 1950s, as a machine shop in the 1960s, and as a commercial laundry in the 1970s. Northeast Alloys & Metals purchased the facility in April 1986 and used it to recycle specialty metal parts. In January 1989, Northeast Alloys and Metals leased the property to ELG Haniel Tradings to perform the metal recycling operations. Operations at the facility ceased in 1991. The facility is currently unoccupied.

The Record of Decision (ROD) for the site was issued by the NYSDEC in March 1998 (Appendix A). A pre-design investigation was completed and reports issued by URS in June and October 1999. Contract documents (Contract No. D004178) for remedial construction were prepared by URS and issued by the NYSDEC in May 2000. The notice of intent to award the contract was issued on August 8, 2000 to Scientech NES, Inc. of Danbury, Connecticut. Notice to Proceed with construction at the site was given to Scientech on December 4, 2000. Major construction at the site was completed by April 2001.

1.1.3 Record of Decision Summary

The ROD for the Northeast Alloys and Metals site was issued by the NYSDEC in March 1998. The overall goal for the remediation of the site is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. As stated in the ROD, these overall goals apply to the Northeast Alloys site as follows:

- Reduce, control or eliminate, to the extent practicable, the contaminated soil present on site
- Eliminate the potential for direct human or animal contact with the contaminated soils on site
- Mitigate the impacts of contaminated groundwater on the environment
- Provide for attainment of SCGs for groundwater quality to the extent practicable.

To meet the remedial goals for the site, a remedy was selected that consists of the following components as summarized in the ROD:

1) Installation of a groundwater collection and treatment system based on the remedial design program. The groundwater collection and treatment system will treat contaminated water prior to discharge to an onsite infiltration system.

2) Installation of a soil vapor extraction system at RW-1 and RW-2.

3) Excavate contaminated soil in the vicinity of MW-9 to meet soil cleanup goals.

4) Implement a site-wide operation, monitoring and maintenance program to ensure that the remedial program is effective and remedial action goals are obtained.

5) Institutional controls such as deed restrictions on groundwater use will be implemented until groundwater standards are obtained.

6) The remedial design will verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial action program. Any uncertainties identified during the RI/FS will be resolved. This will include the determination of the size, location and number of groundwater and soil vapor extraction wells.

Prior to performing the remedial design for the site, URS conducted a Pre-Design Investigation. The Pre-Design Investigation further delineated the extent of soil and groundwater contamination and determined site-specific criteria necessary for design of the selected remedial actions. Based on the findings of the Pre-design Investigation, two components of the remedial action selected in the ROD were modified. The changed components were:

Treated Groundwater Discharge – treated groundwater will be discharged to the local Oneida County public sewer system instead of to an infiltration gallery.

Soil Vapor Extraction – considering the findings of the RI and the Pre-Design Investigation, soil vapor extraction was not considered to be warranted as there is no significant vadose zone soil contamination in the vicinity of RW-1 and RW-2.

All components of the ROD remedy were completed as part of the remedial construction at the site by Scientech. The major component of the remediation is the groundwater collection and treatment system, for which this Operation, Maintenance, and Monitoring (OM&M) manual has been prepared.

1.2 System Design and Construction

The following are the contacts for the persons involved in the design and construction of the remediation systems:

NYSDEC:

Peter S. Ouderkirk, P.E.
NYSDEC – Region 6
7th Floor – Environmental Quality
317 Washington Street
Watertown, New York 13601
Phone: 315-785-2513
Fax: 315-785-2422

Design and Construction Oversight:

Dan Rothman, P.E.
URS Corporation
282 Delaware Avenue
Buffalo, New York 14202
Phone: 716-856-5636
Fax: 716-856-2545

Construction:

Robert E. McPeak, Jr., P.E.
Scientech
44 Shelter Rock Road
Danbury, Connecticut 06810
Phone: 203-796-5300
Fax: 203-796-5045

1.3 System Overview

The groundwater collection and treatment system at the Northeast Alloys and Metals site is composed of the following elements:

- Collection trench
- Collection sump with pumps, sampling ports, and flow meters
- Blowers
- Treatment manhole
- System controls
- Discharge piping

A brief description of the operation and maintenance of each item is provided below. Appendix K contains drawings that show the system and its components. Additional information can also be obtained from the manuals and guides located in Appendices F through I.

1.3.1 Collection Trench

A stone-filled collection trench intercepts groundwater flowing northward across the site. The trench is approximately 255 feet long and includes two legs that extend from a central collection sump as shown on the record drawings (Appendix K). The depth of the trench varies from 14' to 18'. A perforated pipe at the bottom of the trench carries intercepted groundwater to the collection sump. The stone portion of the trench is wrapped in geotextile fabric to prevent silt and fines from clogging the collection trench.

The perforated pipe at the trench bottom is constructed with three cleanouts that provide access for cleaning. Two piezometers are located along the collection pipe for measuring the depth of water in the trench. These also are shown in the drawings in Appendix K.

1.3.2 Collection Sump with Pumps

A collection sump is located at the intersection of the two legs of the trench. Both sections of perforated pipes are sloped to drain to the sump, which is the lowest elevation of the trench. The sump is constructed of 18-inch diameter HDPE with a solid cap at the bottom. The bottom of the cap is approximately 20 feet below grade.

Two Grundfos submersible pumps are located in the collection sump to pump groundwater from the sump to the treatment manhole. The pumps are installed in the sump with pitless adapters. These adapters allow the pumps to be removed from the sump quickly and without disconnecting any piping. A shallow manhole is installed at the top of the collection sump to provide access to the pumps, pitless adapters, sampling ports, and the flow meters. To remove the pumps it is necessary to remove the power cord from the pump tubing, and then to reattach the cord as the pump is lowered back into the sump.

Each of the two submersible pumps has a separate discharge line into the treatment manhole. The discharge lines are equipped with a flow meter, installed on the line immediately upstream of a sampling port. This allows the total flow from each pump to be individually determined. A flow control valve is located on each line at the point where they discharge into the treatment manhole. Pump flow rates may be adjusted by opening or closing the valve.

1.3.3 System Blowers

The system includes two Rotron Regenerative blowers that are located in the treatment shed immediately southwest of the collection sump. These blowers are used to aerate the collected groundwater as it flows through the treatment manhole. These blowers are programmed to operate one at a time, with the second as a spare. Each blower is equipped with a vacuum relief valve, check valve, filter and silencer.

1.3.4 Treatment Manhole

The treatment manhole is a four-foot diameter concrete manhole with concrete baffles, an air diffuser manifold with bubble diffusers, and a discharge line that gravity drains to the sanitary sewer on the west side of Pitcher Street. The manhole is designed for groundwater to flow from the inlet line (from the collection sump on the east side) around the first baffle, over the diffuser manifold, around the second baffle, and then out the gravity discharge line (on the west side of the manhole).

Groundwater pumped from the collection sump enters the manhole at a depth of approximately four feet below ground. The discharge lines from the blowers are connected to bubble diffusers at the bottom of the manhole. Unions are provided so that this line can be disconnected, and the entire stainless steel diffuser assembly can be removed. The assembly riser pipe slides vertically into supports attached to the manhole wall, and a peg on the north side of the manhole floor.

1.3.5 System Controls

A control system for the entire collection and treatment system is located in the treatment shed. The system allows for both local and remote control of the system. The system includes a control panel with status lights to indicate:

- Sump pump high level alarms
- Groundwater treatment manhole high level alarms
- Blower 1 status (on-off-auto)
- Blower 2 status (on-off-auto)
- Pump 101 status (on-off-auto)
- Pump 102 status (on-off-auto)
- Reset button

Inside the control panel is the EOS control module that can be manually operated via the control pad beneath the LCD display. To the left of the control panel are the two flow transmitter panels to record flow from the submersible pumps. These are accessed manually via the control buttons beneath the LCD displays.

The EOS System may also be accessed by a compatible computer either on-site or from a remote location using a common telephone line. In order to obtain computer access, the following steps should be followed.

- Be sure that the computer is equipped with a modem connected to a telephone jack.

- Install the 3 program disks and 1 site file disk on the computer hard drive. When the ProView screen appears on the computer, select "File" - "Open." Open the "Site file." Select "Local communications" if you are on-site and "Remote communications" if you are off-site.

- Select "Dial number"

- Dial number and EOS screen appears.

- Additional detailed information regarding the operation of the EOS system is included in Appendix I.

1.3.6 Discharge Pipe

Treated groundwater is discharged from the treatment manhole through a 6-inch PVC line. The line drains by gravity into the County sewer line on the west side of Pitcher Street. The discharge line on the west side of the treatment manhole includes a vent, a house trap and a cleanout; all of which are accessible via riser pipes approximately 2' above grade. The line also includes a cleanout at the bottom of the embankment approximately 18' to the east of the eastern shoulder of Pitcher Street. The discharge line runs beneath Pitcher Street and connects to an existing sanitary sewer at a depth of approximately six feet below ground.

1.4 Operations

The groundwater collection and treatment system is designed to operate automatically, and without any need for operator input. For system operation, both of the groundwater pumps, and one of the blowers should be set to "auto" on the control panel. If started correctly, all of the pumps and blowers should operate as determined by the water levels in the trench, etc., and all of the alarms and shutdowns should function correctly.

To operate either the pumps or blowers without level control, set the switch on the control panel to "on." Please note however, that when set to "on," the equipment is outside of the control system, and will not shut down due to the low water levels and other alarm conditions. The "on" position should be used only for testing or maintenance purposes and not for routine operation of the systems.

1.5 Maintenance and Inspection Frequency

Table 1-1 summarizes maintenance and frequency requirements for the groundwater collection and treatment system. The general requirements are outlined below. Additional information regarding specific operations and maintenance requirements can be obtained from the equipment manuals, located in Appendices F through I.

Collection Trench

- Cleanouts located in the collection trench should be checked quarterly for large deposits of silt and sediment. If necessary, cleaning can be accomplished using portable pumps to flush high volumes of water through the system or by other methods available from professional sewer line cleaning companies.

Collection Sump with Pumps

- The sump should be checked annually to ensure that deposited sediments are not interfering with operation of the submersible pumps.

Table 1-1

Northeast Alloys and Metals

Summary of Equipment Maintenance Requirements

Component	Description	Manufacturer	Maintenance	Frequency	Comments
Collection Trench					
Cleanouts	Corrugated 6-inch Ø HDPE		Inspect for settling and clean	Quarterly	
Piezometers	0.010 Slot PVC		Monitor water levels	Quarterly	
Sump					
Sump	18-inch Ø Corrugated HDPE		Remove Sediment	As required	
Sump Pumps	Redi-Flo 4, 3450 rpm Submersible Pumps	Grundfos, Fresno, CA (559) 292-8000	Inspect	Quarterly	
Flow Meter	Signet 515/2536 Rotor-X Flow Sensor	+GF+ Signet, El Monte, CA (626) 571-2770	Inspect	Quarterly	See Appendix E
Flow Transmitter	Signet 8550 Flow Transmitter	+GF+ Signet, El Monte, CA (626) 571-2770	Inspect	Quarterly	See Appendix E
Pressure Transmitter	Model 516	Viatran, Grand Island, NY (800) 688-0030	Inspect	Quarterly	See Appendix E
Blowers					
Rotron Regenerative Blowers	Rotron DR808	AMETEK, Saugerties, NY (914) 246-3401	Replace sealed bearings	After 15,000 - 20,000 hours (2 years)	See Appendix C
Blower Filters	Solberg, FS-231P-250	Solberg, Itasca, IL (800) 451-0642	Replace filter	As required	See Appendix C
Vacuum Valves	Model 337	Kunkle, Black Mountain, NC (828) 669-3700	Inspect	Quarterly	See Appendix C
Check Valves	Style 5002	Technocheck, Erie, PA (814) 838-6963	Inspect	Quarterly	See Appendix C

Table 1-1

Northeast Alloys and Metals

Summary of Equipment Maintenance Requirements

Component	Description	Manufacturer	Maintenance	Frequency	Comments
Treatment Manhole					
Diffusers	Diffused Gas Technologies Model SS-1	Diffused Gas Technologies, Cincinnati, OH (513) 531-4426	Clean	Quarterly	
Inlet Lines	1¼-inch diameter PVC		Inspect	Annually	
System Controls					
Controls	EOS Series 2 Plus	EOS Research, Portsmouth, NH (603) 431-2371	Monitor performance data	Monthly	See Appendix F
Discharge Piping					
Pipe	6-inch Ø Schedule 80 PVC				
Cleanouts / Traps	6" Ø Sch 80 PVC with 6" cast iron house trap		Clean	Annually or as required	

J:\35618.04\Excel\[gw elevation table.xls]Table 1-1

- The pumps and the flow meters should be removed quarterly from the sump to ensure that they are clean and working properly. No other maintenance is required.

- The pressure transmitter should be removed quarterly and inspected for any buildup or corrosion.

Blowers

- Blower bearings are sealed and require no regular maintenance; however they should be replaced periodically as specified in the O&M Manual.

- Maintenance for the blower system includes periodically changing air filters and ensuring that the vacuum valves and check valves are operating properly. These items should be checked during each inspection to verify that there are no blockages or other problems.

- During all visits to the site, the blowers should be observed for any unusual noises or vibration

Treatment Manhole

- The inlet lines from the collection sump should be checked annually for blockage.

- The diffuser assembly should be removed quarterly and any blockage or buildup on the diffusers should be removed.

- The treatment manhole should be checked for the buildup of any sediment, and cleaned if necessary.

System Controls

- As long as the system is operating correctly, no maintenance is required.

Discharge Piping

- The discharge pipe, cleanouts, and traps should be inspected annually for the buildup of solids, and then cleaned as necessary. Cleaning for the discharge piping is the same as for the leachate collection pipe.

1.6 Manuals

Copies of the manufacturers information, manuals, and guides for the major system components has been included with the OM&M manual as Appendices F through I. Please refer to the table of contents to determine the location of a specific manual.

Note that additional information and replacement parts can be obtained from local suppliers and also via the Internet.

1.7 Warranties

Warranty information from the original equipment supplier has been included as Appendix J.

2.0 SYSTEM SAMPLING

The groundwater treatment system discharges treated water to the local sanitary sewer system under Groundwater Remediation Discharge Permit No. GW-055 with the Oneida County Sewer District (OCSD). Sampling of the treatment system effluent is limited only to that as required by the discharge permit for the facility. Complete sampling and monitoring requirements for the effluent are included in the permit, a copy of which has been included as Appendix B.

In addition to the permit required effluent sampling, a sample of the untreated influent to the system also will be analyzed.

2.1 Effluent Monitoring Parameters and Discharge Limitations

In accordance with the discharge permit, the treatment system must meet the following limitations for discharge:

PARAMETER	LIMIT
Total Flow (gal/month)	No Limit
Total VOCs	2.0 mg/L [1,2]
Mercury	0.2 mg/L [2,3]
Nickel	2.0 mg/L

Notes:

1. Total Volatile Organics is the sum of all detectable VOC substances as determined using EPA Method 624.

2. Individual VOCs and Mercury must not exceed concentrations listed in the TCLP regulation for RCRA Hazardous Waste (40 CFR 261.24, Table 1).

3. Future regulations for Mercury may become more stringent when the Great Lakes Initiative is implemented.

2.2 Effluent Monitoring and Reporting

Effluent monitoring and reporting will be as follows:

a) Within the first 90 days of operation, all permit parameters must be analyzed and a report submitted to the OCSD.

b) All permit parameters must be analyzed twice per year. Semi-annual reports are due to the OCSD on May 31 and November 30 of each year.

c) Monthly discharge flow tabulations must be submitted with the semi-annual monitoring reports.

The treated groundwater sample should be collected from the treatment manhole, at the mouth of the gravity discharge line.

2.3 Influent Sampling

Although not a requirement of any permit, it is important to monitor the contaminant concentrations in the collected groundwater, prior to treatment. Influent concentrations will be used to monitor any trends in contaminant concentrations over time, as well as to provide an estimate of the removal efficiency being achieved by the treatment manhole.

It is recommended that the system influent be sampled at the same time as the effluent samples are collected. The only analysis required for the influent sample is for TCL VOCs.

3.0 GROUNDWATER MONITORING

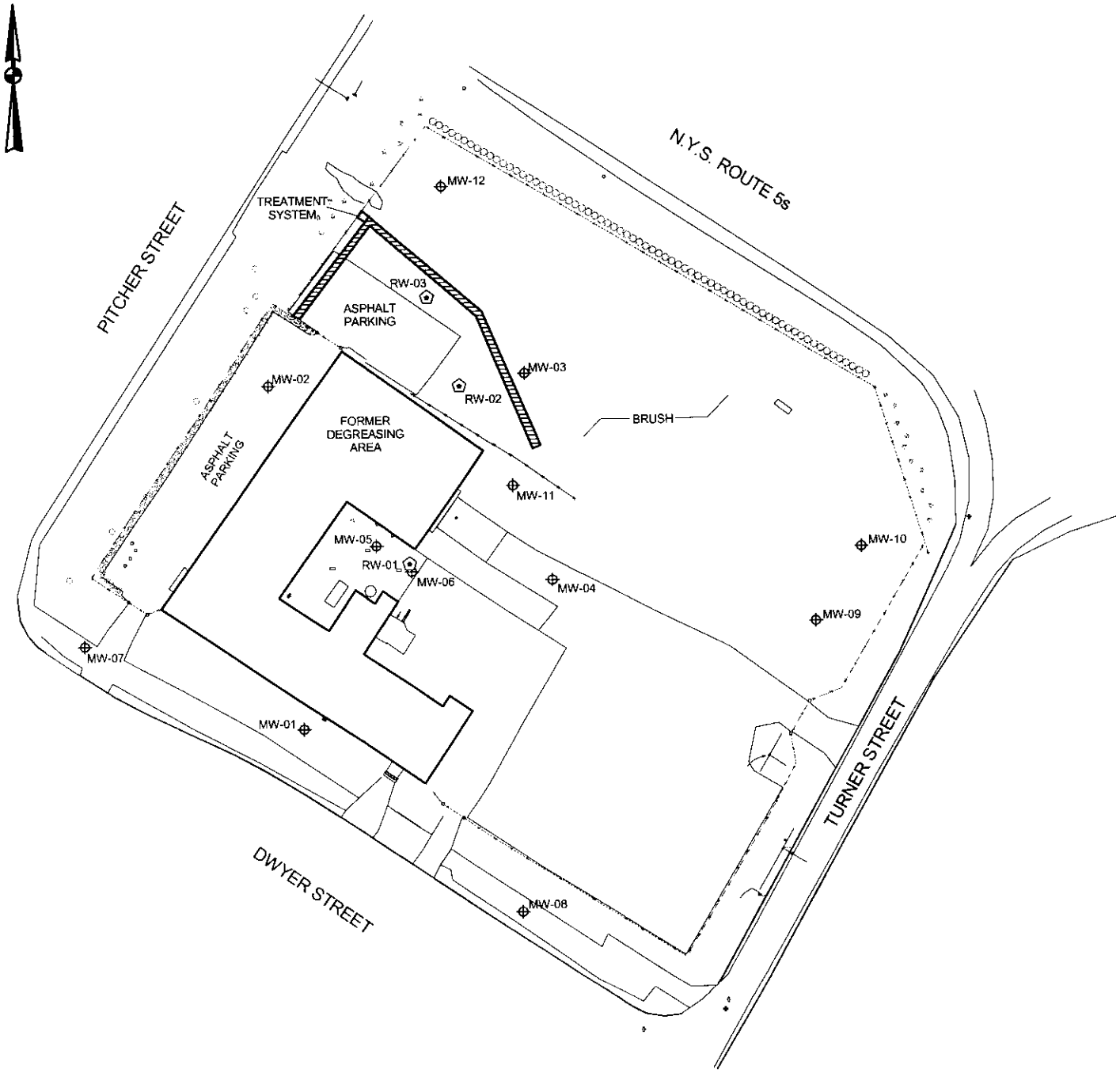
The purpose of the groundwater monitoring program is to assess the impact of the groundwater treatment system and to determine the long-term effectiveness of the site remedy. A network of 12 groundwater monitoring wells (MW-01 through MW-12) is in place at the Northeast Alloys and Metals site. Three recovery wells (RW-01 through RW-03) and several piezometers also have previously been installed.

3.1 Groundwater Analysis

For the purpose of monitoring the progress of remediation at the site, the twelve existing monitoring wells, MW-1 through MW-12 should periodically be sampled and analyzed. Monitoring well locations are shown on Figure 3-1. All groundwater samples will be analyzed only for Target Compound List (TCL) volatile organic compounds (VOCs), using the latest version of the NYSDEC ASP methods. ASP Category A deliverables should be provided by the analytical laboratory. Samples should be collected and analyzed following standard NYSDEC procedures or as outlined in the *Remedial Design – Pre-Design Investigation Work Plan*, prepared by URS.

During the first year of operation, samples will be collected quarterly, in the months of February, May, August, and November. Following the first year, the samples will be collected twice per year. Sampling during the months of May and November is recommended to indicate site contaminant concentrations associated with springtime and late fall hydrological conditions, typically representative of high and low water table elevations, respectively.

All groundwater results should be compared to the latest version of the *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, Division of Water Technical and Operational Guidance Series (1.1.1). Table 3-1 shows the existing limitations for those contaminants most likely to exceed the criteria based on previous analytical data. Based on the groundwater analysis, maps should be prepared to estimate the extent of the contaminant plume.



Legend

- Monitoring Well
- Recovery Well
- Groundwater Collection Trench (Approximate Location)

100 0 100 Feet

URS	NORTH EAST ALLOYS AND METALS MONITORING WELL LOCATIONS	FIGURE 3-1

L:\35618.02\dp\Gis\2001\northeast.apr MONITORING WELL/SAMPLING LOCATIONS 10/3/2001

Table 3-1

Northeast Alloys and Metals
Summary of Common Site Groundwater Contaminants and Limitations

Contaminant	**Water Quality Criteria** (µg/L)
1,1,1-Trichloroethane	5
1,1,2-Trichloroethane	1
1,1-Dichloroethane	5
1,1-Dichloroethene	5
1,2-Dichloroethane	0.6
1,2-Dichloroethene	5
Benzene	1
Chlorobenzene	5
Ethylbenzene	5
Methylene Chloride	5
Toluene	5
Trichloroethene	5
Vinyl Chloride	2
Xylene	5

Source: NYSDEC. 1998. Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Following the first or second year of sample analysis, the list of wells to be sampled should be re-evaluated. Upgradient wells, and wells that consistently meet the water quality standards, may be sampled less frequently or dropped from the sampling program.

3.2 Water Elevations

In addition to collection of samples for analysis, water levels should be measured at least quarterly at all monitoring wells and recovery wells. Table 3-2 includes the survey information for the existing monitoring wells and piezometers.

Based on the measured groundwater elevations, groundwater contour maps should periodically be prepared. These maps should be used to evaluate the groundwater flow directions and capture zone of the groundwater collection trench. The extent of the capture zone should be compared to the estimated extent of the groundwater contaminant plume.

3.3 Laboratory

All groundwater samples should be sent to a laboratory which is Environmental Laboratory Approval Program (ELAP) certified for the contaminants of concern for analysis. Approximately one week prior to sample collection, the laboratory should be contacted to obtain the sample containers as required for the upcoming event. After collection, the samples should be stored on ice at 4° C and then dropped off, or shipped via overnight delivery to the laboratory.

3.4 Recent Groundwater Monitoring

On July 5 and 6, 2001, under the direction of Peter Ouderkirk from the NYSDEC, personnel from URS collected groundwater samples from ten of the monitoring wells located at the site. Groundwater elevations also were measured at all of the monitoring well locations.

Figure 3-2 shows the groundwater elevation contours plotted from the data collected during the sampling event. Note that the contours in the immediate vicinity of the groundwater collection trench are estimated, based on the bottom elevation of the trench, and assuming that the trench effectively dewaters groundwater to that level. The data show that the trench is effectively intercepting any contaminated groundwater that is potentially migrating away from the site.

The results of the groundwater analysis are shown on Table 3-3 and summarized on Figure 3-3. During this sampling event, no contaminants above Class GA groundwater criteria were detected in the monitoring wells downgradient of the collection trench, i.e., MW-03 and MW-12. The results of the July 2001 sampling event are relatively consistent with the findings of previous sampling events. The courtyard area remains the most highly contaminated portion of the site. These results will serve as a baseline for comparison to future sampling events.

Legend

- Monitoring Well
- Recovery Well
- Groundwater Collection Trench (Approximate Location)
- 428 Groundwater Elevation Contour

MW-01, 428.81
Location ID — Groundwater Elevation (ft amsl)

100 0 100 Feet

URS

NORTH EAST ALLOYS AND METALS
GROUNDWATER ELEVATION CONTOUR MAP
(JULY 5, 2001)

FIGURE 3-2

L:\35618.02\dbiGis\2001\northeast.apr 07/05/01(W/TRENCH) GROUNDWATER ELEVATION CONTOUR MAP
07/23/2001

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-01	MW-02	MW-02	MW-03	MW-03
Sample ID			NEA-MW1	NEA-MW2	MW-02	NEA-MW3	MW-03
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	04/12/99	07/06/01	04/09/99	07/06/01
Parameter	**Units**	**Criteria***					
Volatiles							
1,1,1-Trichloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	UG/L	5	NA	NA	10 U	NA	10 U
1,1,2-Trichloroethane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	UG/L	5	10 U	10 U	10 U	1 J	10 U
1,1-Dichloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	UG/L	5	NA	NA	10 UJ	NA	10 UJ
1,2-Dibromo-3-chloropropane	UG/L	0.04	NA	NA	10 U	NA	10 U
1,2-Dibromoethane	UG/L	-	NA	NA	10 U	NA	10 U
1,2-Dichlorobenzene	UG/L	3	NA	NA	10 U	NA	10 U
1,2-Dichloroethane	UG/L	0.6	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (cis)	UG/L	5	NA	NA	10 U	NA	0.8 J
1,2-Dichloroethene (total)	UG/L	5	10 U	10 U	NA	2 J	NA
1,2-Dichloroethene (trans)	UG/L	5	NA	NA	10 U	NA	10 U
1,2-Dichloropropane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	UG/L	3	NA	NA	10 U	NA	10 U
1,4-Dichlorobenzene	UG/L	3	NA	NA	10 U	NA	10 U
2-Hexanone	UG/L	50	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	UG/L	-	10 U	10 U	10 U	10 U	10 U
Acetone	UG/L	50	10 U	10 U	10 U	10 U	10 U
Benzene	UG/L	1	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-01	MW-02	MW-02	MW-03	MW-03
Sample ID			NEA-MW1	NEA-MW2	MW-02	NEA-MW3	MW-03
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	04/12/99	07/06/01	04/09/99	07/06/01
Parameter	**Units**	**Criteria***					
Volatiles							
Bromoform	UG/L	50	10 U	10 UJ	10 U	10 U	10 U
Bromomethane	UG/L	5	10 UJ	10 U	10 U	10 UJ	10 U
Carbon Disulfide	UG/L	60	10 U	10 U	10 UJ	10 U	10 UJ
Carbon Tetrachloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Methyl acetate	UG/L	-	NA	NA	10 U	NA	10 U
Chlorobenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroform	UG/L	7	10 U	10 U	10 U	10 U	10 U
Chloromethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	UG/L	5	NA	NA	10 U	NA	10 U
Ethylbenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Isopopylbenzene	UG/L	5	NA	NA	10 U	NA	10 U
Methyl Ethyl Ketone (2-Butanone)	UG/L	50	10 U	10 U	10 U	10 U	10 U
Methyl tert-butyl ether	UG/L	10	NA	NA	10 U	NA	10 U
Methylcyclohexane	UG/L	-	NA	NA	10 U	NA	10 U
Methylene Chloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Styrene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Toluene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Trichloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	UG/L	5	NA	NA	10 U	NA	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-01	MW-02	MW-02	MW-03	MW-03
Sample ID			NEA-MW1	NEA-MW2	MW-02	NEA-MW3	MW-03
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	04/12/99	07/06/01	04/09/99	07/06/01
Parameter	**Units**	**Criteria***					
Volatiles							
Vinyl Chloride	UG/L	2	10 U	10 U	10 U	25	10 U
Xylene (total)	UG/L	5	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U
Cyclohexane	UG/L	-	NA	NA	10 U	NA	10 U
trans-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

(oval) Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-04	MW-04	MW-05	MW-05	MW-06
Sample ID			NEA-MW4	MW-04	NEA-MW5	MW-05	NEA-MW6
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/09/99	07/06/01	04/09/99	07/06/01	04/09/99
Parameter	Units	Criteria*					
Volatiles							
1,1,1-Trichloroethane	UG/L	5	10 U	1 NJ	12	10	5,200 D
1,1,2,2-Tetrachloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	UG/L	5	NA	10 U	NA	10 U	NA
1,1,2-Trichloroethane	UG/L	1	10 U	10 U	10 U	3 J	4 J
1,1-Dichloroethane	UG/L	5	10 U	10 U	30	54	3,200 D
1,1-Dichloroethene	UG/L	5	10 U	10 U	10 U	1 J	200 J
1,2,4-Trichlorobenzene	UG/L	5	NA	10 UJ	NA	10 UJ	NA
1,2-Dibromo-3-chloropropane	UG/L	0.04	NA	10 U	NA	10 U	NA
1,2-Dibromoethane	UG/L	-	NA	10 U	NA	3 J	NA
1,2-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
1,2-Dichloroethane	UG/L	0.6	10 U	10 U	10 U	1 J	4 J
1,2-Dichloroethene (cis)	UG/L	5	NA	9 NJ	NA	370 D	NA
1,2-Dichloroethene (total)	UG/L	5	10 U	NA	110	NA	19,000 D
1,2-Dichloroethene (trans)	UG/L	5	NA	10 U	NA	2 J	NA
1,2-Dichloropropane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
1,4-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
2-Hexanone	UG/L	50	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	UG/L	-	10 U	10 U	10 U	10 U	10 U
Acetone	UG/L	50	10 U	10 U	10 U	10 U	10 U
Benzene	UG/L	1	10 U	10 U	10 U	10 U	1 J
Bromodichloromethane	UG/L	50	10 U	10 U	10 U	0.4 J	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-04	MW-04	MW-05	MW-05	MW-06
Sample ID			NEA-MW4	MW-04	NEA-MW5	MW-05	NEA-MW6
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/09/99	07/06/01	04/09/99	07/06/01	04/09/99
Parameter	**Units**	**Criteria***					
Volatiles							
Bromoform	UG/L	50	10 UJ	10 U	10 UJ	3 J	10 UJ
Bromomethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	UG/L	60	10 U	10 UJ	10 U	10 UJ	10 U
Carbon Tetrachloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Methyl acetate	UG/L	-	NA	10 U	NA	10 U	NA
Chlorobenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroethane	UG/L	5	10 U	10 U	10 U	0.7 J	2 J
Chloroform	UG/L	7	10 U	10 U	10 U	0.2 J	10 U
Chloromethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	UG/L	5	NA	10 U	NA	10 U	NA
Ethylbenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Isopopylbenzene	UG/L	5	NA	10 U	NA	0.2 J	NA
Methyl Ethyl Ketone (2-Butanone)	UG/L	50	10 U	10 U	10 U	10 U	3 J
Methyl tert-butyl ether	UG/L	10	NA	10 U	NA	2 J	NA
Methylcyclohexane	UG/L	-	NA	10 U	NA	0.8 J	NA
Methylene Chloride	UG/L	5	10 U	10 U	10 U	0.7 J	2 J
Styrene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Toluene	UG/L	5	10 U	10 U	10 U	10 U	1 J
Trichloroethene	UG/L	5	10 U	10 U	500 D	330 D	230 J
Trichlorofluoromethane	UG/L	5	NA	10 U	NA	10 U	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-04	MW-04	MW-05	MW-05	MW-06
Sample ID			NEA-MW4	MW-04	NEA-MW5	MW-05	NEA-MW6
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/09/99	07/06/01	04/09/99	07/06/01	04/09/99
Parameter	**Units**	**Criteria***					
Volatiles							
Vinyl Chloride	UG/L	2	10 U	10 U	23	19	950 J
Xylene (total)	UG/L	5	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U
Cyclohexane	UG/L	-	NA	10 U	NA	10 U	NA
trans-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	1 J	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

(oval) *Concentration Exceeds Criteria.*

NA - Not Analyzed

Detection Limits shown are PQL

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[MATRIX] = 'WG' AND [PRCCODE] = 'VOA' AND [SAMPNO] <> '2' AND [LOCID] <> 'CARBFILERF'

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-06	MW-07	MW-08	MW-09	MW-09
Sample ID			MW-06	NEA-MW7	NEA-MW8	NEA-MW9	MW-09
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/12/99	04/12/99	04/12/99	07/06/01
Parameter	Units	Criteria*					
Volatiles							
1,1,1-Trichloroethane	UG/L	5	1,600 D	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	UG/L	5	10 U	NA	NA	NA	10 U
1,1,2-Trichloroethane	UG/L	1	3 J	10 U	10 U	10 U	10 U
1,1-Dichloroethane	UG/L	5	2,900 D	10 U	10 U	10 U	10 U
1,1-Dichloroethene	UG/L	5	110	10 U	10 U	2 J	0.7 J
1,2,4-Trichlorobenzene	UG/L	5	10 UJ	NA	NA	NA	10 UJ
1,2-Dibromo-3-chloropropane	UG/L	0.04	10 U	NA	NA	NA	10 U
1,2-Dibromoethane	UG/L	-	10 U	NA	NA	NA	10 U
1,2-Dichlorobenzene	UG/L	3	10 U	NA	NA	NA	10 U
1,2-Dichloroethane	UG/L	0.6	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (cis)	UG/L	5	18,000 D	NA	NA	NA	97
1,2-Dichloroethene (total)	UG/L	5	NA	10 U	10 U	230	NA
1,2-Dichloroethene (trans)	UG/L	5	35	NA	NA	NA	6 J
1,2-Dichloropropane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	UG/L	3	10 U	NA	NA	NA	10 U
1,4-Dichlorobenzene	UG/L	3	10 U	NA	NA	NA	10 U
2-Hexanone	UG/L	50	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	UG/L	-	10 U	10 U	10 U	10 U	10 U
Acetone	UG/L	50	10 U	10 U	10 U	10 U	10 U
Benzene	UG/L	1	0.9 J	10 U	10 U	10 U	10 U
Bromodichloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-06	MW-07	MW-08	MW-09	MW-09
Sample ID			MW-06	NEA-MW7	NEA-MW8	NEA-MW9	MW-09
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/12/99	04/12/99	04/12/99	07/06/01
Parameter	**Units**	**Criteria***					
Volatiles							
Bromoform	UG/L	50	10 U	10 UJ	10 UJ	10 UJ	10 U
Bromomethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	UG/L	60	10 UJ	10 U	10 U	10 U	10 UJ
Carbon Tetrachloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Methyl acetate	UG/L	-	10 U	NA	NA	NA	10 U
Chlorobenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroethane	UG/L	5	34	10 U	10 U	10 U	10 U
Chloroform	UG/L	7	10 U	10 U	10 U	10 U	10 U
Chloromethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	UG/L	5	10 U	NA	NA	NA	10 U
Ethylbenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Isopopylbenzene	UG/L	5	10 U	NA	NA	NA	10 U
Methyl Ethyl Ketone (2-Butanone)	UG/L	50	10 U	10 U	10 U	10 U	10 U
Methyl tert-butyl ether	UG/L	10	10 U	NA	NA	NA	10 U
Methylcyclohexane	UG/L	-	10 U	NA	NA	NA	10 U
Methylene Chloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Styrene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Toluene	UG/L	5	1 J	10 U	10 U	10 U	10 U
Trichloroethene	UG/L	5	240 DJ	10 U	10 U	72	25
Trichlorofluoromethane	UG/L	5	10 U	NA	NA	NA	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

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[MATRIX] = 'WG' AND [PRCCODE] = 'VOA' AND [SAMPNO] <> 'Z' AND [LOCID] <> 'CARBFILEFF'

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-06	MW-07	MW-08	MW-09	MW-09
Sample ID			MW-06	NEA-MW7	NEA-MW8	NEA-MW9	MW-09
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/12/99	04/12/99	04/12/99	07/06/01
Parameter	**Units**	**Criteria***					
Volatiles							
Vinyl Chloride	UG/L	2	870 DJ	10 U	10 U	3 J	50
Xylene (total)	UG/L	5	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U
Cyclohexane	UG/L	-	10 U	NA	NA	NA	10 U
trans-1,3-*Dichloropropene*	UG/L	0.4	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are *PQL*

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-10	MW-10	MW-11	MW-11	MW-12
Sample ID			NEA-MW10	MW-10	NEA-MW11	MW-11	NEA-MW12
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	07/06/01	04/12/99	07/06/01	04/12/99
Parameter	Units	Criteria*					
Volatiles							
1,1,1-Trichloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	UG/L	5	NA	10 U	NA	10 U	NA
1,1,2-Trichloroethane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	UG/L	5	NA	10 UJ	NA	10 UJ	NA
1,2-Dibromo-3-chloropropane	UG/L	0.04	NA	10 U	NA	10 U	NA
1,2-Dibromoethane	UG/L	-	NA	10 U	NA	10 U	NA
1,2-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
1,2-Dichloroethane	UG/L	0.6	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (cis)	UG/L	5	NA	10 U	NA	1 J	NA
1,2-Dichloroethene (total)	UG/L	5	10 U	NA	10 U	NA	10 U
1,2-Dichloroethene (trans)	UG/L	5	NA	10 U	NA	10 U	NA
1,2-Dichloropropane	UG/L	1	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
1,4-Dichlorobenzene	UG/L	3	NA	10 U	NA	10 U	NA
2-Hexanone	UG/L	50	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	UG/L	-	10 U	10 U	10 U	10 U	10 U
Acetone	UG/L	50	50	10 U	10 U	10 U	1 J
Benzene	UG/L	1	10 U	10 U	10 U	10 U	2 J
Bromodichloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-10	MW-10	MW-11	MW-11	MW-12
Sample ID			NEA-MW10	MW-10	NEA-MW11	MW-11	NEA-MW12
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	07/06/01	04/12/99	07/06/01	04/12/99
Parameter	**Units**	**Criteria***					
Volatiles							
Bromoform	UG/L	50	10 U	10 U	10 U	10 U	10 U
Bromomethane	UG/L	5	10 UJ	10 U	10 U	10 U	10 U
Carbon Disulfide	UG/L	60	10 U	10 UJ	10 U	10 UJ	10 U
Carbon Tetrachloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Methyl acetate	UG/L	-	NA	10 U	NA	10 U	NA
Chlorobenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Chloroform	UG/L	7	10 U	10 U	10 U	10 U	10 U
Chloromethane	UG/L	5	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	UG/L	50	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	UG/L	5	NA	10 U	NA	10 U	NA
Ethylbenzene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Isopopylbenzene	UG/L	5	NA	10 U	NA	10 U	NA
Methyl Ethyl Ketone (2-Butanone)	UG/L	50	10 U	10 U	10 U	10 U	10 U
Methyl tert-butyl ether	UG/L	10	NA	10 U	NA	10 U	NA
Methylcyclohexane	UG/L	-	NA	10 U	NA	10 U	NA
Methylene Chloride	UG/L	5	10 U	10 U	10 U	10 U	10 U
Styrene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Toluene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Trichloroethene	UG/L	5	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	UG/L	5	NA	10 U	NA	10 U	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-10	MW-10	MW-11	MW-11	MW-12
Sample ID			NEA-MW10	MW-10	NEA-MW11	MW-11	NEA-MW12
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			04/12/99	07/06/01	04/12/99	07/06/01	04/12/99
Parameter	Units	Criteria*					
Volatiles							
Vinyl Chloride	UG/L	2	10 U	10 U	10 U	10 U	4 J
Xylene (total)	UG/L	5	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U
Cyclohexane	UG/L	-	NA	10 U	NA	10 U	NA
trans-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	10 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

TABLE 3-3
ANALYTICAL GROUNDWATER SAMPLE RESULTS
NORTH EAST ALLOYS

Location ID			MW-12	RW-01	RW-01	RW-02	RW-03
Sample ID			MW-12	NEA-RW1	RW-01	NEA-RW2	NEA-RW3
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/09/99	07/06/01	04/09/99	04/09/99
Parameter	Units	Criteria*					
Volatiles							
1,1,1-Trichloroethane	UG/L	5	10 U	110	62 J	10 U	10 U
1,1,2,2-Tetrachloroethane	UG/L	5	10 U	10 U	100 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	UG/L	5	10 U	NA	100 U	NA	NA
1,1,2-Trichloroethane	UG/L	1	10 U	10 U	100 U	10 U	10 U
1,1-Dichloroethane	UG/L	5	10 U	130	170	10 U	10 U
1,1-Dichloroethene	UG/L	5	10 U	14	15 J	10 U	10 U
1,2,4-Trichlorobenzene	UG/L	5	10 UJ	NA	100 U	NA	NA
1,2-Dibromo-3-chloropropane	UG/L	0.04	10 U	NA	100 U	NA	NA
1,2-Dibromoethane	UG/L	-	10 U	NA	100 U	NA	NA
,2-Dichlorobenzene	UG/L	3	10 U	NA	100 U	NA	NA
1,2-Dichloroethane	UG/L	0.6	10 U	10 U	100 U	10 U	10 U
1,2-Dichloroethene (cis)	UG/L	5	10 U	NA	1,500	NA	NA
1,2-Dichloroethene (total)	UG/L	5	NA	1,200 D	NA	120	10 U
1,2-Dichloroethene (trans)	UG/L	5	10 U	NA	10 J	NA	NA
1,2-Dichloropropane	UG/L	1	10 U	10 U	100 U	10 U	10 U
1,3-Dichlorobenzene	UG/L	3	10 U	NA	100 U	NA	NA
1,4-Dichlorobenzene	UG/L	3	10 U	NA	100 U	NA	NA
2-Hexanone	UG/L	50	10 U	10 U	100 U	10 U	10 U
4-Methyl-2-Pentanone	UG/L	-	10 U	10 U	100 U	10 U	10 U
Acetone	UG/L	50	10 U	10 U	100 U	10 U	9 J
Benzene	UG/L	1	1 J	10 U	100 U	10 U	15
Bromodichloromethane	UG/L	50	10 U	10 U	100 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

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Concentration Exceeds Criteria.

NA - Not Analyzed

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Sample ID			MW-12	NEA-RW1	RW-01	NEA-RW2	NEA-RW3
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/09/99	07/06/01	04/09/99	04/09/99
Parameter	Units	Criteria*					
Volatiles							
Bromoform	UG/L	50	10 U	10 UJ	14 J	10 U	10 UJ
Bromomethane	UG/L	5	10 U	10 U	100 UJ	10 UJ	10 U
Carbon Disulfide	UG/L	60	10 UJ	10 U	100 U	10 U	10 U
Carbon Tetrachloride	UG/L	5	10 U	10 U	100 U	10 U	10 U
Methyl acetate	UG/L	-	10 U	NA	100 U	NA	NA
Chlorobenzene	UG/L	5	10 U	10 U	100 U	10 U	6 J
Chloroethane	UG/L	5	10 U	10 U	100 UJ	10 U	10 U
Chloroform	UG/L	7	10 U	10 U	100 U	10 U	10 U
Chloromethane	UG/L	5	10 U	10 U	100 UJ	10 U	10 U
Dibromochloromethane	UG/L	50	10 U	10 U	100 U	10 U	10 U
Dichlorodifluoromethane	UG/L	5	10 U	NA	100 UJ	NA	NA
Ethylbenzene	UG/L	5	10 U	10 U	100 U	10 U	36
Isopopylbenzene	UG/L	5	10 U	NA	100 U	NA	NA
Methyl Ethyl Ketone (2-Butanone)	UG/L	50	10 U	10 U	100 U	10 U	4 J
Methyl tert-butyl ether	UG/L	10	10 U	NA	12 J	NA	NA
Methylcyclohexane	UG/L	-	10 U	NA	100 U	NA	NA
Methylene Chloride	UG/L	5	10 U	10 U	100 U	10 U	9 J
Styrene	UG/L	5	10 U	10 U	100 U	10 U	10 U
Tetrachloroethene	UG/L	5	10 U	10 U	100 U	10 U	10 U
Toluene	UG/L	5	10 U	10 U	100 U	10 U	72
Trichloroethene	UG/L	5	10 U	1,500 D	1,200	7 J	10 U
Trichlorofluoromethane	UG/L	5	10 U	NA	100 U	NA	NA

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

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Location ID			MW-12	RW-01	RW-01	RW-02	RW-03
Sample ID			MW-12	NEA-RW1	RW-01	NEA-RW2	NEA-RW3
Matrix			Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Depth Interval (ft)			-	-	-	-	-
Date Sampled			07/06/01	04/09/99	07/06/01	04/09/99	04/09/99
Parameter	Units	Criteria*					
Volatiles							
Vinyl Chloride	UG/L	2	10 U	69	130 J	29	10 U
Xylene (total)	UG/L	5	10 U	10 U	100 U	10 U	380
cis-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	100 U	10 U	10 U
Cyclohexane	UG/L	-	10 U	NA	100 U	NA	NA
trans-1,3-Dichloropropene	UG/L	0.4	10 U	10 U	100 U	10 U	10 U

*Criteria- NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June 1998, Revised April 2000, Class GA.

Flags assigned during chemistry validation are shown.

Concentration Exceeds Criteria.

NA - Not Analyzed

Detection Limits shown are PQL

4.0 SNOW PLOWING

During the winter months, there is significant snowfall at the Northeast Alloys and Metals site. Since the site is currently unoccupied, and since the groundwater collection and treatment facilities are located at the interior of the site, the NYSDEC will be responsible for maintaining vehicular access to the site. Clear access must be maintained both for routine maintenance activities, as well as for emergency access to the site.

It is expected that vehicular access will be via the gate at the southwest corner of the site, near the intersection of Pitcher and Dwyer Streets. From this gate, a swath should be plowed directly northward to the vicinity of the treatment plant. The total length of plowing is approximately 350 feet. At a minimum, the drive should be plowed once per week, or as often as can be arranged with the NYSDEC operations group.

Activities to be conducted for snow plowing include:

- In early October, install flags or brightly painted stakes (minimum 3 feet above ground) at all monitoring wells, cleanouts, and piezometers across the site. Indicate the identification of the well or piezometer on the stake.

- Ensure that the area to be plowed is clear of debris and other materials that may hamper plowing efforts. Mark or flag all structures that could potentially be damaged by a snowplow (e.g., the collection sump and treatment manhole).

- Arrange with the local NYSDEC operations group to provide plowing service for the site.

- Verify that the plowing personnel have all keys required to access the site.

- Verify that the plowing personnel are aware of the area to be plowed, and of the location of the treatment facility.

Snow Plow Contact Person:

Gary Vanderneut
NYSDEC, Herkimer - Sub Office
225 North Main Street
Herkimer, New York 13350

Phone: (315) 866-6330

5.0 MOWING / TRIMMING (WEED EATING)

Periodic mowing and trimming will be required to maintain clear access to the treatment system and its components. Since the site is currently unoccupied, and since the groundwater collection and treatment facilities are located at the interior of the site, the NYSDEC will be responsible to maintain the areas surrounding the treatment facilities.

Grass and brush will be periodically cut to allow personnel to access the site for maintenance, and to prevent the system components from being overrun and obscured. It is expected that the site will be mown a minimum of once per month during the growing season. If this is not adequate, the frequency of mowing should be increased.

The area to be maintained includes: the access road to the site, the area surrounding the treatment building and manholes, and the length of the collection trench. After mowing, the grass should be trimmed from around the treatment building, manholes, and the piezometers and cleanouts along the collection trench.

Activities to be included for mowing include:

- In early spring, ensure that all piezometers and wells are clearly marked and visible in the area to be maintained.
- Ensure that the area to be mown is clear of rocks, debris, and other material that may interfere with mowing.
- Arrange with the local NYSDEC operations group to schedule mowing service for the site.
- Verify that the maintenance personnel have all keys required to access the site.
- Verify that the maintenance personnel know the extent of the site to be mown.

Mowing Contact Person:

Gary Vanderneut
NYSDEC, Herkimer - Sub Office
225 North Main Street
Herkimer, New York 13350

Phone: (315) 866-6330

6.0 UTILITIES

Only two utilities are associated with the operation of the groundwater collection and treatment system, electric for operation of the system, and the local Publicly Owned Treatment Works (POTW) for discharge of the treated water.

6.1 Electric

Electric power to the site is provided by Niagara Mohawk. Power is provided, and most of the equipment operates, on 460 Volt, 3 phase, 60 Hertz. The control system operates on 115 Volt, 1 phase, 60 Hertz.

Billing information for the site:

Account Number:	23830-1401705
Address:	2145 Dwyer Avenue, Utica, New York 13501
Billing Address:	NYSDEC, 625 Broadway, 11th Floor, Albany, New York, 12233-7014, Attn: Gerald J. Rider, Jr.
Phone Number:	(518) 457-9640

Bills for the site are currently being sent to ***Gerald J. Rider, Jr.,*** in the Bureau of Hazardous Site Control, Division of Environmental Remediation.

6.2 POTW

The groundwater treatment system discharges treated water to the local sanitary sewer system under Groundwater Remediation Discharge Permit No. GW-055 with the Oneida County Sewer District (OCSD). The discharge manhole is located directly west of the treatment plant, on the far side of Pitcher Street. Please note that the OCSD is only responsible for the treatment of the water discharged from the treatment system. The City of Utica is responsible for the sewer system that transports the groundwater to the OCSD, and should be contacted in the event that any changes are proposed to the sewer connection.

The OCSD should be contacted for approval prior to any modifications to the treatment system and/or the water being treated by the system. Additional information and requirements of the OCSD are included in the permit, Appendix B to this OM&M manual.

The contact person for the OCSD:

R. D. Hoffman, Industrial Waste Chemist
Oneida County Department of Water Quality and Water Pollution Control
51 Leland Avenue, PO Box 442, Utica, New York 13503-0442
Phone: 315-798-5656
Fax: 315-724-9812
Permit No: GW-055

Bills for the site are currently being sent to ***Susan M. Lasdin, P.E.,*** in the Bureau of Hazardous Site Control, Division of Environmental Remediation.

7.0 PHONE SYSTEM

The groundwater collection and treatment system includes an operation and control system supplied by EOS Research Ltd. One important feature of the system is the ability to remotely monitor and control the operation of the treatment system.

7.1 Components

The major component of the monitoring system is the EOS ProControl Series 2 Plus. This telemonitoring and control unit serves several functions:

- Programmable logic control (PLC) that supervises and controls the operation of the system, interfacing with all of the electrical devices.
- Remote control and monitoring of the system via a modem link.
- Fax and pager reporting to provide periodic status reports and to alert operators to alarm conditions.
- Datalogging capability to record and store operating conditions and data in memory for trending and reporting purposes.

EOS ProView software is used to provide an interface with the ProControl unit. The ProView allows the user to:

- Monitor system sensors
- Control system inputs and outputs
- Change the operation of the system
- View and change the system setup
- Extract logged data from the memory of the unit

Additional information regarding the components of the control system, as well as the User's Guides and Manuals, is included in the System Manual, included with this manual as Appendix F.

The ProView software is presently being maintained by ***Susan M. Lasdin, P.E.,*** in the Bureau of Hazardous Site Control, Division of Environmental Remediation.

7.2 Phone Number

The system phone number is required in order to remotely call into the control system. The phone number for the control system is (315) 733-7209. Other modem connection and setting information is included in the ProView software.

7.3 Contacts

The control system can be programmed to send out routine and alarm fax messages, as well as pager messages, to two phone numbers each. Each of these is programmed via the ProView software as outlined in the User's Guide.

The system is presently programmed to contact the following fax numbers:

Jack Marsch (315) 793-2748

The system is not presently programmed to contact any pager numbers.

Peter S. Ouderkirk, P.E.
NYSDEC – Region 6
7th Floor – Environmental Quality
317 Washington Street
Watertown, New York 13601
Phone: 315-785-2513
Fax: 315-785-2422

Oneida County Department of Water Quality and Water Pollution Control

The Oneida County Groundwater Discharge Permit requires that monitoring reports and certification statements be submitted on a semi-annual basis. Reports are due on May 31 and November 30 of each year. Approximately two months prior to these due dates, Oneida County sends a reminder to the permit holder, presently Susan M. Lasdin, P.E., of the NYSDEC.

Two forms are submitted as the report. One is the *Oneida County Sewer District Reporting Form*, on which the total flow and the results of the discharge sample analysis are reported. Monthly flow totals and reports from the analytical laboratory must be attached with this report. The analytical data submitted must include a method reference and chain of custody information.

The second form to be submitted is the *Oneida County Sewer District Industrial User Report Certification*. This form is just completed and signed to certify that the treatment system is meeting (or not meeting) the discharge requirements.

Copies of both forms are included with the permit, Appendix B.

Completed forms should be addressed to:

Attn: Pretreatment
Oneida County Sewer District
P.O. Box 442
Utica, New York 13503

8.0 REPORTING

Standard forms will be used to record the results of routine inspections, monitoring, and maintenance activities at the site. Copies of all forms have been included as Appendix C. These forms should be completed, as appropriate, after any activities occur at the site.

8.1 Reports

During the first year of operation, quarterly reports should be prepared to document the operation of the remedial systems. Following the first year, these reports should be prepared semi-annually (i.e., following all analytical events at the site).

An annual report also should be prepared to summarize the operation of the remedial system over an entire year. The annual report should contain all data measurements, maps, tables, etc. from the quarterly and semi-annual reports, and summarize the maintenance events at the site for the year. The annual report should be complete enough to replace the previous reports of the year. The annual report should also be prepared as a digital version on CD in accordance with NYSDEC guidance. Following the first year of operation, the annual report may be combined with or replace the second report of the year.

A suggested format for the reports is included below:

1.0 Introduction – include a brief description of the system, site location, and a figure showing the treatment system and all well locations.

2.0 Summary of Operation – summarize the quantity of groundwater treated during the period, the average flow rate, and identify any downtime or problems that occurred; include figures and tables as appropriate to summarize previous data and to identify any trends in operation of the system.

3.0 Analytical Data – summarize the results of any system analyses conducted during the period, identify any discharge exceedances, etc., and include tables to summarize the analytical data.

4.0 Progress of Remediation – Summarize the progress of the treatment system to meeting the remedial goals for the site. Prepare tables summarizing the results of the monitoring well analysis, estimate the total quantity of contamination removed by the system to date, and prepare tables showing the groundwater contours for the site.

8.2 Reporting

NYSDOH

All quarterly, semi-annual, and annual operations reports should be copied to:

Greg Rys
New York State Department of Health – Herkimer District Office
5665 State Route 5
Herkimer, New York 13350
Phone: 315-866-6879
Fax: 315-866-8192

NYSDEC

All routine inspection, monitoring, and maintenance forms should be copied to Susan M. Lasdin, P.E., at the NYSDEC office in Albany, NY.

All quarterly, semi-annual, and annual operations reports should be copied to:

Susan M. Lasdin, P.E.,
NYSDEC
Albany, New York

APPENDIX A

RECORD OF DECISION

Department of Environmental Conservation

Division of Environmental Remediation

NORTHEAST ALLOYS AND METALS
UTICA (C), ONEIDA COUNTY, NEW YORK
SITE NO. 6-33-045
March 1998

RECORD OF DECISION

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT
RECORD OF DECISION

NORTHEAST ALLOYS AND METALS
City of Utica, Oneida County, New York
Site No. 6-33-045

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Northeast Alloys and Metals Site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1999 (40 CFR 300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Northeast Alloys and Metals Site, and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix C of the ROD.

Assessment of the Site

Actual or threatened release of volatile organic compounds (VOCs) from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) Reports for the Northeast Alloys and Metals Site and the criteria identified for evaluation of alternatives, the NYSDEC has selected the following remedy:

- Installation of a groundwater collection and treatment system based on the remedial design program. The groundwater collection and treatment system will treat contaminated water in order to discharge to an on site infiltration system.
- Installation of a soil vapor extraction system at RW-1 and RW-2.
- Excavate contaminated soil in the east gate area in the vicinity MW # 9 to meet soil clean up goals.
- Implementation of a site-wide operation, monitoring and maintenance program to insure that the remedial program is effective and remedial action goals are obtained.
- Institutional controls such as deed restrictions on groundwater use will be implemented until groundwater standards are obtained.

- The remedial design will verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved. This will include the determination of the size, location and number of groundwater and soil vapor extraction wells.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/31/98
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

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FOR THE
RECORD OF DECISION
NORTHEAST ALLOYS AND METALS SITE

Appendices

SECTION 1: SITE LOCATION AND DESCRIPTION

The Northeast Alloys and Metals Site is located between State Route 5S and Dwyer Street in Utica, Oneida County, New York. The property is located in a mixed industrial/commercial area just inside the city limits, which forms the boundary between Oneida and Herkimer County (Figure 1-1). The New York Central Railroad runs in an east-west direction approximately 1500 feet north of the site. The Mohawk River flows in an easterly direction and is located approximately 1800 feet to the north.

The facility occupies about 3.9 acres and consists of a plant building, asphalt parking area, and loading dock area which occupy the southwest portion of the property. The plant building, which occupies approximately 21,000 square feet, is a one story masonry block structure. A small portion of the paved parking lot area, which contains the former underground storage tank (UST) and former drum storage area, is referred to as the "Courtyard" (Figure 1-2).

SECTION 2: SITE HISTORY

2.1: Operational/Disposal History

The property and buildings have been used for the manufacturing of electronic components in the 1950's, a machine shop in the 1960's, and as a commercial laundry in the 1970's. Northeast Alloys & Metals purchased the facility in April of 1986 and used the facility to recycle specialty metal parts. In January 1989 Northeast Alloys and Metals leased the property to ELG Haniel Trading's ("Trading") to perform the metal recycling operations. Trading ceased operations at the facility in October of 1991. The facility is currently unoccupied.

Chlorinated solvents were initially discovered during a post-closure investigation. The investigation was for a 10,000 gallon UST located in the Courtyard area and contained fuel oil. The tank removal was conducted in July of 1989.

As part of the tank removal, a 24 inch sump was placed in the vicinity of the tank removal area in order to collect contaminated groundwater and/or product. In August 1989, samples of the water found in the sump was found to contained Trichloroethene.

The use of chlorinated solvents was prevalent at the site, particularly in the metal degreasing operation. In addition, past employees stated that spent solvents were released to the environment when a forklift accidentally punctured a 55 gallon drum which was being loaded onto a truck for off site disposal.

2.2 Environmental Investigation History

In July of 1989 a spill was recorded with the NYSDEC (# 89-04225) for Northeast Alloys and Metals Inc.. A 10,000 gallon fuel oil storage tank and 55.68 tons of contaminated soils were removed from the tank area. Empire Soils Investigation installed four monitoring wells and twelve borings at the site to determine the impacts associated with the leaking tank.

In October 1989, a Hydrologeologic Investigation Report for the Northeast Alloys and Metals Site was submitted to the Department by Empire Soils Investigation Inc. The report summarized the tank removal and the subsequent analytical data. Water found in the sump installed in the former UST area was found to contain 70.8 ppb Trichloroethene.

In 1992, Huntingdon- Empire Soils Investigations Inc., conducted a follow up investigation to evaluate whether soil or groundwater in the immediate vicinity of the former UST had been impacted by solvents. Four borings were advanced and groundwater was found to contain Vinyl Chloride (Non Detect - 17 ppb) and 1,2-Dichloroethene (1 ppb). Water found in the sump installed in the former UST area was found to contain 1,055 ppb total VOC's.

In 1993, ERM Northeast conducted an investigation to further evaluate the extent of VOC contamination in soil and groundwater. Six borings and two monitoring wells (MW-5 and MW-6) were installed in the Courtyard. Chlorinated solvents up to 29,000 ppb were found in the newly installed groundwater wells.

In 1994, Harress Pickel Consultants conducted a soil gas and groundwater investigation to further evaluate the extent of VOCs in soil and groundwater. Soil gas was gathered from 16 locations on site and elevated levels of TCE and TCA were documented on site and an additional area to the north of the main building was found. This correlated with the historic location of the degreasing operation.

SECTION 3: CURRENT STATUS

The presence of hazardous waste at the site presents a significant threat to human health and the environment and the site was placed on the Registry of Inactive Hazardous Waste Sites as a class "2" in 1994. Civil and Environmental Consultants, Inc. has recently completed and revised a Remedial Investigation/Feasibility Study (RI/FS), dated February 12, 1998.

3.1: Summary of the Remedial Investigation

The purpose of the RI was to further define the nature and extent of any contamination resulting from previous activities at the site, and to collect data necessary to screen remedial alternatives.

A report entitled "Remedial Investigation/ Feasibility Study - Former Northeast Alloys and Metals Site, Utica, New York", dated January 1998 has been prepared describing the field activities and findings of the Remedial Investigation in detail. The RI activities included the following:

- **A review of all existing data.**
- **A soil gas survey.**
- **Sampling and analysis of water and sediments.**
- **Installation of soil borings and monitoring wells for analysis of soil and groundwater as well as physical properties of soil and hydrogeologic conditions.**
- **Investigation of historic underground storage tank locations.**
- **Investigation of the extent of migration of contaminated groundwater from the site.**

The analytical data obtained during the RI was compared to environmental Standards, Criteria and Guidance (SCGs). Groundwater, drinking water, and surface water SCGs identified for the Northeast Alloys and Metals site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of the NYS Sanitary Code. Soil SCGs are based on NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) 4046 soil cleanup guidelines for the protection of groundwater and background conditions.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas of the site require remediation. These are summarized below. More complete information can be found in the RI Report. The following outlines the specific information gathered during the RI for each medium of concern.

3.1.1 Geological Features

The site is located in the Hudson Lowlands Physiographic province of New York State, within the floodplain of the Mohawk River which is approximately 1,800 feet to the north. The geology in the area of the Mohawk

River Drainage Basin consists of unconsolidated sediments of glacio-fluvial and alluvial origin overlying bedrock of the Utica Shale Formation. The unconsolidated deposits in the vicinity of the site are classified as a principal aquifer. Well yields in the vicinity of the site are typically between 10 and 100 gallons/minute. The regional direction of groundwater flow in the unconsolidated deposits is to the east, following the direction of flow of the Mohawk River.

3.1.2 Hydrogeologic Features

Fill ranged from 4 feet at MW-1 to 12 feet at MW-3. Beneath the fill at MW-2 and MW-4, a grey brown silt and clay unit with some to little fine to coarse sand were encountered. In boring MW-2, this unit became more granular at depth and extended to the bottom of the boring at 18.0 feet. At MW-4 the silt and clay unit changed to silt with some fine to coarse sand at a depth of 11 feet below grade. Groundwater was encountered at depths ranging from 6.1 feet at MW-1 to 9.0 feet below grade at MW-3. The primary water bearing unit is the upper interbedded silt and sand units. The average horizontal hydraulic gradient between MW-1 and MW-3 is 0.016 feet/feet. The hydraulic conductivity of the unconsolidated water bearing materials at the site, based on the field tests, is between 6.8×10^{-5} and 1.2×10^{-4} cm/sec. An estimate of the average linear velocity of groundwater flow at the site is 0.1 feet/day or 40 feet per year. The glacial till unit found beneath the upper unconsolidated layer has an estimated permeability of 7×10^{-5} cm/sec. Bedrock is found at approximately 27 feet below grade.

3.1.3 Physical Features

The most significant features which may influence groundwater flow and contaminant migration are the building foundation and the stormwater sewer system. The foundation of the building separates the Courtyard from the northern portion of the site where elevated levels of soil gas were recorded. Seasonal changes in groundwater elevations have produced changing groundwater flow patterns from north-northeast to north-northwest (Figure 3-6). Underground utilities exist upgradient of the site which include gas, water, storm sewer and sanitary sewer lines. A storm sewer system exists in the courtyard and to the east of the building, however, the direction which the storm sewer transects the site is not known.

3.1.4 Surface Water

The Mohawk River is located approximately 1,800 feet to the north of the site. No other surface water bodies exist on or near the site.

3.1.5 Contaminants

The following is a description of impacts from the disposal of hazardous waste and past practices at the Northeast Alloys and Metal Site. Based on the results of the RI in comparison to SCGs and potential for public health and environmental exposure rates, certain areas and media require remediation.

3.1.5 (a) Groundwater

Generally groundwater contamination found at the site is related to and found in proximity to the former UST and the drum spillage area in the Courtyard and downgradient of the degreaser area.

Groundwater quality standards were exceeded in 5 out of 12 wells installed on site. The highest concentrations of VOCs were found in MW-6, RW-2, RW-1, MW-5, Sump, MW-9 and MW-3, in that order. Levels of contaminants were found in the following ranges: 1,1,1-Trichloroethane(4-29,000 ppb), 1,1-Dichloroethane(35 ppb - 14,634 ppb), 1,2-Dichloroethene(28 ppb - 41,000 ppb), Trichloroethene(47 ppb - 3,900 ppb), 1,1-Dichloroethene (17 ppb - 560 ppb), and Vinyl Chloride (11 ppb - 280 ppb).

Groundwater contamination near the east gate, at MW-9 was found to be 47 ppb for TCE and 199 ppb for 1,2-DCE.

Groundwater contained elevated levels of metals which include aluminum, antimony, arsenic, calcium, chromium, cobalt, iron, magnesium, and vanadium. However, given the historic use as a scrap yard, the elevated levels of metals are not unexpected. The highest levels of metals found in the groundwater at MW-2 were located at the old scrap storage area.

RW-1 had a significant level of sodium, however, it was determined that the drillers put salt in the well to melt ice. This would account for this unusually high level. Other levels of sodium found at the site are within normal limits.

Semi-volatile organic compounds (SVOC) were not prevalent at the site. Only MW-6 and RW-1 contained estimated levels of Bis (2-Ethylhexyl) phthalate (80 ppb), Benzo(a) anthracene (2 ppb) and Chrysene (2 ppb).

No PCBs were detected in site groundwater or soils.

There are no known users of groundwater within a 1.5 miles radius of the site and the area is serviced by a public water supply.

3.1.5 (b) Soil Gas

Previous investigations utilized soil gas to delineate VOC contamination found at the site. Sixteen soil borings were advanced to depth ranging from 1 to 4 feet below grade. Detectable levels of TCA and TCE were identified which correlated with the former drum area and the former degreaser locations. Levels ranged from ND - 780 mgg/M^3 for Trichloroethene and ND - 96 mgg/M^3. The highest concentrations were found at the same location, SG7. SG7 is just to the north of the building area where the former degreasing operation was conducted (Figure 1-4).

3.1.5 (c) Soil

As part of the RI, shallow soil samples were taken from across the site in order to determine if other areas had been effected by past practices.

Several semivolatile organics and metals were detected in the shallow soil samples in both background and on-site samples. Levels of PAHs are believed to be associated with asphalt and other roadway contaminants. Metals are also believed to be associated with the surrounding roads and historical use of the site. These semivolatiles and metals are not deemed to be a significant threat.

Soil sampling and historic soil gas sampling in the vicinity of the courtyard and down gradient of the building, indicates that an area of approximately 16,000 square feet exists which exhibits elevated levels of VOCs. Soils samples in this area exhibited total VOCs in the range of 1846 ppb to non detect. The majority of the contamination found in the soils exists just above the groundwater table which is found approximately 8-10 feet below grade.

Soil sampling conducted near the east gate have identified a small area contaminated with Trichloroethene (8,200 ppb to 790 ppb), Benzo (a) anthracene (570 ppb), Benzo (a) pyrene (570 ppb) and Chrysene (630 ppb). Approximately 200 cubic yards of soils are believed to be contaminated above cleanup goals.

Downgradient wells and soil samples confirm that the contamination has not migrated to other areas.

3.1.5 (d) Air

Soil sampling and screening for the preliminary organic compounds of concern have not indicated the presence of target compounds at measurable levels near the surface of the site and, therefore, airborne contamination, measured in the breathing zone, is not anticipated.

3.2 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site in the absence of site remediation.

An exposure pathway is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are: 1) source of contamination; 2) environmental media and transport mechanisms; 3) point of exposure; 4) route of exposure; and 5) receptor population. These elements may be based on past, present, or future events.

Completed pathways which are known to, or may, exist at the site include ingestion and dermal contact.

There is a future potential for ingestion of contaminated groundwater. However, no potable supply wells operate on the site and the area is supplied by public water.

There is a potential for dermal contact or incidental ingestion exposures due to contaminated surface and sub-surface soils.

3.3 Summary of Environmental Exposure Pathways:

Because the site is fully developed, there are few, if any, on-site ecological receptors (i.e., terrestrial flora and fauna) to be evaluated. Except for the Mohawk River to the north, surrounding areas are developed and have minimal ecological receptors. Potential risks to ecological receptors to the north would be from contaminated groundwater, however, the documented groundwater contamination is predominantly confined near the site and the Mohawk River is over 1,800 feet from the site. If left un-remediated, contaminated surface soils could enter the storm sewer system and then migrate to the Mohawk River. However, most underground utilities are upgradient of the impacted areas.

SECTION 4: ENFORCEMENT STATUS

The NYSDEC and Mrs. Joyce A. Rossi entered into a Consent Order on January 28, 1997. The Order obligated the responsible parties to develop and implement a remedial program for the Northeast Alloys Site. The remedial program includes the development and implementation of a remedial investigation/feasibility study, an interim remedial measure (if warranted) and a remedial/ remedial construction program.

Upon issuance of the Record of Decision, the remedial design/remedial construction program would be implemented.

Under a separate agreement between Mrs. Joyce A. Rossi and ELG Haniel Trading's, the environmental consulting firm of Civil and Environmental Consultants Inc., was procured to develop and implement the required programs.

SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria, and Guidance (SCGs) and be protective of human health and the environment.

At a minimum, the remedy selected should eliminate or mitigate all significant threats to the public health and to the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Reduce, control, or eliminate, to the extent practicable, the contaminated soil present on site .
- Eliminate the potential for direct human or animal contact with the contaminated soils on site.
- Mitigate the impacts of contaminated groundwater to the environment.
- Provide for attainment of SCGs for groundwater quality to the extent practicable.

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Northeast Alloys and Metal Site were identified, screened and evaluated in a feasibility study. This evaluation is presented in the report entitled "Remedial Investigation/Feasibility Study", dated February 12, 1998.

A summary of the detailed analysis follows. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction.

6.1: Description of Alternatives

Potential remedial alternatives for the Northeast Alloys and Metals Site were identified, screened and evaluated in a three phase feasibility study. This evaluation is presented in the report entitled "Remedial Investigation/Feasibility Study".

It is proposed, as part of each alternative, that contaminated soils in the vicinity of the east gate would be excavated for off site disposal in order to meet soil cleanup objectives. Approximately 200 cubic yards of soils would require excavation and disposal at an estimated cost of $ 60,000. This would return this small area to unrestricted use.

The following alternatives address the groundwater and remaining soil contamination found in the vicinity of the on-site building. A summary of the detailed analysis follows.

Alternative #1
No Action

The No Action Alternative is typically evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This Alternative would leave the site in its present condition and would not provide any additional protection to human health and the environment.

A groundwater monitoring program would be developed to track the contaminated groundwater trends and movement. A deed restriction would be placed on the site to prevent future use of on-site groundwater and to limit contact with contaminated soils. A security fence would be erected and maintained.

Present Worth:	$ 138,000
Capital Costs:	$ 10,000
Annual O&M:	$ 8,000
Time to implement	3 months

Alternative #2
Groundwater Extraction and Treatment

This Alternative includes the extraction of groundwater using well points and treatment on site prior to disposal at the Publicly Owned Treatment Work (POTW). A monitoring and maintenance program would be developed to insure that the groundwater system was operating effectively, and to monitor contaminated groundwater to insure that levels of VOCs were being reduced and that off site migration was mitigated. The anticipated length of time required to remediate the site is ten (10) years.

Present Worth:	$ 291,000
Capital Costs for Groundwater and Soil:	$ 104,000
Annual O&M:	$ 24,000
Time to implement	6 - 12 months

Alternative #3
Groundwater Extraction and Treatment with Soil Vapor Extraction

This Alternative is the same as Alternative #2, except that vapor extraction will also be performed in RW-1 and RW-2 to enhance remediation. The combined groundwater extraction and soil vapor extraction system would enhance contaminant mass removal from the impacted area. The anticipated length of time required to remediate the site is six (6) years.

Present Worth:	$ 254,000
Capital Costs for Groundwater and Soil:	$ 117,000
Annual O&M:	$ 27,000
Time to implement	6 - 12 months

6.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study. The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection. The last five evaluation criteria are termed "primary balancing criteria" and are used to compare the positive and negative aspects of each of the remedial strategies.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative #1 would not meet SCGs for groundwater or soils because the contaminated materials would be allowed to stay in place and exceed standards and guidance values. Contaminated materials could continue to migrate and impact off site receptors.

Alternatives #2 and Alternative #3 would meet SCGs for groundwater over time. These alternatives both include the removal of contaminated groundwater from the site, therefore SCGs for groundwater would be obtained eventually. Alternative #3, which includes the soil vapor extraction, would most likely obtain SCGs for soils as well.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternative #1 would not be considered to be protective of human health and the environment since site related contamination above cleanup goals would remain in-place and would continue to impact groundwater and migrate off-site.

Alternative #2 is considered to be protective of human health and the environment due to the active removal of contaminated water from the site.

Alternative #3 is considered to be the most protective of human health and the environment due to the aggressive remediation of both contaminated groundwater and soils.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative #1 would not cause any short-term impacts due to the lack of disturbance of the site and it would take the least time to implement.

The remaining two alternatives could create potential short term impacts to workers and the public from the installation of remedial systems and the exposure to contaminated groundwater and soils. However, these impacts would be mitigated by implementing readily available safety procedures, including air monitoring, the wearing of protective equipment, decontamination of equipment prior to leaving the site, and implementation of engineering controls which may include, but are not limited to covering soils, installing migration barriers to keep contaminants from migrating beyond the work site boundaries, and the use of dust suppression techniques. Alternatives # 2 and # 3 are considered to have the same level of short-term impacts and are considered to take approximately the same time to implement.

4. Long-term Effectiveness and Permanence. This criteria evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative #1 would not provide long-term effectiveness or permanence because contamination would remain in place.

Alternative #2 would provide a higher degree of long-term effectiveness and permanence because contaminated groundwater would be actively collected and treated.

Alternative #3 would provide the highest level of long-term effectiveness and permanence because both contaminated groundwater and contaminated soil gas would be actively removed from the site and treated.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative #1 would provide no reduction in toxicity, mobility or volume as it pertains to contaminated wastes or media.

Alternative #2 would provide a higher degree of reduction compared to Alternative #1.

Alternative #3 is considered to provide the highest degree of reduction based upon the quantity of contaminated mass which will be removed from the groundwater and the soil.

6. Implementability The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

The No Action Alternative would be considered to be implementable.

Alternatives #2 and #3 are also considered to be the implementable overall, because standard construction and administrative techniques would be utilized.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criteria evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 3

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan are evaluated. A "Responsiveness Summary" included in Appendix C presents the public comments received and the Department's responses to the concerns. In general the public comments received were supportive of the selected remedy. The Attorney representing ELG Haniel Metal Corporation filed comments from the Law Office of Cohen & Grigsby, P.C.. These comments overall pertained to the Department's preference to have a small area of contaminated soil near the east gate removed. ELG Haniel Metal Corporation has never supported doing work in this area and believe that there is no reason to remove contaminated soils which are in exceedance of the Department's soil cleanup goals and which has caused violations of groundwater quality. The Department has provided the response to these comments in the Responsiveness Summary. The Comments have note caused a change in the Department's selected Remedy.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative #3, along with removal of contaminated soil near the east gate, as the remedy for this site.

The elements of the proposed remedy are as follows:

1. Installation of a groundwater collection and treatment system based on the remedial design program. The groundwater collection and treatment system will treat contaminated water in order to discharge to an on site infiltration system.

2. Installation of a soil vapor extraction system at RW-1 and RW-2.

3. Excavate contaminated soil in the vicinity of MW # 9 to meet soil clean up goals.

4. Implementation of a site-wide operation, monitoring and maintenance program to insure that the remedial program is effective and remedial action goals are obtained.

5. Institutional controls such as deed restrictions on groundwater use will be implemented until groundwater standards are obtained.

6. The remedial design will verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved. This will include the determination of the size, location and number of groundwater and soil vapor extraction wells.

The estimated present worth cost to implement the remedy is $254,000. The cost to construct the remedy is estimated to be $117,000 and the estimated average annual operation and maintenance cost for 6 years is $27,000.

The following is the basis for the Department's proposal:

- The removal of contaminated soils near the east gate will remove the source of contamination which has impacted groundwater in the vicinity of MW #9 and return the entrance roadway to unrestricted use.

- The installation of a groundwater collection and treatment system will meet SCGs for groundwater within an acceptable time frame.

- The installation of a soil vacuum extraction system will facilitate the remediation of the site and will expedite the attainment of SCGs and remedial goals.

- The monitoring and maintenance of the systems and groundwater at the site will insure a successful remediation.

SECTION 8: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the Northeast Alloys and Metals Site remediation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established.

- A site mailing list was established which included nearby property owners, local political officials, local media, and other interest parties.

- A public meeting was held to discuss the characteristics of the site and the proposed remedy, and to answer any questions raised.

- A "Responsiveness Summary" was prepared to address the comments received during the public comment period for the PRAP.

