MILLER SPRINGS REMEDIATION MANAGEMENT, INC.

LOVE CANAL SITE

COLLECTION AND AQUEOUS PHASE LIQUID (APL) TREATMENT SYSTEM

OPERATION AND MAINTENANCE MANUAL

Love Canal Site
Niagara Falls, New York

Reprinted November 13, 2002

Glenn Springs Holdings, Inc.
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November 13, 2002

Mr. Abul Barkat, P.E.
NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation, Region 9
270 Michigan Avenue
Buffalo, NY 142032999

Re: Love Canal Site $932020, Treatment Facility
Operation and Maintenance Manual, October 2002, Revised

Dear Mr. Barkat:

Enclosed please find three revised copies of the final version of the Love Canal Site, Collection and Aqueous Phase Liquid (APL) Treatment, Operation and Maintenance Manual. I inadvertently left out three exhibits: Exhibit E, City of Niagara Falls Discharge Permit No. 44; Exhibit H, Procedures Index; and Exhibit I, Owner's Manuals Index.

Sincerely,

Jeri Wash

Jennifer Wash
Administrative Assistant

:jlw
Enclosures
Cc: Mr. Brian Sadowski – NYSDEC, Division of Environmental Remediation
Mr. Matthew Forcucci – NYS Department of Health
Mr. Donald Tubridy – Miller Springs Remediation Management, Inc.
Mr. Brian Downie - Miller Springs Remediation Management, Inc.
Mr. George Luxbacher - Glenn Springs Holdings, Inc.

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1.0 INTRODUCTION

This operating manual was prepared by Miller Springs Remediation Management, Inc. (MSRM), Glenn Springs Holdings, Inc. and their consultant, Conestoga-Rovers & Associates (CRA) for the Love Canal Leachate Treatment Facility (LCLTF). The LCLTF is located adjacent to the Love Canal Landfill.

This manual replaces a prior manual written by (CRA) in 1984 for the New York Department of Environmental Conservation (DEC) and revised by the DEC in 1988 and 1994. That manual consisted of three separate volumes:

Volume I	Operations & Maintenance Manual
Volume II	Equipment Lists & Operation/Maintenance Manuals
Volume III	Operation and Maintenance Procedures

Volume II was a compilation of individual manuals and has been integrated into the MSRM maintenance system; it no longer exists as a separate volume (an index of the manuals is provided in Appendix I). Volume III consisted of O&M procedures for specific unit operations. These procedures have been reviewed and incorporated as MSRM LCLTF operating procedures. These procedures augment this O&M Manual but are no longer included as a separate volume. (A list of the procedures is included in Appendix H.)

The Love Canal Treatment Facility is located in the southeast corner of the City of Niagara Falls, New York, and is approximately one-quarter mile north of the Niagara River. Operations at the Site involve collecting and treating of leachate, sediment, and non-aqueous phase liquids (NAPL) collected from the landfill for subsequent disposal.

Remedial operational responsibility has been assigned by Occidental Chemical Corporation (OCC) to Miller Springs Remediation Management, Inc. (MSRM), under contract supervision by Glenn Springs Holdings, Inc. (GSHI); both MSRM and GSHI are OCC affiliates. The on-site contact responsible for the management activities of the Leachate Treatment Facility at Love Canal is:

Miller Springs Remediation Management, Inc.
Don Tubridy
WNY Operations Manager
716-283-0112

1.1 PURPOSE AND SCOPE OF O&M MANUAL

The purpose of this operating manual is to provide operating personnel with:

- a description of the collection system;
- a description of the leachate treatment system;
- an understanding of the unit operations and control parameters inherent in system operation;
- the location of system start-up, normal operating and shutdown procedures; and
- the operator actions required in the event of alarm notifications.

The Love Canal Collection and Treatment Systems operate under the substantive provisions of the State of New York Treatment Storage and Disposal Facility Permitting Requirement Regulations (6 NYCRR 373). Within these regulations the Site fits two exemption categories:

- 373-1.1(d)(1)(iii), Storage of hazardous waste that is generated on-site in containers or tanks for a period not exceeding 90 days. Other than the storage of liquid hazardous waste over the designated sole source aquifers; and
- 373-1.1(d)(1)(xii), Elementary neutralization Units or wastewater treatment unit.

