Operations and Maintenance Summary Manual

Onalaska Groundwater Treatment System

Prepared by

CH2M HILL

May 1997

MKE100171FA.WP5/1

Contents

Tables

Figures

MKE10017204.WP5

Section 1
Introduction

This manual provides the plant operating staff with the information necessary to operate and maintain the Onalaska Groundwater Treatment System. (Information regarding the landfill cap and its maintenance and the In Situ Bioremediation System is provided in other documents.) The manual gives an overview of the system and the treatment goals and describes how the extraction wells and process equipment function. Startup and shutdown procedures are discussed along with other information related to the operation of the system. Requirements for sampling, monitoring, and reporting are also discussed. The manual includes:

- Section 1—Introduction
- Section 2—Site Background
- Section 3—Process Description
- Section 4—Process Startup and Shutdown
- Section 5—Routine and Special Process Operations
- Section 6—Sampling, Monitoring and Reporting
- Section 7—General Plant Information
- Section 8—Safety
- Appendix A—P&IDs/Equipment List
- Appendix B—Log Sheets
- Appendix C—Analytical Methods
- Appendix D—Safety Information
- Appendix E—Material Safety Data Sheets

This manual is intended only to provide an overview of operating the process. It does not present detailed descriptions or step-by-step programming/operation instructions of each piece of equipment. For specific information for a given piece of process equipment, as well as requirements for equipment maintenance, consult the manufacturer's O&M manual. Manufacturers' O&M manuals have been supplied for each piece of equipment and are available and are covered in a four-volume set.

MKE100171FC.WP5

Section 2
Site Background

The Onalaska Municipal Landfill site is located in Onalaska Township, Wisconsin. It consists of the former municipal landfill, about 8 acres in area and 15 to 20 feet deep, and adjacent property to which the groundwater contamination plume has migrated. The site was operated as a sand and gravel quarry from the 1960s to 1970s. In the 1970s, municipal wastes and industrial wastes, including naphtha-based solvents, were disposed of at the site. Remedial investigations conducted at the site during 1989 found that the groundwater was contaminated, primarily with volatile organic compounds (VOCs), and the groundwater contamination was migrating toward the Black River (Figure 2-1). The investigations also concluded that an area of soils outside the limits of the landfill was contaminated with petroleum based solvents (zone of non-aqueous phase contamination) and that the landfill cap required an upgrade.

The groundwater extraction system is designed to (1) prevent continued offsite migration of contaminants emanating from the landfill and from contaminated soil outside the landfill and (2) reduce contaminant concentrations in the groundwater to the extent practical. The extraction system, five wells located along the downgradient edge of the landfill (Figure 2-1), was designed to capture contaminated groundwater within the target remediation area defined in the feasibility study (FS). The well system was designed to extract groundwater at a design flow rate of 800 gallons per minute (gpm). The actual flow rates may vary between 600 and 1,000 gpm.

The groundwater cleanup standards for the site are listed in Table 2-1. These standards are the remediation goals to be met when implementing the groundwater remedy at the Onalaska site. The Groundwater Monitoring Plan details the standards and points of standard application.

The treatment system is designed to provide best available technology economically achievable (BATEA) to remove iron and VOCs. The treatment system consists of aeration (to oxidize the iron), clarification (to remove the majority of the oxidized iron and miscellaneous suspended solids), and air stripping (to remove VOCs). The facility has been designed to accommodate a filter, if required, in the future. The filter is currently not part of the process. Sludge from the Clarifier is dewatered with a Filter Press and the resulting filter cake is disposed of in a landfill. The treated groundwater is discharged to a diffuser located in along the eastern bank of the Bullet Chute. Figure 2-2 is a process flow diagram depicting the treatment system.

Table 2-2 presents the estimated influent and effluent concentrations for the treatment system.

Table 2-1
Groundwater Cleanup Standards
Set by Federal EPA
Onalaska Landfill

Compound	Standard (μg/L)
Benzene	0.067
Toluene	68.6
Xylene	124
Ethylbenzene	272
Arsenic[1]	5
Barium[1]	200
Lead	5
Trichloroethene	0.18
1,1-Dichloroethane	0.04
1,1,1-Trichloroethane	40
1,1-Dichloroethene	0.024

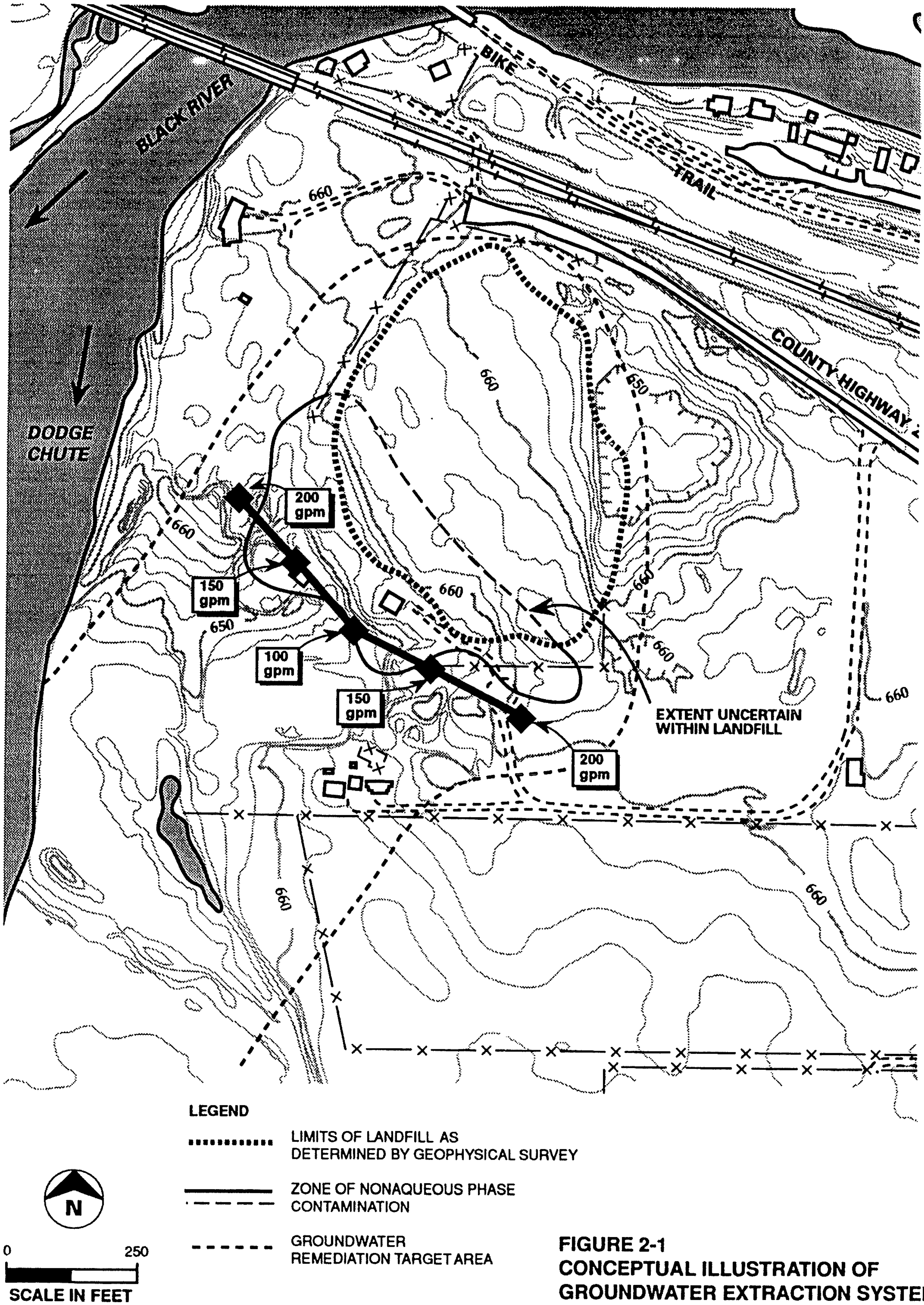
[1] Naturally occurring levels for these compounds may be higher than these standards.
μg/L = micrograms/liter

MKE100171FE.WP5/1

Table 2-2
Summary of Influent/Effluent Parameters

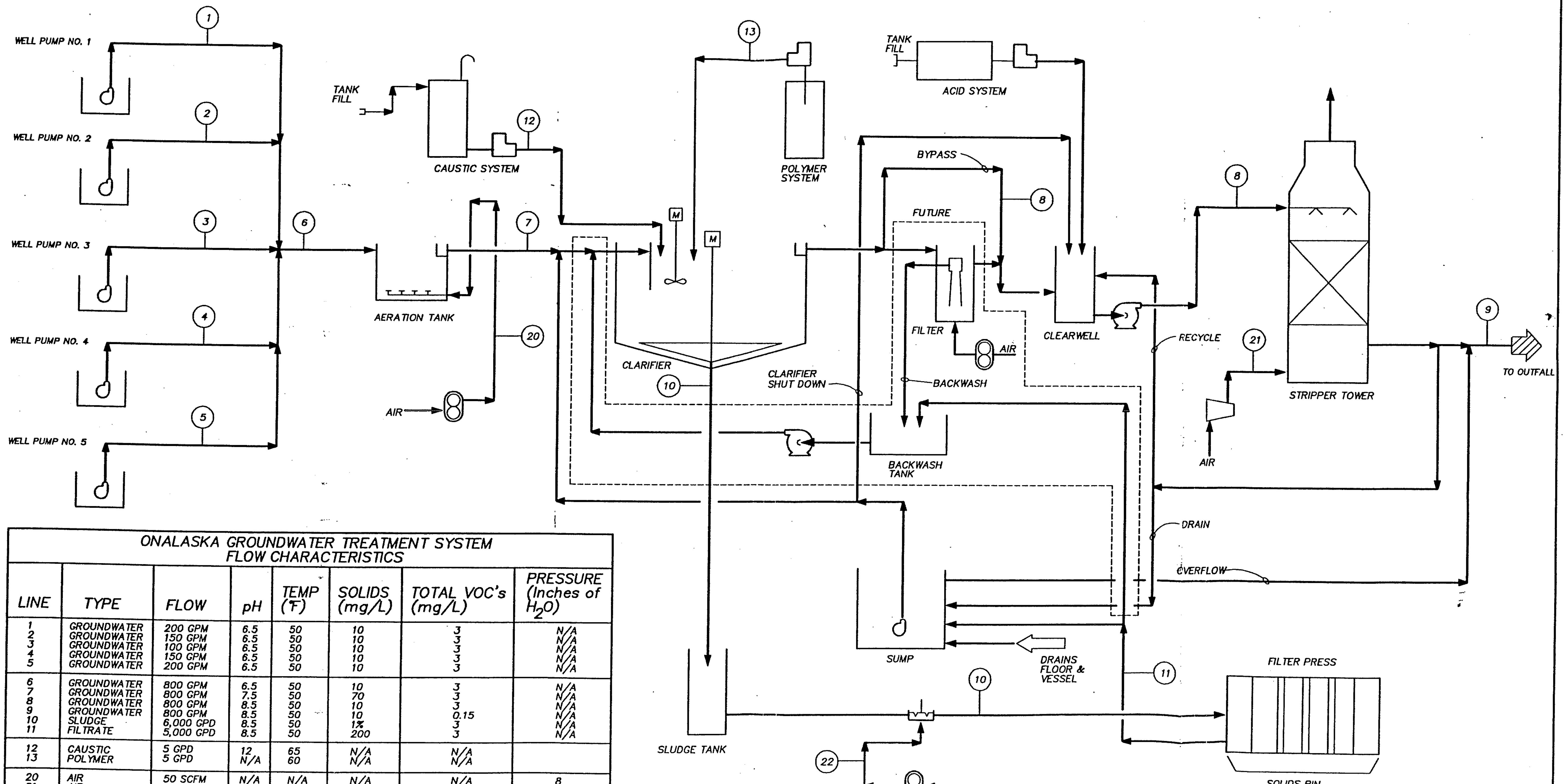
Contaminant	Average Influent Concentration	Effluent Concentration
Benzene	4 μg/L	< 1 μg/L
Ethylbenzene	79 μg/L	< 1 μg/L
Toluene	2,800 μg/L	140 μg/L
Xylene	625 μg/L	31 μg/L
Iron	25 mg/L	1 mg/L
BOD	3 mg/L	2 mg/L
TSS	22 mg/L	10 mg/L
NH_3	10 mg/L	8 mg/L
pH	6.6	8.3

Concentrations are estimated based on groundwater well sampling during the Remedial Investigation



GLE65624.SU.ML Concept GW Extract Syst 8-4-94mms/LML

FIGURE 2-1
CONCEPTUAL ILLUSTRATION OF GROUNDWATER EXTRACTION SYSTEM
ONALASKA LANDFILL



ONALASKA GROUNDWATER TREATMENT SYSTEM FLOW CHARACTERISTICS

LINE	TYPE	FLOW	pH	TEMP (°F)	SOLIDS (mg/L)	TOTAL VOC's (mg/L)	PRESSURE (Inches of H_2O)
1	GROUNDWATER	200 GPM	6.5	50	10	3	N/A
2	GROUNDWATER	150 GPM	6.5	50	10	3	N/A
3	GROUNDWATER	100 GPM	6.5	50	10	3	N/A
4	GROUNDWATER	150 GPM	6.5	50	10	3	N/A
5	GROUNDWATER	200 GPM	6.5	50	10	3	N/A
6	GROUNDWATER	800 GPM	6.5	50	10	3	N/A
7	GROUNDWATER	800 GPM	7.5	50	70	3	N/A
8	GROUNDWATER	800 GPM	8.5	50	10	3	N/A
9	GROUNDWATER	800 GPM	8.5	50	10	0.15	N/A
10	SLUDGE	6,000 GPD	8.5	50	1%	3	N/A
11	FILTRATE	5,000 GPD	8.5	50	200	3	N/A
12	CAUSTIC	5 GPD	12	65	N/A	N/A	
13	POLYMER	5 GPD	N/A	60	N/A	N/A	
20	AIR	50 SCFM	N/A	N/A	N/A	N/A	8
21	AIR	5,000 SCFM	N/A	N/A	N/A	N/A	<1
22	AIR	50 SCFM	N/A	N/A	N/A	N/A	100

FIGURE 2-2

CH2M HILL

DSGN P.M.BOERSMA					
DR D.OXLEY					
CHK S.M.KEITH					
APVD S.M.KEITH	NO.	DATE	REVISION	BY	APVD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS FLOW DIAGRAM

SHEET 48
DWG NO. 01-N-02
DATE OCT 1992
PROJ NO. GL065602.FD

Section 3
Process Description

This section presents an overview and functional description of the extraction and treatment system. (Detailed operating procedures are presented in Sections 4 and 5.) A Process Flow Diagram (PFD) for the treatment system is shown in Figure 2-2. The PFD provides an overview of the system in schematic form and defines each major process stream. Piping and instrumentation diagrams (P&IDs), provided in Appendix A, show the locations of all process equipment, valves, and controls. Table A-1 (in Appendix A) lists and describes the equipment shown in the P&ID along with manufacturer and model number.

The groundwater treatment system and the process building are designed so that a filter or oil/water separator can be added in the future if needed. If a filter or separator is added, an operational description would be added to this manual.

Unless otherwise noted, all electric process equipment is controlled from the Main Control Panel (MCP) and power is fed through the Motor Control Center (MCC). Electric motors are fitted with lockout switches. The lockout for the sump pumps is located at the local panel. Other lockouts are located at the MCC. The chemical metering pumps must be unplugged at the receptacles. Annunciators indicate the operating status for each piece of equipment. A more detailed discussion of the motor controls is presented in Section 4.

All tanks and process equipment are equipped with maintenance drains connected to the sump under the treatment building. All tanks are equipped with overflows that also flow into the sump.

All exterior piping is heat traced to prevent freezing in the winter.

Groundwater Extraction Wells

The purpose of the extraction wells is to collect and pump the groundwater to the treatment system. The wells are designed and spaced so that their total zone of influence covers the width of contaminated groundwater plume (Figure 2-1).

The general construction of all five wells is similar. All wells are constructed with 8-inch stainless steel screen. All wells are about 85 feet deep with submersible pumps (Pumps Nos. 1 through 5). Each well is individually piped to the process building, where it enters through the floor and connects to a manifold.

After each extraction line enters the process building, there is a plug valve, a pressure indicator, a flow indicator, and a butterfly valve. The flow rate, total volume of groundwater pumped for that well, and pressure are read locally. The flow rates of all five wells are totalized and the sum is transmitted to the control room where a total flow is read on a strip chart recorder. The individual extraction lines then join the manifold, the groundwater is piped to the Aeration Tank.

Aeration Tank

The purpose of the Aeration Tank (T-2-1) is to aerate the groundwater to oxidize the ferrous (soluble) iron to ferric (insoluble) iron so it will settle as a solid in the Clarifier. The capacity of the Aeration Tank is 12,000 gallons (15-minute retention time at an 800-gpm flow). Groundwater enters the tank through a side inlet pipe and exits over an overflow weir. Coarse bubble diffusers anchored on the bottom of the tank are designed to inject 50 scfm supplied by a positive displacement Aeration Blower (M-2-2). The blower, equipped with a silencer and a filter, is designed to deliver the air at a pressure of 8 psig. A pressure indicator is mounted on the air supply line next to the blower.