APPENDIX A
TABLES

Appendix A - Table 1
New York State Standards, Criteria and Guidance Applications

U.S. Environmental Protection Agency (EPA)
- Toxic Substance Control Act (TSCA)
- USEPA Health Based Soil Criteria for Systemic Toxicant and Carcinogens

New York State Department of Environmental Conservation (NYSDEC)

NYSDEC - Division of Environmental Remediation
- 6NYCRR Part 375-Inactive Hazardous Waste Disposal Site Remedial Program

Hazardous Waste Technical and Administrative Guidance Memoranda (TAGMs)
- TAGM 4030 - Selection of Remedial Actions at Inactive Hazardous Waste Sites
- TAGM 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels
- TAGM 4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites

NYSDEC - Division of Hazardous Substance Regulations
- 6NYCRR Part 370 - Hazardous Waste Management System - General
- 6NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporter, and Facilities
- 6NYCRR Part 376 - Land Disposal Restrictions

NYSDEC - Division of Solid Waste
- 6NYCRR Part 360 - Solid Waste Management Facilities
- 6NYCRR Part 364 - Waste Transporters Permits

NYSDEC - Division of Water
- 6NYCRR Part 700-705 - Water Quality Regulations for Surface Water and Groundwater
- 6NYCRR Part 750-757 - Implementation of NYPDES in New York State
- Technical and Operation Guidelines (TOGS) 1.1.1-Ambient Water Quality Standards and Guidance Values

NYSDEC - Division of Spill Management
- STARS Memo # 1: Petroleum-Contaminated Soil Guidance Policy
- State Navigation Law - Article 12 (Oil Spill Prevention, Control and Compensation)

NYSDEC - Division of Fish and Wildlife
- Technical Guidance for Screening Contaminated Sediments (Nov 1993)

New York State Department of Labor
- 12 NYCRR Part 56-Asbestos

Occupational Safety and Health Administration
- 29 CFR 1900-1999

Appendix A - Table 2
Representative Contamination Summary

Medium	Class	Contaminant of Concern	Concentration Range	Frequency of Exceedances	SCG *
Groundwater (Shallow)	Volatile Organic Compounds	1,1,1-Trichloroethane	Non Detect - 29,000 ppb	9 out of 32	5 ppb
		1,1,2-Trichloroethane	Non Detect - 19 ppb	2 out of 32	5 ppb
		1,1-Dichloroethane	Non Detect - 14,634 ppb	9 out of 32	5 ppb
		1,1-Dichloroethene	Non Detect - 560 ppb	6 out of 32	5 ppb
		1,2-Dichloroethane	Non Detect - 37,000 ppb	5 out of 32	5 ppb
		1,2-Dichloroethene	Non Detect - 41,000 ppb	10 out of 32	5 ppb
		Trichloroethene	Non Detect - 2100 J ppb	11 out of 32	5 ppb
		Vinyl Chloride	Non Detect - 280 J ppb	8 out of 32	2 ppb
	Semi Volatile Organic Compounds	Bis(2-Ethylhexyl) phthalate	Non Detect - 80 J ppb	1 out of 11	50 ppb
		Benzo(a)anthracene	Non Detect - 2 J ppb	1 out of 11	.002 ppb
		Chrysene	Non Detect - 2 J ppb	1 out of 11	.002 ppb
	Metals	Antimony	Non Detect - 17.8 J ppb	2 out of 13	3 ppb
		Arsenic	Non Detect - 70.4 ppb	4 out of 13	25 ppb
		Beryllium	Non Detect - 5.73 ppb	3 out of 13	3 ppb
		Chromium	Non Detect - 202 J ppb	3 out of 13	50 ppb
		Copper	Non Detect - 703 J ppb	2 out of 13	200 ppb
		Lead	Non Detect - 1740 R ppb	3 out of 13	25 ppb
		Manganese	642 ppb - 230,000 ppb	13 out of 13	300 ppb
		Mercury	Non Detect - 3.9 ppb	1 out of 13	2 ppb
		Sodium	1250 ppb - 201,000	6 out of 13	20,000 ppb
		Zinc	36.2 ppb - 571 J ppb	3 out of 13	300 ppb
Soils	Volatile Organic Compounds	Acetone	ND - 1700 J ppb	3 out of 15	200 ppb
		Trichloroethene	ND - 8200 J ppb	3 out of 15	700 ppb
		1,2-Dichloroethene	ND - 190 ppb	1 out of 11	100 ppb
	Semi Volatile Organic Compounds	Benzo(a)anthracene	Non Detect - 570 ppb	3 out of 5	224 ppb or MDL
		Chrysene	Non Detect - 430 ppb	1 out of 5	400 ppb
		Benzo(a)pyrene	Non Detect - 570 ppb	3 out of 5	61 ppb or MDL
		Benz(a,h)anthracene	Non Detect - 1,200 ppb	2 out of 17	14 ppb or MDL

Appendix A - Table 2
Representative Contamination Summary

Medium	Class	Contaminant of Concern	Concentration Range	Frequency of Exceedances	SCG *
	Metals	Aluminum	Non Detect - 0.66 ppm	1 out of 5	0.16 ppm
		Beryllium	Non Detect - 33 ppm	1 out of 5	30 ppm
		Copper	6.6 ppm - 149 ppm	3 out of 5	25 ppm
		Iron	6,870 ppm - 47,000 ppm	1 out of 5	21,000 ppm

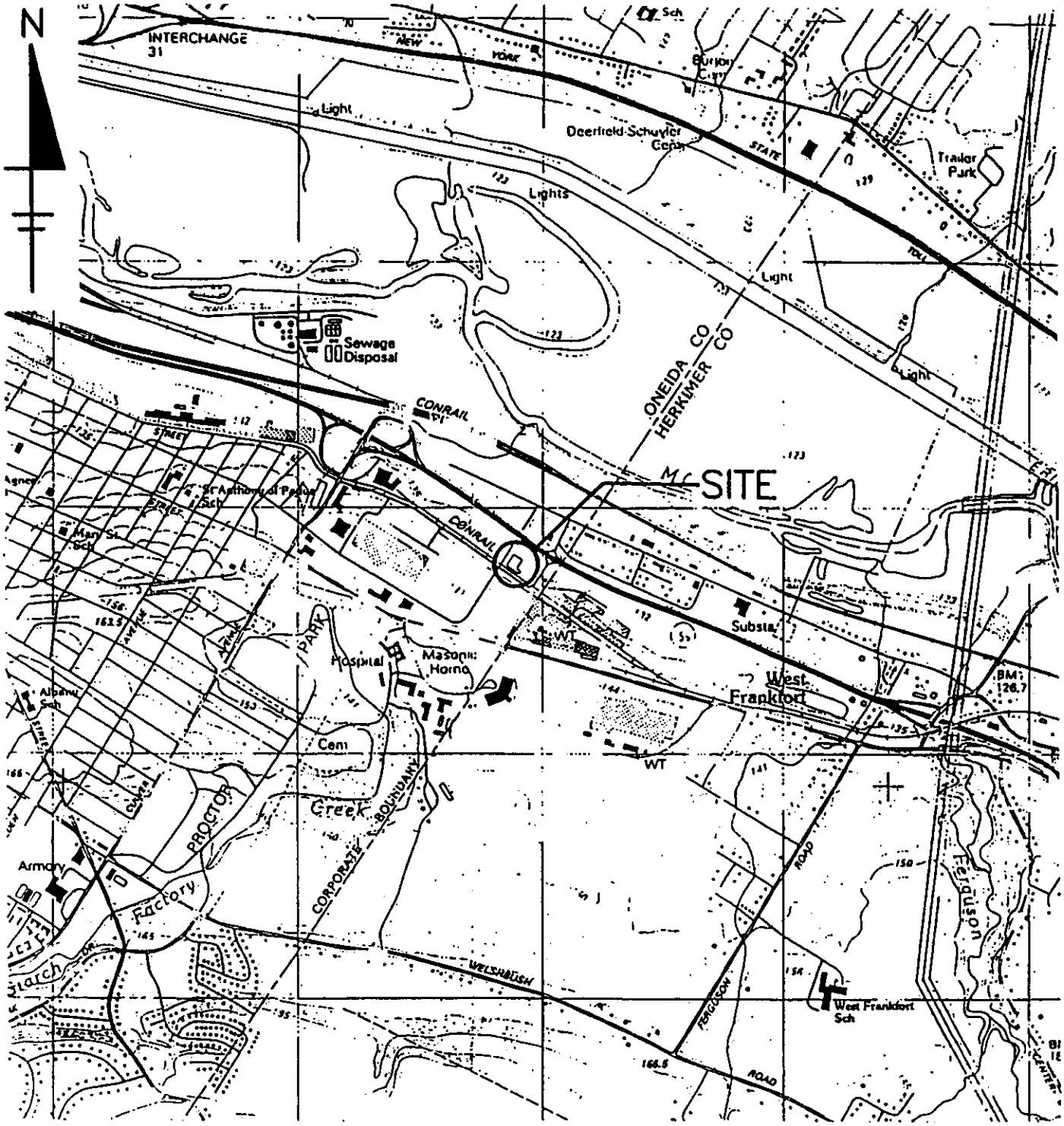
* SCG's for groundwater is standard in 6 NYCRR PART 703
SCG's for soil is objectives in NYSDEC TAGM 4046
SCG's for metals in soil are based on average site background

Appendix A - Table 3
Northeast Alloys and Metals
Remedial Alternative Costs

Remedial Alternative	Capital Costs	Annual O&M	Total Present Worth
Alternative # 1 No Action	$ 10,000.00	$ 8,000.00	$ 138,000.00
Alternative # 2 Groundwater Extraction and Treatment & Soil Removal	$ 104,000.00	$ 24,000.00	$ 291,000.00
Alternative # 3 Groundwater Extraction and Treatment and Soil Vacuum Extraction & Soil Removal	$ 117,000.00	$ 27,000.00	$ 254,000.00

Note: Present Worth Value is based upon a 5 % Present Work Factor using continuous compounding.

APPENDIX B
FIGURES



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SCALE IN FEET
0 2000 4000

Civil & Environmental Consultants, Inc.
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Cleveland, OH (412) 963-1063 • (800) 494-0252

SITE LOCATION
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY: M.T.M.	ACAD FILE: 94502F11	SCALE: 1"=2000'	DATE: 4/1/97	94502	FIGURE 1-1
CHKD. BY:					

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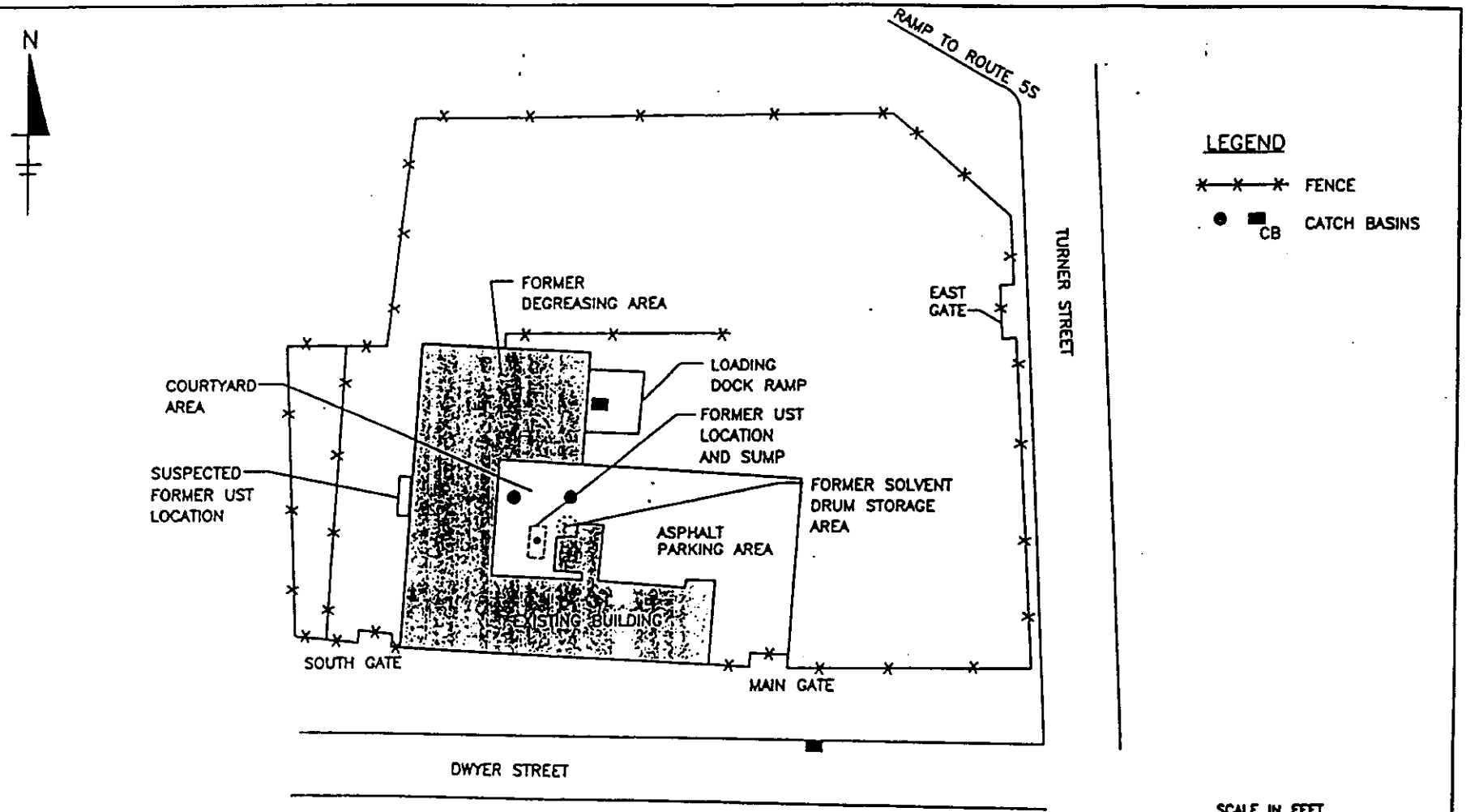

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ERM – NORTHEAST, SOIL AND GROUNDWATER INVESTIGATION AT THE FORMER NORTHEAST ALLOYS & METALS SITE, MAY 1993.

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Civil & Environmental Consultants, Inc. Pittsburgh, PA (412) 921-7090 Cincinnati, OH (513) 467-9526			SITE LAYOUT RI/FS REPORT NORTHEAST ALLOYS AND METALS UTICA, NEW YORK		
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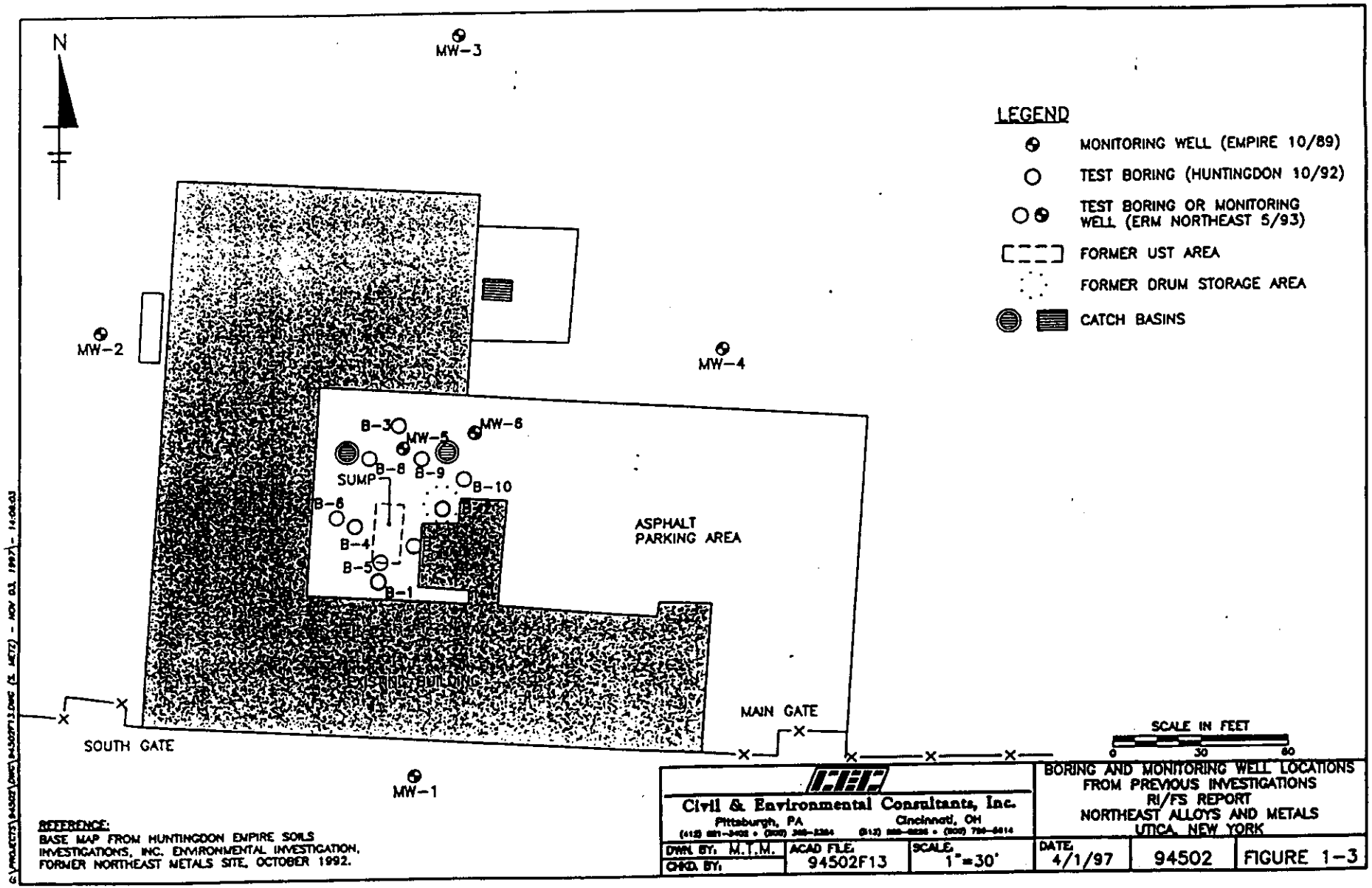

REFERENCE:
BASE MAP FROM HUNTINGDON EMPIRE SOILS INVESTIGATIONS, INC. ENVIRONMENTAL INVESTIGATION, FORMER NORTHEAST METALS SITE, OCTOBER 1992.

Civil & Environmental Consultants, Inc.
Pittsburgh, PA
Cincinnati, OH

BORING AND MONITORING WELL LOCATIONS
FROM PREVIOUS INVESTIGATIONS
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

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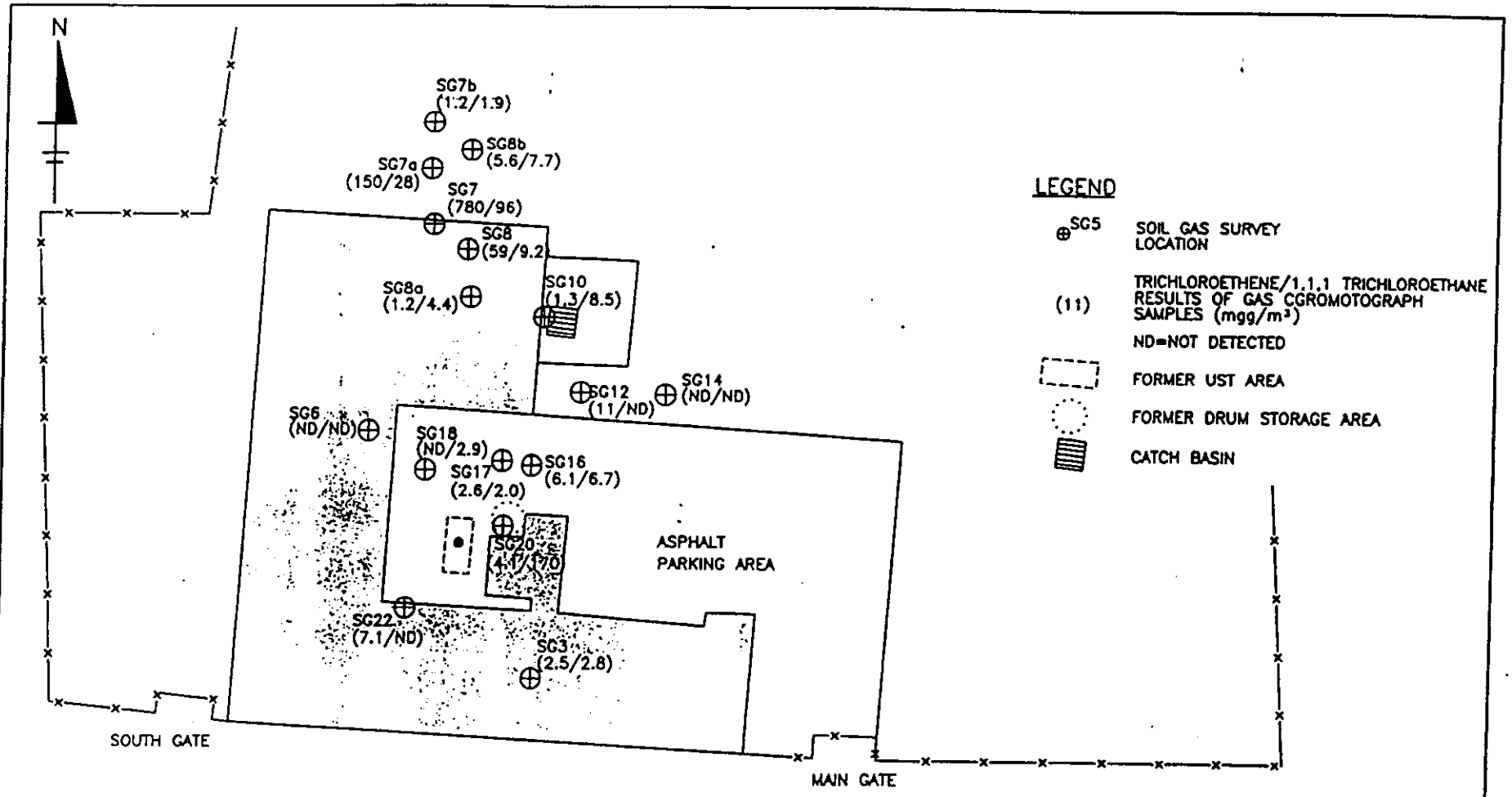

REFERENCE:
HARRESS PICKEL CONSULTANTS, SOIL GAS & GROUNDWATER INVESTIGATION AT THE FORMER NORTHEAST ALLOYS & METALS SITE, DECEMBER 1993.

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RESULTS OF HPC SOIL GAS SURVEY
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

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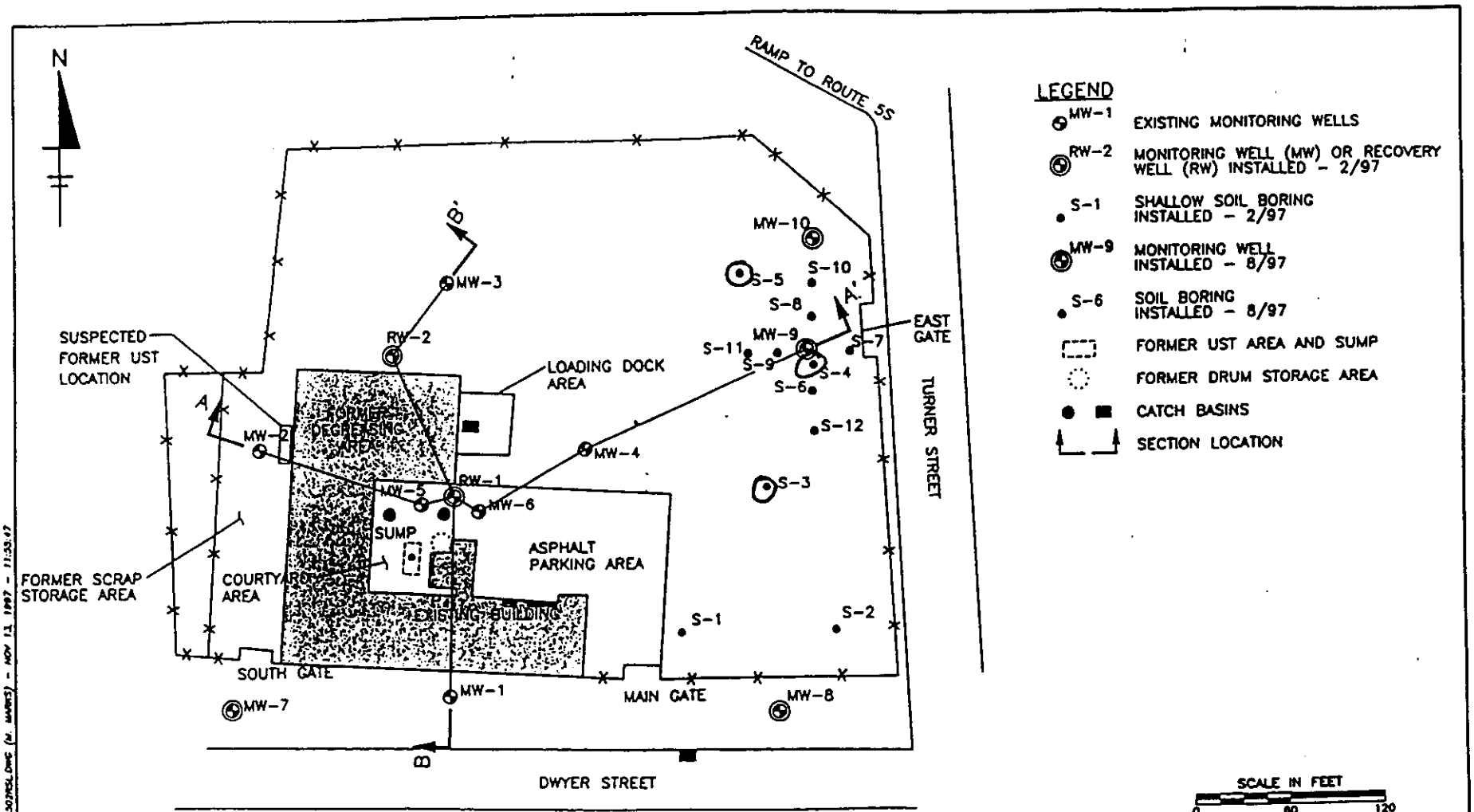

REFERENCE:
BASE MAP FROM ERM - NORTHEAST, SOIL AND GROUNDWATER INVESTIGATION AT THE FORMER NORTHEAST ALLOYS & METALS SITE, MAY 1993.

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Civil & Environmental Consultants, Inc.
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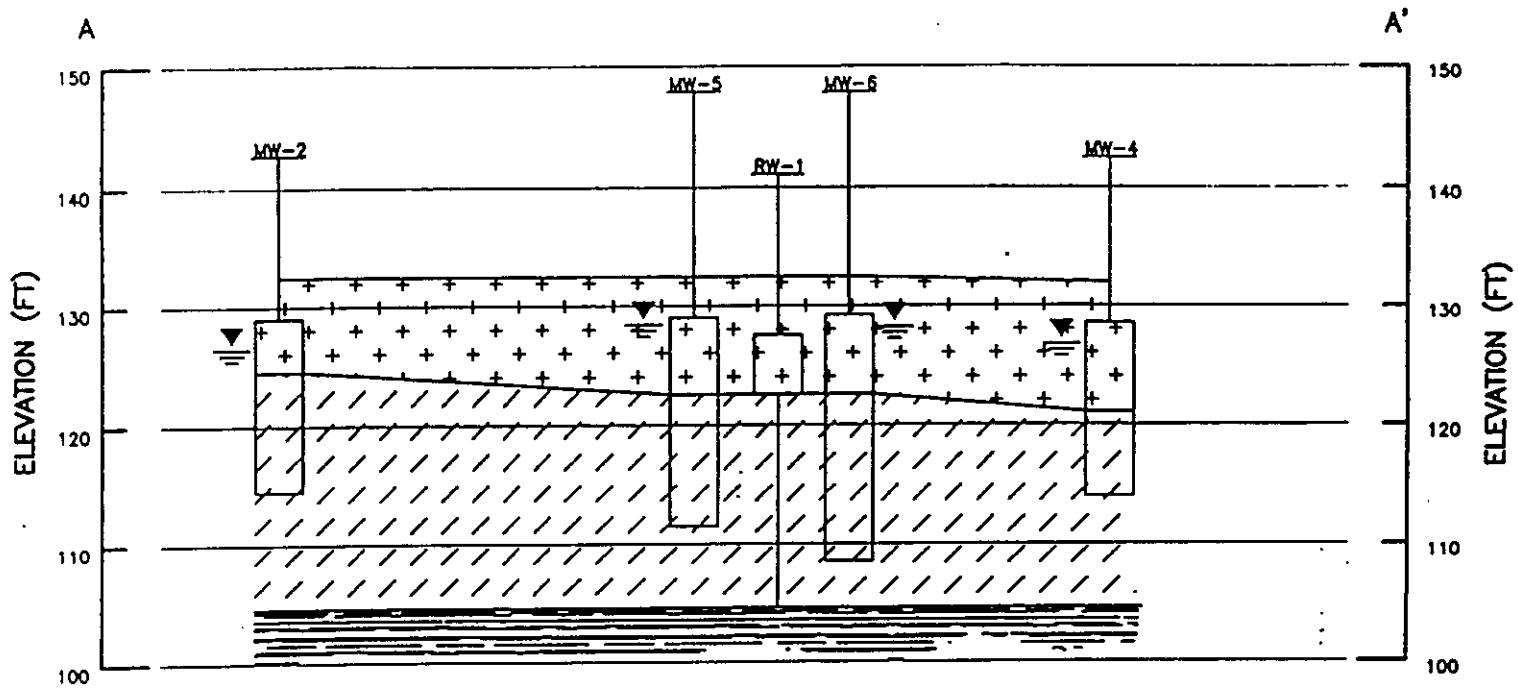
Cincinnati, OH

SOIL BORING AND WELL INSTALLATION PLAN
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY: M.T.M.	ACAD FILE: 94502RSL	SCALE: 1"=60'	DATE: 10/21/97	94502	FIGURE 2-1
CHKD. BY: BV					



LEGEND

- FILL BROWN, BLACK, GRAY SILTY AND FIRM SAND SOME CLAY TRACE ROCK FRAGMENTS, BRICK AND WOOD
- TILL BLACK, DARK GRAY, BROWN SILT SOME FINE SAND AND CLAY TRACE ROUND TO ANGULAR ROCK FRAGMENTS
- SHALE BLACK (UTICA SHALE)
- MONITORING WELL AND SCREEN INTERVAL
- WATER LEVEL ELEVATION

GEOLOGIC CONDITIONS

THE BORING LOGS AND RELATED INFORMATION PRESENTED IN THIS REPORT DEPICT SUBSURFACE CONDITIONS AT THE TEST BORING LOCATIONS AND AT THE TIME OF DRILLING. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER.

GEOLOGIC CORRELATIONS SHOWN BETWEEN TEST BORINGS GENERALLY ARE BASED ON STRAIGHT-LINE INTERPOLATION. ACTUAL CONDITIONS BETWEEN TEST BORINGS MAY DIFFER.

VERTICAL SCALE IN FEET
0 10 20

HORIZONTAL SCALE IN FEET
0 60 120

Civil & Environmental Consultants, Inc.
Pittsburgh, PA (412) 921-3488 • (800) 365-2324
Cincinnati, OH (513) 985-8230 • (800) 759-8814

CROSS SECTION A-A'
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY: M.T.M.	ACAD FILE: 94502AA	SCALE: AS NOTED	DATE: 4/2/97	94502	FIGURE 3-1
CHKD. BY: [illegible]					

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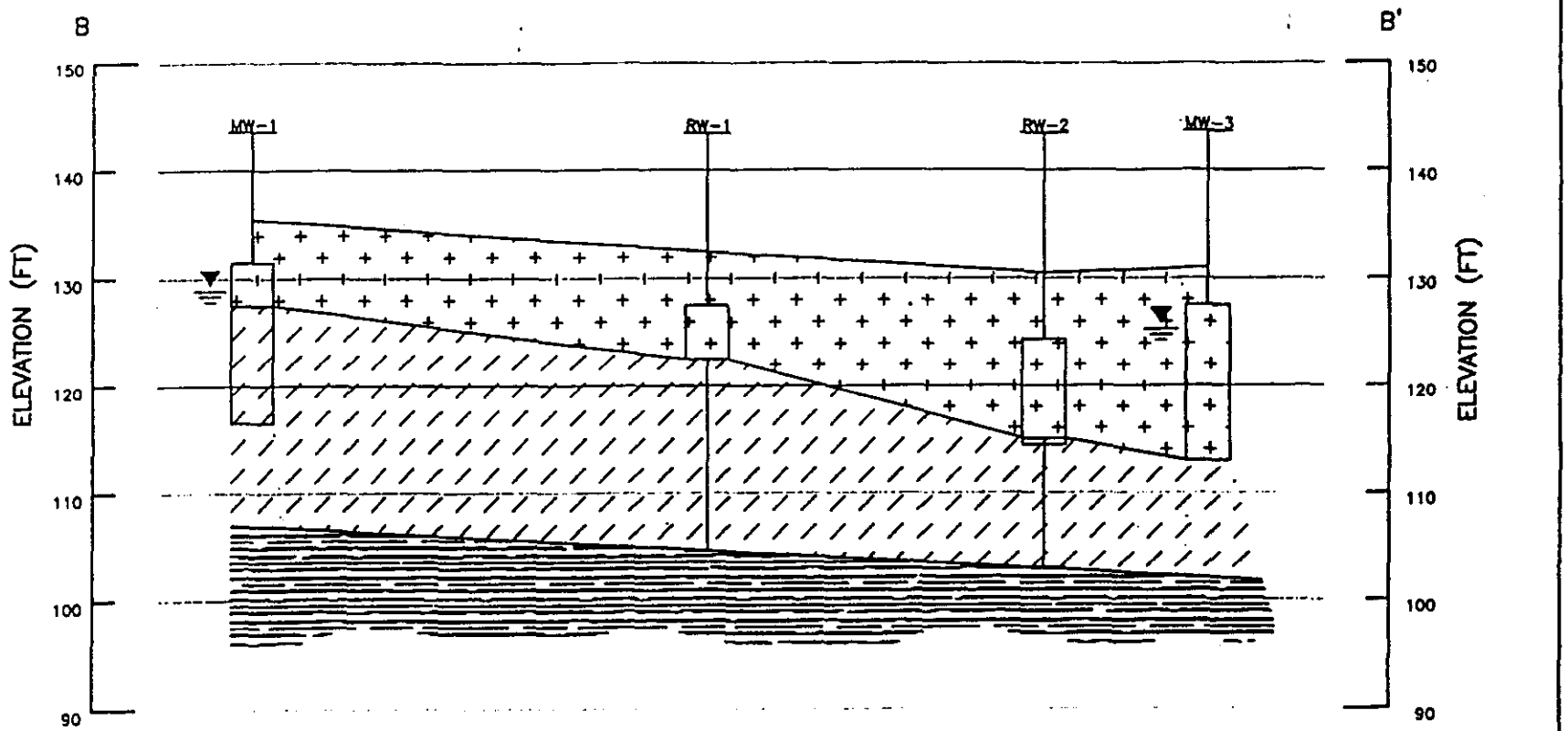

LEGEND

- FILL BROWN, BLACK, GRAY SILTY AND FIRM SAND SOME CLAY TRACE ROCK FRAGMENTS, BRICK AND WOOD
- TILL BLACK, DARK GRAY, BROWN SILT SOME FINE SAND AND CLAY TRACE ROUND TO ANGULAR ROCK FRAGMENTS
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VERTICAL SCALE IN FEET
0 10 20

HORIZONTAL SCALE IN FEET
0 60 120

Civil & Environmental Consultants, Inc.
Pittsburgh, PA (412) 921-7090 • (800) 365-2324
Cincinnati, OH (513) 985-0230 • (800) 759-0814

CROSS SECTION B-B'
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY: M.T.M.	ACAD FILE: 94502BB	SCALE: AS NOTED	DATE: 4/2/97	94502	FIGURE 3-2
CHKD. BY: TPV					

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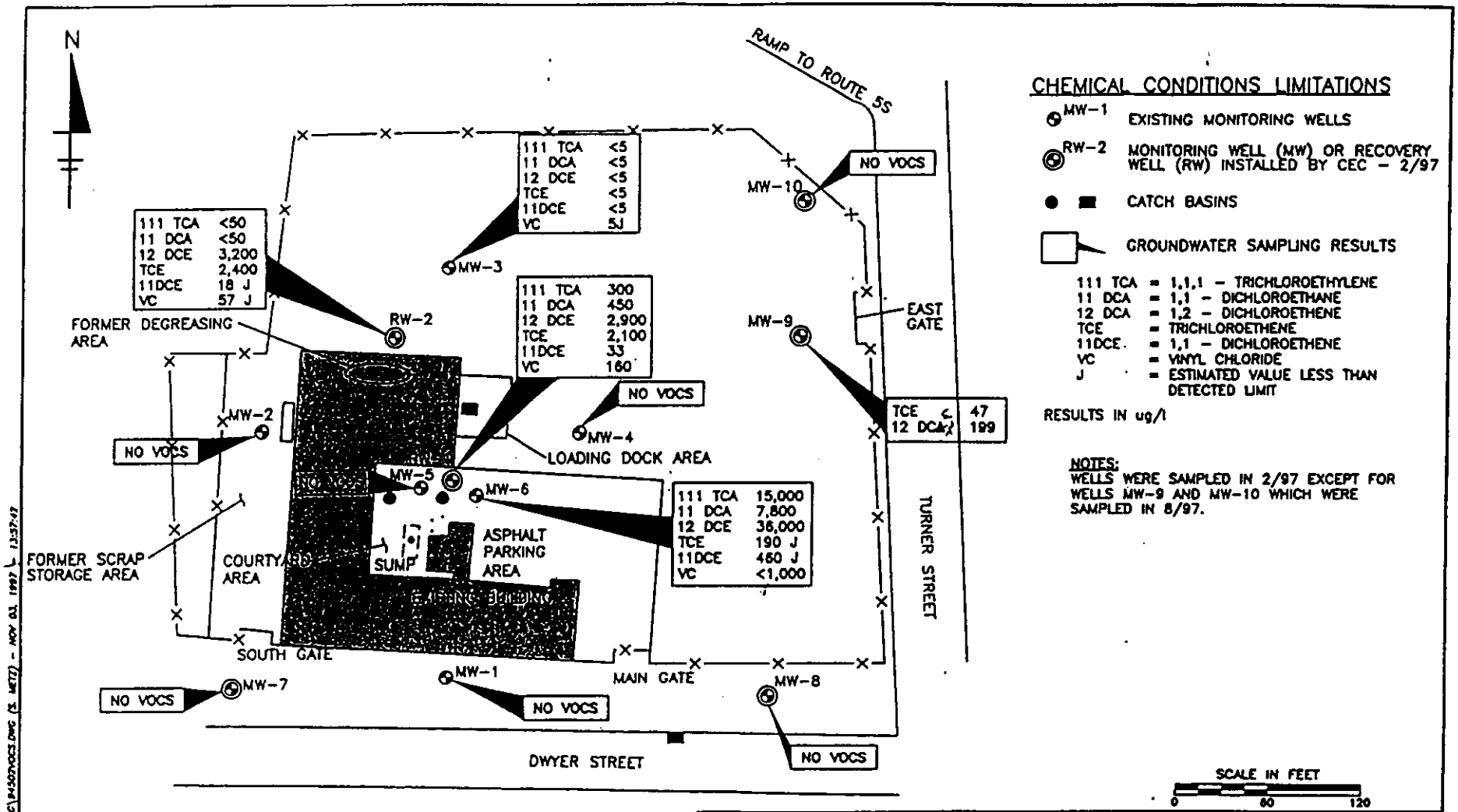


CHEMICAL CONDITIONS LIMITATIONS

- MW-1 — EXISTING MONITORING WELLS
- RW-2 — MONITORING WELL (MW) OR RECOVERY WELL (RW) INSTALLED BY CEC – 2/97
- CATCH BASINS
- GROUNDWATER SAMPLING RESULTS

111 TCA = 1,1,1 – TRICHLOROETHYLENE
11 DCA = 1,1 – DICHLOROETHANE
12 DCA = 1,2 – DICHLOROETHENE
TCE = TRICHLOROETHENE
11DCE = 1,1 – DICHLOROETHENE
VC = VINYL CHLORIDE
J = ESTIMATED VALUE LESS THAN DETECTED LIMIT

RESULTS IN ug/l

NOTES:
WELLS WERE SAMPLED IN 2/97 EXCEPT FOR WELLS MW-9 AND MW-10 WHICH WERE SAMPLED IN 8/97.

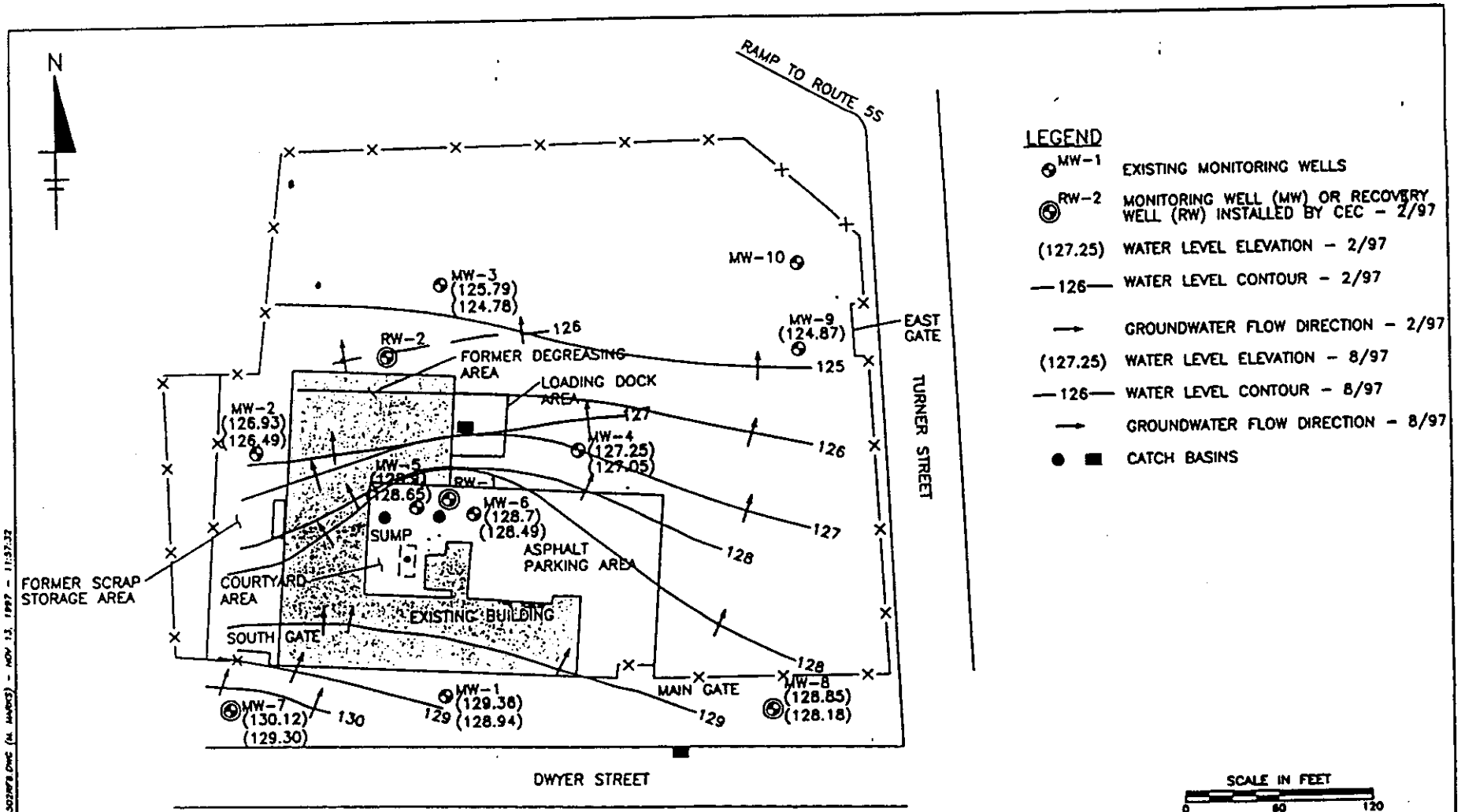
REFERENCE:
ERM – NORTHEAST, SOIL AND GROUNDWATER INVESTIGATION AT THE FORMER NORTHEAST ALLOYS & METALS SITE, MAY 1993.

Civil & Environmental Consultants, Inc.
Pittsburgh, PA (412) 921-3402 • (800) 365-3364
Cincinnati, OH (513) 985-8230 • (800) 750-0614

EXTENT OF VOCS IN GROUNDWATER
RI/FS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY. R.E.P.	ACAD FILE 94502VOCS	SCALE 1"=60'	DATE 10/20/97	94502	FIGURE 3-4
CHKD. BY. TAV					

G:\PROJECTS\94502\DWG\94502VOCS.DWG (S. METZ) – NOV 03, 1997 13:37:49



REFERENCE:
ERM - NORTHEAST, SOIL AND GROUNDWATER INVESTIGATION AT THE FORMER NORTHEAST ALLOYS & METALS SITE, MAY 1993.

Civil & Environmental Consultants, Inc.
Pittsburgh, PA (412) 921-8100 • (800) 365-2324
Cincinnati, OH (513) 985-9220 • (800) 759-5814

GROUNDWATER CONTOUR MAP
WATER LEVELS MEASURED 2/97 AND 8/97
RI/RS REPORT
NORTHEAST ALLOYS AND METALS
UTICA, NEW YORK

DWN. BY: M.T.M.	ACAD FILE: 94502RF8	SCALE: 1"=60'	DATE: 10/21/97	94502	FIGURE 3-6
CHKD. BY: TSV					

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APPENDIX C
EXHIBITS

Administrative Record
Northeast Alloys and Metals Inc.
Site No. 6-33-045

1. Hydrogeologic Investigation, Empire Soils Investigations, Inc., Dated 1989

2. Environmental Investigation, Huntingdon Empire Soils Investigations Inc., Dated 1992

3. Soil and Groundwater Investigations, ERM Northeast, Dated 1993

4. Soil Gas and Groundwater Investigation, Harress Pickel Consultants, Dated 1994

5. Remedial Investigation/Feasibility Study Work Plan, Civil and Environmental Consultants, Inc., Revised October 3, 1997

6. Remedial Investigation/Feasibility Study Report, Civil and Environmental Consultants, Inc., Revised: February 12, 1998

RESPONSIVENESS SUMMARY
NORTHEAST ALLOYS AND METALS
SITE NO. 6-33-045

The following comments were provided by Mr. Fred Tolhurst of Cohen and Grigsby, P.C. Mr. Tolhurst is the attorney representing ELG Haniel Metal Corporation.

Comment #1:

- Section 3.1: Operational/Disposal History: Northeast Alloys and Metals, Inc. removed a 10,000 gallon UST and closed the tank excavation in July 1989. At that time, a 24-inch diameter corrugated pipe was placed in the excavation cavity and soil was backfilled around the pipe. In August 1989, a water sample was collected from the pipe that was reported to contain TCE.

Response #1:

- Dates have been incorporated into the ROD.

Comment #2:

- Section 4, Current Status, The PRAP states: The presence of hazardous waste at the site presents a significant threat to human health and the environment and the site was placed on the Registry of Inactive Hazardous Waste Sites as a class "2" in 1994. Civil and Environmental Consultants, Inc. has recently completed and revised a Remedial Investigation/Feasibility Study (RI/FS), dated February 12, 1998. The conclusion that the site presents a "significant threat to human health and the environment" is unsubstantiated and seemingly contrary to the portions of the February 1998 Remedial Investigation/Feasibility Study Report ("RI/FS Report") which find that a "no action" remedial alternative (with minimal institutional controls to protect against future use of groundwater) would meet the evaluation criteria for selection of a remedy. The RI/FS Report is based on data produced by various investigations of the site. However, the data has been found not to exceed USEPA risk based concentrations for soils.

Response #2:

- This section refers to language derived from 6NYCRR Part 375, as the regulation defines significant threat. No change is required. USEPA risk based concentrations for soils. The Department utilizes the Technical and Administrative Guidance Memorandum (TAGM) 4046 which deals with the soil cleanup objectives and levels. The USEPA Risk Based concentrations for soils was not identified as a SCG during the RI/FS process. On page 56 of the RI/FS TAGM 4046 is identified as the SCG considered for the comparison of contaminated soils to soil cleanup goals. This section does not consider the USEPA risked based level, nor does it discuss the highest levels of VOC which were identified in this

area. Soil samples taken at S-4 exhibited Trichloroethene (TCE) at 8200 ppb. The language on page 56 only discusses TCE at 47 ppb. The Department did take into consideration the highest levels of contamination and utilized the most stringent SCGs which were identified in the RI/FS. Subsequently the removal of these soils is required and justified. Groundwater contamination near the east gate, at MW-9 was found to be 47 ppb for TCE and 199 ppb for 1,2- DCE. The groundwater standard for TCE and DCE is 5 ppb. Levels established in TAGM 4046 are protective of groundwater quality. If levels of contamination are found above TAGM goals, then removal is required.

Comment #3:

- Section 4.1: Summary of the Remedial Investigation, the PRAP states: Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas of the site require remediation. With regard to the East Gate Area, DEC's conclusion in the PRAP identifies no specific public health and environmental exposure routes and offers no support for the conclusion that the "east gate area" requires remediation. In contrast, the RI/FS Report forms exactly the contrary conclusion! Namely, based on comparison to EPA risk based standards and limited impacts to on-site groundwater, the RI/FS Report concludes that the area by the east gate does not require remediation. (RI/FS Report, pp. 56-58)

Response #3:

- The Department believes that this is an isolated area TAGM 4046 Soil Cleanup Objectives and Cleanup goals have been exceeded. In addition, NYS water quality standards have been exceeded. The NYSDOH is concerned with the volatile organic compounds being located in surficial soils and near the main entrance road and gate. These soils may come into contact with site workers and visitors as well as truck and foot traffic. If the soils are to remain in place, they would need to be covered and monitored until dissipated. This approach is unacceptable, because further groundwater contamination may occur and the area of contamination could grow. Please see comments previously made under Response # 2.

Comment #4:

- Section 6: Summary of the Remediation Goals, the PRAP states: The goals selected for this site are: Provide for attainment of SCGs for groundwater quality to the extent practicable. Mitigate the impacts of contaminated groundwater to the environment. Reduce, control, or eliminate, to the extent practicable, the contaminated soil present on site. Eliminate the potential for direct human or animal contact with the contaminated soils on site. The remediation goals stated in the PRAP are materially different from the remediation goals that are stated in the RI/FS Report that DEC has already approved. (RI/FS Report, p. 70.) In the RI/FS Report, the remediation goals are directed to

protection of groundwater that may be affected by on-site contamination and thus elimination of exposure pathways to contaminated soil for humans and animals. The PRAP has extended those goals to further include the goal to "reduce, control, or eliminate, to the extent practicable, the contaminated soil present on-site." This focus on contaminated soils, irrespective of whether such soils present a significant threat to human health and the environment, is unnecessary and unwarranted.

Response #4:

- The above language has been included because the Department believes that the contaminated soils require remediation and present a significant environmental threat due to the exceedance of groundwater standards. The TAGM 4046 soil cleanup goals are based on the protectiveness of groundwater. If concentrations of hazardous substances exceed a given threshold, the potential for groundwater quality to be adversely impacted does exist. As shown in the RI, both soil cleanup goals and groundwater standards have been exceeded. Therefore, by removing the contaminated soils, groundwater quality will improve and the area can be returned to unrestricted use, as it pertains to the soils.

Comment # 5:

- Section 7.1: Description of Alternatives, the PRAP states: It is proposed, as part of each alternative, that contaminated soils in the vicinity of the east gate would be excavated for off site disposal in order to meet soil cleanup objectives. Approximately 200 cubic yards of soils would require excavation and disposal at an estimated cost of $60,000. This would return this small area to unrestricted use. DEC's proposal for excavation in the east gate area is not supported by the RI/FS Report. On the contrary, the RI/FS specifically considered the minor contamination in the east gate area and concluded that no action was appropriate based on the limited impact to groundwater and that the highest levels of VOCs detected in soil do not represent a human health risk (RI/FS Report, pp. 56-58). Indeed, the PRAP concedes that "downgradient wells and soil samples confirm that the contamination has not migrated to other areas [from the east gate area]" (PRAP, p. 5). Soils in the east gate area are not causing groundwater contamination that is migrating off-site and there is no risk of dermal contact with soils based on most recent EPA Guidance, "Risk Based Concentration Table," USEPA, Region 111, October 22, 1997. Accordingly, the proposal for excavation in the east gate area would not further any of the remediation goals set forth in Section 6 of the report. On the contrary, excavation of soils at depth would only create a risk for exposure to workers where none exists now.

Response #5:

- This comment has been partially answered in the previous sections. The argument that excavation of soils will present risks to workers is unsubstantiated. Standard construction techniques would be applied to the excavation of the east gate soils and conventional

monitoring and safety equipment would be available for use. Engineering controls such as dust suppression techniques and shoring could be implemented if necessary. The referenced pages 56-58 in the revised RI/FS report has failed to discuss the initial sampling results which exhibited Trichloroethene at 8200 ppb. The sections that are referenced discusses soil concentrations at in the range of 47 ppb for TCE. The RI has clearly shown the exceedances of NYSDEC soil cleanup goals and groundwater standards.

Comment #6:

- Section 7.2: Evaluation of Remedial Alternatives, 1. Compliance as SCGs, the PRAP states: Alternative #1 would not meet SCGs for groundwater or soils because the contaminated materials would be allowed to stay in place and exceed standards and guidance values. Contaminated materials could continue to migrate and impact off site receptors. The PRAP suggests that a "no action" alternative does not comply with SCGS. This is contrary to analyses of the "no action" alternative in the RI/FS Report. The PRAP conclusion apparently is founded on the assumption that there are current users of contaminated groundwater at the site. However, that is inconsistent with the PRAP's own finding that "there are no known users of groundwater within a 1.5 mile radius of the site and the area is serviced by a public water supply" (PRAP, p. 4). Accordingly, DEC's conclusion that the no action alternative does not comply with SCG's is inconsistent with its own findings and contrary to the RI/FS Report.

Response #6:

- In the Department's December 19, 1997 comment letter on the RI/FS, concerns about the definition of the contaminated groundwater plume and the potential for off site migration and the need to define this during a preliminary design phase, are discussed. The current understanding of the site does indicate that the groundwater is contained within the site and with deed restrictions current users and site operators would not utilize the water. The premise of this comment relates to the basis that in New York State all groundwater is considered to be useable as a potable water supply. Left unremediated, off site groundwater could be impacted and future groundwater users could be affected. It is the Department's understanding that there are no current users of the groundwater in the vicinity, however, this does imply that the Department will restrict future use in the area.

Comment #7:

- Section 7.2 Evaluation of Remedial Alternatives, 2. Protection of Human Health and the Environment, the PRAP states: Alternative #1 would not be considered to be protective of human health and the environment since site related contamination above cleanup goals would remain in-place and would continue to impact groundwater and migrate off site. DEC's conclusion in the PRAP that the "protection of human health and the environment" criterion is not met apparently is based on a future contingency that residential wells would

be installed in the contaminated zone. This is inconsistent with the PRAP's own findings that there are no current users of this groundwater (PRAP, p. 4).

Response #7:

- This statement, as discussed above, is valid. The Department's review of local groundwater users did not identify any current users in the near vicinity, however the Department cannot control or prohibit future use of groundwater. The Department's responsibility is to protect all the groundwater of NYS and to provide for remedial programs which will restore groundwater quality for unrestricted future use.

Comment #8:

- Section 7.2 Evaluation of Remedial Alternatives, 4. Long-term Effectiveness and Permanence, the PRAP states: Alternative #1 would not provide long-term effectiveness or permanence because contamination would remain in place. The conclusion in the PRAP that the "no action" alternative "would not provide long-term effectiveness or permanence" is not supported by evaluation of remaining risks, the adequacy of the controls intended to limit the risk, or the reliability of the controls.

Response #8:

- Pursuant to the Department's Technical and Administrative Guidance Memorandum (TAGM) 4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites this section is valid. As compared to the other alternatives, the no action alternative is not considered to provide long-term effectiveness or permanence. Furthermore, the primary focus of this evaluation section is the extent and effectiveness of the controls that may be required to manage the wastes or residuals remaining at the site and the operating system necessary for the remedy to remain effective. The no action alternative does not provide any controls or systems to manage contaminated soil or groundwater.

Comment #9:

- Section 7.2 Evaluation of Remedial Alternatives 7. Cost, the PRAP states: Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criteria evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 3. Cost is a critical consideration for any remedies that interested parties may perform. DEC estimates that its proposal for soil removal in the east gate area will cost $60,000. That proposal is intended to remedy soils that pose only minimal and acceptable risk to human health or the environment. Contrary to the implication in the PRAP, it is not required that remedial alternatives meet all the other "balancing" criteria before cost is taken into consideration. Cost must be considered for those alternatives that comply

with SCG's and that are protective of the public health and the environment. The applicable regulations provide that a remedy that satisfies the threshold criteria shall be "cost effective." To be "cost effective," the cost of the remedy is to be proportional to the evaluated "long-term effectiveness and permanence"; the "reduction of toxicity, mobility or volume through treatment"; and "short-term effectiveness." 40 C.F.R. § 300.430(fl(ii)(D). In evaluating the criterion for "reduction of toxicity, mobility or volume through treatment" for soils in the east gate area, the PRAP does not propose any treatment of east gate soils as part of their off-site disposal nor will treatment occur if the soils remain in place. Therefore, both alternatives for the soil will have the same evaluation with respect to this criterion and as a result would not support the increased cost of excavation and off-site disposal. There has been no evaluation for excavation and off-site disposal under the "long-term effectiveness and permanence" criterion. The concerns associated with the soils remaining on-site have not been shown to outweigh the vagaries attendant to off-site disposal of contaminated soils. Moreover, excavation of contaminated soils produces the possibility of an unfavorable exposure to short term risks. Thus, the cost of off-site disposal is disproportionately high in comparison to the lack of increased benefit to long-term performance and short-term impacts. As a result, removal of soils from the east gate area is not "cost-effective."

Response #9:

- Several parts to this comment have been responded to in previous comments. The Department feels that the removal of these contaminated soils and the restoration of this area to prerelease conditions provides a benefit and is protective of human health and the environment. In addition, if you take into consideration the costs associated with containment, sampling and analytical costs which will be required during any long-term monitoring and maintenance program, the benefit of removing these soils becomes more evident. In addition, the site in question is not owned or operated by ELG Haniel Metal Corporation, if these soils are not removed, future use of this area may be restricted and future sales or development of this site may be limited. However ELG Haniel Metal Corporation does not have any interest vested in the future use of this site or to what level future use restrictions are applied which may diminish the developablilty and future retail of this property.

Comment #10:

- Section 8: Summary of the Preferred Remedy, the PRAP states: Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is proposing Alternative #3, along with removal of contaminated soil near the east gate, as the remedy for this site. The elements of the proposed remedy are as follows: 1) installation of a groundwater collection and treatment system based on the remedial design program; 2) installation of a soil vapor extraction system at RW-1 and RW-2; 3) excavate

contaminated soil in the vicinity to meet soil clean up goals; 4) implementation of a site-wide operation, monitoring and maintenance program to insure that the remedial program is effective and remedial action goals are obtained; 5) institutional controls such as deed restrictions on groundwater use will be implemented until groundwater standards are obtained. DEC's own proposal for excavation and off-site disposal at the east gate area does not satisfy its stated goals for remediation. That alternative would not "reduce, control, or eliminate, to the extent practicable, the contaminated soil present on site" and it would not "provide for attainment of SCGs for groundwater quality to the extent practicable." That is because the cost of the proposed excavation remedy makes it economically impractical. By insisting on an unwarranted soil excavation remedy in the east gate area, DEC effectively reads "to the extent practicable" out of its own stated remediation goals. Moreover, the excavation remedy for the east gate area does not serve to eliminate the potential for direct human or animal contact with the contaminated soils on site" because no such potential currently exists. Indeed, excavation of the soils would have exactly the opposite affect by creating a risk of human exposure. Finally, the proposed soil removal for the east gate area would not "mitigate the impacts of contaminated groundwater to the environment" because there is no off-site groundwater contamination caused by these soils. (PRAP, p. 5)

Response # 10:

- This comment has been addressed in previous responses.

Comment #11:

- The PRAP also states: The remedial design would verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS would be resolved. This would include the determination of the size, location and number of groundwater and soil gas extraction wells. The "Summary of the Preferred Remedy" in the PRAP also seems to imply that further details are necessary for the installation of the proposed system. The RI/FS Report proposes a remedial system for which no further investigation or field study is needed. The size, location and number of groundwater and soil gas extraction wells has been determined. Undefined "uncertainties identified in the RI/FS process" have been resolved to the extent necessary. No further verification of conceptual design or details of construction and operation are necessary or economically practicable with respect to the remediation proposed in the RI/FS Report.

Response #11:

- As discussed in the Department comment letter on the RI/FS report, there exists one area on the site to the northwest of the degreasing area where it has been shown that contaminated groundwater may be flowing in this direction. This area does not have any

monitoring wells nor has it been sampled by any other means. In order to verify this potential pathway and to define the limits of a collection system, the Department has proposed to perform some limited evaluation of this area during the preliminary design stages. The Department's objective in this situation is to construct and operate a remedial design system that is effective and efficient and meets the remedial objectives within a reasonable time frame. If contamination is migrating from the site and is not properly identified and treated, future off site migration may occur which will be more difficult to capture and additional liabilities will be incurred. Therefore, the limited program is required. A properly engineered and designed system is the goal of the Department. The design, construction and operation for the groundwater extraction and soil vacuum extraction may not vary from that which is discussed in Section 6 of the RI/FS, however given the unknowns which have been identified above, a preliminary design program will ensure that a properly sized, located and equipped system is constructed and operated to be effective and efficient. The design for the removal of the soils located near the east gate will also be required under this program. The Department expects the Responsible Parties to follow TAGM HWR-95-4056 for remedial actions.

APPENDIX B

DISCHARGE PERMIT

ONEIDA COUNTY DEPARTMENT OF WATER QUALITY & WATER POLLUTION CONTROL

51 Leland Ave., PO Box 442, Utica, NY 13503-0442
(315) 798-5656 (FAX) 724-9812

Ralph J. Eannace, Jr.
County Executive

Steven P. Devan, P.E.
Commissioner

February 22, 1999

MR. DONALD A. McCALL, P.E.
URS GREINER WOODWARD CLYDE
282 DELAWARE AVENUE
BUFFALO NY 14202-1805

Re: Groundwater Remediation Discharge Permit No. GW-055
for Northeast Alloys & Metals c/o NYSDEC

Dear Mr. McCall:

Enclosed is a permit from the Oneida County Sewer District for wastewater discharged from groundwater cleanup and site remediation projects.

1) This permit is valid for both pump test wastewater and future groundwater remediation discharges

2) A bill for the $100 annual permit fee will be sent separately.

3) The OCSD also issues semi-annual bills for groundwater remediation projects based on the volume of wastewater discharged during the reporting period, as measured and reported by the Permittee, at the 1999 rate of $1.71 per 1,000 gallons listed in the Sewer Usage Rate Schedule.

4) Groundwater permits are issued for a five (5) year period, and are considered cancelled when written notice of project closure is submitted by the permittee. Submit closure notice promptly to avoid unnecessary billing and other correspondence.

5) The permittee is responsible for providing copies of this permit to its subcontractors and other regulatory agencies.

6) Written comments and requests for changes must be submitted within thirty (30) days.

Sincerely,

THE ONEIDA COUNTY DEPARTMENT OF
WATER QUALITY & WATER POLLUTION CONTROL

STEVEN P. DEVAN, P.E.
Commissioner

rdh/jap

cc: Ms Pat Zima, OCSD Billing

cc: D. Rothman
D. McCall
file
P. Ouderkirk - NYSDE

Oneida County Sewer District
Groundwater Remediation Discharge Permit No. GW-055

In accordance with all terms and conditions of Local Law No.4 of 1994, the Oneida County Sewer Use Rules & Regulations; and also with any applicable provisions of Federal, State, or County law or regulation,

PERMISSION IS HEREBY GRANTED TO:

Site Address:	NORTHEAST ALLOYS & METALS 2145 DWYER AVENUE UTICA NY 13501
Contracting Agency:	NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Contact:	MR. PETER OUDERKIRK
Address:	NYSDEC, REGION #6 HEADQUARTERS STATE OFFICE BUILDING WATERTOWN NY 13601
Telephone:	(315)-785-2522
Permittee & Contractor:	URS GREINER WOODWARD CLYDE
Contact:	MR. DONALD A. McCALL, P.E.
Address:	282 DELAWARE AVENUE BUFFALO NY 14202-1805
Telephone:	(716)-856-5636
Fax:	(716)-856-2545

for the discharge of wastewater generated during groundwater cleanup and site remediation into the sanitary sewer system tributary to the Oneida County Water Pollution Control Plant, 51 Leland Avenue, Utica, New York.

In addition to the conditions contained in this document, the Oneida County Sewer District is incorporating by reference all applicable provisions of Federal Regulation 40 CFR 403 "General Pretreatment Regulations for Existing and New Sources of Pollution", and Local Law No. 4 of 1994, the Oneida County Sewer Use Rules & Regulations, into this permit.

Note; this permit does not relieve the permittee of the responsibility of complying with any other applicable Federal, State or Local Laws, Regulations and/or Ordinances.

This permit is granted in accordance with the application information filed with the office of the Commissioner, Oneida County Water Quality & Water Pollution Control, together with the following named conditions and requirements.

Principal Groundwater Contaminants: Chlorinated Volatile Organics, Mercury, and Nickel.

Permit Modification Tracking System:
Application Letters: 01-19-99 & 02-19-99
Effective Date: 02-22-99
Expiration Date: 02-22-04

Issued by:

THE ONEIDA COUNTY DEPARTMENT OF
WATER QUALITY & WATER POLLUTION CONTROL

STEVEN P. DEVAN, P.E.
Commissioner

Conditions for Acceptance of Wastewater Discharged from Groundwater Cleanup & Site Remediation:

1. **Site Information Required:** The Permittee must inform the OCSD of all contaminants found or suspected to be present at the site, and the pretreatment option to be used prior to discharge to the sewers. The Permittee must provide copies of analytical data, and a written descriptive outline about the site and the cleanup procedure. **This information was provided in 01-19-99 & 02-19-99 letters from URS Greiner Woodward Clyde.**

2. **Monitoring & Reporting:**

   a) Self-monitor the treated pump test wastewater once for all permit parameters, and submit the results to the OCSD. This information can be submitted in the first semi-annual report, which is due on 05-31-99.

   b) If the project is inactive for a reporting period, submit a letter documenting project status by the semi-annual report due date.

   c) Self-monitor all permit parameters once within the first ninety (90) days of groundwater remediation discharge, and submit the results to the OCSD.

   d) Following the 90 day startup, perform semi-annual self-monitoring of all permit parameters. The semi-annual reports are due May 31 & November 30 of each year.

   e) Based on analytical data for the site, the OCSD waives its standard self-monitoring requirements for Combustible Gas %LEL, Odor, and Oil & Grease.

   f) Sampling and analysis of the discharge must be performed using methods presented in 40 CFR 136 for Environmental Analysis.

   g) Monthly flow data must be submitted with the semi-annual report. The flow data may consist of actual flow measurements or best engineering estimates.

3. **Discharge Limits:**

POLLUTANT PARAMETER	LIMIT	NOTES
Total Flow, gal/month	No Limit	
Total VOCs, mg/L	2.0	a+b
Mercury, mg/L	0.2	b+c
Nickel, mg/L	2.0	

   a) Total Volatile Organics is the sum of all detectable VOCs substances as determined using the EPA 624 Method.

   b) As the OCSD does not accept RCRA Hazardous Waste, individual VOCs (see list in 9-b of this permit) and Mercury must not exceed concentrations listed in the TCLP Regulation (40 CFR 261.24 Table 1).

   c) Future regulations for Mercury may become more stringent when the Great Lakes Initiative is implemented.

4. **Other Approvals Prior To Discharge:** As each Town, Village or City discharging to the OCSD owns the sewer lines and collection system, the Permittee must obtain permission from the local governing Municipality in which the cleanup project site is located, to discharge the wastewater into their Municipal sewers.

5. **Charges and Fees:** Rates are established through County Legislation. Billing will be handled separately from permitting, with the current rates as follows:

   a) Permit Administrative Fee: $100 for all or part of the period January 1 thru December 31.

   b) Volume Charge: A semi-annual charge based on the volume of wastewater discharged, as measured and reported by the Permittee. The 1999 rate is $1.71 per 1,000 gallons. If rate changes occur, written notification will be sent.

   c) Late Payment Charge: 10% will be added to all charges which are paid after the late date posted on the bill. Failure to make timely payment may result in permit revocation.

6. **Permit Changes:** The OCSD unconditionally reserves the right to amend or rescind this approval without prior notice.

7. **Wastewater Not Approved by This Permit:** Wastewater stored in containers other than treatment system process tanks cannot be directly discharged to the sewer system as a groundwater discharge. It must be hauled under NYSDEC Part 364 & OCSD Hauler Permits for discharge at the designated Hauler Manhole at the OCSD Plant, or hauled to a NYSDEC permitted disposal facility.

8. **Fines and Penalties:** Failure to follow any Permit conditions can result in Enforcement & Penalties against the Permittee as provided for in Local Law No.4 of 1994, the Oneida County Sewer Use Rules & Regulations.

9. **Special Permit Conditions:**

   Clarification & Additions to Standard Permit Conditions:

   a) The OCSD requires that treatment technology, such as carbon columns, be installed and used for pump test wastewater and all future wastewater discharges to the sewer system from this NYSDEC-contracted site clean-up.

   b) The contaminants listed below were detected in groundwater samples: low levels of Mercury & Nickel, VOCs including 1-1 Dichloroethene, 1-1 Dichloroethane, 1-2 Dichloroethene, 1,1,1-Trichloroethane, and Trichloroethene.

   c) The following pollutant groups were at low or non-detect concentrations: Semivolatile Organics and Pesticide/PCBs.

   d) The OCSD requires monitoring equipment/facilities for taking representative samples of the discharge using manual grab sampling techniques.

ONEIDA COUNTY SEWER DISTRICT REPORTING FORM

Submit To:
ATTN: PRETREATMENT
ONEIDA COUNTY SEWER DISTRICT
PO BOX 442
UTICA NY 13503

From:
URS GREINER WOODWARD CLYDE
282 DELAWARE AVENUE
BUFFALO NY 14202-1805

Site:
NORTHEAST ALLOYS & METALS
2145 DWYER AVENUE
UTICA NY 13501

REPORTING PERIOD: _____ to _____

SAMPLING RESULTS:

This form is used for reporting pump test wastewater discharges, and 90-day startup and regular groundwater remediation system discharges.

For semi-annual reporting, a grab sample of the discharge is analyzed for the pollutants listed. Attach signed Report Certification.

In response to any violations incurred, self-monitor for pollutant in violation at least once a week until there are results for three consecutive sampling events which are in full compliance with Permit Limits. Submit all results for all samples taken. The first resampling result is due within thirty (30) days; a complete report with all three resampling results is due within sixty (60) days. Attach signed Report Certification.

ATTACH COPIES OF ALL CITY WATER BILLS, CONTRACT LABORATORY REPORTS, AND MANIFESTS OF HAZARDOUS WASTE SHIPMENTS FOR THE REPORTING PERIOD.

POLLUTANT PARAMETER:	DAILY MAXIMUM LIMIT	ANALYTICAL RESULTS Sample#1	Sample#2	Sample#3
Date Sampled				
Sample Number				
Discharge Flow (Note 1)				
Mercury, mg/L	0.2			
Nickel, mg/L	2.0			
Total VOCs (Note 2+3)	2.0			

1) Attach monthly flow totalizer data.

2) Total VOCs using EPA Method 624.

3) Individual VOCs must not exceed concentrations listed in the TCLP Regulation (40 CFR 261.24 Table 1).

Signature: _____ Date: _____

ONEIDA COUNTY SEWER DISTRICT
INDUSTRIAL USER REPORT CERTIFICATION

Submit To:
ATTN: PRETREATMENT
ONEIDA COUNTY SEWER DISTRICT
PO BOX 442
UTICA NY 13503

From:
URS GREINER WOODWARD CLYDE
282 DELAWARE AVENUE
BUFFALO NY 14202-1805

Site:
NORTHEAST ALLOYS & METALS
2145 DWYER AVENUE
UTICA NY 13501

ATTACH TO REPORT DATED: _____

REPORTING PERIOD: _____ to _____

The following certification of information provided in industrial user reports is made in compliance with the General Pretreatment Regulations.

1. Compliance or Non-Compliance Status: Ref = 40 CFR 403.12(b)(6)

Check A or B. If B is checked, attach a statement describing O&M and/or pretreatment required; include the shortest schedule by which you can provide the required O&M and/or pretreatment.

[ ] A. I certify that Pretreatment Standards are being met on a consistent basis.

[ ] B. I certify that Pretreatment Standards are NOT being met on a consistent basis, and that additional operation and maintenance (O&M) and/or additional pretreatment is required to achieve compliance with Pretreatment Standards and Requirements.

2. Information Certification: Ref = 40 CFR 403.6(a)(2)(ii)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Authorized Signature: _____

Title: _____

Date: _____

PLEASE ATTACH THIS CERTIFICATION TO THE SEMI-ANNUAL & OTHER REPORTS THAT YOU SUBMIT TO THE ONEIDA COUNTY SEWER DISTRICT.

APPENDIX C

MONITORING AND MAINTENANCE LOGS

Northeast Alloys and Metals

Field Records

Date: _____ Personnel: _____

Weather: _____ _____

Is system operating upon arrival? YES NO (circle one)

If "NO," what caused the shutdown, and when?

_____

_____

Any alarm conditions?

_____

_____

Other observations or potential problems?

_____

_____

P-101 Total Flow (gal): _____

P-102 Total Flow (gal): _____

B-101 status? ON OFF (circle one)
B-102 status? ON OFF (circle one)

System Effluent Sampled? YES NO (circle one)
Monitoring Wells Sampled? YES NO (circle one)

Monitoring/Maintenance Performed:

_____

_____

Northeast Alloys and Metals

Water Elevation Monitoring Table

Date: _____ Personnel: _____

Location ID	**Top of Riser Elevation** (feet)	**Ground Elevation** (feet)	**Depth to Water** (feet)	**Water Elevation** (feet)
MW-01	437.04	435.01		
MW-02	431.65	431.75		
MW-03	432.55	430.30		
MW-04	430.85	430.95		
MW-05	431.51	432.33		
MW-06	431.88	432.31		
MW-07	437.02	436.94		
MW-08	436.16	436.11		
MW-09	432.62	432.97		
MW-10	430.68	431.58		
MW-11	433.79	431.40		
MW-12	433.12	430.41		
RW-01	432.07	432.38		
RW-02	429.95	430.29		
RW-03	428.90	429.37		

J:\35618.04\Excel\[gw elevation table.xls]Water Elevations

Northeast Alloys and Metals

Summary of Site Sampling Requirements

Sample Location	Monitoring Parameters		
	VOCs	**Mercury & Nickel**	**Water Elevations**
System Effluent	Semi-annual	Semi-annual	
System Influent	Semi-annual		
MW-01	Quarterly[1]		Quarterly
MW-02	Quarterly[1]		Quarterly
MW-03	Quarterly[1]		Quarterly
MW-04	Quarterly[1]		Quarterly
MW-05	Quarterly[1]		Quarterly
MW-06	Quarterly[1]		Quarterly
MW-07	Quarterly[1]		Quarterly
MW-08	Quarterly[1]		Quarterly
MW-09	Quarterly[1]		Quarterly
MW-10	Quarterly[1]		Quarterly
MW-11	Quarterly[1]		Quarterly
MW-12	Quarterly[1]		Quarterly
RW-01	Quarterly[1]		Quarterly
RW-02	Quarterly[1]		Quarterly
RW-03	Quarterly[1]		Quarterly

1. The frequency will be reduced to semi-annual following the first year of operation.

518-402-9557

Tom Koch

Table 3-2

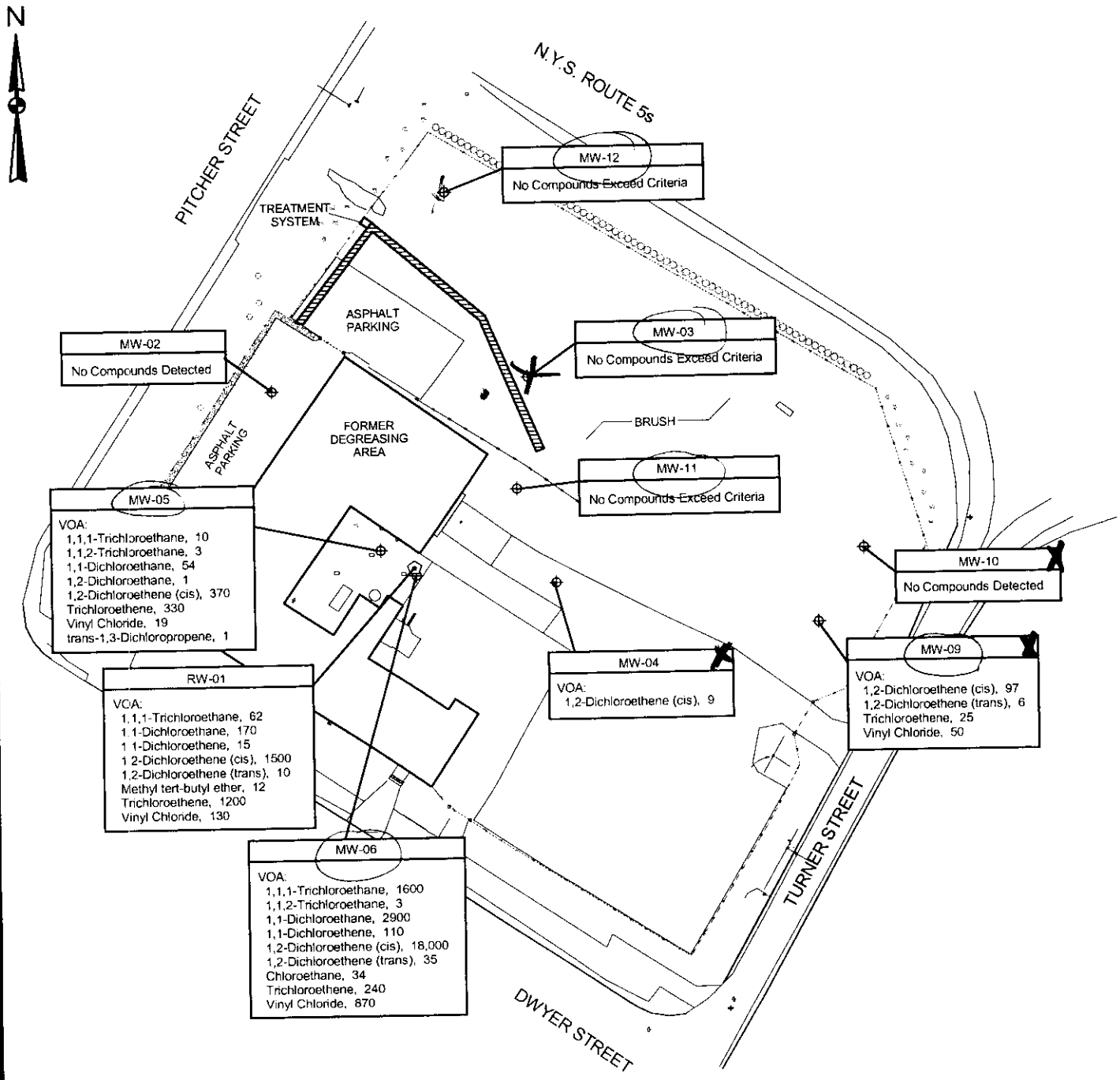
Northeast Alloys and Metals

Water Elevation Monitoring Table

From ground surface to bottom of well

Location ID	Top of Riser Elevation (feet)	Ground Elevation (feet)	~~Depth to Water~~ (feet)	Water Elevation (feet)
MW-01	437.04	435.01	19.0' Bg	
MW-02	431.65	431.75	18.0' Bg	
MW-03	432.55	430.30	18.0 Bg	
MW-04	430.85	430.95	18.0 Bg	
MW-05	431.51	432.33	19.0' Bg	
MW-06	431.88	432.31	23.5' Bg	
MW-07	437.02	436.94	14' Bg	
MW-08	436.16	436.11	14' Bg	
MW-09	432.62	432.97	18' Bg	
MW-10	430.68	431.58	20' Bg	
MW-11	433.79	431.40	18' Bg	
MW-12	433.12	430.41	20' Bg	
RW-01	432.07	432.38	-	
RW-02	429.95	430.29		
RW-03	428.90	429.37		

J:\35618.04\Excel\[gw elevation table.xls]Table 3-2



L:\35618.02\dbGis\2001\northeast apr JULY 2001 GROUNDWATER CONTAMINATION 10/4/2001

URS

NORTH EAST ALLOYS AND METALS
GROUNDWATER ANALYTICAL RESULTS
(JULY 2001)

FIGURE 3-3

APPENDIX D

BORING LOGS

DATE STARTED 8-22-89
FINISHED 8-22-89
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS INC — SUBSURFACE LOG

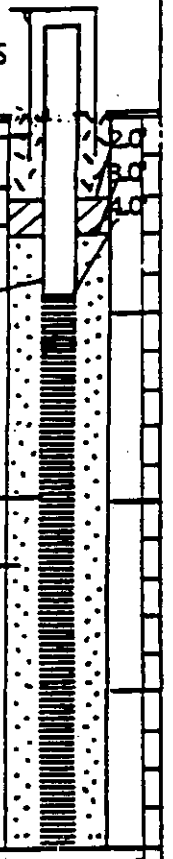
HOLE NO. MW-1
SURF. ELEV. 101.27
G. W. DEPTH See Notes

PROJECT North East Alloy & Metals
LOCATION Utica, New York

DEPTH FEET	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION
0		1	2	4				TOPSOIL 0.5'
				8	5	12		Fill: Black SILT & fine-coarse SAND, Some fine-coarse Gravel, Cinders, Brick (Damp-Firm)
		2	5	8				
				7	8	15		
5		3	7	5				Brown SILT, Some fine-coarse Sand & Gravel (Moist-Loose)
				4	4	9		
		4	4	4				Grades to SILT & fine-coarse SAND, Some fine Gravel (Wet-Loose)
				6	10	10		
10		5	24	24				Brown/Red SILT, Some fine-medium Sand, trace fine gravel (Wet-Compact)
				36	52	60		
		6	25	35				
				34	68	69		
		7	65	45				becomes (Wet-Very Compact)
				42	38	87		
15		8	18	32				
				34	36	66		
		9	48	32				
				66	75	98		
20								Boring Terminated @ 19.0'
25								
30								
35								

NOTES

Locking Guard Pipe
Grout
Bentonite Seal 4.0'
2" Schedule 40PVC Riser Pipe
8.0'
0.01" Slotted Well Screen
4Q Sand



Water first encountered @ 6.1'

Reference elevation is the top of the PVC Well Pipe (103.43)

No blows to drive 2 " spoon 12 " with 140 lb. pin wt. falling 30 " per blow.
No blows to drive ____ " casing ____ " with ____ lb. weight falling ____ " per blow

CLASSIFICATION Visual by Geologist

DATE
STARTED 8-21-89
FINISHED 8-22-89
SHEET 1 OF 1

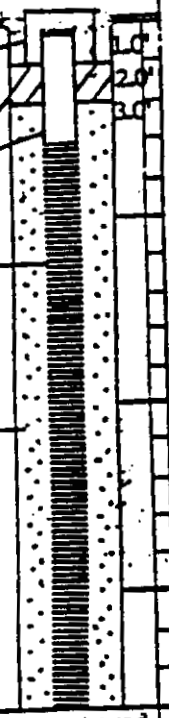
EMPIRE SOILS INVESTIGATIONS INC — SUBSURFACE LOG

HOLE NO. MW-2
SURF. ELEV. 98.08
G. W. DEPTH See Notes

PROJECT North East Alloy & Metals
LOCATION Utica, New York

DEPTH IN FEET	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION
								CONCRETE .5'
		1	5	7	6	13		Fill: Black fine-medium SAND, Some Silt, Wood, Brick, Cinders (Damp-Firm)
		2	4	6				
				6	6	12		Brown SILT, Some fine-medium Sand (Moist-Firm)
5		3	2	3				
				4	5	7		Grey/Brown SILT & CLAY, trace fine-medium sand, brick (Moist-Loose)
		4	4	6				
				9	14	15		
		5	5	10				Brown SILT & CLAY, little fine-medium sand (Wet-Firm)
10				10	12	20		
		6	5	12				
				21	24	33		
		7	24	100/.5'				Grades with little coarse gravel (Wet-Compact)
		8	14	16				
15				22	46	38		
		9	37	32				
				35	43	67		becomes (Wet-Very Compact)
								Boring Terminated @ 18.0'
20								
25								
30								
35								

NOTES



Water first encountered @ 7.5'

Reference elevation is the top of the PVC Well Pipe (97.88).