These exemptions require compliance with the following sections of NYCRR 373:

- Personnel Training (g)
- Preparedness and Prevention
- Contingency Plans and Emergency Procedures
- Use and Management of Containers
- Tank Systems

and:

- A label or sign stating "Hazardous Waste" must identify all areas, tanks, and containers used to accumulate hazardous waste. In addition, tanks and containers must be marked with other words to identify their contents.
- Each container is properly labeled and marked according to sections 372.2(a)(5) and 372.2(a)(6) of this title.
- The date on which the container is full is clearly marked and visible for inspection on each container.

Additionally MSRM complies with other applicable law governing the identification and handling of hazardous wastes including but not limited to:

- 6NYCRR 370 Hazardous Waste Management System: General
- 6NYCRR 371 Identification and Listing of Hazardous Wastes
- 6NYCRR 372 Hazardous Waste Manifest System
- 6 NYCRR 376 Land Disposal Restrictions

These regulations are referenced in the appropriate sections of the manual.

As previously noted, equipment operating procedures and manuals provided by the manufacturers or suppliers have been integrated into the MSRM maintenance system, and are maintained in the Love Canal File Room in the Administration Building. As-built drawings for various sections of the site are also on file in the Love Canal File Room.

A thorough review and understanding of this manual and other designated reports is essential for safe, environmentally sound, efficient operation of the facility. Designated reports consist of the following:

- Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual (this report);
- Love Canal Long Term Monitoring Manual; and
- Health and Safety Plan, including a Contingency Plan/Emergency Response Plan.

The "Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual" will be updated as significant modifications are made to the system. A formal internal review of the Love Canal Collection and Leachate Treatment System will be performed a minimum of every five years. Revisions of the manual will be distributed to the Site and appropriate operating personnel.

1.2 DEFINITIONS

A brief description of terms used in this manual follows:

APL	Aqueous Phase Liquid
CRA	Conestoga-Rovers & Associates
DCF	Dewatering Containment Facility
DEC	New York State Department of Environmental Conservation
EPA	United States Environmental Protection Agency
FRP	Fiberglass Reinforced Plastic
GPM	Gallons Per Minute
GSHI	Glenn Springs Holdings, Inc.
HMI	Human Machine Interface
LCLTF	Love Canal Leachate Treatment Facility
MCC	Motor Control Center
MSRM	Miller Springs Remediation Management, Inc.
NAPL	Non-Aqueous Phase Liquid
OCC	Occidental Chemical Corporation
PC	Pump Chamber
PID	Proportional-Integral-Derivative
PLC	Programmable Logic Controller
RCRA	Resource, Conservation, and Recovery Act
ROD	Record of Decision
TDH	Total Dynamic Head

TOC	Total Organic Carbon; a standard measure of the organic contaminant level of a wastewater.
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound; an organic compound with a high vapor pressure. Typically the compound evaporates at relatively low temperatures.
WAN	Wide Area Network

1.3 BUILDING AND EQUIPMENT NOMENCLATURE

The equipment and buildings listed below are discussed in the "Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual".

1.3.1 BUILDINGS

A list of the buildings is as follows:

- Administration Building
- Treatment Building
- Drum Barn

1.3.2 SPILL CONTAINMENT AREAS

A list of the spill containment areas is as follows:

- Treatment Building
- Loading Pads
  - East Adjacent LCLTF (Carbon Loading)
  - South Adjacent LCLTF (Sludge Loading)
- Sludge Storage Dike

- Drum Barn

1.3.3 VESSELS

A list of vessels is as follows:

- Raw Water Tank (LC-106)
- Filter Feed Tank (LC-107)
- Sludge Holding Tank (LC-105)
- South Sector Collection System Storage Tank (PC3) (LC-201)
- North/Central Sector Collection System Storage Tank (six chambers) (PC3A) (LC-211)
- Clarifier (LC-101)
- Bag Filter No. 1A (LC-102A)
- Bag Filter No. 1B (LC-102B).
- Bag Filter No. 2A (LC-103A)
- Bag Filter No. 2B (LC-103B)
- Carbon Tank V-1 (LC-131)
- Carbon Tank V-2(LC-132)
- Carbon Transfer Tank V-3 (LC-133)
- Sludge Storage Tank No. 1 (LC-141)
- Sludge Storage Tank No. 2 (LC-142)
- Sludge Storage Tank No. 3 (LC-143)
- Sludge Storage Tank No. 4 (LC-144)

2.0 SITE DESCRIPTION

2.1 HISTORY

The Love Canal was one of two initial excavations designed to provide inexpensive hydroelectric power for industrial development around the turn of the 20th century. Between 1942 and 1952, Hooker Chemical and Plastics Corporation (now Occidental

Chemical Corporation) disposed of over 21,000 tons of various chemicals into Love Canal. The solid and liquid wastes deposited into the Canal include acids, chlorides, mercaptans, phenols, toluenes, pesticides, chlorophenols, chlorobenzenes, and sulfides.