Clarifier/Chemical Addition/Sludge Tank

The Clarifier (T-3-1) is a solids contact Clarifier designed to remove the oxidized iron from the groundwater by settling the iron solids to the bottom of the Clarifier. The Clarifier has three zones: the mixing zone, the reaction zone, and the settling zone. The mixing zone provides a gently mixed area where the pH of the groundwater is raised to 8.3 through the addition of caustic (sodium hydroxide) to speed the rate of the oxidation reaction. Sludge from the bottom of the Clarifier is mixed with the influent in the mixing zone with a marine propeller. Polymers can also be added to the mixing zone if needed. Water flows from the mixing zone to the Clarifier's reaction zone to allow time for the oxidation reaction to take place. Finally, the water flows to the settling zone of the Clarifier which provides a long retention time to allow the oxidized iron solids (ferric hydroxide) to settle to the bottom.

The Clarifier is above grade, with a steel tank and concrete bottom. It is sized for a 30-minute reaction time in the reaction zone and a sludge settling rate of 0.5 gpm/sq. ft. Groundwater flows by gravity into the Clarifier from the Aeration Tank and in turn flows by gravity to the Clear Well (T-4-4). Ferric hydroxide sludge settled in the Clarifier is scraped with the constantly revolving sludge rake to the center where it is removed through a discharge line at the bottom of the tank. The sludge is then pumped to the Sludge Tank (T-6-1).

Two drive units (M-3-1 and M-3-2) are mounted on the Clarifier. M-3-1 turns the sludge rake. M-3-2 turns the marine propeller mixer in the mixing zone or center well. An alarm on the MCP will light if the sludge rate reaches 10 to 20 percent of its design torque. The sludge rate will shut down if it reaches 10 to 20 percent of its design torque. The speed of the propeller can be controlled locally at the Clarifier.

Caustic sodium hydroxide is fed into the mixing zone through the Caustic Pump (P-10-2). The pH in the mixing zone is continually monitored with a pH probe connected to a transmitter which sends a signal to the Caustic Pump to maintain the pH set point. The Caustic Pump will automatically adjust its feed rate to maintain the pH set point based on the signal from the pH probe. An indicator on the MCP displays the pH in the mixing zone.

The caustic sodium hydroxide is stored in a 750-gallon Caustic Tank (T-10-1). A secondary containment system with a capacity more than 110 percent of the tank volume, surrounds the tank. Caustic sodium hydroxide solidifies at temperatures below 55°F. Thus the Caustic Tank and piping are heat traced to maintain a minimum temperature of 75°F. A level indicator in the tank provides a reading locally. The Caustic Tank is filled from an outside fill pipe mounted on the side of the building.

A diked area is provided next to the Caustic Tank to contain drums of polymer, if necessary. The Polymer Pump (P-9-1) is a chemical metering pump that supplies polymer to the mixing zone of the Clarifier at a set flow rate. This pump will be manually set to provide the required polymer amount.

About 6,000 gallons of 1 percent sludge are generated by the Clarifier daily. The Clarifier can hold a few days of sludge in the bottom. The sludge is pumped to the Sludge Tank by a Sludge Transfer Pump (P-3-4). The pumping rate of the Sludge Transfer Pump can be adjusted by locally adjusting the pressure on the air supply to the pump. The Sludge Tank is sized to hold 11,000 gallons of sludge, or enough solids to complete one cycle of the Filter Press.

The Sludge Tank is equipped with a drain valve 13 feet above the floor surface. As sludge thickens in the Sludge Tank, supernatant can be drained to the sump with a manually operated valve. Supernatant should be drained off the sludge tank to achieve maximum sludge thickness before starting a filter press run.

Clear Well

Supernatant from the Clarifier flows by gravity into the Clear Well (T-4-4). The water is then pumped from the Clear Well to the top of the Stripper Tower (T-5-1) by the Clear Well pump (P-4-5). The level in the Clear Well is transmitted to a level controller in the Control Room which sends a signal to the pneumatically-operated flow control valve (LCV 4-4). The valve modulates to maintain the water level set point in the Clear Well.

Sulfuric acid is pumped (by P-14-2) into the pipe between the Clear Well Pump and Stripper Tower.

Stripper Tower

The Stripper Tower (T-5-1) is designed to remove 95 percent of the VOCs from the groundwater. VOCs are removed by creating a large air/water interface on the tower packing. The VOCs volatilize from the downward flowing water into the upward flowing air where they are discharged at the top of the tower. The treated water discharges at the bottom of the tower and drains to the Black River (Bullet Chute) via the buried gravity discharge line.

The Stripper Tower itself has no moving parts or controls. A pressure indicator mounted on the tower indicates the pressure drop of the air flow across the packing. The pressure drop is designed to be less than 6 inches of water. The Stripper Tower Fan (M-5-3), located in the process building, pushes about 5,000 scfm of air through the tower.

The effluent piping from the Stripper Tower is designed so that the valve on the discharge line can be shut and the effluent recirculated to the Clear Well or to the sump. Normally, the effluent will discharge to a pipe that runs back inside the building, through a pH meter, and then to the river (Bullet Chute).

Directing the groundwater back to the Clear Well allows constant recirculation of the same water to test and clean the tower. By directing the groundwater back to the sump, the groundwater can be pumped back to the start of the plant for recirculation during startup. The Stripper Tower also has an overflow connection to the effluent line which will protect the tower and fan from water should the effluent valves be closed or plugged.

Filter Press

The Filter Press (M-6-3) dewaters the sludge from the Clarifier from about 1 percent solids to 30 to 40 percent solids producing a filter cake that can be disposed of offsite in a landfill. The filter cake should not contain any free liquids. The Filter Press can produce 40 cubic feet of filter cake during one 3- to 4-hour cycle. It is expected that about 15 to 20 cubic feet of filter cake will be produced per day, thus the press will have to complete about three to four cycles per week. The plant operator determines when a Filter Press run is needed and initiates each Filter Press cycle.

The Filter Press is a plate and frame press in which the sludge is compressed under high pressure to remove the liquids. The sludge is pumped to the press with an air operated diaphragm sludge feed pump (P-6-2) that will continue to pump until the back pressure reaches 100 psig. The Filter Press is operated completely with pressurized air. An air compressor (M-8-1) supplies the pressurized air to the diaphragm pumps and Filter Press. Water that is removed from the sludge drains by gravity to the sump. When the Filter Press cycle is complete, the Filter Press plates must be separated by the operator to allow the filter cake to drop into the dumpster below the press. Air valves and a scraper may be used to remove filter cake sticking to the press.

The press is equipped with a Sludge Pump control panel to regulate the pressure and flow of the Sludge Pump. The control will shut down the Sludge Pump when it is no longer able to pump sludge through the Filter Press. A signal light on the control panel indicates when the cycle is complete. The Filter Press is also equipped with an plate shifter that will pull the Filter Press plates back individually to drop off the filter cake from the plates.

A filter precoat system, installed with the Filter Press, includes a Precoat Tank (T-6-5), Recirculation Pump (P-6-6), and a Precoat Tank Mixer (M-6-5). The precoat system will be used if the ferric sludge is difficult to dewater. The precoat system is designed to coat the Filter Press plates with a coating of diatomaceous earth slurry. This improves the dewatering characteristics of the sludge. A batch of slurry will be mixed in the Precoat Tank and then circulated through the Filter Press by the Recirculation Pump. When precoating is complete, the Sludge Pump will be activated to pump sludge from the Sludge Tank to the Filter Press to start dewatering the sludge.

Plant Air Compressor

All compressed air supplied to the Filter Press and the pneumatic valves is supplied by the plant air compressor (M-8-1). The compressor, a rotary screw compressor, can supply 80 scfm at 100 psig. An air dryer is located downstream of the air compressor and provides dry air to controls and the potable water tanks. The dryer also has an oil filter and a dew point indicator.

Sulfuric Acid Tank

The acid storage tank (T-14-1), located outside, has the capacity of storing 5,600 gallons of 93 percent sulfuric acid. The tank is located in a containment sump which has the capacity to hold the tank volume.

The purpose of the addition of sulfuric acid is to lower the pH of the effluent, which had been raised in the clarifier, to neutral (pH = 7) before discharging to the receiving stream. The pH of the effluent is monitored by pH probe (AE 5-4). The acid feed pump (P-14-2) flow rate, however, is controlled by a flow-paced signal from the MCP.

The acid feed pump (P-14-2), located inside, is a variable-speed pump rated for 0.5 gph at 20 psi. Acid is pumped into the pipe between the Clear Well Pump and the Stripper Tower.

Sump

The floor drains in the building, the tank drains and overflows, and the filtrate drain from the Filter Press are connected to the sump (T-7-1) below the floor of the process building. The sump consists of two sump pumps (P-7-2-1 and P-7-2-2) that pump the contents of the sump back to the Clarifier (normal valving) or Clear Well. Pump P-7-2-1, sized to pump 100 gpm, is used to return wash water and filtrate to the Clarifier. Pump P-7-2-2, sized to pump 800 gpm, is used during startup, testing, shutdown of the process, or other abnormal situations. The sump is equipped with an emergency overflow which will direct flow by gravity to the effluent line should the sump be filled while the sump pumps are not operating.

Discharge

After flowing through the air stripper, the treated water is discharged through a submerged diffuser in the Black River (Bullet Chute).

MKE100171FC.WP5

Section 4
Plant Startup and Shutdown

Introduction

This section:

- Describes the interaction of the control panel and the process equipment
- Provides instructions on plant startup and shutdown
- Provides trouble shooting information in the event of a shutdown

Process Control

Almost all of the process equipment is controlled from the control panel. (The Filter Press, Sludge Feed Pump, sump pumps and filter precoat system are controlled locally.) The control panel is the first area to check in the event of a shutdown. The control panel includes:

- Annunciators that indicate an upset in the system
- Level indicators for the Clear Well and Sludge Tank
- On/off switches and on/off/auto switches for the process equipment
- pH controllers for the caustic and acid feed systems

Figure 4-1 is a diagram of the MCP, an annunciator schedule, and a MCP schedule. The MCP is equipped with an audible alarm that will sound if there is an upset in any of the control systems.

Annunciators

The top set of lights on the control panel are annunciators that will flash if one of the following happens:

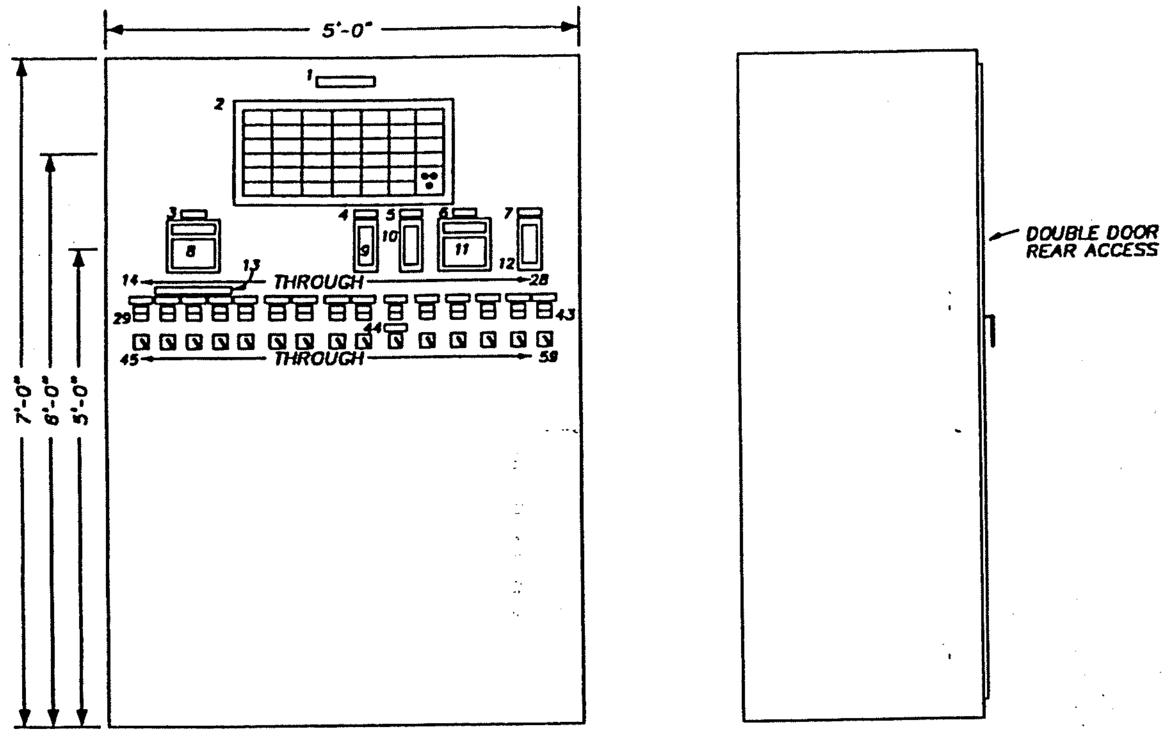
- Well pump failure

- A malfunction in the Clarifier mixer

- A malfunction in the Clarifier (sludge rake) drive

- High torque on the Clarifier drive

- High water level in the Clear Well



FRONT SIDE

MAIN CONTROL PANEL (MCP) PANEL ELEVATION
NTS

MCP ANNUNCIATOR SCHEDULE

ROW-COLUMN	TAG NUMBER	WINDOW INSCRIPTION
1-1	QA-1-1-1 (FAIL)	WELL PUMP NO. 1 FAILED
1-2	QA 2-2-1 (FAIL)	AERATION TANK BLOWER FAILED
1-3	(FUTURE)	(FUTURE FILTER-LEAVE BLANK)
1-4	LAH-5-2	STRIPPING TOWER SUMP LEVEL HIGH
1-5	LALL-7-1	PLANT DRAIN SUMP LEVEL LOW-LOW
1-6	PAL-8-1	COMPRESSED AIR PRESSURE LOW
2-1	QA-1-1-2 (FAIL)	WELL PUMP NO. 2 FAILED
2-2	QA-2-2-2 (FAIL)	AERATION WELL BLOWER FAILED
2-3	(FUTURE)	(FUTURE FILTER-LEAVE BLANK)
2-4	QA-5-3 (FAIL	STRIPPING TOWER FAN FAILED
2-5	LAHH-7-1	PLANT DRAIN SUMP OVERFLOW
2-6	LAH-13-1	WASTEWATER HOLDING TANK LEVEL HIGH
3-1	QA-1-1-3 (FAIL)	WELL PUMP NO. 3 FAILED
3-2	NAH-3-1 (TORQUE)	CLARIFIER DRIVE TORQUE HIGH
3-3	(FUTURE)	(FUTURE FILTER-LEAVE BLANK)
3-4	AAHL-5-4 (pH)	STRIPPING TOWER DISCHARGE pH HIGH/LOW
3-5	LAHHH-7-1	PLANT DRAIN SUMP OVERFLOW
3-6	SPARE	SPARE-UNINSCRIBED
4-1	QA-1-1-4 (FAIL)	WELL PUMP NO. 4 FAILED
4-2	QA-3-1 (FAIL)	CLARIFIER DRIVE FAILED
4-3	LAH-4-4	CLEARWELL LEVEL HIGH
4-4	LAL-12-2-1	POTABLE WATER SUPPLY TANK LEVEL LOW
4-5	LAL-12-2-2	SAFETY SHOWER SUPPLY TANK LEVEL LOW
4-6	SPARE	SPARE-UNINSCRIBED
5-1	QA-1-1-5 (FAIL)	WELL PUMP NO. 5 FAILED
5-2	QA-3-2 (FAIL)	CLARIFIER MIXER FAILED
5-3	LAH-4-4	CLEARWELL LEVEL HIGH
5-4	PAL-12-3-1	POTABLE WATER HEADER PRESSURE LOW
5-5	PAL-12-3-2	SAFETY SHOWER HEADER PRESSURE LOW
5-6	---	TEST-RESET-ACKNOWLEDGE
6-1	FAHL-1-4	WELL FIELD FLOWRATE HIGH/LOW
6-2	AAHL-3-3 (pH)	CLARIFIER pH HIGH/LOW
6-3	QA-4-5 (FAIL)	CLEARWELL PUMP FAILED
6-4	PAL-11-2	SERVICE WATER PRESSURE LOW
6-5	TAL-10-1	CAUSTIC TANK TEMPERATURE LOW