N = No. blows to drive 2 " spoon 12 " with 140 lb. pin wt. falling 30 " per blow. CLASSIFICATION Visual by

DATE
STARTED 8-22-89
FINISHED 8-22-89
SHEET 1 OF 1

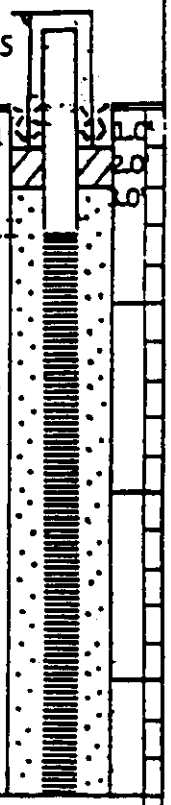
EMPIRE SOILS INVESTIGATIONS INC

SUBSURFACE LOG

HOLE NO. MW-3
SURF. ELEV. 96.63
G. W. DEPTH See Notes

PROJECT North East Alloy & Metals
LOCATION Utica, New York

DEPTH FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0								TOPSOIL .1	
		1	5	4				Fill: Black SILT & fine-coarse SAND & GRAVEL, ASH, CINDER, BRICK (Damp-Firm)	Locking Guard Pipe
				10	10	14			Grout
		2	5	3					Bentonite Seal
				4	5	7			2" Schedule 40 PVC Riser Pipe
5		3	2	2				Brown SILT, Some fine-coarse Sand (Moist-Loose)	
				2	2	4			
		4	2	2				Black/Grey SILT, little fine-coarse sand, organic matter (Wet-Loose)	0.01" Slotted Well Screen
				2	3	4			
		5	2	2					
10				2	3	4			
		6	2	1				-similar with glass fragments	
				2	2	3			12.0'
		7	3	2				Black/Grey SILT, little fine-medium sand, organic matter (Wet-Firm)	4Q Sand
				3	2	5			
15		8	7	7					
				8	8	15			
		9	8	18					
				22	30	40		becomes (Wet-Compact)	
								Boring Terminated @ 18.0'	Water first encountered @ 9.0'
20									Reference elevation is the top of the PVC Well Pipe (98.93)
25									
30									
35									



N = No. blows to drive ___ " 10000 ___ " with ___ lb

Visual by

DATE
STARTED 8-23-89
FINISHED 8-23-89
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS INC

SUBSURFACE LOG

HOLE NO. MW-4
SURF. ELEV. 97.35
G. W. DEPTH See Notes

PROJECT North East Alloy & Metals
LOCATION Utica, New York

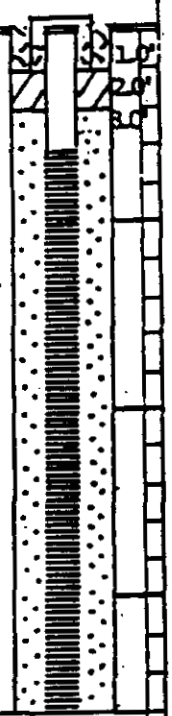
DEPTH ft	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION
0		1	24	30				Fill: Grey fine-coarse SAND & SILT, Some fine Gravel (Damp-Compact)
				20	20	50		
		2	15	12				
				10	4	22		4.0'
		3	3	4				Grey Brown SILT & CLAY, little fine-medium sand (Wet-Loose)
5				5	5	9		
		4	5	4				
				4	3	8		
		5	4	7				
				10	15	17		
10		6	10	13				11.0'
				23	25	36		Brown SILT, Some fine-coarse Sand, trace fine gravel
		7	25	30				
				40	42	70		
		8	11	15				
15				15	18	30		
		9	20	23				
				32	41	55		
								Boring Terminated @ 18.0'
20								
25								
30								
35								

NOTES

Curb Box with Locking Cap
Grout
Bentonite Seal
2" Schedule 40 PVC Riser Pipe
0.01" Slotted Well Screen
4Q Sand

Water first encountered @ 8.2'

Reference elevation is the top of the PVC Well Pipe (97.12)



N = No blows to drive 2 " spoon 12 " with 140 lb. pin wt. falling 30 "per blow.
C = No blows to drive ____ " casing ____ " with ____ lb. weight falling ____ "per blow.

CLASSIFICATION Visual by Geologist

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

LOG OF MONITORING WELL: MW-5

Project Name & Location: FORMER NORTHEAST ALLOYS & METALS, UTICA, NY			Project Number: 694-001	Water Level(s) (DBC)	Site Elevation Datum
Drilling Company: AQUIFER DRILLING AND TESTING, INC.		Driller: JOE MIRANDA		Date / Time / Levels	Ground Elevation: 98.58'
Method: 4-1/4" HOLLOW STEM AUGER	Date Started: 1/19/93	Date Completed: 1/19/93			Top of Steel Cap Elevation
Completion Depth: 21'	ERM-Northeast Geologist/Engineer: W. MAHONEY				Top of Riser Elevation: 97.90'

WELL CONSTR. (NTS)	DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	Blow per 6 in.	Time	HNU/ OVA (ppm)	SOIL DESCRIPTION
	0						0-8" Concrete Slab
	1	S-1	12"	15			Fill material, Black, Brown Coal material, dry-loose
	2			6			
	3						
	4						
	5	S-2	12"	RW RW 2 1			Brown with green f SAND and SILT, some Clay, damp, tight, sheen on upper part of recovery ~ 4". Outside of spoon has a sheen, slight odor.
	6						
	7						
	8						
	9						
	10	S-3	12"	6 7 15 20			Red CLAY with some Sand. Firm, small SHALE and rounded pebbles. Spoon was wet.
	11						
	12						
	13						
	14						
	15	S-4	16"	23 26 30 32			Brown/black CLAY with shards of Shale-like pebbles, angular, one large cobble rounded, wet firm.
	16						
	17						Dark brown SILT, wet, from cuttings.
	18						Firm surface, from cuttings. Wet SILT, from cuttings, soupy.
	19						
	20	S-5	12"	15 21 19 20			Brown/black CLAY, dry, firm, has small pieces of shale and pebbles.
	21						
	22						
	23						
	24						
	25						

LEGEND:
- Cement
- Bentonite /cement
- Bentonite Seal
- Gravel pack
- Screen
- End/Top cap

WELL CONSTRUCTION:

0'-0.5'	Protective Flush-mount manhole.
0.5'-1'	Bentonite-Cement Grout
1'-3'	Bentonite Seal
4'-19'	2" Diameter Sch. 40 0.01 Slot PVC Screen
3'-20'	#0 Morie Sand

NTS - Not to scale

DBC - Depth below PVC casing

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

LOG OF MONITORING WELL: MW-6

Project Name & Location	Project Number	Water Level(s) (DBC)			Site Elevation Datum
FORMER NORTHEAST ALLOYS & METALS, UTICA, NY	694-001	Date	Time	Levels	Ground Elevation 98.69'
Drilling Company: AQUIFER DRILLING AND TESTING, INC.	Driller: JOE MIRANDA				Top of Steel Cap Elevation
Method: HOLLOW STEM AUGERS	Date Started: 1/19/93 — Date Completed: 1/19/93				Top of Riser Elevation 98.08'
Completion Depth: 24'	ERM-Northeast Geologist/Engineer: W. MAHONEY				

WELL CONSTR. (NTS)	DEPTH (ft below grade)	SAMPLES No.	Recovery (inches)	Blow per 6 in.	Time	HNU/ OVA (ppm)	SOIL DESCRIPTION
	0						0-8" Concrete Slab
	1	S-1	2"	12			GRAVEL, dry, loose.
	2			7			
	3						Black/brown material.
	4						
	5	S-2	16"	1 2			Brown medium SAND, SILT, little gravel, damp, tight.
	6			1 2			
	7						Dark brown fine SAND
	8						
	9						
	10	S-3	16"	14 20			Red brown CLAY with gravel (angular shards), firm, dry.
	11			21 21			
	12						Brown CLAY, rolled into balls, from cuttings.
	13						
	14						
	15	S-4	10"	31 27			Reddish brown CLAY with some Gravel (rounded pebbles), firm, dry.
	16			21 22			
	17						
	18						
	19						
	20	S-5		21 24			Dark brown CLAY, firm, damp, with some small Gravel pieces.
	21			27 22			
	22	S-6		26 37			CLAY with Gravel (angular pieces), damp, rolled into little balls. Silt detected at 23'.
	23						
	24						
	25						

LEGEND:
- Cement
- Bentonite /cement
- Bentonite Seal
- Gravel pack
- Screen
- End/Top cap

WELL CONSTRUCTION:
- 0.5'-1' Bentonite-Cement Grout
- 3.5'-23.5' 2" Dia. 0.01 Slot Screen
- 0'-0.5' Protective Manhole
- 1'-3.5' Bentonite Seal
- 3.5'-23.5' Morie Sand Pack

NTS - Not to scale

DBC - Depth below PVC casing

Civil & Environmental Consultants, Inc.
Cincinnati, OH (513) 469-0210 • (800) 759-5814
Pittsburgh, PA (412) 921-3402 • (800) 365-2324

PROJECT ID: N.E. ALLOY AND METAL
BORING/WELL #: MW-7
PROJECT #: 94502
PAGE 1 OF 1

DATE STARTED: 2/12/97 COMPLETED: 2/12/97	WELL INSTALLED: ☒ YES ☐ NO
DRILLING COMPANY: MAXIM	WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW
DRILLER: John Munck	OUTER CASING: FLUSH MOUNT W/Locking Cap
GEO REPRESENTATIVE: K. MEURER	DEVELOPMENT METHOD: Bailed
DRILLING METHOD: 6¼ H.S.A.	RESULTS:
BORE HOLE Ø: 10" CORE SIZE:	YIELD:
BACKFILL	SURFACE PROTECTION: CONCRETE
AIR MONITORING INSTRUMENT: PID #3	WATER LEVELS:
CASING ELEVATION:	TOC=TOP OF INNER CASING — OPEN BORE HOLE ⊙ COMPLETION:
GROUND ELEVATION	OPEN BORE HOLE ⊙: _____ HRS:
KEY #: 493	GS=GROUND SURFACE — WELL ⊙ COMPLETION:
COMMENTS/PROBLEMS:	WELL ON / / :
	WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):

SAMPLE NO. CORE RUN	RUN/RECOVERY % RECOVERY	BLOWS COUNTS ROD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-1	75 54 47 5	1.0	5.1	1	GRAY/BLK SLAG AND Cinder HARD MOIST FILL			
S-2	14 7 5 4	1.0	4.2	3	As Above STIFF			
S-3	6 4 3 3	1.0	4.9	5	As Above M. STIFF			
S-4	1 1 1 2	0.3	5.3		As Above Soft Wet @ 8'			
S-5	3 3 10 22	1.2	17.0	10	As Above SLT ODOR(?)			10/20 SILICA SAND; 2" SCH 40 PVC SLOTTED 0.010
S-6	17 15 16 24	1.6	0.2		BLK/Purple SILT AND CLAY Some C-SAND TRACE GRAVEL V. STIFF - HARD ALLUVIUM			
S-7	15 11 15 24	1.5	2.0		As Above			
				15		B.O.B. 14D		
				20				

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: MW-7
PROJECT #: 94502

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Civil & Environmental Consultants, Inc.
Cincinnati, OH (513) 469-0210 • (800) 759-5814 — Pittsburgh, PA (412) 921-3402 • (800) 365-2324

PROJECT ID: N.E. ALLEY AND METALS

BORING/WELL #: MW-8

PROJECT #: 94502

PAGE 1 OF 1

DATE STARTED: 2/12/97 COMPLETED: 2/12/97

DRILLING COMPANY: MAXIM

DRILLER: John / Mark

GEO REPRESENTATIVE: K. NIEUKER

DRILLING METHOD: 6 1/4 H.S.A

BORE HOLE ∅: 10" CORE SIZE:

BACKFILL

AIR MONITORING INSTRUMENT: PID # 3

CASING ELEVATION:

GROUND ELEVATION

KEY #: 493

COMMENTS/PROBLEMS:

WELL INSTALLED: ☒ YES ☐ NO

WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW

OUTER CASING: FLUSH MOUNT W/Locking Cap

DEVELOPMENT METHOD: Bailed

RESULTS:

YIELD:

SURFACE PROTECTION: Concrete

WATER LEVELS:

TOC=TOP OF INNER CASING

GS=GROUND SURFACE

OPEN BORE HOLE ∅ COMPLETION: DRY

OPEN BORE HOLE ∅: _____ HRS:

WELL ∅ COMPLETION:

WELL ON / / :

WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):
Cuttings on PLASTIC

SAMPLE NO. CORE RUN	RUN/RECOVERY % RECOVERY	BLOWS COUNTS ROD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)
S-1	1.0	49 47 11 7	1.0	1	GRAY BLK CINDER, SLAG, BRICK HARD MOIST FILL		
S-2	1.3	4 4 6 6	2.2	2 3 4	GRAY SILTY CLAY TRACE CINDER M. STIFF MOIST FILL		
S-3	1.5	3 4 4 6	1.0	5	GRAY/GREEN/RED SILTY CLAY MOIST M. STIFF ALLUVIUM		
S-4	1.6	9 3 5 6	0.4		AS ABOVE		
S-5	1.6	3 4 7 10	0.5		GRAY/PURPLE SILTY CLAY M. STIFF WET @ 8' ALLUVIUM		
S-6	0.7	10 8 9 12	1.2	10	GRAY/PURPLE SILTY CLAY SOME SAND AND GRAVEL STIFF WET		
S-7	1.6	48 7 14	0.2		GRAY/BLACK SILTY CLAY TRACE Rock Frag 13.8 - SOME M-C SAND WET ALLUVIUM		
				15		BOB 14.0'	
				20			

WELL DIAGRAM: CONCRETE; 10/20 SILICA SAND; 2" SCH 40 PVC SLOTTED 0.010

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: MW-8
PROJECT #: 94502

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PROJECT ID: NEAM | BORING/WELL #: MW-9 | PROJECT #: 94502 | PAGE 1 OF 1

DATE STARTED: 8/16/97 COMPLETED: 8/17/89 | WELL INSTALLED: ☒ YES ☐ NO
DRILLING COMPANY: MAXIM | WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW
DRILLER: RICH / BRAC | OUTER CASING: FLUSH MOUNT W/LOCKING CAP
CEC REPRESENTATIVE: KJM | DEVELOPMENT METHOD: Bailed
DRILLING METHOD: 8¼ | RESULTS:
BORE HOLE ø: 8 12" CORE SIZE: — | YIELD:
BACKFILL: — | SURFACE PROTECTION: 2 x 2' Pad CONCRETE
AIR MONITORING INSTRUMENT: PID #4 | WATER LEVELS:
CASING ELEVATION: | TOC=TOP OF INNER CASING | OPEN BORE HOLE ● COMPLETION: 12265
GROUND ELEVATION | OPEN BORE HOLE ●: ____ HRS:
KEY #: | GS=GROUND SURFACE | WELL ● COMPLETION: 82 T.O.C
COMMENTS/PROBLEMS: | WELL ON / / :
WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):

SAMPLE NO. CORE RUN	RUN/RECOVERY % RECOVERY	IN OWS COUNTS ROD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-1	1.2	6,6,5	62.4	1	BLK/BRN F-SAND AND CINDER TRACE BRICK DRY M. DENSE FILL			
S-2	1.3	4,4,5	68.3	2 3 4	AS ABOVE			
S-3	0.8	2,2,1	75.1	5	AS ABOVE Moist			
S-4	0.1	2,1,1	46.2		AS ABOVE			
S-5	0.5	1,1,1	51.8		AS ABOVE WET @ 8.0			
S-6	0.2	1,2,2	50.1	10	AS ABOVE			
S-7	1.3	4,4,5	31.3		AS ABOVE TO 13.0 13.0 - BLK/GRAY SILT SOME F. SAND TRACE CLAY AND GRAY WET REWORKED TILL			
S-8	0.5	33,30,26	32.9	15	BLK/GRAY F. SAND AND SILT TRACE GRAVEL REWORKED TILL			
S-9	1.0	33,26,22,21	26.9		BLK/GRAY F. SAND AND SILT TRACE GRAVEL AND CLAY DRY TILL			
				20				

WELL DIAGRAM: 10/20 SILICA SAND; 2" SCH 40 PVC SLOTTED 0.010

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: MW-9
PROJECT #: 94502

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PROJECT ID: NEAM | BORING/WELL #: MW-10 | PROJECT #: 94502 | PAGE 1 OF 1

DATE STARTED: 8/9/97 COMPLETED: 8/9/97 | WELL INSTALLED: ☒ YES ☐ NO
DRILLING COMPANY: MAXIM | WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW
DRILLER: RRH/CHSP | OUTER CASING: Flush Mount w/lock box
CEC REPRESENTATIVE: KJM | DEVELOPMENT METHOD: Bailed
DRILLING METHOD: 6¼ HSA | RESULTS:
BORE HOLE ø: 12 CORE SIZE: | YIELD:
BACKFILL: — | SURFACE PROTECTION:
AIR MONITORING INSTRUMENT: PID HNU | WATER LEVELS:
CASING ELEVATION: | TOC=TOP OF INNER CASING | OPEN BORE HOLE ● COMPLETION: 11.15G5
GROUND ELEVATION | OPEN BORE HOLE ●: HRS:
KEY #: | GS=GROUND SURFACE | WELL ● COMPLETION:
COMMENTS/PROBLEMS: | WELL ON / / :
WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):

SAMPLE NO. CORE RUN	RUN/RECOVERY × RECOVERY	IN OWS COUNTS RQD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-1	1.3	7,10,10,14	52.1	1	BLK/BRN F SAND AND CINDER TRACE SLAG+ BRICK DRY FILL			
S-2	1.3	11,12,8,7	74.8	3	As Above			
S-3	1.5	4,3,3,3	28.4	5	As Above			
S-4	1.2	3,2,1,2	37.0		As Above wet @ 7.0			
S-5	1.0	3,2,1,1	29.5	10	As Above			
S-6	0.7	3,2,1,1	33.8		As Above			N/20 SAND SAND
S-7	0.5	1,WOH,1,1	31.8 46.8		As Above			2" SCH.40 PVC SLOTTED 0.010
S-8	0.2	2,1,1,3	46.8	15	As Above trace wood			
S-9	0.3	4,7,13,17	45.8		As Above to 17.0			
S-10	0.5	14,3,3,4	27.1		17.0 - BLK REWORKED TILL SL. Hydrocarbon odor As Above to 19.5 19.5 - DK GRAY/BRN SILTY SAND T. SAND TRACE CLAY AND GRAVEL MOIST TILL			
				20				

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: MW-10
PROJECT #: 94502

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URS Greiner, Inc.

TEST BORING LOG:

BORING NO.: MW-11

PROJECT: NORTHEAST ALLOYS & METALS.

SHEET: 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35618.02

BORING CONTRACTOR: TRI-STATE DRILLING & BORING

BORING LOCATION:

GROUNDWATER: ENCOUNTERED AT 14.5'

DATE	TIME	LEVEL	TYPE
4/5/99	1530	10.6 BGS	INSIDE AUGERS.

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
DIA.	4¼" ID	2 IN.		
WT.		140#		
FALL		30 IN		
* POCKET PENETROMETER READING				

GROUND ELEVATION:

DATE STARTED: 4/5/99

DATE FINISHED: 4/5/99

DRILLER: WAYNE AULT

GEOLOGIST: SCOTT MCCABE

REVIEWED BY:

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	Hnu (ppm)	CLASS USCS	REMARKS
		1	SS	11 10 / 13 9	90%	BLACK BROWN GRAY	MEDIUM DENSE → MEDIUM STIFF	FILL: FINE TO MEDIUM SAND AND CINDER, FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND AND CINDERS	0		MOIST
		2	SS	5 5 / 6 6	60%				0		- FEW REDDISH BROWN MOTTLES.
5		3	SS	3 4 / 2 3	70%		STIFF	SILT, TRACE FINE SAND, SLAG, BRICK, CINDERS, WOOD	0		
		4	SS	6 9 / 7 8	70%	BROWN		CLAYEY SILT, TRACE FINE TO MEDIUM SAND, CINDER, BRICK	0		DRY
		5	SS	6 7 / 10 13	75%				0		
10		6	SS	4 8 / 11 23	70%	DARK GREY	STIFF → VERY STIFF	FINE SANDY SILT, SOME MEDIUM TO COARSE SAND, TRACE FINE TO MEDIUM GRAVEL.	0	SM	MOIST
14.3		7	SS	8 16 / 21 13	50%				0		
15 / 15.5		8	SS	13 17 / 16 18	75%	BROWN	DENSE	FINE TO COARSE SAND AND GRAVEL	0	GW	SAMPLE WET 14.5'
18		9	SS	14 12 / 19 15	75%	BROWN	VERY STIFF	FINE SANDY SILT, TRACE MEDIUM TO COARSE SAND AND GRAVEL	0	SM	
20								BORING COMPLETED AT 18.0'			
25											
30											
35											

COMMENTS: BORING ADVANCED WITH MOBIL-B57 USING 4¼ IN ID HSA TO 18.0', MONITORING WELL INSTALLED WITH 2" SCH 40 PVC. SCREEN INTERVAL 8.0-18.0' CONTINUOUS.

PROJECT NO.: 35618.02

BORING NO.: MW-11

URS Greiner, Inc.

TEST BORING LOG:

BORING NO.: MW-12

PROJECT: NORTHEAST ALLOYS & METALS

SHEET: 1 OF 1

CLIENT: NYSDEC

JOB NO.: 35618.02

BORING CONTRACTOR: TRI-STATE DRILLING & BORING

BORING LOCATION:

GROUNDWATER: ENCOUNTERED AT 12.0'

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	split spoon		
DIA.	4 1/4"	2"		
WT.		140 #		
FALL		30"		

DATE	TIME	LEVEL	TYPE
4/6/99	10:00	9.3'	INSIDE AUGERS

* POCKET PENETROMETER READING

GROUND ELEVATION:

DATE STARTED: 4/6/99

DATE FINISHED: 4/6/99

DRILLER: WAYNE AULT

GEOLOGIST: SCOTT MCCABE

REVIEWED BY:

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	Hnu (ppm)	CLASS USCS	REMARKS
0		1	SS	8 13 / 18 15	100%	DARK BROWN → BLACK	VERY STIFF → HARD → DENSE	FILL: SANDY SILT, SOME CINDER AND SLAG, TRACE BRICK → FINE TO MEDIUM SAND AND CINDER, TRACE SLAG	0		DRY
		2	SS	15 36 / 31 42	75%				15		
5		3	SS	25 23 / 20 11	90%				8		
		4	SS	8 8 / 6 5	70%	BROWNISH GREY → LIGHT BROWN	MEDIUM STIFF	CLAYEY SILT, TRACE FINE TO MEDIUM SAND AND GRAVEL	14	ML	MOIST
		5	SS	4 6 / 5 6	90%				4		VERY MOIST
10		6	SS	4 4 / 6 8	90%				1		
		7	SS	10 14 / 20 17	100%	BROWN	DENSE	FINE TO COARSE SAND AND FINE TO MEDIUM GRAVEL, TRACE SILT	0	WG	SAMPLE WET 12.0'
15		8	SS	7 5 / 13 11	100%	GREYISH PURPLE	STIFF	FINE SANDY SILT, SOME MEDIUM TO COARSE SAND AND FINE TO MEDIUM GRAVEL.	0	SM	
		9	SS	11 7 / 12 14	100%				0		
		10	SS	11 14 / 15 21	100%				0		
20						DK. GREY	VERY STIFF	CLAYEY SILT, TRACE SAND AND GRAVEL		ML	
								BORING COMPLETED AT 20.0'			
25											
30											
35											

COMMENTS: BORING ADVANCED USING MOBIL B-57 WITH 4 1/4" ID HSA TO 20.0'. MONITORING WELL INSTALLED WITH 2" SCH 40 PVC. SCREEN INTERVAL 10-20.0' CONTINUOUS

PROJECT NO.: 35618.02

BORING NO.: MW-12

Civil & Environmental Consultants, Inc.
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PROJECT ID: NORTHEAST ALLOY AND METALS
BORING/WELL #: RW-1
PROJECT #: 94502
PAGE 1 OF

DATE STARTED: 2/13/97 COMPLETED: 2/14/97
DRILLING COMPANY: MAYJEW
DRILLER: JOHN | MARK
GEO REPRESENTATIVE: K. MURRER
DRILLING METHOD: 6¼ HSA
BORE HOLE ø: 10" CORE SIZE:
BACKFILL
AIR MONITORING INSTRUMENT: PID # 3
CASING ELEVATION:
GROUND ELEVATION
KEY #:

WELL INSTALLED: ☒ YES ☐ NO
WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW
OUTER CASING: FLUSH MOUNT W/Locking Cap
DEVELOPMENT METHOD: Bailer
RESULTS:
YIELD:
SURFACE PROTECTION: CONCRETE
WATER LEVELS:
TOC=TOP OF INNER CASING
GS=GROUND SURFACE
OPEN BORE HOLE ⊙ COMPLETION:
OPEN BORE HOLE ⊙: _____ HRS:
WELL ⊙ COMPLETION:
WELL ON / / :

COMMENTS/PROBLEMS:
Well offset 5ft East of Boring.
Boring Back Filled w/BENTONITE to 0.5
S-6 Sample From Well b/c No Recovery in Sample From boring

WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):
Soil on Plastic

SAMPLE NO. CORE RUN	RUN/RECOVERY % RECOVERY	BLOWS COUNTS ROD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-1	1.4	24 26 10	3.0	1	0.5 CONCRETE - BLK SLAG, CINDER MOIST STIFF FILL			6" RISER, BENTONITE
S-2	1.6	5 3 4	4.2	2 3 4	As ABOVE to 3.0. 3.0 - GRAY/BLK SILT AND CLAY STIFF MOIST FILL			
S-3	1.2	13 6 8	4.2	5	GRAY SILTY CLAY TRACE Rock Frag ~~AND~~ Wood ~~Wet~~ STIFF WET @ 5.0 FILL			
S-4	1.4	34 8 10	3.4		BRN SILTY CLAY TRACE WOOD AND ROCK FRAG M. STIFF WET FILL			#10/20 SILICA SAND, 4" SCH40 PVC SLOTTED .010
S-5	1.5	9 21 23 24	18		As ABOVE			
S-6	0.5	37 47 65	3.3	10	GRAY/BLACK SILT SOME F SAND, CLAY AND Rock FRAG DRY ~~FILL~~ TILL			B.O.B. 10.0
S-7	1.0	21 48 50 42	4.9		GRAY/PURPLE SILT SOME CLAY, F SAND AND TRACE ROCK FRAG. ~~HARD~~ DRY TILL			
S-8	0.8	21 35 37 42	4.5	15	As ABOVE			
S-9	1.0	12 21 23 35	3.1		BLK As ABOVE			
S-10	1.6	21 26 29 30	3.8		As ABOVE			
				20				

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: RW-1
PROJECT #: 94502

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Civil & Environmental Consultants, Inc. PROJECT #:94502 BORING/WELL #: RW-1 PAGE 2 OF 2

SAMPLE NO. CORE RUN	RUN/RECOVERY X, RECOVERY	BLOWS COUNTS RQD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-11	1.2	21 36 24 27	3.1	21'-22	As Above			
S-12	1.3	100 31 44 47	3.8	23-24	As Above			
S-13	1.2	22 57 100 72	3.1	25	Gray/Blk Silt Some F Sand, Clay, Rock Frag. and Gravel Moist Till			
S-14	0.7	62 100/0.4	4.1		As Above			
S-15	0.1	100/	0.0	30	Auger Refusal @ 28.0 - Blk Shale in Shoe of Spoon.	B.O.B. 28.0		

NOTES:

BORING/WELL #: RW-1
PROJECT #: 94502

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PROJECT ID: NORTHEAST ALLEY + HITCH
BORING/WELL #: RW-2
PROJECT #: 94502
PAGE 1 OF 2

DATE STARTED: 2/14/97 COMPLETED: 2/15/97
DRILLING COMPANY: MAXIM
DRILLER: JOHN / MARK
CEC REPRESENTATIVE: K. MEURER
DRILLING METHOD: 6¼ HSA
BORE HOLE ø: 11" CORE SIZE: —
BACKFILL: —
AIR MONITORING INSTRUMENT: PID #3
CASING ELEVATION:
GROUND ELEVATION
KEY #:
COMMENTS/PROBLEMS:
RW-2 Well offset 5' North of Boring
BORING BACK FILLED W/ BENTONITE
S-4 Sampled During Well Boring b/c of No Recovery during Boring

WELL INSTALLED: ☒ YES ☐ NO
WELL HEAD STICKUP: FT. ☐ ABOVE ☒ BELOW
OUTER CASING:
DEVELOPMENT METHOD: Bailed
RESULTS:
YIELD:
SURFACE PROTECTION:
WATER LEVELS:
TOC=TOP OF INNER CASING
GS=GROUND SURFACE
OPEN BORE HOLE @ COMPLETION:
OPEN BORE HOLE @: _____ HRS:
WELL @ COMPLETION:
WELL ON / / :
WASTE HANDLING (CUTTINGS, DRILLING FLUIDS, DEVELOPMENT WATER):

SAMPLE NO. CORE RUN	RUN/RECOVERY % RECOVERY	BLOWS COUNTS RQD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-1	1.3	33 3 10 7	13.3	1 2	BLK/BRN SLAG AND CINDER MOIST M. STIFF FILL			
S-2	1.8	55 3 4	25.2	3 4	AS ABOVE			
S-3	1.3	2 2 3 3	11.1	5	AS ABOVE WITH TRACE COAL			
S-4	0.4	1 1 1	5.6		AS ABOVE			
S-5	1.2	64 5 5	342		BLK/BRN SILT AND CLAY TRACE Rock Frag, Wood AND Coal Wet @ STIFF FILL			
S-6	1.0	3 2 3 3	9.3	10	AS ABOVE W/ SOME F-M SAND			
S-7	0.7	2 17 13 10	2.0		AS ABOVE			
S-8	0.8	105 15 14	1.1		AS ABOVE to 15.5 15.5 - BLK SILT SOME F. Sand, CLAY ROCK FRAG DRY V. STIFF TILL			
S-9	0.8	105 6 12	2.6	15	BLK SILT SOME F-SAND, CLAY AND Rock Frag. DRY STIFF TILL			
S-10	1.2	50/10 50	2.0		AS ABOVE			
				20				B.O.B. 16.0

WELL DIAGRAM: 10/20 SILICA SAND; 4" SCH 40 PVC SLOTTED 0.010

CONTACT TYPES: ABRUPT ——— GRADATIONAL — — —
IRREGULAR OR ANGULAR ~~~~ ESTIMATED .....

BORING/WELL #: RW-2
PROJECT #: 94502

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Civil & Environmental Consultants, Inc. PROJECT #: 94502 | BORING/WELL #: RW-2 | PAGE 2 OF 7

SAMPLE NO. CORE IIIII	IIIII/RECOVERY % RECOVERY	BLOWS COUNTS RQD	ORGANIC VAPOR READING (PPM)	DEPTH (FEET)	MATERIAL DESCRIPTION AND COMMENTS	GRAPHIC LOG	ELEVATION (FEET, MSL)	WELL DIAGRAM
S-11	1.3	34 99 68 76	0.9	21 22	As Above			
S-12	0.9	100 10"/4	3.0	23 24	As Above some rock frags			
S-13	1.0	67 58 49 10"/3	2.8	25	As Above			
S-14	1.0	87 72 10"/3	1.7		As Above			
				30				

NOTES:

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BORING/WELL #: RW-2
PROJECT #: 94502

URS Greiner, Inc.

TEST BORING LOG:

BORING NO.: RW-3

PROJECT: NORTHEAST ALLOYS & METALS

CLIENT: NYSDEC

BORING CONTRACTOR: TRI-STATE DRILLING & BORING

GROUNDWATER: ENCOUNTERED @ 4.0'

DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
DIA.	8 1/4"	2"		
WT.		140#		
FALL		30"		

* POCKET PENETROMETER READING

SHEET: 1 OF 1

JOB NO.: 35618.02

BORING LOCATION:

GROUND ELEVATION:

DATE STARTED: 4/6/99

DATE FINISHED: 4/6/99

DRILLER: WAYNE AULT

GEOLOGIST: SCOTT MCCABE

REVIEWED BY:

DEPTH FEET	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	Hnu (ppm)	CLASS USCS	REMARKS
		1	SS	3 4 / 5 7	70%	DK BROWN BLACK	LOOSE ↓ MEDIUM DENSE ↓ VERY LOOSE	FILL: SILTY SAND, SOME GRAVEL. FINE TO MEDIUM SAND AND CINDER, TRACE ORGANICS, METAL, METAL FILINGS, BRICK, SLAG, AND GRAVEL	4		MOIST - SLIGHT PETROLEUM ODOR.
		2	SS	6 7 / 8 7	80%				100		SAMPLE WET 4.0'
5		3	SS	3 2 / 1 2	100%				80		- STRONG PETROLEUM ODOR.
		4	SS	2 1 / 1 1	90%				95		
		5	SS	1 1 / 2 1	100%				120		
10		6	SS	1 2 / 1 1	100%				110		
		7	SS	1 2 / 1 31	100%				60		
14.3						DK. GRAY	VERY STIFF	CLAYEY SILT, TRACE SAND AND GRAVEL		ML	
								BORING COMPLETED AT 14.3'			
15											
20											
25											
30											
35											

COMMENTS: BORING ADVANCED USING MOBIL B-57 WITH 8 1/4 ID HSA TO 14.3' MONITORING WELL INSTALLED WITH 4" SCH 40 PVC. SCREENED INTERVAL 4.3 - 14.3' CONTINUOUS

PROJECT NO.: 35618.02 BORING NO.: RW-3

APPENDIX E

WELL CONSTRUCTION INFORMATION

DRILLING SUMMARY

Geologist:
Scott McCabe

Drilling Company:
Tri-State Drilling & Boring

Driller:
Wayne Ault

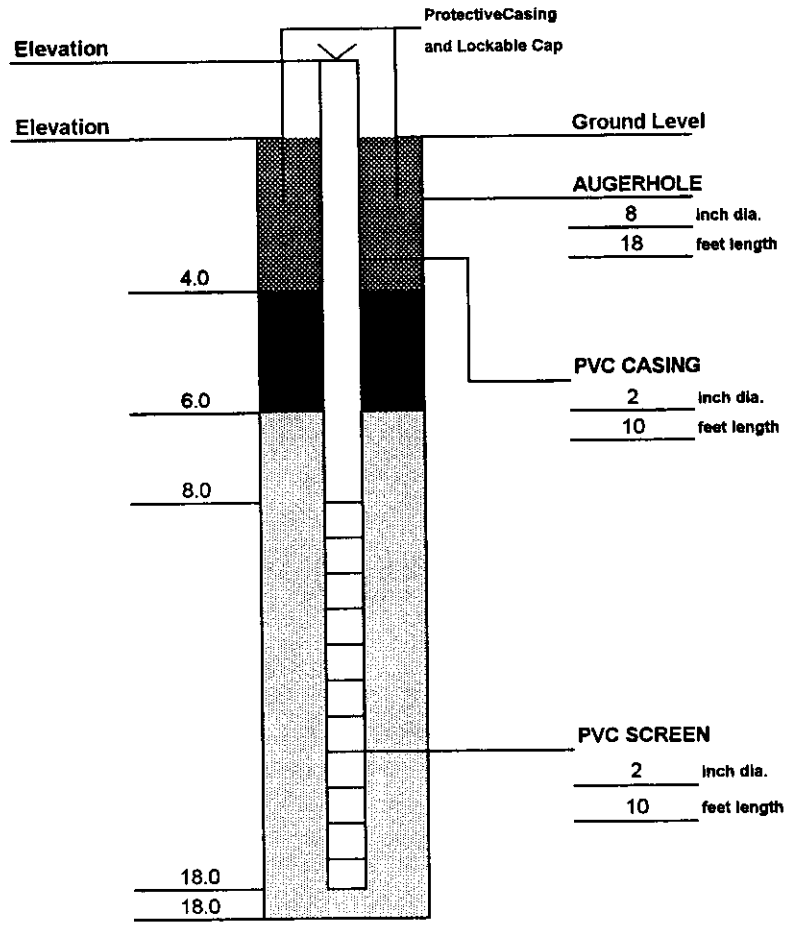
Rig Make/Model:
Mobil B-57

Date:
4/5/99

GEOLOGIC LOG

Depth(ft.)	Description
0-1.0	Fill: Fine to medium sand and cinders.
1.0-4.0	Fill: Fine sandy silt, trace sand and cinders
4.0-6.0	Fill: Silt, trace fine sand, slag, cinders, wood
6.0-11.0	Fill: Clayey silt, trace fine to medium sand, cinder,brick
11.0-14.3	Fine sandy silt, some medium to coarse sand, trace gravel
14.3-15.5	Fine to coarse sand and gravel
15.5-18.0	Fine sandy silt, trace medium to coarse sand and gravel.

DEPTH



NOT TO SCALE

WELL DESIGN

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: 4 in. Steel Stick-up	Type: 2 in. Sch 40 PVC	Type: Unimin #00N Setting: 6.0 - 18.0'
Monitor: 2 in. Sch 40 PVC	Slot Size: .010 in.	SEAL MATERIAL Type: Bentonite Chips Setting: 4.0 - 6.0'

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	Location: Northeast Alloy & Metal	Project No.: 35618.02
U R S Greiner	OVERBURDEN WELL CONSTRUCTION DETAILS	Well Number: MW-11

DRILLING SUMMARY

Geologist: Scott McCabe

Drilling Company: Tri-State Drilling & Boring

Driller: Wayne Ault

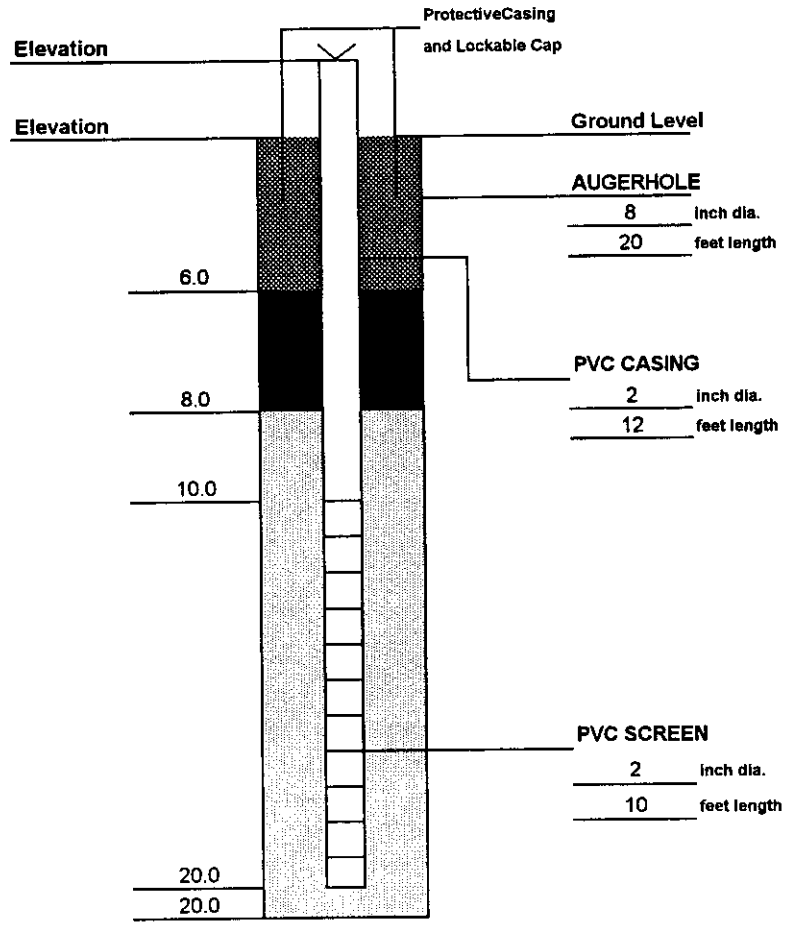
Rig Make/Model: Mobil B-57

Date: 4/6/99

GEOLOGIC LOG

Depth(ft.)	Description
0-4.0	Fill: Sandy silt, some cinder and slag, trace brick
4.0-5.5	Fill: Fine to medium sand and cinder, trace slag
5.5-11.5	Clayey silt, trace fine to medium sand and gravel
11.5-13.8	Fine to coarse sand and fine to medium gravel, trace silt
13.8-19.5	Fine sandy silt, some medium to coarse sand and fine to medium gravel
19.5-20.0	Clayey silt, trace sand and gravel

D E P T H



NOT TO SCALE

WELL DESIGN

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: 4 in. Steel Stick-up	Type: 2 in. Sch 40 PVC	Type: Unimin #00N Setting: 8.0 - 20.0'
Monitor: 2 in. Sch 40 PVC	Slot Size: .010 in.	SEAL MATERIAL Type: Bentonite Chips Setting: 6.0 - 8.0'

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: NYSDEC	Location: Northeast Alloy & Metal	Project No.: 35618.02
U R S Greiner	OVERBURDEN WELL CONSTRUCTION DETAILS	Well Number: MW-12

DRILLING SUMMARY

Geologist:
Scott McCabe

Drilling Company:
Tri-State Drilling & Boring

Driller:
Wayne Ault

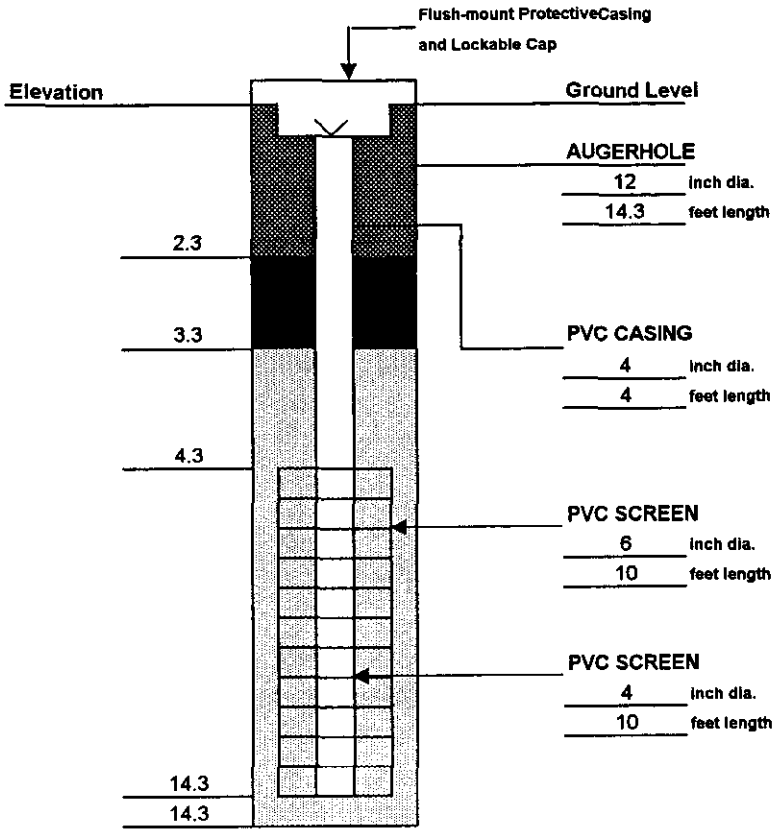
Rig Make/Model:
Mobil B-57

Date:
4/6/99

GEOLOGIC LOG

Depth(ft.)	Description
0-1.0	Fill: Silty sand, some gravel
1.0-13.7	Fill: Fine to medium sand and cinder, trace organics, metal, metal filings, brick, slag, gravel
13.7-14.3	Clayey silt, trace sand and gravel

DEPTH



WELL DESIGN

NOT TO SCALE

CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface: 8 in. Steel Flush-mount	Type: 4 in. Sch 40 PVC Slot Size: .010 in.	Type: Unimin #00N Setting: 3.3-14.3'
Monitor: 4 in. Sch 40 PVC	Type: 6 in. Sch 40 PVC Slot Size: .010 in.	SEAL MATERIAL Type: Bentonite Chips Setting: 2.3-3.3'

COMMENTS:

Monitoring well was constructed with a prepacked screen portion. Unimin type #00N sand was used to fill the prepacked screen.

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

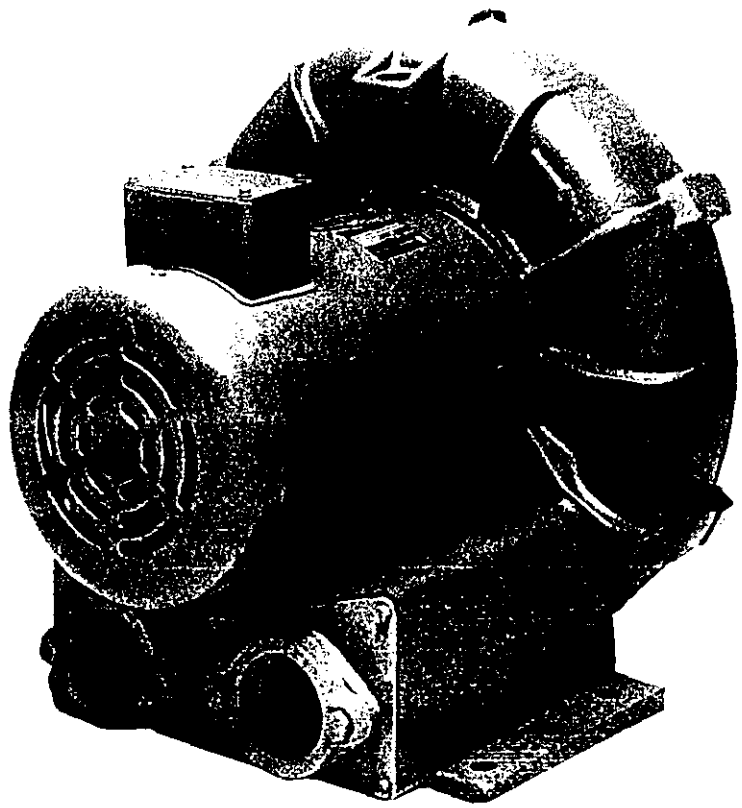
Client: NYSDEC	*Location:* Northeast Alloy & Metal	*Project No.:* 35618.02
U R S Greiner	OVERBURDEN WELL CONSTRUCTION DETAILS	Well Number: RW-3

APPENDIX F

AIR SPARGE SYSTEM MANUALS

DR 808 ~~& CP 808~~
Regenerative Blower

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- CE compliant – Declaration of Conformity on file
- Maximum flow: 350 SCFM
- Maximum pressure: 116 IWG
- Maximum vacuum: 6.9" Hg (93.9 IWG)
- Standard motor: 7.5 HP, TEFC
- Cast aluminum blower housing, impeller & cover; cast iron flanges (threaded)
- UL & CSA approved motor with permanently sealed ball bearings
- Inlet & outlet internal muffling
- Quiet operation within OSHA standards

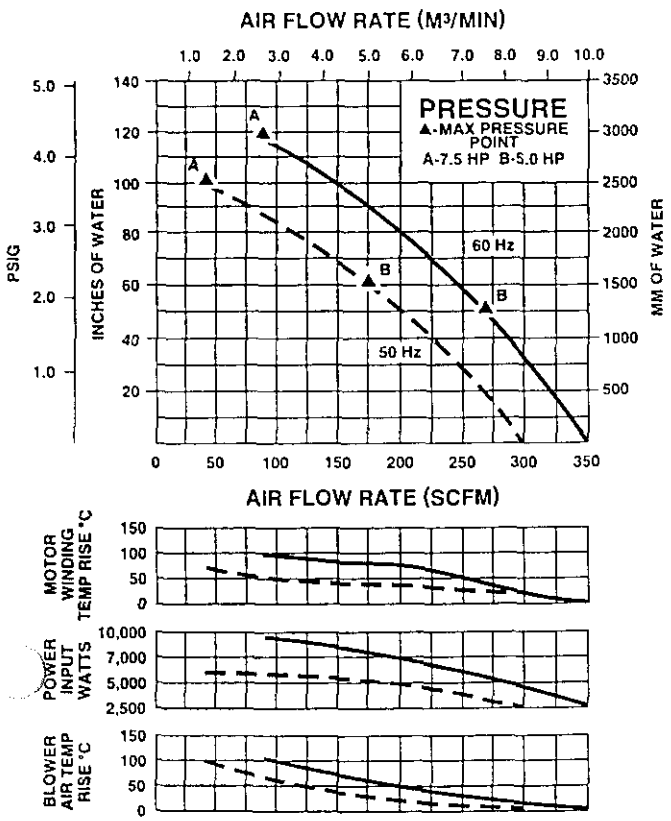


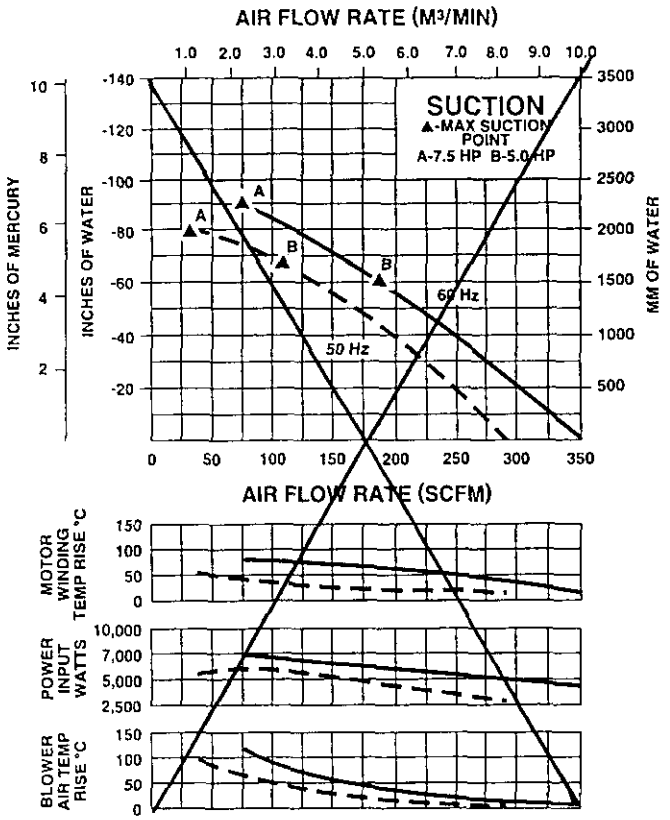
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

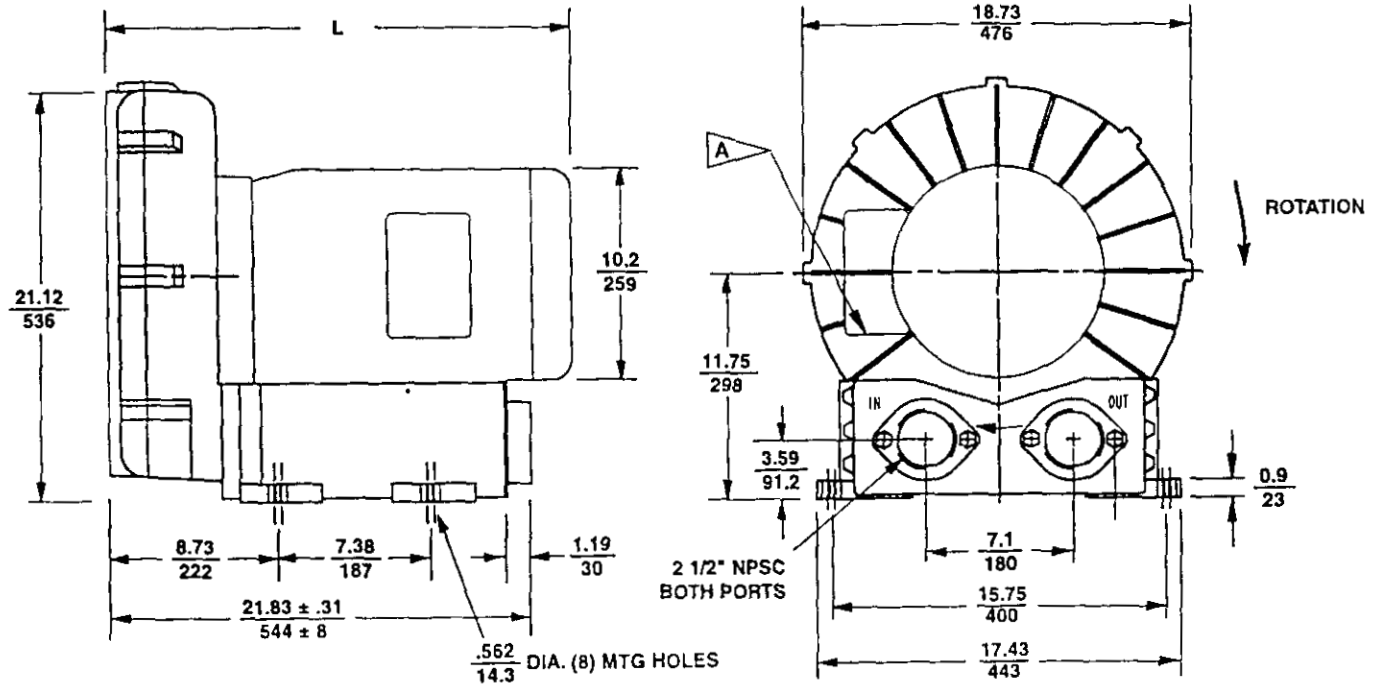
ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- Internal mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

BLOWER PERFORMANCE AT STANDARD CONDITIONS





DR 808 & CP 808 Regenerative Blower



DIMENSIONS: IN / MM
TOLERANCES: .XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)

MODEL	L (IN)	L (MM)
DR808AY72MX	23.37	594
~~DR808AY86MX~~	~~23.37~~	~~594~~
DR808D89MX	19.25	490
CP808FG72MXLR	23.37	594

Scale CAD drawing available upon request

A TERMINAL BOX CONNECTION 1.06 INCH DIAMETER ON TEFC MOTORS .75 NPT ON XP MOTORS

SPECIFICATIONS

MODEL	DR808AY72MX	~~DR808AY86MX~~	DR808D89MX	CP808FG72MXLR	HiE808AY72MX
Part No.	038722	~~038724~~	038725	038734	~~038728~~
Motor Enclosure – Shaft Material	TEFC – CS	~~TEFC – CS~~	TEFC – CS	ChemTEFC – SS	~~TEFC – CS~~
Horsepower	7.5	7.5	5.0	Same as DR808AY72MX – 038722 except add Chemical Processing (CP) features from catalog inside front cover	Same as DR808AY72MX – 038722 except add High Efficiency motor
Voltage [1]	~~230~~/460	575	230/460		
Phase – Frequency [1]	Three - 60 Hz	Three - 60 Hz	Three - 60 Hz		
Insulation Class [2]	F	F	F		
NEMA Rated Motor Amps	~~20.2~~/11.1	7.2	17.3-15.6/7.8		
Service Factor	1.15	1.15	1.15		
Locked Rotor Amps	~~120~~/60	60	152/76		
Max. Blower Amps [3]	~~27.0~~/13.5	10.8	17.0/8.5		
Recommended NEMA Starter Size	1/1	1	1/0		
Shipping Weight	294 lb (134 kg)	262 lb (119 kg)	294 lb (134 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. *Our dual voltage* 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. *All voltages* above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum *operating temperature:* Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed *140°C (air temperature rise plus inlet temperature). Performance curve maximum* pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] *Maximum* blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your *Local Field* Sales Engineer for specification updates.

GENERAL INSTALLATION INSTRUCTIONS

AMETEK

OTRON TECHNICAL MOTOR DIVISION
Industrial Products
75 North Street, Saugerties, NY 12477 U.S.A.
Telephone: 914-246-3401 Fax: 914-246-3802

Rotron Regenerative Blowers

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200°F. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

For further information regarding Rotron regenerative blowers (including service & parts manuals), please contact your local field sales engineer.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Shell Dolium "R" 25-40% Fill	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Shell Dolium "R" 30%+/- 5% Fill	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOE NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

* 3 phase units

** 1 phase units

*** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.

SMALL FILTER SILENCERS

SOLBERG

Since 1968 Solberg has been manufacturing quality OEM and industrial filters for air compressor, blower and vacuum applications. By pioneering many filter manufacturing techniques and building their own production machinery, Solberg is fulfilling their commitment of continual product improvement and prompt response to customer needs.

The Solberg line includes most all sizes of inlet, inline, and exhaust system filters and elements, filter silencers, oil mist filters, high temperature filters and more. There is a choice of media to suit specific duty requirements. As the filter specialist, Solberg can also provide reliable products for individual needs and unique filter applications. Ask for an engineering evaluation of your requirements.

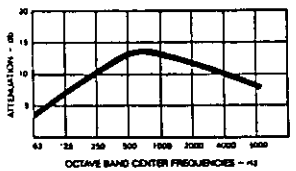
APPLICATIONS

- Blowers
- Air Compressors
- Fans
- Hydraulic breathers
- Engines

FEATURES

- Fully drawn weatherhood - no welds to rust or vibrate apart
- Tubular silencing design - tubes positioned to maximize attenuation and air flow while minimizing pressure drop

TYPICAL NOISE ATTENUATION – FS SERIES



- Durable carbon steel construction with baked enamel finish
- Low pressure drop center bracket and pipe design
- Interchangeable elements

OPTIONS (Inquiries Encouraged)

- Various elements available - See Element Bulletin
- 1/8" & 1/4" tap holes for differential pressure guages
- Epoxy coated housings
- Hot dipped galvanized housings
- Special connections

FS-19P-125

- Connection size: 125 = 1-1/4"; 250 = 2-1/2"
- Element part #: Odd #'s = Polyester, Even #'s = Paper, Even #'s + S = Wire Mesh, P = Polyurethane foam pre-filter included
- FS denotes Filter Silencer

SMI MODEL NUMBERS - FS Series			EFFECTIVE SURFACE AREA OF ELEMENT IN SQUARE FEET		APPLICATION CFM PULSATING FLOW	APPLICATION CFM CONTINUOUS FLOW	MPT Connection	Approx. Shipping Wt. Lbs.	DIMENSIONS		
W/Polyester Element	W/Paper Element	W/Wire Mesh Element	Polyester	Paper	Reciprocating Compressors	Fans, Blowers, Compressors (Rotary, Centrifugal, Screw)			A	B	C
FS-05-025	FS-04-025	—	.2	.2	6	6	1/4"	.5	2-11/16"	*5.8"	2-1/2"
FS-05-038	FS-04-038	—	.2	.2	6	6	3/8"	.5	2-11/16"	*5/8"	2-1/2"
FS-07-038	FS-06-038	—	.58	.58	8	8	3/8"	1	3-15/16"	*5/8"	3-1/4"
FS-07-050	FS-06-050	—	.58	.58	10	10	1/2"	1	4-1/4"	15/16"	3-1/4"
FS-11-050	FS-10-050	—	1.1	1.1	15	15	1/2"	1.5	4-1/8"	15/16"	4-1/4"
FS-11-075	FS-10-075	—	1.1	1.1	20	20	3/4"	1.5	4-1/2"	1-1/4"	4-1/4"
FS-11-100	FS-10-100	—	1.1	1.1	25	25	1"	1.5	4-1/2"	1-1/4"	4-1/4"
FS-15-050	FS-14-050	FS-14S-050	.5	.9	10	10	1/2"	1.8	4"	1-1/2"	6"
FS-15-075	FS-14-075	FS-14S-075	.5	.9	20	20	3/4"	2	4"	1-1/2"	6"
FS-15-100	FS-14-100	FS-14S-100	.5	.9	20	25	1"	2.1	4"	1-1/2"	6"
FS-19P-100	FS-18P-100	FS-18S-100	1.5	3.0	30	35	1"	3	6-1/2"	1-1/2"	6"
FS-19P-125	FS-18P-125	FS-18S-125	1.5	3.0	60	60	1-1/4"	3.3	6-1/2"	1-1/2"	6"
FS-19P-125-9T	FS-18P-125-9T	FS-18S-125-9T	1.5	3.0	60	60	1-1/4"	3.5	7-7/8"	2-1/8"	6"
FS-19P-125HC	FS-18P-125HC	FS-18S-125HC	1.5	3.0	60	60	1-1/4" Fem.	3.3	5-7/8"	5/8"	6"
FS-19P-150	FS-18P-150	FS-18S-150	1.5	3.0	60	80	1-1/2"	3.5	6-1/2"	1-1/2"	6"
FS-19P-150-4	FS-18P-150-4	FS-18S-150-4	1.5	3.0	60	80	1-1/2"	3.7	8-5/8"	3-5/8"	6"
FS-19P-150-7T	FS-18P-150-7T	FS-18S-150-7T	1.5	3.0	60	80	1-1/2"	3.7	6-1/2"	1-1/2"	6"
FS-19P-150-9T	FS-18P-150-9T	FS-18S-150-9T	1.5	3.0	60	80	1-1/2"	3.9	7-1/8"	2-1/8"	6"
FS-31P-200	FS-30P-200	FS-30S-200	2.3	5.7	60	135	2"	7.8	7-1/4"	2-1/4"	10"
FS-231P-200	FS-230P-200	FS-230S-200	4.5	10.9	135	135	2"	14	12-1/4"	2-1/4"	10"
FS-19P-250-9T	FS-18P-250-9T	FS-18S-250-9T	1.5	3.0	60	100	2-1/2"	4.5	8-1/4"	3-1/4"	6"
FS-31P-250	FS-30P-250	FS-30S-250	3.3	5.7	80	195	2-1/2"	8.2	7-1/4"	2-1/4"	10"
FS-231P-250	FS-230P-250	FS-230S-250	4.5	10.9	195	195	2-1/2"	14.5	12-1/2"	2-1/2"	10"
FS-231P-300	FS-230P-300	FS-230S-300	4.5	10.9	300	300	3"	15	12-1/2"	2-1/2"	10"

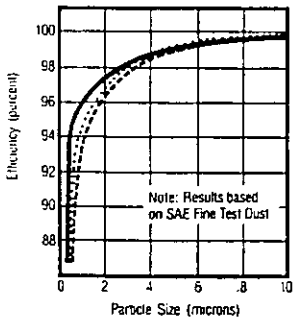
*Currently 15-16

REPLACEMENT ELEMENTS

1/4" to 3" MPT
Up to 300 CFM

POLYESTER

Dust Removal efficiency of polyester media at face velocity of:
15 cfm/ft²-media ————
30 cfm/ft²-media • • • • • • • • • • • • • • •
45 cfm/ft²-media – – – – – – – – – – – – –

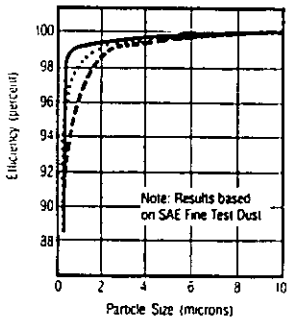


- High temperature plastisol endcaps
- Reinforced with epoxy coated steel wire on both sides of polyester
- Nominally 99+% efficient at 10 microns
- Washable - lukewarm water and mild detergent
- Dust loading capacity is increased 40-50% with polyurethane prefilter

ADVANTAGES
- Less maintenance
- More durable
- Moisture resistant
- Handles hot air and oil mist from unload cycle of reciprocating compressor

PAPER

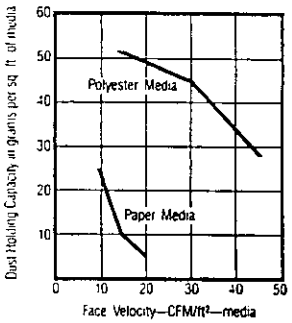
Dust Removal efficiency of paper media at face velocity of:
10 cfm/ft²-media ————
15 cfm/ft²-media • • • • • • • • • • • • • • •
20 cfm/ft²-media – – – – – – – – – – – – –



- Plastisol endcaps
- Heavy duty industrial strength paper
- Nominally 99+% efficient at 10 microns
- Reinforced with heavy gauge galvanized expanded metal
- Dust loading capacity is increased 40-50% with polyurethane prefilter

ADVANTAGES
- Less expensive
- More surface area per given size
- Higher efficiency

Influence of Face Velocity on Dust Holding Capacity



SMI ELEMENT NUMBERS			Flow CFM	EFFECTIVE SURFACE AREA IN SQUARE FEET		DIMENSIONS		
Polyester	Paper	Wire Mesh		Polyester	Paper	I.D.	O.D.	HT
[illegible]	04	—	6	.2	.2	—	2-1/4"	1"
[illegible]	06	—	10	.58	.58	—	3"	1-3/8"
[illegible]	08	08S	15	.25	.45	1-1/8"	2-1/4"	2-1/4"
[illegible]	14	14S	30	.5	.90	3"	4-3/8"	2-5/16"
[illegible]	18P	18S	100	1.5	3.0	3"	4-3/8"	4-3/4"
[illegible]	30P	30S	195	2.8	5.7	3-5/8"	5-3/4"	4-3/4"
[illegible]	230P	230S	300	4.5	10.9	3-5/8"	5-3/4"	9-1/2"

P = Polyurethane Prefilter

NOTE
Additional interchangeable elements listed in Element Brochure EL-10

SOLBERG Manufacturing, Inc.
1151 West Aromore Ave. • Itasca, Illinois 60143-1087
1-800-451-0642 • Illinois: 630-773-1363 • Fax: 630-773-0522

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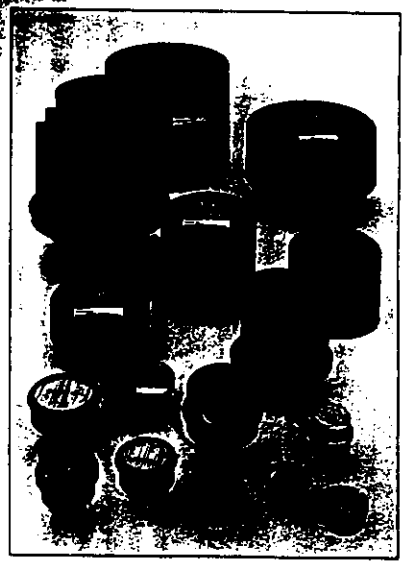
SOLBERG

SMALL FILTER SILENCERS

1/4" to 3" MPT
Up to 300 CFM
Complete Assemblies



Bulletin SFS-40

KUNKLE®
Valve Division

IRON SAFETY AND VACUUM VALVES

MODELS 215V 337

ASME Standard

UV

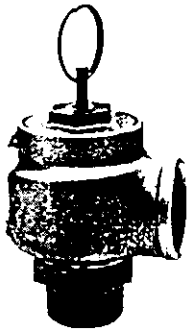
N.B. Certified

PRESSURE LIMITS 337 — 60 PSIG-300°F.

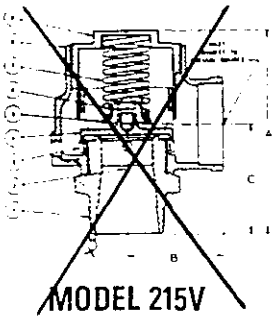
VACUUM LIMITS 215V — 22" HG.-300°F.

APPLICATIONS

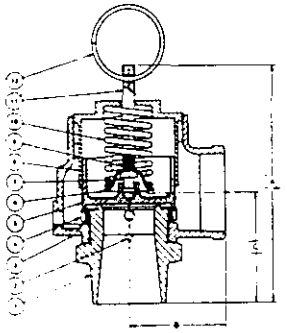
- Protection of low to medium pressure high volume blowers, compressors and pneumatic conveying systems.
- Bulk hauling trailers/equipment.
- Light gauge tanks.
- Protection of high volume vacuum pumps and conveying systems.



MODEL 337



MODEL 215V



MODEL 337

FEATURES

High capacity full nozzle design. Bronze nozzle, disc and guide with cast iron housing. Flat bronze valve seats are lapped for optimum performance. Warn ring offers easy adjustability for precise opening with minimum preopen or simmer and exact blowdown control. Pivot between disc and spring corrects mis-alignment and compensates for spring side thrust. Model 337 has "pull-ring" lift device for easy manual testing. Every valve 100% tested/inspected for pressure setting, blowdown and leakage. All adjustments are factory sealed to prevent tampering or dis-assembly.

OPTIONS

Stainless steel trim (nozzle and disc).

SPECIFICATIONS

SIZE IN & OUT	A		B	C	WGHT LBS.
	337	215V			
2"	7	~~6¼~~	3	3¼	8
~~2½"~~	~~8~~	~~7½~~	~~3¼~~	~~3¼~~	~~14~~
3"	9	8½	4	4¼	20

CAPACITIES

SCFM Air, 60°F., 10% Accumulation

Set Pressure PSIG	MODEL 337		
	2"	2½"	3"
5	527	799	1157
10	743	1127	1632
15	903	1368	1982
20	1062	1609	2331
25	1221	1850	2680
30	1380	2091	3029
35	1539	2332	3379
40	1698	2573	3728
45	1857	2814	4076
50	2017	3055	4428
60	2335	3537	5125

Set Inches Mercury	MODEL 215V		
	2"	2½"	3"
1	140	213	308
2	217	329	477
3	264	400	579
4	299	453	657
5	331	501	726
6	352	533	772
7	372	564	817
8	391	592	858
9	403	610	884
10	413	625	906
12	424	642	930
12.8 to 22	426	646	935

MODEL NUMBER/ORDER GUIDE

MODEL NO. POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EXAMPLE	2	1	5	V	—	H	0	1	—	Q	E				
	0	3	3	7											

INLET SIZE
H — 2"
~~J — 2½"~~
~~K — 3"~~

VARIATION (01 thru 99)
Number Provided Only by Manufacturer to Cover Specific Feature or Option.

DESIGN REVISION
Indicates Non-Interchangeable Revision. Dash (-) II Original Design

VALVE SERVICE
K-Air ASME Sec VIII (Model 337 Only)
~~Q-Vacuum (Model 215V Only)~~

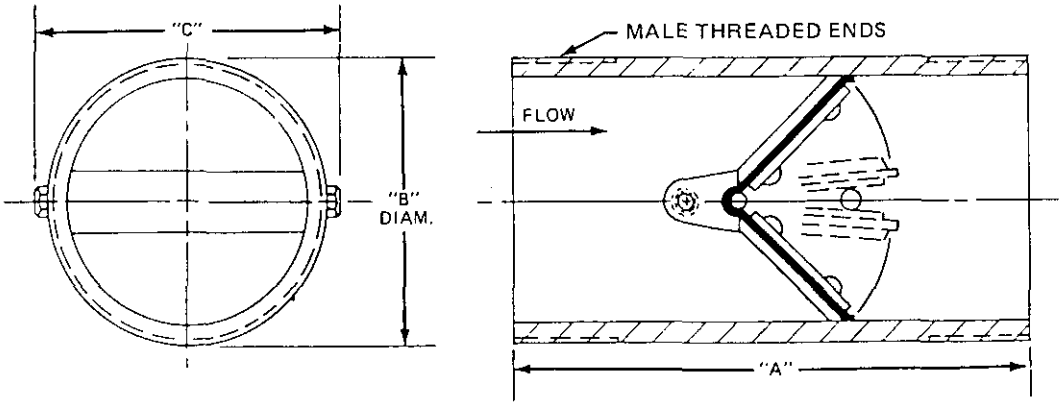
SPRING MATERIAL
E-Stainless (302)

SET PRESSURE
Models 337 2 PSIG (0002) thru 60 PSIG (0060)
~~Model 215V 1" HG (Inches of Mercury) (0001) thru 22" HG (0022) Vacuum~~

KEYSTONE

TECHNOCHECK
MALE THREADED ENDS

STYLE 5002



GENERAL DIMENSIONS FOR STYLE 5002

VALVE SIZE	"A"	"B"	"C"	VALVE SIZE	"A"	"B"	"C"
1	3-1/2	1.315	1-5/8	4	6	4-1/2	4-7/8
1-1/4	3-1/2	1.660	2	5	7	5-9/16	6-1/8
1-1/2	4	1.900	2-1/4	6	8	6-5/8	7-1/8
2	4	2-3/8	2-3/4	8	10	8-5/8	9-1/2
2-1/2	5	2-7/8	3-1/4	10	12	10-3/4	11-1/2
3	5-1/2	3-1/2	3-7/8	12	14	12-3/4	13-3/4

ALL DIMENSIONS IN INCHES

STANDARD MODELS & MATERIALS

STYLE	BODY	INTERNALS	PSI C.W.P.
5002-AL	Aluminum	Aluminum	50
5002-BR	Brass	Brass	150
5002-304	304 Stainless Steel	304 Stainless Steel	150
5002-316	316 Stainless Steel	316 Stainless Steel	150
5002-Class A	Steel	Aluminum	150
5002-Class D	Steel	Cadmium Plated Steel	150
Standard Elastomer: Buna-N			

OPTIONAL MATERIAL SELECTION

INTERNAL MATERIALS

- Aluminum
- Bronze
- 304 Stainless Steel
- 316 Stainless Steel
- Cadmium Plated Steel
- Electroless Nickel Plated Steel or Aluminum
- Monel*
- Titanium*
- Hastelloy*

*Non stock item – Available upon request.

SPRING MATERIALS

- 304 Stainless Steel
- 316 Stainless Steel

Monel and Inconel springs available upon request.

SEALING MEMBER MATERIALS

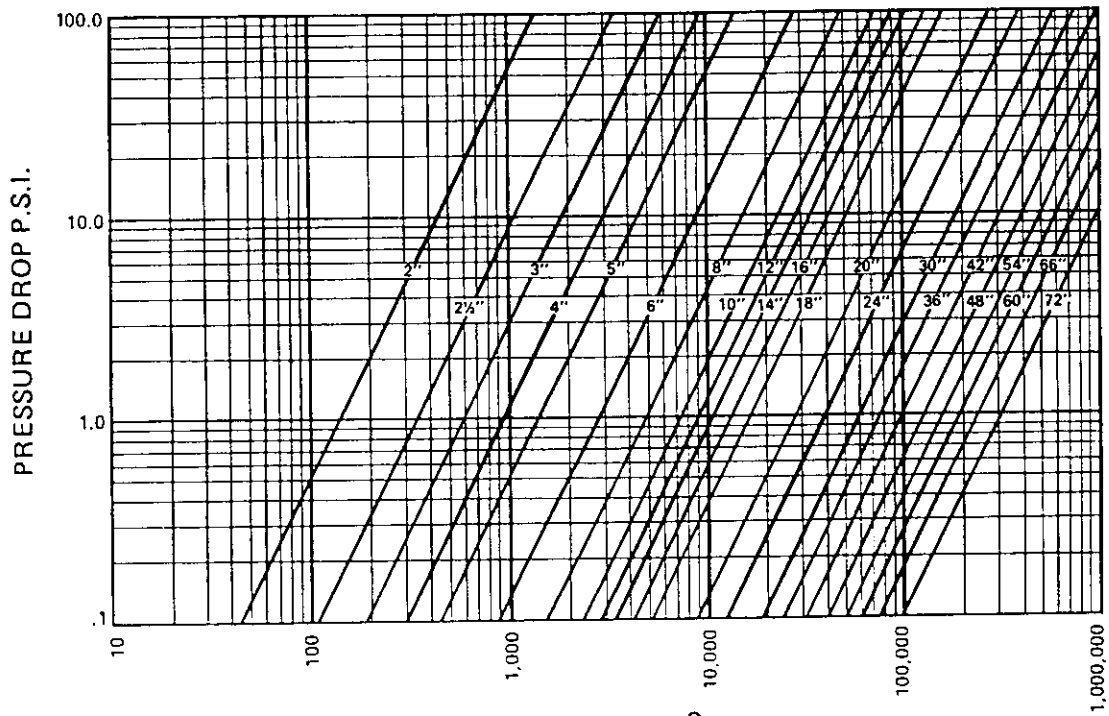
MATERIAL	*TEMPERATURE RANGE
• Buna-N	–60 to 225° F
• Neoprene	–40 to 225° F
• Butyl	–65 to 325° F
• Hypalon	–20 to 300° F
• EPDM	–40 to 300° F
• Viton	–20 to 400° F
• Teflon	–20 to 450° F
• Silicone	–100 to 500° F
• FDA Approved White Neoprene	–40 to 225° F

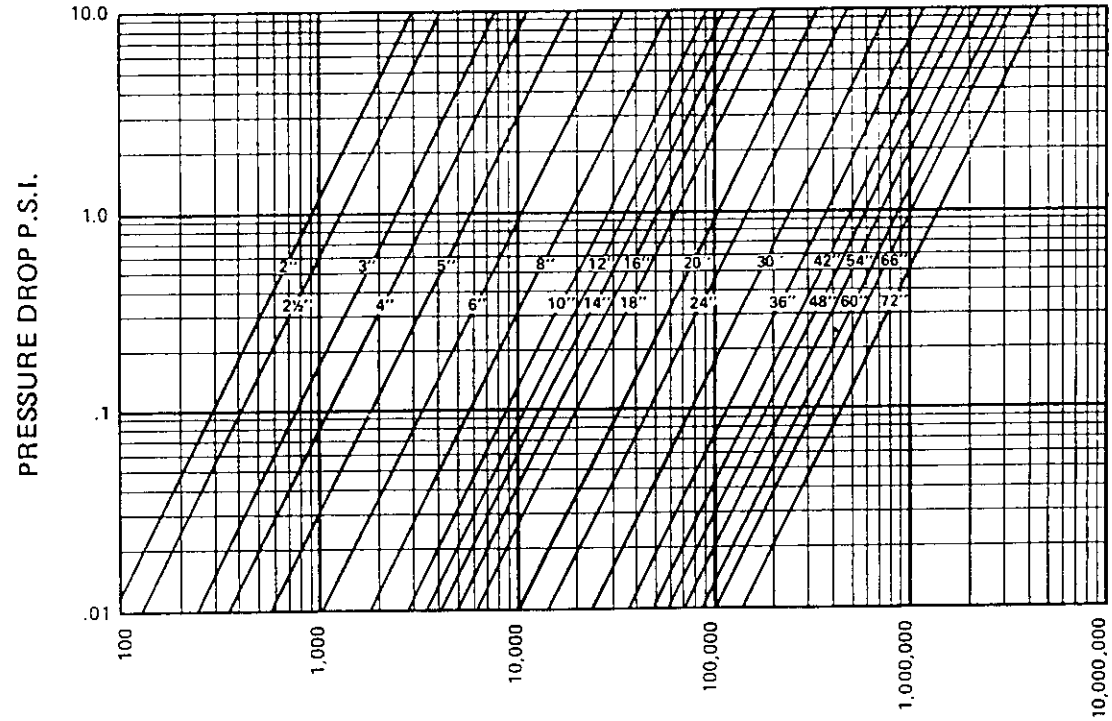
*This temperature range is for general guidance. The figures may vary with application.

CONSULT FACTORY FOR MATERIALS, SIZES AND PRESSURE RATINGS NOT SHOWN.

• COMBINATION END CONFIGURATIONS ALSO AVAILABLE.

PRESSURE DROP CHARTS
FOR WATER AND AIR SERVICE





TECHNO CORPORATION
2709 WEST 10TH ST.
P.O. BOX 1416
ERIE, PA 16512
PHONE: 814-838-4561
FAX: 814-838-6963

APPENDIX G

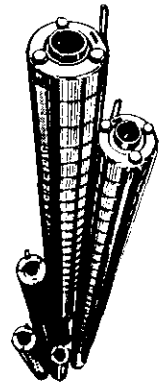
GROUNDWATER PUMP

GRUNDFOS®

Redi-Flo4 Environmental Submersible Pumps

10E

Submittal Data 3450 RPM 60 Hertz



JOB or CUSTOMER:

ENGINEER:

CONTRACTOR:

SUBMITTED BY: DATE:

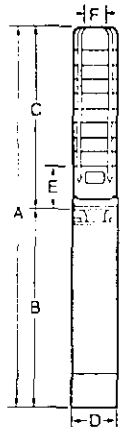
APPROVED BY: DATE:

ORDER NO.: DATE:

SPECIFICATION REF.:

QUANTITY	TAG NO.	MODEL NO.	GPM	FEET	VOLT	PHASE	COMMENT

Dimensions



Technical Data

FLOW RANGE: 5 to 14 US GPM

MOTORS: Grundfos MS402E Environmental Submersible Motor (Standard)
Maximum Operating Temperature: 104°F (40°C)
Maximum Operating Pressure: 220 PSI
Maximum Number of Starts Per Hour: 100
Minimum Recommended Flow Past Motor: 0.25 ft/sec
(NOTE: Franklin Pollution Recovery motor is optional.)