MCP PANEL SCHEDULE

ITEM NO.	INSTRUMENT ITEM/ TAG NUMBER	NAMEPLATE INSCRIPTION (SERVICE LEGEND)
1	NAMEPLATE	MAIN CONTROL PANEL (MCP)
2	ANNUNCIATOR	(SEE ANNUNCIATOR SCHEDULE)
3	NAMEPLATE	TOTAL WELL FIELD FLOWRATE
4	NAMEPLATE	CLARIFIER FEED pH
5	NAMEPLATE	CLEARWELL LEVEL CONTROL
6	NAMEPLATE	STRIPPING TOWER DISCHARGE pH
7	NAMEPLATE	SLUDGE TANK LEVEL
8	FIR/SHL-1-4	(NONE REQUIRED)
9	AI-3-3 (pH)	(NONE REQUIRED)
10	LIC-4-4 (AM)	(NONE REQUIRED)
11	AIR/SHL-5-4 (pH)	(NONE REQUIRED)
12	LI-6-1	(NONE REQUIRED)
13	NAMEPLATE	WELL FIELD PUMP STATUS/CONTROL
14	NAMEPLATE	WELL PUMP NO. 1
15	NAMEPLATE	WELL PUMP NO. 2
16	NAMEPLATE	WELL PUMP NO. 3
17	NAMEPLATE	WELL PUMP NO. 4
18	NAMEPLATE	WELL PUMP NO. 5
19	NAMEPLATE	AERATION TANK BLOWER STATUS/CONTROL
20	NAMEPLATE	AERATION WELL BLOWER STATUS/CONTROL
21	NAMEPLATE	CLARIFIER MECHANISM STATUS/CONTROL
22	NAMEPLATE	CLARIFIER MIXER STATUS/CONTROL
23	NAMEPLATE	SLUDGE TRANSFER PUMP STATUS
24	NAMEPLATE	CLEARWELL PUMP STATUS/CONTROL
25	NAMEPLATE	STRIPPING TOWER FAN STATUS/CONTROL
26	NAMEPLATE	SERVICE WATER PUMP STATUS/CONTROL
27	NAMEPLATE	PRECOAT TANK MIXER STATUS/CONTROL
28	NAMEPLATE	RECIRCULATION PUMP STATUS/CONTROL
29	QL-1-1-1 (OO)	(ON/OFF)
30	QL-1-1-2 (OO)	(ON/OFF)
31	QL-1-1-3 (OO)	(ON/OFF)
32	QL-1-1-4 (OO)	(ON/OFF)
33	QL-1-1-5 (OO)	(ON/OFF)
34	QL-2-2-1 (OO)	(ON/OFF)
35	QL-2-2-2 (OO)	(ON/OFF)
36	QL-3-1 (OO)	(ON/OFF)
37	QL-3-2 (OO)	(ON/OFF)
38	QL-3-4 (OO)	(ON/OFF)
39	QL-4-5 (OO)	(ON/OFF)
40	QL-5-3 (OO)	(ON/OFF)
41	QL-11-1 (OO)	(ON/OFF)
42	QL-6-5 (OO)	(ON/OFF)
43	QL-6-6 (OO)	(ON/OFF)
44	NAMEPLATE	POLYMER PUMP CONTROL
45	HS-1-1-1 (O/O-R)	(ON/OFF-RESET)
46	HS-1-1-2 (O/O-R)	(ON/OFF-RESET)
47	HS-1-1-3 (O/O-R)	(ON/OFF-RESET)
48	HS-1-1-4 (O/O-R)	(ON/OFF-RESET)
49	HS-1-1-5 (O/O-R)	(ON/OFF-RESET)
50	HS-2-2-1 (O/O-R)	(ON/OFF-RESET)
51	HS-2-2-2 (O/O-R)	(ON/OFF-RESET)
52	HS-3-1 (O/O-R)	(ON/OFF-RESET)
53	HS-3-2 (O/O-R)	(ON/OFF-RESET)
54	HS-9-1 (OO)	(ON/OFF)
55	HS-4-5 (O/O-R/A)	(ON/OFF-RESET/AUTO)
56	HS-5-3 (O/O-R)	(ON/OFF-RESET)
57	HS-11-1 (OOA)	(ON/OFF/AUTO)
58	HS-6-5 (OO)	(ON/OFF)
59	HS-6-6 (OO)	(ON/OFF)

NOTE: PROVIDE HOUSEKEEPING PAD UNDER MCP SAME AS PROVIDED FOR MCC.

CH2M HILL

DSGN OHLSSON						
DR OHLSSON						
CHK R.NAGEL						
APVD S.M.KEITH	NO.	DATE	REVISION	BY	APVD	

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS INSTRUMENTATION AND CONTROL SYSTEM
MAIN CONTROL PANEL ELEVATION/DETAILS

SHEET 55
DWG NO. 01-N-09
DATE JULY 1992
PROJ NO. GLO65602.FD

- High levels in the bottom of the stripping tower sump
- A malfunction of the plant Air Compressor
- High (first level above overflow level), high (second level above overflow level), or low water levels in the building sump
- Low header pressure and low tank level in the safety shower tank and the potable water tank
- Low pressure in the service water tank
- High water level in the wastewater tank
- Failure of Aeration Tank Blower
- Failure of Stripper Tower Fan
- Aeration well blower failure
- High/low Clarifier pH
- High/low stripping tower discharge (effluent) pH
- Failed Clear Well pump
- Low Caustic Tank Temperature
- High/low flow rate from extraction wells

Level Indicators

The second set of controls on the control panel are process indicators for total flow rate (with strip chart recorder), Clarifier pH, Stripper Tower pH, Clear Well level control, and Sludge Tank level.

The pH indicators for the clarifier and air stripper include pH controllers where high and low set points can be set for the caustic/acid feed pumps. The clear well level control can be programmed to adjust the level set point in the clear well.

Switches

The final set of controls on the control panel are on/off and on/off/auto switches and indicator lights for the well pumps, aeration tank blower, aeration well blower, caustic feed pump, acid feed pump, stripper tower fan, clear well pump, service water pump, clarifier mixer, and clarifier rake.

Startup

The following instructions are provided for starting and operating the groundwater extraction and treatment system. The instructions assume that all process tanks and equipment are full of water.

General

1. Check that all breakers are energized at the motor control center (MCC).

2. Check that all local motor switches are on.

3. Check that all switches at the control panel are off.

4. Check that all drain valves for the tanks and process equipment are closed (V-163, V-232, V-262, V-332, V-333, V-432, V-441).

5. Place the following valves in the positions as indicated:

Valve	Function	Position
V-111, V-121, V-131,V-141, V-151	Extraction well valves	Open
V-112, V-122, V-132, V-142, V-151	Extraction well valves	Open
V-262	Clarifier sludge	Open
V-321	Clear Well discharge	Open
V-323	Clear Well pump discharge	Open
V-432	Stripper to sump	Closed
V-332	Stripper to Clear Well	Closed
V-433	Effluent	Open
V-233, V-236	Caustic feed line	Open

Valve	Function	Position
V-703	Acid feed line	Open
V-271	Polymer feed line	Open
V-272	Polymer feed line drain	Closed
V-440, V-441, V-442, V-443, V-444	General service water	Closed
V-513	After Sludge Tank	Closed
V-641	Compressed air	Open
V-615	Sump valve	Closed
V-612, V-614, V-616	Sump valves	Open

Blowers, Compressors, Motors

The following equipment has to be activated before startup of extraction wells:

1. Turn on the Aeration Tank Blower from the control panel and verify that the pressure indicated at the Aeration Blower pressure gauge (PI 2-3) is at least 8 psig.

2. Turn on the motors to the Mixer Drive and Sludge Rake Drive on the Clarifier at the local panel. Visually inspect the Clarifier to verify that the Mixer and Sludge Rake Drive are working.

3. Push Start on the Plant Air Compressor panel for the plant air. Allow the compressor to warm up for 2 minutes in the unload mode. Push Load twice for the Modulate/ACS mode. This compressor supplies air to the pneumatically activated valves and so it must be on at all times (even though the Filter Press is not running). Verify that the compressor is on by checking the pressure indicator on the compressor panel. The pressure should be at least 90 psig and not exceed 100 psig.

4. Turn on the Stripper Tower Fan from the control panel. Verify that the fan is working by checking the pressure difference across the tower packing.

5. Turn on the Caustic Pump from the local control panel. The pump will operate until the set point (pH 8.3) is reached in the mixing zone. Verify that the pump is set for automatic control.

6. Turn both Sump Pumps to the automatic position. These pumps will not start until the water level in the sump switches the pumps on.

Groundwater Extraction Wells

The Well Pumps are turned on and adjusted to the desired flow one at a time to avoid putting more flow through the system than it is designed for. To start Well Pump No. 1:

1. Turn on Well Pump No. 1 (HS 1-5) at the control panel.

2. Turn on the Clear Well pump.

3. Check the water flow rate at the local flow indicator and adjust the butterfly valve until the flow is at the desired rate. The initial flow rates from each well are as follows:

Well	Flow Rate
1	200 gpm
2	150 gpm
3	100 gpm
4	150 gpm
5	200 gpm

   The suggested flow rates may be varied based on guidance from the WDNR and U.S. EPA for the optimal extraction flow rate.

4. Repeat steps 1 through 4 for Well Pumps Nos. 2, 3, 4, and 5.

5. Turn on the acid feed pump.

6. Verify that the pH in the discharge is about 7 and the pH in the Clarifier is about 8.3.

7. Turn on the Polymer Pump (after all the wells are turned on).

Plant Shutdown

Short-Term Routine Shutdown

A short-term routine shutdown is for minor repair or replacement of nonsubmerged equipment, power outages, or other events that will cause short-term interruption of the process.

For short-term routine shut down:

1. Turn off the Well Pumps Nos. 1 to 5.

2. ~~The Clear Well pump should be turned off or it will trip off low tank level and alarm.~~ I think it will stop on low level but not alarm. Need to check.

3. Turn off the Aeration Tank Blower and Stripper Tower Fan.

4. Turn off the Caustic Pump, Acid Pump, and the Polymer Pump.

5. Turn off the Clarifier mixer and sludge rake.

6. If the plant is to be left in a shut down mode, close valves V-111, V-121, V-131, V-141, and V-151 from the extraction wells.

Long-Term Shutdown

A long-term shutdown is for major repair of equipment or repair of any submerged equipment. A long-term shutdown would include any repair that necessitates draining the process equipment. The following steps should be completed for a long-term shutdown.

1. While the system is still operating, remove as much sludge as possible from the bottom of the Clarifier. This may require two or three Filter Press cycles in one day. (See section on Filter Press operation.) At the start of long-term shutdown, there should be very little sludge in the bottom of the Clarifier and the Sludge Tank should be empty.

2. Turn off the well pumps and close extraction well valves V-111, V-121, V-131, V-141, and V-151.

3. Turn off the Caustic Pump, Acid Pump, and the Polymer Pump.

4. Verify that sump pumps are positioned in the AUTO mode.

5. Turn off the Aeration Tank Blower and Stripper Tower Blower.

6. Open valve V-163 and drain the contents of the Aeration Tank into the sump. The water will be pumped by the sump pumps into the Clarifier and then to the Clear Well and air stripper. Close valve V-163 when the Aeration Tank is empty.

7. Turn off the Clarifier mixer and allow 4 hours for solids still in suspension in the Clarifier to settle.

8. Remove residual sludge in the bottom of the Clarifier by pumping the sludge into the Sludge Tank and dewater the sludge on the Filter Press. Run as many cycles as needed to process all sludge in the Clarifier.

9. Turn off the sludge rake motor.

10. Set valves on sump to pump to the Clear Well. Open V-262 to drain the contents of the Clarifier to the sump. The sump pump will pump the contents of the Clarifier to the Clear Well, where it will be pumped to the Stripper Tower.

11. When the Clarifier is drained, close V-262.

12. Turn off the Clear Well Pump, sump pump, and Stripper Tower Fan.

The system is shutdown after these steps and the Aeration Tank and Clarifier are empty.

13. During the winter, the 3 feet of water in the bottom the Stripper Tower must be drained to the sump by opening V-432. Close V-432 when the Stripper Tower is drained.

Emergency Shutdown

The annunciators indicate potential problems in the treatment system. Some problems will trigger automatic shutdown of the entire system. When a problem is suspected or the alarm on the control panel is on, the operator should first assess the problem by determining what annunciator lights are on. The treatment system (including the groundwater extraction wells) will shut down automatically for the following reasons:

1. Shutdown of the Aeration Blower
2. High water level in the Clear Well
3. High water level in the sump
4. Malfunction or shutdown of the Stripper Tower Fan

Troubleshooting

Aeration Tank Blower

Loss of air flow to the Aeration Tank will result in the failure of the system to oxidize and remove the iron. Loss of air flow to the Aeration Tank may be noticed by lack of noise from the blower, or by the pressure indicated on the pressure gauge on the blower. If the blower shuts down, the extraction wells will automatically be turned off and all other process equipment will shut down (e.g., Clear Well pump, Polymer Pump, Caustic Pump).

Operator Response:

- Check the blower for broken belts or other damage. Also check the blower circuit breaker for power overload. Check the blower inlet for obstructions. Consult the blower manual for trouble shooting.
- Restart the blower from the control panel if a problem has been identified and solved.
- If the blower will not restart, shutdown treatment system and contact the blower supplier.
- When the blower is back online, restart the process following the instructions presented under "Startup."

Clear Well Overflow

The level in the Clear Well is controlled through a pneumatic flow control valve. Should the level in the Clear Well reach a high set point, the groundwater extraction wells will shut down, which will be followed by shutdown of the rest of the process equipment. Should the level in the Clear Well reach a low set point, the Clear Well pump will trip off. As water refills the Clear Well, the Clear Well pump will turn on automatically. A high water shutdown most likely would be caused by malfunction of the flow control valve. A low water shutdown most likely would be caused by flow being interrupted from the Clarifier or by failure of the flow control valve.

Operator response:

- Verify that the extraction wells are on and flow is continuous from the Aeration Tank to the Clarifier and then to the Clear Well.
- Verify that Clear Well Level Controller on the MCP is set on auto.

- Verify that the air compressor is on and supplying air at a sufficient pressure (80 psi) for the flow control valve. (The valve will fail in the closed position.)

- Inspect the pump for damage or signs of overheating. Also check the pump's starter for overload trip.

- If the tank is empty, allow the tank to fill by turning on one extraction well. When the tank is full, restart the pump.

- If the level in the tank can be maintained within the set points, turn on another extraction well. Continue to turn on the extraction wells one at a time.

- If the tank continues to overfill or underfill, call the manufacturer of the flow control valve.

Sump Overflow

If the water level in the Sump reaches the level at which the water is flowing through the overflow pipe and discharging to the effluent pipe, the groundwater extraction wells will automatically shut down and then the entire system will shut down. The cause for this overflow most likely would be the failure of both of the sump pumps or a blocked effluent line, too high an inflow, or plugged pump suction strainer.

Operator response:

- Visually inspect the outfall to verify that it has not been blocked.

- Check the sump pumps power circuits for signs of overload. Attempt to restart the sump pumps individually from the local control panel.

- Check the sump pump suction strainer.

Tower Fan Failure

Loss of air flow to the Stripper Tower may be noticed by lack of fan noise or the lack of a pressure reading on the pressure gauge for the Stripper Tower. Without counter-current air flow, the Stripper Tower will not remove VOCs. Thus if the fan shuts down, the groundwater extraction wells will shut down also.

Operator Response:

- Inspect the fan area for evidence of broken belts.

- Attempt to restart the fan by turning the fan on from the control panel if a problem has been identified and solved.

- If the fan restarts normally, restore air stripper operation as required. If fan failure recurs, open the blower circuit breaker and perform any required maintenance. Verify that the fan disconnect switch is turned on, and check for motor overload breaker trip or foreign matter in the fan.

- Call an electrician for additional assistance if the fan does not start.

Well Pump Failure

Having one well pump shut off will NOT shut down the entire process. However, if the overall flow rate is less than 500 gpm, a low flow rate alarm light will flash on the control panel.

Operator Response:

- Check the water level in the well. Connect the bicycle air pump to the nipple extending from the wellhead and pump air until a steady reading is observed on the pressure gauge at the wellhead. Compute the water level. If the water level is lower than normal, the well pump was probably shut off automatically because of low groundwater levels, possibly caused by a clogged well screen.

- Monitor groundwater levels with time and attempt to restart the well pump after the water levels in the well have recovered.

- Restart the well pump. Check the water level when the pump starts running. If the water level reaches 5 feet above the pump, the well pump will shut off because of low water level.

- Schedule well maintenance to have the well screen cleaned (see section on well cleaning).

If well does not operate when groundwater levels are adequate:

- Turn the handswitch to OFF to disable the control circuit and lock the motor power disconnect in the open position.

- Check discharge line valve, meter, and outlet.

- Turn handswitch to ON and attempt to start again.

- If start is successful, resume normal operation and check for excessive noise and vibration.

- If pump does not start properly call for an electrician to check motor starter circuitry.

- Call the well supplier for maintenance of the well pumps if the problem is not associated with the pump controls. Refer to the manufacturer's operation and maintenance manual.

Plant Air Compressor Shutdown

If the compressor shuts down, the pneumatically controlled valve after the Clear Well will lose pressure and slowly close (fail in the closed position). The Clear Well Pump will shut down when the compressor alarm registers at the MCP. The treatment process will shut down as described in the previous section on Clear Well overflow.

Shutdown of the air compressor will also cause the building heating system to fail in the ON mode.

Filter Press

About 5 feet of sludge should be maintained in the bottom of the Clarifier. Changes in sludge volume should be tracked closely on the daily log sheets.

The sludge tank holds 10,000 gallons of sludge. If the sludge tank were full of sludge and the sludge had a 1 percent solids content, there would be enough sludge to complete a filter press run. However, the sludge may have to be thickened to achieve a 1 percent solids content. The sludge transfer pump should be run at about 2 to 3 gpm continuously. This rate should fill the sludge tank in 3 days. When the sludge tank is full, decant off the upper one third and spend one more day filling it. Then run the filter press. This should be enough solids needed for a filter press run. (Note: When the sludge transfer pump is shut down, it tends to clog. Try to keep it operating as much as possible.)

If operations suggest that there is not sufficient solids in the sludge tank to complete a filter press run, then the follower liner plate of the filter press (the last plate in the stack) and the blank plate (the 1 inch steel plate) should be inserted further up in the stack to reduce the amount of sludge needed for a filter press run. The blank plate weighs about 600 pounds. Always maintain an even number of plates in use.

The controller that controls the sludge feed pump is set to run for 13 stages at 14 minutes per stage. At each stage, the pressure feeding to the sludge transfer pump will increase by about 7 to 8 psi. When the pressure reaches 100 psi, the controller will run one final stage for 1 hour at the maximum 100 psi pressure. After this final stage, the cake is ready for discharge. Blow some air into the upper left discharge port to chase out residual water in the press.

Note: The press should NEVER be fed more than 100 psi of pressure during pressure. Therefore, never increase the air compressor to a pressure greater than 100 psi. If this cycle does not produce good cake, then call Eimco about modifications to the cycle.

See the attached instructions for precoating. Precoat with about 75 to 100 pounds of precoat media. The precoat systems should keep running until the sludge feed pump reaches 25 psi of pressure.

MKE100171FC.WP5

Section 5
Routine Process Operations and Inspections

Under normal operating conditions, inspections/monitoring must be performed daily (Monday through Friday) or weekly to assess system operation. These operations are discussed below. Log sheets used to record normal operations of the plant are provided in Appendix B.

Groundwater Extraction Wells (Log Sheet No. 1)

Daily

Record the flows, totalized flow and pressures from individual wells where the extraction lines enter the building. (Adjustment to flow rates in individual wells will be made only after groundwater levels are measured and in conjunction with the EPA and WDNR.)

Weekly

- Measure and record the water level in each of the extraction wells.
- Calculate and record the drawdown and specific capacity for each well.

Aeration Tank (Log Sheet No. 2)

Daily

Check the pressure being supplied to the Aeration Tank from the blower.

Clarifier (Log Sheet No. 2)

Daily

- Verify that the mixer and sludge rake are working.
- Measure the depth of sludge in the bottom of the Clarifier using a sludge gauge and record the depth of sludge. Record sludge depth at edge, middle, and center of clarifier.
- Record the level of caustic sodium hydroxide in the caustic storage tank. When the Caustic Tank is half empty, order a new supply.

- Measure and record the amount of polymer being fed to the Clarifier. Add new drums of polymer and order additional polymer as needed. Polymer feed rates will be changed only after consultation with the polymer supplier.

- Record volume of sludge in the sludge tank and the operating pressure of the sludge transfer pump.

As Necessary

The mixer drive on the Clarifier may need to be adjusted after several months. Adjust only after consultation with CH2M HILL.

Stripper Tower

Daily

Visually inspect the air intake of the air stripper to check that it is not clogged.

Record the pressure drop across the air stripper from the pressure gauge mounted on the outside of stripper tower.

Sludge Dewatering/Disposal

Daily

Draw off has much supernatant as possible from the Sludge Tank and drain to the sump by opening the supernatant drain valve.

As Necessary

- When the Sludge Tank is full, activate the Filter Press and sludge pump to dewater the sludge. Turn off the Filter Press and release the filter cake to the roll off container.

- Arrange for the roll off container to be emptied as needed (about 3 to 4 weeks).

- The sludge transfer pump will have to be calibrated so that solids are removed from the Clarifier at the same rate they are produced, as evidenced by a constant sludge blanket level in the clarifier.

Air Monitoring

Daily, survey the building with the HNu and record breathing space organic vapor concentrations as shown on log sheet No. 4. (Note: These procedures do not replace health and safety requirements in the health and safety manual.)

Routine Inspection/Maintenance

For each piece of equipment, develop a maintenance schedule summary. Refer to manufacturers' O&M manual for guidance.

Well and Pump Maintenance and Rehabilitation

Well construction, hydrogeologic conditions, water quality, and especially specific capacity data are crucial to implementing an effective maintenance program. These data should be collected weekly. Performance monitoring and routine maintenance schedules should be established on the basis of the characteristics of the extraction system. It is important to note any changes in the operating characteristics of the wells and pumps, because both can deteriorate to the point where rehabilitation is difficult, if not impossible. Generally, experience indicates that if the specific capacity of a well declines by 10 to 20 percent, it is time to initiate rehabilitation procedures.

To determine any performance loss, a specific capacity baseline will be established from well performance test data collected from extraction wells following installation. (Specific capacity is the flow rate of the well divided by the drawdown in the well. Drawdown in the well is the static water level minus the water level in the well.) Establishing a baseline will allow the detection of any drop in specific capacity or well yield during the life of the system.

Reduction in specific capacity (well yield) by chemical incrustation or biofouling of the well screen, pump, and/or the formation around the well screen is of particular concern because of the high iron concentration observed at the site. Biofouling of the pump and the well screen can be controlled by routine maintenance. Typical maintenance for the extraction wells may be shock chlorination treatments using sodium hypochlorite. Frequency of treatment will be based on the specific capacity data collected during operation.

Frequent shock chlorination treatments may have a detrimental (corrosive) effect on the stainless steel well screen and/or casing over a period of several years. (The well pump and cable should be removed before shock chlorination.) In addition, incrustation can cause sand pumping over time. Because of the potential, the extraction wells have been designed to facilitate replacement of the well screen should it become necessary.

Evidence of well screen deterioration would be the onset of sand pumping after several months or years of service.

The pump impellers, housing, and shaft are particularly susceptible to sand pumping. Corrosion or biofouling of pump parts can also be serious problems. Any of these conditions can drastically reduce the efficient life of a pump.

Aeration Tank and Diffusers

Every 6 months, the Aeration Tank should be drained (following the procedures discussed above) and the coarse bubble diffusers cleaned with a dilute acid solution. Precipitation and microbial growth may tend to clog the diffuser ports over time. This would increase the pressure needed to blow air through the Aeration Tank and reduce the effectiveness of the aeration.

Stripper Tower

The plastic media in the air Stripper Tower may become fouled over time by mineral deposits or biological growth. Routine inspection of the media every 6 months and monitoring tower performance for VOC removal will indicate if media replacement is necessary. An abnormal pressure drop through the tower can also indicate media fouling. Inspect the packing by removing the access covers per the manufacturers' instructions if either reduced removal efficiency or increased pressure drop occurs. Media cleaning frequency will depend on site and operating conditions. When media begins to stick together because of deposits, it is time to clean the media. Refer to the air stripping manufacturer's operation and maintenance manual for media cleaning procedures.

To replace the media, the media is removed through the manhole at the bottom of the packing. An appropriate container should be placed underneath this manhole to collect the media. New or cleaned media can be inserted through the manhole at the top of the packing.

Other parts of the Stripper Tower should be inspected as well. The Stripper Tower air plenum should be visually inspected every 6 months by removing the bottom manhole cover. Check condition of packing support plate. Tower upper internals should be visually inspected per the manufacturers' O&M manual. A manlift will be necessary to access the upper Stripper Tower manways. Remove the manhole cover near the top of the tower. Look for growths and deposits and clean the surfaces if required. Note the condition of the packing below the distributor and whether settlement has occurred (some settlement is normal and usually does not affect stripping performance). The tower sump should be visually inspected for deposits every year. Clean out deposits and verify that the discharge pipe is not obstructed.

Filter Press

The cloths on the Filter Press will wear out with time and will have to be replaced. One extra set of cloths and the needed tools have been supplied with the Filter Press. Consult the Filter Press maintenance manual for further instructions on filter cloth replacement.

MKE100171FC.WP5

Section 6
Sampling, Monitoring, and Reporting

Sampling/Analysis

Sampling of treated and untreated groundwater (influent and effluent) is performed onsite to assess the ongoing performance of the process equipment and to verify compliance with effluent limits. Samples will be analyzed for the parameters listed in Table 6-1 by a WDNR-certified laboratory. Some onsite testing of process water will be required as well. Log sheets for recording sample results are included in Appendix B.

The onsite laboratory equipment includes a pH meter, thermometer, and conductivity meter. Operating instructions are supplied for each piece of equipment and should be consulted for equipment use and calibration.

Weekly sampling for the treatment system includes collecting an influent sample, a sample from the Clear Well, and an effluent sample. Analyze the samples for pH, conductivity, and temperature. Also note the sample color and smell, if any. daily

Monitoring

Influent

Quarterly, collect an influent sample and analyze for BOD, ammonia, TSS, TDS, metals (including iron), hardness, VOCs, and nitrate. Collect a sludge sample from the bottom of the Clarifier and analyze for percent solids. These analyses will be completed by an offsite laboratory under subcontract to the operator. The laboratory must be WDNR-certified. Appendix C includes the list of influent parameters and the analytical methods to be used.

Effluent

The objective of the treatment facility is to provide best available equipment economically achievable (BATEA). This includes removing 95 percent of the VOCs and most of the iron in the groundwater. The WDNR will also regulate the effluent pH, BOD, TSS, and ammonia. Because the groundwater cleanup is part of a CERCLA action, a NPDES permit will not be required. However, the effluent monitoring must conform to the general requirements for surface water discharges in the State of Wisconsin and the effluent limits listed in Table 6-1 and Table 6-2. Monitoring will consist of collecting effluent samples for offsite analysis for the parameters listed in Table 6-1. Composite samples should be collected using an ISCO sampler or similar device. Appendix C provides an example description of how to use the ISCO composite sampler.

Whole effluent toxicity test samples will be collected and analyzed on a quarterly basis. CH2M HILL will be responsible for collection and analysis. Table 6-3 summarizes the testing requirements.

Air Stripper Offgas

Toluene and xylene, the primary VOCs being removed from the air stripper, are regulated under the NR 445 regulations that govern the discharge of toxic compounds to the air. However, the estimated mass emissions from the air stripper are 10 times less than the mass emissions required for further control. Consequently, no sampling is required of the air stripper offgas. However, the air stripper offgas estimates will be reviewed each quarter after the influent sampling results are complete.

Sludge

Initially, the company contracted to dispose of the filter cake will require a Toxicity Characteristic Leaching Procedure (TCLP) analysis of the filter cake, a filter paint test, and a percent water analysis. Further tests of the filter cake will depend on the requirements of the disposal company.

Reporting

All laboratory testing results should be summarized in tabular form and submitted to CH2M HILL within 4 weeks of testing. The test results should be accompanied by a memorandum describing when the samples were collected, who collected the samples, and how the samples were containerized and shipped. Raw data tables (from the lab) should also be provided.

Provide completed daily and weekly process monitoring logs to CH2M HILL on a semi-monthly basis. The log forms are provided in Appendix B. Provide the reports within 1 week of the last entry for each set of logs.

MKE100171FC.WP5

Section 7
Facilities Information

The building is designed to adequately house the process equipment for the treatment system and provide space for associated activities. This section describes the facilities. Information on facility maintenance should be obtained from the supplied maintenance manuals.

Heating, Ventilation, and Air Conditioning

The process building is heated with propane. The 1,000-gallon propane tank is located south of the building. Four gas fired, ceiling mounted unit heaters controlled by two thermostats heat the building. A make-up air inlet on the south wall of the building is used to exchange outside air as-needed. A wall mounted air conditioner located in the office is designed to cool the office and laboratory. Ceiling fans are mounted around the process building to reduce thermal stratification. Small exhaust fans in the laboratory and bathroom are designed to go on automatically when the lights are turned on.

The operator must coordinate delivery of propane to the propane storage tank on an as-needed basis. The operator will also need to seasonally adjust the ratio of make-up air to recirculation air inside the building. Thermostats can be set to the desired temperature. For a more detailed description of the HVAC system, the operator should consult the equipment manuals.

Note: The heating and ventilation unit requires plant air to operate. If plant air is shut down, the heaters will automatically turn on.

Electrical Supply

The building is supplied with 3-phase, 480-volt power from Trempealeau Electric company. The electricity is supplied to the site by overhead lines. At the last pole north of the building, the electric lines descend to the ground and are buried. The electricity enters through the floor in the control room. A transformer steps down the voltage to 110 or 220 volts, depending on what voltage is needed.

Potable Water

Potable water will be supplied from two 450-gallon, pressurized water tanks. Potable water will have to be brought to the site as-needed by a water supplier. The plant operator will have to monitor the supply of water and coordinate delivery of the water on an as-needed basis. An anti-microbial growth powder may have to be added to water supply tanks.

The safety showers should be operated every 3 months to drain water from the pressure tank so it can be replenished with fresh water.

Annunciators in the control panel will indicate when the water pressures or levels in the potable water tanks are low. An annunciator will also indicate if a safety shower is in use.

Sewage

All sewage from the toilet and sink in the lavatory and laboratory drains to a 2,000-gallon holding tank south of the building. The tank is equipped with a high level alarm at the control panel to signal when it is full.

The operator will have to monitor the sewage level in the tank and coordinate disposal of the sewage with a septic tank cleaning company on an as-needed basis.

Service Water

General service water (nonpotable water) is to be used for cleaning the floors and process equipment. The water will be pumped from the bottom of the Air Stripper with the Service Water Pump (P-11-1). The pump is turned on from the control panel. A pressure tank near the service water pump pressurizes the service water system. Numerous hose connections located around the process building can be used for flexible hose connections. Floor drains in the process building drain to the sump.

Plant Air

Several air line outlets are located around the facility for operator use.

General Maintenance

General maintenance such as snow removal, grass cutting, cleaning, and site security will be the responsibility of the plant operator to perform or coordinate.

Section 8
Plant Safety

Plant personnel are responsible for acquainting themselves with safety hazards and taking steps to eliminate them. This section on safety is intended to highlight significant plant safety issues and provide resources that supply more detailed information. Thus this section is intended to be used as a guide for accessing other safety manuals and resources. This section is not to be considered a comprehensive safety manual for the plant operation.

The plant personnel should also become familiarized with the ''Part P'' Health and Safety Plan addendum. A copy is maintained in the control room. This addendum provides additional information regarding potential operational hazards onsite.

An effective safety program is the responsibility of everyone involved in the plant operation. The plant operator is responsible for:

- Reading the reference material on safety
- Observing safety precautions
- Knowing and understanding safety precautions
- Knowing how to use safety equipment

There are two types of safety concerns associated with the operation of this plant. The first type includes the general plant safety concerns associated with operating any industrial facility. The second type pertains to specific hazards associated with the contaminants in the groundwater.

General Plant Safety Concerns

Numerous regulations and reference materials have been produced which set minimum safety standards for industrial facilities, and specifically for wastewater treatment plants. These include:

- The *Manual of Practice No. 1, Safety in Wastewater Works*, by the Water Pollution Control Federation

- Federal regulations for industrial safety (40 CFR 29.1910)

- *Safety in Operation of Wastewater Treatment Plants*, by OSHA.

These manuals provide appropriate guidelines for eye, ear, head, foot, and skin protection as well as guidelines for working near industrial equipment.

Plant personal are also instructed to consult the process equipment operation manuals for information pertaining to proper safety procedures.

Plant personnel are also referred to the Wisconsin Administrative Code:

- Chapter 11 for liquified petroleum gases
- Chapter 31 for confined space entry

Chemical Hazards

There are two types of chemical hazards associated with operating the treatment facility. The first is associated with handling chemicals and other substances used as part of the treatment process. These include diatomaceous earth, caustic sodium hydroxide, sulfuric acid, polymer, and others as identified. Material Safety and Data Sheets (MSDSs) must be maintained. The MSDSs should be consulted for proper handling and safety precautions.

It will be the duty of the plant operator to establish a Hazard Communications Program which identifies chemicals in use at the facility.

The second type of chemical hazard is associated with fugitive emissions of VOCs or other contaminants from the groundwater. Generally, the groundwater within the building is contained within piping and tanks. Thus there are few places where contaminants could be emitted to the air. Table 8-1 provides a list of the main VOCs detected in the groundwater along with the personal exposure limit (PEL), the threshold limit value (TLV), and the concentration for immediate danger to health and life (IDLH) for each VOC. Table 8-1 also lists symptoms and affects of acute exposure.

The potential for exposure will be highest during equipment maintenance and cleaning (e.g., cleaning the inside of tanks). Project-specific health and safety plans must be developed for each task for which chemical exposure is likely. The health and safety plan would include provisions for monitoring breathing space air for VOCs and selecting personnel protective equipment.

Spills and Releases

A failure of a tank or piping could result in the loss of contaminated groundwater to the environment. After any uncontrolled release of chemicals to the groundwater, the DNR should be notified. The DNR will establish appropriate response actions. Notify appropriate agencies in the event of spills or releases in excess of reportable quantities. Contact the local emergency response team for spills or releases of significant proportion.

Medical Emergencies

A first aid kit should be kept in the process building office at all times. A record of all injuries should be kept along with the facility files. Table 8-2 is a list of emergency contacts. Appropriate names and numbers should be filled in. This table should remain posted by the telephone at all times.

Access Control

Access to the site is authorized only to facility operators, CH2M HILL, the U.S. EPA, and the WDNR. Maintenance subcontractors can be granted access to the site only after authorization from CH2M HILL or the facility operator. All unauthorized entries should be reported to the police and to CH2M HILL.

All persons entering the treatment building while the treatment process is operating (contaminated groundwater flowing into the building) must be 24-hour or 40-hour trained per 40 CFR 29.1910. Persons not meeting these qualifications can be granted access only after the operator has ceased normal operations, ventilated the building, and verified that ambient organic vapor concentrations are at background levels.

MKE100171FC.WP5

Table 8-1
Known Contaminants

Known Contaminant	PEL/TLV	IDLH	Symptoms/Effects of Acute Exposure
Benzene	10	2,000	CARC; CNS NARC; IRR; BURNS; HEADACHE; NAUS.
Toluene	100	2,000	IRR-SKIN, EYES; CNS NARC; HEADACHE; NAUS.
Ethyl Benzene	100	2,000	IRR-SKIN, EYES, RESP; SKIN INF; DIZZINESS; CHEST CONS.
Total Xylenes	100	10,000	IRR-SKIN, EYES; SKIN ABS.