DISCHARGE SIZE: 1¼" NPT

PUMP END CONSTRUCTION MATERIALS: Stainless Steel and Teflon®

INSTALLATION: Unit to be installed vertically for submerged operation.

Electrical Data, Dimensions, and Weights ①

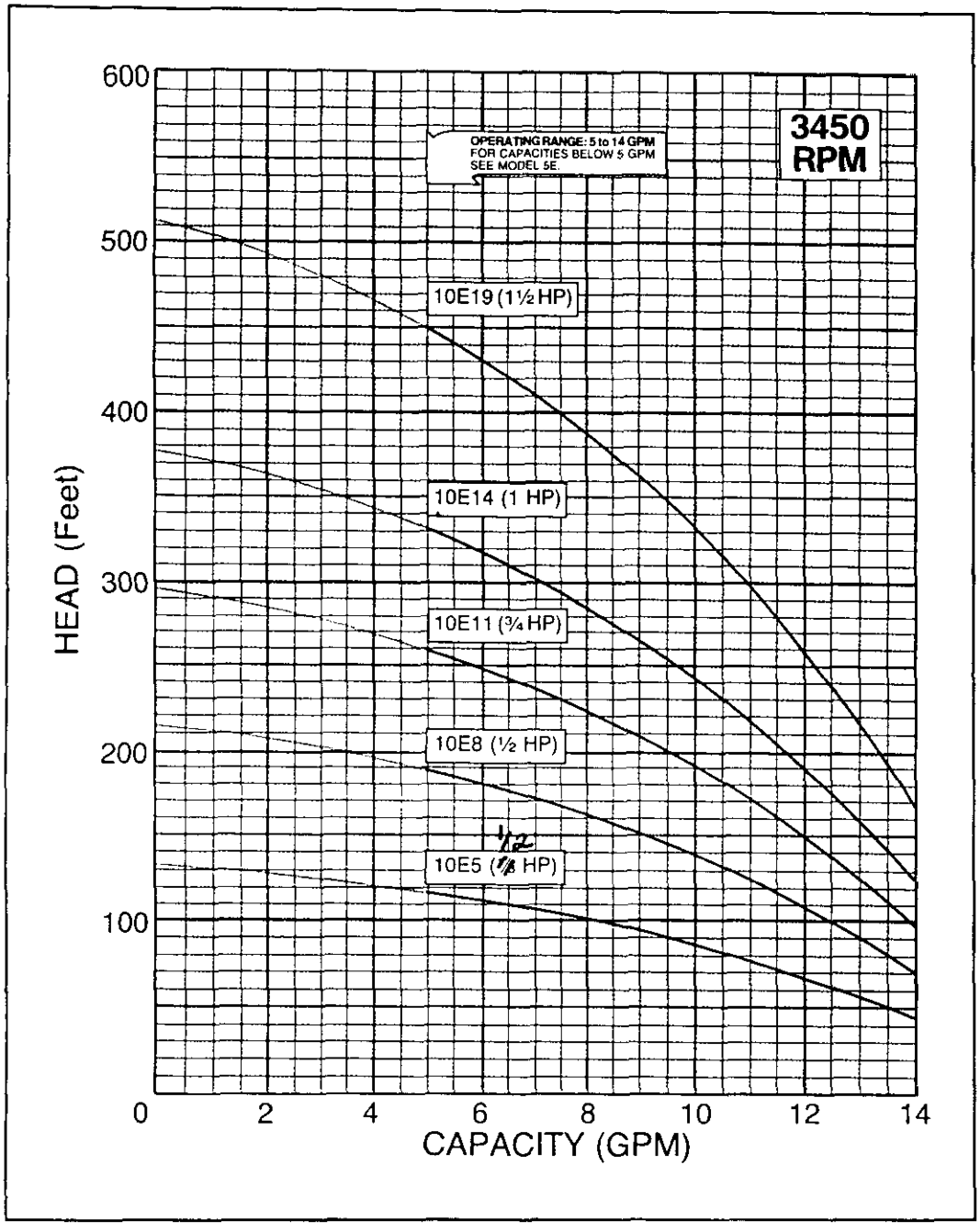
PUMP TYPE	MOTOR HP	MOTOR SF	MOTOR PH	MOTOR VOLTS	DIMENSIONS (In Inches) OVERALL LENGTH A	MOTOR LENGTH B①	PUMP END LENGTH C	MAX. DIA. D	INLET E	DISCH. PIPE SIZE (NPT) F	NET WEIGHT (LBS.)②	SHIP. WEIGHT (LBS.)②
10E5	~~⅓~~ ½	1.75	~~1~~ 3	~~230~~ 460	20 5/16	10	10 5/16	3 31/32	3 ¼	1 ¼	24	25
~~10E8~~	~~½~~	~~1.60~~	~~1~~	~~230~~	~~23 9/16~~	~~10 13/16~~	~~12 3/4~~	~~3 31/32~~	~~3 ¼~~	~~1 ¼~~	~~26~~	~~28~~
10E11	¾	1.50	1	230	26 9/16	11 3/8	15 3/16	3 31/32	3 ¼	1 ¼	28	30
10E14	1	1.40	1	230	29 11/16	12	17 11/16	3 31/32	3 ¼	1 ¼	31	32
10E19	1½	1.30	1	230	35 3/8	13 9/16	21 13/16	3 31/32	3 ¼	1 ¼	35	37

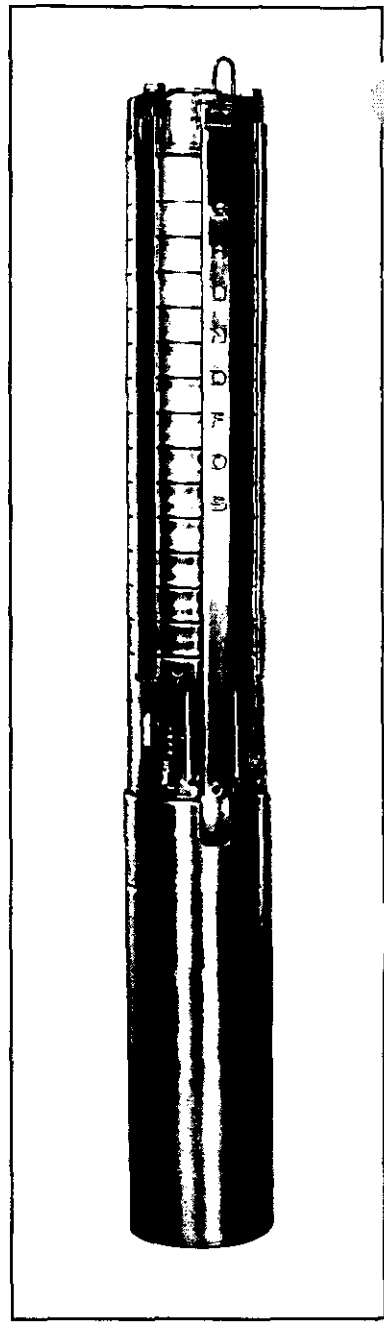
① Data for Grundfos MS402E motors. ② Does not include motor leads.

10E

Redi-Flo4 Environmental Pump

Performance Curves





Materials of Construction

REDI-FLO4 PUMP END	
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Check Valve Seat	304 Stainless Steel & Teflon®
Diffuser Chamber	304 Stainless Steel
Impeller Seal Ring	Teflon®
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	304 Stainless Steel
Coupling	329/420/431 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Intermediate Bearings	Teflon®

NOTE: Specifications are subject to change without notice.

GRUNDFOS ENVIRONMENTAL MOTOR	
Nema Top	304 Stainless Steel
Studs & Fasteners	304 Stainless Steel
Nuts	316 Stainless Steel
Sand Slinger	Viton®
Shaft Extension	431 Stainless Steel
Diaphragm	Viton®
Stator Housing	304 Stainless Steel
Fill Plug Screw	304 Stainless Steel
Fill Plug Washer	Teflon®

GRUNDFOS ENVIRONMENTAL MOTOR LEADS	
Connector Sleeve	304 Stainless Steel
Connector Potting	Scotch Cast #4® Epoxy w/Viton® Cap
Connector Plug	Viton®
Lead Insulation	Teflon®

GRUNDFOS Pumps Corp. • 2555 Clovis Ave. • Clovis, CA 93612
Support Centers: Allentown, PA • Atlanta, GA • Mississauga, Ontario, Canada

L-RF4-TL-010 | 7/19/91
PRINTED IN USA

SANTOPRENE SUBMERSIBLE PUMP CABLE

PACKAGED CABLE

Hi-Lo supreme twisted type, UL approved cable furnished in pre cut lengths with water tight viton plug on one end for direct connection to Franklin motor. Stranded copper conductor, 2 with ground or 3 with ground.

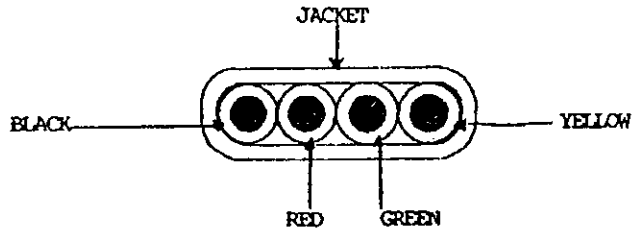
APPLICATION

**For use with submersible pumps in water wells, cable is UL approved for this application.

**Suitable for hot or cold conditions, from 50 F to 200 F, 105 C dry, 75 C wet, 60 C in oil.

**Santoprene Thermoplastic rubber is inherently resistant to a wide variety of oils, solvents and chemicals.

Section 501-11 of 1990-National Electrical Code, entitled Flexible Cords, Class I, Divisions I and 2 (page 70-442) has been interpreted by inspectors such that a flexible cord is appropriate for use with Electric Submersible Pump in Class I, Division I, Group D applications so long as the pump has a means of removal from the "wet-pit" without entering the "wet-pit." This is accomplished by the drop pipe connected to the pump or by the safety cable. The Hi-lo Supreme Santoprene lead generally meets the flexible cord requirements as interpreted by these inspectors.



CONSTRUCTION: Jam nut 316 Stainless steel, bushing-viton, sleeve 316 stainless.

CONDUCTORS-12 AWG 19/25 TPC

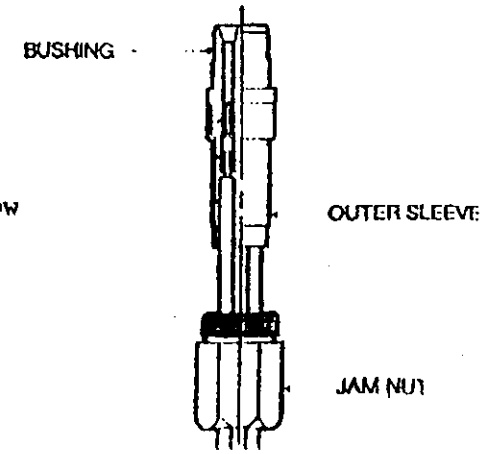
INSULATION-Santoprene .045" wall nom.

COLOR CODE-Black,Red, Green,and Yellow

JACKET-.020" Wall Nom. .238" X .802"

FINAL O.D.-.238" X .802"

WEIGHT- 147.3/1000' Nom



APPENDIX H

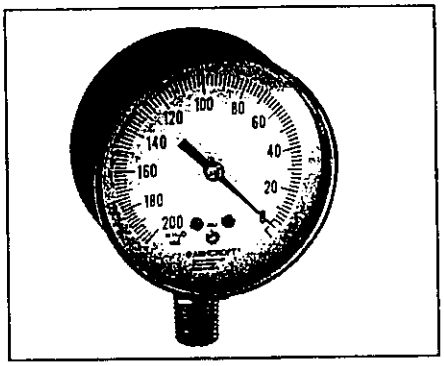
INSTRUMENTATION

ASHCROFT®

Low Pressure Diaphragm Gauges
Series 1490, Grade A (2-1-2%)

- *2½" dial size*
- *Steel case/black epoxy painted*
- *Bronze diaphragm*
- *Brass socket*
- *Sensitive diaphragm-capsule sensor mechanism*
- *For use with gases that are not corrosive to bronze and brass*

The Ashcroft® Type 1490 series of product measures low pressures from 10" H_2O thru 15 psi as well as vacuum and compound ranges. This gauge uses a diaphragm capsule which is very sensitive for measuring low pressures and vacuum.



SELECTION TABLE

Case Size		Gauge Type		Tube and Socket Material		Connection Size and Location		Variations		Range
Code		Code	Steel-Black Painted case	Code		Code		Code		
25	2½	1490	Push-in poly-carbonate window	A	Bronze diaphragm	02L	¼ lower	TU	Throttle plug	Per standard range table
		~~1491~~	~~Threaded poly-carbonate window~~		Brass socket	~~02B~~	~~¼ back~~	NH	Wired stainless steel tag	
		1492	Threaded poly-carbonate window with flush mounting U-clamp			~~01L~~	~~⅛ lower~~			Consult factory for special range requirements
		~~1493~~	~~Push in poly-carbonate window with flush mounting U-clamp~~			~~01B~~	~~⅛ back~~			

STANDARD METRIC RANGES

Pressure	Figure Intervals	Minor Graduation
0/60 cm H_2O	10	1
0/2.5 kPa	0.5	0.05
0/4.0 kPa	0.5	0.05
0/10 kPa	1	0.1
0/16 kPa	1	0.1
0/25 kPa	5	0.5
0/40 kPa	5	0.5
0/100 kPa	10	1
Vacuum		
2.5/0 kPa	0.5	0.05
4.0/0 kPa	0.5	0.05
10/0 kPa	1	0.1
16/0 kPa	1	0.1
25/0 kPa	5	0.5
40/0 kPa	5	0.5
100/0 kPa	10	1
Compound		
-10/60 cm H_2O	10	1
-10/80 cm H_2O	10	1
-20/40 cm H_2O	10	1
-10/100 cm H_2O	10	1
-10/120 cm H_2O	10	1

STANDARD RANGES

Pressure	Figure Intervals	Minor Graduation
0/10 in. H_2O	1	0.1
0/15 in. H_2O	5	0.2
0/30 in. H_2O	5	0.5
0/60 in. H_2O	10	1
0/100 in. H_2O	10	1
~~0/160 in. H_2O~~	~~20~~	~~2~~
0/200 in. H_2O	20	2
~~0/300 in. H_2O~~	~~50~~	~~5~~
0/10 oz./in.²	1	0.1
0/15 oz./in.²	5	0.2
0/30 oz./in.²	1	0.1
0/60 oz./in.²	10	1
0/100 oz./in.²	10	1
0/160 oz./in.²	20	2
0/250 oz./in.²	50	5
0/3 psi	0.5	0.5
0/5 psi	1	0.1
0/10 psi	1	0.1
0/15 psi	5	0.2
Vacuum		
15/0 in. H_2O	5	0.2
30/0 in. H_2O	5	0.5
60/0 in. H_2O	10	1
100/0 in. H_2O	10	1
200/0 in. H_2O	20	2
15/0 oz./in.²	5	0.2
30/0 oz./in.²	1	0.1
60/0 oz./in.²	10	1
100/0 oz./in.²	10	1
Compound		
-30/30 in. H_2O	10	1
-30/30 in.oz./in.²	10	1
-10/10 in. H_2O	2	0.2

Dual Scale

Range		Graduations			
		Inner Scale		OuterScale	
Inner Scale	Outer Scale	Figure Intervals	Minor Grad.	Figure Intervals	Minor Grad.
0/9 oz./in.²	0/15 in. H_2O	1	0.2	5	0.2
0/20 oz./in.²	0/35 in. H_2O	5	0.5	5	0.5
0/35 oz./in.²	0/60 in. H_2O	5	0.5	5	0.5
0/60 oz./in.²	0/100 in. H_2O	10	1	10	1

Other ranges available on request. Consult factory.

TO ORDER THESE LOW PRESSURE DIAPHRAGM GAUGES:

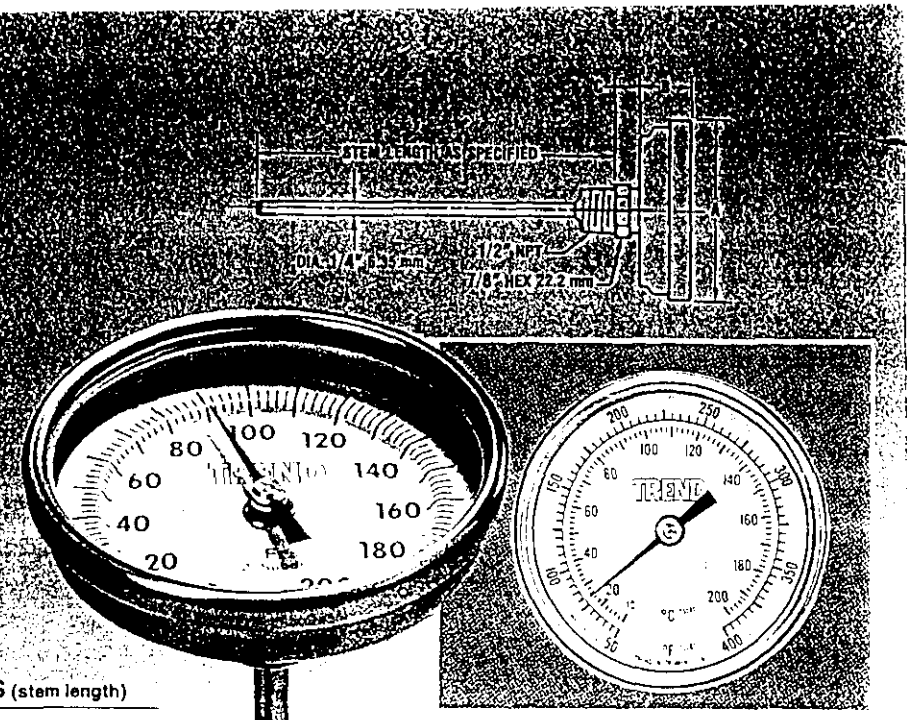
Select: 25 1490 A 02L XXX 10"H_2O

1. Dial size–2½
2. Case type
3. Tube and socket material
4. Connection size–¼ (02), ⅛ (01)
5. Connection location–Lower (L), Back (B)
6. Optional features–see page 88
7. Standard pressure range–10"H_2O

Accessories–see pages 138-144

Reference Bulletin QG-1

INDUSTRIAL THERMOMETERS
DIAL SIZES, 3" - 5"
90° BACK ANGLE FORM
Model 33 & 53
Bi-Metal Thermometers



Dial Size	A	B	C	S (stem length)
3" 76.2 mm	3 1/4" 82.55 mm	11/16" 17.38 mm	1/4" 6.35 mm	as specified
5" 127 mm	5 1/4" 133.35 mm	15/16" 23.81 mm	7/16" 11.11 mm	as specified

ALL DIMENSIONS ± 1/16" (1.58 mm)

Catalog Numbers

Stem Length Inches	Stem Length Millimeters	MODEL 33 Dial Size 3" 76.2 mm	MODEL 53 Dial Size 5" 127 mm
2 1/2	63.5	33025	53025
4	101.6	33040	53040
6	152.4	33060	53060
9	228.6	33090	53090
12	304.8	33120	53120
15	381.0	33150	53150
18	457.2	33180	53180
24	609.6	33240	53240

Standard Ranges — Dual Scale (*Other Ranges Available*)

Fahrenheit (outer scale) Range	Fig. Interval	Div.	Celsius (inner scale) Range	Fig. Interval	Div.
-100 to 150°	20°	2°	-70 to 70°	10°	1°
- 40 to 120°	20°	2°	-40 to 50°	10°	1°
25 to 125°	10°	1°	- 5 to 50°	5°	1/2°
0 to 140°	10°	1°	-20 to 60°	5°	1/2°
0 to 200°	20°	2°	-15 to 90°	10°	1°
0 to 250°	20°	2°	-20 to 120°	10°	1°
20 to 240°	20°	2°	- 5 to 115°	10°	1°
50 to 300°	20°	2°	10 to 150°	10°	1°
50 to 400°	50°	5°	10 to 200°	20°	2°
50 to 500°	50°	5°	10 to 260°	20°	2°
50 to 750°	100°	10°	65 to 400°	50°	5°
to 1000°	100°	10°	100 to 540°	50°	5°

*Not recommended for continuous use over 800°F or 425°C.

For complete list of available ranges, including Celsius only and Fahrenheit only, please see page 13.

This high quality, low cost thermometer is designed for applications where a weather resistant, tamper proof case is required.

Specifications

CASE: Corrosion resistant 304 stainless steel.

DIAL: Anti parallax heavy gauge aluminum with black markings on white matte finish. Dished form with Celsius on lower plane and Fahrenheit on raised plane. Also available with single scale and custom design.

CRYSTAL: Heavy duty clear glass, gasketed and sealed to insure weather tight integrity.

HERMETIC SEAL: Per ASME B40.3.

STEM/CONNECTION: Type 304 stainless steel, 1/4 inch (6.35 millimeter) diameter with standard lengths to 24 inches (609 millimeters). 1/2 inch NPT connection is standard.

BI-METAL ELEMENT: An extremely responsive temperature sensing helix which has been carefully sized and tested, heat treated and aged to relieve inherent stresses and insure continued accuracy.

ACCURACY: One percent full scale (Grade A per ASME B40.3).

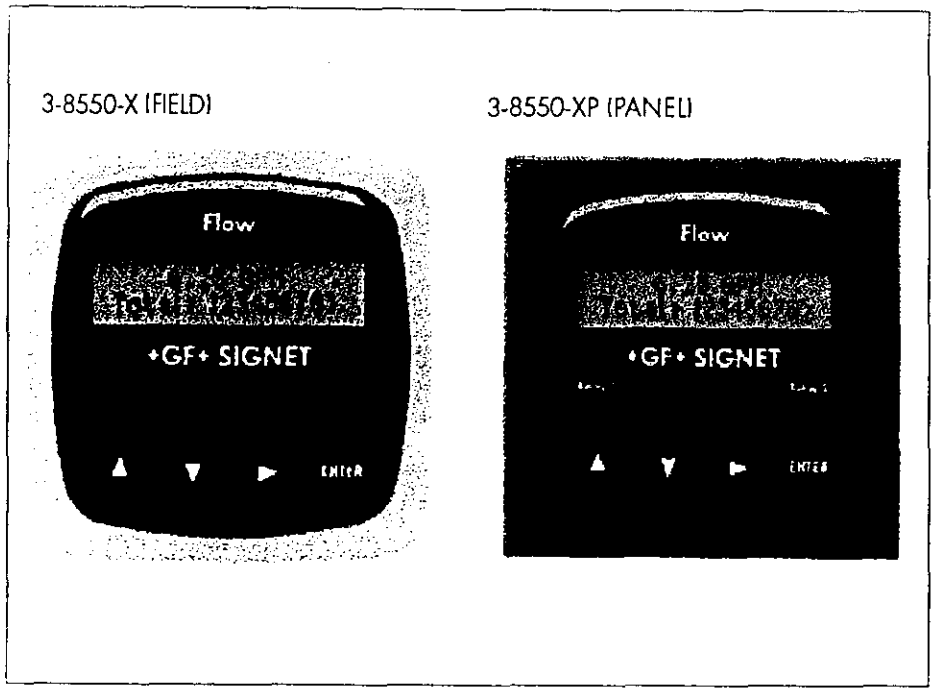
OPTIONS: Special ranges, dial layouts, accuracies, stems, connections and windows

How to Order

The catalog number shown indicates only the dial size, angle form and stem length. For complete, descriptive part number please use the tables listed on page 13.

See General Specifications on this page for construction features and for available accessories and options.

+GF+ SIGNET 8550 ProcessPro™ Flow Transmitter



Features

- **Permanent & resettable totalizers**
- **Scaleable outputs**
- **Relay options**
- **Mounting versatility**
- **Simulate function**
- **2 x 16 character dot matrix LCD**
- **Chemical resistant enclosure and self-healing window**
- **Large pushbuttons**
- **Clearly marked terminal labels**

Application

- **Flow control and monitoring**
- **Filtration or softener regeneration**
- **Effluent totalization**
- **Pump protection**
- **Feed pump pulsing**
- **Ratio control**
- **Water distribution**
- **Leak detection**

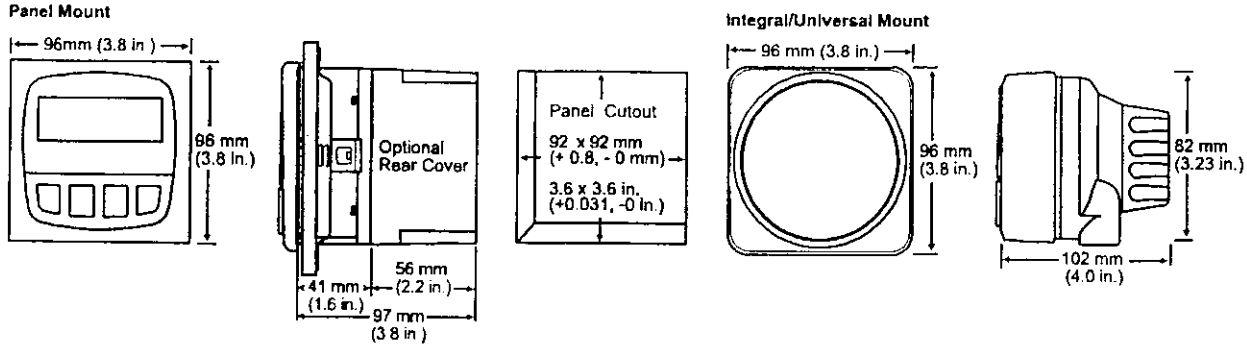
Description

The +GF+ SIGNET 8550 Flow Transmitter is an advanced solution that converts the signal from all +GF+ SIGNET flow sensors into a 4 to 20 mA signal for long distance transmission, and offers the unique feature of dual input and output capability. Configuration flexibility is maximized with two optional relays for process control, two packaging options for integral/pipe mount or panel installation, and scalability for virtually any flow range or engineering unit. State-of-the-art electronic design ensures long-term reliability, signal stability, and simple user setup and operation.

Technical Features

Mounting Version	Part No.	Wire Power	Sensor Input	4 to 20 mA Output	Open Collector/ Relay
Field 	3-8550-1	2/4 non-powered and powered sensors	1	1	1 O.C. Hi, Lo, Pulse Freq or Off
	~~3-8550-2~~	~~4 non-powered and powered sensors~~	~~1~~	~~1~~	~~2 Relays Hi, Lo, Pulse or Off~~
	3-8550-3	2/4 non-powered and powered sensors	2	2 Sensor 1, Sensor 2 or delta Flow	2 O.C.'s Hi, Lo, Pulse Freq or Off
Panel 	3-8550-1P	2/4 non-powered and powered sensors	1	1	1 O.C. Hi, Lo, Pulse Freq or Off
	3-8550-2P	4 non-powered and powered sensors	1	1	2 Relays Hi, Lo, Pulse or Off
	3-8550-3P	2/4 non-powered and powered sensors	2	2 Sensor 1, Sensor 2 or delta Flow	2 O.C.'s Hi, Lo, Pulse Freq or Off

Dimensions

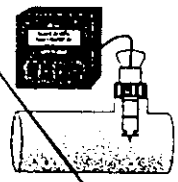


Installation

The transmitter is available in a panel mount or a field version. The field version is mounted to the sensor using the integral mount kit (3-8051) or you may select the universal mount kit (3-8050) to mount the transmitter on a surface near the sensor.

1. Panel Mount

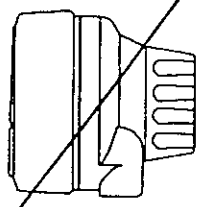
3-8550-XP



All panel mount transmitters (3-8550-XP) include a mounting bracket and gasket for a NEMA 4X watertight panel installation. Panel mount transmitters fit into a standard 1/4 DIN panel cutout.

2. Integral Mount

3-8051 Kit

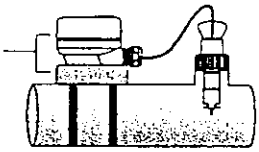


The Integral Mount Kit (3-8051) can be ordered separately and includes a conduit base, locking ring, and integral adapter for mounting the transmitter and sensor directly in a pipe.

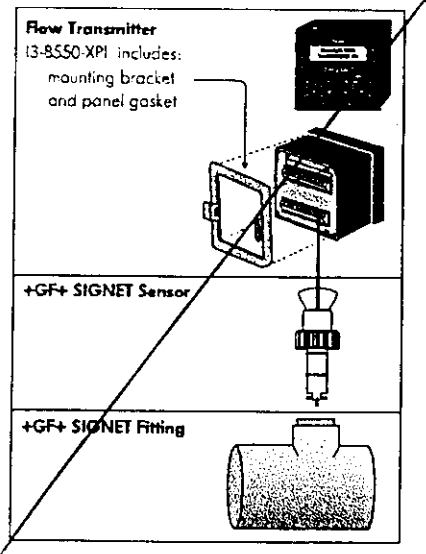
3. Universal Mount

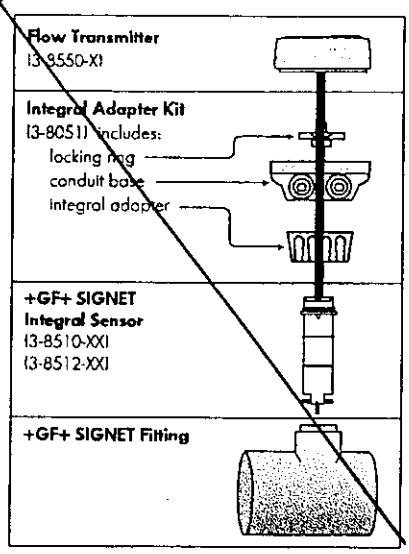
3-8550-X Transmitter

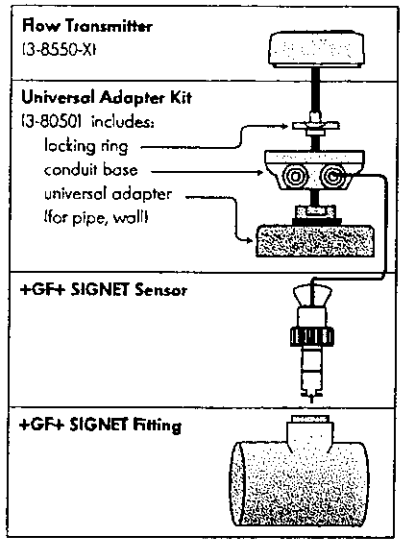
3-8050 Kit



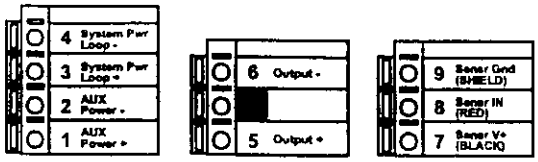
The Universal Mount Kit (3-8050) can be ordered separately and includes a conduit base, locking ring, and universal adapter for mounting the transmitter on a pipe, wall, or other stationary surface.



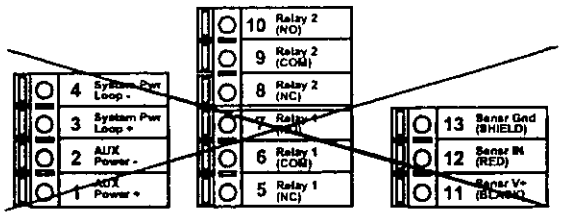




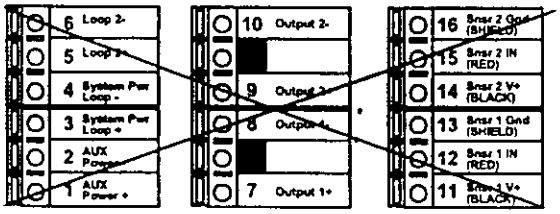
Rear Terminal View



3. terminal 8550-1



3. terminal 8550-2



3. terminal 8550-3

Technical Data

General

Compatibility:
+GF+ SIGNET Flow Sensors with frequency outputs

Accuracy: ±0.5 Hz

Enclosure:
- Rating: NEMA 4X/IP65 front
- Case: PBT
- Panel Case Gasket: Neoprene
- Window: Polyurethane coated polycarbonate
- Keypad:
  Sealed 4-key silicone rubber
- Weight: Approx. 325g (12 oz.)

Display:
- Alphanumeric 2 x 16 LCD
- Update rate: 1 second
- Contrast: User selected, 5 levels

Environmental

Operating temperature:
-10 to 70°C (14 to 158°F)

Storage temperature:
-15 to 80°C (5 to 176°F)

Relative humidity:
0 to 95%, non-condensing

Standards and Approvals

- CSA, CE, UL listed
- Manufactured under ISO 9001

Electrical

Power:
- 12 to 24 VDC ±10%, regulated
  (-1) 61 mA max.; (-2) 200 mA max.; (-3) 122 mA max.

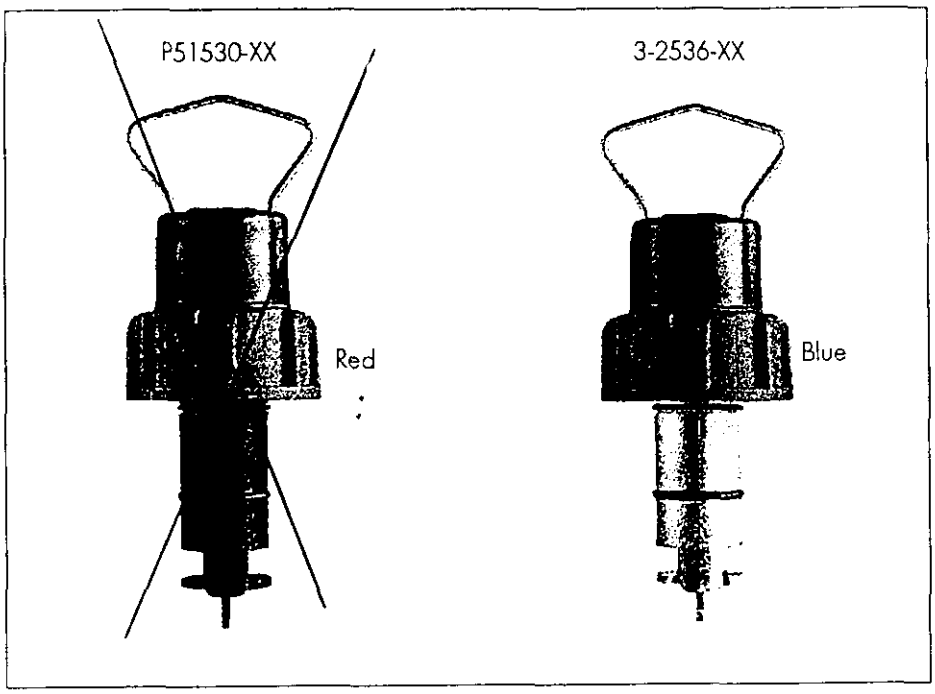
Sensor Input:
- Range: 0.5 to 1500 Hz
- Sensor power:
  2-wire: 1.5 mA @ 5 VDC ± 1%
  3 or 4 wire: 20 mA @ 5 VDC ± 1%
- Optically isolated from current loop
- Short circuit protected

Current output:
- 4 to 20 mA, isolated, fully adjustable and reversible
- Max loop impedance:
  50Ω max. @ 12 V,
  325Ω max. @ 18 V,
  600Ω max. @ 24 V
- Update rate: 100 ms
- Accuracy: ±0.03 mA

Relay output:
- Mechanical SPDT contacts: Hi, Lo, Pulse, Off
- Maximum voltage rating: 5 A @ 30 VDC, 5 A @ 250 VAC resistive load
- Hysteresis: User adjustable
- Max 300 pulses/min.

Open-collector output: Hi, Lo, Pulse, Off
- Open-collector, optically isolated,
  50 mA max. sink, 30 VDC max.
  pull-up voltage.
- Max 300 pulses/min.

+GF+ SIGNET 515/2536 Rotor-X Flow Sensors



Features

- **PVDF or Polypropylene molded sensor body**
- **Simple Insertion Design**
- **Wide Turndown Ratio of 66:1**
- **For DN15 to DN1000 (0.5 to 36 in.) pipes**
- **Self-powered Flow Rate (P51530-XX)**
- **Process Ready Signal (3-2536-XX)**
- **Extended length for wet-tap installations available**

Application

- **Pure Water Production**
- **Filtration systems**
- **Chemical Production**
- **Liquid Delivery Systems**
- **Pump Protection**
- **Scrubbers**

Description

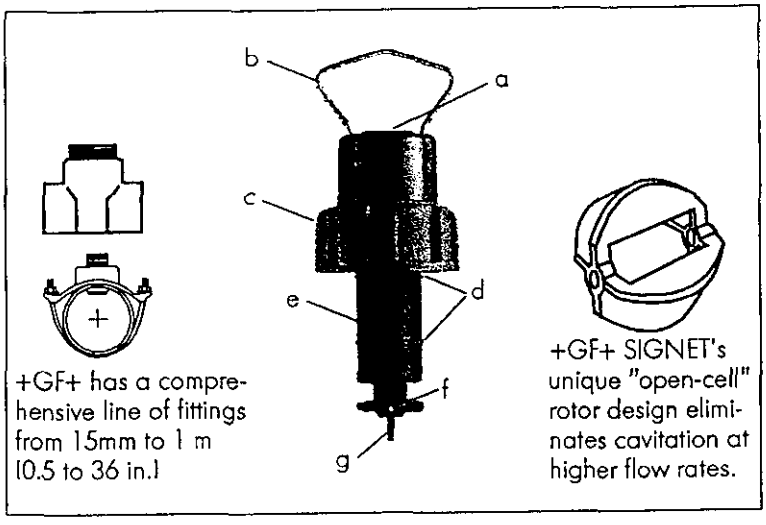
Invented over 25 years ago by +GF+ SIGNET, the Rotor-X paddle-wheel insertion-flow sensor is a proven flow sensor. These highly repeatable, rugged sensors offer exceptional value with little or no maintenance required. Installation is simple with +GF+ SIGNET's comprehensive line of fittings for all pipe materials in sizes from DN15 to DN1000 (0.5 to 36 in.). Output signal of the 515 is a sinusoidal frequency capable of driving a self-powered flowmeter (3-5090). The 3-2536 has a process-ready open-collector signal and can operate to flows as low as 0.1 m/s (0.3 ft/s).

Options

Rotor-X Sensors	Instrument Options								
	3-8550-1	3-8550-2	3-8550-3	3-5090	3-5075	3-5100	3-5500	3-5600	3-9010
P51530-XX	●	●	●	●	●	●	●	●	●
3-2536-XX	●	●	●		●		●	●	●

Technical Features

a) 1/2 in. NPT Conduit Connection
b) Large bail simplifies insertion/removal
c) High-strength ring nut with provision for lead seal installation
d) Dual O-ring seal (Viton® standard, EPR optional)
e) Molded one-piece black glass-filled Polypropylene or natural PVDF body
f) Multiple pin materials
g) Open-cell rotor with material options

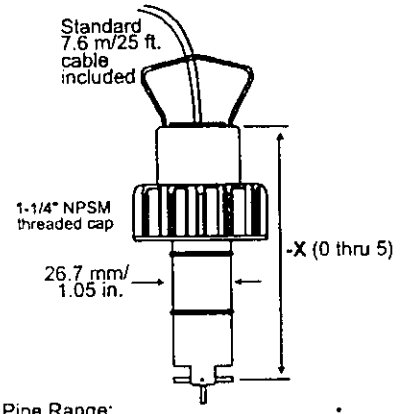


+GF+ has a comprehensive line of fittings from 15mm to 1 m (0.5 to 36 in.)

+GF+ SIGNET's unique "open-cell" rotor design eliminates cavitation at higher flow rates.

Dimensions

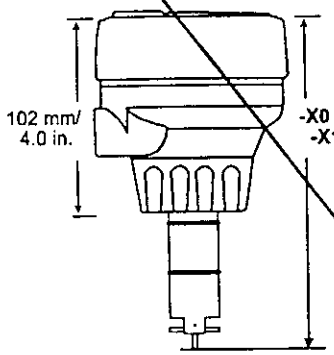
515/2536 Sensor



Pipe Range:

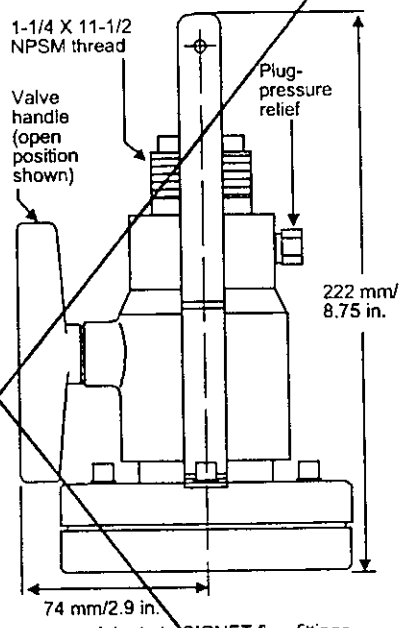
1/2 to 4 in.	-X0 = 104 mm/4.1 in.	
5 to 8 in.	-X1 = 137 mm/5.4 in.	
10" and up	-X2 = 213 mm/8.4 in.	
1/2 to 4 in.	-X3 = 219 mm/8.6 in.	Wet-tap Lengths
5 to 8 in.	-X4 = 254 mm/10 in.	
10" and up	-X5 = 331 mm/13 in.	

8510 / 8512 Integral Sensor with Transmitter (sold separately)



-X0 = 152 mm/6.0 in.
-X1 = 185 mm/7.3 in.

319 Wet Tap Assembly



- Adapts to SIGNET flow fittings
- Extended 515 sensor included (not shown)
- 7 bar/100 psi max. @ 20°C/68°F
- Max. installation/removal pressure: 1.7 bar/25 psi @ 22°C/72°F

Fitting Types

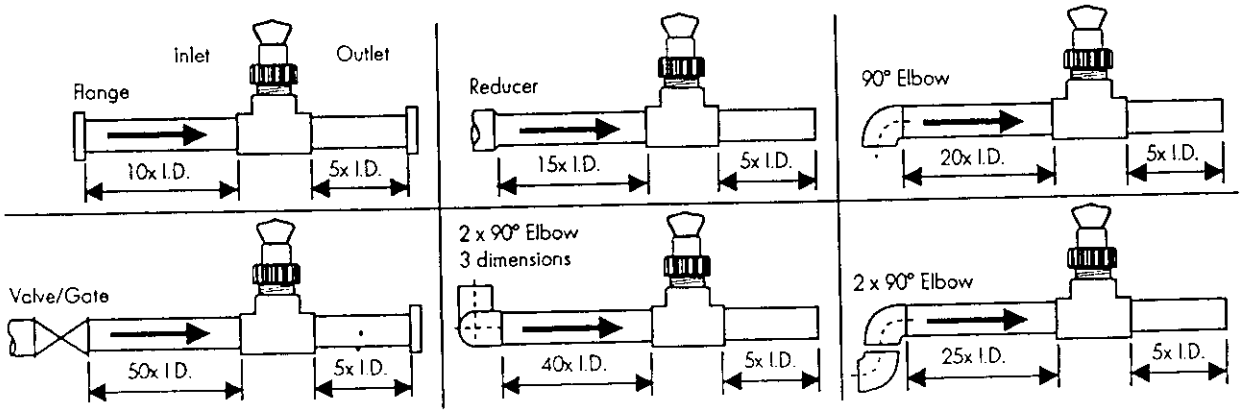
Refer to Fitting Specification Sheets for detailed part numbers

Type	Description
Plastic tees: PV8T CPV8T PV8Txxx F CPV8TxxxF	• 0.5 to 4 in. versions • PVC or CPVC • Mounts via glue-on fittings
Plastic Saddles: PV8S (PVC) CPV8S (CPVC)	• 2 to 4 in., cut 1-7/16 in. hole in pipe • 6 to 8 in., cut 2-1/4 in. hole in pipe • Pipes over 8 in., use iron or fiberglass saddle
Iron strap-on saddles: IR8S	• 2 to 4 in., cut 1-7/16 in. hole in pipe • Over 4 in., cut 2-1/4 in. hole in pipe • Special order over 12 in.
Weldolets: Copper/Bronze (BR4B) Carbon Steel (CS4W) 316SS (CR4W)	• 2 to 4 in., cut 1-7/16 in. hole in pipe • Over 4 in., cut 2-1/4 in. hole in pipe • Remove insert before welding • Installed by certified welder only • Special order over 12 in.

Type	Description
Threaded tees: •Iron (IR4T) •Carbon Steel (CS4T) •316 SS (CR4T)	• 0.5 to 2 in. versions • Mounts on threaded pipe ends
Fiberglass tees & saddles: FPT FPS	• 1.5 in. to 8 in. PVDF insert • > 8 in. PVC insert • Special order over 12 in.
Polypropylene (PPMT) PVDF (SFMT)	Metric wafer fitting • For pipes DN 65 to 200 mm • PP or PVDF
Polypropylene (PPMT) PVDF (SFMT)	Metric union fitting • For pipes from DN 15 to 50 mm • PP or PVDF

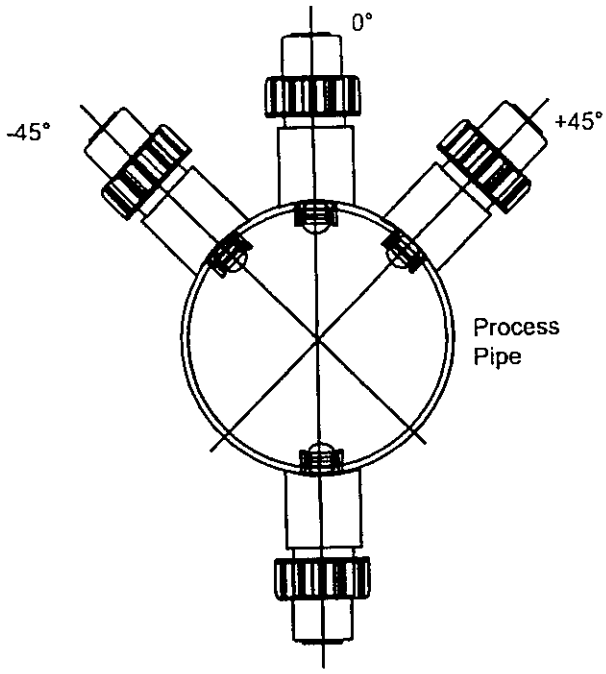
Installation

- Six common installation configurations are shown here as guidelines to help you select the best location in your piping system for a paddlewheel flow sensor.
- Always maximize distance between sensors and pump sources.



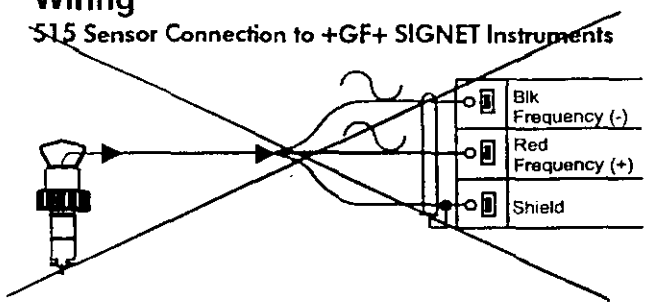
Sensor Mounting Position

- Horizontal pipe runs: Mount sensor in the upright (0°) position for best overall performance. Mount at a maximum of 45° when air bubbles are present. Do not mount on the bottom of the pipe when sediments are present.
- Vertical pipe runs: Sensor must be mounted in lines with UPWARD flow only.

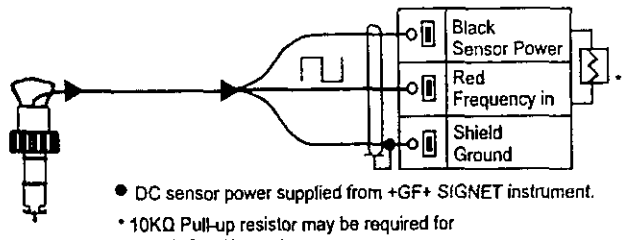


Wiring

~~515~~ Sensor Connection to +GF+ SIGNET Instruments



2536 Sensor Connection to +GF+ SIGNET Instruments



● DC sensor power supplied from +GF+ SIGNET instrument.

* 10KΩ Pull-up resistor may be required for non-SIGNET brand instrument

Technical Data

General (for both ~~515 &~~ 2536)

Pipe Size Range:	15 to 1000 mm (0.5 to 36 in.)
Linearity:	±1% of full range
Repeatability:	±0.5% of full range
Minimum Reynolds Number Required:	4500

Wetted Materials:

Sensor Body:	Glass-filled Polypropylene (black) or PVDF (natural)
O-rings:	FPM-Viton (std) or EPDM or FPM-Kalrez
Pin:	Titanium or Hastelloy-C or PVDF; other materials options available
Rotor:	Black PVDF or Natural PVDF; optional Tefzel with or w/o Fluoralloy B sleeve

Cable Type:	2-conductor twisted pair with shield (22 AWG)	
Weight:	-X0	454 grams
	-X1	476 grams
	-X2	680 grams
	-X3	794 grams
	-X4	850 grams
	-X5	1 kg
	P31940	1.2 kg

Standards and Approvals (for both ~~515 &~~ 2536):

- Manufactured under ISO 9001
- CE

~~General~~ (515 Only)

Flow Rate Range:	0.3 to 6 m/s (1 to 20 ft./s)
Pipe Size Range:	DN15 to DN1000 (0.5 to 36 in.)
Cable Length:	7.6 m (25 ft.)/60 m (200 ft.) maximum
Signal:	
Frequency:	19.7 Hz per m/s nominal (6 Hz per ft/s)
Amplitude:	3.3 V p/p per m/s nominal (1 V p/p per ft/s)
Source Impedance:	8 KΩ

Standards and Approvals (515 only):

- FM Class I, II, III/Div./groups A-G

General (2536 Only)

Flow Rate Range:	0.1 to 6 m/s (0.3 to 20 ft./s)
Pipe Size Range:	DN15 to DN1000 (0.5 to 36 in.)
Cable Length:	7.6 m (25 ft.)/300 m (1,000 ft.) maximum
Signal:	
Frequency:	49Hz per m/s nominal (15 Hz per ft/s nominal)
Supply voltage:	3.5 to 24 VDC regulated
Supply current:	<1.5 mA @ 3.3 to 6 VDC
	<20 mA @ 6 to 24 VDC
Output Type:	Open collector transistor, sinking
Output Current:	10 mA max.

Accessories (continued)

Rotors 2536/8512-XX

Mfr. Part No.	Code	Description
3-2536.320-1	198 820 052	Rotor, PVDF Black
3-2536.320-2	159 000 272	Rotor, PVDF Natural
3-2536.320-3	159 000 273	Rotor, Tefzel
3-2536.321	198 820 054	Rotor and Pin, PVDF Natural
3-2536.322-1	198 820 056	Sleeved Rotor, PVDF Black
3-2536.322-2	198 820 057	Sleeved Rotor, PVDF Natural
3-2536.322-3	198 820 058	Sleeved Rotor, Tefzel
Rotor Pins		
M1546-1	198 801 182	Pin, Titanium
M1546-2	198 801 183	Pin, Hastelloy-C
M1546-3	198 820 014	Pin, Tantalum
M1546-4	198 820 015	Pin, Stainless Steel
P51545	198 820 016	Pin, Ceramic
O-Rings		
1220-0021	198 801 186	O-Ring, FPM-Viton
1224-0021	198 820 006	O-Ring, EPDM
1228-0021	198 820 007	O-Ring, FPM-Kalrez
Miscellaneous		
P31536	198 840 201	Sensor Plug, Polypro
P31536-1	198 840 202	Sensor Plug, PVDF Metric
P31536-2	159 000 649	Sensor Plug, PVDF
P31542	198 801 630	Sensor Cap, Red (for use w/515)
P31542-3	159 000 464	Sensor Cap, Blue (for use w/2536)
P31934	159 000 466	Conduit Cap
P51589	159 000 476	Conduit Adapter Kit
5523-0222	159 000 392	Cable, (per foot)
3-8051	159 000 187	Transmitter Integral Adapter

Engineering Specifications for both ~~515 and~~ 2536 Flow Sensors

- The flow sensor shall use a four-blade, open-cell rotor design using insertion paddlewheel technology.
- Linearity of the output signal with respect to flow rate shall be ±1 % of full range.
- Measurement repeatability of the output signal with respect to flow rate shall be ±0.5 % of full range.
- The sensor body shall be made of injection-molded polypropylene (PP) that shall accommodate up to 12.5 bar @ 20°C (180 psi @ 68°F) and 1.7 bar @ 90°C (25 psi @ 194°F). As an alternative, the sensor shall be made of injection-molded polyvinylidene fluoride (PVDF) that shall accommodate up to 14 bar @ 20°C (200 psi @ 68°F) and 1.7 bar @ 100°C (25 psi @ 212°F).
- The sensor shall attach to a pipe via a variety of insertion-style installation fittings supplied by the flow sensor manufacturer. Attachment shall use a 1-1/4 X 11-1/2 NPSM threaded cap. Sealing shall be accomplished with a double O-ring seal. O-rings shall be made of FPM-Viton, FPM-Kalrez or EPDM.
- The sensor shall be equipped with 0.5 in. female conduit connection.

~~Engineering~~ Specifications for +GF+ SIGNET 515 Rotor-X Flow Sensor

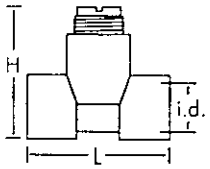
- The sensor shall require no electrical power.
- The sensor shall provide an output signal of 3.3 V p-p per m/s nominal (1 V p-p per ft/s) at a frequency of 19.7 Hz per m/s nominal (6 Hz per ft/s) from 0.3 to 6 m/s (1 to 20 ft/s).
- Output shall be via a twisted pair, foil-shielded cable with drain wire. Supplied cable shall be at least 7.6 m (25 ft) long, with a maximum allowable length of 60 m (200 ft).
- The operating range of the sensor shall accommodate nominal flow rates from 0.3 to 6 m/s (1 to 20 ft/s).
- The sensor shall meet appropriate CE standards and FM standards for Classes I, II and III, Division I/Groups A-G.

Engineering Specifications for +GF+ SIGNET 2536 Low Flow Sensor

- The sensor shall operate with a power input of 3.3 to 6VDC @ <1.5 mA or from 6 to 24 VDC @ <20 mA.
- The sensor output shall provide an open-collector pulse at a frequency of 49.2 Hz per m/s nominal (15 Hz per ft/s).
- Output shall be via a twisted pair, foil-shielded cable with drain wire. Supplied cable shall be at least 7.6 m (25 ft) long, with a maximum allowable length of 300 m (1000 ft).
- The operating range of the sensor shall accommodate nominal flow rates from 0.1 to 6 m/s (0.3 to 20 ft/s).
- The sensor shall meet appropriate CE standards.

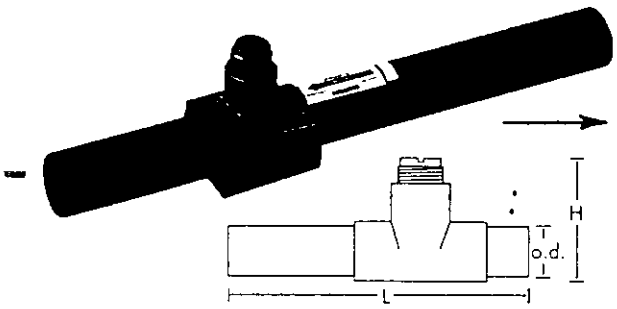
+GF+ SIGNET Plastic Installation Fittings

PVC TEES SCH 80 - Fitting only



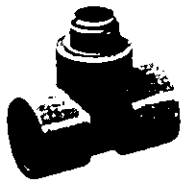
Part no.	Size	L	H	i.d.
PV8T005F	0.50 in.	3.75	3.6	.85
PV8T007F	0.75 in.	3.75	3.8	1.06
PV8T010F	1.00 in.	4.26	4.0	1.33
PV8T012F	1.25 in.	4.36	4.4	1.67
PV8T015F	1.50 in.	4.90	4.6	1.91

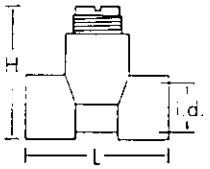
PVC TEES SCH 80 - With Pipe



Part no.	Size	L	H	o.d.
PV8T005	0.50 in.	14	3.6	0.840
PV8T007	0.75 in.	14	3.8	1.050
~~PV8T010~~	~~1.00 in.~~	~~17~~	~~4.0~~	~~1.315~~
PV8T012	1.25 in.	20	4.4	1.660
~~PV8T015~~	~~1.50 in.~~	~~24~~	~~4.6~~	~~1.900~~
PV8T020	2.00 in.	24	5.0	2.375
PV8T025	2.50 in.	24	5.4	2.875
PV8T030	3.00 in.	24	6.0	3.500
PV8T040	4.00 in.	24	7.0	4.500

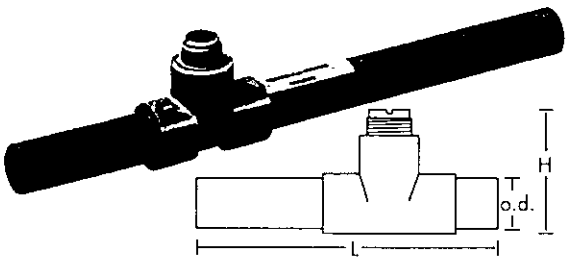
CPVC Tees SCH 80 - Fitting only





Part no.	Size	L	H	i.d.
CPV8T005F	0.50 in.	3.75	3.6	.85
CPV8T007F	0.75 in.	3.75	3.8	1.06
CPV8T010F	1.00 in.	4.26	4.0	1.33
CPV8T012F	1.25 in.	4.36	4.4	1.67
CPV8T015F	1.50 in.	4.90	4.6	1.91

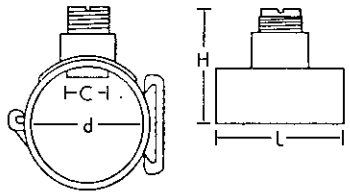
CPVC Tees SCH 80 - With Pipe



Part no.	Size	L	H	o.d.
CPV8T005	0.50 in.	14	3.6	0.840
CPV8T007	0.75 in.	14	3.8	1.050
CPV8T010	1.00 in.	17	4.0	1.315
CPV8T012	1.25 in.	20	4.4	1.660
CPV8T015	1.50 in.	24	4.6	1.900

- Mounts on SCH 80 CPVC pipe

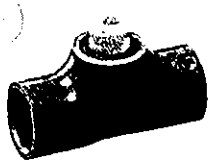
PVC Glue-on Saddles

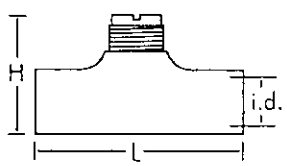


Part no.	Size	L	H	d	C
PV8S020	2.00 in.	4.00	5.0	2.375	1.43
PV8S025	2.50 in.	4.75	5.4	2.875	1.43
PV8S030	3.00 in.	5.00	6.0	3.500	1.43
PV8S040	4.00 in.	5.00	7.0	4.500	1.43
PV8S060	6.00 in.	5.00	10.0	6.625	2.25
PV8S080	8.00 in.	5.00	11.5	8.625	2.25

- Mounts on SCH 80 PVC pipe
- C - Clearance dimension

Fiberglass Glue-on Tees





Part no.	Size	L	H	i.d.
FPT015	1.50 in.	5.5	4.7	1.92
FPT020	2.00 in.	7.7	8.0	2.375

- PVDF insert - all sizes
- Mounts on fiberglass pipe

Viatran
CORPORATION
An Invensys company

INSTALLATION DATA MANUAL

Model 516 Pressure Transmitter

PRODUCT OVERVIEW

All information contained in this document is representative of a standard Model 516. If the product you ordered has special requirements or modifications, refer to the Laser Marked information on the product and your purchase order for possible alteration to the product's configuration. Failure to verify product configuration before installation may cause permanent product damage and in most cases, void the manufacturer's product warranty. If you are unsure or have questions about your product, please contact our Application Engineers for assistance.

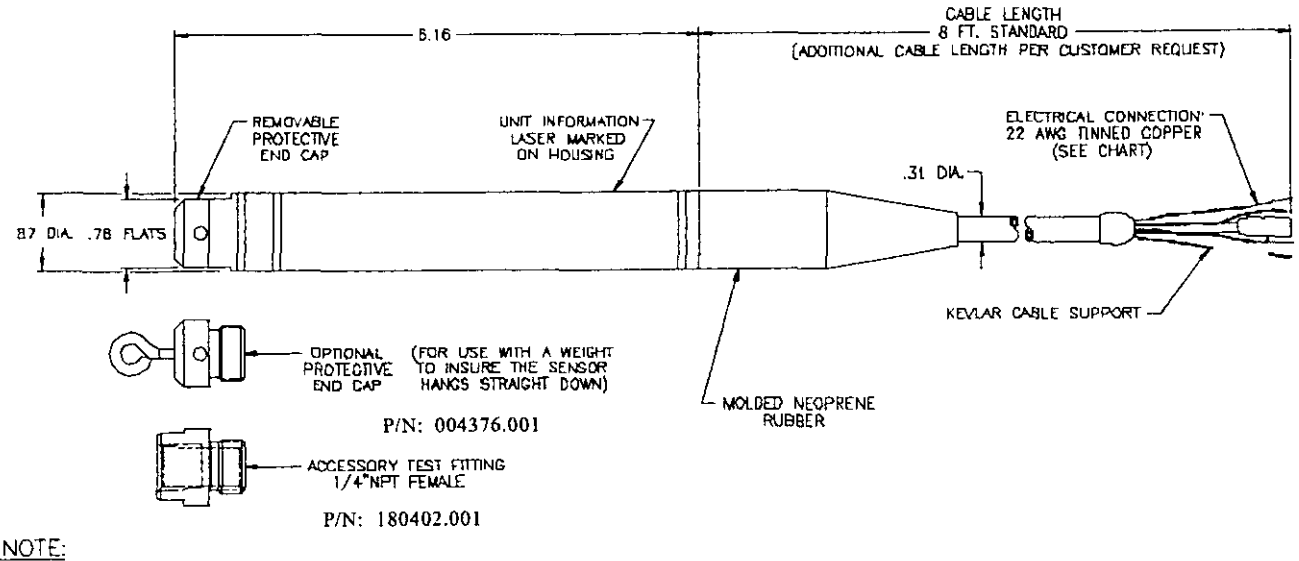
Remove and retain all instruction manuals and performance certificates that are shipped with the product. These documents provide important information on the product's calibration, operation, safety precautions, recommended maintenance, re-calibration requirements, repair service instructions and warranty information. These documents are updated from time to time as changes to the product occur and should be reviewed at receipt so that proper and safe installation can occur.

BASIC OPERATION

The Model 516 has been pre-set at the factory for the required output and is referenced to atmospheric pressure (zero PSIG). Once factory set, the product should perform as indicated by the performance certificate and product labeling. In all cases the zero and span cannot be externally adjusted, hence any deviation from the factory settings could indicate damage to the sensor, electronics (model dependent), or both. A deviation could also indicate a plugged breather which can be easily replaced.

INSTALLATION DATA - VIATRAN MODEL 516

Note: The drawing below is for informational purposes only and is not to scale. All dimensions are nominal, in inches and for reference purposes only.



NOTE:

1. ALL DIMENSIONS ARE NOMINAL, IN INCHES AND ARE FOR REFERENCE PURPOSES ONLY

Standard Output:
4-20 mA

Sensor Construction:
Oil Filled Silicon

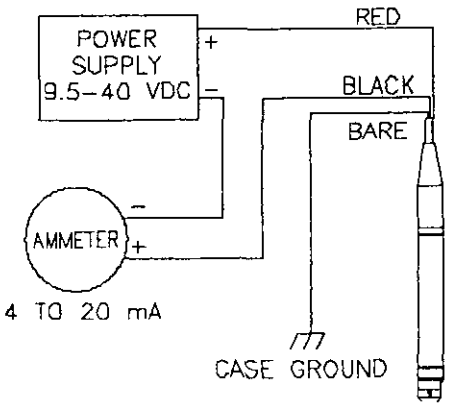
Wetted Parts:
304, 304L, 316 SST and Neoprene Cable

Pressure Connection:
5/8" Straight Female Thread with End Cap Installed

Electrical Mating Connection:
Acceptable 18AWG Wire Termination Connection

Model 516

Wiring:
Red: + Signal
Black: - Signal
Green: Case Ground



REQUIREMENTS & CAUTIONS

1. All electrical & pressure connections should be compatible with the model specifications as outlined above.
2. The product's internal electrical circuitry is isolated from case ground. It is not recommended that the case or ground of the unit be connected to the input, output or calibrate pins of the product or wiring system. Ground loops and line noise will affect the product's performance and will in most cases cause internal electrical failure.
3. All products should be protected from direct or continued exposure to fluids at the electrical connection.
4. On some lower range models a breather opening, with breather filter, is used to allow for proper product function. At no time should the filter be removed in service. If any mist, vapor or fluid is permitted to enter this breather without the filter, total unit failure will occur.
5. At no time should an object be inserted into the pressure port or pressed against the sensing area to deflect the sensor (to test or simulate pressure), as on some models permanent damage to the sensing diaphragm may occur.
6. When shipped in quantities, units should be packaged individually to eliminate possible damage.

ACCESSORIES - OPTIONAL EQUIPMENT

Digital Meter ..... Consult Factory
Breather Tube Filter 003871.002
Accessory Test Fitting 180402.001
Protective End Cap 004376.001

MAINTENANCE AND REPAIR

All Viatran transmitters have been designed to function free from routine or scheduled maintenance. Simple cleaning of the pressure cavity on an as needed basis will provide many years of satisfactory performance. Protecting the product from continued exposure to moisture or fluids at the electrical connection, breather area will eliminate premature internal failure of the product. Generally any time the product is removed from service, the pressure cavity should be flushed with a stainless steel compatible cleaner to prevent media buildup. During the cleaning process only a soft, lint-free cloth is recommended. Never use a coarse or stiff bristle brush to clean media from the diaphragm surface.

It is suggested that the calibration be verified on a usage dependent schedule. If the product is in continuous service 7 days a week, then calibration verification may be necessary every 6 to 8 months. If the product is in a lab test environment a more lenient verification schedule would be appropriate. In all instances the performance of the product will depend on the individual application or process in which it is installed. More continued usage would require a shorter period between calibration verification and product maintenance.

If a product is perceived to be exhibiting problems, it can be returned to Viatran for analysis and/or repair. It is suggested that only Viatran personnel attempt repair of the product. Any damage resulting from customer disassembly would result in a loss of coverage under the warranty policy. All Viatran products are able to be repaired at minimal cost if simple cleaning and precautions are taken in the handling and application of the product. Older products returned for repair are updated to current specifications unless the repair cost would outweigh the cost of a new replacement model. Products returned for repair should include information on the person to contact for repair quote approval, the individual to contact if Viatran's technical staff requires additional information during analysis, and a brief description of the problem associated with the product's failure.

WARRANTY

Viatran Corporation warrants that its products shall be free from defective workmanship and/or material for a period of twelve (12) months from the date of shipment, provided that Viatran's obligation hereunder shall be limited to correcting any defective workmanship and/or replacing any defective material f.o.b. factory. No allowance will be made for any expense incurred for correcting any defective workmanship and/or material without written consent by Viatran. This warranty is in lieu of all other warranties expressed or implied.

REPAIR INSTRUCTIONS

Viatran's Transmitters are designed to be easily repaired and recalibrated if necessary. If a failure occurs, the transmitter should be returned to the factory for inspection and testing. Please contact the Customer Support Department at 1-800-688-0030, for a return tracking number and/or a repair cost estimate. A nominal inspection fee is charged on all units returned to the factory which are not subsequently repaired.

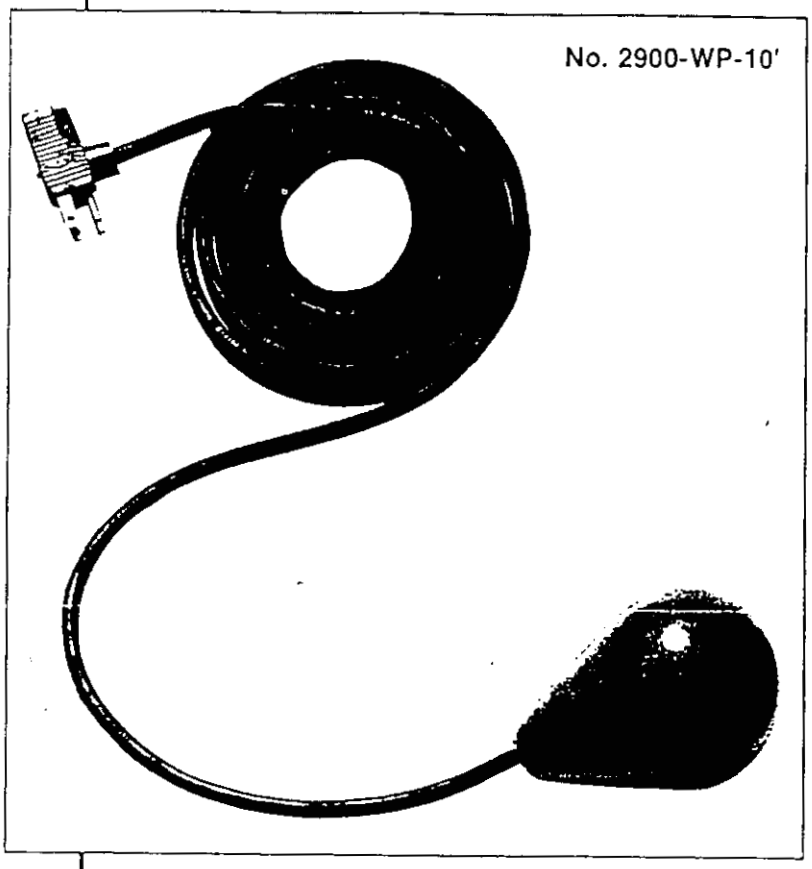
WIDE ANGLE (90°-100°) FLOAT SWITCHES

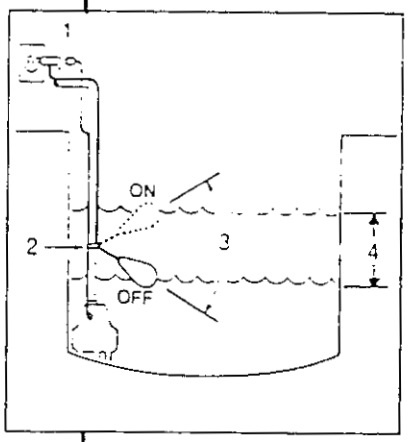
Wide Angle Level Control
The wide angle switch is designed to eliminate the need for two level controls in order to get a desired amount of pump down or the automation of a manual pump. You simply secure the float cord to the discharge line and plug it into a 3-wire grounded receptacle, with the pump cord being inserted into the back of the series tap plug.

The #2900-WP Wide Angle Switch is manufactured for use with permanent split capacitor, shaded pole and capacitor start motors up to ½ HP at 115 Volts. The 20 Amp rated all steel hermetically sealed mercury switch will withstand up to a maximum of 43 Amps starting current, with 12-15 Amp run current, with 10 and 20 foot cord lengths.

- Most economical
- Maximum dependability
- Reliable hermetically sealed all steel mercury switch

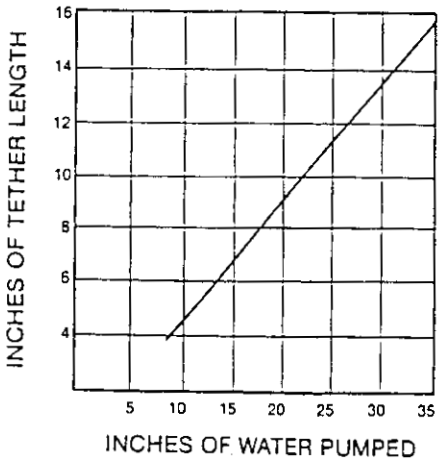
Simple sump pump operation, or repair.

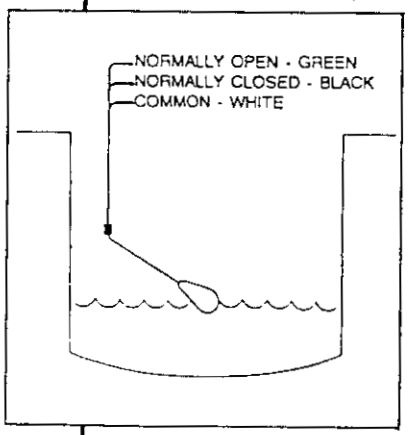




Wide Angle System

1. In line series plug.
2. Float tethered to discharge line.
3. 120° Angle between on and off.
4. Inches of water pumped determined by tether length.



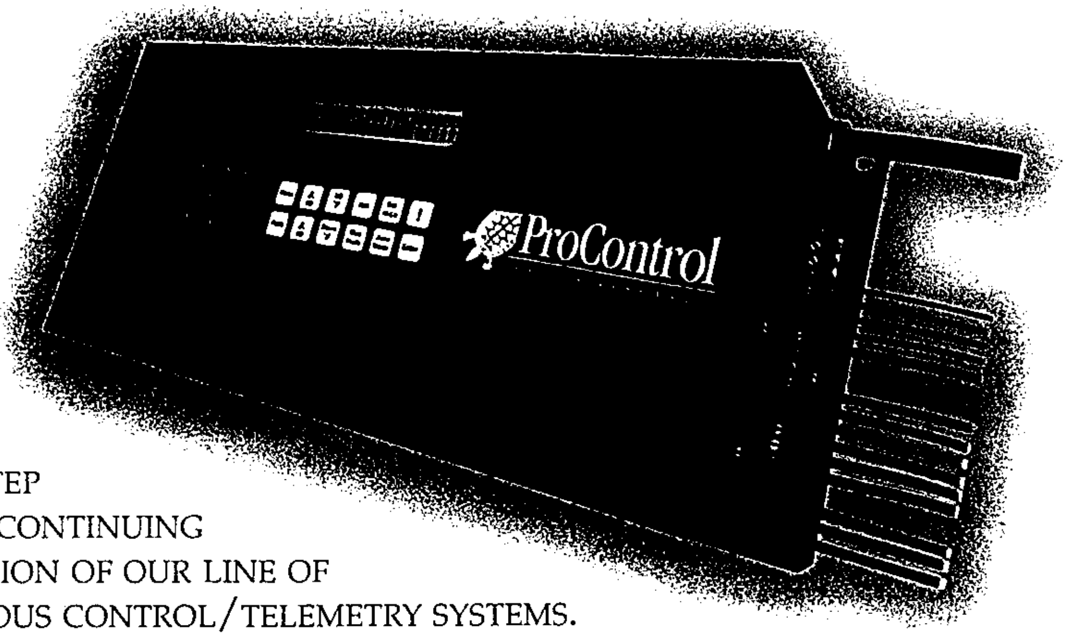


Narrow Angle Single Pole Double Throw Switch
The #2900-SPDT uses a three lead cord that offers both normally open and normally closed operations. The steel tube mercury switch is rated at 7 Amp.

APPENDIX I

CONTROL PANEL

EOS Research ProControl *series 2 plus*



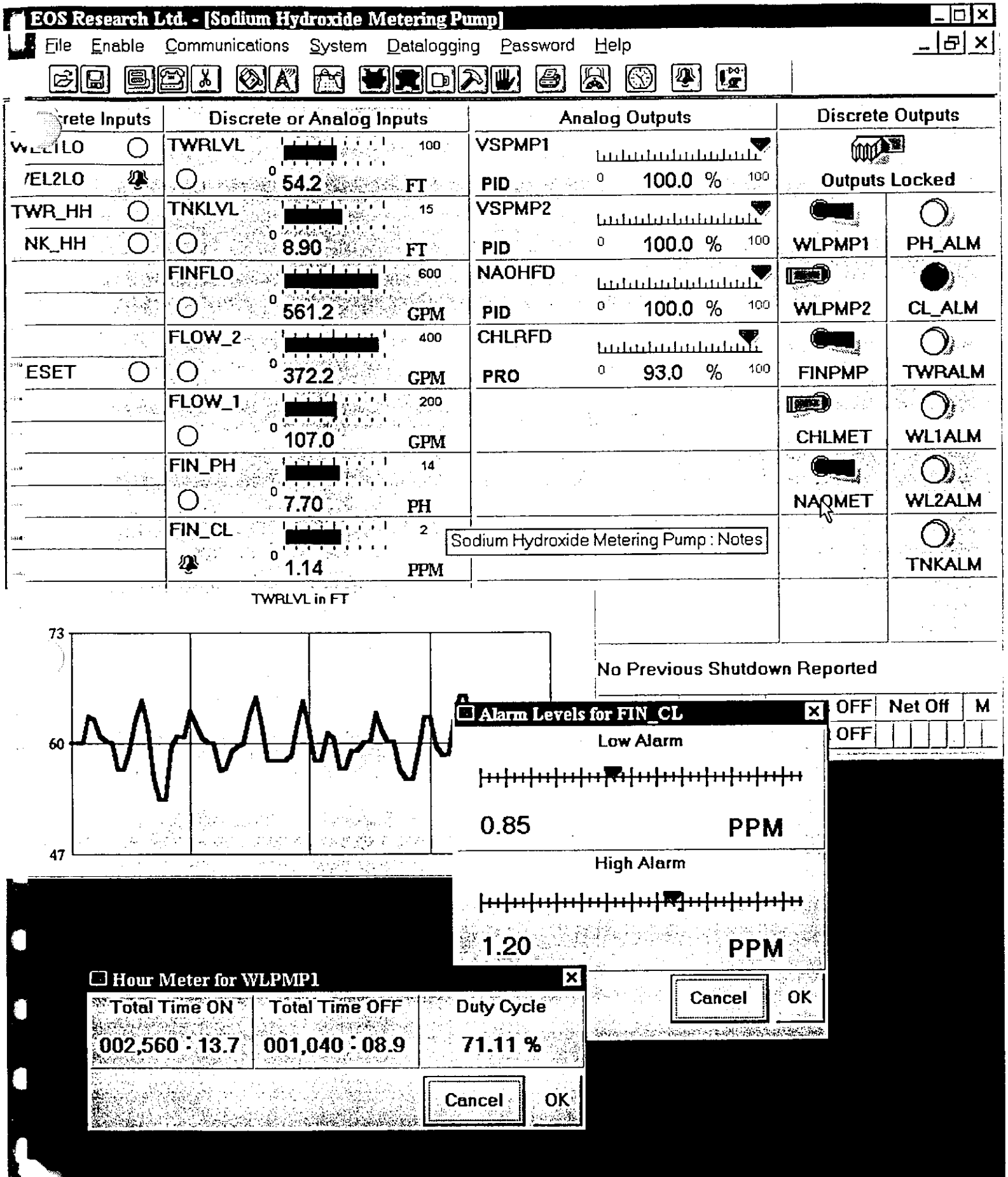
THE
NEXT STEP
IN THE CONTINUING
EVOLUTION OF OUR LINE OF
INGENIOUS CONTROL/TELEMETRY SYSTEMS.

- **Stand-Alone Control:** Powerful and straightforward, event-driven process control. Everything from simple on/off control to complex startup sequences and PID control loops. The ProControl comes ready for easy installation, pre-programmed by EOS Research or one of our technology partners.
- **Remote Control and Monitoring:** We provide a window into your operation from any remote location, with our easy-to-use ProView™ software and reliable, proven modem communications. You'll have the same level of control as if you were at the site.
- **Fax/Pager/Email Reporting:** The ProControl will keep you informed with scheduled fax or email status reports, and instant fax/pager alerts on alarm conditions.
- **Datalogging:** As your information manager, the ProControl will record all operating conditions in its extensive battery-backed memory, while keeping track of flow totals, duty cycles, etc. With remote access to your logged data for download or review at any time, the ProControl is an invaluable tool for reporting, troubleshooting, and trend-graphing.
- **I/O:** Interfaces with almost any device or sensor using an array of discrete and analog inputs and outputs, including built-in optically isolated inputs, frequency inputs, and relay outputs. Complete control panels can be built with a [illegible].
- **Other Features:** Include a built-in power supply for 24V, 15V and 5V, status LEDs, pluggable connectors for all I/O, on-board display and keypad, password protection, Flash ROM program memory, and a host of other features unique to the ProControl.

EOS Research has developed a new brain for your system. The ProControl *series 2 plus* is the cost-effective, user friendly answer for managing remote operations efficiently, whether your system is on the other side of the world, or just the other side of the building. It's been designed from the ground up as an integrated solution, with advanced stand-alone control, remote monitoring, alarm reporting and data-logging capabilities in one compact unit.

E O S

310 West Road, Portsmouth, NH 03801 PH (603) 431-2371 FX (603) 431-2562



PROVIEW ™, the user-friendly, Windows-based remote user interface

DESIGNING YOUR SYSTEM WITH THE EOS RESEARCH PROCONTROL *series2plus*

The purpose of this application note is to demonstrate the functionality of the EOS Research ProControl *series2plus* controller/remote monitoring system, and the ease with which you can incorporate it into your project design.