MKE100149EF.WP5

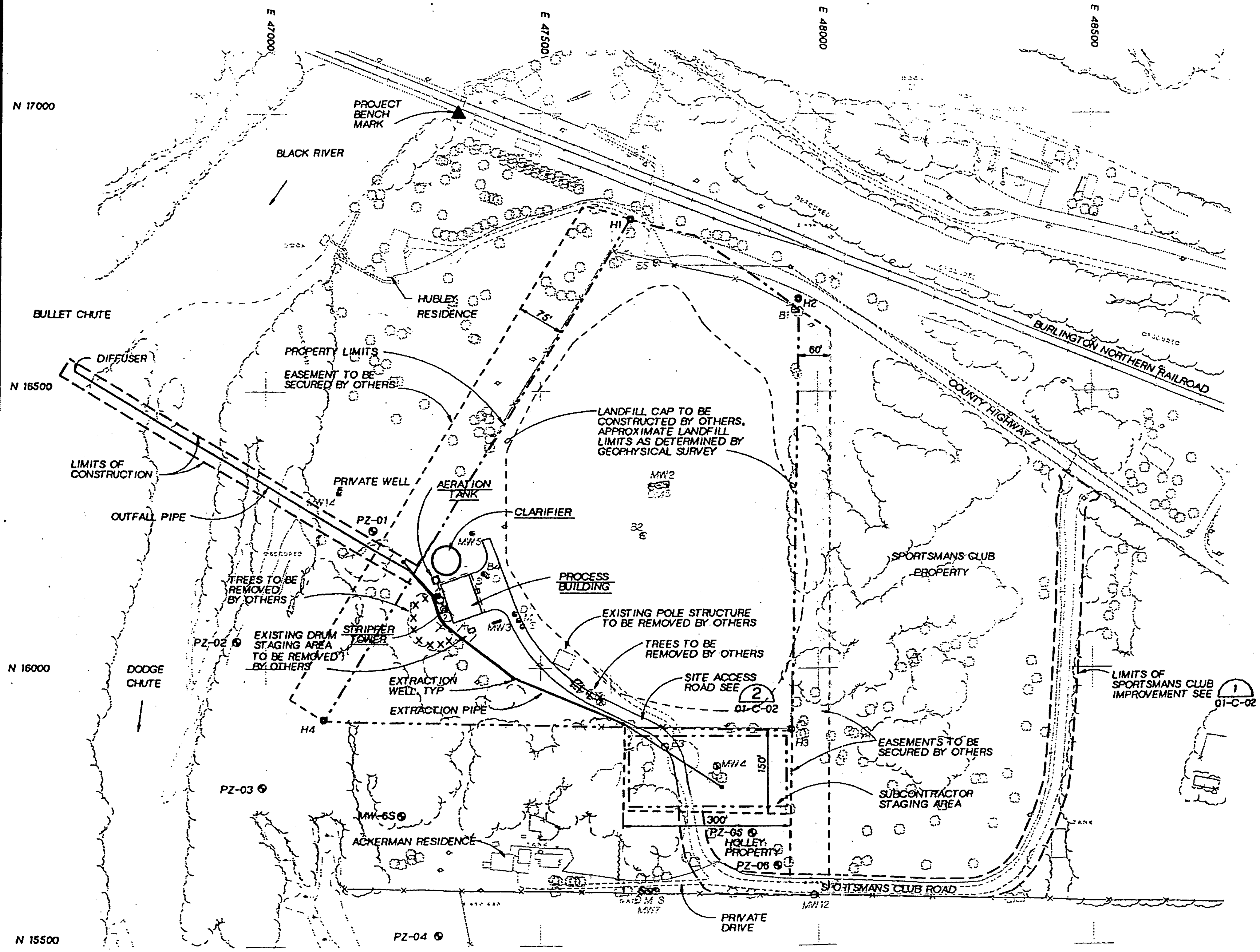
Table 8-2
Emergency Contacts

Emergency Contacts	Name	Phone
Plant Manager		
EPA Contact		
Sate Environmental Agency		
Fire Department		
Police Department		
State Police		
Health Department		
Poison Control Center		
Medical Emergency		
Hospital Name:		
Hospital Address:		
Name of 24-Hour Ambulance:		
Route to Hospital:	Attach map with route to hospital	
Distance to Hospital ______________		
The site safety manager shall post the above information in a conspicuous location.		

MKE100149F0.WP5

APPENDIX A
P&IDs/EQUIPMENT LIST

30-JUL-1992 01-C-01.dgn



VERTICAL CONTROL

PROJECT BENCHMARK:

CHISELED "X" IN THE SOUTHEAST WINGWALL ON THE RAILROAD TRESTLE, ELEVATION = 657.09

VERTICAL DATUM BASIS IS USGS 1929. ELEVATION ESTABLISHED BY OTHERS FROM THE FOLLOWING LA CROSSE COUNTY BENCHMARKS:

1. PK NAIL IN FRONT OF MARY JANE FRITZ COTTAGE W8602 LYTLE ROAD, ELEVATION 660.02.
2. CHISELED SQUARE IN SE CORNER OF CURBING AROUND ONALASKA TOWNSHIP HONOR ROLL MEMORIAL AT INTERSECTION OF COUNTY ROAD ZN AND COUNTY ROAD OT, ELEVATION 653.03.

HORIZONTAL CONTROL

POINT	NORTHING	EASTING	DESCRIPTION
H1	16809.40	47660.98	1" IRON PIPE
H2	16665.53	47965.52	1" IRON PIPE
H3	15887.77	47950.28	1" IRON PIPE
H4	15906.08	47109.21	1" IRON PIPE

HORIZONTAL DATUM BASIS IS ASSUMED PROJECT COORDINATE GRID SYSTEM. TRANSFORMATION TO WISCONSIN STATE PLANE 2 ZONE COORDINATES CAN BE ACCOMPLISHED BY ADDING 700,000 TO THE NORTHING AND 1,600,000 TO THE EASTING.

NOTES:

1. CONSTRUCTION LIMITS COINCIDE WITH PROPERTY LINE AND/OR EASEMENTS UNLESS OTHERWISE NOTED.
2. SUBCONTRACTOR SHALL SHARE THE SITE, INCLUDING THE STAGING AREA WITH OTHER SUBCONTRACTORS. SCHEDULING OF WORK IS CRITICAL. SEE SPECIFICATIONS.
3. BASE MAPPING BY MARTINEZ CORPORATION. SITE WAS FLOWN ON 11-11-88. ORIGINAL MAPPING WAS PREPARED AT A SCALE OF 1"=100'.
4. PZ-01, PZ-02, PZ-03, PZ-04, PZ-05, PZ-06, AND MW-6S ARE ALL TO BE INSTALLED UNDER THIS CONTRACT.

N

0 100 200 300

SCALE 1"=100'

CH2M HILL

DSGN MW PADDOCK						
DR PT KUTZ PA LLANAS						
CHK MS SCHMIEGE						
APVD S KEITH	NO.	DATE	REVISION	BY	APVD	

REUSE OF DOCUMENTS

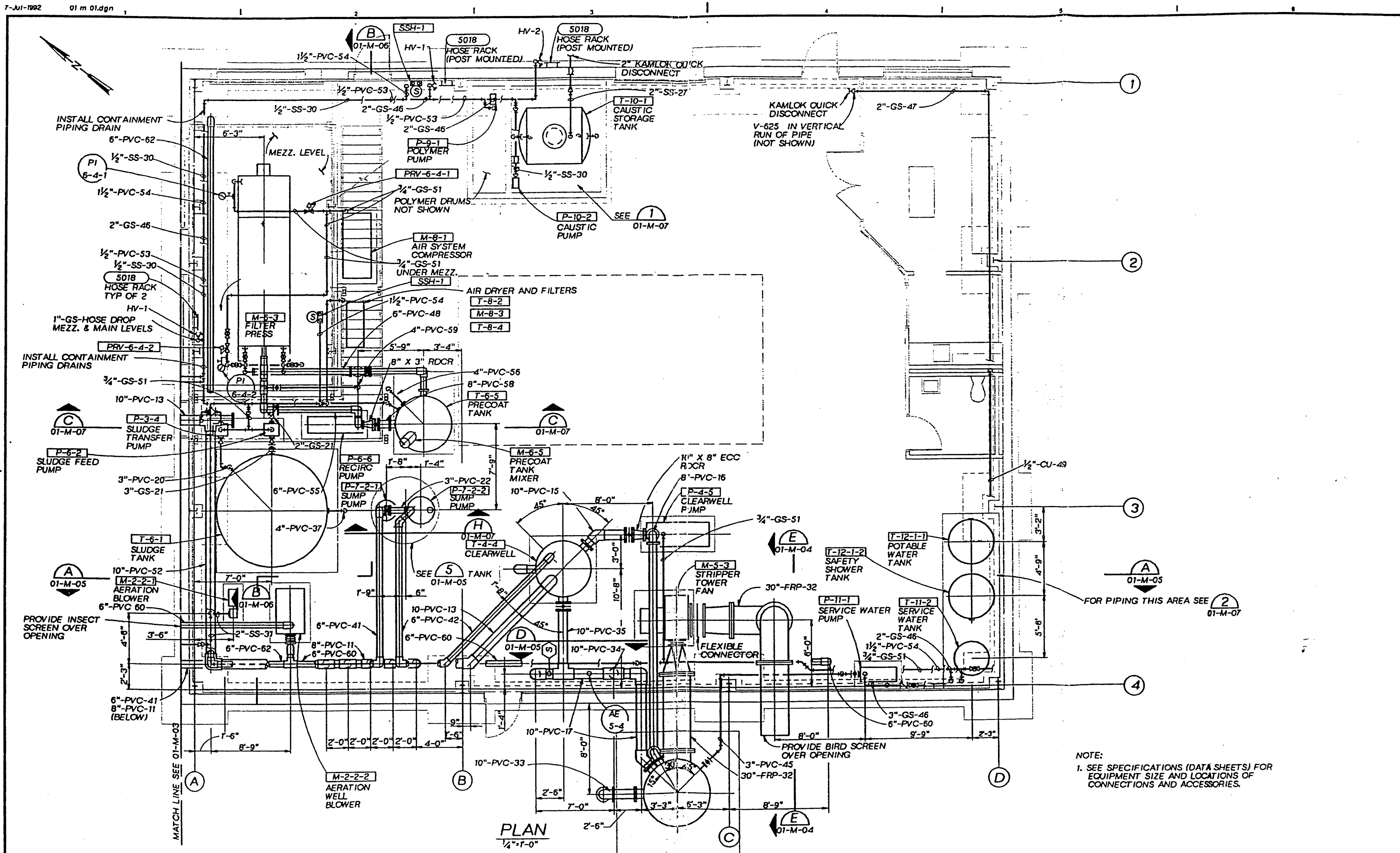
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

GENERAL SITE PLAN

SHEET 8
DWG NO. 01-C-01
DATE OCT 1992
PROJ NO. GLO65602.FD

7-Jul-1992 01 m 01.dgn



PLAN
¼"=1'-0"

NOTE:

1. SEE SPECIFICATIONS (DATA SHEETS) FOR EQUIPMENT SIZE AND LOCATIONS OF CONNECTIONS AND ACCESSORIES.

DSGN P. BOERSMA	NO.	DATE	REVISION	BY	APVD
DR D. OXLEY					
CHK R. YOLO					
APVD S. KEITH					

CH2M HILL

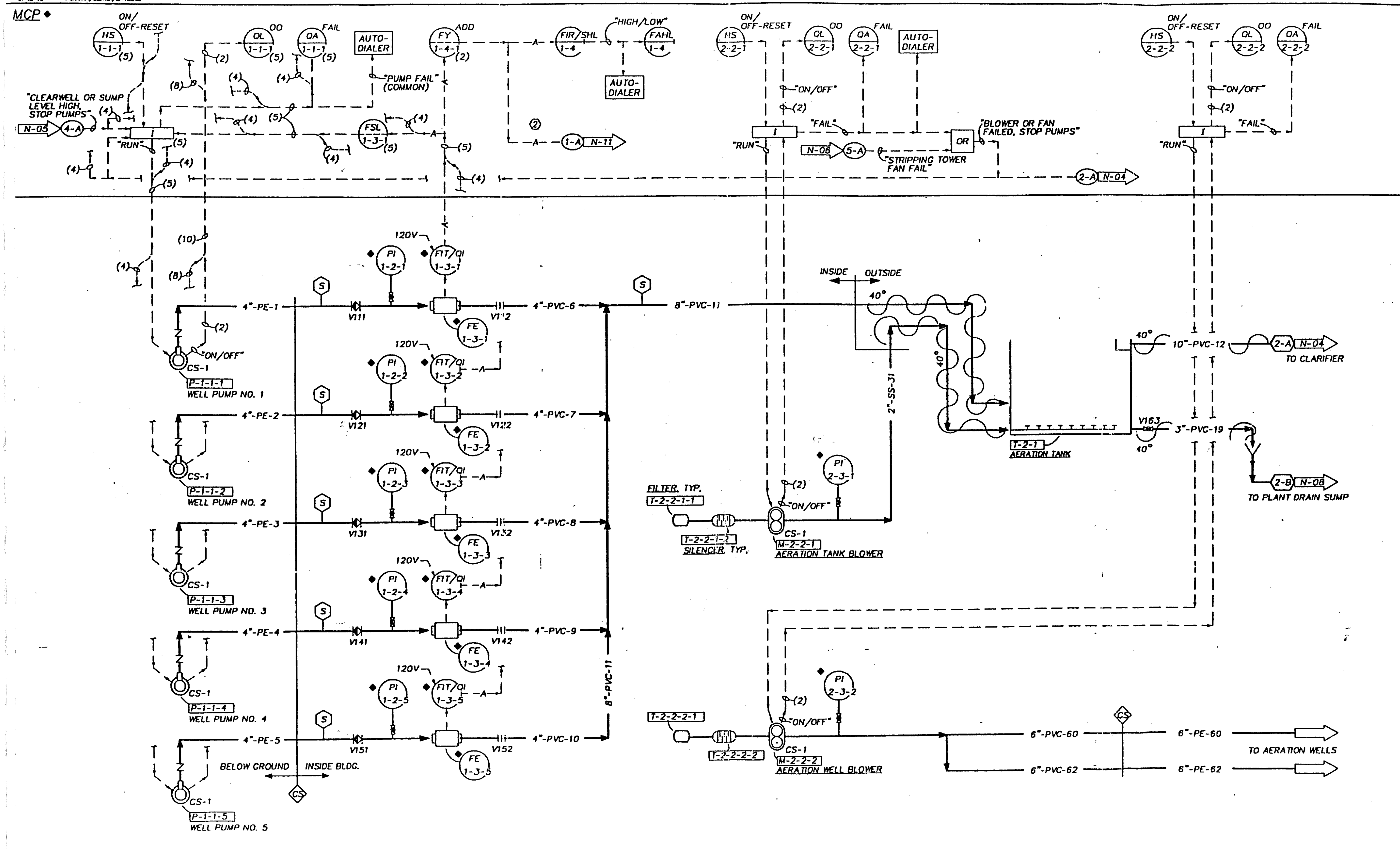
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS BUILDING
MECHANICAL
EQUIPMENT AND PIPING PLAN

SHEET	32
DWG NO.	01-M-02
DATE	OCT 1992
PROJ NO.	GLO65602.FD



CH2M HILL

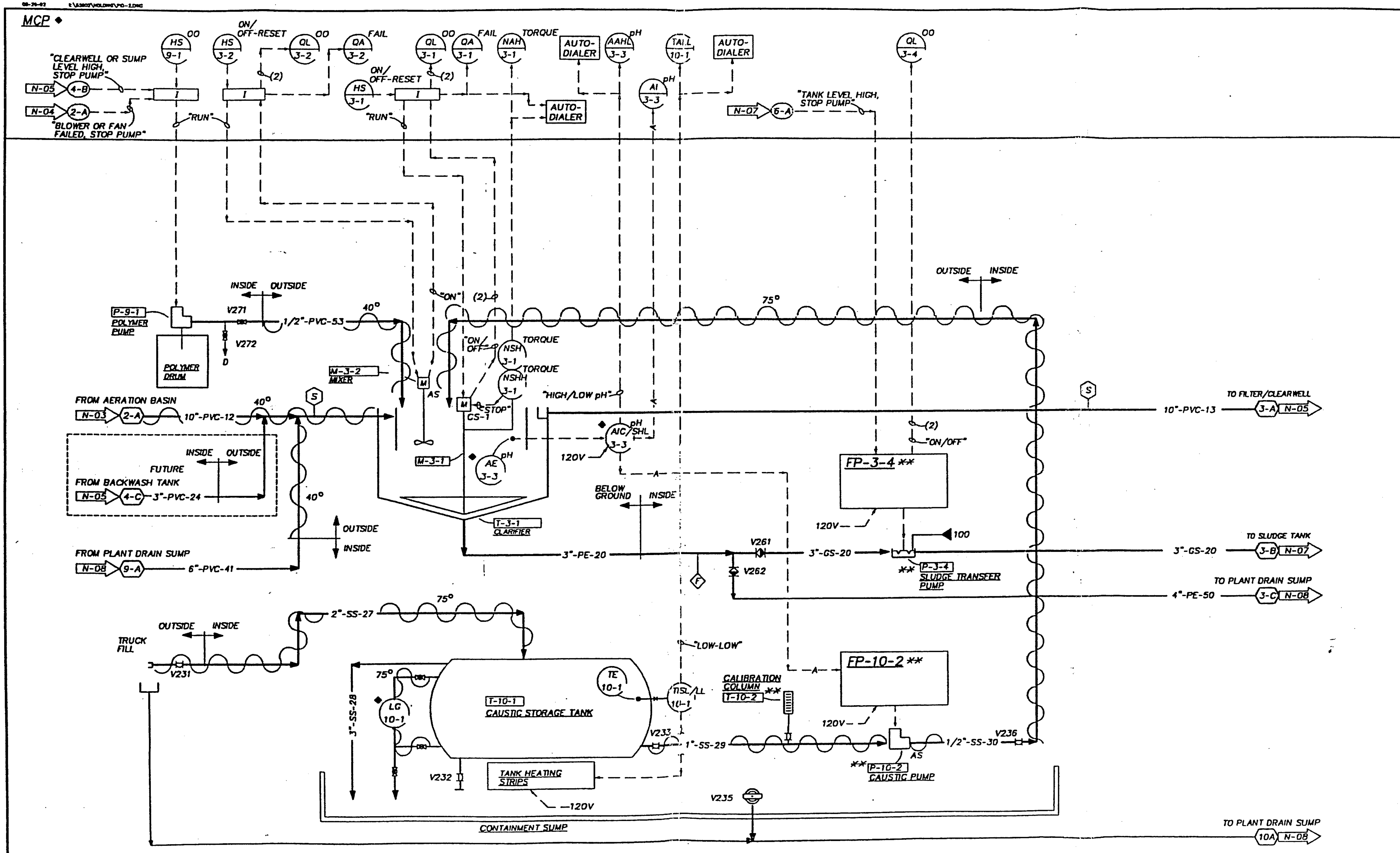
DSGN KEITH/OHLSSON				
DR OXLEY/OHLSSON				
CHK R.NAGEL	②	1/93	ADDED PACING SIGNAL TO ACID FEED SYSTEM	BO	SMK
APVD S.M.KEITH	NO.	DATE	REVISION	BY	APVD