What Does it Do?

The ProControl *series2plus* is an innovative cost and labor-saving device that performs multiple tasks for your stand-alone operation.

- **Stand-alone Control:** The ProControl is a sophisticated programmable logic controller that will efficiently supervise and control your operation. One ProControl can interface with up to 78 electrical devices (float switches, pressure transducers, pH transmitters, flow meters, pumps, blowers, etc.), and execute numerous control functions simultaneously. Automatic shutdown routines can be programmed in to protect your operation during alarm conditions. It is extremely versatile in terms of the control algorithms it can execute.

- **Remote Control and Monitoring:** The ProControl gives you a window into your operation from any remote location, using PROVIEW™, the easy-to-use Windows™-based software supplied with the system. You communicate with the ProControl over a modem link, which allows you to view all of your system's operating conditions, while also providing the same access to control functions that you would have were you at the site (e.g., turning pumps on and off, adjusting alarm setpoints, etc.). No other telemonitoring device gives you the ProControl's level of remote control capability.

- **Fax and Pager Reporting:** The ProControl will *keep you informed.* It will send you periodic fax status reports of your project operations on a schedule specified by you, and will alert you immediately by fax or pager if an alarm condition warrants attention. No longer do you have to assume what's happening at your remote operation.....the ProControl will tell you exactly.

- **Datalogging:** The ProControl is your information manager. It is a powerful datalogger with new expanded capacity that automatically records all operating conditions in its battery-backed memory. You can access your logged data remotely at any time, and download it to your office computer for further processing. The datalogging capability is an invaluable tool for reporting purposes, troubleshooting, and trend graphing.

What Do You Get?

The ProControl *series2plus* is configured in a high-quality extruded aluminum case which houses the ProControl's processor, all input/output circuitry, fax modem, power supply, and relays. The *series2plus* has a keypad and LCD display for accessing control functions. An external transformer supplies power for the ProControl unit, while the ProControl itself provides 24 volts, 15V, and 9V for analog sensors and 5-volt DC power for digital switches or sensors. All electrical connections to the *series2plus* are made via pluggable connectors. The ProControl can be mounted on the wall for retrofit to an existing operation. Or, a complete control panel for a new system would include the ProControl *series2plus* in a NEMA 4 enclosure along with motor starters for your equipment – no other hardware is necessary. EOS Research's PROVIEW™ operating software, ***customized to your operating specs,*** is standard with the unit. The ProControl comes ready to wire to. Once you supply power, it is ready to run with ***no further programming necessary.*** You also get a plain-English User's Manual which runs you through its easy-to-use functions, and which shows you how to connect with your operation from your office computer.

EOS RESEARCH PROCONTROL *series2plus*

What You Don't Get

Every treatment plant, monitoring station, remediation system, or other stand-alone operation is unique, so there are some things that we cannot build into a standard hardware configuration. The following items are ***not*** provided with the base ProControl *series2plus* configuration, although we can integrate them for you:

- Sensors, switches, etc. that serve as inputs to the ProControl
- Motor starters, VFD's, and contactors specific to controlled pieces of equipment
- Pumps, blowers, valves, etc. (equipment that the *series2plus* controls)
- Office computer for remote access (486 PC or higher with min. 9600-baud modem)

ProControl Implementation

By including the ProControl into your initial system design, you can greatly simplify the process of getting from idea to execution. The ProControl *series2plus* is versatile enough to act as the "brains" for operations as simple as a pump lift station to those as sophisticated as a multi-process treatment plant. The key to this versatility is its ***programmable control***, which replaces inflexible hardware-based logic (relays, timers, interlocks) with infinitely flexible software control (don't worry, we program the software for you). You don't need to design a complicated control panel, struggle with ladder-logic diagrams, or get stuck with a control system that won't allow changes in control strategy. Of course, the ProControl can also be easily retrofitted to an existing operation.

Here's how to implement the EOS ProControl *series2plus* with your project:

1. Review our system specifications and talk to us or one of our technology partners to determine which ProControl configuration is best for your operation.
2. Provide us with basic information about your operation. We'll need to know what devices (inputs) you want to monitor (e.g., flow meters, conductivity sensors, pressure switches, etc.), what outputs (e.g., pumps, blowers, etc.) you want to control, and what control routines you want to employ. You can describe your control routines in words, flow charts, or with a functional specification. A system schematic always helps. Experienced EOS Research Applications Engineers are always available to help you with your control ideas.
3. EOS Research or one of our technology partners will configure and custom-program your *series2plus* unit.
4. After the *series2plus* is shipped to you, mount the ProControl unit or control panel on a wall, supply 110/120-volt power, and hook up your sensor wires and wiring to your controlled equipment.
5. The ProControl is ready to run.

Additional services EOS can provide include system installation, customized programming of a full graphical user interface, and engineering assistance with sensors and systems integration. Call us. You'll speak with experienced engineers who know your applications. We provide you with a complete, working system, and back it up with EOS' many years of applications expertise and dedication to customer satisfaction.

E O S
r e s e a r c h

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EOS Research ProControl and ProView™ Software vs. Conventional PLC and HMI Software Packages

General

The EOS Research ProControl Series 2^{plus} represents an alternate PLC configuration that is an effective and powerful package for control, datalogging, alarm fax/pager reporting and integrated remote monitoring of any stand-alone operation. As the heart of a control panel, the ProControl Series 2^{plus} PLC is a stand-alone device that incorporates full PLC functionality, on-board datalogging memory, modem communications, and integrated remote monitoring capability. The human-machine interface (HMI) software for the system is EOS Research's ProView™, which can be used locally with a laptop computer or remotely with any modem-equipped personal computer as a graphical user interface to access all of the controller's functions. The ProControl does not require a dedicated personal computer with HMI for any control functionality or to perform datalogging. Rather, communications with the controller is conducted on an on-demand basis as the operator's needs arise. The ProControl has been designed from the ground up as a stand-alone device for environmental control applications that do not require a full-time operator. This control panel configuration is a functionally equivalent but more cost-effective, powerful and easy-to-use alternative to the more conventional PLC/HMI architecture.

PLC

The ProControl is fully programmable for any PLC capability. It also integrates battery-backed datalog memory, full remote monitoring/control, and fax/pager reporting with no additional hardware, software, or personal computers required. The ProControl contains power supplies for instrumentation, all I/O circuitry, internal modem, LCD display and keypad, and relay outputs within its compact, extruded aluminum enclosure. The ProControl is easily adapted for additional I/O and control algorithms through software reconfiguration, which can be accomplished remotely without a site visit.

HMI

ProView™ is the HMI software package provided free of charge with the ProControl system. There are no site or development license fees, and ProView™ can be installed on up to three personal computers without additional cost to the end user. ProView™ provides a straightforward, easy-to-use standard graphical interface that can be employed both on-site by direct connection with a laptop computer, and off-site by any personal computer equipped with a modem. ProView™ seamlessly integrates remote monitoring

capability in the HMI, thereby providing a much more reliable remote operator interface. Users have easy access to alarm levels, operating setpoints, fax/pager report numbers, datalogging setup, etc. ProView™ is designed to be used *on demand* to easily access all functions of the ProControl, most of which can otherwise be accessed from the LCD display and keypad on the unit itself.

Datalogging

Datalogging is accomplished in the ProControl itself, not in a personal computer connected to it. Datalogging memory can be configured for up to 10,000 points per analog input channel, up to 30,000 discrete input state changes, and 10,000 events (logic steps). ProView™ can be used either locally or remotely to extract, view and graph logged data, making off-site analysis of the information simple. Data can be exported to any popular spreadsheet or database program for further analysis.

In summary, the ease of use, programming power, seamlessly integrated remote communications and telemetry capabilities of the ProControl system provide a much more cost-effective and powerful system than the conventional PLC/HMI control system architecture.

CONTROL/TELEMONITORING SYSTEM

PART 1 GENERAL

1.01 Scope of Work

A. Work includes installation of control/telemonitoring system (CTS) capable of stand-alone control, remote monitoring, fax and pager reporting, and datalogging. Provide services including mounting of panel, wiring to input/output (I/O) devices, system set-up and testing. Contractor shall furnish a complete, functional CTS that meets all requirements of these specifications. Contractor shall ensure the compatibility of sensors, transducers, switches, motor starters, etc. with the CTS. Furnish and provide fully configured on-site firmware and remote monitoring software for the CTS, including documentation specified herein.

1.02 Submittals

A. Submit __ copies of manufacturer's data indicating the following:

1) General CTS panel layout

2) Electrical ratings of components (volts, amps, horsepower as applicable)

3) High voltage and low voltage wiring and connection diagrams

4) System software configuration printout

5) Complete hardware and software manuals

1.03 Warranty

A. The CTS shall be warranted against defects in material and workmanship for a period of one year.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The CTS shall be the ProControl Series 2^{plus} as manufactured by EOS Research Ltd., with fully configured firmware and ProView software.

2.02 Equipment/Materials

A. The CTS shall consist of the following components:

1. ProControl CPU unit with integral modem, 24V/15V/9V power supplies, output relays, program and log memory, 2-line LCD display and tactile keypad, configured for (__ digital inputs, __ digital outputs, __ analog inputs, __ analog outputs)

3. Appropriate motor starting provisions for driven outputs

4. NEMA 4 enclosure

5. Custom serial cable for direct connection to CPU

B. The CTS firmware shall be capable of the following:

1. Up to 64 simultaneous control algorithms specified by Boolean logic

2. Remote reporting via fax which indicates site origin, CTS system time, status of all inputs and outputs, present control state and last system shutdown. System must fax to two different fax locations, allow faxing on a predetermined schedule (i.e., daily, hourly), and in response to system alarms

3. Remote alarm reporting to numeric and alphanumeric pagers. CTS shall allow different messages for each alarm condition, and up to an 80-character message for alphanumeric pagers

4. 12-bit analog resolution

5. Datalogging of all inputs, outputs, and system processes. Each logged data point shall indicate date, time to nearest second, and I/O state. Datalogging capacity shall be at least 2,000 data points per analog channel, at least 2,000 data points total for digital channels, and at least 2,000 data points total for process events

6. Programmed startup and shutdown routines

7. Flow totalization, hour meters, remote memo display, proportional and proportional-integral-derivative (PID) control capability, password protection

C. The CTS remote monitoring software shall include the following:

1. A full graphical user interface designed for operation under Microsoft Windows™ 3.1, Windows 95™, and Windows 98™, capable of complete remote control and monitoring

2. Intuitive monitoring screen which displays all I/O status, communicating via modem to provide real-time system data

3. Digital inputs shall be configured as red or green "LEDs" or alarm bells. Digital outputs shall be configured as toggle switches or alarm buttons. Analog inputs shall be displayed as bar graphs. Analog outputs shall be displayed as slider switches

4. Logged data retrieval, specifying start and finish time, type of data, and graph display

5. Real-time trend graphing of specified inputs

6. Two-level password protection for 1) full remote control and 2) "view-only" ability

7. Ability to send memos to LCD display of remote ProControl unit

PART 3 EXECUTION

3.01 Installation

A. Verify, at the factory, wiring continuity and CTS operation by simulated inputs and outputs. Verify all control routines, fax reporting, and software interface.

B. Install CTS according to factory specifications. Prior to power -up, verify voltage of circuits leading to system inputs and outputs.

C. *(Optional)* Provide services of factory trained and experienced field personnel to complete I/O connections and field-test CTS. Verify that system is fully operational and performing intended functions within specified tolerances.

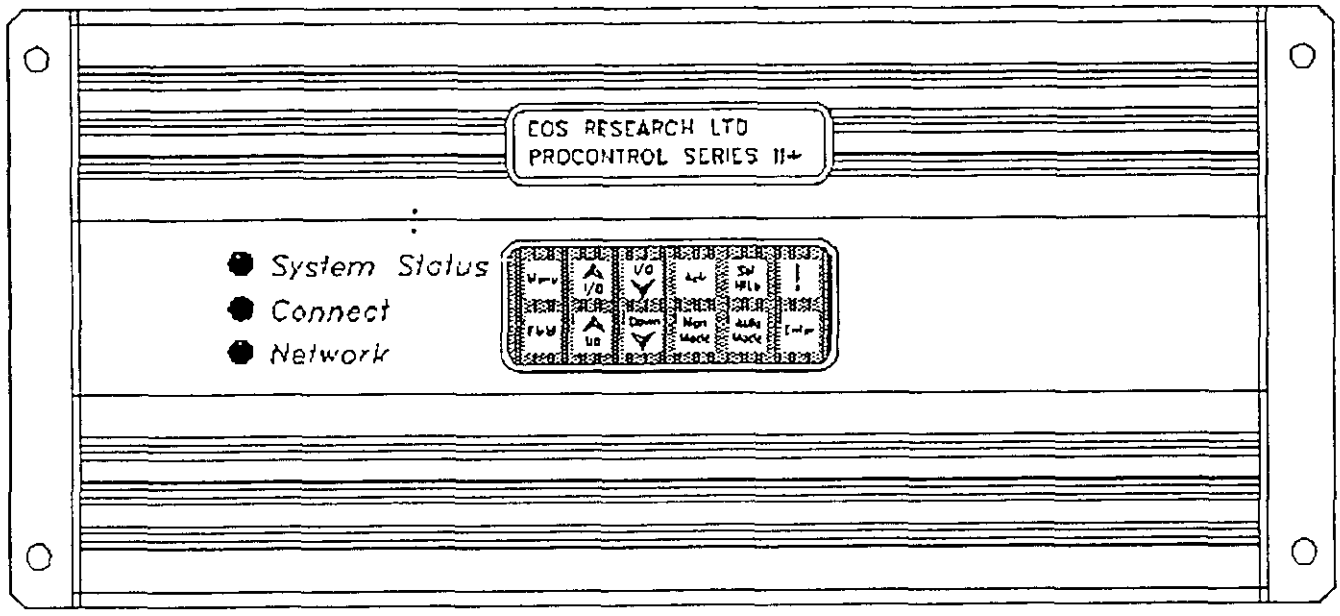
3.02 *(Optional)* Start-up Assistance

A. Provide services of factory trained and experienced field personnel to assist during start-up of system. Services shall include monitoring of control routines, adjustments to control program (if necessary), troubleshooting of sensor circuits, optimizing process control constants, and stress testing of inputs and control routines.

PROCONTROL SERIES 2*plus*

Type B

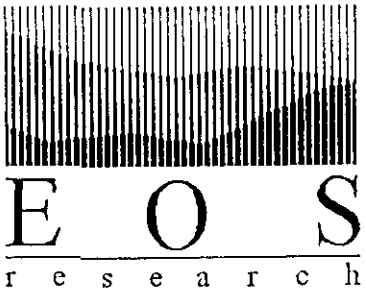
Product Specification



The next generation Type B ProControl features a capacity of up to 50 industrially-hardened inputs and outputs in a small and easy-to-use package. The **Series 2*plus*** contains everything you need for the core of your control/telemetry system, including the ability to connect directly to 120V inputs, and to drive motor starters, solenoids and other devices directly from built-in relay outputs. The **Series 2*plus*** includes expanded datalogging and reporting capability, a built-in power supply for your instruments and transducers, as well as pluggable connectors for all I/O.

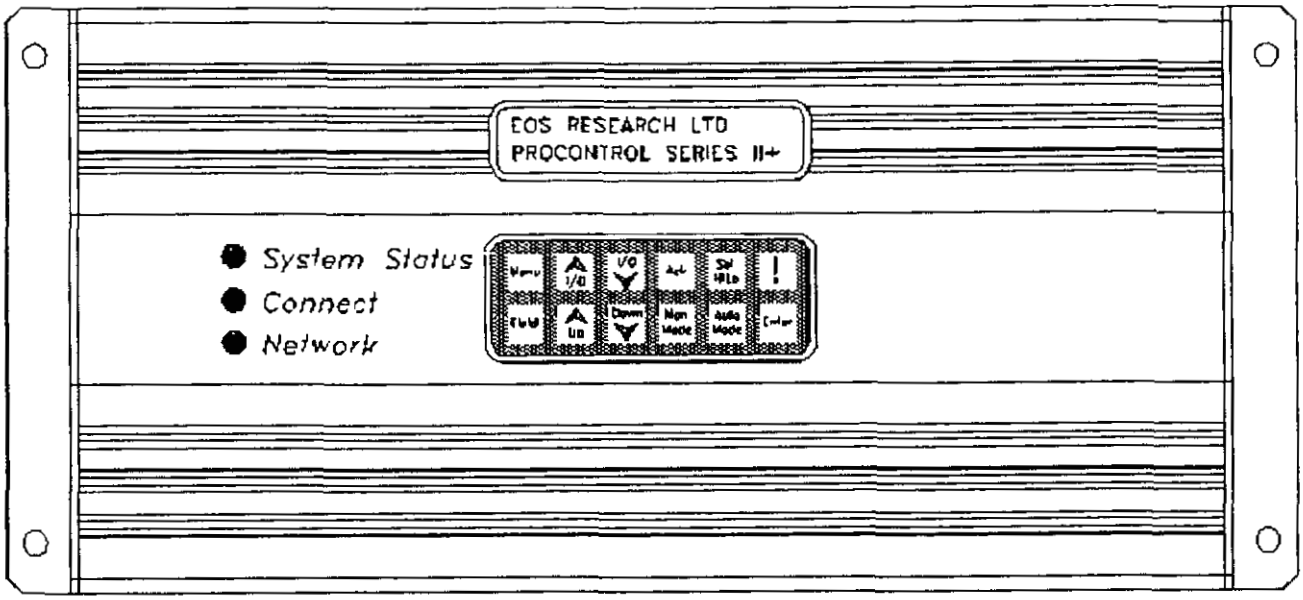
	Model BØ	Model B1	Model B2
Inputs			
Discrete	Twelve (12) protected discrete inputs. Support for 4 flowmeters or pulse accumulators with rates to 200Hz.	Twelve (12) protected discrete inputs. Support for 4 flowmeters or pulse accumulators with rates to 200Hz.	Sixteen (16) protected discrete inputs. Eight (8) optically isolated inputs. Support for 6 flowmeters or pulse accumulators with rates to 200Hz.
Analog	Four (4) 4-20ma inputs with built-in 24Vdc supply. Inputs are surge and short-circuit protected and may also be used as discrete inputs	Eight (8) 4-20ma inputs with built-in 24Vdc supply. Inputs are surge and short-circuit protected and may also be used as discrete inputs	Ten (10) 4-20ma inputs with built-in 24Vdc supply. Inputs are surge and short-circuit protected and may also be used as discrete inputs
Outputs			
Discrete	Eight (8) relay outputs rated at 1/2A, 120VAC	Fourteen (14) relay outputs rated at 1/2A, 120VAC	Fourteen (14) relay outputs rated at 1/2A, 120VAC
Analog			Two (2) 4-20ma outputs. PID loop control.

	Model BØ	Model B1	Model B2
Datalogging			
Discrete	2,000 points. All logging occurs on change of state.	2,000 points standard. 30,000 points optional. All logging occurs on change of state.	2,000 points standard. 30,000 points optional. All logging occurs on change of state.
Analog	8,000 points (2000 per channel).	16,000 points standard (2000 per channel). 80,000 points optional.	20,000 points standard (2000 per channel). 100,000 points optional.
Event	2,000 points.	2,000 points standard. 10,000 points optional.	2,000 points standard. 10,000 points optional.
Communications			
Modem	*ProView Software, PC to ProControl Interface - 9600 baud.*		
FAX	Alarm and Status Reports. Group 3, Class 2 FAX reporting at 9600 baud		
Pager	TAP standard numeric and alpha-numeric paging at 300 to 2400 baud.		
Local	Direct RS-232 Serial interface with automatic local/remote switching.		
e-mail	Coming Soon!		
Network	Optional - Types B1 and B2 can be linked via RS-485 for distributed control or higher I/O counts		
User Interface			
LCD	2 x 20 character display (BØ has no display)		
Keypad	2 x 6 membrane keypad (BØ has no keypad)		
LEDs	LEDs: System Status, Communications Link, Networking		
Process Control			
System	Up to 32 regular system processes total (24 on Type BØ) with 8 startup and 8 shutdown processes. Processes run every 0.35 seconds.		
Alarms	Generate shutdowns, two FAX reports and/or two Pager messages.		
Loops	PID loop control with user control of setpoint, proportional, integral and differential gains and max change per calculation. Also open loop proportional algorithm.		
Power			
System	20VAC, 30VA, external transformer provided		
I/O Supply	24 VDC, 15V and 9V available for powering sensors/instruments.		
Environmental			
Dimensions	13.5" long x 6" wide x 3.5" high.		
Weight	6 lbs.		
Power Dissipation	25W		
Operating Temp.	-20C to +50C		
Humidity	95% R.H. non-condensing		



PROCONTROL

SERIES 2*plus* USER MANUAL



Version 2.X

LIMITED WARRANTY

EOS Research Ltd. (EOS) warrants its products to be free from defects in materials and workmanship for a period of one year from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its sole option, any such defective products. This warranty includes parts and labor. This warranty does not apply to equipment which has been damaged by accident, negligence or misapplication or has been altered or modified in any way.

EXCEPT AS PROVIDED HEREIN, EOS RESEARCH LTD. MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MECHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties, therefore the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

IMPORTANT SAFETY PRECAUTIONS

Any complex hardware or software may be difficult to document, explain or understand. It is important to consider the consequences or unexpected or abnormal behavior which may be caused by a defect or human failure to comprehend. In order to protect people and property from damage, a thorough safety analysis should always be performed. When the consequences of a failure are serious, it is essential to protect life and property against such a failure with redundant backup systems or safety devices. It is agreed between the purchaser and EOS Research Ltd. that protection against and the consequences of any such failure are entirely the purchaser's responsibility.

This device is not approved for use in life support or medical systems.

As installed, this product may be part of a system which is required to meet various electrical, fire, safety or other codes and regulations. Compliance with these code is the purchaser's responsibility.

Specifications subject to change without notice.

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Portsmouth, NH 03801
603.431.2371
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TABLE OF CONTENTS

Please see the ProView manual for operation of the remote access software which is supplied with the ProControl Series 2^{plus}.

1.0 System Overview

1.1 General

The *ProControl Series* 2^{plus} is a small but powerful microprocessor based control/ telemonitoring system. By combining a control panel and remote monitor in one unit, the Series 2^{plus} can act as a central supervisory and data management tool for any stand-alone operation. The *ProControl Series* 2^{plus} can perform multiple tasks:

- **Stand-Alone Control:** The *ProControl Series* 2^{plus} is a sophisticated programmable logic controller that will efficiently supervise and control your operation. It can interface with up to 70 electrical devices (float switches, pressure transducers, pH transmitters, flow meters, pumps, blowers, etc.), and execute numerous control functions simultaneously. Automatic shutdown routines can be programmed in to protect you operation during alarm conditions. It is extremely versatile in terms of the control algorithms it can execute.

- **Remote Control and Monitoring:** The *ProControl Series* 2^{plus} gives you a window into your operation from any remote location, using the easy-to-use Windows-based software supplied with the system. You communicate with the ProControl over a modem link, which allows you to view all of your system's operating conditions, while also providing the same access to control functions that you would have if you were at the site (e.g., turning pumps on and off, adjusting alarm setpoints, etc.). No other telemonitoring device gives you the ProControl's level of remote control capability.

- **Reporting:** The *ProControl Series* 2^{plus} will keep you informed. It will send you periodic fax status reports of your project operations on a schedule specified by you, and will alert you immediately either by fax or by numeric or alpha-numeric pager if an alarm condition warrants attention. No longer do you have to assume what's happening at your remote operation.....the ProControl will tell you exactly.

- **Datalogging:** The *ProControl Series* 2^{plus} is your information manager. It is a powerful datalogger that automatically records all operating conditions in its battery-backed memory. You can access your logged data remotely at any time, and download it to your office computer for further processing. The datalogging capability is an invaluable tool for reporting purposes, troubleshooting, and trend graphing.

One or more of these features can be used in your installation; they are standard in every ProControl unit.

1.2 Key Concepts

The following are the building blocks of any Series 2^{plus} monitoring and control system.

Inputs and Outputs (I/O's)

No system can be effective in the real world without communication and one of the principal ways the ProControl communicates is by responding to information collected by sensors and by issuing "commands" to other electronic or electrical devices. Sensor information constitutes an *Input* while a "command" to another device constitutes an *Output*. The Series 2^{plus} works with all of the more important types of I/O devices in general use. Appendix A demonstrates how a variety of I/O devices are connected to the ProControl.

Digital Inputs

These inputs are designed to detect the closure of switch contacts such as those found on float switches or overpressure sensors. They can respond to any normally open or normally closed dry contact. The Series 2^{plus} provides its own wetting (supply) voltage of 5 volts DC for each digital input circuit. The Series 2^{plus} can respond to changes in state as fast as 4 Hz or 3 Hz (cycles per second) depending on the model purchased. Digital inputs are "debounced" for 125 or 150 milliseconds, respectively. This means that a switch or other input that changes state (becomes open or closed) must stay in that state for 125 or 150 milliseconds before the Series 2^{plus} will respond to the change.

Eight high-speed digital inputs can also be used for traditional digital (pulse-output) flow meters. These inputs can detect signal changes at up to a 200/500 Hz rate. All high-speed digital inputs are "debounced" for 1250/500 microseconds. The faster rate applies only to those systems containing the 18.432 MHz processor.

Analog Inputs

These inputs are compatible with sensors which send out a 4 - 20 milliamp (mA) signal. Most analog sensors are available with this type of signal, examples being pressure transducers, pH transmitters, and many flow meters. These inputs allow the operator to read the actual "value" of a parameter, such as pressure, instead of an on/off signal.

Digital Outputs

Digital outputs turn things like pumps, solenoid valves, and alarm lights on and off. The Series 2^{plus} digital outputs are relay outputs designed to switch small loads directly, such as motor starters, lamps, and solenoid valves.

Analog Outputs

Analog outputs are typically used in process control schemes where a controlled piece of equipment can accept a signal which is variable over a range. This output is expressed as a percentage (0 - 100%) and is used to control pump speeds, chemical dosing rates, etc., instead of conventional on/off operation. The equipment that the ProControl sends the analog output to must accept a 4 - 20 mA signal. Often, an analog output is used in conjunction with an analog input such as a pH transmitter to form a control scheme known as *feedback control.* In essence, the input and output will work together to maintain a user set input level. This concept is described further in the next section under *Analog Output Processes.*

Tagnames

Each input and output is given a descriptive *Tagname* by the user that uniquely identifies it to the system operator. For instance, a digital input could be called "TANKHI", an analog input could be called "AIRFLO" and a digital output could be called "PUMP_1". This tagname is used by the local LCD display, the FAX report and by the ProView software. The analog inputs are also given a *Units Tagname* which identifies the unit of measure associated with the input sensor. Each tagname can be up to six characters long and each units tagname can be up to three characters long ("PSI", for instance). The tagnames can include the uppercase letters A-Z, the numbers 0-9, a blank space, and the underscore (_) character.

1.3 Control Basics

The status of all inputs or outputs can easily be monitored both locally and remotely. What gives the Series 2^{plus} its real power, however, is the ability to automatically initiate actions based on the status of the inputs and your pre-programmed instructions (this is often called *Process Control*). These actions can include switching certain outputs, faxing back a report, sending an alphanumeric or numeric page, shutting down the entire system or sounding the local alarm. Process control functions are programmed into your ProControl by EOS Research or one of our technology partners according to your specifications.

Active State

Central to the use of control on the Series **2**^{plus} is the concept of *Active State*. Each input on the ProControl receives certain signals from a sensor which constitute "normal" operation and other signals which constitute an exception to normal operation.

A digital input can monitor only two states, ON or OFF (alternatively, CLOSED or OPEN). The *Active State* would be the state in which the controller would respond to the digital input, and perform certain actions or generate an alarm. For example, if a high level float switch in a tank is tripped (turned ON) by rising fluid level, we can say that its *Active State* correlates to a situation in which the fluid level is high. The active state of the float switch could cause the Series **2**^{plus} to trigger an alarm, turn off a pump, or initiate some other action. The Series **2**^{plus} can be set up so that either ON or OFF is the active state.

An analog input sensor can take on many states (or values) between the minimum and maximum of its measurement range. The ProControl operator, however, can set two threshold values which divide the total input span into two functional regions. These threshold values are more commonly called the *Low Alarm Limit* and the *High Alarm Limit*, although on the Series **2**^{plus} these thresholds are somewhat more flexible in use than those names imply. An analog input which has transcended either its Low Alarm Limit or High Alarm Limit is said to be in its active state.

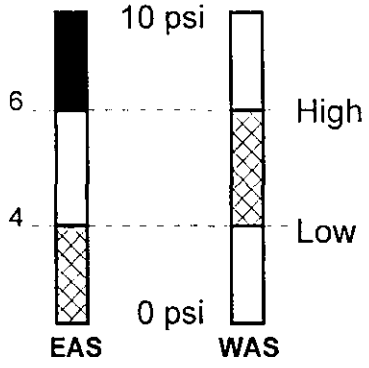


Figure 1. Active State

For instance, consider an analog input sensor which measures pressure from 0 to 10 PSI. The system operator could set the low limit to 4 PSI and the high limit to 6 PSI. In this case the *Active State* would usually be considered as the input state greater than 6 PSI or less than 4 PSI. This interpretation is called *Endpoint Active State* (EAS) on the Series **2**^{plus} because the endpoints of the range are the areas which need to trigger action or generate alarms. The opposite interpretation is also possible and is called *Window Active State* (WAS). Any input values between 4 PSI and 6 PSI would trigger action or generate alarms.

If the ProControl has *Alarms Set*, when any input enters its active state, a local beeper will sound on the ProControl. The word *Alarm* here applies only to the sounding of a local beeper and is not associated with any process control. The active state condition is indicated on the LCD display and can be acknowledged by the operator. The beeper is silenced when it has been acknowledged or after 30 seconds have elapsed. The beeper only operates when the system is operating in Manual mode.

Startup Sequence

The *Startup Sequence* is a series of control algorithms or steps which run in succession and which are designed to place the system in its normal operating mode. It can be as simple as turning all the outputs on simultaneously, or as complex as a multi-stage delay with many conditions. Up to 8 or 16 individual startup steps can be declared depending on the model of the controller. The ProControl can be configured to automatically run this sequence when the unit is powered up.

Process Tasks

A *Process Task* is an ongoing control algorithm which runs continuously. Think of each process task as an IF-THEN statement, in which an action is initiated if a certain condition or combination of conditions exists. Some examples are:

- IF Tank Level Sensor 2 is on, THEN turn Pump 2 off
- IF Air Flow Rate < 10 cfm AND Reactor Temperature > 250^{O}, THEN open Bleed Valve 2

Up to 16 or 64 separate process tasks can be run simultaneously depending on the model of the controller. Process tasks can trigger FAX reports, pager alerts, and system shutdowns.

Shutdown Sequence

The *Shutdown Sequence* is a series of control steps which run in succession and which are designed to shut your system down in a manner which is best for the equipment or treatment processes involved. The shutdown sequence can be activated manually or automatically due to an alarm condition. Here is a typical shutdown sequence:

- Turn off Well Pumps 1 and 2
- Wait 5 minutes, then turn off Stripper Blower
- Open Bleed Valve 2
- When Oxidizer Temperature < 150^{O}, turn off SVE Blower

Automatic Operation

The use of the startup sequence, process tasks, and the shutdown sequence constitutes *Automatic Operation* of your system with the ProControl Series **2^{plus}** (otherwise known as *Auto Mode*). The Series **2^{plus}** will be placed into auto mode (automatically) when your system has been started up using the programmed startup sequence. If one condition of the programmed startup sequence is not met during the startup process, your system will be completely shut down by the ProControl as a safety measure. Once the startup sequence has been successfully completed, the ProControl begins running the process tasks continuously. **PROCESS TASKS WILL RUN ONLY WHEN IN AUTO MODE.** Please note that the audible beeper will not sound even if the ProControl has *Alarms Set* when it is in Auto Mode, since the process tasks will control these situations as the user has specified.

Manual Operation

You can override the Series 2^{plus} programmed control functions by operating in *Manual Mode*. In manual mode, your process will respond only to operator input from the keypad of the ProControl, or to commands issued from the ProView software. **PLEASE NOTE THAT PROCESS TASKS AND THEIR ERROR-CHECKING MECHANISMS DO NOT RUN DURING MANUAL MODE!** Manual mode is useful when you wish to troubleshoot your system, but none of the system safeguards built into auto mode are available. You can place your operation into auto mode any time by issuing the command from the keypad.

Analog Output Processes

In some cases, you may want to use an analog output to control equipment that maintains an analog input at a certain constant level. For example, you may wish to automatically maintain a pH of 8.5 in a reaction tank by varying the dosing rate of a chemical feed pump. The pH you wish to maintain (8.5) is called the *SetPoint* of the analog output process. An analog input to the ProControl (in this case, a pH transmitter) is said to provide *feedback* to the unit, and combined with an analog output, constitute *feedback control.*

PID Loops

A reliable type of feedback control can be obtained through a *PID Loop*. PID stands for *Proportional-Integral-Derivative*, and is a commonly-used process control technique. We'll skip the details of the mathematics involved, but suffice it to say that a PID loop is the favored control technique for most analog output processes. With only a *Proportional* term applied in the equation, the analog output is controlled based on an error signal generated from the difference between the SetPoint and the actual analog input. The PID loop can also improve its performance as it continues to run if an *Integral* term is used and can respond to quick changes in the controlling analog input if a *Derivative* term is used. EOS Research will configure your PID loops for you and can provide further information if necessary.

Proportional Outputs

In some cases, it may be desirable to base an analog output signal on an analog input value. In this situation, no specific SetPoint is used because there is a direct relationship between the output and input values. For example, if you wanted to base the output of a metering pump on some flow rate, you might use a proportional output to relate the amount of chemical metered to the flow rate.

2.0 On-Site Operation

2.1 LCD Display

If your unit did not come with an LCD display, the following sections *do not* apply.

The 2 line x 20 character LCD display is used to display and control system operations. The display is divided into separate areas or fields, as outlined below.

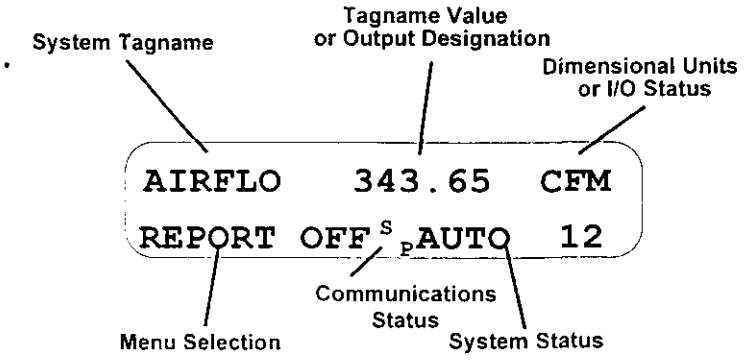


Figure 2. Display Fields

System Tagname This six-character field is used to identify the I/O point displayed. Descriptive names such as WELL1 or BLOWER are used.

Tagname Value For analog inputs, this field displays the value of the input, the high alarm limit, or the low alarm limit. For digital outputs, OUTPUT is displayed. For digital inputs, this field is unused. For analog outputs, this field displays the output percentage, the output level, or the associated input setpoint.

Dimensional Units or I/O Status For analog inputs, this three-character field displays the dimensional units associated with the input sensor, such as GPM or PSI. For digital inputs and outputs, this field displays either ON or OFF. For analog outputs, this field abbreviates percent with PCT. In the case of digital outputs, if the particular output displayed has been designated a lamp output (*see ProView manual*), and a lamp test is currently running, an asterisk (*) will appear before ON or OFF to indicate the lamp is illuminated despite the indicated output status (the output will return to this indicated status once the lamp test has been completed).

Menu Selection This field displays the current menu selection.

Communications Status This field displays one of five different descriptors which indicate any of several special functions of the ProControl. If no communications action is being taken, ">" will appear. Communications messages include: **SP** (Sending Page) - indicates that the unit is attempting to send either an alphanumeric or numeric page; **EF** (Encoding Fax) - indicates that the unit is presently encoding a facsimile report as a result of a request by either the operator or the unit itself; **SF** (Sending Fax) - indicates that the unit is attempting to send a fax report; and **DC** (Data Communications) - indicates that the unit is presently interfaced with ProView.

System Status This area displays the current system status: AUTO, MANUAL, START, or SHUTD and an associated process task number indicating the last successfully completed Auto process, current Startup process, or current Shutdown process.

2.2 Keypad

The Series 2^{plus} keypad contains 12 buttons which are used along with the LCD Display to control the operations of the system.

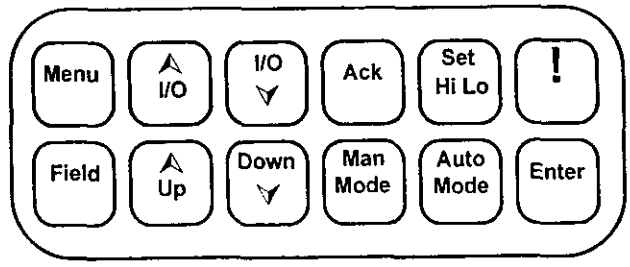
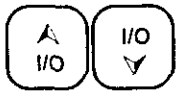


Figure 3. Series 2^{plus} Keypad

This key is used to scroll through a series of options which are displayed on the LCD screen, and which allow the user to configure various aspects of system behavior.



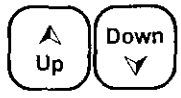
These keys are used to display information about particular I/O points on the LCD Screen. The keys allow the user to scroll through all of the system I/O points either forward or backward.

The Acknowledge key is used to silence the audible beeper or to acknowledge a memo sent from a remote ProView user.

The Set Hi Lo key allows the user to change the high and low alarm limits for analog inputs or to toggle the display in the I/O Summary.

The Emergency Shutdown key is used to turn off all outputs and return the system to manual mode. The programmed shutdown sequence is <u>not</u> executed using this key.

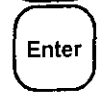
The Field key is used to select a character position to be edited. It is used in conjunction with any direct alphanumeric entry.



These keys are used to toggle system variables from one state to the next or to scroll through possible character entries when used in conjunction with the Field key.

This key is used to place the system in manual mode.

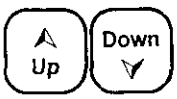
This key is used to place the system in auto mode.



The Enter key is used to initiate certain actions selected by other keys or to confirm alphanumeric editing done using other keys.

2.3 Password

When the system is first turned on the password screen is displayed and the user is prompted to enter the password to gain access to the system. "EOS" is the default password. The password on the Series 2^{plus} was designed as a *low-level* security feature. It is not sufficient in and of itself to withstand a determined effort at system entry. The ProControl unit can be configured to bypass the password screen when the unit is powered up.




```
CUSTOMER ID TAGNAME
ENTER PASSWORD: BAA
```

Use the Up and Down keys to change the character displayed above the cursor.


```
CUSTOMER ID TAGNAME
ENTER PASSWORD: BAA
```

The Field key is used to move the cursor to the next character to be edited.


```
CUSTOMER ID TAGNAME
ENTER PASSWORD: EOS
```

The enter key submits the password for approval.

If the password was entered correctly, the following screen will be displayed for about a second before the operations screen is displayed:

```
Password Accepted
VER 2.XXX    : 1
```

ROM Version # — User Setup Version #

Otherwise, the following message will be displayed for a second and the user will be returned to the password menu:

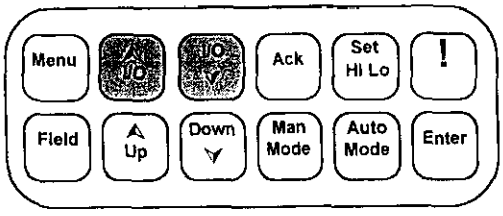
```
Incorrect Password
```

2.4 Operations Screen

After the password has been entered correctly, the operations screen is displayed. The operations screen allows the user to set system parameters and to review the status of all system inputs and outputs.

```
WELL1                OFF
ALARMS SET >MANUAL
```

2.5 I/O Keys



Pressing the I/O Up or I/O Down keys will scroll through the operational I/O points in the system. Data relevant to a particular I/O point will be displayed to right of the point's Tagname.

I/O Up

```
WELL2                    ON
ALARMS  SET >MANUAL
```

Forward scroll through I/O points

I/O Up

```
WELL3                    OFF
ALARMS  SET >MANUAL
```

Forward scroll through I/O points

I/O Down

```
WELL2                    ON
ALARMS  SET >MANUAL
```

Backward scroll through I/O points

2.6 Digital Input Menu

Input Tagname — Input Status

```
WELL2                    ON
ALARMS  SET >MANUAL
```

A digital input displayed in the operations screen will be displayed as shown. When the input is in its Active State "ON" will be displayed in the Input Status area. Otherwise, "OFF" will be displayed.

2.7 Digital Output Menu

Output Tagname — Lamp Status — Output Status

```
PUMP1      OUTPUT  *OFF
ALARMS  SET >MANUAL
```

A digital output displayed in the operations screen will appear as shown. When the output has been turned on, "ON" will be displayed in the Output Status area. Otherwise, "OFF" will be displayed. The cursor is displayed under the first character in the status field to indicate that it can be changed. The Lamp Status character (*) will be shown for a lamp output if a *lamp test* is running regardless of the output's true state.

Up / Down

```
PUMP1      OUTPUT  ON
ALARMS  SET >MANUAL
```

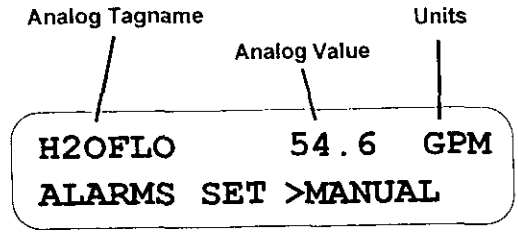
Pressing the Up or Down key will toggle the digital output state and turn the corresponding relay OFF or ON.

Field

```
PUMP1      OUTPUT  ON
ALARMS  SET >MANUAL
```

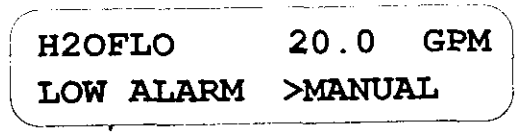
Pressing the Field key will move the cursor to the Menu selection field.

2.8 Analog Input Menu



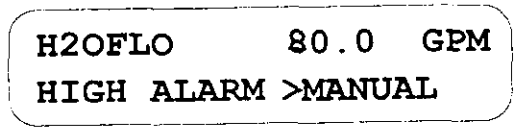
An analog input displayed in the operations screen will be displayed as shown to the left. The value of the analog input will be shown along with the dimensional units. In the case of a pulse accumulator (totalizer only), you will see only TOT where units is normally displayed.

Set Hi Lo



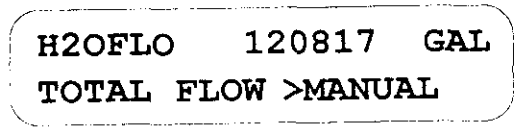
Use the Set Hi Lo key to set the low alarm limit.

Set Hi Lo



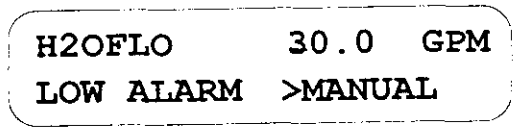
Press the Set Hi Lo key again to set the high alarm limit.

Set Hi Lo



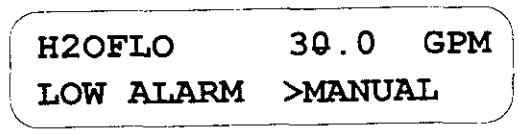
Press the Set Hi Lo key again to see the total flow on a flow type input, and once more to return.

Up Down



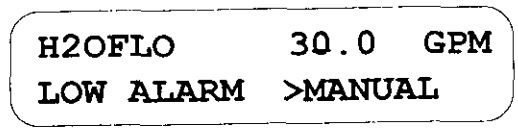
The Up and Down keys are used to change the value of the current character, as denoted by the cursor.

Field



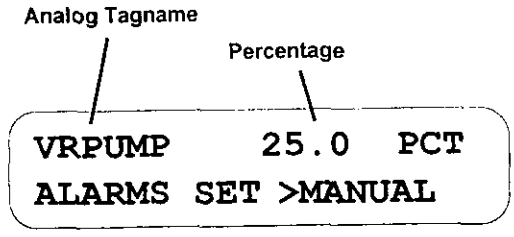
The Field key is used to move to the next character to be edited.

Enter



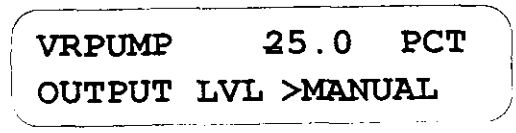
To save the low alarm limit changes, press the enter key.

2.9 Analog Output Menu



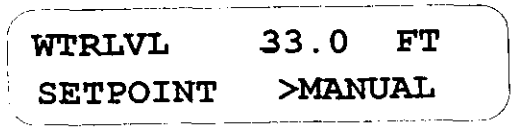
An analog output displayed in the operations screen will be displayed as shown to the left. The percentage of full scale output will be displayed as well.

Set Hi Lo



The Set Hi Lo key can be used to set the output percentage.

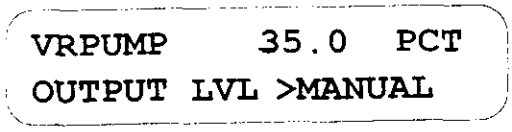
Set Hi Lo



Press the Set Hi Lo key again to declare the SetPoint of an associated analog input. The SetPoint is used only if a PID control loop is in use as an analog output process.

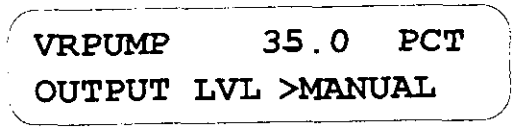
Pressing Set Hi Lo again returns to the original menu.

Up Down



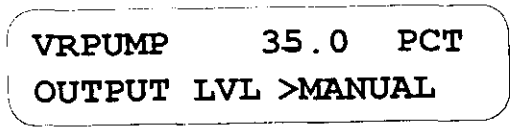
The Up and Down keys are used to change the value of the current character, as denoted by the cursor.

Field



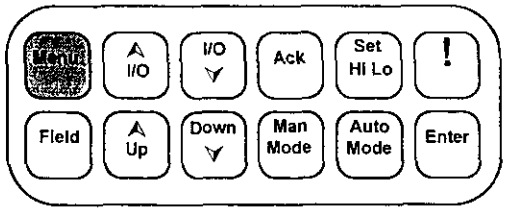
The Field key is used to move to the next character to be edited.

Enter



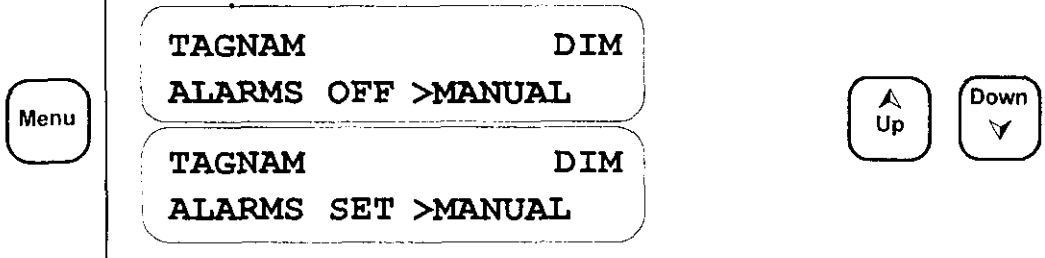
To save the output level changes, press the enter key.

2.10 Menu Key

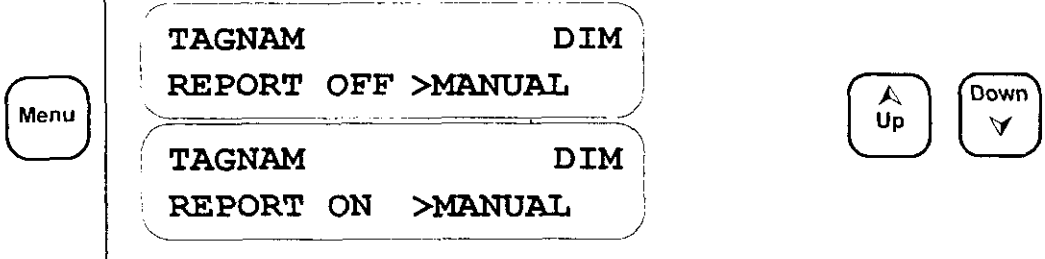


When pressed, the Menu key will scroll through a series of items which allow the user to configure various aspects of system behavior. A description of these items appear in a 10 character field at the bottom left of the display. Either the Up and Down keys or the Enter key is used to change the item.

ALARMS Use the Up and Down keys to enable or disable Alarms.



REPORT Use the Up and Down keys to enable or disable the unit's reporting capabilities (fax or page).



FAX NOW Use the Enter key to send a FAX report immediately.

STARTUP Use the Enter key to run the Startup Sequence.

SHUTDOWN Use the Enter key to run the Shutdown Sequence.

Menu

```
TAGNAM              DIM
SHUTDOWN    >MANUAL
```

Enter

LAST SHUTDOWN This display item shows what input or output caused the last shutdown.

Menu

```
TAGNAM              DIM
SDN TAGNAM >MANUAL
```

LOG OFF Use the Enter key to Log Off the system and return to the password menu.

Menu

```
TAGNAM              DIM
LOGOFF      >MANUAL
```

Enter

LAST MEMO Use the Enter key to see the last memo sent from the remote ProView user. Up and Down are used to scroll through the message, and Ack is used to return to the ProControl menus. If you hit any other key you will see an informative message telling you which keys are valid. The message will be displayed for 3 seconds if no keys are pressed, but can be acknowledged before the 3-second period by pressing either the Ack or Enter keys.

Menu

```
TAGNAM              DIM
LAST MEMO   >MANUAL
```

Enter

```
HEY BULLWINKLE,
REMEMBER TO SHUT THE
```

Down

```
LIGHTS OFF!
PUSH <ACK> TO RETURN
```

Field

```
UP & DOWN TO SCROLL
OR <ACK>NOWLEDGE
```

Ack

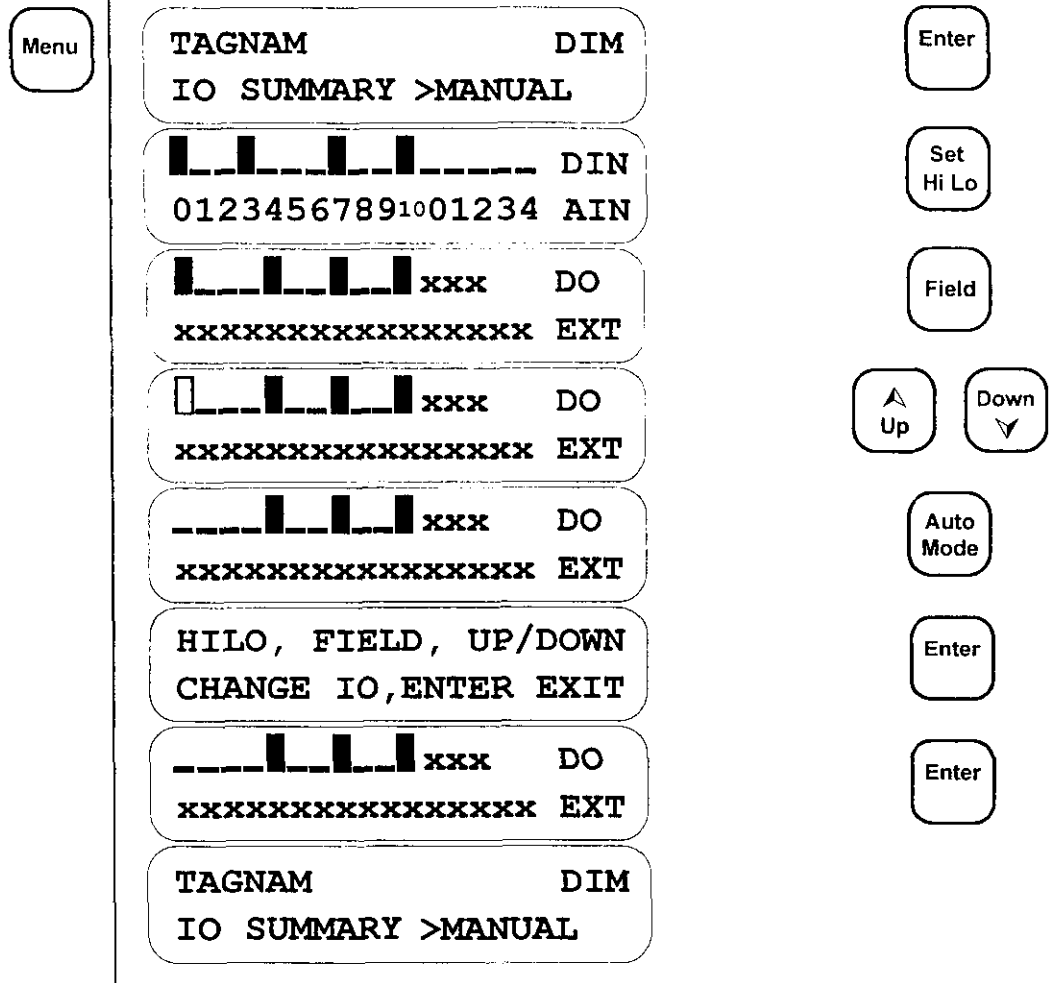
```
LIGHTS OFF!
PUSH <ACK> TO RETURN
```

Ack

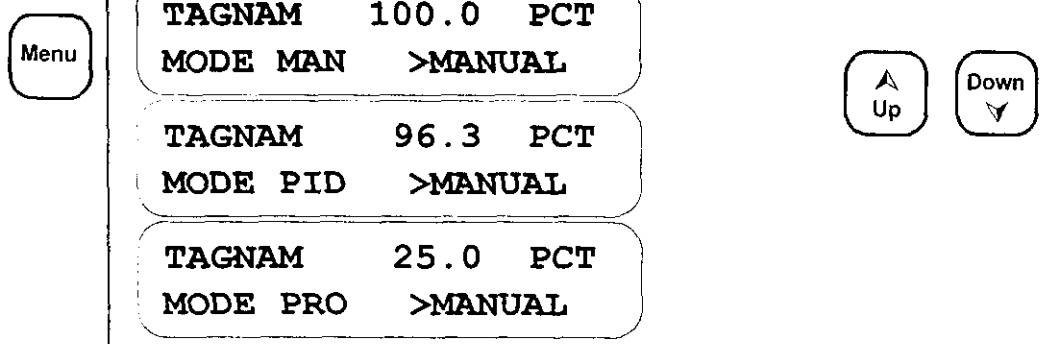
```
TAGNAM              DIM
LAST MEMO   >MANUAL
```

IO SUMMARY

Use the Enter key to enter the I/O summary. The analog input values 0-10 represent a percentage of full scale (i.e. 0 ≅ 4 mA, 5 ≅ 12 mA). Set HiLo is used to toggle between input/output summaries. An underscore represents an open input or an unswitched output. A block indicates a closed input or a switched output. An **x** or **X** is displayed when an output is not enabled and is unswitched or switched, respectively. An asterisk (*) will be displayed if an output is declared as a lamp and a lamp test is currently being performed. The Field key can be used to move the blinking cursor through the outputs. The Up/Down keys can be used to toggle the state of the output whose position is covered by the blinking cursor. The Enter key will return the ProControl back to its standard menus. If you press any other keys you will see an informative message telling you which keys are valid. The message will be displayed for 3 seconds if no keys are pressed, but can be interrupted before the 3-second period by pressing the Enter key.

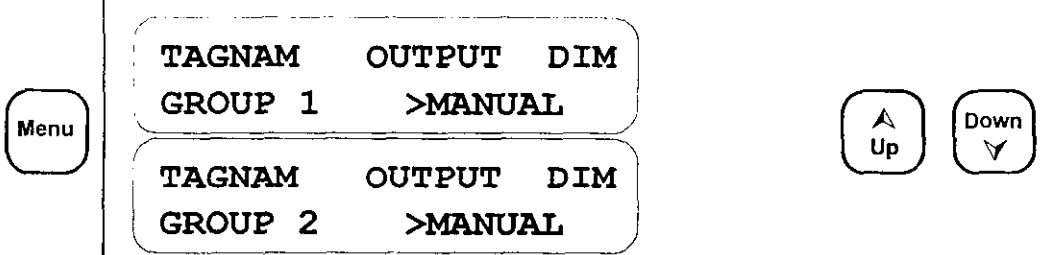


MODES Use the Up and Down keys to toggle an Analog Output from Manual control to PID control or Proportional control, depending on which analog output process is being used. This selection will only appear if an analog output tagname is displayed and the analog output is part of an analog output process.



GROUP The ProControl allows outputs to be assigned to different *Groups* to allow greater process control flexibility. In some cases, you may wish to be able to specify alternate process tasks for a given output. For instance, you can have the operation of a pump be controlled by a series of level switches in a tank, or alternately, the pump can be run on a timed cycle. By selecting the appropriate process Group, you can change the control strategy for that piece of equipment. EOS Research will configure the groups for you according to your specifications

Use the Up and Down keys to select a Group for the displayed output. This menu item is displayed only for outputs that have been configured by EOS to have alternate process Groups.



2.11 LED Indicators

Your ProControl unit has three status LEDs to the left of the keypad, which are used to indicate the following:

System Status: Normally ON when unit is powered.
One blink - The system has internally reset.
Two blinks - An internal error has occurred.

Connect: ON if user is remotely or locally connected.
ON if system is faxing or paging.
Slow blink - last fax or page failed, press ACK to clear.
Fast blink - local connect cable inadvertantly left plugged in, press ACK to clear.

Network: Rapid blinking indicates an active network connection.

3.0 Reporting Features

3.1 Fax Report

The ProControl unit will keep you informed of your system's operations with facsimile status reports. With the supplied ProView software you can configure the unit to send fax reports to up to two different numbers. You can also have these reports sent on a daily basis, at regular intervals during the day, or when triggered by specific process tasks. You can send one at any time by using the *Fax Now* option either from the menu on the ProControl's display, or through the ProView software.

The fax report you receive will contain several fields, each denoted by a shadow box. The number of fields will depend on the configuration of your system. For instance, you would not see a field indicating *Analog Outputs* if your system does not contain any of these.

The fields as you will see them are shown below. All information enclosed in brackets is variable and depends on your particular system configuration.

To:

```
<FAX RECIPIENT>
```

will indicate the intended fax recipient's name.

From:

```
THE <SYSTEM NAME>          SYSTEM IN <SITE LOCATION>    AT <TIME> ON <DATE>
SETUP VERSION X        :   ROM VERSION 2.x          :   MODEL B1
```

will indicate the name and location of your system, the date and time at which the fax report was initiated, your current ProView setup version, and the current on-board software version 2.X.

System Status:

```
<MODE><PXX>  :   LAST SHUTDOWN AT <TIME> ON <DATE> BY <SHUTDOWN CAUSE>
                 FAX REPORT INITIATED BY <FAX CAUSE>
```

will indicate the current <MODE> of the controller and associated process. For example, if the controller is running the startup or shutdown sequence, you would see either START or SHUTD followed by the current algorithm. Similarly, in auto mode, you would see AUTO followed by the last successfully completed process task.

The LAST SHUTDOWN indicates when the system last initiated the shutdown sequence and what caused it to happen. For example, if the shutdown sequence were initiated by a key press, the cause you would see would be KEYPAD. Similarly, if the shutdown sequence were caused by a process task such as a high pressure sensor whose tagname was HIPRES, you would see HIPRES as the <SHUTDOWN CAUSE>. If multiple inputs or outputs caused the shutdown (i.e. a process task was dependent on more than one input being in the active state and/or multiple outputs being ON), the most recent one which changed will appear as the cause.

Similarly, the FAX REPORT INITIATED BY line will indicate the tagname of the I/O point which caused the fax to be sent, provided there was only one I/O point responsible. If multiple I/O points were responsible, the process itself will be indicated. Consider, for example, a process task where a shutdown was caused by HIPRES and BLOWER, and a fax was also generated. The <FAX CAUSE> would be PROCESS XX, where *XX* is the number from 1 - 64 of this process task. In the case where *Fax Now* was selected from the menu option on the LCD, the <FAX CAUSE> would be KEYPAD. The <FAX CAUSE> from a ProView generated *Fax Now* command would be REMOTE. This line will <u>not</u> appear on daily or interval scheduled fax reports.

Discrete Inputs:

```
<TAGNAME> is <STATE>   <TAGNAME> is <STATE> ...
```

will indicate the status of all of the digital inputs in four columns. Inputs which are in the active state will appear as ON and those which are in their normal state will appear as OFF.

Discrete Outputs:

```
<TAGNAME> is <STATE>   <TAGNAME> is <STATE> ...
```

will indicate the status of all of the digital outputs in four columns.

Analog Inputs:

```
<TAGNAME> is <VALUE> <DIM> LIMITS are L: <LO-LIM> <DIM> H: <HI-LIM> <DIM>
<TAGNAME> is <VALUE> <DIM> TOTAL FLOW is <FLOW>   <DIM>
<TAGNAME>                  TOTAL FLOW is <FLOW>   <DIM>
...
```

will indicate the current value, dimensional units, low alarm limit, and high alarm limit for all analog inputs which are not flow-type inputs. The precision of the values displayed can be selected through ProView. Any flow-type analog input which is responsible for maintaining a total flow will display that flow in place of the alarm limits. Any pulse-type digital input used for a digital flow meter will appear here since the information being obtained by that type of flow meter is analog in nature. In addition, pulse accumulators (volume totalizers) will appear here.

Analog Outputs:

```
<TAGNAME>   <PCT>  PCT  <MODE>      <TAGNAME>   <PCT>  PCT  <MODE>
...
```

will indicate the output percentage and mode of operation of all analog outputs. The precision is fixed to one decimal place and will range from 0.0 to 100.0, expressed as a percentage. The <MODE> of operation will be PID if the analog output is currently being used in a PID loop, or PRO if the analog output is currently being used in a Proportional scheme, otherwise it will be MAN indicating that the analog output is under manual control.

The next two pages contain examples of scheduled and alarm fax reports.

To:

BULLWINKLE J MOOSE

From:

THE NORTH WATER SUPPLY SYSTEM IN MAYBERRY USA @ 09:44:00 ON 12/10/1999
SETUP VERSION 1 : ROM VERSION 2.156 : MODEL B2

System Status:

AUTO P04 : NO PREVIOUS SHUTDOWN

Discrete Inputs:

WEL1LO is OFF	WEL2LO is OFF	TWR_HH is OFF	TNK_HH is OFF
RESET is OFF			

Discrete Outputs:

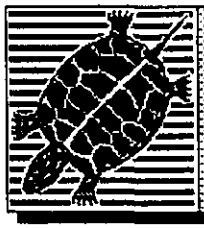
WLPMP1 is ON	WLPMP2 is ON	FINPMP is ON	CHLMET is ON
NAOMET is ON	PH_ALM is ON	CL_ALM is ON	TWRALM is OFF
WL1ALM is OFF	WL2ALM is OFF	TNKALM is OFF	

Analog Inputs:

TWRLVL is 59.2	FT	LIMITS are	L: 8.0	FT	H: 70.0	FT
TNKLVL is 0.00	FT	LIMITS are	L: 8.00	FT	H: 12.00	FT
FINFLO is 501.3	GPM	TOTAL FLOW is	14794	GAL		
FLOW_2 is 399.3	GPM	TOTAL FLOW is	12561	GAL		
FLOW_1 is 0.0	GPM	TOTAL FLOW is	0	GAL		
FIN_PH is 0.00	PH	LIMITS are	L: 6.00	PH	H: 8.00	PH
FIN_CL is 0.00	PPM	LIMITS are	L: 0.75	PPM	H: 2.00	PPM

Analog Outputs:

VSPMP1	86.8 PCT	PID	VSPMP2	100.0 PCT	PID
NAOHFD	100.0 PCT	PID	CHLRFD	20.0 PCT	PRO



ALARM Fax Report

EOS Research Ltd. — ProControl Series II+

To:

BULLWINKLE J MOOSE

From:

THE NORTH WATER SUPPLY SYSTEM IN MAYBERRY USA @ 09:34:12 ON 12/10/1999
SETUP VERSION 1 : ROM VERSION 2.156 : MODEL B2

System Status:

AUTO P04 : NO PREVIOUS SHUTDOWN
FAX REPORT INITIATED BY REMOTE

Discrete Inputs:

WEL1LO is OFF	WEL2LO is OFF	TWR_HH is OFF	TNK_HH is OFF
RESET is OFF			

Discrete Outputs:

WLPMP1 is ON	WLPMP2 is ON	FINPMP is ON	CHLMET is ON
NAOMET is ON	PH_ALM is ON	CL_ALM is ON	TWRALM is OFF
WL1ALM is OFF	WL2ALM is OFF	TNKALM is OFF	

Analog Inputs:

TWRLVL is 59.1	FT	LIMITS are	L: 8.0	FT	H: 70.0	FT
TNKLVL is 0.00	FT	LIMITS are	L: 8.00	FT	H: 12.00	FT
FINFLO is 203.5	GPM	TOTAL FLOW is	11348	GAL		
FLOW_2 is 399.6	GPM	TOTAL FLOW is	8671	GAL		
FLOW_1 is 0.0	GPM	TOTAL FLOW is	0	GAL		
FIN_PH is 0.00	PH	LIMITS are	L: 6.00	PH	H: 8.00	PH
FIN_CL is 0.00	PPM	LIMITS are	L: 0.75	PPM	H: 2.00	PPM

Analog Outputs:

VSPMP1	37.4 PCT	PID	VSPMP2	100.0 PCT	PID
NAOHFD	100.0 PCT	PID	CHLRFD	20.0 PCT	PRO

3.2 Page Alerts

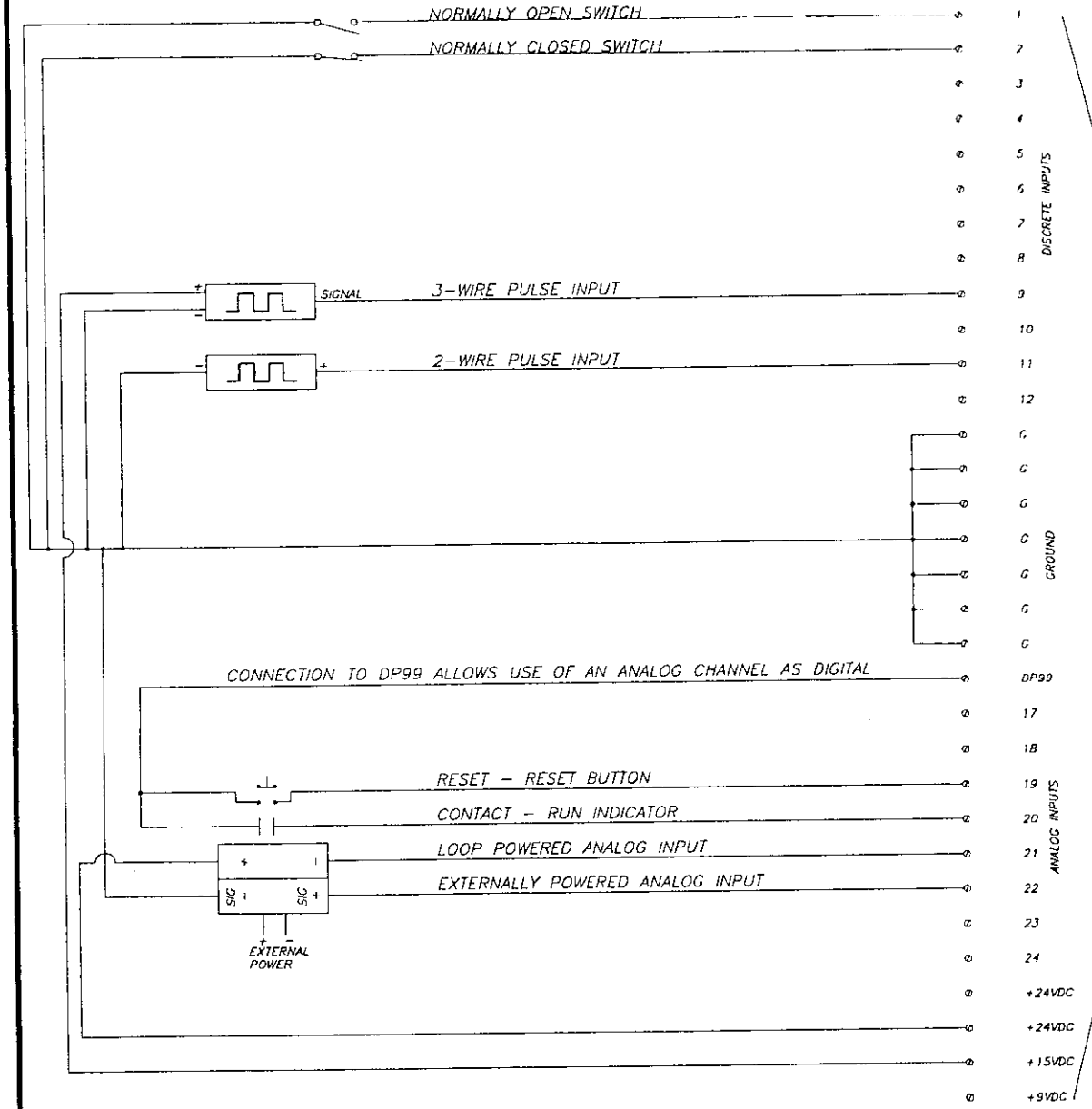
The ProControl unit can alert you to important conditions at your site via a page alert. Any system that is not in manual mode, that is, executing process tasks or the startup or shutdown sequences, can send a message up to eighty characters in length to an alphanumeric pager or up to nineteen digits in length to a numeric pager. If you are out of the office and away from a fax machine, you will still be alerted to any trouble at your site. With ProView you can select up to two pager numbers to be called. Each process task or startup/shutdown algorithm is capable of sending a message to either or both of these pagers. The pager messages are configured by EOS Research according to your specifications.

An example message for an alphanumeric pager would be:

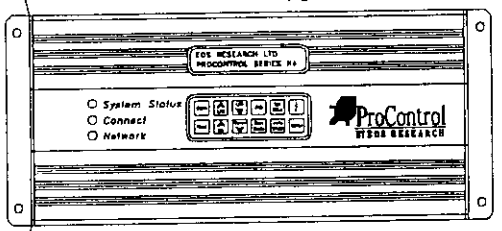
```
ANYTOWN SITE
High water level EQ Tank
System shut down!
Call Fred to fix: 555-6789
```

APPENDIX A

EXAMPLE WIRING DIAGRAM



SERIES 2*plus* Type B1-B2, A1-A2



NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
2. INPUT IMPEDANCE FOR SERIES 2Plus ANALOG INPUTS IS 135 OHMS.
3. ACTIVE DISCRETE INPUTS WILL SOURCE 1mA WHEN GROUNDED.
4. THE ProControl SOURCES 5VDC FOR DISCRETE INPUTS.
5. DISTRIBUTE ANALOG INSTRUMENTS EVENLY ACROSS +24VDC TERMINALS.

E O S
research
210 West Road Portsmouth, NH

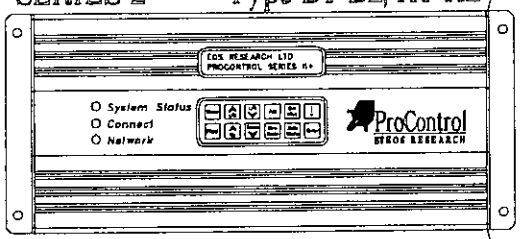
TYPICAL ProControl WIRING
DIGITAL & ANALOG INPUTS - BOTTOM LEFT SIDE

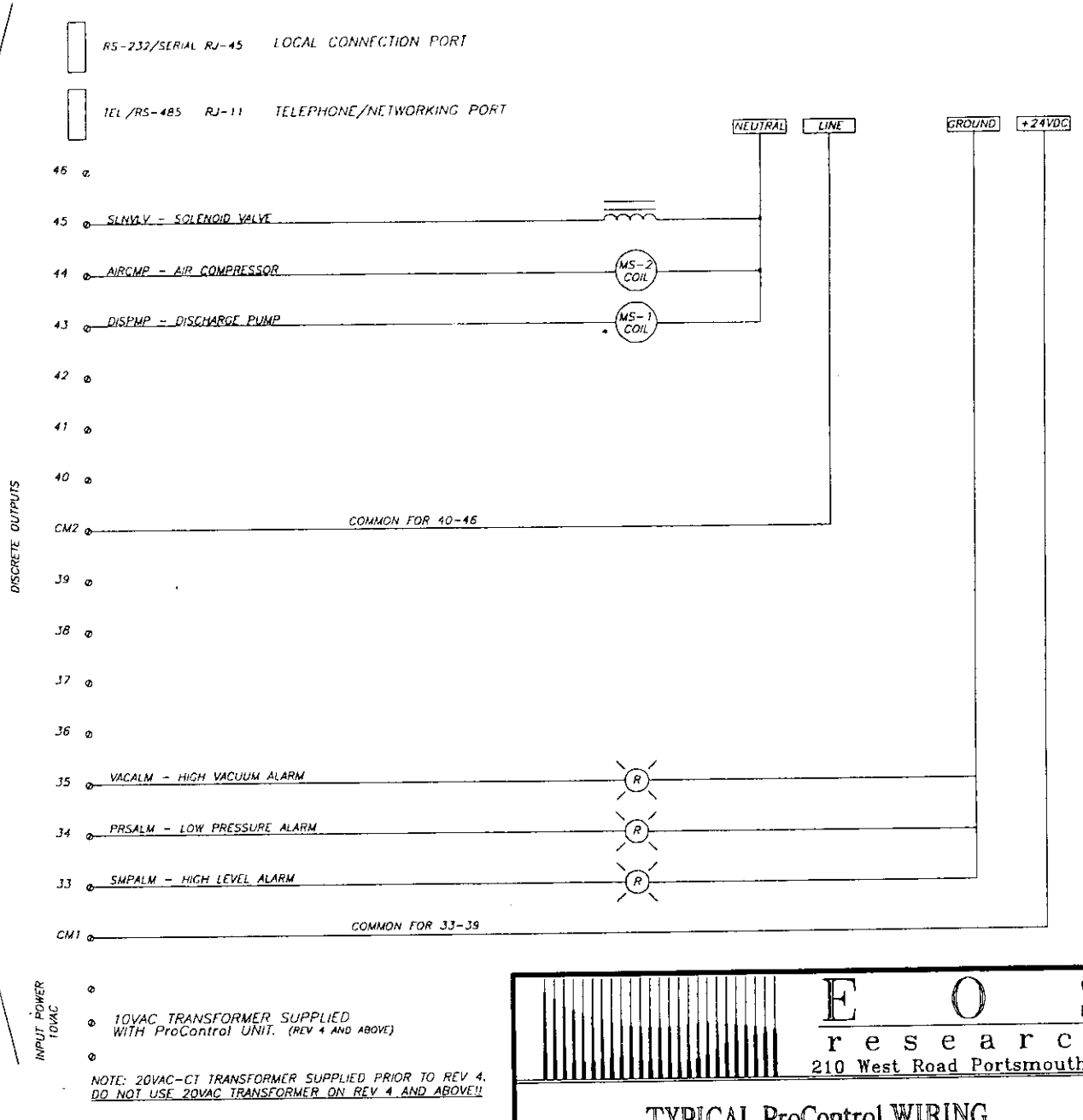
GENINBOT.DWG

REV 5.3 11/29/99

EXAMPLE WIRING DIAGRAM

SERIES 2*plus* Type B1-B2, A1-A2





NOTES:
1. OUTPUT RELAYS RATED AT 125VAC/0.5A, 24VDC/0.5A
   UNITS SHIPPED AFTER 12/1/99 RATED AT 125VAC/1.0A, 24VDC/1.0A
2. CM1 IS SWITCHED TO 33-39 AND CM2 IS SWITCHED TO 40-46 WHEN OUTPUT IS ACTIVE.
3. DO NOT USE +24VDC FROM ProControl TO DRIVE OUTPUTS. FOR TRANSDUCER POWER ONLY.

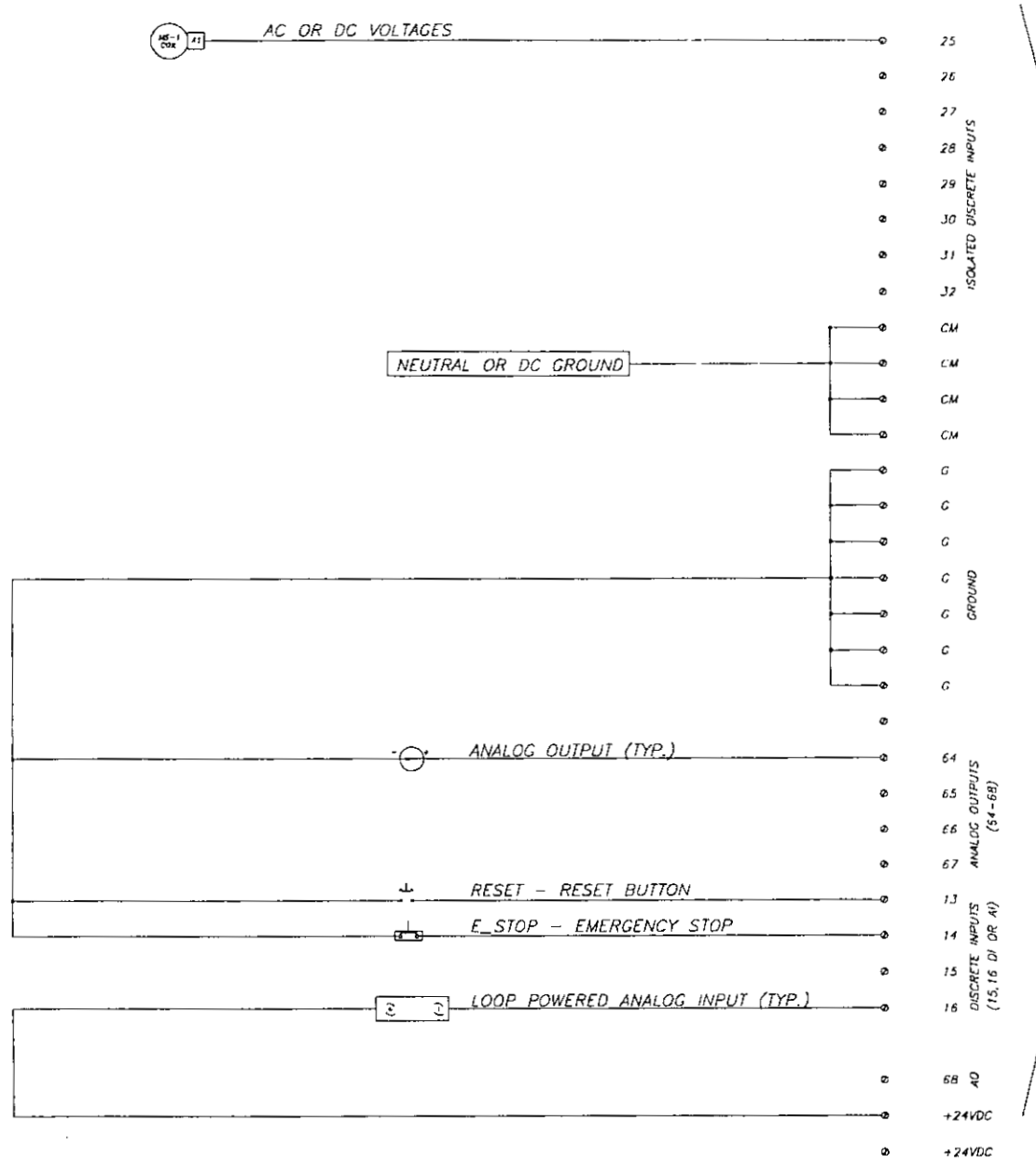
E O S
research
210 West Road Portsmouth, NH

TYPICAL ProControl WIRING
DIGITAL OUTPUTS - RIGHT SIDE

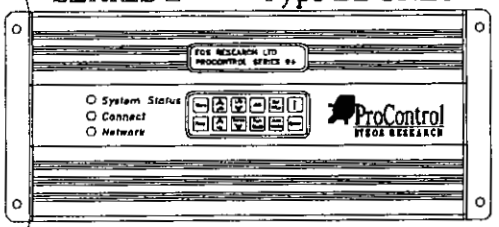
GENOUT.DWG

REV 5.3 11/29/99

EXAMPLE WIRING DIAGRAM



SERIES 2*plus* Type B2 ONLY



NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
2. INPUT IMPEDANCE FOR SERIES 2Plus ANALOG INPUTS IS 135 OHMS.
3. MAXIMUM ISOLATED DISCRETE INPUT VOLTAGE 120V. ALL INPUTS MUST BE SAME VOLTAGE AND SHARE THE SAME COMMON OR NEUTRAL!
4. CM REPRESENTS COMMON FOR INPUTS 25-32. (ie. 120VAC, CM=NEUTRAL/ 24VDC, CM=DC GROUND)

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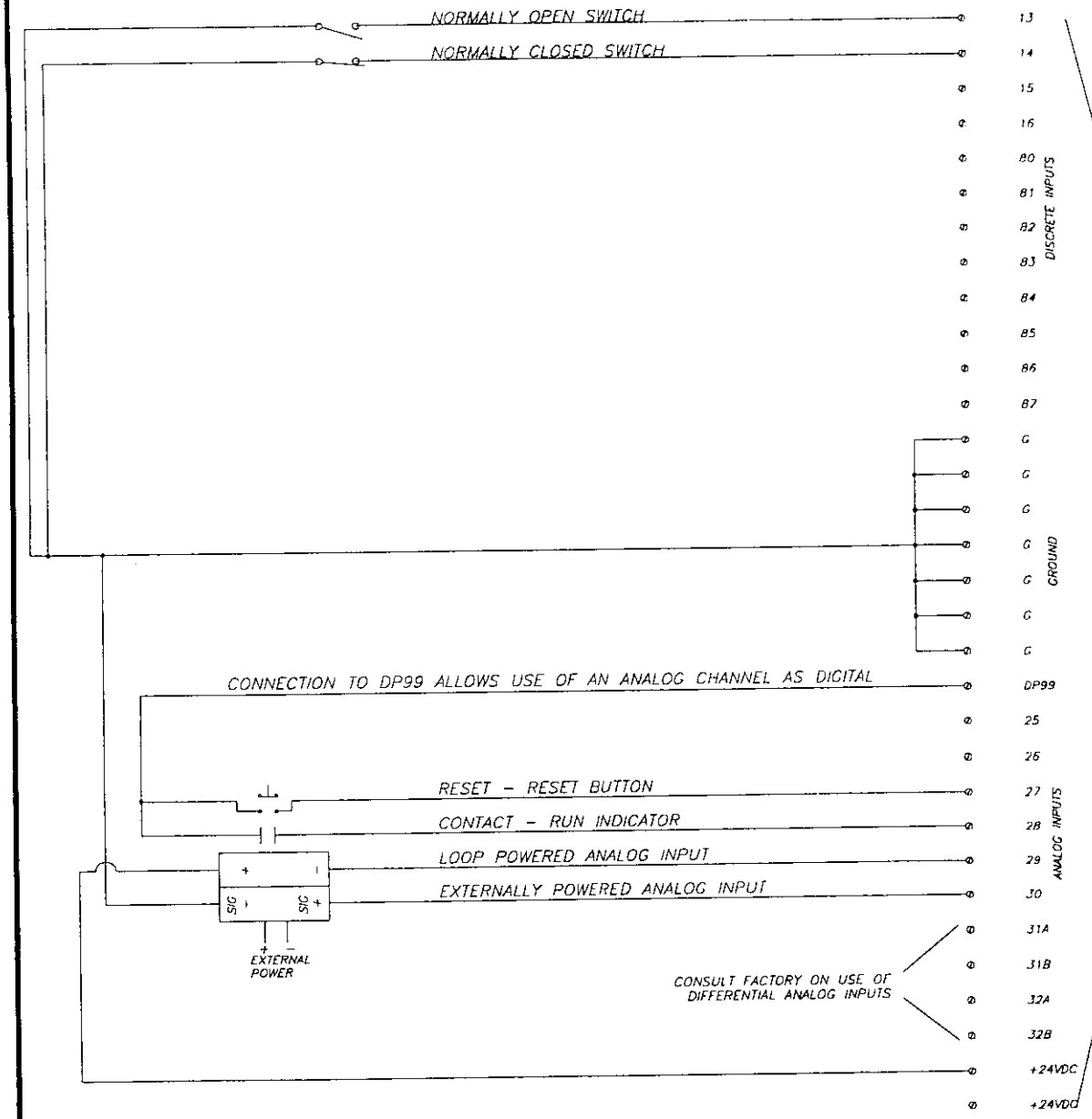
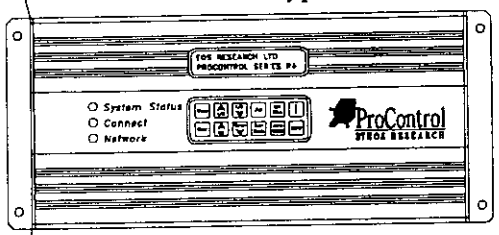
TYPICAL ProControl WIRING
DIGITAL INPUTS & ANALOG OUTPUTS
TYPE B2 - TOP LEFT SIDE

EXAMPLE WIRING DIAGRAM



SERIES 2*plus* Type A1-A2



NOTES:
1. FOR ANALOG INPUTS, MAINTAIN VOLTAGE AND TOTAL LOOP RESISTANCE PER MFG. SPECIFICATIONS.
2. INPUT IMPEDANCE FOR SERIES 2Plus ANALOG INPUTS IS 135 OHMS.
3. ACTIVE DISCRETE INPUTS WILL SOURCE 1mA WHEN GROUNDED.
4. THE ProControl SOURCES 5VDC FOR DISCRETE INPUTS.
5. DISTRIBUTE ANALOG INSTRUMENTS EVENLY ACROSS +24VDC TERMINALS.

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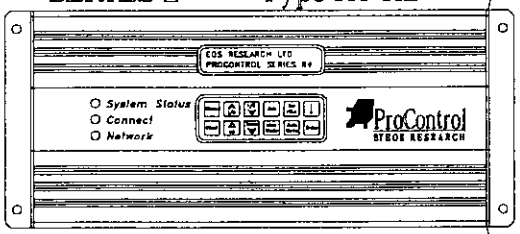
TYPICAL ProControl WIRING DIGITAL & ANALOG INPUTS - TYPE A - TOP LEFT SIDE

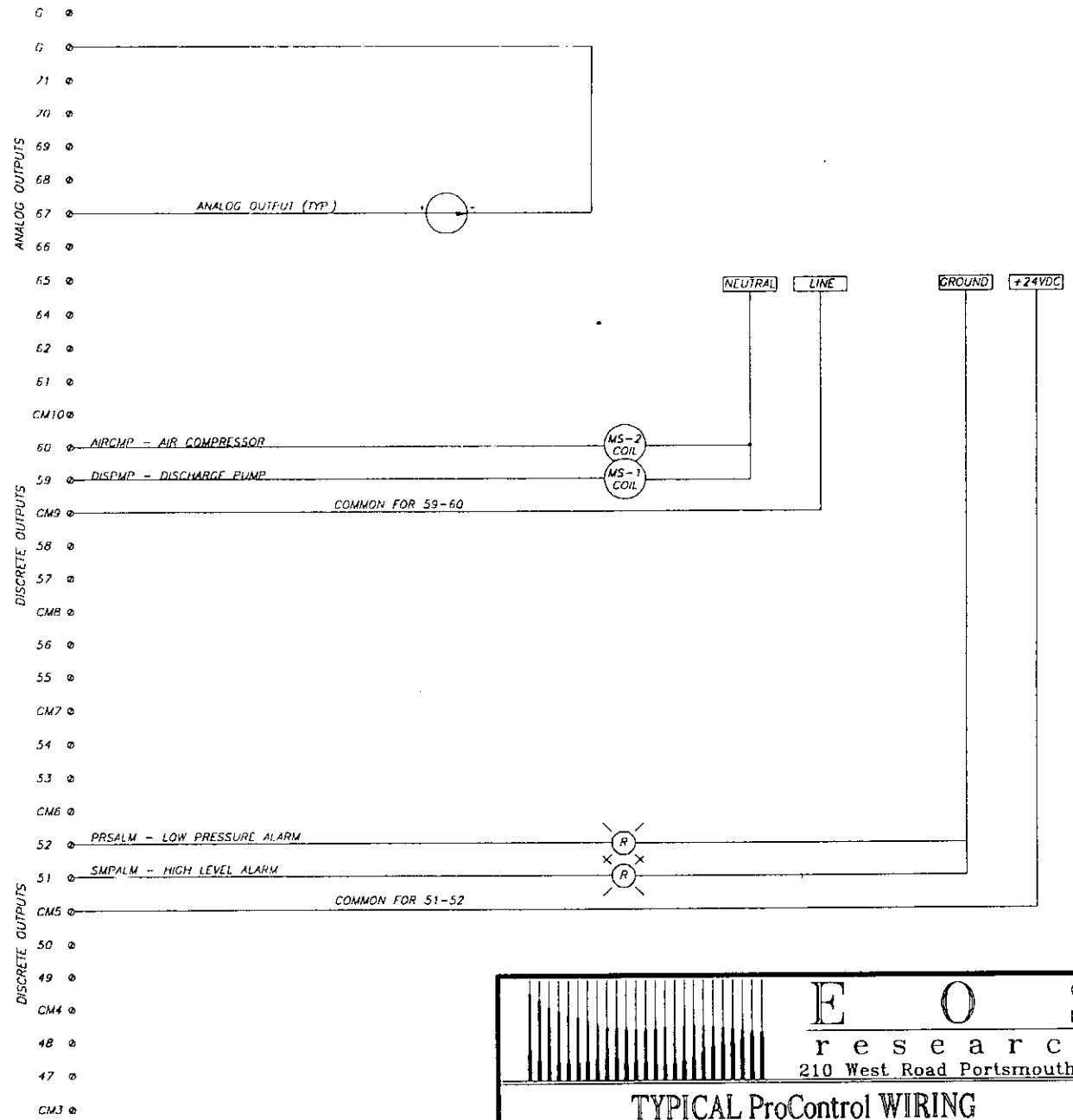
GNINTOPA.DWG

REV 3 11/29/99

EXAMPLE WIRING DIAGRAM

SERIES 2*plus* Type A1-A2





NOTES:
1. OUTPUT RELAYS ARE RATED AT 125VAC/0.5A, 24VDC/0.5A
   UNITS SHIPPED AFTER 12/1/99 RATED AT 125VAC/1.0A, 24VDC/1.0A
2. CM3 IS SWITCHED TO 47-48, CM4 IS SWITCHED TO 49-50, ETC. WHEN OUTPUT IS ACTIVE.
3. DO NOT USE +24VDC FROM ProControl TO DRIVE OUTPUTS. FOR TRANSDUCER POWER ONLY.

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TYPICAL ProControl WIRING
DIGITAL & ANALOG OUTPUTS
TYPE A - TOP RIGHT SIDE

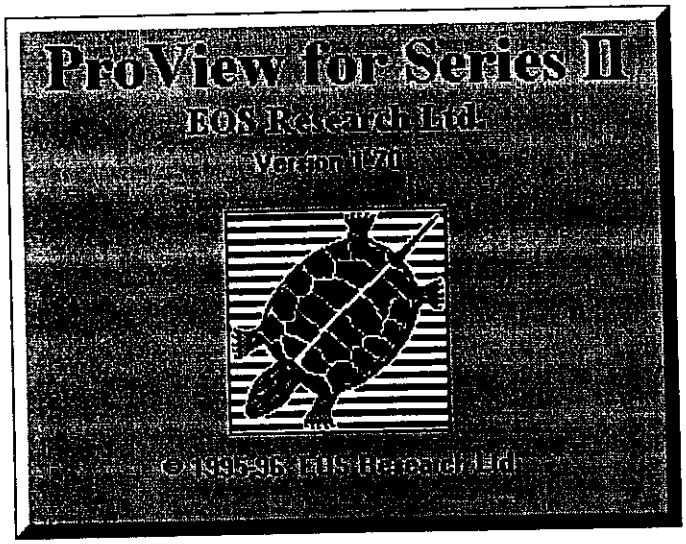
REV 3 11/29/99

GENOUTA.DWG

ProView™

for Series II

User's Guide



Version 1.70

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION AND INSTALLATION

This chapter provides a brief introduction to ProView features, the system requirements for running the program, and instructions for installing it.

Introduction to PROVIEW

ProView is used in conjunction with the ProControl Series II unit. The ProControl is a telemonitoring and control system designed to reduce your operation's O&M (operations and maintenance) costs, while ensuring that performance is maximized. With ProView you can:

- Monitor system sensors
- Control system inputs and outputs
- Change the way the system operates
- View and change system setups
- Extract datalogged system information

Some system parameters can be set with the ProControl's LCD display (if included). Many others can only be set using ProView.

In order for ProView to function, it must be connected to the ProControl unit. It can be connected in one of two ways. The first way is with a cable that connects your PC's serial port with the ProControl unit. This method of connection is most often used at the system site using a laptop PC. The second method is via dial-up modem from your office or from anywhere that a connection to the telephone system can be established.

You should be familiar with the operation of the ProControl unit and have read the ProControl manual before running ProView.

System Requirements

COMPUTER: You will need an IBM PC or compatible with a 386 (minimum) or greater microprocessor with 4MB RAM and Microsoft Windows version 3.1 or later. A minimum of 4MB of Hard Disk space needs to be available. A mouse or similar pointing device is also required.

Several functions in ProView require the use of the right mouse button. Make sure the right mouse button is not assigned to some other function such as double-click. See your mouse driver software for details.

MODEM: You need a Hayes Compatible (AT) Modem which supports a data rate of 2400 baud. The modem can be external or internal. It must be connected to COM Port 1, 2, 3 or 4.

How to Install from the Windows Program Manager

1. Run Windows as you normally would.

2. From the Windows Program Manager, pull down the File menu and click on Run. You will see the Run dialog box.

3. Place the diskette labeled ProView Installation Disk #1 in the a: drive or the b: drive

4. Type the following:

   a:\setup

   if you put your diskette into drive b: in the last step then type:

   b:\setup

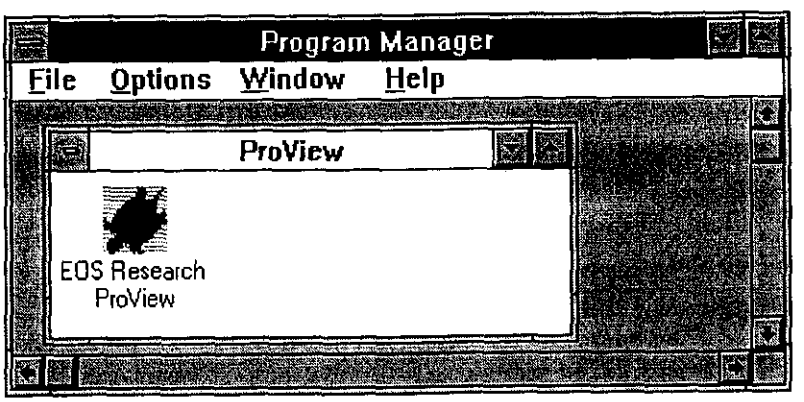
   Click on OK.

You will see a screen informing you that ProView is loading the install program. After the appropriate files from disk #1 have been copied, you will be asked to insert Installation Disk #2. The installation program will begin and you will be required to select a target drive. In the dialog box, type the drive and path where you wish to install ProView. The default is C:\PROVIEW.

ProView will then be installed on your hard drive.

You will also need a site description file for every ProControl unit you need to access. This file has a ".pvs" extension and is normally supplied pre-configured for you on a separate diskette. Using Windows File Manager, transfer all such site files to the directory in which your ProView files were placed. The default is C:\PROVIEW. Depending on your site configuration, you may also have several other files included along with your site description file. The files will have the extensions of *.not, *.pid, *.cus or *.bmp. You should transfer these files to the default ProView directory as well.

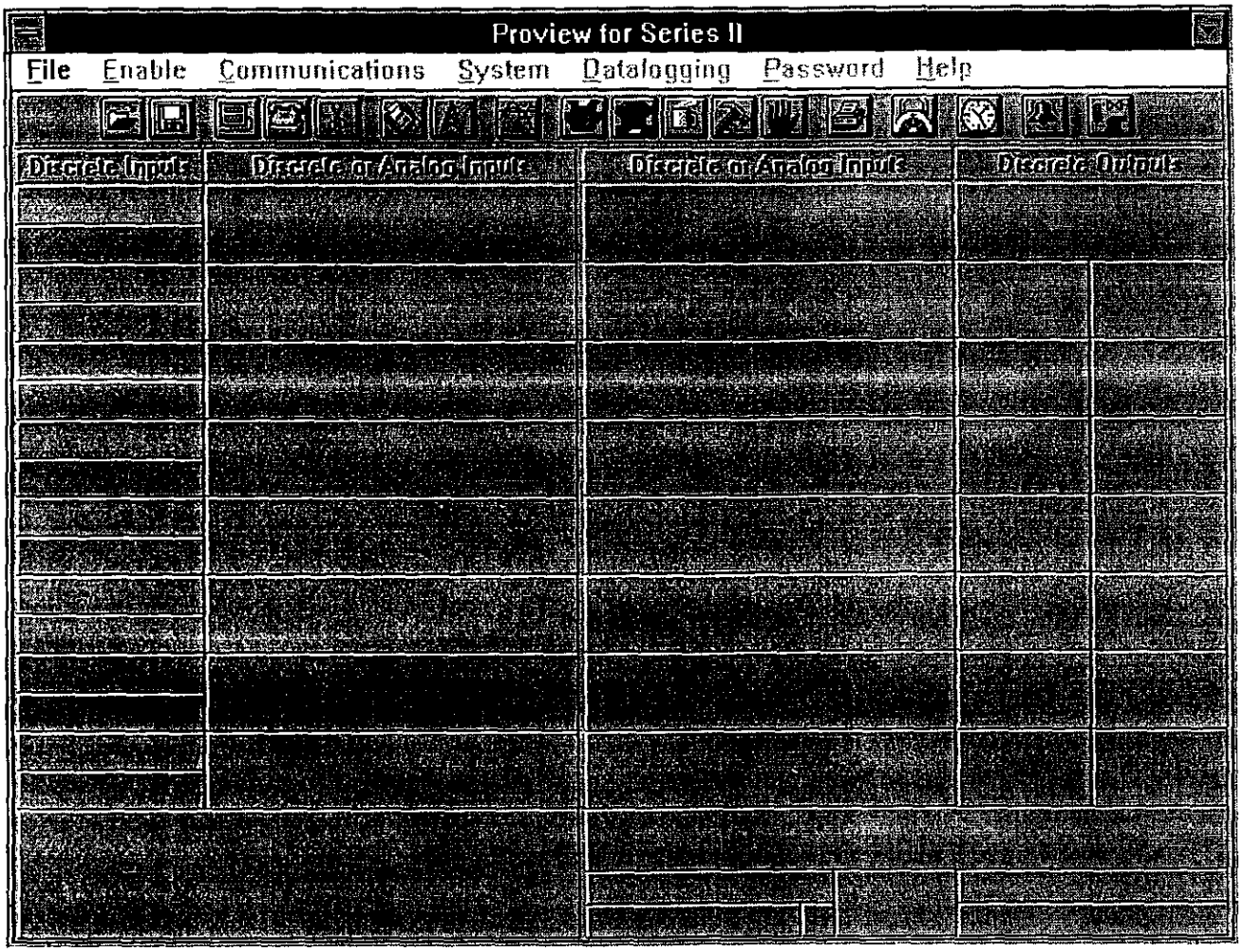
When the installation is complete, you will see the ProView program group and icon.



You may need to close some or all of your currently running applications before installing ProView.

Running ProView

After installing ProView as described above, double-click on the ProView icon. After an introduction screen, you will see the ProView Main screen.



The main screen contains pull-down menus similar to those found on other Windows applications as well as a Toolbar which provides an alternative way to navigate through ProView. Placing the cursor over a Toolbar button and leaving it there for a short while produces a "balloon". A balloon is a small pop-up message which describes the action to be taken if the Toolbar button is "pushed".

Right now, since no system file has been loaded, the main screen is blank and the toolbar is disabled. All menus except the File menu have been "ghosted". A selection is ghosted when the operation represented by the selection is unavailable.

Below the Toolbar are four information areas which are filled in based on the system setup and on the current system status. The Discrete Inputs area contains information about the ON/OFF switches or sensors connected to inputs 1 through 16 on the ProControl unit. The Discrete or Analog Inputs area contains information about sensors or switches connected to the ProControl analog expansion board. These are

inputs 17 through 32. The inputs can represent 4-20ma transducers or simple ON/OFF switches depending on your site configuration. The Analog Outputs area, behind the rightmost group of Discrete or Analog Inputs, contains information about any 4-20ma output control schemes that may be included in your system. The Discrete Outputs area contains information regarding the output relays connected to the ProControl. The Extended Outputs area, behind the Discrete Outputs, contains information regarding any relays or run lights beyond the first 14.

Your particular "site file" will determine which of these groups you may view. For example, if you use ProView 1.70 to open a site file which was originally shipped with version 1.1, 1.5, or 1.6, there will be no extended outputs available. You may also notice that certain menu choices are grayed out and unselectable depending on your site file version.

At the bottom of the screen are a series of information boxes. These show the status of certain important system parameters when ProView is connected to a remote ProControl unit.

Changing Information

ProView has been designed to make it easy to view and change the information which governs the way your system works. However, ProView must always be *connected* to the ProControl unit in order to actually change information. It is important to remember that ProView itself is only a window into the operation of the ProControl unit. It does not provide any control function by itself. Chapter 3 discusses how to connect to the ProControl.

Most of the information in ProView that can be changed can only be changed while connected. If ProView is not connected, this setup information is visible but disabled. When ProView is connected to the ProControl unit, this information becomes accessible. When information is changed in ProView, a "?" is appended to the description or title of the information to indicate that the new data has been sent to the ProControl. When the "?" disappears, the data has been received by the ProControl and confirmed by ProView.

While many of the controls that change information in ProView are graphical, much of the information is displayed in text form. To edit text based information, click on it and make your changes as you would in any Windows application. When you click on the text, it is highlighted to show that it has the current focus. After completing your text editing you can save the changes by first pressing the ENTER key while the cursor is still within the text box being edited, and then clicking on the "OK" button for the current form.

CHAPTER 2: GETTING STARTED

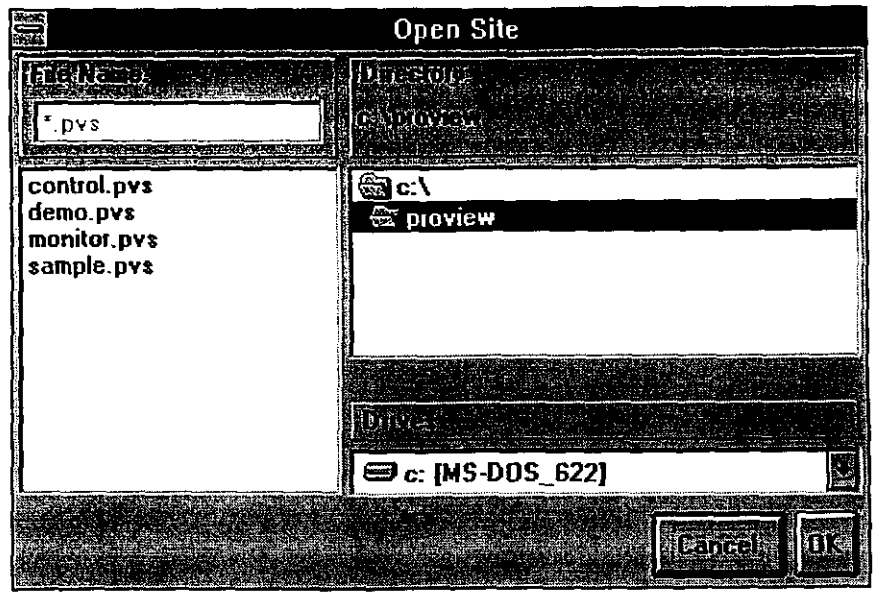
This chapter explains how to open a site file and examine the information contained within it. Also covered is the procedure to print the system configuration to a file.

Opening a Site File

Every ProControl unit has a "system configuration" file which tells the unit which inputs or outputs are enabled, what their descriptive "Tagnames" are and how they should respond to changes in input status. This same file is used by ProView to provide a window into what is going on within the remote ProControl unit and, by extension, with the site operation. To open a site file proceed through the following steps.

1. Pull down the File menu. Click on Open Site. You will see the Open Site dialog box. You can also use the ALT-Key combination represented by the first underlined character in the menu name. In this case use ALT-F.

You can also use the Toolbar button at the top of the main screen to open a site file. The first time you run the program, however, the toolbar is disabled. To open a subsequent file you can click on the Open File Toolbar button .



2. In the Drives area of the dialog box click once on the down arrow to pull down the Drives list, then click on the drive that contains the file you wish to open.

3. In the Directories area of the dialog box, click on the sub directory that contains the file. Notice that the current directory is shown under the word Directory. To move "up" in the directory tree,

double-click on the level to which you want to move. To move "down" in the directory structure, double-click on the sub directory.

4. In the File area you will see all files in the selected drive and directory that have the extension **.pvs**. Only files with this extension can be opened. Select the file you wish to open by clicking on the file name in the file list box. When you click on a file the file name appears in the File Name box to confirm your selection.

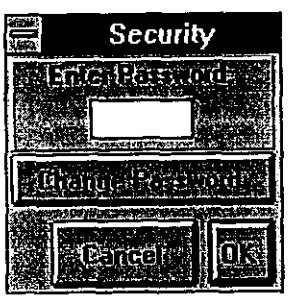
5. Click on the OK button to open the selected file.

The title of the main screen will change to include the file name and version number. The file name and version number are enclosed within brackets.

Entering the Password

No system information is displayed at this point because the password has not been entered. To enter the password:

1. Pull down the Password menu. You will see the Password dialog box. If you have just opened a site file the Password dialog box will appear automatically.



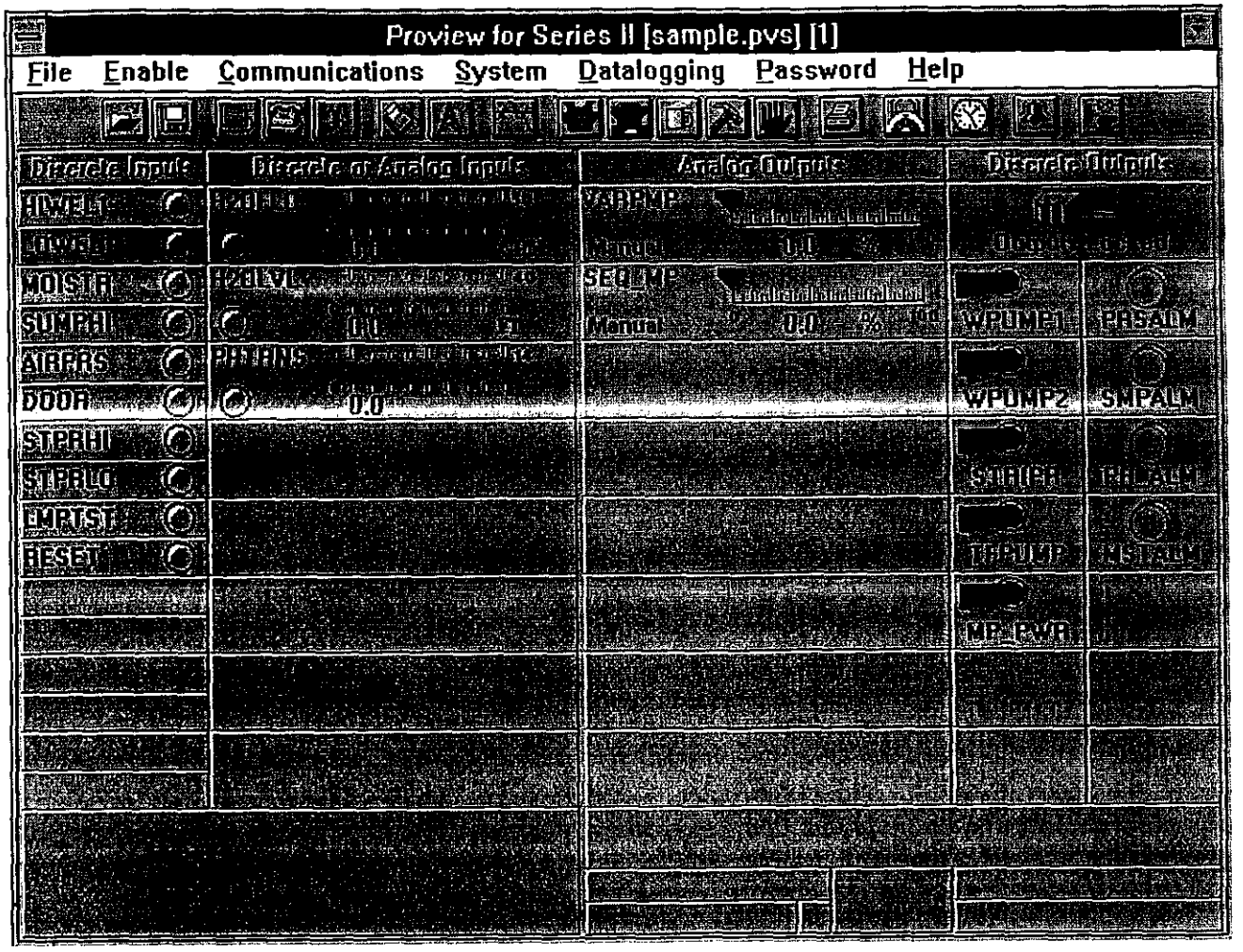
A word about passwords:
The password used in ProView can be different than the one used to access the ProControl unit through the LCD display. In either case the valid characters are 0-9 and A-Z upper case only. Up to three characters are permitted. The password was designed as a low-level security feature sufficient to prevent inadvertent operation and to deter tampering. It is ***NOT*** *sufficient in and of itself to withstand a determined effort at system entry. To disable the password on the ProControl unit, contact us to configure your unit to bypass the password screen, or simply set the password to AAA. The password for ProView cannot be disabled.*

2. Move your cursor to the text box and enter the password. The default password is EOS. Then click on the OK button or hit the Enter key.

3. If the password is incorrect, the dialog box will disappear and a beep will sound. No system configuration information will be shown.

4. If the password is correct, the Password dialog box will disappear and the system configuration information will be shown on the main screen.

A View-Only Mode password, "VOM", may be entered to allow a connection to the remote system for observing the system status, however, no changes to any ProControl information (fax, etc.) may be made when in this mode.



Examining the Main Screen

This particular site has eight discrete inputs, three analog inputs, eleven discrete outputs, and two analog outputs. Two of the discrete outputs are behind the discrete outputs panel in the Extended Outputs area.

Discrete Inputs

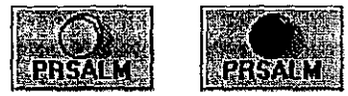
On the left side of the screen below the heading "Discrete Inputs" are shown the names of enabled discrete or digital inputs. These names (called "Tagnames") identify the input. To the right of the Tagname is a virtual "LED". This LED's color or shape will change based on the status of the input. If discrete input #1 is "OFF", the LED next to the letters HIWEL1 is gray in color. If HIWEL1 is "ON" then the LED is green. If HIWEL1 is "ON" and has been set up as an alarm input the LED becomes a red "Alarm Bell". The panels below the 10th discrete input (RESET) are blank because those inputs have not been enabled in this particular site configuration.

Analog Inputs

In the middle of the screen below the heading "Analog or Discrete Inputs" are shown the enabled analog inputs. Analog inputs can also be configured as simple discrete inputs. Below the Tagname is another LED. For analog inputs, this LED is either gray when the H2OFLO is not in the alarm state or red when it is in the alarm state. To the right of the Tagname is a small bar graph which gives a visual indication of the value of the analog input. The bar graph indicator itself can be green or red. It is not shown here because, at this point, there is no analog input data available (ProView is not connected to the ProControl unit). To the left and right of the bar graph are numbers that represent the lower and upper bounds, respectively, of the analog input values. In this case H2OFLO has been set up with a range of 0 to 50. Below the bar graph is a numerical representation of the value of H2OFLO. (0.00) It changes along with the bar graph when updates are received from the ProControl unit. Finally, in the lower right corner are the dimension units of the analog input, in this case GPM.

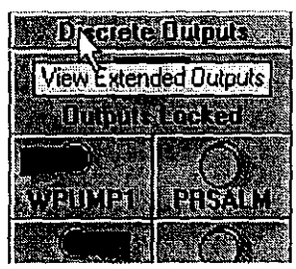
Discrete Outputs

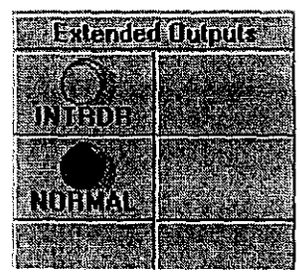
On the right side of the screen below the heading "Discrete Outputs" are shown the names of enabled discrete outputs. In this site configuration there are six such outputs. Below the Tagname of the output is a virtual "Toggle Switch". By its position and its color it shows the state of discrete output and also allows the user to change that state. If the switch is on the left hand side and gray then the output is "OFF". If the switch is on the right hand side and green then the output is "ON".



Discrete outputs can also be configured with virtual "Alarm Lights" or "Run Lights" instead of switches. Outputs are configured in this way when an alarm or run light more nearly approximates the function of this output than a toggle switch would. If the light appears gray then the output is "OFF". If an alarm light appears red or a run light appears green then the output is "ON".

Your system may also have "Extended Outputs" which are located on a panel behind the Discrete Outputs. To access these outputs, point your mouse at the title Discrete Outputs. When a balloon appears, indicating that you may toggle the foreground, click the left mouse button.





Analog Outputs

To the right of the first column of the Discrete or Analog Inputs is the Analog Outputs area. It may be concealed by the second column of Discrete or Analog Inputs. To pull the Analog Outputs to the front, point your mouse at the title Discrete or Analog Inputs in the second column. When a balloon appears, indicating that you may toggle the foreground, click the left mouse button.

To the right of the Tagname there is a slide-scale which indicates the current percentage of full-scale output (0% to 100%) both graphically and with text. Below the Tagname is the current mode of the output. This mode can be changed from Manual, which indicates the output is under user control, to PID or PRO, which would indicate that the output is involved in an output control scheme and is under automatic control. These output control schemes are described in chapter 5 under PID and PRO options.

Printing the Setup to File

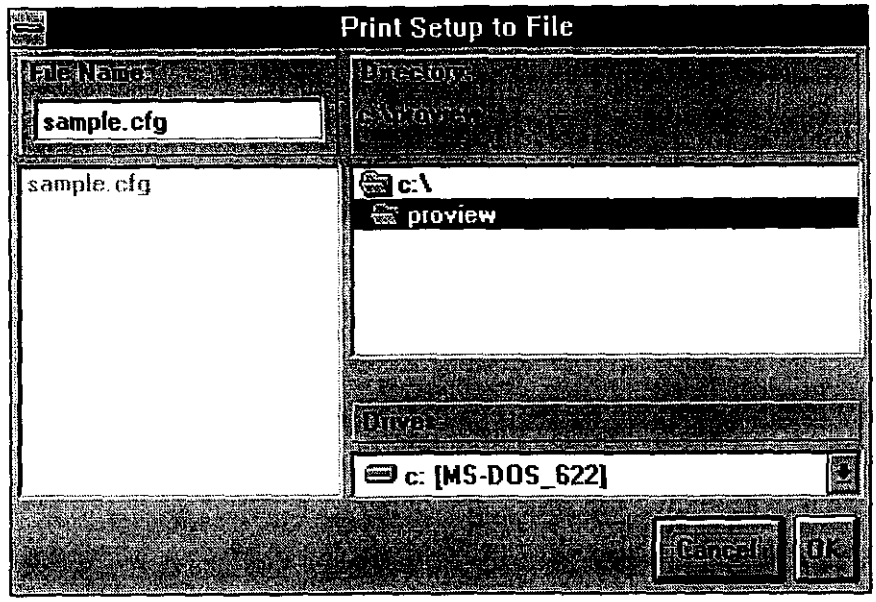
A more detailed analysis of the site configuration can be made by printing the setup data to a file and then examining the file. To print the setup proceed through the following steps.

1. Pull down the File menu. Click on Print Setup. You can also use the ALT-F combination to pull down the file menu.

   Or

   Click on the Print Setup button. 

2. You will see the Print Setup to File dialog box.



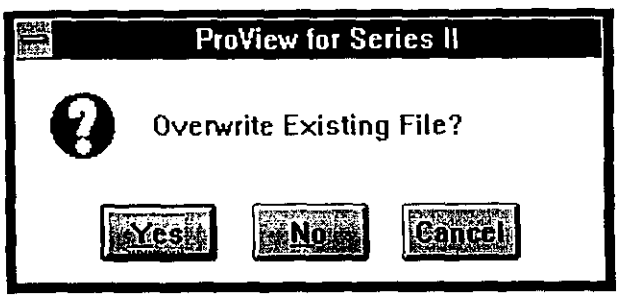
3. In the Drives area of the dialog box click once on the down arrow to pull down the Drives list then click on the drive where you wish to place the printed setup file. The default is the drive on which ProView has been installed.

4. In the Directory area of the dialog box, click on the subdirectory where you wish to place the printed setup file. Notice that the current directory is shown under the word Directory. To move "up" in the directory tree, double-click on the level to which you want to move. To move "down" in the directory structure, double-click on the sub directory. The default is the directory in which ProView has been installed.

5. In the File Name area you will see the name of the suggested print file. The default extension for the print file is **.cfg**. To change the filename click on the File Name text box and alter the name to suit your needs. You can also select an existing .cfg file name by clicking on the file name in the file list box. When you click on a file the file name appears in the File Name box to confirm your selection.

6. Click on the OK button to print the setup to the selected file.

If you are overwriting an existing file, a message box pops up to make sure than this is in fact what you want to do.



A word about Files:
Do not confuse the site configuration file (.pvs) which is a binary file with the printed setup file (.cfg) which is a text file. A text file can be viewed with a word processing program while a binary file typically cannot.

Examining the Setup File

To examine your site configuration more thoroughly, use an editor or word processor such as Windows Write or Notepad to view the file you have just created. See the documentation that pertains to the editor or word processor you are using to open the .cfg text file.

The file produced by our sample site is shown below. The first section consists of identifying information about the ProControl unit and setup information about the site in which it is installed.

EOS RESEARCH LTD.

ProControl Series II

ProView Configuration File Information

***** FAX Recipient:	MYRON R COMPUTER
***** Customer:	EOS RESEARCH TEST
***** Site Location:	SUPERFUND USA
***** Setup:	1
***** Option:	D
***** Type:	0
***** Serial Number:	11119
***** Date:	05/23/96
***** Time:	11:38:08
***** ProView:	Version 1.70

THE INPUTS INCLUDED IN THIS SYSTEM ARE:

#	TAGNAME	TAGNAME DESCRIPTION	SETUP*	RANGE
1	HIWEL1	Well #1 High Level	D,NO,ST	
2	LOWEL1	Well #1 Low Level	D,NO,ST	
3	MOISTR	Moisture Sensor	D,NO,AL	
4	SUMPHI	High Sump Level	D,NO,AL	
5	AIRPRS	High Air Pressure Sensor	D,NO,AL	
6	DOOR	Building Door Closure Switch	D,NO,AL	
7	STPRHI	Air Stripper Sump High Level	D,NO,ST	
8	STPRLO	Air Stripper Sump Low Level	D,NO,ST	
9	LMPTST	Lamp Test Button	D,NO,ST,LAMP	
10	RESET	Reset Switch	D,NO,ST,STRT	
17	H2OFLO	Well #2 H2O Flow	A,EP,ST	0-50 GPM
18	H2OLVL	Well #2 Pressure Transducer	A,EP,ST	0-40 FT
19	PHTRNS	pH Transmitter	A,EP,AL	0-14

*INPUT SETUP NOTES

D - This input is a (Discrete) or ON/OFF Input.
A - This input is a (Analog) or Variable Input.
C - This input is a Pulse Flowmeter Input.
NO-This input is a (Normally Open) Discrete Input.
NC-This input is a (Normally Closed) Discrete Input.
EP-(Endpoint) This input is "Active" when its value is outside the low to high alarm levels.
WD-(Window) This input is "Active" when its value is between the low and high alarm levels.
ST-(Status) This input shows a green LED in ProView when it is in its Active State.
AL-(Alarm) This input shows a red alarm bell in ProView when it is in its Active State.
EMRG-This input performs an Emergency Shutdown.
STRT-This input performs a system Startup.
MANL-This input puts the system in Manual mode.
AUTO-This input puts the system in Auto mode.
LAMP-This input performs a Lamp Test.

THE DISCRETE OUTPUTS INCLUDED IN THIS SYSTEM ARE:

#	TAGNAME	TAGNAME DESCRIPTION	SETUP*
1	WPUMP1	Recovery Well Pump #1	
2	WPUMP2	Recovery Well Pump #2	
3	STRIPR	Air Stripper Blower	
4	TFPUMP	Transfer Pump	
5	MP_PWR	Metering Pump Power	
8	PRSALM	High Air Pressure Alarm	LT,AI
9	SMPALM	High Sump Alarm	LT,AI
10	PH_ALM	pH Alarm	LT,AI
11	MSTALM	Moisture Alarm	LT,AI
15	INTRDR	Intruder Alert	LT,AI
16	NORMAL	Normal Operation Indicator	LT,AI

*OUTPUT SETUP NOTES

G1-(Group 1)- This output will not respond to processes 17-32.

```
G2-(Group 2)- This output will not respond to processes 01-16.
LT-(Lamp Test) - This output has been declared as an alarm light.
AI-(Alternate Image) - This output is displayed as an icon other than the default switch.

THE ANALOG OUTPUTS INCLUDED IN THIS SYSTEM ARE:

#  TAGNAME              TAGNAME DESCRIPTION                    SETUP*    INPUT
-- ------- ---------------------------------------------- ---------- ------
1  VARPMP  Well Pump #2 Variable Speed Drive               PID,REV    H2OLVL
2  SEQ_MP  Sequestering Agent Metering Pump Rate           PRO,FOR    H2OFLO

*ANALOG OUTPUT SETUP NOTES
--------------------------
PID  -This output is involved in a PID (Proportional,Integral,Derivative) control loop.
PRO  -This output is involved in an open loop (Proportional) control scheme.
FOR  -The PID or PRO loop will run in the (Forward) direction.
REV  -The PID or PRO loop will run in the (Reverse) direction.
INPUT-This Tagname will serve as the input to the control loop.
```

Input and Output Configuration

The Inputs section identifies all enabled system inputs from 1 to 32 and describes how they are configured. The bracketed section of each input's notes is used as its Tagname description. The *notes* feature will be described later in this document. In addition, a Setup section further identifies each input in terms of its signal nature, analog (A) or discrete (D), its configuration if discrete as Normally Open (NO) or Normally Closed (NC), and its alarm displaying nature, Alarm (AL) or Status (ST). Discrete Inputs can also be configured as functions such as Startup (STRT) or Emergency Shutdown (EMRG), and can be used as a lamp tester (LAMP) which will illuminate any Discrete Outputs which are configured as lamps. A Range is specified for all Analog Inputs as well as the Active State region, denoted Endpoint (EP) or Window (WD).

See the ProControl manual for a description of Endpoint and Window Active States.

Other configurations which are not displayed on the printed configuration but are available in system setup include:

- Zero-clamped display – display will read zero instead of a negative number if less than 4 mA are received at the input.

- Totalization – whether or not a quantity (GAL) is accumulated from a rate measurement (GPM). Totalizer slope refers to the ratio of how often the totalizer is updated (fixed at 1 second) to the time value implicit in the input's dimensional units. In this case H2OFLO is recorded in GPM (gallons per *minute*). Since there are 60 seconds in one minute, the totalizer slope is set at 60.

- Pulse flow meter frequencies – the minimum and maximum pulse frequencies which correspond with the minimum and maximum flow rate capabilities of the meter.

The Discrete Outputs section is similar except that there are some different Setup codes. Some outputs may be assigned to groups (G1,G2) which affect the way they are viewed by the process tasks. Outputs which display an Alternate Image (lamp image) than the standard switch image are designated AI. Outputs which behave as lamps are designated LT to indicate that they will be illuminated as a result of a lamp test input entering its active state.

For a further explanation of Normally Open, Normally Closed, Groups and related terminology please see the relevant section of the ProControl Series II manual.

The Analog Outputs section details the setup of any enabled 4-20 mA output loops. There are two outputs in this section: VARPMP and SEQ_MP. The Setup codes PID and PRO indicate whether or not the output is involved in one of two analog output control schemes known as PID loops or open loop Proportional control. The direction of the analog output control scheme is indicated by forward (FWD) or reverse (REV). The input which provides the reference signal upon which the analog output scheme is based is designated under the INPUT heading.

For a further explanation of PID or open loop Proportional control please see the PID and PRO Options section of this manual.

In this particular setup, H2OLVL is the INPUT which indicates that in this PID loop, the variable speed pump VARPMP is using the water level H2OLVL to determine at what rate it should be pumping to maintain a "set point" water level. The setup section indicates REV for a reverse action PID loop. In other words, the analog output should respond in a sense opposite the corresponding analog input. In order to decrease the input (water level over the transducer), it is necessary to increase the pump rate.

The other analog output, SEQ_MP represents a metering pump output whose rate should depend on the system flow rate, H2OFLO, but in a proportional sense (PRO). Instead of using feedback to achieve a set point as in the PID loop, this control scheme is not feedback oriented but simply bases the analog output directly on the input with some proportionality constant.

Process Tasks

The next section of the file pertains to what are called process tasks. These determine how the ProControl unit responds to input changes while in Auto, Startup or Shutdown modes. It is important to note that the ProView software does not take any independent action itself. All control decisions are made by the ProControl unit.

```
THE PROCESS CONTROL TASKS EXERCISED BY THIS SYSTEM ARE:

Process 1: If HIWEL1 is ON  THEN
Delay for 5 Seconds, Switch WPUMP1 ON

Process 2: If LOWEL1 is ON  THEN
Switch WPUMP1 OFF

Process 3: If MOISTR is ON  THEN
Delay for 5 Seconds, Send Report[FAX #1;FAX #2;Page #1;Page #2], Initiate Shutdown, Switch MSTALM ON AND
NORMAL OFF
Page Message: 'ProControl Alert: Moisture Level High '


Process 4: If SUMPHI is ON  THEN
Delay for 5 Seconds, Send Report[FAX #1;FAX #2;Page #1;Page #2], Initiate Shutdown, Switch SMPALM ON AND
NORMAL OFF
Page Message: 'ProControl Alert: High Sump Alarm '

Process 5: If AIRPRS is ON  THEN
Delay for 5 Seconds, Send Report[FAX #1;FAX #2;Page #1;Page #2], Initiate Shutdown, Switch PRSALM ON AND
NORMAL OFF
Page Message: 'ProControl Alert: Air Pressure Alarm '

Process 6: If DOOR is ON  THEN
Send Report[FAX #1;FAX #2;Page #1;Page #2], Switch INTRDR ON
Page Message: 'ProControl Alert: Intruder Alert '

Process 7: If H2OFLO is Low AND WPUMP2 is ON  THEN
```

```
Send Report[FAX #1;FAX #2;Page #1;Page #2], Switch NORMAL OFF
Page Message: 'ProControl Alert: Low Flow in Well #2 '

Process 8: If PHTRNS is ON  THEN
Delay for 5 Seconds, Send Report[FAX #1;FAX #2;Page #1;Page #2], Initiate Shutdown, Switch PH_ALM ON AND
NORMAL OFF
Page Message: 'ProControl Alert: pH Alarm '

Process 9: If MOISTR is OFF AND SUMPHI is OFF AND AIRPRS is OFF AND H2OFLO is OFF AND PHTRNS is OFF  THEN
Switch NORMAL ON

Process 10: If STPRHI is ON  THEN
Delay for 5 Seconds, Switch TFPUMP ON

Process 11: If STPRLO is ON  THEN
Switch TFPUMP OFF

Startup 1:
Switch STRIPR ON

Startup 2:
Delay for 10 Seconds, Switch WPUMP2 ON AND MP_PWR ON

Startup 3:
Switch PRSALM OFF AND SMPALM OFF AND PH_ALM OFF AND MSTALM OFF AND INTRDR OFF

Shutdown 1:
Switch WPUMP1 OFF AND WPUMP2 OFF AND TFPUMP OFF AND MP_PWR OFF

Shutdown 2:
Delay for 1 Minute, Switch STRIPR OFF
```

This sample site has a fairly straight-forward process flow. On startup, some of the system outputs are switched on sequentially and all alarm indicators are switched off. On shutdown, all outputs are turned off and a FAX message is generated. The process tasks are mostly self-explanatory. It is important to remember how and when the process tasks are run:

- Process tasks are run continuously while the ProControl unit is in AUTO mode. No automatic action is taken in MANUAL mode.

- Startup and shutdown processes are run in sequence. When the Startup sequence is finished the unit is placed in AUTO mode and the Process Tasks are run. If any Startup process in the sequence fails, then all the non-lamp outputs are turned "OFF" and the unit reverts to MANUAL mode. A Startup process fails when any IF condition is not satisfied for 60 seconds after the Startup process begins. The Startup sequence begins when the ProControl or ProView operator initiates it. The Startup sequence can also begin when power is first applied to the ProControl unit if the "Auto Startup" option has been enabled.

- The Shutdown sequence works in a similar manner. When the Shutdown sequence is finished, the ProControl unit reverts to MANUAL mode. If any Shutdown process in the sequence fails (is not run after 60 seconds), then all the non-lamp outputs are immediately turned "OFF" and the unit reverts immediately to MANUAL mode. The Shutdown sequence can be initiated either by the ProControl or ProView operator or by a process task (Processes 3, 4, 5, and 8 do this in our example).

Process Capability

The ProControl runs process tasks which are based on Boolean "AND" logic. There are 64 available processes, 16 of which can be used as part of a startup sequence, and 16 of which can be used as part of a shutdown sequence. There is no Boolean "OR" command in ProControl logic. If alternate conditions should perform the same task, more than one process will be necessary. Each process has the following capability:

- Can be based on many simultaneously existing I/O conditions
- Include short or long delays for de-bouncing or simple time delay
- Use memory variables for linking processes
- Cycle outputs with timers or during certain specific times of the day
- Perform system shutdowns
- Send reports to fax and/or pagers

If you wish to modify the ProControl programming, please contact us for assistance.

CHAPTER 3: ESTABLISHING COMMUNICATION

This chapter explains how to connect ProView to the ProControl unit by local serial cable and by remote modem.

By itself, ProView does not reveal very much about your site. It must be connected to the ProControl unit in order to yield any data.

Local Connection

To establish a local connection, run through the following steps:

1. Use the local serial cable supplied with ProView to connect the computer which you are using to a ProControl unit. One end of the cable terminates with a female 9-pin connector. Use this end to plug into the serial port on your computer. If the COM port on your computer is a 25-pin connector, you need a 25-pin (DB25) to 9-pin (DB9) adapter. *This is not supplied with ProView.* The other end of the serial cable is terminated with a 6 pin RJ-11 "telephone" connector. Use this connector to plug into the right hand side of the ProControl unit. You must first remove the cable which connects the ProControl's modem to the ProControl unit itself.

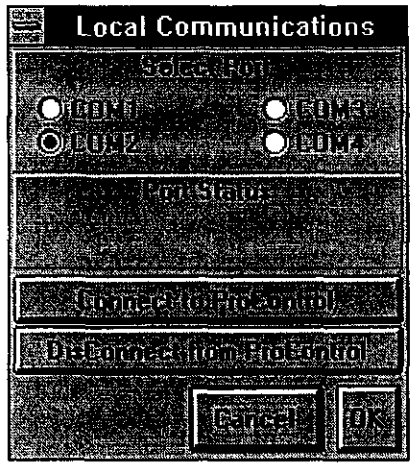
   Warning: Be sure and reconnect the modem cable to the ProControl unit after you are finished. If you do not, no remote communications will be possible.

   Warning: If the ProControl unit or modem is powered OFF for any reason, make sure they remain connected for the first 45 seconds after power up before unplugging the cable to attempt a local connection. Otherwise the modem may not be properly configured.

2. Pull down the Communications menu. Click on Local. You can also use ALT-C.

   Or

   Click on the Local Connect Toolbar button. 
   You will see the Local Communications dialog box.



3. Select the COM port to which the ProControl is connected by clicking on the "radio button" next to the COM port you want to use. COM ports 1 through 4 are supported.

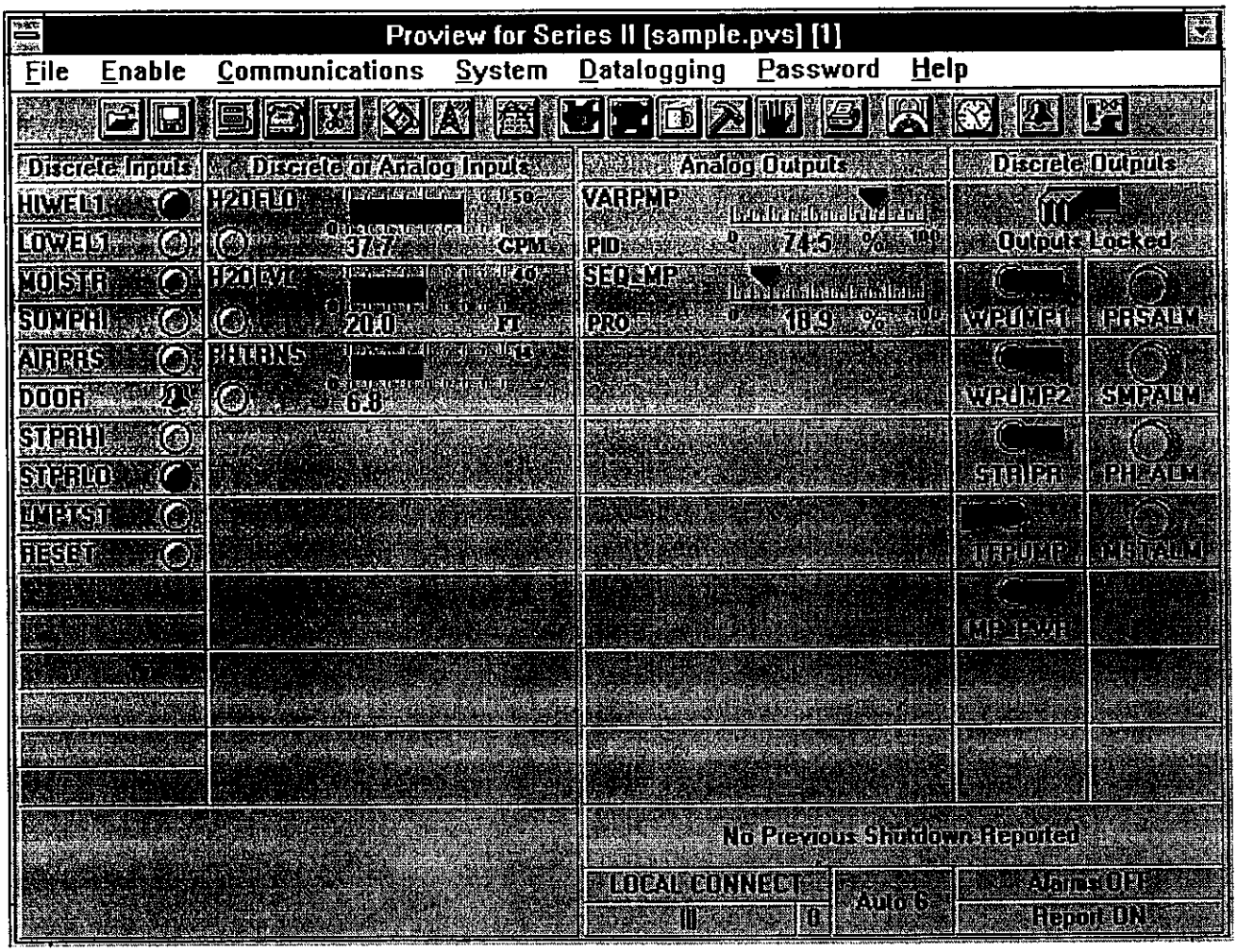
4. Click on the Connect to ProControl button.

5. You will see status messages in both the Port Status area of the Local Communication dialog box and in the leftmost information box on the main screen. Usually you will see Trying Local... followed by LOCAL CONNECT if the attempt is successful. If the attempt is unsuccessful you will see message boxes outlining the suspected problem.

6. After connecting, click on the OK button to get rid of the Local Communications dialog box.

After establishing a local connection, ProView will perform an initial scan of site conditions. This will take a few moments during which time the mouse pointer will turn into an hourglass. After the initial scan, updates will occur every 2 seconds or so.

Below is a view of the main screen after a local connection has been established.



Notice that the screen has been updated to reflect the current operating conditions at the site. At the bottom of the screen, the message boxes have been filled in as well.

Remote Connection

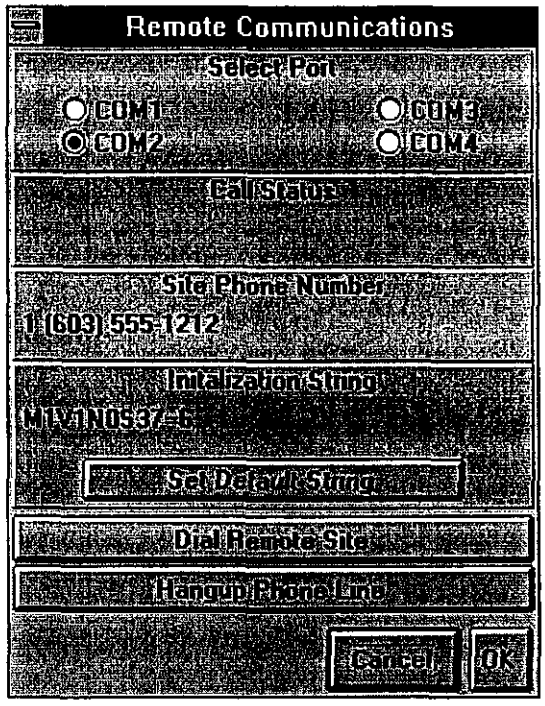
For a remote connection, the procedure is a little different. Follow these steps:

1. Make sure that your modem is connected properly to your computer's serial port by following the manufacturer's instructions. Don't forget to plug the phone line into your modem. Your modem must be Hayes compatible and capable of operation at 2400 baud.

2. Pull down the Communications menu. Click on Remote. You can also use ALT-C.

   Or

   Click on the Remote Connect Toolbar button. 
   You will see the Remote Communications dialog box.



3. Select the COM port to which your modem is connected by clicking on the "radio button" next to the COM port you want to use. COM ports 1 through 4 are supported.

4. Check to see if the Site Phone Number is the one you want to dial. If not, click on the phone number text and change it.

5. Examine the Initialization String to see if it is correct for your type of modem. An "AT" is automatically sent before the initialization string. If you are unfamiliar with "AT" commands, the default of M1V1N0S37=6 will usually work just fine if you have a 9600 or 14400 baud modem. If not, enter the AT commands which will force your modem to connect at 2400 baud. Higher speeds are fine but unnecessary and may make communication less reliable over noisy phone lines. If you are using a strictly 2400 baud modem then you will probably get an error if you use the

M1V1N0S37=6 string. Use M1V1 instead. You may want to consult your modem's manual for further details on which "AT" commands it supports. If you need to change the initialization string then click on the initialization string text and edit it.

6. Click on the Dial Remote Site button.

7. You will see status messages in both the Call Status area of the Remote Communication dialog box and in the leftmost information box on the main screen. Usually you will see the following messages:

Trying Remote...	ProView is attempting to contact the modem
OK	ProView has successfully connected to the modem
Setup...	ProView is sending the Initialization string to the modem
Dialing...	ProView is dialing the site phone number
CONNECT 2400	Connection has been established with the remote modem
REMOTE CONNECT	Connection has been established with the remote ProControl unit

8. If the attempt is unsuccessful you will see message boxes outlining the suspected problem.

9. After connecting, click on the OK button to get rid of the Local Communications dialog box.

Ending a Connection

The simplest way to end a connection, to hang up in essence, is to click on the Disconnect button on the Toolbar.  This works for either a local or remote connection.

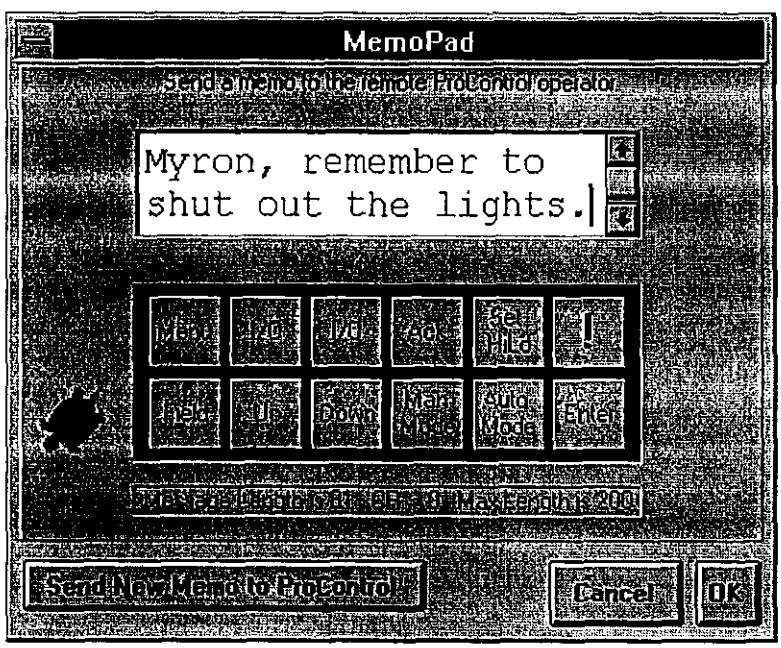
Alternatively, you can re-open the Local or Remote Communications dialog box and click on either the Disconnect button (Local) or the Hangup button (Remote). After ending the connection, you should see NOT CONNECTED in the lower center message box. 

Sending a Memo

A useful feature of the ProControl Series II is the ability to transmit short memos to a site operator. From ProView, you can send a 200 character message to the LCD of the ProControl unit. The site operator must acknowledge your memo before returning to his normal display. The goal of this feature is to aid in communicating with a person at the site while the phone line is in use for a connection to the ProControl.

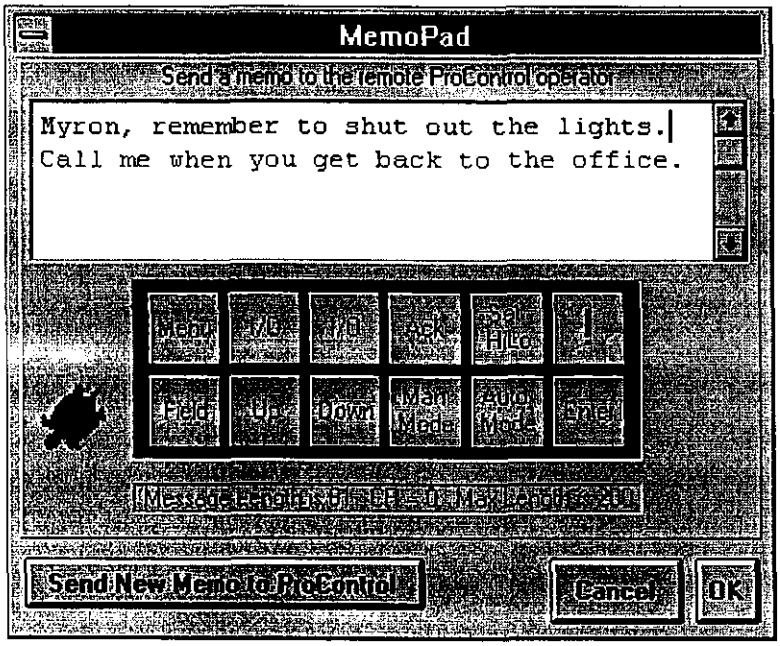
To send a memo, follow these steps:

1. Pull down the Communications menu and select the menu item Send Memo



2. Type your memo onto the screen of the MemoPad, which is a visual representation of the ProControl unit. It will appear on the ProControl LCD exactly as it appears to you on the MemoPad, two lines at a time. Words will automatically wrap around to the next line, but you may enter <CR> (Carriage Return) characters to immediately jump to the next line if it is necessary. However, the fewer <CR> characters you use, the longer the text message you can type, since each <CR> represents 20 characters. The Message Length counter will keep track of the number of text and <CR> characters you have used. The Max Length counter will decrease to let you know how many more characters can be entered.

3. You can view your memo at a magnified scale if you wish. By clicking the right mouse button when the pointer is over the text window, the text window will become significantly wider for you to edit larger memos without having to scroll up and down. To toggle back to the de-magnified view, repeat this procedure.



4. Once completed, you may click the Send New Memo to ProControl button to display the memo on the ProControl LCD, OK to save the memo but not transmit it, or Cancel to abort the entire procedure.

5. The Ack button on the MemoPad will flash red to indicate when the ProControl operator has acknowledged your memo. Your computer's speaker will also beep to accompany this visual indication.

CHAPTER 4: MANAGING YOUR SITE

This chapter explains how to change the way your ProControl system operates by switching between Manual and Automatic modes, initiating a startup or shutdown sequence and changing other key system parameters.

Switching Between System Modes

There are four modes of operation for the ProControl Series II: Manual, Automatic, Startup and Shutdown. To initiate a switch to a different mode, simply click on the appropriate Toolbar button  or click on the Systems menu and then on the Process Operations sub menu.

AUTOMATIC Mode:  Click on the AUTO Mode button on the Toolbar (The Coffee Cup). Alternatively, Click on the Systems menu, then on the Process Operations sub menu and finally on the Auto Mode sub-sub menu.

MANUAL Mode:  Click on the MANUAL Mode button on the Toolbar (The Hammer). Alternatively, Click on the Systems menu, then on the Process Operations sub menu and finally on the Manual Mode sub-sub menu.

STARTUP Mode:  Click on the STARTUP button on the Toolbar (The Green Traffic Light). Alternatively, Click on the Systems menu, then on the Process Operations sub menu and finally on the Startup System sub-sub menu.

SHUTDOWN Mode:  Click on the SHUTDOWN Mode button on the Toolbar (The Red Traffic Light). Alternatively, Click on the Systems menu, then on the Process Operations sub menu and finally on Shutdown System sub-sub menu.

EMERGENCY SHUTDOWN:  Click on the Emerg OFF button on the Toolbar (The Red Hand). Alternatively, Click on the Systems menu, then on the Emergency OFF! sub menu.

You can monitor the current system mode by examining the message box at the bottom of the main screen.

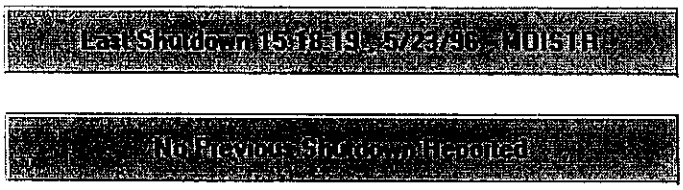
The system is currently in Manual mode.

The system is currently in Auto mode, the last process task run was process task #1.

The system is currently in Startup mode, the last startup task run was startup task #1.

The system is currently in Shutdown mode, the last shutdown task run was shutdown task #1.

In addition you can monitor the last action to initiate the Shutdown mode by examining the lower right-hand message box.



System Operations

There are several other important system parameters which can be set by ProView.

Date & Time

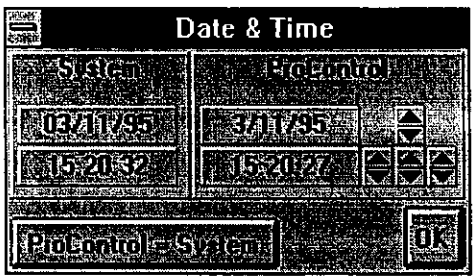
The ProControl unit keeps a Date and Time clock which it uses to time stamp datalogging information and other important system events.

To set the Date & Time:

1. Pull down the Systems menu. Click on System Operations. Then click on System Time. You can also use ALT-S.

   Or

   Click on the System Time Toolbar button.  You will see the Date & Time dialog box.



2. On the left side of the dialog box in the System panel is the current date and time according to your PC. On the right side of the dialog box in the ProControl panel is the date and time according to the ProControl unit. The two clocks should not vary by more than a few minutes. Follow the procedure outlined below if you need to change the time.

3. To set the ProControl's clock equal to the PC's clock click on the ProControl = System button.

4. To set the ProControl's clock to a specific time use the time spinners  to change the ProControl's clock. The upper spinner changes the date and lower set of three spinners change the hour, minute and second (left to right respectively).

5. To set your PC's time (System time) use the Program Manager in Windows.

If you are not connected to the remote unit then the ProControl panel in the Date & Time dialog box is disabled.

Note: Daylight Savings Time is not supported. You will need to make any necessary changes manually.

Warning: Changing the time by a large amount can lead to discontinuities in the datalogging history of your ProControl unit.

Alarms

An alarm is an audible indication to the operator that an input signal is in its "active state".

On the ProControl unit, the beeper sounds if the "Alarms" are "Set", the unit is in manual mode and an input is in the active state. The Alarm continues to sound until it either is acknowledged by the operator or times out by itself.

In ProView, a "Beep" sounds from the PC speaker if the "Alarms" are "Set", and an input that has been configured as an "Alarm Input" enters the active state. No acknowledgment is necessary.

The current state of the alarms can be monitored by the message box at the bottom right of the main screen. 

To change the current Alarm state:

Pull down the Enable menu. Click on the Alarms sub menu choice. The sub menu reads 'Set Alarms' if the alarms are OFF and 'Turn Alarms OFF' if the alarms are Set. You can also use ALT-E to reach the Enable menu.

Or

Click on the Alarms Toolbar button.  If the Alarms are Set then they will be turned off. If they are off, then clicking the button will set them.

If you try to change the Alarm state and ProView is not connected to the remote ProControl unit then a message box appears.

Remote Reporting

A report is a FAX or a page message sent by the ProControl unit. In order for any reporting to occur, Remote Reporting must be enabled. The current status of Remote Reporting is indicated at the bottom right of the main screen. 

To enable or disable remote reporting:

1. Pull down the Enable menu from the menu bar.

2. If Remote Reporting has a check mark next to it then Remote Reporting is enabled. To disable Remote Reporting click on the word Remote Reporting.

3. If Remote Reporting does not have a check mark next to it then Remote Reporting is disabled. To enable Remote Reporting click on the word Remote Reporting.

Log Off Remote User

This function is used occasionally to reset the remote ProControl's LCD screen to the password menu. It is used to ensure that password protection remains in effect for the ProControl unit.

To Log Off the remote user:

Pull down the Systems menu. Click on System Operations. Then click on the Log Off Remote User sub-sub menu. You can also use ALT-S to reach the Systems menu.

Initiate FAX NOW!

This function is the equivalent of pressing FAX NOW on the ProControl unit. It is used to generate and send an immediate FAX report to the currently enabled FAX numbers. FAX reports must be enabled in the System FAX Report dialog box and ProView must be connected via modem (remotely) for this command to proceed.

Since both the modem and FAX system of the ProControl use the same telephone line, ProView will disconnect from the ProControl unit (hangup) after issuing this command to free the remote phone line for FAX use. Normal FAX back operations and times will not be affected.

To initiate an immediate ProControl FAX back:

1. Pull down the Systems menu. Click on System Operations. Then click on Initiate FAX NOW! sub sub menu. You can also use ALT-S to reach the Systems menu.

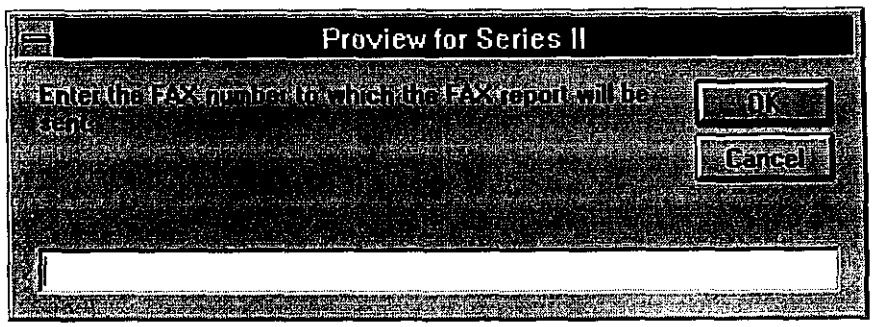
2. ProView will disconnect from the ProControl unit after issuing this command.

Initiate New FAX NOW!

This function is identical to Initiate FAX NOW! except that you can specify a number which is not currently part of the ProControl's configuration. This feature is useful for sending an immediate fax report to someone who does not receive regular fax reports but would like an occasional update.

To initiate a New FAX NOW:

1. Pull down the Systems menu. Click on System Operations. Then click on Initiate New FAX NOW!



2. ProView will alert you first that you will be disconnected from the system in order for the fax to proceed. Then you may enter the FAX number to which the fax report will be sent. Enter the number and click OK to proceed, or Cancel to abort. Don't forget to use "1" and the area code or other appropriate prefix if it is a long distance call from the remote site.

Trend Graphing

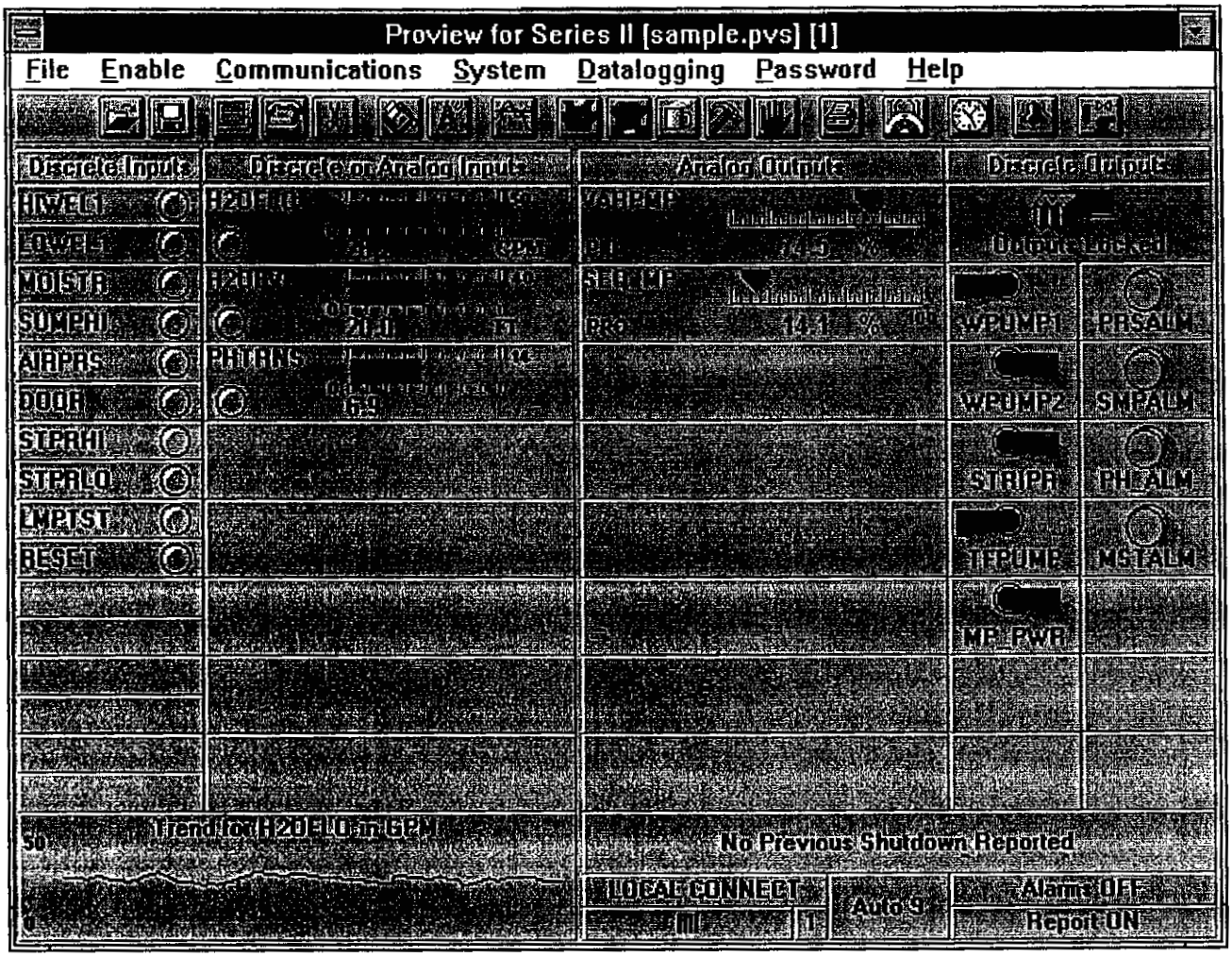
ProView can also perform real-time trend graphing while you are connected either locally or remotely to the ProControl. A 5-minute trend can be displayed in the lower left hand side of the ProView window.

To start trend graphing:

1. Position the mouse at an analog input or analog output tagname.

2. Click the right mouse button until the Balloon that appears contains the word "Trend". Then click the left mouse button to select Trend.

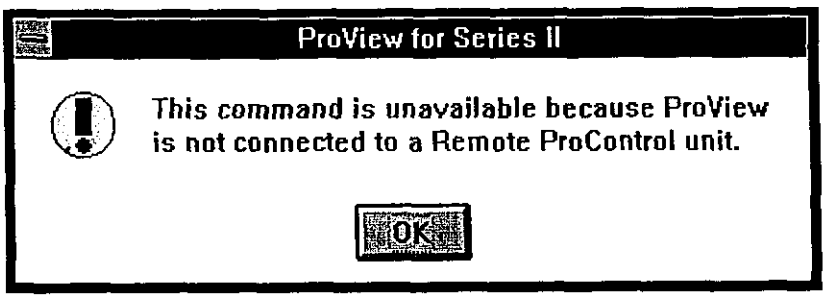
3. The trend will be updated as long as you are connected to the ProControl. If you wish to observe another trend, repeat this procedure and the new trend will replace the old trend.



4. To stop trending and return the panel to its original empty state, click on the word "Trend" in the trend panel.

CHAPTER 5: CHANGING SYSTEM PARAMETERS

This chapter explains how to alter operational data such as the state of a discrete output, analog alarm levels and FAX and Datalogging setups. Almost all of these changes must be attempted while ProView is connected to the remote ProControl unit. If you are not connected you will see a message like the one below reminding you to connect before attempting a change.



Switching an Output State

The state of a discrete output can be changed manually by clicking on the virtual "switch" associated with its Tagname. If the switch is on the left hand side and gray then the output is "OFF". If the switch is on the right hand side and green then the output is "ON". You must also have the outputs "Unlocked" in order to make any output changes. The outputs can be locked and unlocked by clicking on the virtual "slide switch" at the top of the discrete output section of the main screen.

The Output Lock feature is included to prevent inadvertent output changes. You should leave the slide switch in the Locked position whenever possible.

Keep in mind that if the ProControl unit is in Auto mode any discrete output change you make may be "overridden" by a process control task in effect. Make sure that you are familiar with such possibilities or switch to Manual mode before changing the state of a discrete output.

1. 

To change the state of a discrete output click on the virtual toggle switch.

2. 

The toggle switch will change positions and append a "?" after the Tagname. This indicates that the command was sent to the remote unit but that confirmation of the state change has not yet been received. You will not be able to make any other changes to this output until the confirmation has been received.

3. 

The "?" will disappear after confirmation of the state change has been received from the ProControl unit.

Depending on your site configuration, you may be able to change options that affect how the discrete outputs in your system operate in Automatic mode.

Process Groups

If your site has been configured for Process Groups, then you can switch between Group 1 and Group 2. Process Groups are a way to allow a particular discrete output to respond only to a certain group of process tasks. This is usually used when, for instance, you have a pump that sometimes pumps water to one treatment unit and at other times pumps to a second treatment unit. If something should cause a shutdown of the first treatment unit you may want only those pumps currently pumping to the first treatment unit to be shutdown. Process Groups give you the ability to make that distinction.

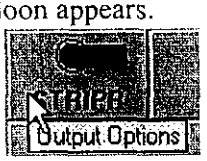
Output Cycle

As part of your site configuration, a discrete output may have been set up as a "Switched" output. This option gives your site the ability to cycle an output on and off continuously at a duty cycle specified in the output options dialog box. It can also give your site the capability to restrict a process task's control over particular discrete output to certain times of the day.

Output Options

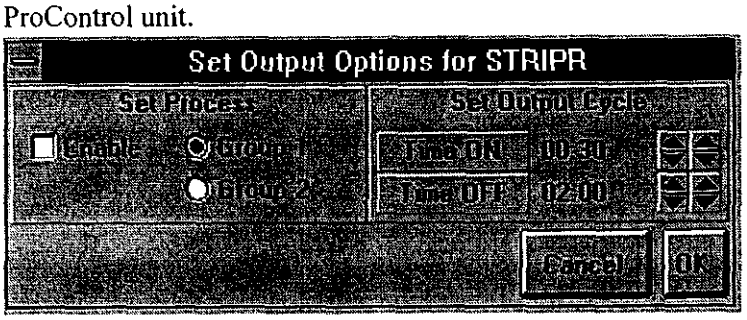
To change an output option proceed through these steps:

1. Place your mouse pointer over the output's Tagname until a balloon appears. Click the *right* mouse button until "Output Options" balloon appears.