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
WELL FIELD PUMPS & AERATION

SHEET 49
DWG NO. 01-N-03
DATE JULY 1992
PROJ NO. GL065602.FD



CH2M HILL

DSGN	KEITH/OHLSSON
DR	OXLEY/OHLSSON
CHK	R.NAGEL
APVD	S.M.KEITH

NO.	DATE	REVISION	BY	APVD

REUSE OF DOCUMENTS

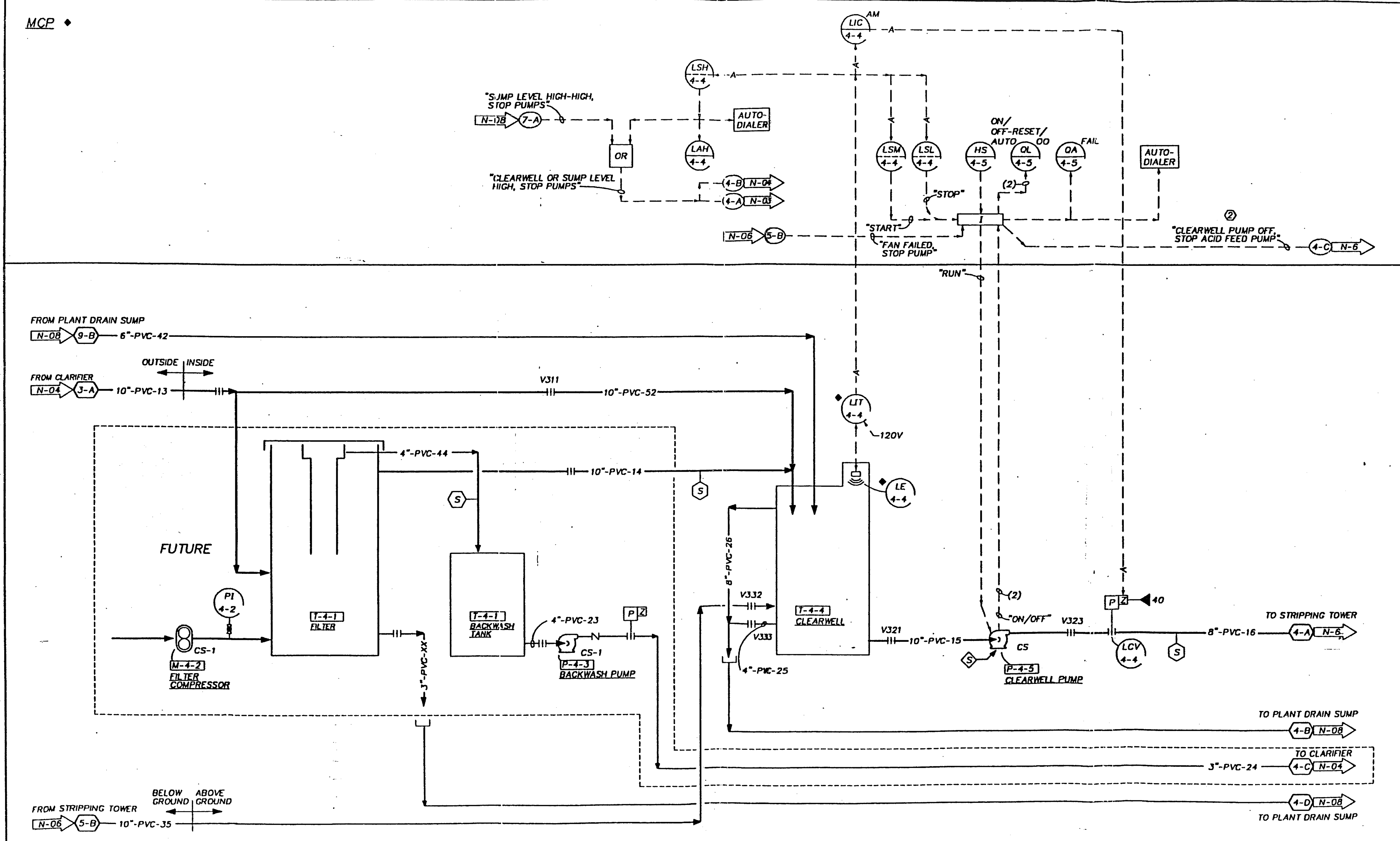
THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL.

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
CLARIFICATION & CAUSTIC SYSTEM

SHEET 50
DWG NO 01-N-04
DATE JULY 1992
PROJ NO. GLO65602.FD



CH2M HILL

DSGN	KEITH/OHLSSON
DR	OXLEY/OHLSSON
CHK	R.NAGEL
APVD	S.M.KEITH

NO.	DATE	REVISION	BY	APVD
2	1/93	ADDED CONTROL INTERLOCK TO ACID FEED PUMP FROM CLEARWELL PUMP.	BO	SMK

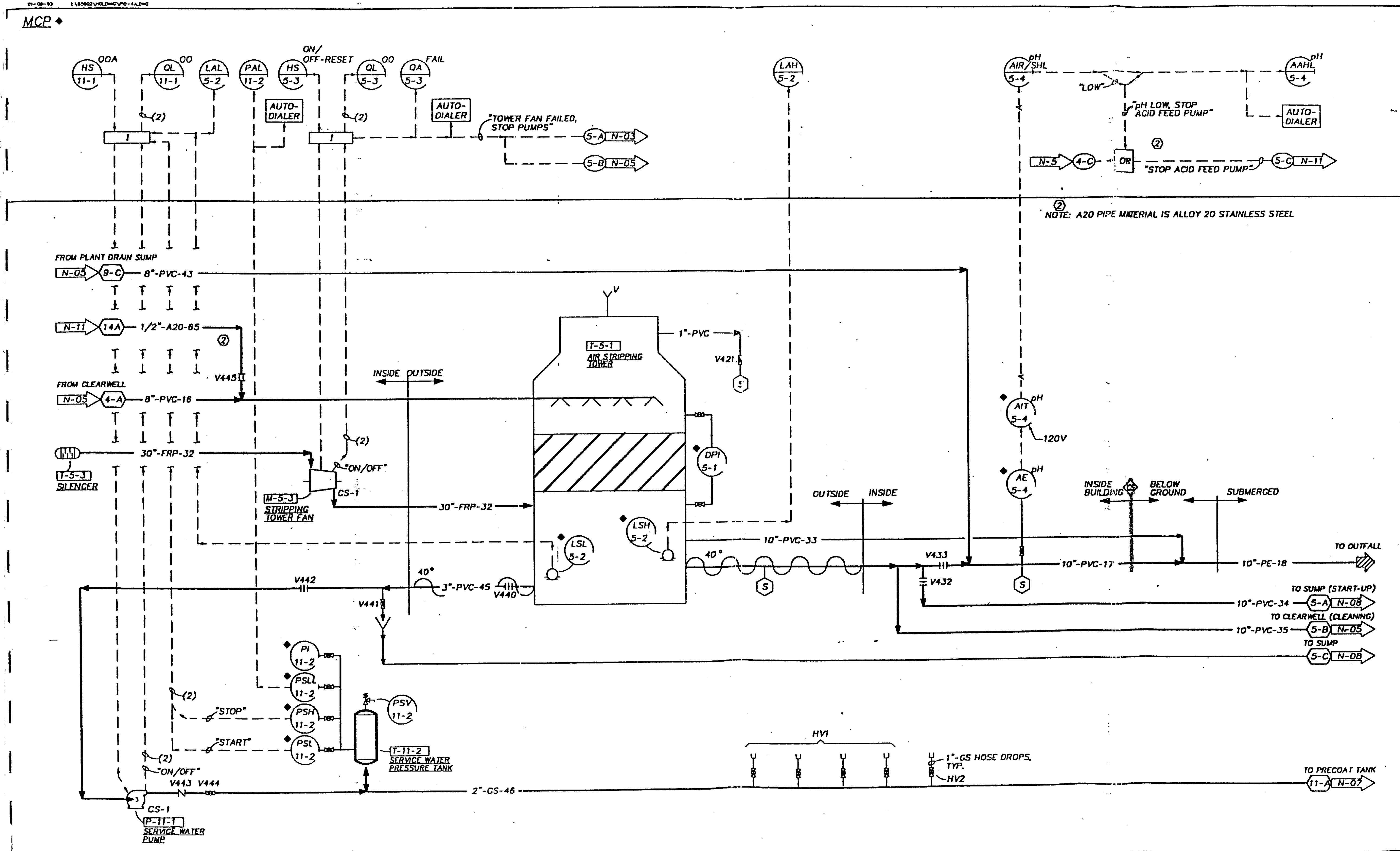
REUSE OF DOCUMENTS

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
FILTRATION AND CLEARWELL

SHEET	51
DWG NO.	01-N-05
DATE	JULY 1992
PROJ NO.	GL065602.FD



CH2M HILL

DSGN	KEITH/OHLSSON	NO	DATE	REVISION	BY	APVD
DR	OXLEY/OHLSSON	2	1/93	ADDED ACID FEED PIPING AND CONTROL INTERLOCK FROM LOW pH ALARM.	BO	SMK
CHK	R.NAGEL					
APVD	S.M.KEITH					

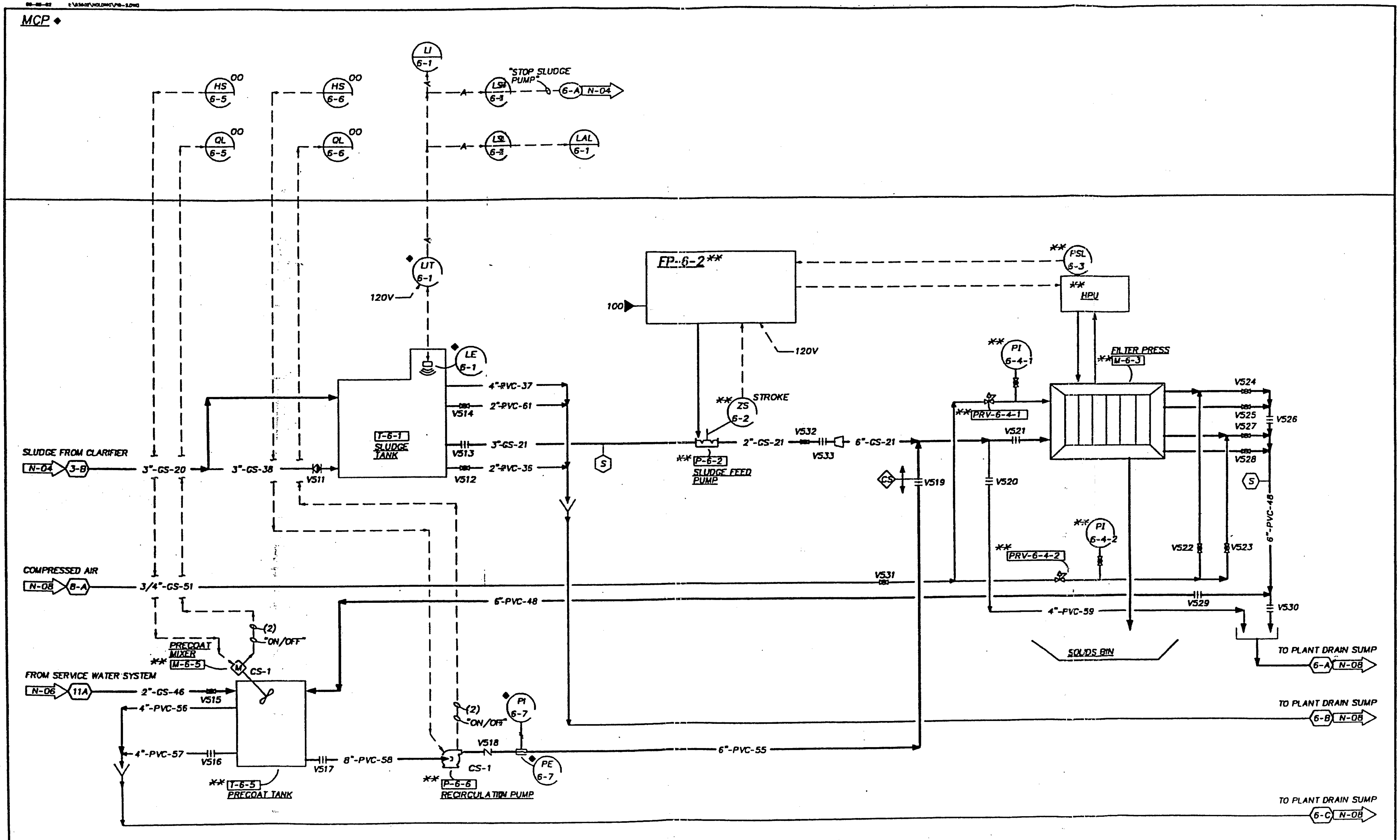
REUSE OF DOCUMENTS

BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
AIR STRIPPING/SERVICE WATER SYSTEM

SHEET 52
DWG NO. 01-N-06
DATE JULY 1992
PROJ NO. GLO65602.FD



DSGN KEITH/OHLSSON						
DR OXLEY/OHLSSON						
CHK R.NAGEL						
APVD S.M.KEITH	NO.	DATE	REVISION	BY	APVD	

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL.

© CH2M HILL

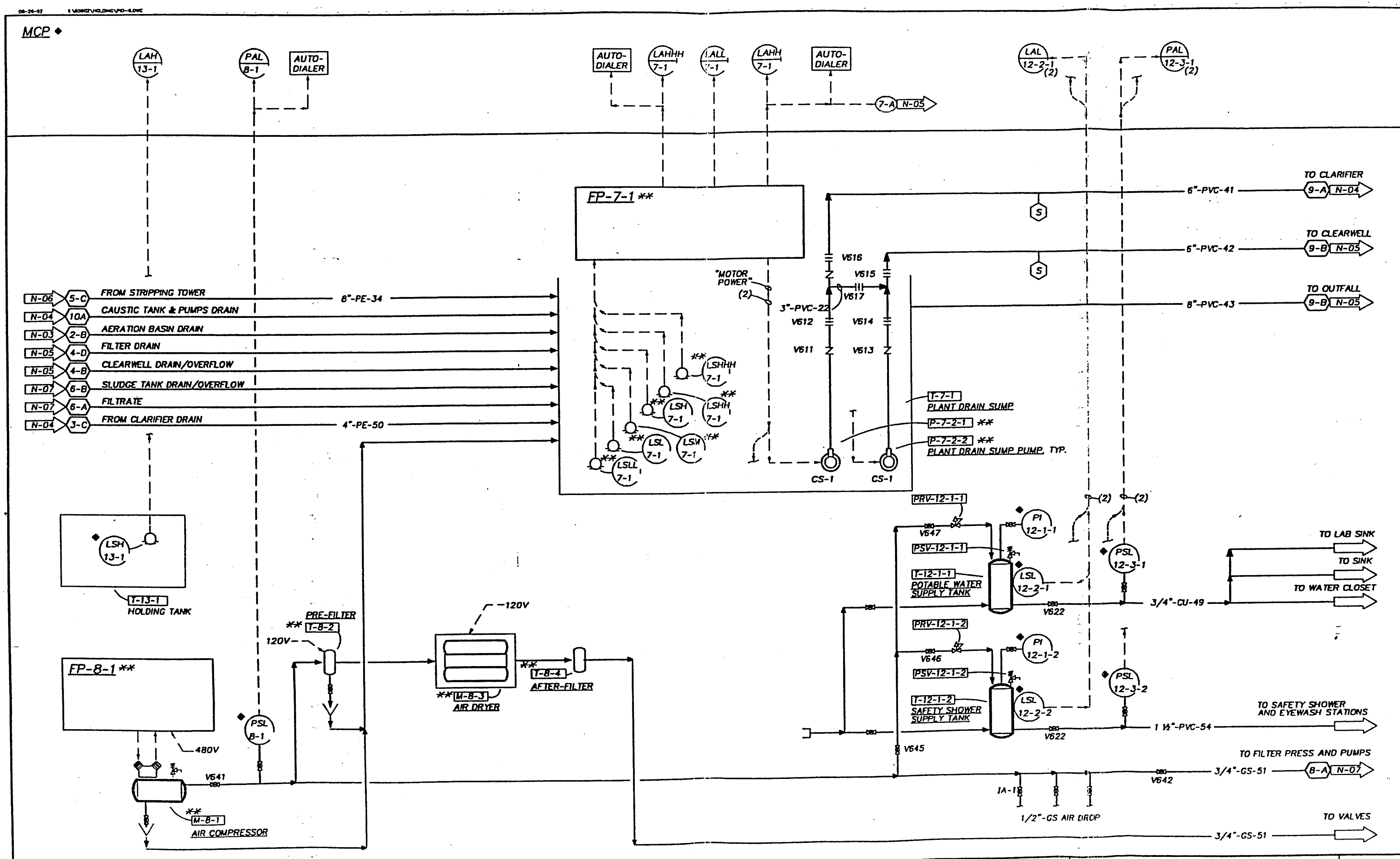
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