2. Click the *left* mouse button.

3. You will see the Set Output Options dialog box. The Set Process or Set Output Cycle panels may not be visible if those options do not apply to your site. Both panels will be disabled if ProView is not connected to a ProControl unit.



To change Process Groups click on either the Group 1 or Group 2 radio buttons in the Set Process panel.

1. To change the Output Cycle times click on the time you want to change and enter the new time in an hours:minutes format. Alternatively, click on the up or down spin buttons to increase or decrease the time you want to change.

2. Click on the OK button to confirm the changes and send the to the ProControl unit. Click on Cancel to get rid of any changes.

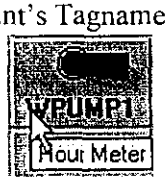
3. If you click on the OK button and are not connected to the remote ProControl unit then a message box appears warning you of that condition. Your changes are not saved.

Hour Meters

Hour meters give you the ability to know exactly how long an input or output has been ON as well as how long it has been OFF. For analog inputs, these hour meters indicate the time the input has been in and out of its *Active State* (for an explanation of Active State, see the accompanying ProControl Series II manual). This information is useful for monitoring electrical consumption or for projecting equipment replacement time. These Hour Meters are updated every second on the ProControl unit. The displayed time resolution will be tenths of minutes.

To read the Hour Meters, follow these steps:

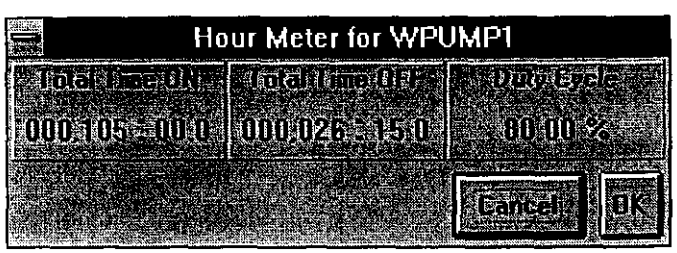
1. Position the mouse pointer over the I/O point's Tagname until a balloon appears.



2. Click the right mouse button until the balloon reads "Hour Meter".

3. Once the appropriate balloon appears, click the left mouse button. The Hour Meter dialog box appears.

4. The Hour Meter box contains information in the form of **Hours:Minutes.10th Minutes** for both ON time and OFF time. The "Duty Cycle" or ratio of ON time to total time is also displayed. It may take a few seconds for the display to be updated once the dialog box appears.



5. To edit the Total "ON" time or the Total "OFF" time click on the total time text and make the required changes. The time text will become highlighted when you click on it and must remain highlighted for you to edit it.

6. When you have finished editing either the Total Time "ON" or "OFF" hit the enter key to confirm the changes and send the new value to the ProControl unit.

7. Move the cursor away from the text areas so that it again becomes a pointer shape to enable new hour meter updates from the ProControl unit.

Notes

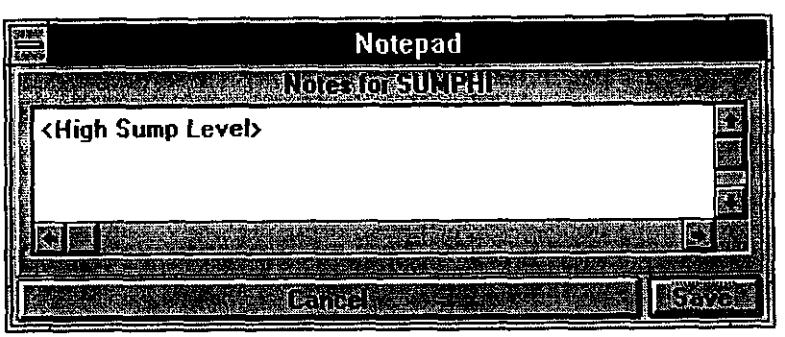
Each I/O point can have its own set of associated notes. You can attach notes which explain the functional purpose of the I/O point or define the I/O point in more detail. This can eliminate some confusion which results from the limitation of six characters in each point's tagname.

To edit an I/O point's notes follow this procedure:

1. Position the mouse pointer over the I/O point's Tagname until a balloon appears.

2. Click the right mouse button until the tag-descriptive balloon also contains the word "Notes".

3. Click the left mouse button to enter the "Notes" feature. The Notepad dialog box appears.



4. Click in the Notes window to edit any notes. The notes enclosed in angle-brackets (i.e. <note>) will also appear at the top of the main screen when the cursor is placed over the tagname of an I/O point.

5. Press Save to save your notes and/or definitions or press Cancel to exit without saving. You must also save the site file before exiting ProView to retain any changes made in Notes.

Analog Alarm Levels

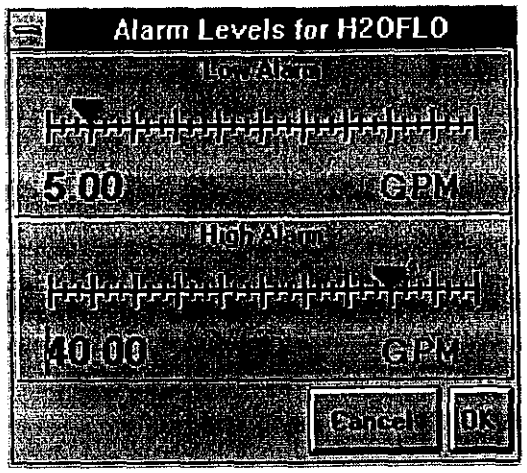
The analog alarm levels define what parts of an analog input's range are considered "active" and which are not. This affects not only the color of LED's and bar graphs on the main screen but also can affect process operations if the analog input is used in a process task.

To set an analog alarm level follow the procedure outlined below.

1. Position the mouse pointer over the analog I/O point's Tagname until a balloon appears.

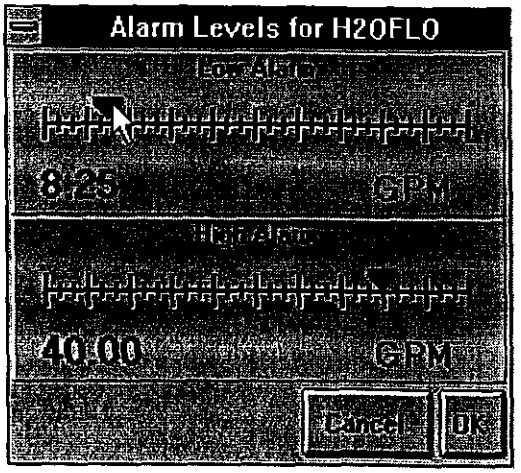
2. Click the *right* mouse button until the balloon reads "Alarm Levels".

3. The Alarm Levels dialog box appears.



4. The present alarm levels are shown in text as well as in the position of the sliders. The low alarm level is shown in the upper half of the dialog box while the high alarm level is shown in the lower half of the dialog box.

5. To change the current alarm level click and hold on the red pointer part of the slider and move your mouse to the left or right. Move the mouse to the left to decrease the alarm level or to the right to increase the alarm level. As you move the slider the text display is updated with the new current value of the alarm level. If you try and move the low alarm level higher than the high alarm level the slider "snaps back" to a level equal or just below that of the high level after you release the mouse button. If you try and move the high alarm level lower than the low alarm level the slider "snaps back" to a level equal or just above that of the low level after you release the mouse button.



6. Another way to change an alarm level is to click on the alarm level text and then type in a value for the new alarm level. If you press the enter key after entering the new alarm level then the alarm level is updated and the new value is sent to the ProControl unit if ProView is connected to it.

If ProView receives an updated alarm level from the ProControl unit, it will update the Alarm Levels dialog box with the new information. If you are in the middle of changing an alarm level your changes may be overwritten by the newly received alarm level. This can happen if someone is changing the alarm levels on the ProControl unit through its LCD display and keypad at the same time you are viewing the alarm levels with ProView. It also happens every 30 to 40 seconds when ProView initiates a new full scan of ProControl data.

7. Click on the OK button to confirm the changes and send them to the ProControl unit. Click on Cancel to get rid of any changes.

8. If you click on the OK button and are not connected to the remote ProControl unit then a message box appears warning you of that condition. Your changes are not saved.

Totalizers

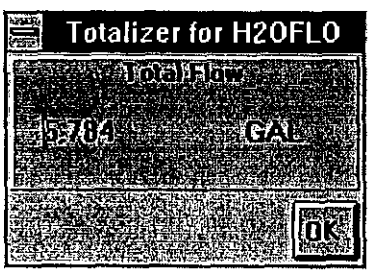
If your site configuration includes an analog input to which a flow meter is connected, it may also include a totalizer. Totalizers give you the ability to view the cumulative total of a flow-based analog input.

To view the totalizer for a flow-based analog input:

1. Position the mouse pointer over the analog input's Tagname until a balloon appears.

2. Click the *right* mouse button until the balloon reads "Alarm Levels". If this balloon never appears then this input is not configured to provide totals.

3. Press the *left* mouse button to see the Totalizer dialog box.



4. The Total Flow for this input since the totalizer was last reset is displayed. It is updated every second while the dialog box is visible and while ProView is connected to the ProControl unit.

5. If you would like to set the totalizer to a different value then click on the value displayed in the dialog box. Enter the new value for the totalizer and press the enter key.

6. Click on the OK button to close the Totalizer dialog box.

PID and PRO Options

Analog outputs can be involved in one of two different control schemes. The first is known as a PID loop and is a common control strategy which employs feedback to achieve a stable, desired input set point by continuously modifying an associated variable output. The second control scheme is known as an open loop proportional (PRO) output. In this scheme, there is no feedback and no setpoint. However, the analog output is related to an input signal by some proportionality constant.

You can modify the PID parameters of a PID controlled analog output (the Proportional, Integral, and Derivative gains) if your analog output is not responding smoothly or quickly enough to changes in its associated input. The Proportional gain specifies the output level based on the error signal produced between the Set Point (desired input level) and the actual input level. Integral gain smoothes the output level based on the tracking history of the input to the Set Point and provides a means of good steady state control. Derivative gain will allow the output to respond to quick changes in the input and provides a means of establishing good transient or instantaneous control.

In the case of a PRO output, you can modify the constant of proportionality to change the amount the output depends on its controlling input. A value of 100 indicates that the output should be 100% when the input is at full scale.

The Max Change parameter allows you to regulate how much the analog output can change in one control cycle (one control cycle is about 1/4 of a second).

To change the PRO or PID parameters, Set Point, or Max Change parameters:

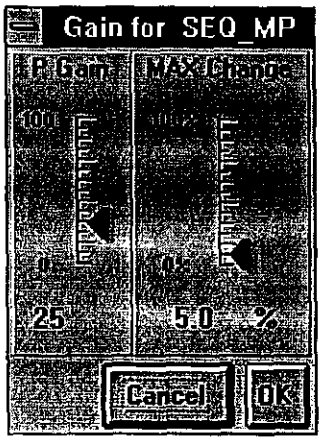
1. First make sure that the analog output is in Manual mode. If the text beneath the Tagname reads "Manual" then proceed. If not, click the word PID (or PRO) and wait a second for it to change to Manual.

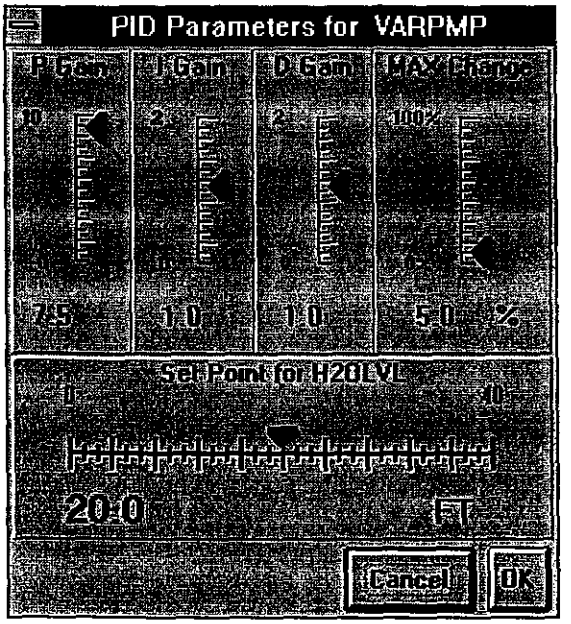
   Note: If the analog output is still engaged in a PID or PRO algorithm when you make changes to its gains, whatever piece of equipment is connected to it may be damaged from large output swings. Be sure to place the output in Manual mode first!

2. Position the mouse pointer over the analog output's Tagname until a balloon appears.

3. If the balloon reads "PID Options" then proceed to the next step. If not, click the *right* mouse button until the correct balloon appears.

4. Press the *left* mouse button to enter the PID Parameters dialog box.





1. To change any of these parameters you can either click and drag the sliding scale or click the text area and enter the value through the keyboard. You can also change the upper limit on all of the gain scales. If you change the upper limits, the slider's position will change accordingly so that its position correctly relates to the lower and upper limits displayed.

2. If you wish to save your changes, click the OK button. If not, click the Cancel button.

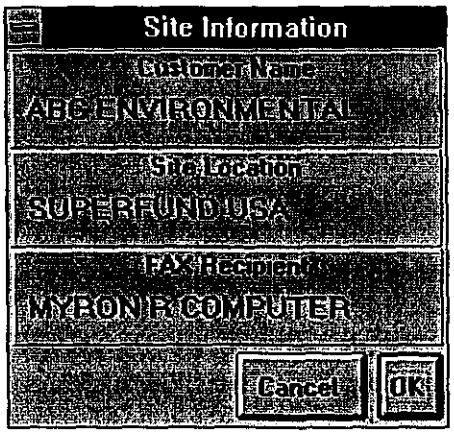
3. To restart your PID loop, click the word Manual underneath the Tagname and wait a second for it to change to PID. Your new parameters are now being used.

Site Information

Site Information is site identification data used in the FAX report and in the various files printed by ProView.

To view or change the Site Information proceed through the following steps:

1. Pull down the File menu. Click on Site Information. You can also use ALT-F. The Site Information dialog box appears.



2. To change the Customer Name, Site Location or FAX Recipient click on the text you want to change and enter the new text. Only uppercase letters, numbers and blank spaces are allowed.

3. Click on the OK button to confirm the changes and send them to the ProControl unit. Click on Cancel to get rid of any changes.

4. If you click on the OK button and are not connected to the remote ProControl unit then a message box appears warning you of that condition. Your changes are not saved.

FAX Report Setup

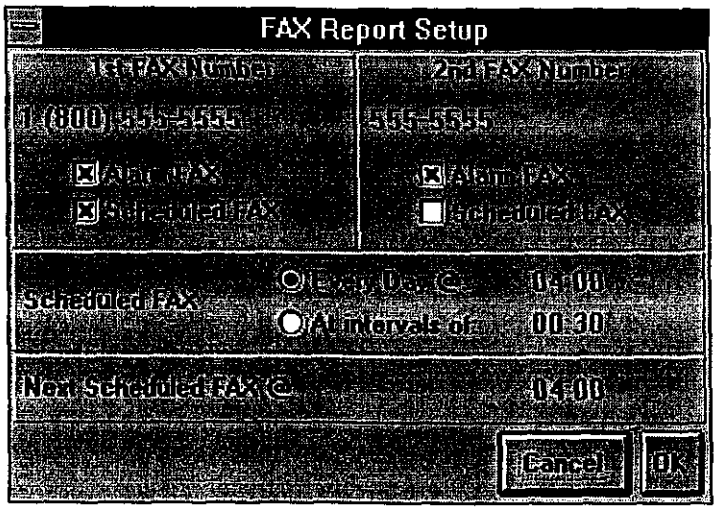
This setup screen is used to change when and where the ProControl's FAX report is sent. You can also disable the FAX report entirely.

To view or change the FAX Report Setup proceed through the following steps.

1. Pull down the Communications menu. Click on FAX Report Setup. You can also use ALT-C.

   Or

   Click on the FAX Report Setup Toolbar button.  You will see the FAX Report Setup dialog box.



2. If Remote Reporting is not enabled, the contents of the dialog box will appear "grayed out" or disabled.

3. The first and second FAX number panels determine where and what kinds of FAX reports are sent by the ProControl unit. There are two kinds of FAX reports generated by the Series II. A scheduled FAX report occurs on a regular basis while an Alarm FAX Report can only occur when a Process Task or shutdown is completed. Whether a Process Task does in fact send a FAX report depends on your site configuration. To enable either kind of FAX report click on the Alarm or Scheduled check box and make sure it contains an "X". To disable FAX reports click on the appropriate check box and make sure it does not contain an "X". If you enable Scheduled FAX reports the Alarm FAX reports for that same number are automatically enabled for you. You can not enable only Scheduled FAX reports.

4. To change the phone number to which the ProControl will FAX reports click on the phone number text and enter any required changes. You can use delimiters like parentheses and dashes to make the phone number easier to read. The ProControl can FAX to two different phone numbers. It will make up to three attempts to send the FAX. If the first try is unsuccessful, the second try shall be initiated 5 minutes later. If the second try is unsuccessful the third try will be 10 minutes after the first. If the third try is unsuccessful the faxback attempt shall be abandoned. The ProControl will try both phone numbers (if they are both enabled) on the first try before moving on to a second attempt.

5. The Scheduled FAX panel determines what kind of FAX report schedule is maintained. To select a daily FAX report click on the Every Day @ button. Then click on the text just to the right of the button and enter the time you would like the FAX report to be sent. The time is in 24 hour format so enter 17:00 for instance for 5 p.m. or 00:30 for 12:30 a.m. To select a shorter periodic interval for FAX reports click on the At Intervals of button. Then click on the text just to the right of the At Intervals of button and enter the time between FAX reports. To establish a FAX report every hour you would enter 01:00. The smallest interval you can enter is 30 minutes or 00:30.

6. The Next Scheduled FAX variable is set by the system every time a scheduled FAX report is completed to show you when the next FAX will be sent. You can also change it yourself if, for instance, the ProControl is set to FAX every hour but you would like it to skip a few hours before

resuming the FAX reports. To set the Next Scheduled FAX time click on the time text in that panel and enter the new time in 24 hour format. *Warning: If you enter a Next Scheduled FAX time that is earlier than the current time as determined by the ProControl's clock you will prevent any scheduled faxes from occurring until the next day at that time.*

7. Click on the OK button to confirm the changes and send them to the ProControl unit. Click on Cancel to get rid of any changes.

8. If you click on the OK button and are not connected to the remote ProControl unit then a message box appears warning you of that condition. Your changes are not saved.

Paging Setup

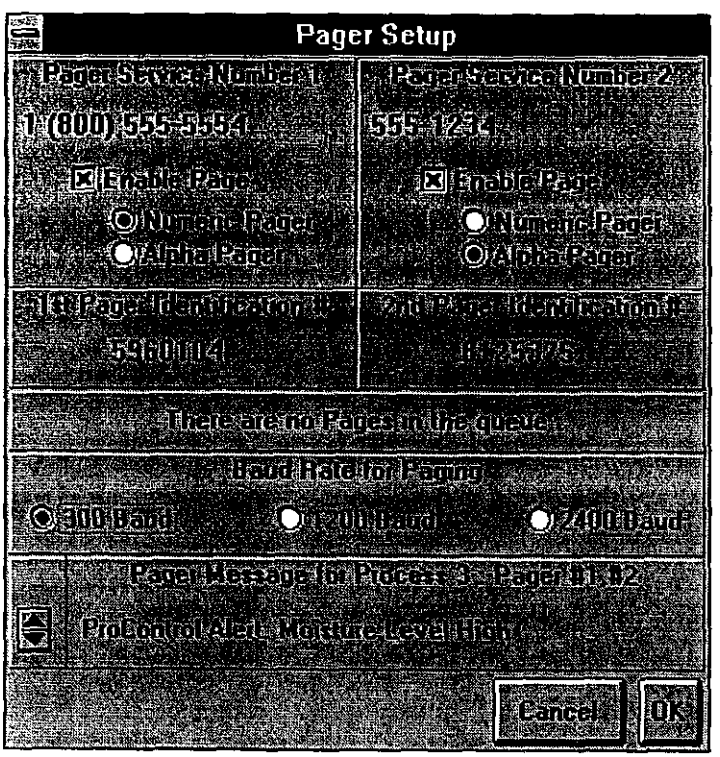
This setup screen is used to change the information pertaining to the two hand-held pagers which can be alerted by the ProControl if a specific event occurs (i.e. system shutdown). You will probably need to contact your paging service directly to obtain some of this information.

To view or change the Paging Setup proceed through the following steps:

1. Pull down the Communications menu. Click on Paging Setup. You can also use ALT-C.

   Or

   Click on the Paging Setup Toolbar button.  You will see the Paging Setup dialog box.



2. The Paging Setup dialog box contains a panel for the Paging Service Number. This number is a modem dial-up which dispatches the page regardless of whether your pager is alphanumeric or numeric. Most paging service customers with numeric pagers do not know this number. You will need to contact your paging service directly to obtain it.

3. To change the paging service number click on the phone number that appears in the panel. You may then edit it as you would in any text editor. You may use parentheses or hyphens if you so choose.

4. In order to enable your paging service number, you need to make sure the Enable Page checkbox is checked. To change the page enable status, simply click on the box next to the words Enable Page. If there is an X in the box, the pager is enabled.

5. Next you must specify whether your pager is alphanumeric or numeric only. Click on the appropriate radio button.

6. The Pager Identification Number (PIN) is a code which identifies your pager and may be up to eight digits in length. If your pager is numeric, the PIN is typically the 7-digit phone number you would dial to manually enter the page. If your pager is alphanumeric it will have a PIN as well but it will not be associated with any manual page entry phone number like the numeric pagers. You should probably contact your paging service directly to confirm this information if you do not already have it or have any doubts. To change the PIN click on the number that appears in the panel. You may edit it just as you edited the paging service number before. Do not use any parentheses or hyphens in this PIN.

7. The next panel indicates whether or not there are queued pages. In other words, if a page has not yet been successfully completed and you have called up the ProControl with ProView, you may be interfering with the ProControl's attempts to send a page. If you disconnect from the ProControl, the page will go through on the next attempt. If you remain connected for several minutes, the page may be canceled and will be logged in the datalogging event log as a Page Fail.

8. The Baud Rate panel can be used to select the speed at which the page information is sent to your paging company. You will need to contact your paging service directly to know what speed they can accommodate. It is recommended that you use 300 baud since it is the most reliable. However, if your paging service number is a toll call, you may wish to take advantage of a higher speed to save phone charges. To change the baud rate, simply click on the appropriate radio button.

9. The Page Messages field allows you to monitor and/or change the information which will be transmitted to your pager from specific events. If you are using a numeric pager, this message cannot exceed nineteen digits in length and may contain only hyphens as non-digit characters. If you are using an alphanumeric pager, this message cannot exceed eighty characters in length. The messages that appear are those associated with process tasks which have been set up to trigger a page. You may wish to consult your site configuration printout to verify this information.

Warning: If you are using a numeric pager and exceed nineteen digits only the first nineteen will be transmitted to your pager. If you attempt to enter non-digit characters such as letters for the Page Message intended for a numeric pager, only the digits up to the first non-digit occurrence will be transmitted.

To change the pager message simply click on it and edit it as you would with any normal text editor. To see the pager messages associated with other control processes, click on the up or down arrow icons beside the pager message box.

10. Once you have finished making your changes click OK to accept changes or Cancel to abort.

Datalogging Setup

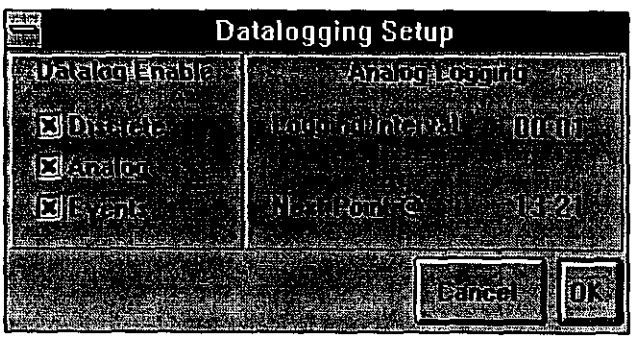
There are three different types of datalogging on the Series II. Discrete Input and Discrete Output changes are logged as they happen. Events are also logged as they happen. An Event is generated each time a Process Task runs and every time an emergency shutdown or other such system action happens. Analog Inputs, on the other hand, are logged at specific time intervals determined by the user. The Datalogging Setup dialog box is used to determine how datalogging is carried out in the ProControl unit.

To view or change the Datalogging Setup proceed through these steps:

1. Pull down the Datalogging menu. Click on Datalogging Setup. You can also use ALT-D.

   Or

   Click on the Datalogging Setup Toolbar button.  You will see the Datalogging Setup dialog box.



2. To enable a type of datalogging click on the Discrete, Analog or Event check box located in the Datalog Enable panel and make sure it contains an "X". To disable a type of datalogging click on the check box and make sure it does not contain an "X".

3. To change the logging interval for analog inputs click on the time next to Logging Interval. Enter the interval you want in 24 hour time format. The range is 1 minute to 24 hours.

4. The Next Point @ variable is set by the system every time a data point is logged to show you when the next point will be logged. You can also change it yourself if, for instance, the ProControl is set to log every hour but you would like to skip a few hours before resuming datalogging. To set the next datalogging time click on the time text associated with Next Point @ and enter the new time in 24 hour format.
   Warning: If you enter a Next Point @ time that is earlier than the current time as determined by the ProControl's clock you will prevent any analog datalogging from occurring until the next day at that time.

5. Click on the OK button to confirm the changes and send them to the ProControl unit. Click on Cancel to get rid of any changes.

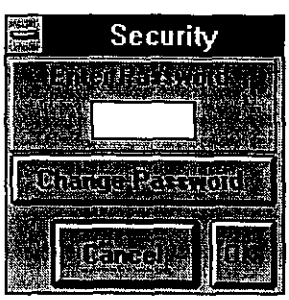
6. If you click on the OK button and are not connected to the remote ProControl unit then a message box appears warning you of that condition. Your changes are not saved.

Changing the Password

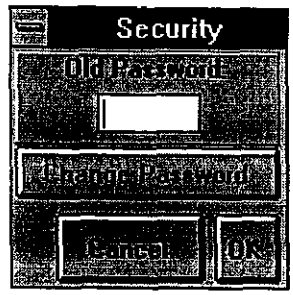
You can change the password for ProView or for access to the ProControl unit. The passwords do not have to be the same. If you change the password while ProView is connected to a ProControl unit then the new password is effective for both ProView and the ProControl unit. If you change the password while not connected to a ProControl unit the new password is effective only for ProView.

To change the password follow these steps:

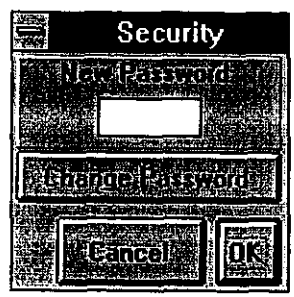
1. Pull down the Password menu. You can also use ALT-P.
   Or
   Click on the Password Toolbar button.  You will see the Security dialog box.



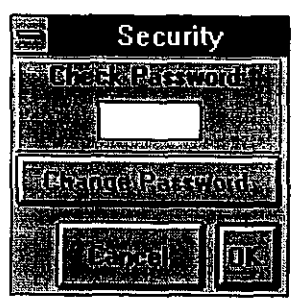
2. Click on the Change Password button. You will prompted to enter the Old Password. Enter the old password in the text box provided. Then click on the OK button or hit the enter key. If you do not enter the password correctly, a beep sounds and the security dialog box disappears.



3. If you enter the old password correctly you are prompted to then enter the new password. Enter the new password in the text box provided. Recall that the password can be up to three characters consisting of the numbers 0-9 and the letters A-Z. Then click on the OK button or hit the enter key.



4. Now you will be prompted to check the new password. Once again enter the new password in the text box provided. Then click on the OK button or hit the enter key.

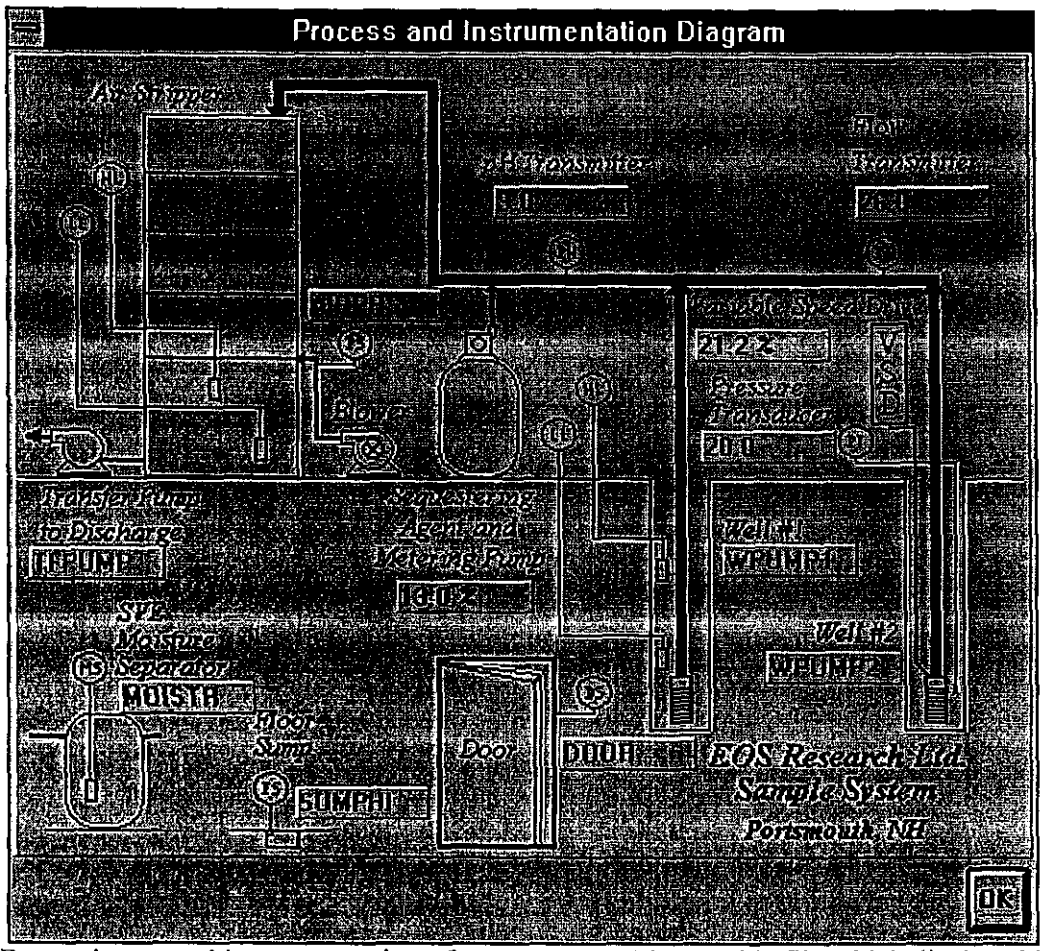


5. If both new password attempts were identical, the new password will be accepted and the security dialog box will disappear. If ProView is connected to the remote system then the new password will be effective for both ProView and the ProControl unit.

6. If you click on the Cancel button at any time during the dialog box session, any password changes do not take effect.

Process and Instrumentation Diagram

One option that can be purchased with the ProControl system is the Process and Instrumentation Diagram (P & ID). If this option has been included in your system configuration, you can view this diagram by clicking on the P & ID icon  .



The P & ID contains a graphic representation of your system. The graphic file which displayed is a bitmap (BMP) file which can be edited with Paintbrush™ or other graphic arts tool. The appropriate file's extension will be ".pid".

On top of the bitmap background are boxes which contain some of the I/O values as they pertain to the system. Digital I/O are displayed as a tagname which changes color when the I/O point is activated. Analog I/O are displayed as a value with analog outputs also containing the '%' symbol to distinguish them from analog inputs. You can move or remove these boxes as you choose. Remember to save the site file before you exit ProView to store these changes.

To change the appearance of the P & ID:

1. To move a decriptive box containing either a tagname or value, hold the shift key and click the left mouse button when positioned on the appropriate box. This will enable you to drag and re-position the box wherever you choose.

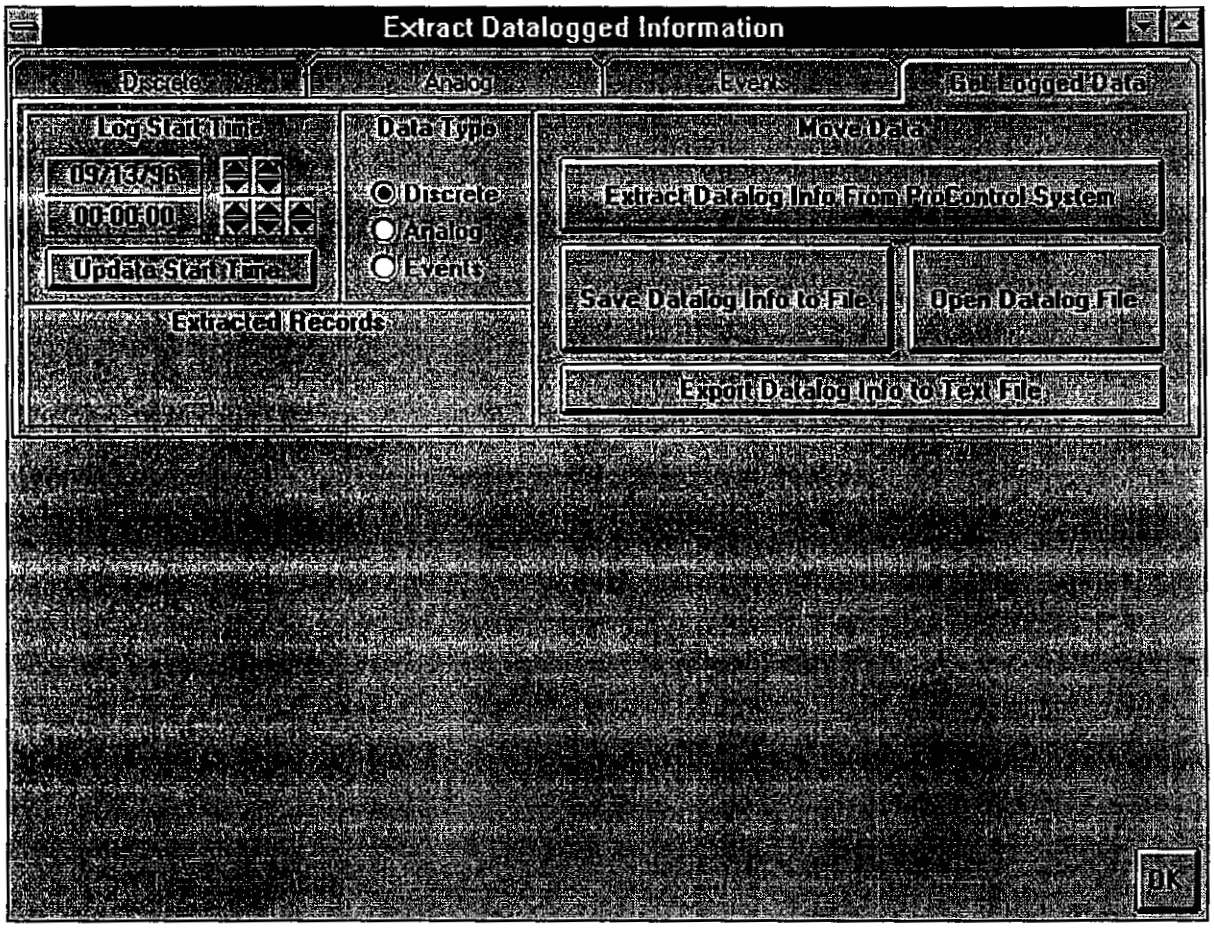
2. To remove a descriptive box, double-click on the box. Once you have removed a box, it will no longer be available to you unless you restore all boxes.

3. To restore all descriptive boxes, position the mouse at the bottom of the P & ID window in the gray area. Then hold down the control and shift keys while simultaneously clicking the left mouse button.

CHAPTER 6: DOWNLOADING LOGGED DATA

This chapter explains how to gather and analyze logged data that has been stored in the ProControl unit's battery-backed memory.

Datalogged information can be downloaded from a ProControl unit anytime ProView is connected. To begin, pull down the Datalogging menu and click on Get Logged Data. After a few moments the Extract Datalogged Information dialog box appears.

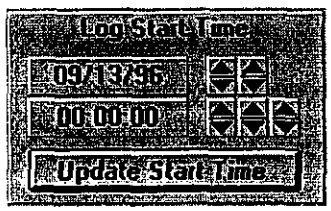


Getting Logged Data

To extract datalogging information from the remote ProControl unit follow these steps:

1. Make sure that you are connected to a ProControl unit.

2. In the Log Start Time panel select the start time. ProView will extract all datalogged data that occurred after this time. Change the start time by clicking on the spin buttons to increase or decrease the Month, Day, Hour, Minute or Second. Click on the Update Start Time button to set the start time to the current time.

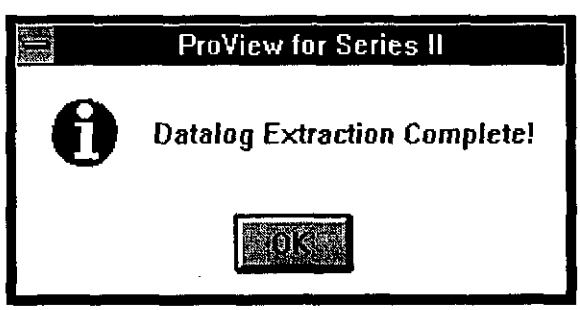


3. Select the type of data you wish to extract. Click on the Discrete, Analog or Event radio button.

4. Click on the Extract Datalog Info From ProControl System button.

5. Monitor the progress of the data extraction.

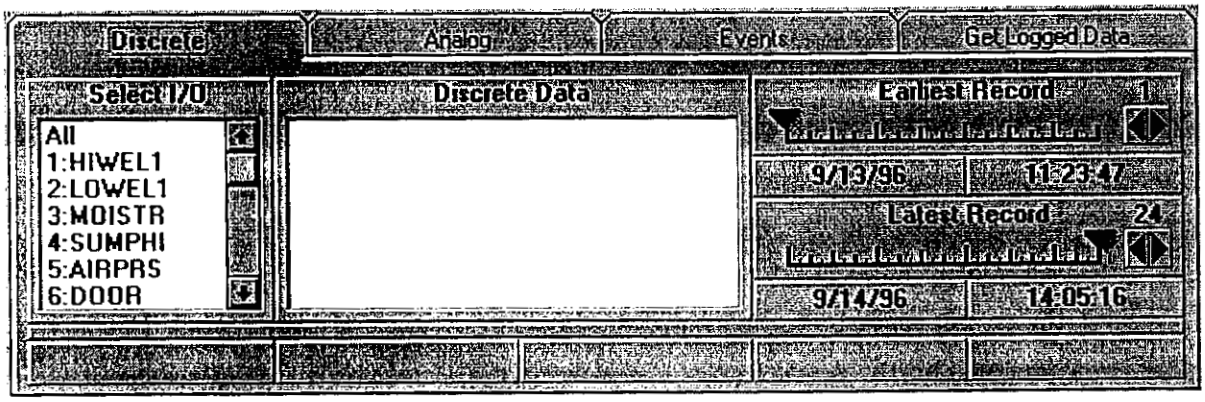
6. Wait until the data extraction is complete. A message box will pop up to inform you.



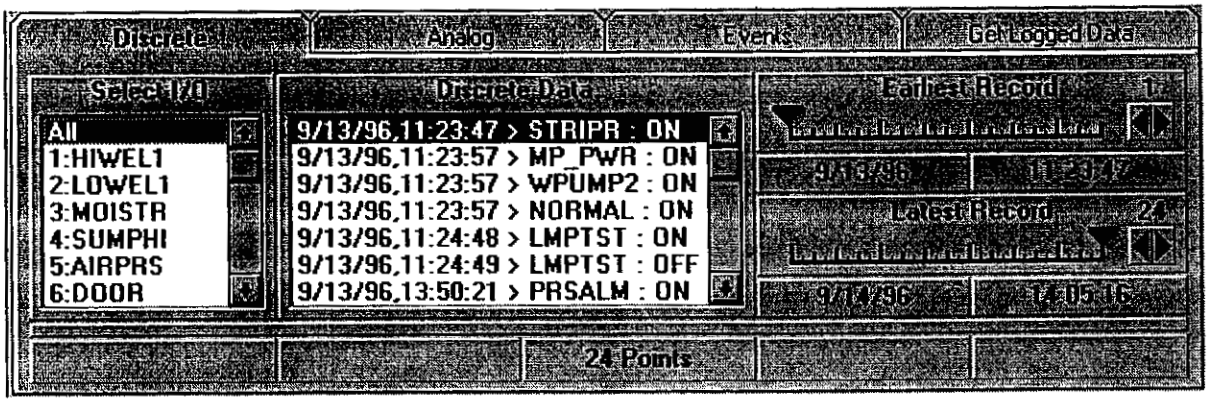
Looking at Discrete Data

To examine the discrete datalogging record that you have extracted click on the Discrete tab.

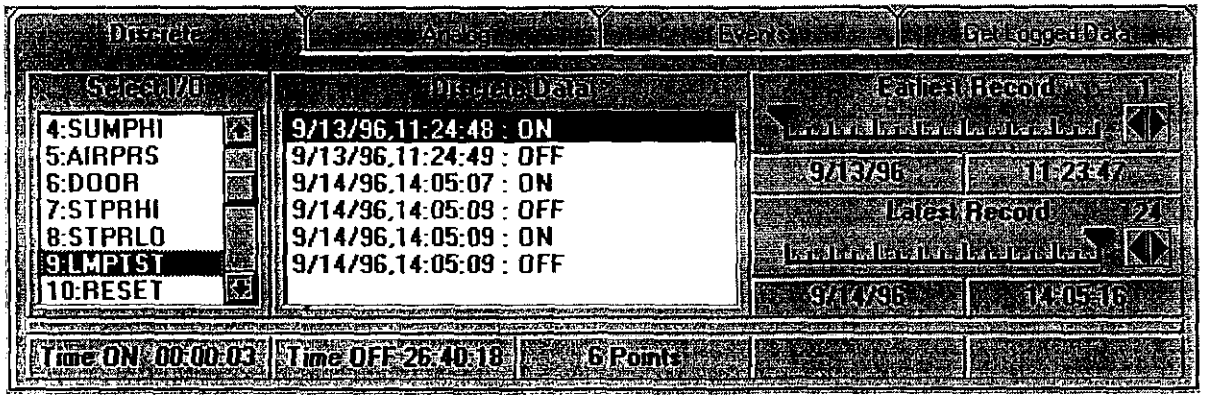
The Discrete Tab appears. On the left , in the Select I/O list box is a list of all enabled inputs and outputs. In the middle is the Discrete Data record. It is empty at the moment since no discrete input or output is selected. On the right the earliest record extracted is shown as 11:23:47 on 9/13/96. The latest record is 14:05:16 on 9/14/96. 24 records were extracted.



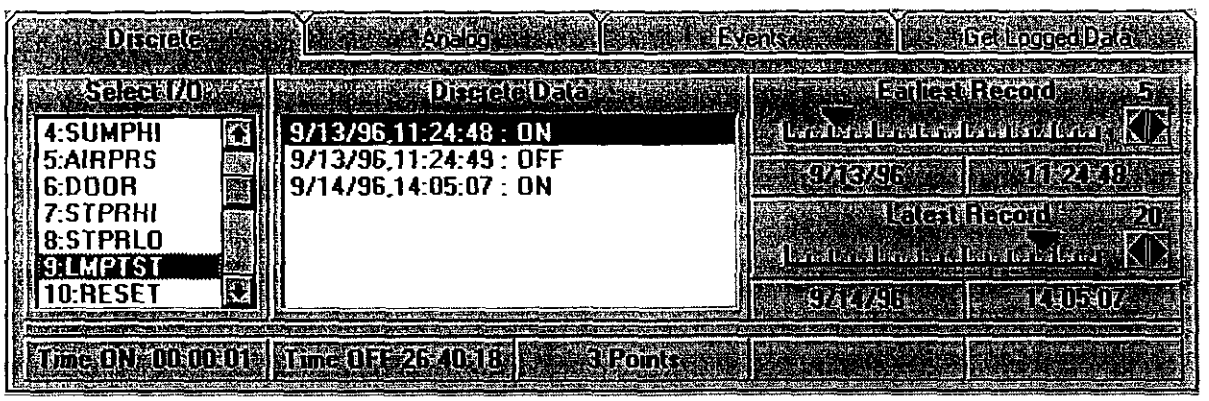
Click on the "All" in the Select I/O list box to examine the entire discrete record. To see other parts of the discrete data record scroll up and down in the Discrete Data list box.



The Select I/O list box is used to filter the data record to include just one discrete input or output. Below, the record for LMPTST is shown. Whenever a single input or output is selected, statistics are generated regarding the selected input or output. 6 points out of the total of 24 were associated with LMPTST. The total time ON was only 3 seconds while the total time OFF was 26 hours, 40 minutes, and 18 seconds.



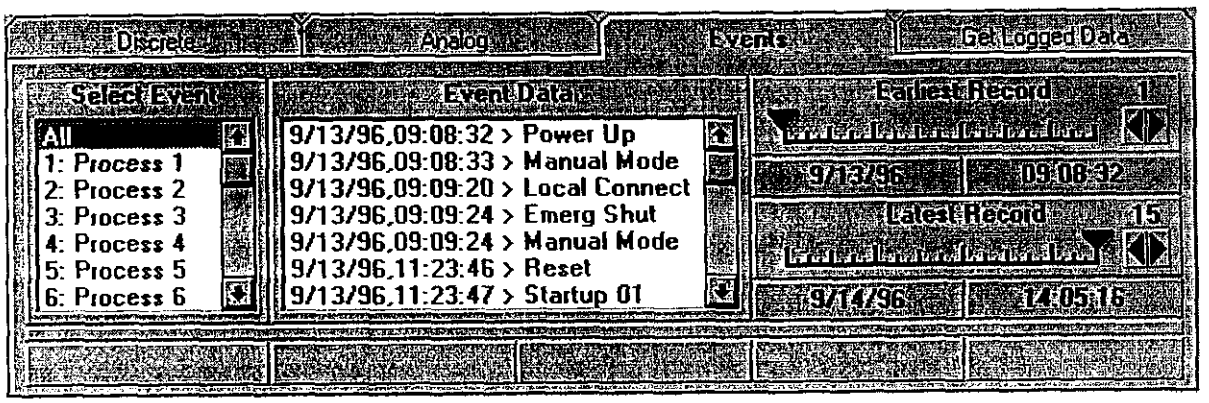
The Earliest Record and Latest Record sliders and spin buttons are used to filter the total record with respect to time. To change this time window click and hold on a slider and move the mouse to the left or right. You can also click on the spin buttons to change the time window. When you are finished click again on the input you wish to examine in the Select I/O list box to see the results of your changes. Below, the total record has been limited to points 5 to 20. Within this time interval, 3 state changes for LMPTST occurred.



Looking at Event Data

To examine the event datalogging record that you have extracted click on the Event tab.

The Event Tab appears. On the left, in the Select Event list box is a list of all enabled processes. In the middle is the Event Data record. On the right the earliest record extracted is shown as 09:08:32 on 9/13/96. The latest record is 14:05:16 on 9/14/96. 15 records were extracted.



Manipulating the event data follows the same procedure as is described for the discrete data earlier in this chapter.

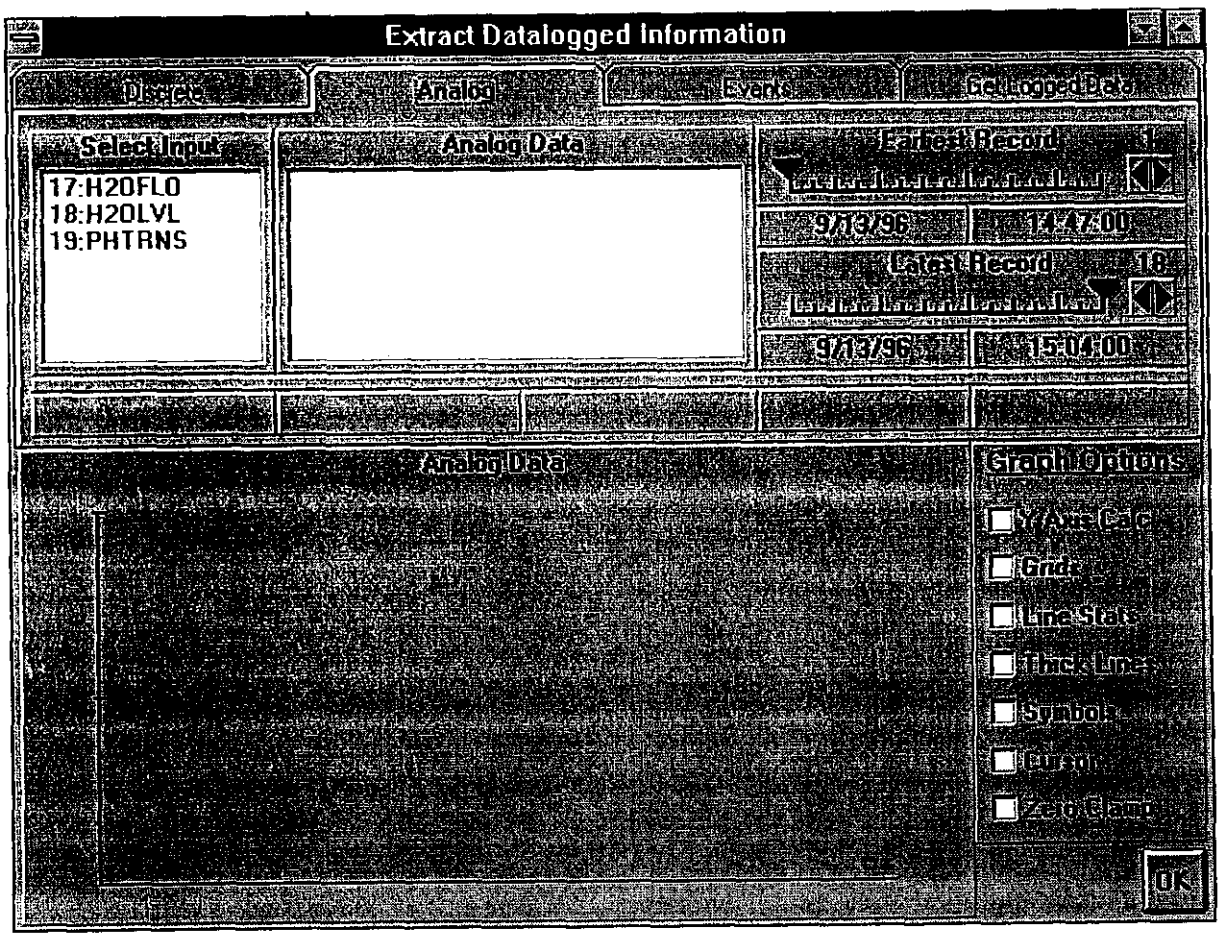
The following is a table describing the list of all datalogged events for the major ProControl versions:

Points / Version	1.7	1.6	1.5	1.1
Processes 1-32	Yes	Yes	Yes	Yes
Processes 33-64	Yes	N/A	N/A	N/A
Startup 1-16	Yes	Yes	Yes	Yes
Shutdown 1-16	Yes	Yes	Yes	Yes
Emergency Shutdown	Yes	Yes	Yes	Yes
Startup Failure	Yes	Yes	Yes	Yes
Shutdown Failure	Yes	Yes	Yes	Yes
Fax Failure	Yes	Yes	Yes	No
Page Failure	Yes	Yes	Yes	N/A
Connect	N/A	Yes	Yes	Yes
Local Connect	Yes	No	No	No
Remote Connect	Yes	No	No	No
Power Up	Yes	No	No	No
Reset	Yes	No	No	No
Manual Mode	Yes	No	No	No
Auto Mode	Yes	No	No	No

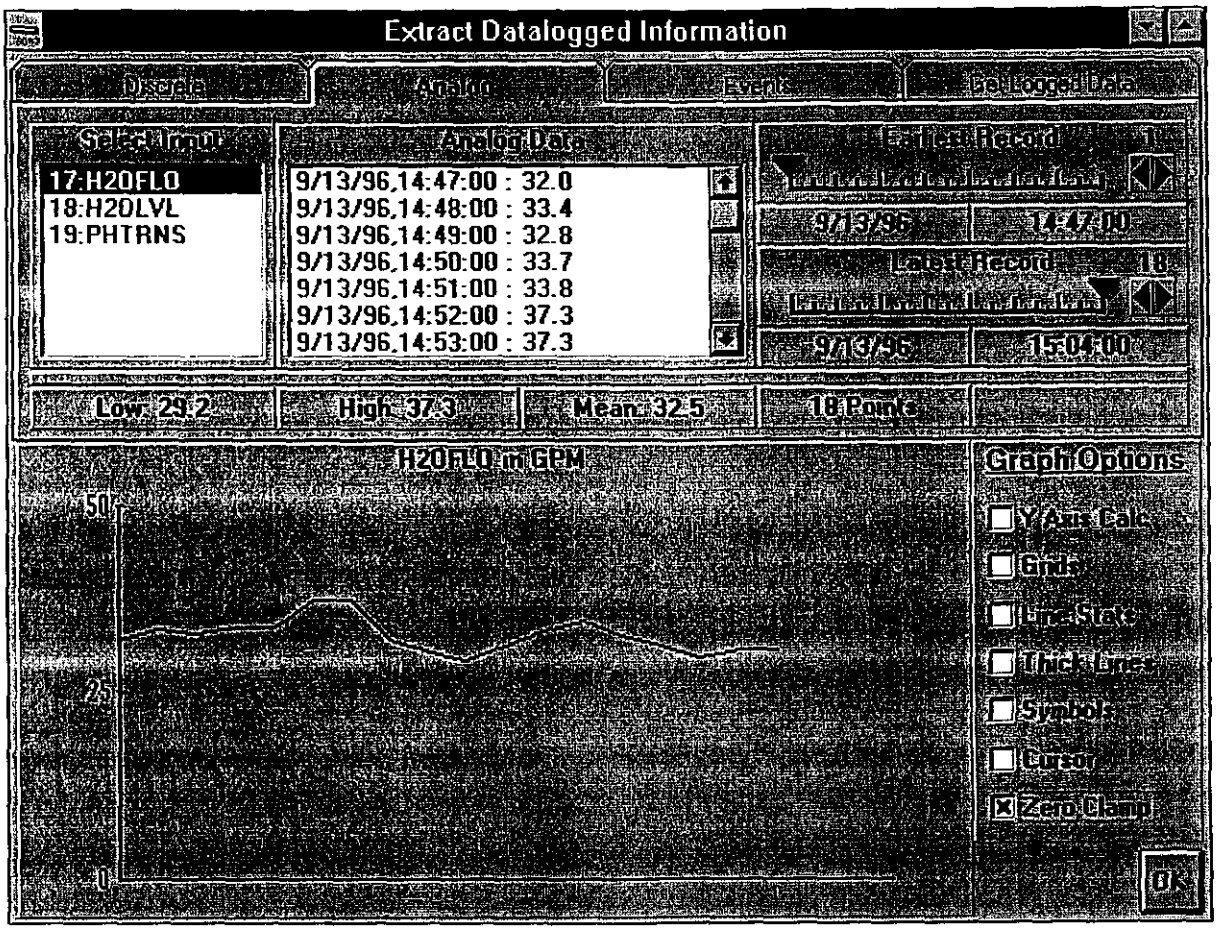
Looking at Analog Data

To examine the analog datalogging record that you have extracted click on the Analog tab.

The Analog Tab appears. On the left in the Select Input list box is a list of all analog inputs. In the middle is the Analog Data record. It is empty at the moment since no input is selected. On the right the earliest record extracted is shown as 14:47:00 on 9/13/96. The latest record is 15:04:00 on 9/13/96. 18 records were extracted.



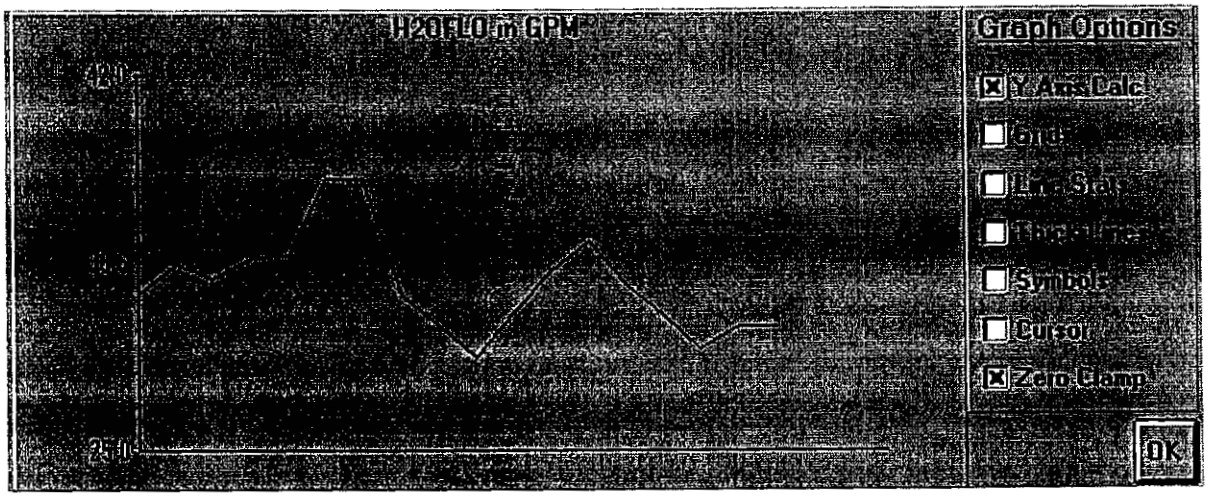
The Select Input list box is used to show and graph data generated by the analog input selected. Below, we will click on an input to show the data for H2OFLO. Statistics are generated regarding the selected analog input. In this case there are 18 points with a Low of 29.2, a High of 37.3 and a Mean of 32.5. A graph of the data points appears in the lower half of the tab along with some graphing options. As in the digital and event tabs the Earliest Record and Latest Record sliders and spin buttons can be used to filter the total record with respect to time. If you filter the data in this way you must click again on the input you wish to examine to see the results of your changes.



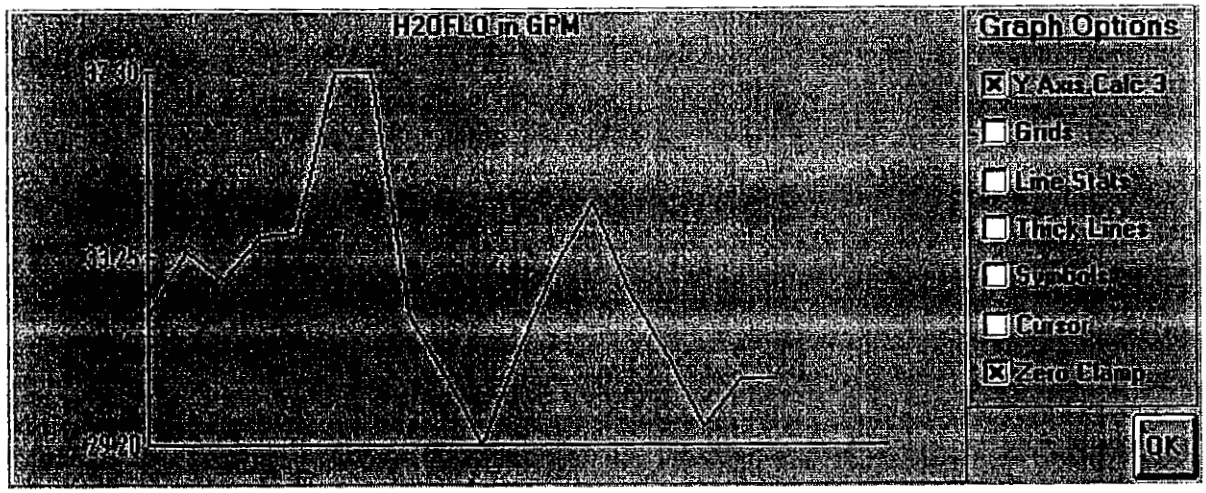
Graphing Options

The Graphing Options are used to change the look of the analog graph. To enable an option click on its check box so that an "X" appears.

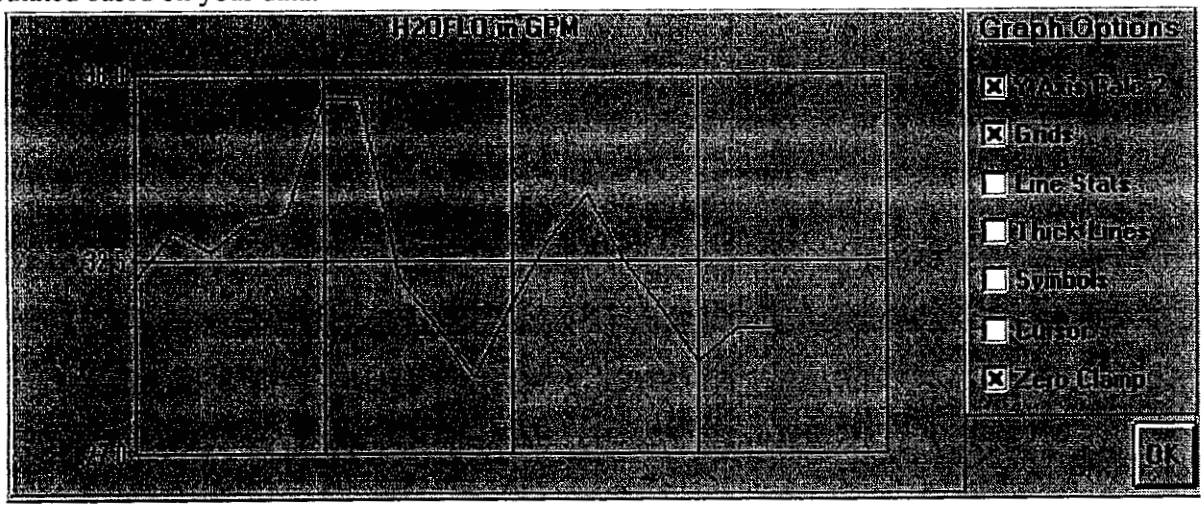
Y Axis Calc: One problem apparent in the graph as it stands now is that the total range in the Y axis is much greater than the range of input data in this sample. That's because the default Y axis range is the range of the analog input itself. Clicking on Y Axis Calc redraws the graph with a calculated Y axis range based on the data in the sample. Now trends in the data are much easier to spot. There are four different Y axis calculations which can be performed. Clicking on the Y Axis Calc box produces the basic Y axis calculation which tightens the vertical axis to aid in showing small changes in the sampled data.



Holding down the Shift, Control, or Alt key, respectively, while clicking Y Axis Calc will produce variation y-axis calculations 1 through 3. Each has a tighter vertical scale than the last, with "Y Axis Calc 3" drawn from the minimum to the maximum in the sampled data set.



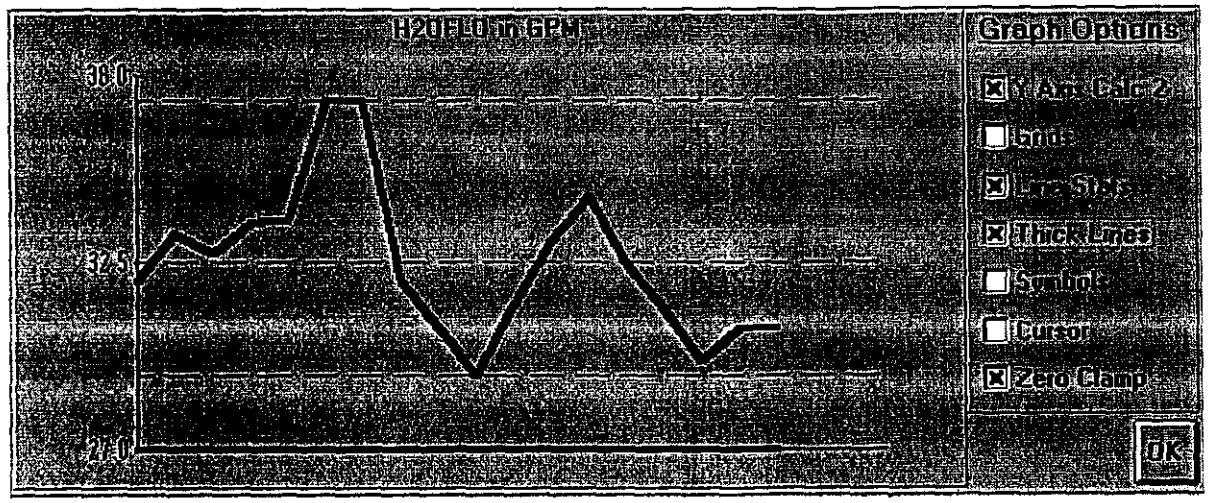
Grids: The grid option places a few X and Y axis grids on the graph as shown below. The exact number is calculated based on your data.



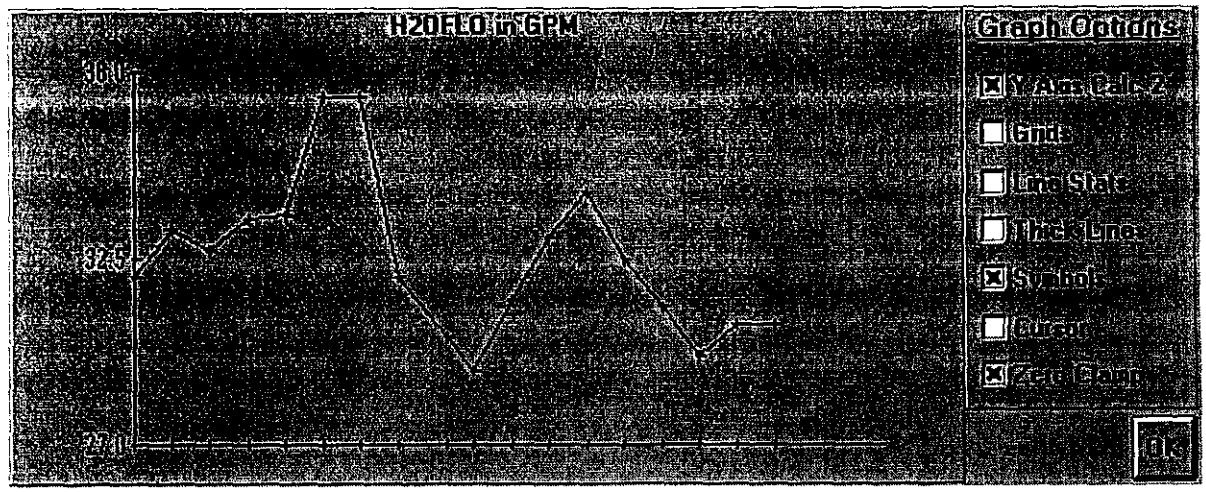
Line Stats: This option will draw dashed lines across the graph to visually indicate Low, High and Mean input levels.

Thick Lines: This option makes the graph data "thicker" to show up more clearly on the screen.

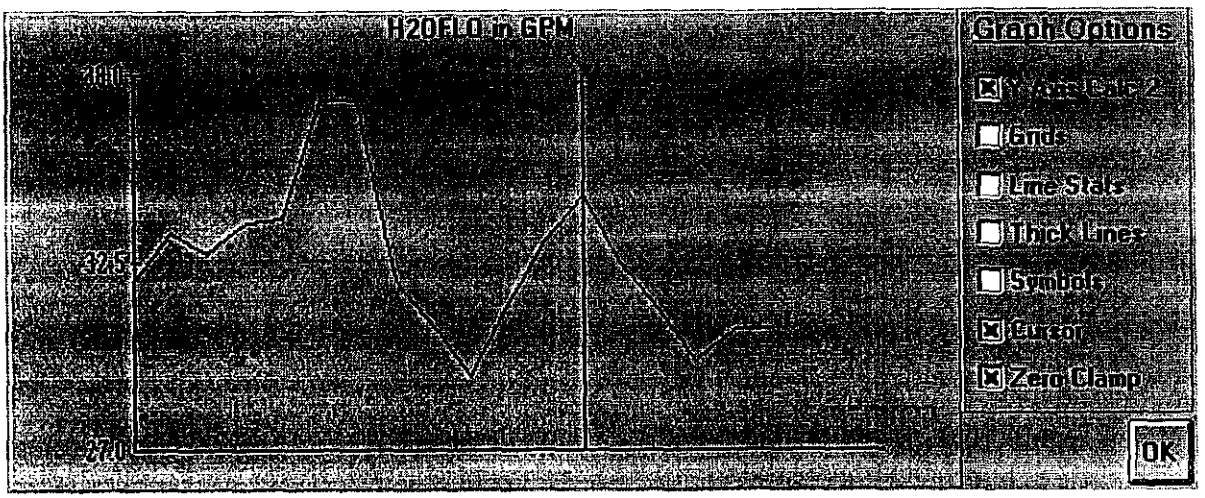
In the graph shown below we have applied the Line Stats and Thick Lines options while disabling the Grids option.



Symbols: This option places a small "+" at each data point instead of a dot.

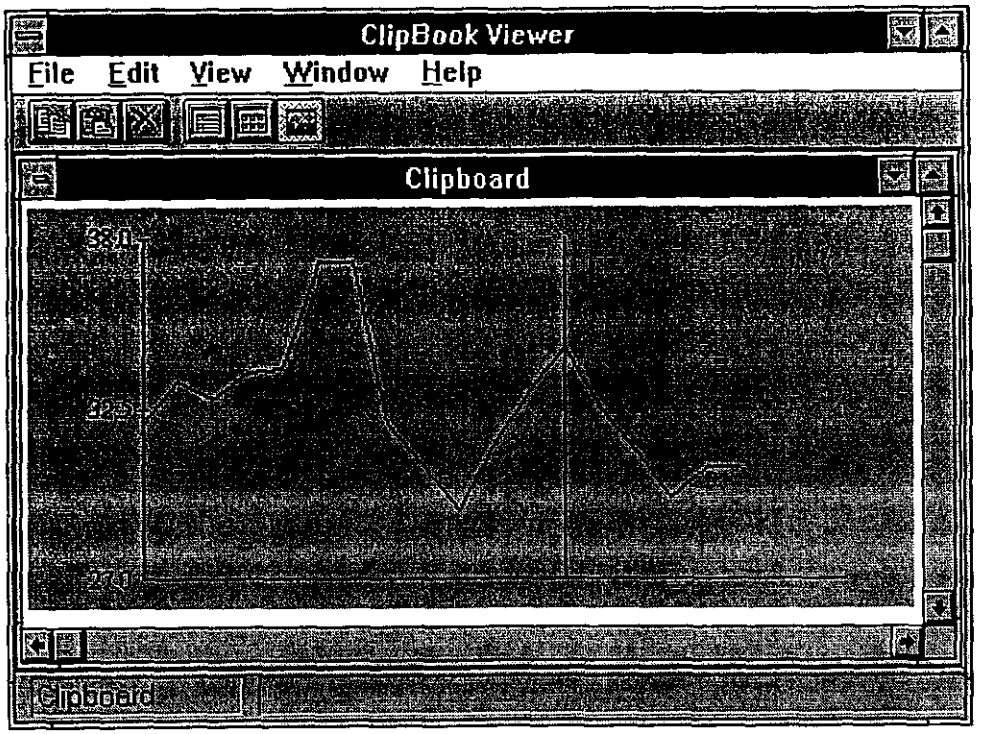


Cursor: This option places a vertical line on the graph at the point selected by clicking in the analog data list box. This makes it easier to correlate the list data with the graph.



Zero-Clamp: This option forces the graph to display zero at all points where data was logged with negative values. Negative values are typically logged when an analog transmitter outputs less than 4 mA.

Keep in mind that every time the graph is redrawn it is also placed in the Windows Clipboard. This makes it easy to use the graph in another application such as a word processor by just "pasting" it in.



After you are finished examining the datalogged information, you may want to save it for future reference within ProView or export to a spreadsheet or word processor.

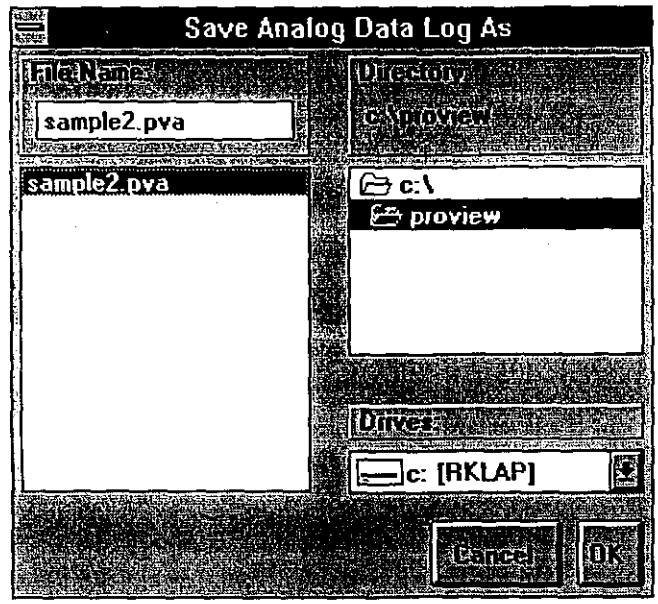
Saving Datalogging to File

To save a datalogging record to a ProView-readable file follow these steps:

1. Click on the Get Logged Data tab. Select the type of file you wish to save by clicking on the appropriate button in the Data Type panel.

2. Click on the Save Datalog Info to File button.

3. This opens the Save Data Log As dialog box. The default file name is the name of the site configuration file with the .pvd, .pva or .pve file extension depending on the type of data file you intend to save (discrete, analog, or events, respectively).



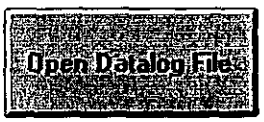
5. To change the file name click on the text box in the File Name panel and make any changes. Click on the OK button to save the file.

Opening a Datalogging File

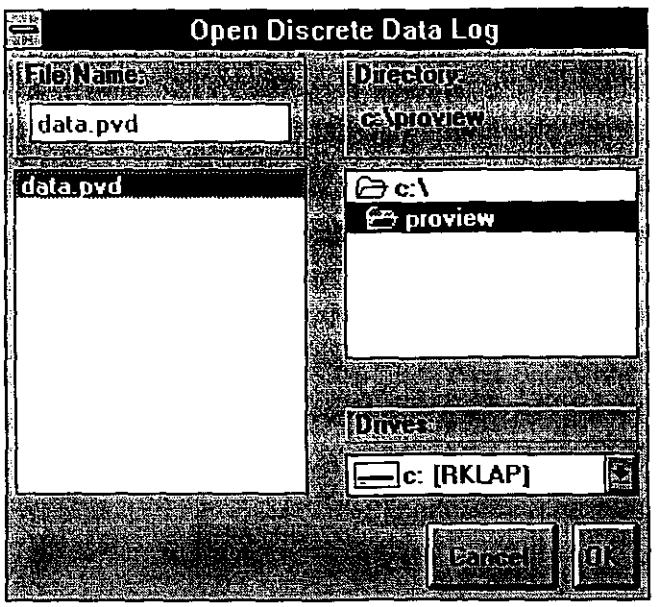
You may wish to open a datalog file that you previously saved for use within ProView. To do so follow these steps.

1. Call up the Extract Datalogged Information dialog box if you are not already there. From the main screen this is done by pulling down the Datalogging menu and clicking on Get Logged Data. Click on the Get Logged Data tab. Select the type of file you wish to open by clicking on the appropriate button in the Data Type panel.

2. Click on the Open Datalog File button.



3. This opens the Open Data Log dialog box. The default file name is the name of the site configuration file with the .pvd, .pva or .pve file extension depending on the type of data file you intend to open.



4. To select a file click on the text box in the File Name panel and make any changes or click on the file name in the file list box. Only files with the .pvd, .pva and .pve extensions can be opened. Click on the OK button to open the file.

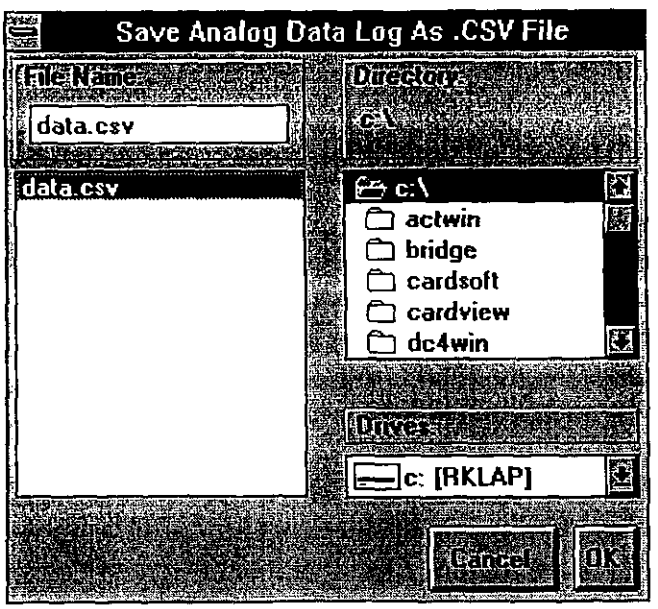
Exporting Datalogging Information

You can export ProView analog data to a CSV (Comma Separated Variable) file suitable for importing into most spreadsheet programs. You can also export discrete and event data to a text file.

1. Call up the Extract Datalogged Information dialog box if you are not already there. Click on the Get Logged Data tab. Select the type of file you wish to export by clicking on the appropriate button in the Data Type panel.

2. Click on the Export Datalog Info to Text File button.

3. This opens the Save Analog Data Log As .CSV File or the Save Discrete Data Log As .TXT File or the Save Event Data Log As .TXT File dialog box depending on the type of file you wish to export. The default file name is the truncated name of the site configuration file with the .csv or .txt extension.



5. To change the file name click on the text box in the File Name panel and make any changes. Click on the OK button to export the file. If you have a large number of data points you wish to save, this will take a few moments.

CHAPTER 7: OTHER OPERATIONS

This chapter explains how to save the site setup, print the current data, configure the remote unit, retrieve a configuration and exit the program.

Saving the Site Setup to File

While you work in ProView you may very often change system information or defaults as outlined in previous chapters. This information is part of your site configuration (or .pvs) file. It should be saved in your .pvs file before ending the program. If it is not, the changes you have made will be lost and the configuration of the remote ProControl unit will be different than that of your site file.

To save your site configuration to file pull down the File Menu. Click on Save Site.

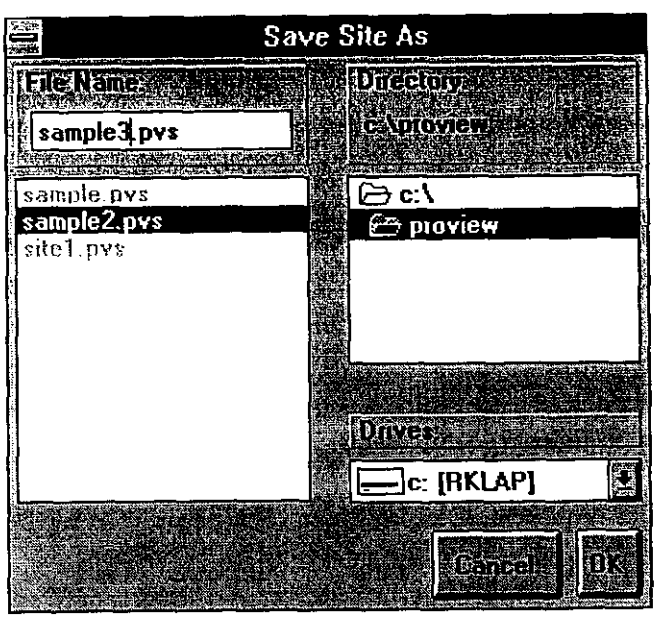
To save your site configuration to a *new file* name proceed through these steps:

1. Pull down the File menu. Click on Save Site As.

   Or

   Click on the Save Site As button. 

2. You will see the Save Site As dialog box.



3. Select the Drive, Directory and File Name you would like and click on the OK button to save the file.

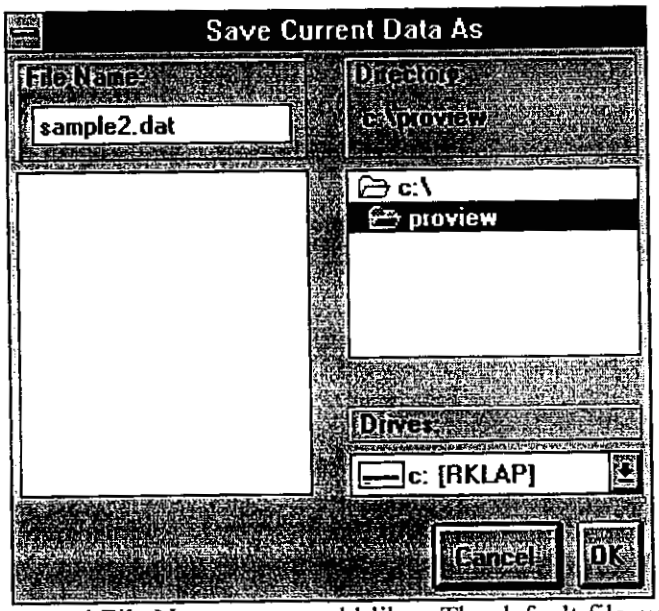
Printing the Current Data to File

You can print the current operational data of the site to a text file for future reference. This can prove useful for documentation and report purposes.