**PROCESS & INSTRUMENTATION DIAGRAM
SLUDGE DEWATERING**

SHEET 53
DWG NO. 01-N-07
DATE JULY 1992
PROJ NO. GL065602.FD



CH2M HILL

DSGN KEITH/OHLSSON				
DR OXLEY/OHLSSON				
CHK R.NAGEL				
APVD S.M.KEITH	NO.	DATE	REVISION	BY	APVD

REUSE OF DOCUMENTS

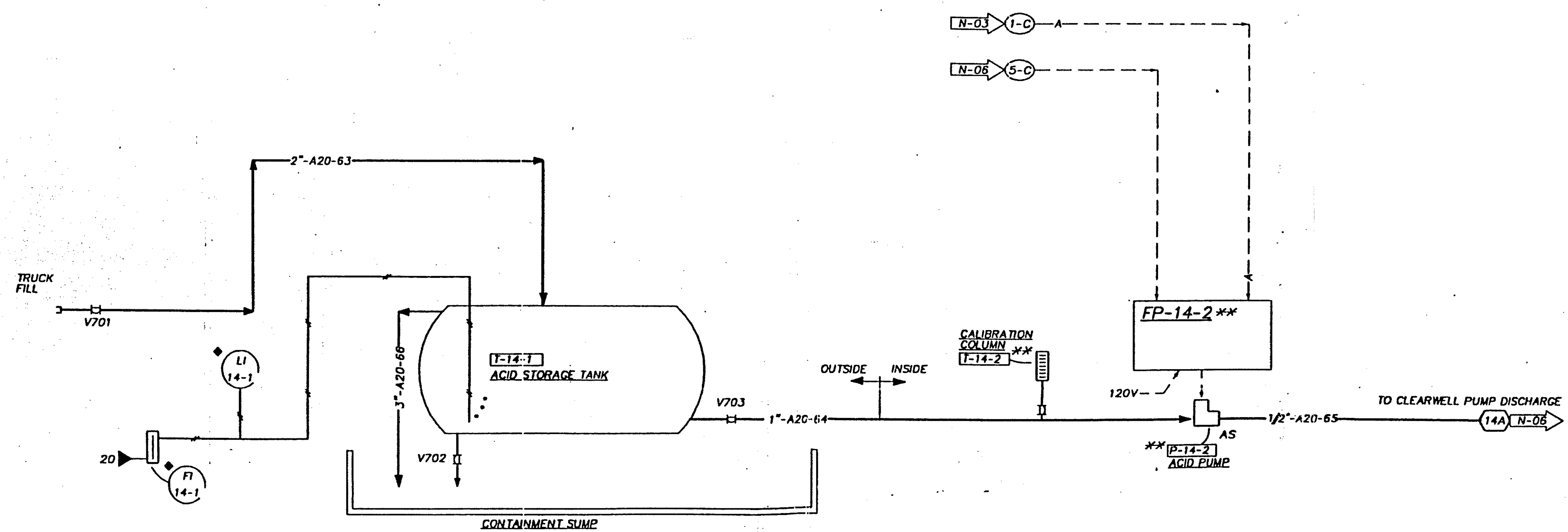
BAR IS ONE INCH ON ORIGINAL DRAWING
0 ——— 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
PLANT SUMP/COMPRESSED AIR SYSTEM

SHEET 54
DWG NO. 01-N-08
DATE JULY 1992
PROJ NO. GL065602.FD

01-08-93 F:\65602\HOLDWG\PID-11A.DWG



DSGN OHLSSON					
DR SDHLSSON					
CHK	2	1-93	NEW SHEET	BO	SMK
APVD	NO.	DATE	REVISION	BY	APVD

CH2M HILL

REUSE OF DOCUMENTS

BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GROUNDWATER REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

PROCESS & INSTRUMENTATION DIAGRAM
ACID SYSTEMM

SHEET	57
DWG NO	01-N-11
DATE	JAN 1993
PROJ NO	GL065602.FD

Equipment List—Onalaska
(Page 1 of 6)
May 13, 1997

Title	Equipment Number	Description	Electrical	Manufacturer/Model/Phone
Aeration Tank	T-2-1	• FRP, cylindrical tank • 11′ diameter/21′ high • 18′ water depth/overflow weir • Coarse bubble diffusers on bottom	--	• Airplastics, Inc.
Aeration Tank Blower	M-2-2-1	• Positive displacement blower • 50 scfm at 8 psig • Single stage • Provide spare blower	7-1/2 hp	• Roots Grub Equipment Corp. (612) 777-4041
Aeration Tank Blower Filter	T-2-2-1-1	• Furnish with M-2-2-1	--	• Roots
Aeration Tank Blower Silencer	T-2-2-1-2	• Furnish with M-2-2-1	--	• Roots
Aeration Well Blower	M-2-2-2	• Positive displacement blower • 300 scfm at 4 psig • Single stage	--	• Roots Grub Equipment Corp. (612) 777-4041
Aeration Well Blower Filter	T-2-2-2-2	• Furnish with M-2-2-2	--	• Roots
Aeration Well Blower Silencer	M-2-2-2	• Furnish with M-2-2-2	--	• Roots
After-Filter	T-8-4	• 3 micron	--	• Ingersoll-Rand/IR30P

Equipment List—Onalaska
(Page 2 of 6)

May 13, 1997

Title	Equipment Number	Description	Electrical	Manufacturer/Model/Phone
Air Compressor	M-8-1	• Rotary screw • 80 scfm at 100 psig operating • Automatic float drain valve	20 hp feeder	• Ingersoll-Rand/SSR-20 Airpower Equipment Corp. (612) 522-7000
Air Dryer	M-8-3	• Regenerative • 20 scfm, 100 psig operating	120 V 5 amps	• Ingersoll-Rand/HB52 Airpower Equipment Corp. (612) 522-7000
Air Stripping Tower	T-5-1	• Packed tower • Remove 95% of toluene, xylene • 6′ diameter • 25′ of packing	--	• ERS (Environmental Restoration Systems) (800) 944-5515
Backwash Pump (Future)	P-4-3	--	--	--
Backwash Tank (Future)	T-4-1	--	--	--
Calibration Column	T-10-2	• Furnish with P-10-2	--	--
Caustic Pump	P-10-2	• Chemical metering/diaphragm • 1 gph capacity • With calibration column	120V 190 watts	• Pulsatron Remedial Systems, Inc.

Title	Equipment Number	Description	Electrical	Manufacturer/Model/Phone
Caustic Storage Tank	T-10-1	• Horizontal/steel • 750 gallon capacity • Insulated • Approximately 5′ diameter • Blanket tank heater	2 heaters 110V 500 watts each	• Highland Tank and Mfg. Co.
Clarifier	T-3-1	• Solids contact clarifier • 50′ diameter/0.5 gpm/sq ft rise rate • 30 min retention in reactor zone	1 hp	• Eimco (801) 526-2000
Clear Well	T-4-4	• Vertical FRP tank • 6′ diameter/8′ tall tank	--	• Air Plastics, Inc.
Clear Well Pump	P-4-5	• Centrifugal • Q = 800 gpm, H = 50′	15 hp	• Griswold Model 811 Remedial Systems, Inc.
Coarse Bubble Diffuser	M-2-3	• Air diffusers for bottom of aeration tank	--	• Sanitaire Industrial Piping Co. (906) 228-8890
Filter (Future)	T-4-1	• Continuously backwashing • 200 sq ft of filter bed • Sand media	--	• Dynasand/DSF-200 • Stratasand/SSF-200
Filter Compressor (Future)	M-4-2	• Piston compressor • 40 scfm at 60 psig	(10 hp)	• Ingersoll-Rand

Equipment List—Onalaska (Page 4 of 6)				May 13, 1997
Title	**Equipment Number**	**Description**	**Electrical**	**Manufacturer/Model/Phone**
Filter Press	M-6-3	• Plate and frame filter press • 40 cu ft volume	--	• Eimco Schriver/1200 FB (801) 526-2000
Mixer Drive	M-3-2	• Furnished with T-3-1	5 hp	• Burhans-Sharpe Co. (206) 932-1030
Plant Drain Sump	T-7-1	• 6′ dia. × 7′ • 1,000 gallons • FRP • Furnished with P-7-2-1 and P-7-2-2	--	--
Plant Drain Sump Pump	P-7-2-2	• Vertical Sump • 800 gpm/35′ head	10 hp	• Carver Pump Remedial Systems, Inc.
Plant Drain Sump Pump	P-7-2-1	• Vertical Sump • 100 gpm/30′ head	2 hp	• Carver Pump Remedial Systems, Inc.
Polymer Pump	P-9-1	• 0.5 gph	120V 80 watts	• Pulsatron Remedial Systems, Inc.
Potable Water Supply Tank	T-12-1-1	• 42″ diameter • 450 gallons	--	• Wessels Industrial Piping Co.
Pre-Filter	T-8-2	• 99.99% of 0.01 microns • Coalescing filter • Automatic drain valve	120 V 5 amps	• Ingersoll-Rand/IR20C

Equipment List—Onalaska (Page 5 of 6)				May 13, 1997
Title	**Equipment Number**	**Description**	**Electrical**	**Manufacturer/Model/Phone**
Precoat Mixer	M-6-5	• Furnished with M-6-3	1/4 hp	--
Precoat Tank	T-6-5	• 600 gallons, FRP • Furnished with M-6-3	--	• Air Plastics, Inc.
Recirculation Pump	P-6-6	• 450 gpm • 30 psi • Furnished with M-6-3	10 hp	• Worthington D-1012 Mountainside, New Jersey (Worthington-Dresser)
Safety Shower Supply Tank	T-12-1-2	• 42″ diameter • 450 gallons	--	• Wessels/Industrial Piping Co. (906) 228-8890
Calibration Column	T-10-2	• Furnish with P-10-2	--	--
Service Water Pressure Tank	T-11-2	• Vertical • 80-gallon expansion tank	--	• Wessels/Industrial Piping Co. (906) 228-8890
Service Water Pump	P-11-1	• Centrifugal • Q = 75 gpm, H = 125′	5 hp	• Goulds Model 3196/ Remedial Systems, Inc.
Sludge Feed Pump	P-6-2	• Air Diaphragm • 0 to 50 gpm • Furnished with M-6-3	--	• Warren-Pupp/Sandpiper (419) 524-8388

Equipment List—Onalaska (Page 6 of 6)				May 13, 1997
Title	**Equipment Number**	**Description**	**Electrical**	**Manufacturer/Model/Phone**
Sludge Tank	T-6-1	• Vertical FRP tank • 10′ diameter/18′ tall	--	• Air Plastics, Inc. (513) 398-8081
Sludge Transfer Pump	P-3-4	• Air Diaphragm • Q = 2—10 gpm, H = 20′	--	• Lutz Remedial Systems, Inc.
Stripper Tower Fan	M-5-3	• Vanaxial • 5,000 scfm @ 3″ H_2O pressure • RPM 500	3 hp	• New York Blower (215) 372-1104
Well Pump	P-1-1-1 & P-1-1-5	• Submersible • 200 gpm/78′ head • Built-in check valve	2 @ 5 hp each	• Grundfos
Well Pump	P-1-1-2 & P-1-1-4	• Submersible • 150 gpm/65′ head • Built-in check valve	2 @ 5 hp each	• Grundfos
Well Pump	P-1-1-3	• Submersible • 100 gpm/60′ head • Built-in check valve	2 hp	• Grundfos
Acid Feed Pump	P-14-1			• Pulsatron Remedial Systems, Inc. (508) 543-1512

APPENDIX B
LOG SHEETS

Operator: ____________________
Week Ending: ____________________

LOG SHEET NO. 1

EXTRACTION WELL FLOW

DATE	*TIME*	*WELL #1*		*WELL #2*		*WELL #3*		*WELL #4*		*WELL #5*		*TOTAL x 10*	*CALCULATED TOTAL GPM*

COMMENTS:

MKE10017201.WP5/1

Operator: ____________________
Week Ending: ____________________

LOG SHEET NO. 2

DAILY PROCESS MONITORING

	MONDAY	*TUESDAY*	*WEDNESDAY*	*THURSDAY*	*FRIDAY*	*SATURDAY*	*SUNDAY*
Aeration Tank Pressure							
Visual Inspection							
Clarifier Mixer/Rake							
Sludge Depth (feet)							
Acid Volume (gal)							
Air Stripper Intake							
Stripper Pressure Drop							
Clarifier pH							
Effluent pH							
Extraction Wells pH							
Iron Influent (mg/L)							
Iron Effluent (mg/L)							
Effluent Temperature							

COMMENTS:

Monthly Report For: ____________________ Page _____ of ____
Operator: ______________ Date: __________ From: (date) ________ to ________

LOG SHEET NO. 3

ONSITE SAMPLING / ANALYSIS RESULTS

DATE:															
Time															
Extraction Wells GPM															
Caustic Volume (Gal)															
Caustic GPM															
Clarifier pH on the Panel															
Clarifier pH on the Portable Meter (weekly check)															
Outfall pH on the Panel															
Outfall pH on the Portable Meter (weekly check)															
Extraction well pH (weekly)															
Polymer Drawdown (inches)															
Polymer GPM															
Temperature (°C) (weekly)															
Iron Influent (weekly) (mg/L)															
Iron Effluent (mg/L)															

COMMENTS:
____
____
____
____

AVERAGES AND CHEMICALS USED					
Caustic Usage =		Gallons		Average Extraction Well Flow =	gpd
Sulfuric Acid Usage =		Gallons		Sludge Accumulation =	
Polymer Usage =		Gallons		Total Flow =	
Well Pumping = #1	#2	#3	#4	#5	

MKE10017201.WP5/3

LOG SHEET NO. 4

BREATHING ZONE MONITORING

DATE *CALIBRATION*					
Background (upwind)					
Control Room					
Sump Pit					
Cat. Walk					
Center Build					
Dumpster					

APPENDIX C
METHODS

SOP# 1: INFLUENT/EFFLUENT SAMPLING

I. Purpose

General reference information for sampling influent and effluent is provided. The sampler should reference the VOC sampling SOP (SOP#2) for collection of VOC samples.

II. Scope

Standard techniques for collecting representative samples from influent and effluent sample taps are summarized.

III. Equipment/Materials

Sample jars, clean latex or surgical gloves

IV. Procedures/Guidelines

1. Dawn protective clothing prior to sampling.

2. The sampling valve should be opened and allowed to run continuously for at least 10 seconds (if possible) before the sample is collected.

3. Samples will be collected from a sample valve identified by Engineer (Contractor) or WDNR.

4. Sample containers should be filled directly from the tap or faucet.

5. Use appropriate sample container and observe sample preservation requirements.

6. Collect matrix spike/matrix spike duplicates as required by the laboratory for QA/QC.

For VOC sampling, see separate SOP on this subject.

V. Attachments

None.

SOP# 2: VOC SAMPLING - WATER

I. Purpose

General guidelines for sampling volatile organic compounds are provided.

II. Scope

Standard techniques for collecting representative samples are summarized.

III. Equipment/Materials

- Sample vials, clean latex or surgical gloves, pH meter
- Hydrochloric acid (HCl) for preservation
- pH meter or pH indicating paper
- surgical or latex gloves

IV. Procedures/Guidelines

1. Sample VOCs before sampling other analyte groups.

2. When sampling for VOCs, evaluate the area around the sampling point for possible sources of air contamination by VOCs. Products that may give off VOCs and possible contaminate a sample include perfumes and cosmetics, skin applied pharmaceuticals, automotive products (gasoline, starting fluid, windshield deicers, carburetor cleaners, etc.) and household paint products (paint strippers, thinners, turpentine, etc.).

3. To check the amount of hydrochloric acid (HCl) that needs to be added at each location, fill a test vial (40ml) with the water to be sampled, add one drop of hydrochloric acid (HCl), gently mix, and check the pH. Repeat this cycle (if necessary) until you reach a pH of 2, counting the number of drops of HCl was required. DISCARD THE TEST VIAL and add an equal number of drops of HCl to each of the sample vials. Proceed to sample.

4. Keep the caps off of the sample vials for as short a time as possible.

5. Wear clean latex or surgical gloves.

6. Fill the sample vial immediately, allowing the water stream to strike the inner wall of the vial to minimize formation of air bubbles. DO NOT RINSE THE SAMPLE VIALS BEFORE FILLING.

7. Fill the sample vial with a minimum of turbulence, until the water forms a positive meniscus at the brim.

8. Replace the cap by gently setting it on the water meniscus. Tighten firmly, but DO NOT OVER TIGHTEN.

9. Invert the vial and tap it lightly. If you see air bubbles in the sample, do not add more sample. Use another vial to collect another sample. Repeat if necessary until you obtain a proper sample.

V. Attachments

None.

VI. Key Checks/Items

- Check for possible sources of contamination
- Check pH
- Fill slowly, with as little turbulence as possible
- Check for air bubbles

SOP# 3: FIELD MEASUREMENT OF SPECIFIC CONDUCTIVITY AND TEMPERATURE

I. Purpose

To provide a general guideline for field measurement of specific conductivity and temperature.

II. Scope

Standard field conductivity and temperature techniques for use on groundwater samples.