To save your current process data to a text file follow these steps.

1. Pull down the File menu. Click on Print Current Data.

2. You will see the Save Current Data As dialog box.



3. Select the Drive, Directory and File Name you would like. The default file extension is .dat. Click on the OK button to save the current data to the file.

4. If you are connected to the ProControl unit, ProView will scan for the latest totalizer and hour meter values.

You can examine the current data file with any text editor. An example of the file is shown below.

```
                    EOS RESEARCH LTD.
                  ProControl Series II

          ProView Current Operational Information

   ********************************************************
   ***** FAX Recipient:      MYRON R COMPUTER          *****
   ***** Customer:           EOS RESEARCH TEST         *****
   ***** Site Location:      SUPERFUND USA             *****
   ********************************************************
   ***** Setup:              1                         *****
   ***** Option:             D                         *****
   ***** Type:               0                         *****
   ***** Serial Number:      11119                     *****
   ***** Date:               09/16/96                  *****
   ***** Time:               11:32:31                  *****
   ***** ProView:            Version 1.70              *****
   ********************************************************

*****************************************************************
```

```
***** Communications State:   LOCAL CONNECT                    *****
***** System Mode:            Auto 9                           *****
***** Last Shutdown:          No Previous Shutdown Reported    *****
***** Alarms:                 Alarms OFF                       *****
***** FAX:                    Report ON                        *****
*****************************************************************
```

THE CURRENT INPUT STATUS:

#	TAGNAME	CURRENT VALUE	LO ALARM	HI ALARM	TOTALIZER		HOURS ON		HOURS OFF	
1	HIWEL1	is OFF					000,000	00.1	000,074	22.3
2	LOWEL1	is OFF					000,000	00.1	000,074	22.4
3	MOISTR	is OFF					000,000	00.0	000,074	22.4
4	SUMPHI	is OFF					000,000	00.0	000,074	22.4
5	AIRPRS	is OFF					000,000	00.0	000,074	22.4
6	DOOR	is OFF					000,000	00.0	000,074	22.5
7	STPRHI	is OFF					000,000	00.0	000,074	22.5
8	STPRLO	is OFF					000,000	00.0	000,074	22.5
9	LMPTST	is OFF					000,000	00.1	000,074	22.4
10	RESET	is OFF					000,000	00.0	000,074	22.5
17	H2OFLO	30.6 GPM	0.0	50.0	135,775	GAL	000,000	01.4	000,074	21.1
18	H2OLVL	21.2 FT	5.0	40.0			000,000	01.4	000,074	21.1
19	PHTRNS	6.9	5.0	10.0			000,000	00.1	000,074	22.4

THE CURRENT OUTPUT STATUS:

#	TAGNAME	CURRENT VALUE	HOURS ON		HOURS OFF	
1	WPUMP1	is OFF	000,000	00.0	000,074	22.5
2	WPUMP2	is ON	000,005	38.7	000,068	43.9
3	STRIPR	is ON	000,005	38.9	000,068	43.6
4	TFPUMP	is OFF	000,000	00.0	000,074	22.5
5	MP_PWR	is ON	000,005	38.7	000,068	43.9
8	PRSALM	is OFF	000,000	14.9	000,074	07.6
9	SMPALM	is OFF	000,000	00.0	000,074	22.5
10	PH_ALM	is OFF	000,000	00.0	000,074	22.5
11	MSTALM	is OFF	000,000	00.0	000,074	22.5
15	INTRDR	is OFF	000,000	00.0	000,000	00.0
16	NORMAL	is ON	000,000	00.0	000,000	00.0

THE CURRENT ANALOG OUTPUT STATUS:

#	TAGNAME	VALUE	PID Mode	SETPOINT	P Gain	I Gain	D Gain	MAX CHG
1	VARPMP	48.7 %	ALG	20.0	5.0	0.5	0.5	5.0 %
2	SEQ_MP	15.3 %	ALG	20.0	25			5.0 %

ANALOG OUTPUT NOTES

VALUE - The current output level expressed as a percentage 0%=4ma 100%=20ma.
MAN - (Manual) The PID or PRO control loop algorithm has been turned off.
ALG - The PID or PRO algorithm is running.
MAX CHG - The maximum amount the output can change in one control cycle.

THE CURRENT REPORTING SETUP:

```
*****************************************************************************
***** Report Enable:          ON                                        *****
***** FAX Number 1:           1 (800) 555-5555   Alarm, Scheduled       *****
***** FAX Number 2:           555-5555           Alarm                  *****
***** Scheduled FAX:          Every Day at:      04:00                  *****
***** Next Scheduled FAX:     04:00                                     *****
***** Pager #1:               Enabled, Numeric                          *****
```

```
***** Pager #2:              Enabled, Alphanumeric                    *****
***** Paging:                Will occur at 300 baud                   *****
***** Page Number 1:         1 (800) 555-5554                         *****
***** Pager ID    1:         5960104                                  *****
***** Page Number 2:         555-1234                                 *****
***** Pager ID    2:         8125375                                  *****
**********************************************************************

THE CURRENT DATALOGGING SETUP:

**********************************************************************
***** Enabled Datalogging:   Digital ,Analog ,Event                   *****
***** Datalogging Interval:  00:01                                    *****
***** Next Datalog Time:     11:36                                    *****
**********************************************************************
```

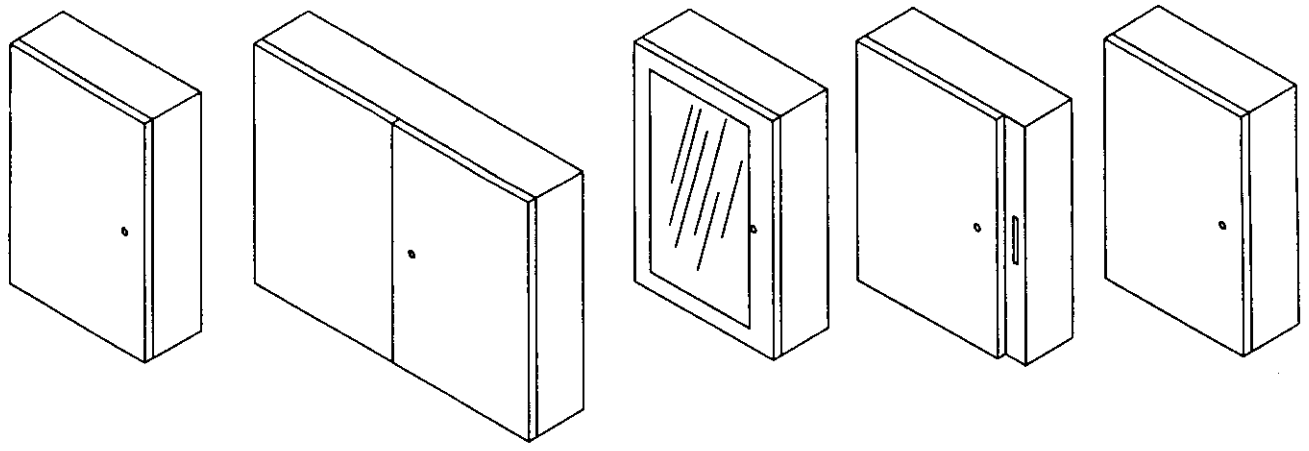
Exiting ProView

You can exit ProView by double clicking on the large  at the top left of the main screen or by pulling down the File menu and clicking on Exit. In either case you will be prompted to save your site configuration file and to save any datalog information in memory. You should also disconnect from the remote ProControl unit before exiting the program.

Hoffman®
A Pentair Company

CONCEPT®

Wall–Mount Enclosure
Gehäuse zur Wandmontage
Boîtier mural
Caja Para Montaje En Pared



64303001

⚠ WARNING

To avoid electric shock, do not energize any circuits before all internal and external electrical and mechanical clearances are checked to assure that all assembled equipment functions safely and properly.

⚠ WARNUNG

Um elektrische Schocks zu vermeiden, setzen Sie die Stromkreise erst dann Spannung aus, wenn alle internen und externen mechanischen Sicherheitsabstände überprüft worden sind, um sicherzustellen, daß alle zusammengebauten Geräte sicher und ordnungsgemäß funktionieren.

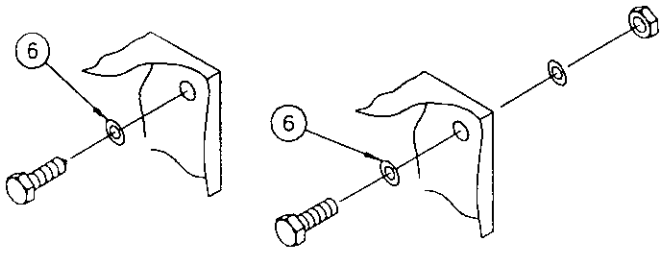
⚠ PRECAUCION

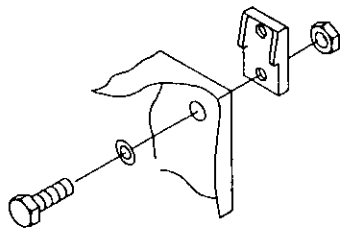
Para evitar una descarga eléctrica no energice ningun circuito antes de que todos los espacios mecánicos y eléctricos (internos y externos) se revisen para asegurar que todo el equipo ensamblado funcione bien y de manera segura.

⚠ AVERTISSEMENT

Pour éviter les décharges électriques, n'activer aucun circuit avant de vérifier tous les circuits internes et externes et tous les dégagements mécaniques afin de s'assurer que les fonctions de tous les équipements assemblés fonctionnent correctement et en toute sécurité.

MOUNTING INSTRUCTIONS (optional mounting feet page 9)
MONTAGEANLEITUNG (optionale Montagefüße siehe Seite 9)
INSTRUCTIONS DE MONTAGE (pattes de montage en option, page 9)
INSTRUCCIONES PARA MONTAJE (Pata de Montaje Opcional Pag. 9)





Mounting Feet
UL/CSA Requirement:
Use of mounting feet mandatory on all type 3,4,4X applications.

The use of the optional mounting feet allows simple mounting with fasteners outside the enclosure.
- Steel Zinc Plated Mounting Foot Kit P/N C–MFK
- Stainless Steel Mounting Foot Kit P/N C–MFKSS
- Composite Mounting Foot Kit P/N C–MTGFT

Kits provide all necessary hardware to install the mounting feet as shown *(order seperately)*

ESPAÑOL
Pie de montaje
Los requisitos del UL/CSA:
Es obligatorio el uso de pie de montaje en todos los artículos del tipo 3,4,4X.

El uso opcional de estos, permite un montaje más sencillo con seguros en el exterior de la caja.
- Juego de pie de mantaje de acero Zinc plateado C–MFK
- Juego de pie de montaje de acero inoxidable C–MFKSS
- Juego de pie de montaje compuesto C–MTGFT

ENGLISH
Mounting holes have been provided in the back of the enclosure for convenient mounting through the enclosure. Attach enclosure to wall or other structure using customer supplied 3/8 inch or M8 fastener, flat washers, and nuts. To insure proper sealing and enclosure protection rating, use the provided sealing washers. Install sealing washers inside the enclosure with rubber face against the enclosure.

DEUTSCH
Auf der Rückseite des Gehäuses befinden sich Montagelöcher für eine bequeme Montage durch das Gehäuse. Befestigen Sie das Gehäuse mit 3/8" oder M8 Schrauben, flachen Unterlegscheiben und Muttern (vom Kunden zu besorgen) an der Wand oder einer anderen Konstruktion. Zur Gewährleistung einer ordnungsgemäßen Abdichtung und Sicherheitsratifizierung des Gehäuses sind die mitgelieferte Dichtringe zu verwenden. Dichtringe im Gehäuse mit der Gummifläche gegen die Gehäusewand installieren.

FRANÇAIS
Des trous de fixation ont été prévus à l'arrière de l'élément pour en faciliter le montage. Fixer l'élément au mur ou à toute autre structure en utilisant une attache 3/8 po. ou M8, des rondelles plates et des écrous à pourvoir par le client. Pour assurer un scellement correct et un bon niveau de protection de l'élément, utiliser les rondelles de scellage fournies. Placer ces rondelles à l'intérieur de l'élément, la partie en caoutchouc contre l'élément.

ESPAÑOL
La parte de atrás del enclaustro (caja) tiene orificios , a través de los cuales se hace el montaje en la pared o alguna otra estructura, utilizando el siguiente material (proporcionado por el cliente): un seguro de 3/8 de pulgada o M8, arandela plana y tornillos. Para asegurar que el sello y el nivel de protección es el apropiado se proporciona la arandela para sellado. Instale la arandela dentro de la caja, poniendo la cara superior del plástico sobre el enclaustro.

DEUTSCH
Montagefüße
UL/CSA Anforderungen:
Die Verwendung von Montagefüßen ist für alle Typ 3,4,4X Anwendungen vorgeschrieben.

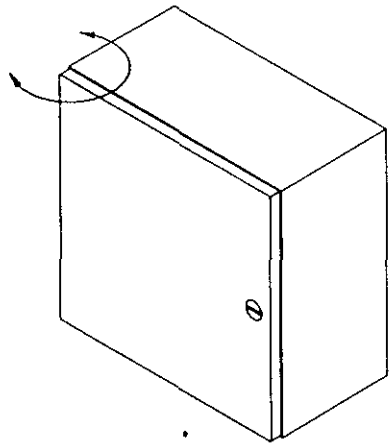
Die Verwendung der optionalen Montagefüße erlaubt eine einfache Montage mit Schrauben von außerhalb des Gehäuses.
- Montagefußbausatz, verzinkt, C–MFK
- Montagefußbausatz, Edelstahl, C–MFKSS
- Montagefußbausatz, Verbund, C–MTGFT

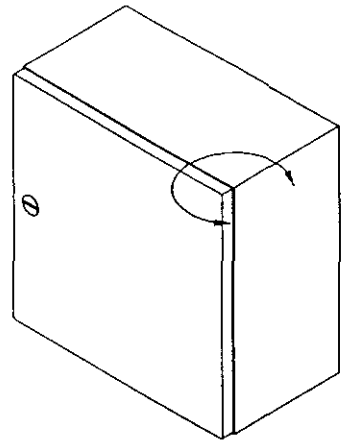
Bausätze beinhalten alle notwendige Hardware um die Montagefüße wie abgebildet zu installieren. *(getrennt bestellen)*

FRANÇAIS
Pattes de Montage
Exigence du UL/CSA
L'utilisation des pattes de montage est mandatoire sur tous les types 3,4,4X applications.
L'utilisation des pattes de montage optionnelles permet de l'extérieure le simple montage de l'élément avec des attaches.
- Pattes de montage Kit, zinc plaque acier C–MFK
- Pattes de montage Kit, acier inoxidable C–MFKSS
- Pattes de montage Kit, composite C–MTGFT

Les Kits contiennent tous les éléments nécessaires pour installer les pattes de montages comme montrés. *(obtenez separatement)*

REVERSING DOOR HINGES (lower door only)
UMKEHREN DER TÜRSCHARNIERE (nur untere Tür)
INVERSION DES CHARNIÈRES DE PORTES (porte inférieure seulement)
BISAGRAS PARA INTER CAMBIO DE POSICION DE PUERTAS





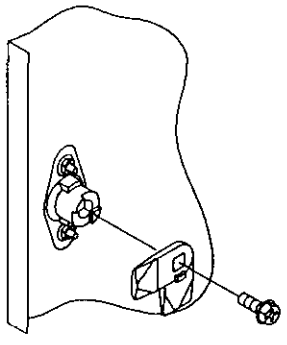
ENGLISH
1) Remove door from body by removing hinge pins.
2) Unscrew hinges from body.
3) Drill Ø.203 (5.16 mm) on opposite enclosure flange at drill point locations.
4) Reinstall hinges and door.
5) Seal the unused hinge holes with customer supplied #10 or M5 screw and silicone sealer.

ESPAÑOL
1)Retire la puerta del cuerpo al mover las bisagras.
2)Desatornille las bisagras del cuerpo.
3)Hacer un hueco con el taladro Ø.203 (5.16mm) en la bisagra del enclaustro opuesto a la ubicación del punto del taladro.
4)Reinstale las bisagras y la puerta.
5)Los orificios de la bisagra que no se usarán se sellarán con el tornillo #10 ó M5 y con el sellador de silicón.

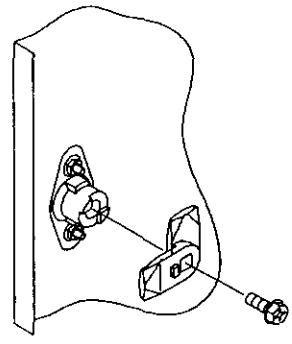
DEUTSCH
1) Entfernen Sie die Scharnierstifte und nehmen Sie die Tür vom Gehäuse ab.
2) Schrauben Sie die Scharniere vom Gehäuse ab.
3) Bohren Sie an der gegenüberliegenden Gehäusewand an den Bohrungspunkten Löcher mit einem Durchmesser von 5,16 mm (Ø .203)
4) Bauen Sie die Scharniere und die Tür wieder ein.
5) Dichten Sie die nicht benutzten Scharnierlöcher mit Schrauben- (Größe #10 oder M5, vom Kunde zu besorgen) und Silikondichtstoff ab.

FRANÇAIS
1) Enlever la porte du corps du meuble en retirant les broches des charnières.
2) Dévisser les charnières du corps du meuble.
3) Percer des trous de 5,16 mm (0,203 po) de diamètre sur le bord opposé du meuble, aux endroits voulus.
4)Réinstaller les charnières et la porte.
5) Boucher les trous de charnière inutilisés avec des vis n° 10 ou M5 et du calfeutrant au silicone, fournis par le client.

REVERSING LATCH DIRECTION
UMKEHREN DER SCHLIESSRICHTUNG
ALLER EN SENS INVERSE LOQUET
INVERSIÓN PICAPORTE DIRECCIÓN



Clockwise to open.
Im Uhrzeigersinn öffnen.
Ouverture dans le sens horaire.
Abrir en dirección a las munecillas del reloj.



Counterclockwise to open.
Entgegen dem Uhrzeigersinn öffnen.
Ouverture dans le sens anti-horaire.
Abrir en sentido contrario, a las manecillas del releg.

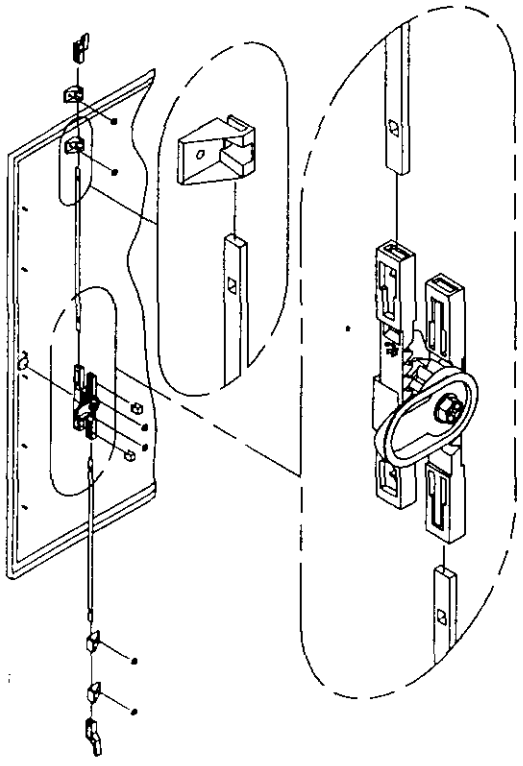
ENGLISH
1) Remove Latch Cam.
2) Invert as shown and reinstall cam.
3) Torque fastener to 4.3Nm (38 in-lbs)

ESPAÑOL
1) Quite la leva del cierre
2) Invierta como se muestra y reinstale la leva
3) Use un torque de 4.3 Nm(38 pulgadas-libras)

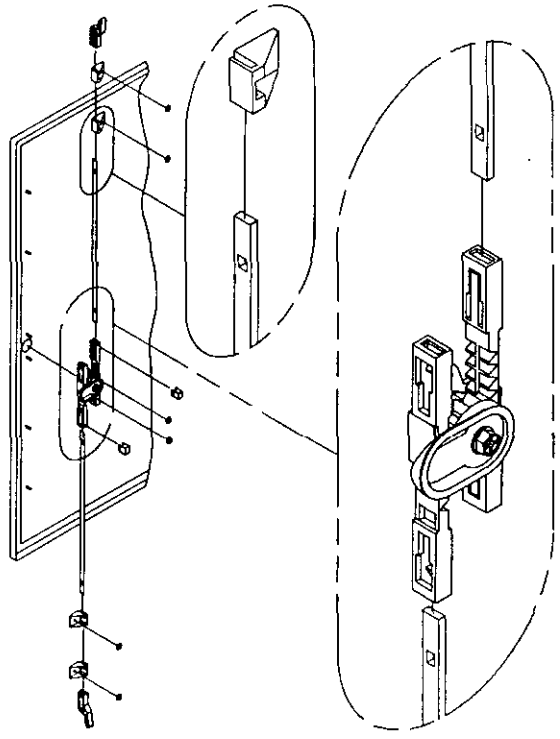
DEUTSCH
1) Riegelnocken entfernen.
2) Nocken gemäß Abbildung umdrehen und wieder installieren.
3) Verschluß mit einem Drehmoment von 4,3 Nm festdrehen.

FRANÇAIS
1) Enlever la came du loquet.
2) Inverser comme indiqué et reposer la came.
3) Appliquer à l'attache un couple de 4,3 Nm (38 lb-po.)

REVERSING MULTIPOINT LATCH DIRECTION (lower door only)
UMKEHREN DER RICHTUNG DES MEHRPUNKTSCHLOSSES (nur untere Tür)
INVERSION DE LA DIRECTION D'UN LOQUET À POINTS MULTIPLES (porte inférieure seulement)
MANIJA MULTIDIRECCIONAL (SOLO PARA PUERTA INFERIOR)



Clockwise to open.
Im Uhrzeigersinn öffnen.
Ouverture dans le sens horaire.
Abrir en dirección a las munecillas del reloj.



Counterclockwise to open.
Entgegen dem Uhrzeigersinn öffnen.
Ouverture dans le sens anti–horaire.
Abrir en sentido contrario, a las manecillas del releg.

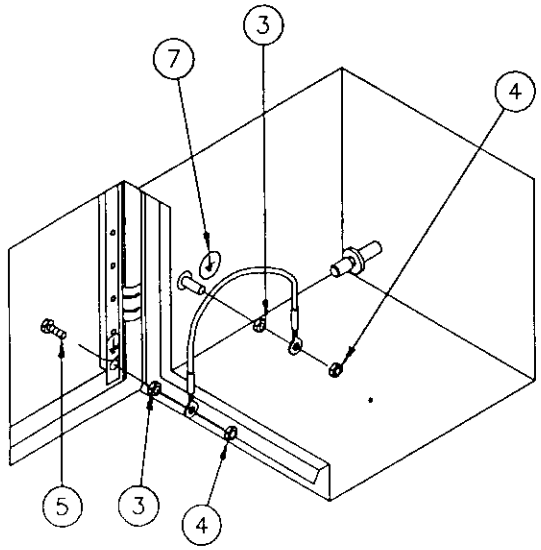
ENGLISH
1) Remove latch system from door.
2) Disengage rods from racks.
3) Remove cam and orient racks as shown.
4) Reinstall cam, torque cam fastener to 38 in–lbs (4.3 Nm).
5) Reposition rod guides.
6) Insert rods in racks.
7) Assemble latch system onto door; torque nuts to 22 in–lbs (2.5 Nm)

ESPAÑOL
1) Retire el sistema de la maniju de la puerta.
2) Retire los engranes de la cremallera.
3) Retire la leva y oriente los rieles corno se muestra.
4) Vuelva a instalar la leva, la cual debe fijarse a un torque de 38 pulgadas por libras (4.3Nm).
5) Vuelva a poner las guias del engranaje.
6) Inserte los engranes en lacremallera.
7) Ensamble el sisterna de la manija dentro de las tuercas de la puerta a un torque de 22 pulgadas por libras (2.5Nm).

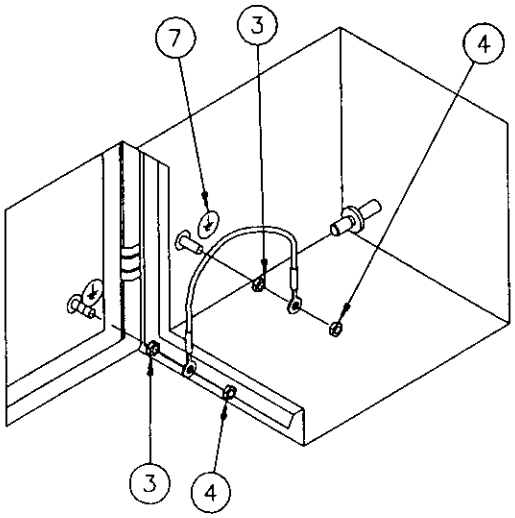
DEUTSCH
1) Entfernen Sie das Riegelsystem von der Tür.
2) Nehmen Sie die Stangen von den Halterungen ab.
3) Entfernen Sie den Nocken und richten Sie die Halterungen gemäß den Abbildungen aus.
4) Bauen Sie den Nocken wieder ein und drehen Sie den Nockenverschluß mit einem Drehmoment von 4,3 Nm (38 in–lbs) fest.
5) Stellen Sie die Stangenführungen neu ein.
6) Setzen Sie die Stangen in die Halterungen ein.
7) Bauen Sie das Riegelsystem in die Tür ein. Ziehen Sie die Muttern mit einem Drehmoment von 2,5 Nm fest.

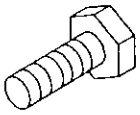
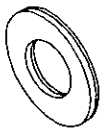
FRANÇAIS
1) Retirer le système du loquet de la porte.
2) Désengager les tiges des crémaillères.
3) Enlever la came et orienter les crémaillères comme indiqué.
4) Réinstaller la came, serrer l'attache de came au couple de 4,3 Nm (38 po–lb).
5) Replacer les guides de tiges.
6) Insérer les tiges dans les crémaillères.
7) Assembler le système du loquet sur la porte, serrer les écrous au couple de 2,5 Nm (22 po–lb).

GROUNDING (MILD STEEL)
ERDUNG (STAHL)
MISE À LA TERRE (ACIER MOU)
CABLE A TIERRA (ACERO SWAVE)

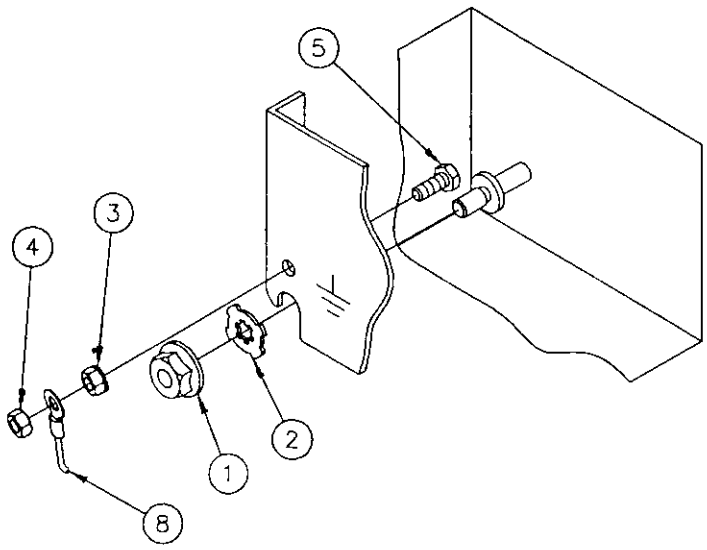


GROUNDING (STAINLESS STEEL)
ERDUNG (EDELSTAHL)
MISE À LA TERRE (ACIER INOXYDABLE)
CABLE A TIERRA (ACERO INOXIDABLE)



1 M8–1.25  (4x) (8x)	2  (1x)	3 M6–1  (3x)	4 M6–1  (3x)
5 M6–1x16  (2x)	6  (4x)	7  (2x)	8  supplied by customer vom Kunden zu besorgen fourni par le client Proporcionudo por el cliente

PANEL INSTALLATION / GROUNDING
INSTALLATION DER RÜCKWAND/ ERDUND
INSTALLATION DU PANNEAU / MISE À LA TERRE
INSTALACION DEL PANEL / CABLE A TIERRA



NOTE:

- For proper panel installation, it may be necessary to bend mounting studs slightly to permit the panel to fit in place.

NOTA:

- Para la instalación apropiada, puede que sea necesario doblar ligeramente los pernos para permitir que el panel encaje.

HINWEIS:

- Für eine ordnungsgemäße Installation ist es eventuell erforderlich, die Montagezapfen leicht zu biegen, um die Rückwand genau einzupassen.

REMARQUE:

- Pour l'installation correcte du panneau, il peut être nécessaire de courber légèrement les montants de fixation afin de permettre au panneau de se mettre en place.

HARDWARE KITS

Included with your Hoffman enclosure is a complete package of hardware for back panel installation. Also provided is all the necessary hardware for grounding the back panel and doors to the enclosure body.

Shown are the proper installation procedures for grounding the doors, covers, and optional panels and mounting the optional side and back panels.

Ground wires (item 1) are available from Hoffman Engineering. Consult the Hoffman Specifiers Guide.

HARDWARE–PAKETE

Für die Installation der Rückwand ist ein komplettes Hardware–Paket im Lieferumfang des Hoffman Gehäuses enthalten. Ferner werden alle Hardware–Bauteile mitgeliefert, die für die Erdung der Rückwand und Türen am Gehäuse erforderlich sind.

Gezeigt werden die passenden Installationsverfahren für die Erdung der Türen, Abdeckungen und optionalen Wände und die Montage der optionalen Seite und Rückwände.

Erdungsdrähte (Pos. 1) sind bei Hoffman Engineering erhältlich. Konsultieren Sie den Hoffman Specifiers Guide.

ACCESORIOS

Estos se incluyen en el enclaustro Hoffman y comprende en paquete con el equipo para la instalación del panel trasero. También se proporciona todo el equipo necesario para hacer tierra de las puertas del panel inferior al cuerpo del enclaustro.

También se muestran los procedimientos de instalación apropiados para hacer tierra en las puertas, cubiertas y paneles opcionales asi como el montaje de los paneles laterales opcionales y traseros.

Los cables de tierra (articulo1) están disponibles en Hoffman Engineering. Consulte la guia de Hoffman quelo especifica.

KITS D'ACCESSOIRES

Un paquet complet d'accessoires pour l'installation du panneau arrière est fourni avec le meuble Hoffman. Est également fourni tout le matériel nécessaire de mise à la terre du panneau et des portes du corps du meuble.

Les illustrations montrent les procédures d'installation correctes de mise à la terre des portes, du dessus ainsi que des panneaux en option et le montage du côté optionnel et des panneaux arrière.

Les fils de mise à la terre (article 1) sont disponibles à Hoffman Engineering. Consulter le guide des identificateurs Hoffman.

REPAINTING INSTRUCTIONS

SUGGESTED PAINTS: The following paints typically provide superior adhesion qualities:

- Two Component Epoxies
- Two Component Polyurethanes
- Lacquers
- Acrylics
- Alkyd Baking Enamels
- Industrial Enamel

SURFACE PREPARATION: Wet wipe all surfaces to be painted with xylene solvent. Allow surfaces to flash dry three to five minutes. If a delay of greater than two hours occurs before painting, wet wipe again.

PAINTING: Apply top coat per paint manufacturer's instructions. Allow adequate cure time between coats.

Allow top coat to cure completely prior to testing paint adhesion. Consult with the paint manufacturer for proper cure time.

ANLEITUNG FÜR DEN NEUANSTRICH

EMPFOHLENE FARBEN: Die folgenden Farben bieten in der Regel ausgezeichnete Haftungseigenschaften:

- Zwei Komponenten Epoxidharze
- Zwei Komponenten Polyesterurethane
- Lacke
- Acryle
- Alkyd–Trockenemaille
- Industrie–Emaille

VORBEREITUNG DER OBERFLÄCHEN: Wischen Sie alle zu streichenden Oberflächen naß mit einer Xylen–Lösung ab. Lassen Sie die Oberflächen kurz drei bis fünf Minuten trocknen. Verzögert sich der Anstrich um mehr als zwei Stunden, wischen Sie die Flächen erneut naß ab.

STREICHEN: Tragen Sie die Beschichtung gemäß den Anweisungen des Farbenherstellers auf. Lassen Sie die Farbe nach jeder aufgetragenen Farbschicht anziehen.

Lassen Sie die oberste Farbschicht vollständig trocknen, bevor Sie die Haftung der Farbe prüfen. Die geeignete Trockenzeit erfahren Sie vom Farbenhersteller.

INSTRUCTIONS DE PEINTURE

PRÉPARATION DE LA SURFACE: Nettoyer toutes les surfaces à peindre avec un solvant au xylène. Laisser les surfaces sécher pendant un court moment de trois à cinq minutes. Si plus de deux heures s'écoulent avant de peindre, nettoyer à nouveau.

- xpoxy à deux composants
- Polyuréthannes à deux composants
- Laques
- Acryliques
- Peintures–émail cuites à l'alkyle
- Peintures–émail industrielles

PRÉPARATION DE LA SURFACE : Nettoyer toutes les surfaces à peindre avec un solvant au xylène. Laisser les surfaces sécher pendant un court moment de trois à cinq minutes. Si plus de deux heures s'écoulent avant de peindre, nettoyer à nouveau.

PEINTURE : Appliquer la couche de couverture suivant les instructions du fabricant de la peinture. Laisser sécher entre les couches pendant un temps adéquat.

Laisser la dernière couche sécher complètement avant de tester l'adhésion de la peinture. Demander au fabricant de la peinture le temps de séchage conseillé.

INSTRUCCIONES PARA REPINTADO

PINTURAS SUGERIAS: Las siguientes pinturas son tipicas por proporcionar una calidad superior de adhesión.

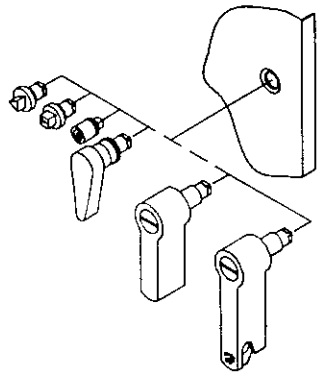
- Epóxicas de dos componentes
- Poliuretano de dos componentes
- Lacas
- Acrilicas
- Con Barniz de horneado Alcalino
- Barniz Industrial

PREPARACION DE SUPERFICIE: Humedezca un trapo con sulvente de xileno y páselo sobre la superficie que va a pintarse. Deje secar la superficie por tres o cinco minutos. Si por alguna razón retrasara el proceso de pintura más de dos horas, humedezca la superficie nuevamente.

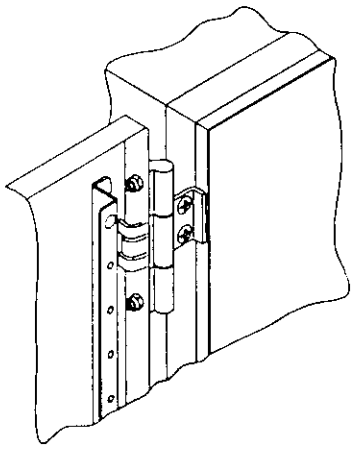
PINTURA: Aplique una capa de pintura por cada capa indicada en el instructivo del fabricante. Dé un tiempo de secado adecuado entre una capa y otra.

Deje que la capa de pintura superior seque por completo antes de realizar cualquier prueba de adhesión de pintura. Consulte el tiempo de secado con la compañia fabricante de la pintura.

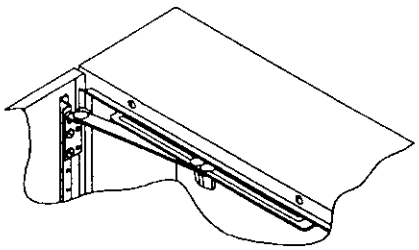
EXTERNAL ACCESSORIES
ZUBEHÖR AUSSEN
ACCESSOIRES EXTERNES
ACCESORIOS EXTERNOS



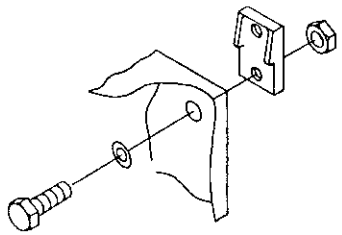
Latch Accessories
Riegelzubehör
Accessoires pour loquet
Accesorios para Seguro



180° Hinge Kit
180Grad-Scharnierbausatz
Kit de charnière à 180°
Juego de Bisagra de 180°

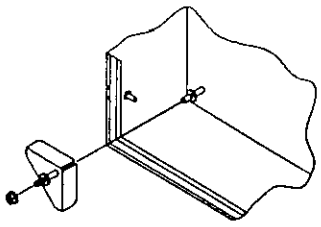


Door Stop Kit
Türanschlag-Bausatz
Kit de butée de porte
Juego Para Tope de Puerta

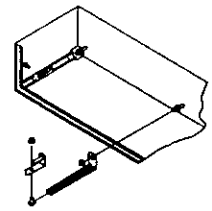


Mounting Feet
Montagefüße
Pattes de montage
Pata de Montaje

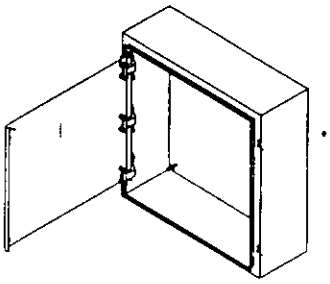
INTERNAL ACCESSORIES
ZUBEHÖR INNEN
ACCESSOIRES INTERNES
ACCESORIOS INTERNOS



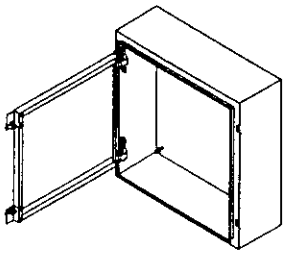
Panel Conversion Kit
Adaptersatz für Montageplatten
Kit de conversion de panneau
Juego Para Panel



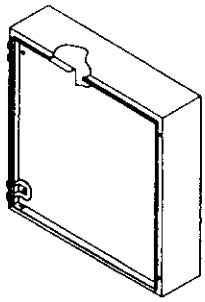
Adjustable Mounting Kit
VerstellbarerMontagebausatz
Kit de montage réglable
Juego Para Montaje Ajustable



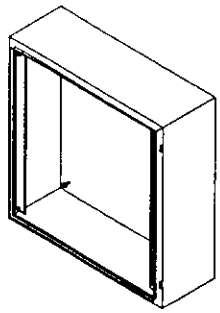
Swing–Out Panel
schwenkbareMontageplatte
Panneau pivotant
Panel de Vaivén



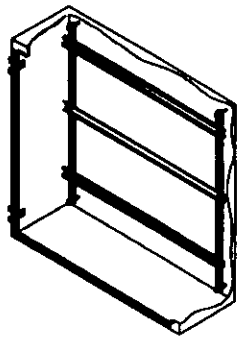
Swing–Out Frame
schwenkbarer Rahmen
Châssis pivotant
Marco Para Panel de Vaivén



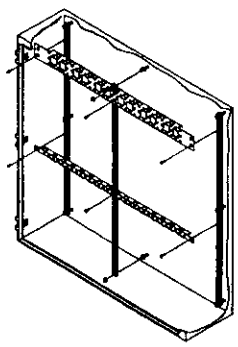
Dead Front Panel
UngeladenesFrontpanel
Panneau avant inerte
Placa Delantera



Rack Angles
Winkelstücke
Cornières du support
Angulo del Estante



DIN Rail Kit
DIN–Schienensatz
Kit de rail DIN
Juego de Riel DIN



Grid Straps
Gitterverstärkungen
Bandes en grille
sujetador Para Rejillas

GENERAL ACCESSORIES

Temperature Control
Options are available to provide an optimal environment for your controls. Options include louvers, filter fans, heat exchangers, air conditioners, and electric heaters.
Floor Stand Kits
Field or factory installation available on single door enclosures.
Drip Shield Kits
Field or factory installation available on single or double door enclosures.
Electrical Interlocks
Internal safety lockout while the enclosure contents are energized.
Corrosion Inhibitors
Protect interior components from corrosion.
Hole Seals
Used to seal extra conduit openings, pushbutton holes, or cutouts against dust, dirt, oil, and water.
Folding Shelves
Can be used to support instruments and test equipment.
Terminal Kit Assemblies
Provides an easy method to mount terminal blocks.
Pedestals
Provides floor mounting for small to medium size enclosures.
Safety Lockouts
Protect personnel and equipment by enabling multiple padlocks to be installed on a de-energized switch.
Touch-Up Paint
Used to repair the finish of enclosures and panels.
Enclosure Stabilizers
Provides stability to floor mounted enclosures which are not bolted to the floor.
Window Kits
Available for many types of Hoffman enclosures.
Data Pocket Kits
Convenient place for documentation.

ALLGEMEINES ZUBEHÖR

Temperaturregulierung
Zur Optimierung der Umgebung für Ihre Bedienelemente sind Optionen verfügbar. Zu den Optionen gehören Jalousien, Filterventilatoren, Wärmetauscher, Klimaanlagen und elektrische Heizungen.
Standfuß-Bausatz
Vor-Ort- oder Werkinstallation bei Einzeltürgehäusen verfügbar.
Tropfschutz-Bausätze
Vor-Ort- oder Werkinstallation bei Einzel- oder Doppeltürgehäusen verfügbar.
Elektrisches Schloß
Hält die Tür geschlossen, solange Stromkreis im Gehäuse unter Spannung steht.
Korrosionsschutz
Schützt Bauteile im Gehäuse vor Korrosion.
Bohrungsdichtungen
Zur Abdichtung zusätzlicher Rohröffnungen, Druckknopfbohrungen oder Ausschnitte gegen Staub, Schmutz, Öl und Wasser.
Klappregale
Zur Unterbringung von Instrumenten und Testgeräten.
Verteiler Montage Einheit
Erlaubt eine leichte Befestigung von Verteilern.
Sockel
Erlaubt Bodenmontage für kleine und mittelgroße Gehäuse.
Sicherheitsaussperrungen
Ermöglicht den Einbau mehrerer Vorhängeschlösser bei ausgeschaltetem Stromkreis zum Schutz von Personal und Geräten.
Tupflack
Zur Lackreparatur an Gehäusen und Panels.
Stabilisatoren für Gehäuse
Zur Stabilität von Standgehäusen, die nicht am Boden verankert sind.
Fensterbausätze
Für viele Arten von Hoffman Gehäuse erhältlich.
Datentaschen-Bausätze
Nützliche Ablage für Handbücher.

ACCESSORIRES GÉNÉRAL

Contrôle de la température
Des options sont disponibles afin de procurer un environnement optimum à vos contrôles. Ces options comprennent des auvents, ventilateurs à filtre, échangeurs de chaleur, climatiseurs et appareils de chauffage électriques.
Kit de tenue autonome sur le sol
Installation sur place ou en usine disponible sur les éléments à une seule porte.
Kits de dispositifs anti-écoulement
Installation sur place ou en usine disponible sur les éléments à une ou deux portes.
Verrouillages électriques
Verrou de sécurité interne pendant que le contenu de l'élément est sous tension.
Inhibiteurs anti-corrosion
Protection des composants internes contre la corrosion.
Joints d'orifices
Utilisés pour assurer l'étanchéité des passages de conduits supplémentaires, des orifices pour boutons-poussoirs ou des découpages contre la pous sière, la saleté, les produits huileux et l'eau.
Etagères pliantes
Peuvent être utilisées pour supporter des instruments et des équipements d'essais.
Assemblages de borniers
Fournissent une méthode simple de montage des borniers.
Caissons
Offrent une disposition autonome reposant sur le sol pour les éléments de petites à moyennes tailles.
Fermetures de sécurité
Protection du personnel et du matériel en permettant l'installation de cadenas multiples sur un interrupteur hors tension.
Peinture de retouche
Utilisée pour réparer le fini des éléments et panneaux.
Stabilisateurs d'éléments
Procurent la stabilité des éléments reposant à même le sol sans y être boulonnés.
Kits de fenêtres
Disponibles pour ne nombreux éléments Hoffman.
Kits de poches à documents
Endroits pratiques pour toute documentation.

ACCESORIOS GENERALES

Control de Temperatura
Opciones disponibles que proporcionen un ambiente óptimo a sus controles. Estas opciones incluyen : rejillas para ventilación, filtros, abanicos, intercambiadores de calor, aires acondicionados y calentadores eléctricos.
Juegos Para Estantes de Piso
Disponibilidad Para Instalación de cajas de una sola puerta , tanto en fábricas como en el campo.
Juego Para Protección de Goteras
Disponibilidad para instalación de cajas de una o dos puertas, tanto en la fábrica como en el campo
Sistema de Cierre Eléctrico
Seguro de protección interna cuando está energizado el contenido de la caja.
Inhibidor de Corrosión
Protege a los componentes de interiores de la corrosión.
Sellos para Orificios
Utilizado para sellar aperturas de conductos para cables, orificios para botones de arranque o protección contra el polvo, suciedad, aceite y agua.
Estantes Plegadizos
Pueden utilizarse como soporte de instrumentos y equipo de prueba.
Juego de Ensamblado para Terminales
Proporciona un método sencillo para montaje de bloques terminales.
Pedestales
Se proporcionan accesorios para montaje en el piso de enclaustros medianos y pequeños
Candado de Seguridad
Protege a la persona y al equipo al proporcionar diversos candados de seguridad al instalarse en un interruptor desenergizado.
Pintura de Retoque
Utilizada para reparar el terminado de cajas y paneles
Estabilizador de Enclaustros (Cajas)
Proporciona estabilidad a los enclaustros montados, los cuales no han sido anclados al piso.
Juego para Ventana
Dispobible para diferentes tipos de cajas Hoffman.
Juego Para Información de Bolsillo
Lugar conveniente para la documentación.

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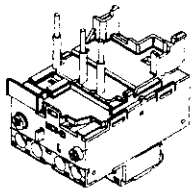
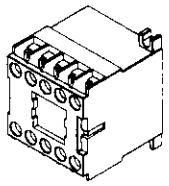
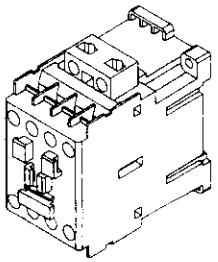
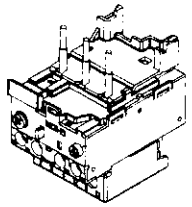
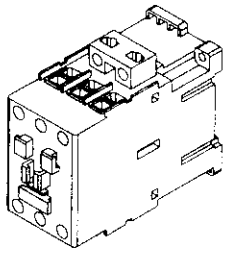
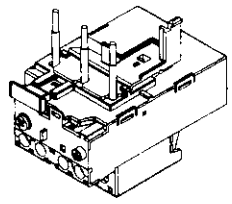
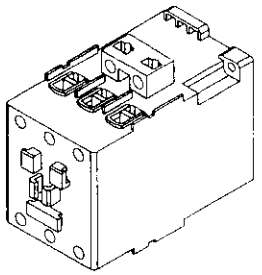
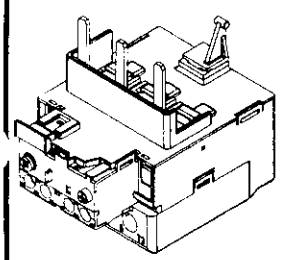
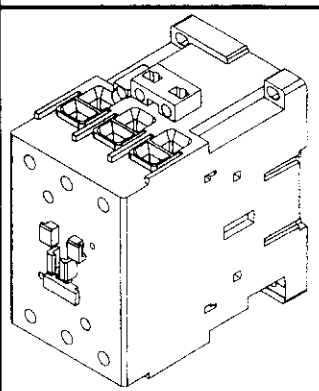
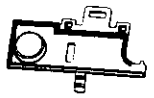
Bulletin 193 MCS-E1 Overload Relay Application and Installation
Application et installation du relais de surcharge Famille 193 MCS-E1
Überlastrelais Bulletin 193 MCS-E1, Anwendung und Installation
Aplicación e instalación del relé de sobrecarga, Boletín 193 MCS-E1
Boletim 193 MCS-E1 Aplicação e Instalação do Relé de Sobrecarga
Applicazione ed installazione dei relè termici Bollettino 193 MCS-E1
ブレティン193 MCS-E1過負荷継電器の応用と取付け
Bulletin 193 MCS-E1过载继电器的使用与安装

(Cat 193-EA_ _ _)

MCS-E1 CAT	CAT 100 & 104		3Ø ~ FLA
 193-EA_ _B		-M05 -M09	0.1 - 12A
		-C09 -C12 -C16 -C23	0.1 - 32A
 193-EA_ _C		-C30 -C37	12 - 37A
 193-EA_ _D		-C43	5 - 45A
 193-EA_ _E		-C60 -C72 -C85	26 - 85A

ACCESSORIES ACCESSOIRES ZUBEHÖR ACCESORIOS ACESSÓRIOS ACCESSORI 付属品 附件		CAT
	193-BC4	193-EA_ _ _
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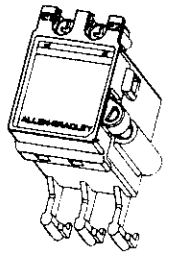
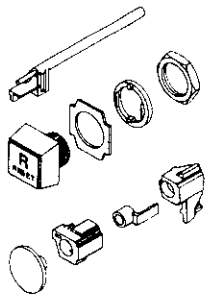
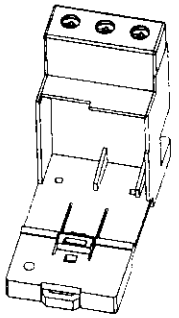
	193-ER1 _ 193-ER1Z _ _	193-EA_ _ _
	198-MR3	193-EA_ _ _
	193-EPM1	193-EA_ _ B 193-EA_ _ C
	193-EPM2	193-EA_ _ D
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41053-051-01 (E)
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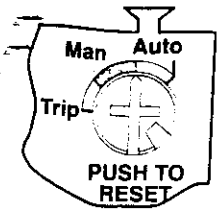
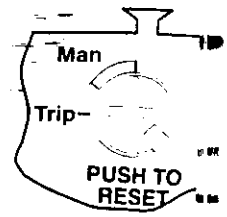
Operating Modes
Modes d'exploitation
Betriebsarten
Modos de operación
Modos de operação
Modalità di funzionamento
操作モード
操作模态

193-EA4__
193-EA5__
193-EA6__



193-EA1__
193-EA2__
193-EA3__



- Anti-tamper shields, Cat 193-BC4 and 193-BC5 are available to inhibit unauthorized or accidental changes of mode or current setting.
  Auto: Push and turn reset button to Auto position. The relay resets automatically, (approximately 2 minutes after tripping.)
  Man (Manual): Reset by pushing button in.
  Trip (Tripped): Push and turn reset button counterclockwise to manually trip. This action causes N.O. and N.C. contacts to change state. Releasing button reverts device to manual mode.

- Des blindages contre modifications indésirables (réf. 193-BC4 et 193-BC5) sont disponibles pour empêcher tout changement de mode ou de réglage accidentel ou non autorisé.
  Auto: Enfoncez et tournez le bouton de remise à zéro sur la position Auto (automatique). Le relais se remet automatiquement à zéro (environ 2 minutes après le déclenchement).
  Man (Manuel) : Remettez à zéro en enfonçant le bouton.
  Trip (Déclenchement) : Enfoncez et tournez le bouton de remise à zéro vers la gauche pour effectuer un déclenchement manuel. Cette action entraîne le changement d'état des contacts N.O. (normalement ouvert) et N.C. (normalement fermé). Le relâchement du bouton remet le dispositif en mode manuel.

- Zum Schutz vor unbefugter oder versehentlicher Änderung der Betriebsart bzw. der derzeitigen Einstellung sind Schutzvorrichtungen (Best.-Nr. 193-BC4 und 193-BC5) lieferbar.
  Auto: Drücken Sie die Reset-Taste und drehen Sie sie in die Stellung Auto. Das Relais wird automatisch zurückgesetzt (etwa zwei Minuten nach dem Auslösen).
  Man (Manuell): Drücken Sie die Taste, um das Relais zurückzusetzen.
  Trip (Ausgelöst): Drücken Sie die Reset-Taste und drehen Sie sie im Gegenuhrzeigersinn, um eine manuelle Auslösung zu verursachen. Hierdurch wird der Status des Schließer- und Öffnerkontakts geändert. Nach dem Loslassen der Taste geht das Gerät in den manuellen Modus über.

- Están a su disposición los protectores, Cat 193-BC4 y 193-BC5, contra la alteración no autorizada o accidental de cambios de modo o posicionamientos actuales.
  Auto: Presione y gire el botón de reseteo a la posición Auto. El relé se restablece automáticamente. (Aproximadamente 2 minutos después del disparo.)
  Man (Manual): Restablezca presionando el botón.
  Trip (Disparo): Presione y gire el botón de reseteo en sentido contrario al de las manecillas del reloj para disparar automáticamente. Esta acción causa que los contactos normalmente abiertos y los contactos normalmente cerrados cambien de estado. El soltar el botón invierte el dispositivo al modo manual.

- Estão disponíveis blindagens antiviolação, Cat 193-BC4 e 193-BC5, para evitar mudanças não-autorizadas ou acidentais do modo ou do ajuste da corrente.
  Auto: empurre e gire o botão de ajuste até a posição Auto. O relé se rearma automaticamente (aproximadamente 2 minutos depois de disparado).
  Man (Manual): para rearmar, empurre o botão para dentro.
  Trip (Acionado): empurre e gire o botão de ajuste no sentido anti-horário, para disparar manualmente. Com isto, os contatos N.A. e N.F mudam de estado. Soltando-se o botão o dispositivo volta ao modo manual.

- Per evitare modifiche non autorizzate o accidentali della modalità o dell'impostazione di corrente, sono disponibili gli schermi anti-maneggiamento, Cat. 193-BC4 e 193-BC5.
  Auto (Automatico): spingere e ruotare il pulsante sulla posizione Auto. Il relè si ripristina automaticamente dopo il raffreddamento (all'incirca 2 minuti dopo l'intervento).
  Man (Manuale): si ripristina spingendo il pulsante in dentro.
  Trip (Scattato): per provocare manualmente l'intervento spingere e ruotare il pulsante in senso antiorario. L'azione cambia lo stato dei contatti da N.O. (normalmente aperto) a N.C. (normalmente chiuso). Rilasciando il pulsante il dispositivo torna alla modalità manuale.

- 許可なしでの使用、あるいは現在の設定モードの偶発的な変更を制止するための不正使用防止シールド (Cat 193-BC4 および 193-BC5)も発売されています。
  Auto（自動）：リセットボタンを押しながら回して自動位置にセットします。継電器が自動的にリセットされます（トリップ後およそ2分）。
  Man（手動）：ボタンを押してリセットします
  Trip（トリップ）：リセットボタンを押しながら時計の針と反対方向に回して手動でトリップを行います。これにより、N.O.接触とN.C.接触の状態が変化します。ボタンを元に戻すと装置は手動モードに変わります。

- 提供防窜改护罩(零件编号Cat 193-BC4和193-BC5)，可防止有人擅或意外更改操作模态或电流设定。
  Auto(自动): 按下复原旋钮，并转动至Auto(自动)档位。继电器在跳闸后会自动复原。(在跳闸后2分钟左右复原。)
  Man(手动): 按下复原旋钮，可使继电器复原。
  Trip(跳闸): 按下复原旋钮，逆时针方向转动，可使继电器跳闸。这个手操纵动作导致N.O.和N.C.触点改变状态。如果放开旋钮，则使继电器回复到手动操作模态。

ATTENTION: Do not use automatic reset mode in applications where unexpected automatic restart of the motor can cause injury to persons or damage to equipment.
ATTENTION : N'utilisez pas le mode Remise à zéro automatique dans les applications où un redémarrage automatique inattendu du moteur pourrait provoquer des blessures personnelles ou des dégâts matériels.
ACHTUNG: Der automatische Rücksetzmodus darf nicht in Anwendungen verwendet werden, in denen der unerwartete Neustart des Motors zu Personen- oder Sachschäden führen kann.
ATENCION: No use el modo de reseteo automático en aplicaciones donde el rearranque repentino del motor pueda causar lesiones personales o daño al equipo.
ATENÇÃO: não utilize o modo de reajuste automático em aplicações nas quais o reinício automático e inesperado do motor possa causar ferimentos às pessoas ou danos ao equipamento.
ATTENZIONE: non usare la modalità di ripristino automatico in applicazioni dove il riavviamento automatico improvviso del motore può provocare infortuni o danni all'apparecchiatura.
注意：モーターの予期しない自動再スタートによって負傷や機器の破損をまねく恐れのあるような応用では、自動リセット・モードを使用しないでください。
注意: 在马达突然自动再起动可能导致人员伤害或设备损坏的地方，切勿采用自动复原模态。

Contact Status
Etat des contacts
Kontaktstatus
Estado del contacto
Situação de contato
Stato dei contatti
接触状態
接触状态

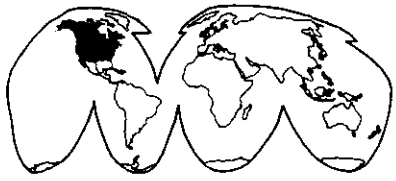
Normal		Test	Tripped
95 — 96	Closed	Open	Open
97 — 98	Open	Open	Closed

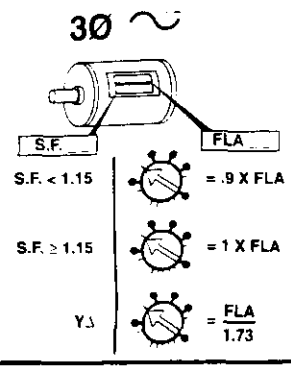
Normal	Tripped	Test
97 95 / 98 96	97 95 / 98 96	97 95 / 98 96

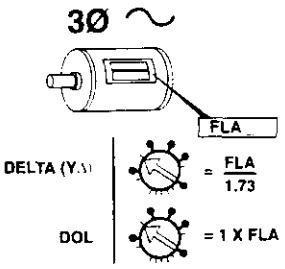
MCS-E1 Features
Caractéristiques du MCS-E1
Leistungsmerkmale des MCS-E1
Características del MCS-E1

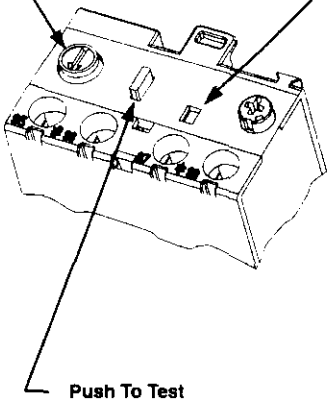
- To adjust trip current, turn dial until the desired current is aligned with the ▲ pointer. Trip rating is 120% of dial setting.
- Pour régler l'intensité de déclenchement, tournez le cadran jusqu'à ce que le pointeur ▲soit sur l'intensité voulue. La valeur nominale de déclenchement est de 120% du réglage cadran.
- Zur Einstellung des Auslösestroms drehen Sie den Schalter, bis der Zeiger ▲ auf die gewünschte Stromstärke zeigt. Der zur Auslösung erforderliche Nennstrom beträgt 120% des eingestellten Wertes.
- Para ajustar la corriente del disparo, gire el dial hasta que la corriente deseada esté alineada con la marca ▲. La capacidad nominal del disparo es el 120% del posicionamiento del dial.
- Para regular a corrente de disparo, gire o disco mostrador até que a corrente desejada esteja alinhada com o indicador ▲. A classe de disparo corresponde a 120% da marcação no mostrador.
- Per regolare la corrente di intervento, ruotare il regolatore fin quando la corrente desiderata non è allineata con il puntatore ▲. Il valore nominale di intervento corrisponde al 120% dell'impostazione del regolatore.
- トリップ電流を調整するには、所定の電流の目盛りが▲印に来るまでダイヤルを回してください。トリップ定格は、ダイヤル設定値の**120%**です。
- 若欲调节跳闸电流设定，可转动刻度盘，使所需的设定值对准▲箭头。跳闸电流额定值是刻度盘显示值的**120%**。

Características MCS-E1
Funzioni dell'MCS-E1
MCS-E1の特長
MCS-E1继电器的特性







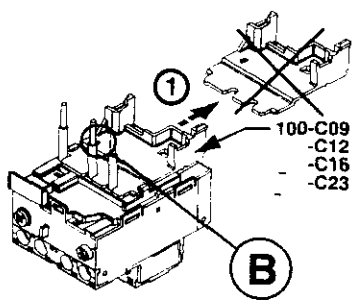


- **Trip Indicator Window**
  Yellow indicator not visible: Not Tripped.
  Yellow indicator visible: Tripped.
- **Fenêtre d'indicateur de déclenchement**
  Indicateur jaune non visible : pas de déclenchement
  Indicateur jaune visible : déclenchement
- **Auslösungsanzeigefenster**
  Gelbe Anzeige nicht sichtbar: keine Auslösung
  Gelbe Anzeige sichtbar: Auslösung
- **Ventana indicadora de disparo**
  Indicador amarillo no visible: No disparado
  Indicador amarillo visible: Disparado
- **Visor de disparo**
  Se o indicador amarelo não estiver visível: não disparado
  Se o indicador amarelo estiver visível: disparado
- **Finestra indicatrice di intervento.**
  Indicatore giallo non visibile: non scattato.
  Indicatore giallo visibile: scattato.
- トリップ表示ウィンドウ
  黄色インジケータが表示されていない場合：トリップなし
  黄色インジケータが表示されている場合：トリップ済み
- 跳闸指示窗
  黄色标记未显示：没有跳闸
  黄色标记显示：已跳闸

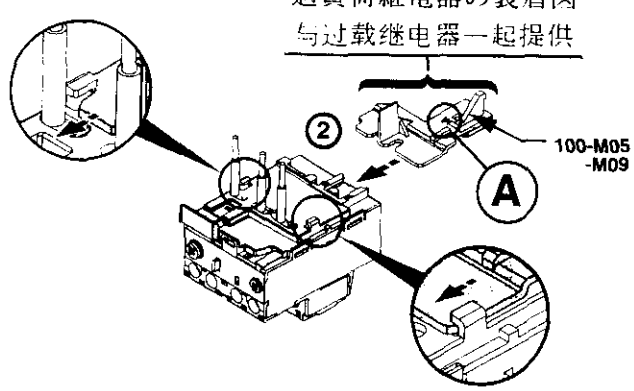
Push To Test
Enfoncer pour tester
Testschalter
Presione para probar
Pressione para testar
Spingere per provare
押してテストします。
按下键钮进行测试

Installation
Instalación
Instalação
Installazione
取付け方法
安装

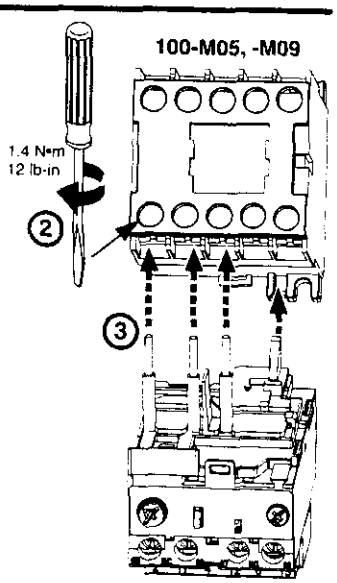
ATTENTION: To prevent electrical shock, disconnect from power source before installing or servicing. Install in suitable enclosure. Keep free from contaminants.
ATTENTION: Avant le montage et la mise en service, couper l'alimentation secteur pour éviter toute décharge. Prévoir une mise en coffret ou armoire appropriée. Protéger le produit contre les environnements agressifs.
ACHTUNG: Vor Installations- oder Servicearbeiten Stromversorgung zur Vermeidung von elektrischen Unfällen trennen. Die Geräte müssen in einem passenden Gehäuse eingebaut und gegen Verschmutzung geschützt werden.
ATENCION: Desconéctese de la corriente eléctrica, antes de la instalación o del servicio, a fin de impedir sacudidas eléctricas. Instálelo en una caja apropiada. Manténgalo libre de contaminantes.
ATENÇÃO: Para evitar choques, desconectar da corrente elétrica antes de fazer a instalação ou a manutenção. Instalar em caixa apropriada. Manter livre de contaminantes.
ATTENZIONE: Per prevenire infortuni, togliere tensione prima dell'installazione o manutenzione. Installare in custodia idonea. Tenere lontano da contaminanti.
注意：感電事故防止のため、取付けまたは修理の際は電源から取り外してください。適切なケース内に取付けてください。また、汚染物質がないことを確認してください。
注意: 为了防止触电，在安装或维修之前必须先切断电源。安装在合适的设备箱内。防止接触污染物。



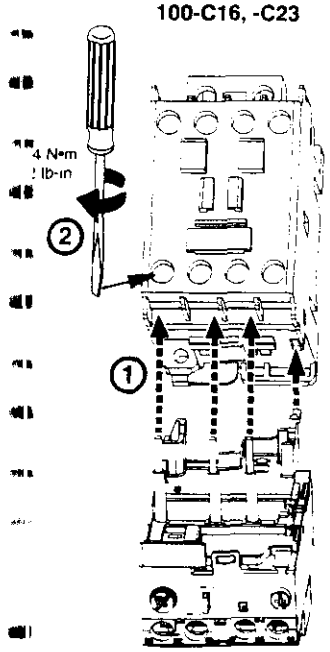
SUPPLIED WITH OVERLOAD RELAY
FOURNI AVEC RELAIS THERMIQUE
MIT ÜBERLASTRELAIS AUSGESTATTET
SUMINISTRADO CON RELE DE SOBRECARGA
FORNECIDOS COM O RELÉ DE SOBRECARGA
IN DOTAZIONE CON IL RELÈ TERMICO
過負荷継電器の装着図
与过载继电器一起提供



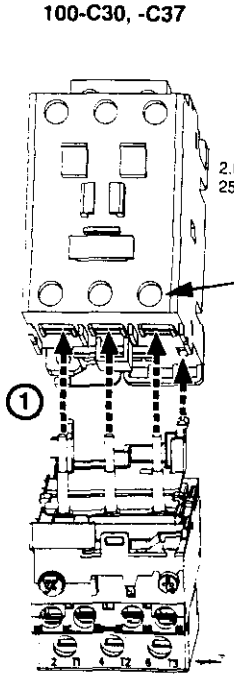
100-M05, -M09



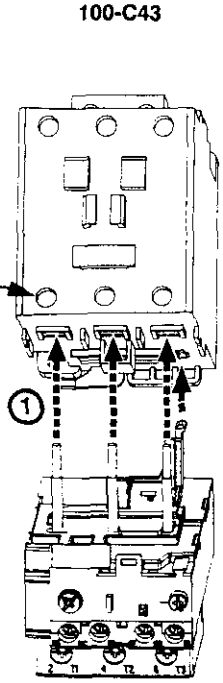
100-C09, -C12
100-C16, -C23



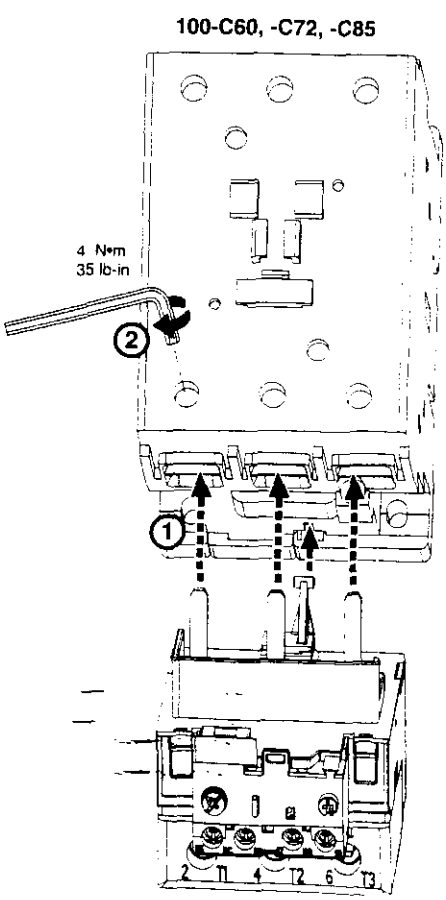
100-C30, -C37



100-C43



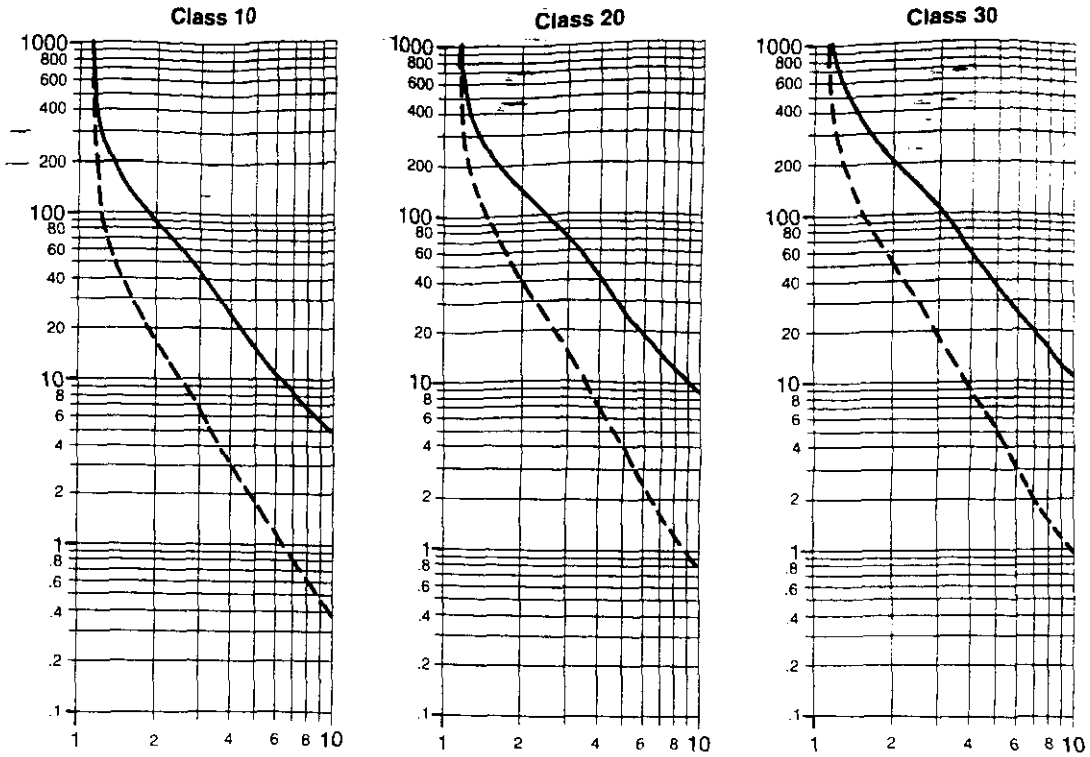
100-C60, -C72, -C85



Trip Curve
Courbe de déclenchement
Auslösekurve
Curva del disparo
Curva de disparo
Curva di intervento
トリップ曲線
跳闸曲线

COLD START
DEMARRAGE A FROID
KALTSTART
ARRANQUE EN FRIO
PARTIDA À FRIO
AVVIAMENTO A FREDDO
冷始動
冷态起动

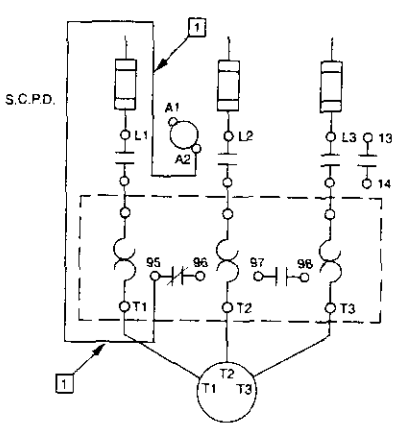
HOT START
DEMARRAGE A CHAUD
WARMSTART
ARRANQUE EN CALIENTE
PARTIDA À QUENTE
AVVIAMENTO A CALDO
熱始動
热态起动

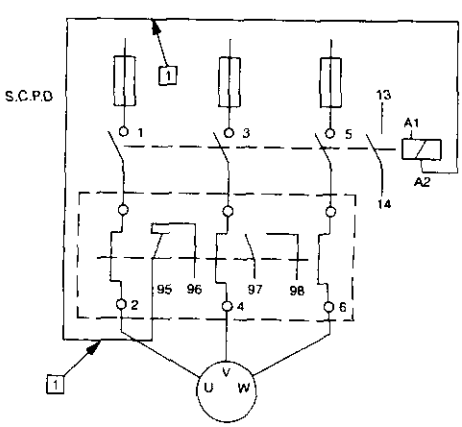


Multiple of FLA
Intensités pleine charge multiples
Vielfache des FLA-Wertes
Múltiplo de FLA

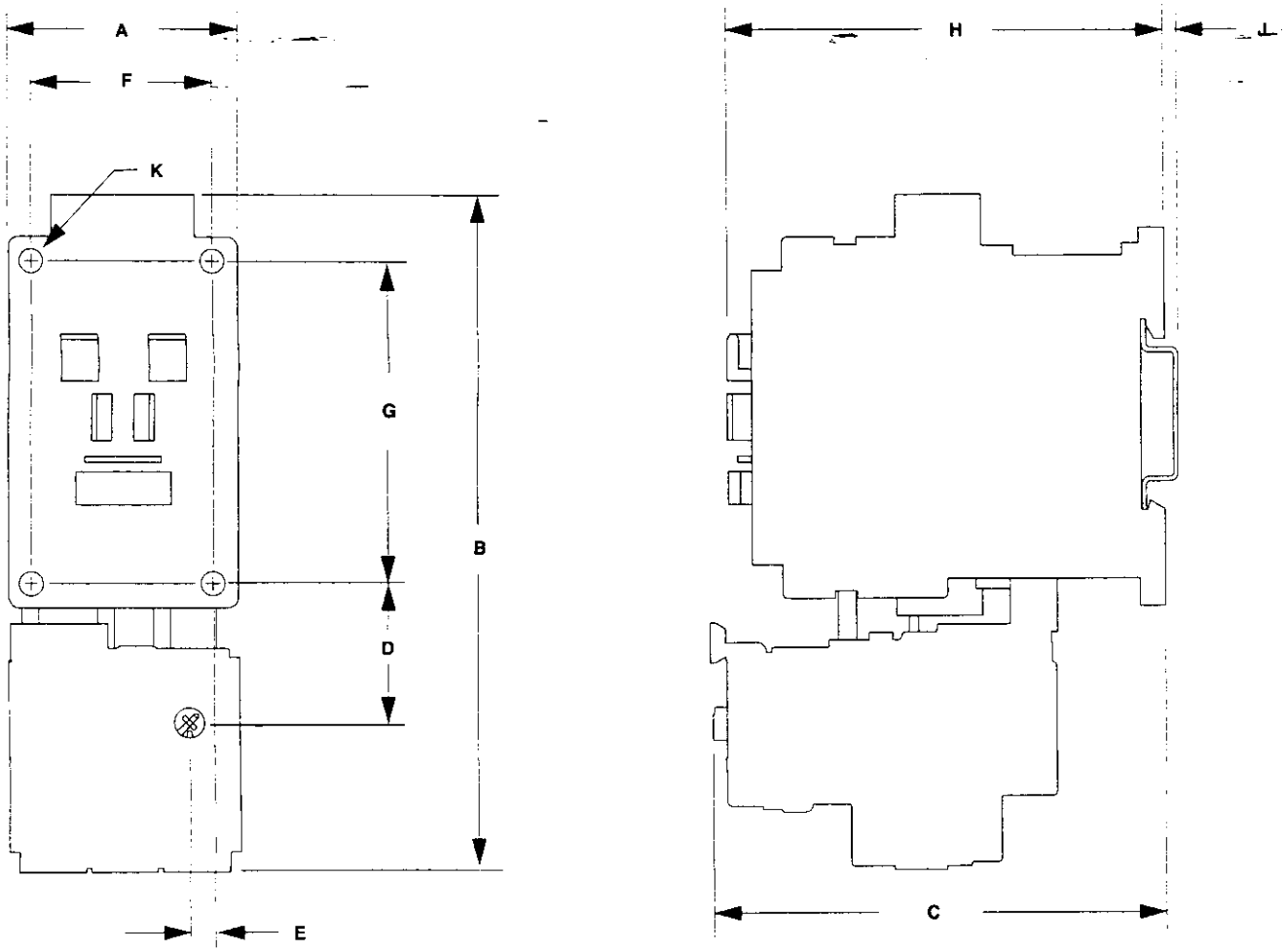
Múltiplo de FLA
Multiplo di Max amp.
FLA 倍率
满载电流安培(FLA)的倍数

Wiring Diagram - 3 Phase Full Voltage DOL Starter
Schéma de câblage - Pleine tension triphasée Démarreur DOL (direct en ligne)
Verkabelungsschema - 3-phasiger Vollspannungs-DOL-Motoranlasser
Diagrama de cableado - Arrancador DOL (directo en línea) trifásico de voltaje pleno
Diagrama de circuito - Dispositivo de partida DOL, trifásico, de máxima tensão
Schema elettrico - Avviatore diretto trifase a tensione piena
配線図 - 3 相全電圧 DOL 始動器
配线图 – 三相全电压DOL起动器





[1] Connection must be fitted by user
[1] Connexion a régler par l'utilisateur
[1] Verbindung muß vom Benutzer hergestellt werden
[1] La conexión debe ser realizada por el usuario
[1] Conexão deve ser colocada pelo usuário
[1] Il collegamento deve essere adattato dall'utente
[1] 接続部はユーザー側で取付けるものとします
[1] 线路连接必须由用户完成



CAT		A	B	C	D	E	F	G	H	J	K
100-M05, -M09	mm	45	107	66.6	25	0	- -	50	48.3	2	(2)-ø4.2
	(in)	(1-49/64)	(4-13/64)	(2-5/8)	(63/64)	0	- -	(1-61/64)	(1-29/32)	(5/64)	((2)-11/64ø)
100-C09, -C12, -C16, -C23	mm	45	131	88.5	29	-0.8	35	60	85.1	2	(2)-ø4.2
	(in)	(1-49/64)	(5-5/32)	(3-27/32)	(1-9/64)	(-1/32)	(1-3/8)	(2-23/64)	(3-11/32)	(5/64)	((2)-11/64ø)
100-C30, -C37	mm	45	136.5	92	29	-0.8	35	60	104.7	2	(2)-ø4.2
	(in)	(1-49/64)	(5-3/8)	(3-5/8)	(1-9/64)	(-1/32)	(1-3/8)	(2-23/64)	(4-1/8)	(5/64)	((2)-11/64ø)
100-C43	mm	54	136.5	92	29	0.4	45	60	104.7	2	(2)-ø4.2
	(in)	(2-1/8)	(5-3/8)	(3-5/8)	(1-9/64)	(1/64)	(1-49/64)	(2-23/64)	(4-1/8)	(5/64)	((2)-11/64ø)
100-C60, -C72, -C85	mm	72	188.5	120	34.5	9.4	55	100	124	2	(4)-ø5.5
	(in)	(2-53/64)	(7-27/64)	(4-23/32)	(1-23/64)	(3/8)	(2-11/64)	(3-15/16)	(4-7/8)	(5/64)	((4)-7/32ø)

41053-051-01 (E)
Printed in U.S.A.

APPENDIX J

WARRANTY

Limitation of Warranty
&
Limitation of Remedy

All products not manufactured by BISCO Environmental carry the original manufacturer's warranty. Copies are available on request.

BISCO Environmental warrants its packaged and manufactured equipment against any defect in material or workmanship, under normal use and storage for a period of twelve (12) months from date of manufacture. In the event that products are found to be defective within the warranty period, BISCO Environmental's sole obligation and remedy shall be the furnishing of replacements for any defective parts, and such replacement parts shall be furnished but not installed by BISCO Environmental. BISCO Environmental will not be liable for special or consequential damages in any claim, suit or proceedings arising under this warranty, nor will BISCO Environmental accept any liability for claims for labor, loss of profit, repairs or other expenses incidental to replacement. The product warranty expressed above is our only warranty and may not be verbally changed or modified by any representative of BISCO Environmental. All freight costs incurred in shipping parts to or from BISCO Environmental or to the manufacturer if necessary, are at the expense of the customer.

BISCO Environmental expressly disclaims any warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose or any warranty arising from a course of dealing or usage of trade. Except to the extent required by applicable law, BISCO Environmental shall not be liable, in tort, contract or otherwise, for any loss or damage, whether direct, consequential or incidental, of any person or entity arising in connections with the equipment.