III. Equipment/Materials

- o Conductivity meter and electrode
- o Distilled water in squirt bottle
- o Standard Potassium Chloride (KCl) Solution (0.01 N)

IV. Procedures/Guidelines

TECHNICAL: Detection limit = 1 umho/cm @ 25 C; range = 0.1 to 100,000 umho/cm

CALIBRATION

Calibrate prior to initial daily use and at least once every 4 hours or every 5 samples, whichever is less. Calibrate with standard solution. The standards should have different orders of conductance. Clean prove according to manufacturers recommendations. Duplicates should be run once every 10 samples or every 4 hours.

1. With mode switch in OFF position, check meter zero. If not zeroed, set with zero adjust.

2. Plug probe into jack on side of meter.

3. Turn mode switch to red line and turn red line knob until needle aligns with red line on dial. If They cannot be aligned, change the batteries.

4. Immerse probe in 0.01 N standard KCl solution. Do not allow the probe to touch the sample container.

5. Set the mode control to TEMPERATURE. Record the temperature on the bottom scale of the meter in degrees C.

6. Turn the mode switch to appropriate conductivity scale (i.e. x100, x10, or x1). Use a scale that will give a mid-range output on the meter.

7. Wait for the needle to stabilize. Multiply reading by scale setting and record the conductivity. The conductivity must then be corrected for temperature.

8. Calculate conductivity using the formula:

$$G_{25} = G_T / [1 + 0.02 (T - 25)]$$

Where:

G_{25} = conductivity at 25 C, umho/cm
T = temperature of sample, degrees C
G_T = conductivity of sample at temperature T, umho/cm

The table below lists the values of conductivity the calibration solution would have if the distilled water were totally non-conductive, however even water of very high purity will still possess a small amount of conductivity.

Temperature (C)	Conductivity (umho/cm)
15	1,141.5
16	1,167.5
17	1,193.6
18	1,219.9
19	1,246.4
20	1,273.0
21	1,299.7
22	1,326.6
23	1,353.6
24	1,380.8
25	1,408.1
26	1,436.5
27	1,463.2
28	1,490.9
29	1,518.7
30	1,546.7

I. Rinse the probe with deionized water

J. Run sample and rinse with deionized water when done

V. Attachments

Conductivity meter calibration sheet

VI. Key Checks/Items

- o Check battery
- o Calibrate

- Clean probe with deionized water when done
- When reading results, note sensitivity settings

VII. Preventative Maintenance

- Refer to operations manual for recommended maintenance.
- Check batteries. Have a replacement set on hand.

SOP# 4: MEASUREMENT OF pH

I. Purpose

To provide a general guideline for measurement of pH

II. Scope

Standard field pH determination techniques for use on influent/effluent samples.

III. Equipment/Materials

- pH buffer solution for pH 4, 7, and 10
- Deionized water in squirt bottle
- pH meter
- Combination electrodes
- Beakers
- Glassware that has been washed with soap and water, rinsed twice with hot water, and rinsed twice with deionized water
- 10% solution of HCl

IV. Procedures/Guidelines

A. CALIBRATION

Calibrate unit prior to initial daily use and at least once every 4 hours or every 5 samples, whichever is less. Calibrate with at least 2 solutions. Clean probe according to manufacturers recommendations. Duplicate samples should be run once every 10 samples or every 4 hours.

1. Place electrode in pH 7 buffer solution.
2. Allow meter to stabilize and then turn calibration dial until a reading of 7.0 is obtained.
3. Rinse electrode with deionized water and place it in a pH 4 or pH 10 buffer solution.
4. Allow meter to stabilize again and then turn slope adjustment dial until a reading of 4.0 is obtained for the pH 4 buffer solution or 10.0 for the pH 10 buffer solution.
5. Rinse electrode with deionized water and place in pH 7 buffer. If meter reading is not 7.0, repeat sequence.

B. PROCEDURE

1. Before sample collection:
   a) Check batteries.
   b) Do a quick calibration at pH 7 and 4 to check electrode.
   c) Obtain fresh solutions.

2. Calibrate meter using calibration procedure.

3. Pour the sample into a clean beaker.

4. Rinse electrode with deionized water between samples.

5. Immerse electrode in solution. Make sure the white KCl junction on the side of the electrode is in the solution. The level of electrode solution should be one inch above sample to be measured.

6. Recheck calibration with pH 7 buffer solution after every five samples.

C. GENERAL

1. When calibrating the meter, use pH buffers 4 and 7 for samples with pH <~~8~~7 and buffers 7 and 10 for samples with pH >~~8~~7. If meter will not read pH 4 or 10, something may be wrong with the electrode.

2. Measurement of pH is temperature dependent. Therefore, temperatures of buffers and samples should be within about 2 degrees C. For refrigerated or cool samples, use refrigerated buffers to calibrate the pH meter.

3. Weak organic and inorganic salts and oil and grease interfere with pH measurements. If oil and grease are visible, note it on the data sheet. Clean electrode with soap and water and rinse with a 10% solution of HCl. Then recalibrate meter.

4. Following measurements:
   a) Report any problems
   b) Compare with previous data
   c) Clean all dirt off meter and inside case
   d) Store electrode in pH 4 buffer

5. Accuracy and precision are dependent on the instrument used; refer to manufacturer's manual. Expected accuracy and precision are +/- 0.1 pH unit.

V. Attachments

pH meter calibration sheet

VI. Key Checks/Items

- o Check batteries
- o Calibrate

VII. Preventative Maintenance

- o Refer to operation manual for recommended maintenance.
- o Check batteries, Have a replacement set on hand.

TO: Steve Keith/CH2M HILL

FROM: David L. Shekoski/CH2M HILL

DATE: August 2, 1994

SUBJECT: Composite Sampling with and ISCO Automatic Sampler at the Onalaska Groundwater Remedial Action Startup

PROJECT: GLE65624.SU.12

INTRODUCTION

The following instructions were prepared from the composite sampling procedures used for the startup of the groundwater extraction and treatment system.

REQUIRED ITEMS

- ISCO Portable Sampler (Model 3700 with 2.5 gallon capacity or Model 3710 with 4 gallon capacity)
- 3/8" Teflon tubing, about 3 feet in length (for suction line)
- Tubing (teflon) for discharge line (any length)
- Distilled water (to flush and calibrate system)
- Graduated cylinder or beaker
- Clean bottle or jar to serve as an interim holding vessel.
- Plastic zip-seal baggies for packaging ice.
- Airbills and coolers for shipping samples.

SET-UP OF ISCO SAMPLER

- Calculate the total volume of sample required to fill all necessary sample containers, including duplicates (if required). If the required volume is greater than the capacity of the unit, it may be necessary to alter the system to accommodate a larger container outside of the base section.

- Calculate what the composite volume must be to collect enough sample over the 24 hour sample period. A time interval of 15 minutes is recommended.

- Since the volume actually delivered can vary from what is actually programmed, it is advised that a manual calibration check be performed prior to the start of composite sampling.

1. Undo the three stainless steel latches on the side of the unit and remove the center section from the base. From inside of the center section, remove the delivery tube from the holding mechanism and slide it back through the opening on the top. Replace the center section.

2. Turn unit on by pressing the **ON/OFF** button (display will read "...STANDBY...", and time and date will appear below it.

3. Configure and program the unit for time-paced sample collection (see ISCO operation manual).

4. Place the inlet tube (the top tube on the pump mechanism) in a container of distilled water, and the outlet tube in a graduated cylinder or beaker.

5. Depress the **MANUAL SAMPLE** button on the control box. The ISCO will run through a complete cycle (purge, sample and purge again).

   NOTE: If the delivery tube is submerged, the delivered sample will be drawn back out of the graduated cylinder, and back through the unit.

6. Compare the volume of water delivered to the graduated cylinder with the target volume, and adjust the programmed sample volume accordingly until proper delivery is obtained.

7. If the capacity of the collection bottle supplied with the unit is adequate for the sample requirements, the operator may choose to remove the center section and feed the delivery tube back through the guide in the center so the sample can be stored inside the base section (this will require subsequent removal for addition of ice into the base). To simplify setup, make it easier to maintain ice levels, or if a larger volume is required than what the collection container can accommodate, leave the delivery tube outside the base section so it can be inserted directly into a collection bottle inside of a cooler placed next to the ISCO sampler.

SET-UP OF SAMPLING NETWORK

The ISCO Portable Sampler is designed to collect samples under pressures ranging from atmospheric to 10-15 psi, however the manufacturer warns that sampling at elevated inlet pressures can cause inconsistencies in sample volumes, particularly if there is potential for pressure variation. For this reason, the following sampling configuration is recommended for collecting composite samples from positive pressure sample ports within the system.

1. Most sample port valves are equipped with a small section of pipe. Remove the threaded pipe section from the valve, and attach a reducer fitting to fit the I.D. of the tubing used to direct the flow to the ISCO. If the reducer fittings are not available, they can be purchased at most hardware stores. The thread size of the valve outlet is 1/2 inch.

2. Run a section of tubing from the reducer to a clean temporary holding vessel, making sure that the end of the tube terminates at or just below the top of the holding vessel (in the event of negative pressure in the system, the water in the holding vessel oan be drawn back through the feed line). If the sample will be collected outside of the process building, place the holding vessel inside of a cooler (with drain open) with the cover partially closed to protect the sample. See Figure 1 for various options.

3. Connect a 3 foot (approximate) section of teflon tubing to the inlet of the ISCO sampler (the upper tube on the control box).

4. If the capacity of the supplied sample container is adequate, place the container inside the base section, making sure that the delivery tube is properly channeled through the guide system, and replace the center section. Set-up is complete. If an outside collection container with additional volume is required (refer back to step 7 in the previous section), place the collection container inside a cooler and run a section of tubing from the ISCO outlet to the collection container, making sure that the tube end is not submerged. This can be accomplished with tape or wire.

SAMPLE COLLECTION

1. Program start time and press **START PROGRAM** button (display will read "Sample 1 of 96 at..." (for 15 minute sample interval)

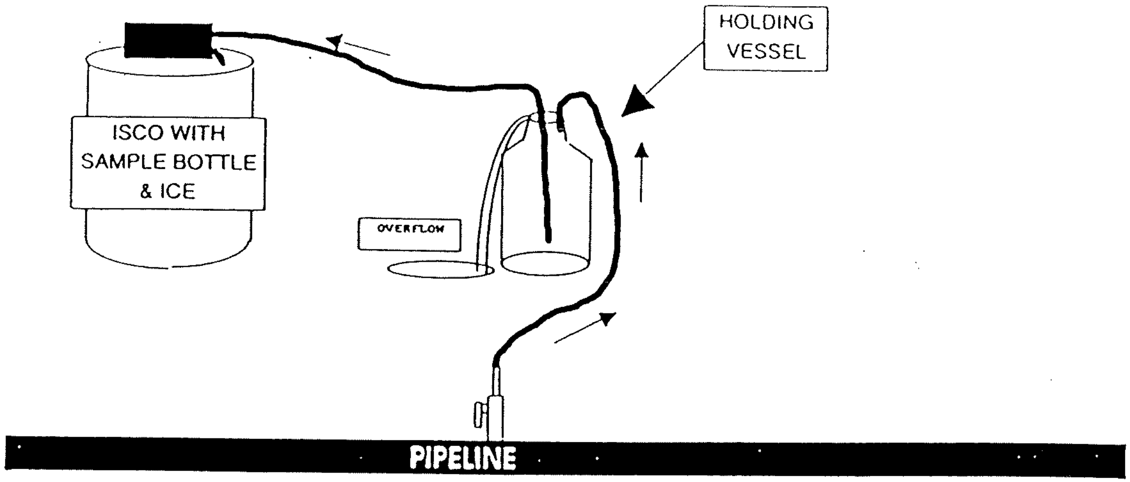
2. Open the sample port valve to allow a the process water to flow into the holding vessel, allowing the process water to continuously overflow the top. If a cooler is used, open the drain plug to allow the overflow to drain out.

3. Fill the ISCO base section (or the cooler with the collection container if a larger volume is required) with ice to keep the sample chilled.

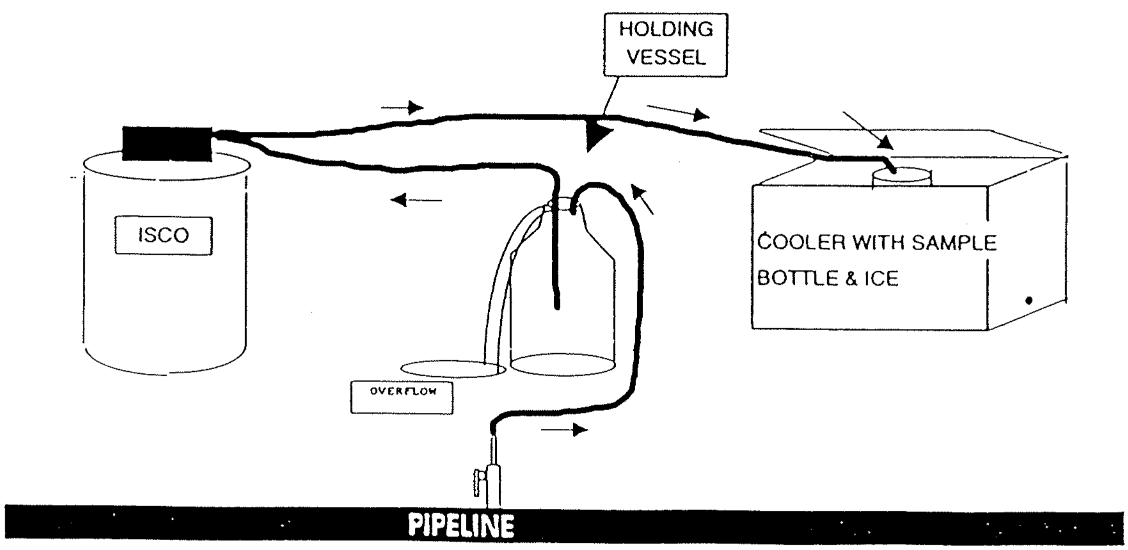
4. Periodically check that the sampler is working properly and the sample has sufficient ice around it to keep it cool.

FIGURE 1

Setup for Composite Sampling using and ISCO Automatic Sampler

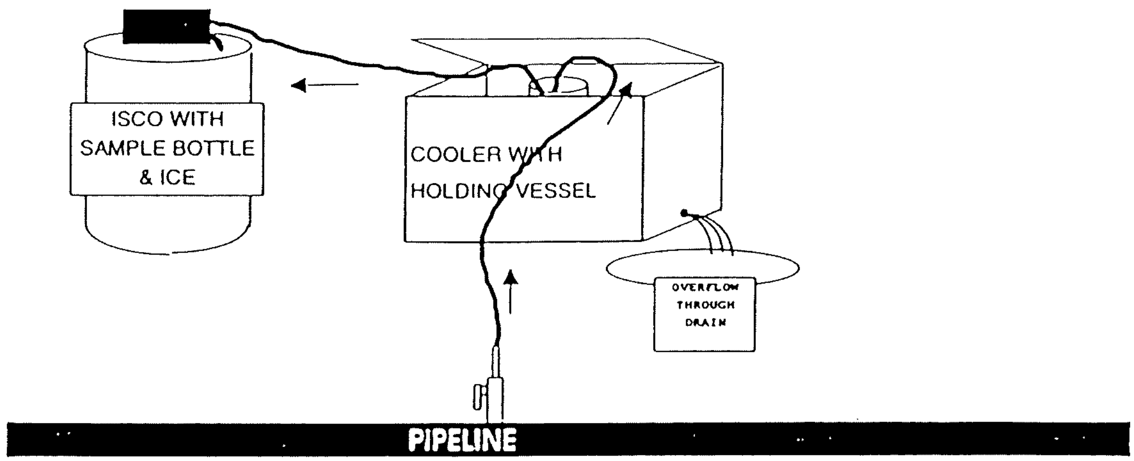


Indoor setup with supplied sample container

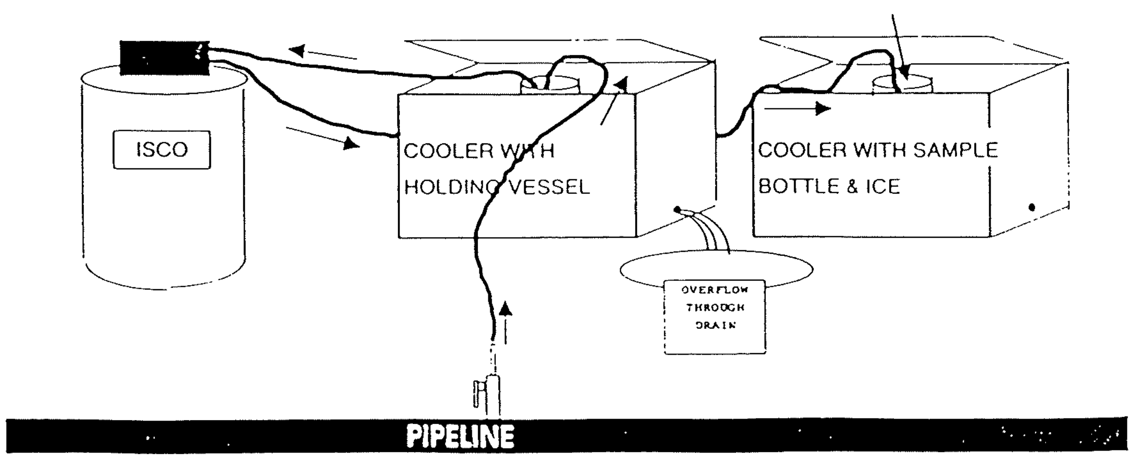


Indoor setup with large volume sample container external to the ISCO unit

Setup for Composite Sampling using and ISCO Automat'c Sampler



Outdoor setup with supplied sample container



Outdoor setup with large volume sample container external to the ISCO unit