The remedial program at Love Canal has been extensive. Construction was initiated in 1978 for a project designed to contain leachate migration from the Canal; this project involved the operation of two temporary leachate treatment plants. The permanent treatment plant has been in operation since December 7, 1979. A forty-mil synthetic membrane cap was installed in 1984 to decrease infiltration over the Canal and to enhance inward migration of groundwater from the surrounding area.

In October 1994, a Consent Judgement between Occidental Chemical Corporation (OCC) and the State of New York was approved by the court. This judgement discussed required operation and maintenance activities for the Love Canal Site. Responsibility for site operations and control passed from NYSDEC to OCC on January 5, 1995. On January 12, 1995, the NYSDEC reclassified the site to a Class 4 site.

Since initiation of remedial activities, responsibility for operation of the Site has been transferred from OCC to Miller Springs Remediation Management, Inc. (MSRM), a Glenn Springs Holdings, Inc. (GSHI) affiliate.

2.2 SITE BACKGROUND

2.2.1 SITE DESCRIPTION

The Site occupies approximately 70 acres in the southeast corner of the City of Niagara Falls and is approximately one-quarter mile north of the Niagara River. The location of the Site is shown on Figure 2.1, and the site plan is shown on Figure 2.3. The Site is bounded by Colvin Boulevard to the north, 95th Street to the west, Frontier Avenue to the south, and 100th Street to the east.

2.2.2 SITE GEOLOGY

The geology of the Site, with increasing depth below ground surface, is as follows:

- Fill (1.8 to 2.5 feet thick outside of the Canal and 10 to possibly 35 feet within the Canal), overlying.
- Alluvium (1.5 to 3.7 feet thick), overlying.
- Clay (13.5 to 23.0 feet thick), overlying.
- Till (at depth of 19 to 27 feet), overlying.
- Lockport Formation Bedrock.

The Site geological column is shown on Figure 2.2.

The first bedrock unit in this area is the Lockport Formation, ranging in thickness from 160 to 180 feet from the north to south. The Lockport Formation is a dolomitic rock grouping consisting of several discrete rock units, the uppermost and largest being the Oak Orchard Member. The Eramosa, Goat Island, Gasport, and Decew Members directly underlie the Oak Orchard Member.

The Clinton Formation lies beneath the Lockport Formation and is a primarily limestone rock grouping generally about 100 feet in thickness. The major rock unit within the Clinton Formation is the Rochester Shale Member, which is about 60 feet in thickness. The Rochester Shale is a regionally present vertical barrier.

The Irondequoit and Reynales Members are lower portions of the Clinton Formation that lie directly beneath the Rochester Shale Unit.

2.2.3 SITE HYDROGEOLOGY

Due to the primarily clayey nature of the subsurface soils at and surrounding the Love Canal, there is very little overburden groundwater movement. The clays act as an aquitard and restrict vertical and horizontal groundwater migration. The measured hydraulic conductivity of the clay layer is on the order of 1×10^{-8} cm/sec. There is a perched water table in the thin alluvium layer overlying the clay. However, this layer is very shallow and would be expected to respond to seasonal variations fairly quickly (i.e., wet in rainy periods and drier in hot dry weather). The hydraulic conductivity of the alluvium layer is estimated to be on the order of 1×10^{-4} cm/sec.

The fill layer within the Canal would typically be saturated due to the excavation into the tight clay and the more permeable nature of most fill materials. In essence, prior to remedial construction, the Canal acted as a "bathtub". Surface water would enter the Canal through areas of the soil cap layer removed by construction of the 99th Street School and other residential activities. The Canal would fill with water to the top of the clay layer and spill over the edges into the adjacent fill and alluvium layers carrying chemicals that came in contact with the water.

The clay/till layers beneath the Canal act as an aquitard and have prevented chemicals from seeping from the Canal into the underlying bedrock. This is evident from the ongoing hydraulic and chemical monitoring performed at the Site.

The bedrock hydrogeologic description is obtained from the results of investigative activities performed at the 102nd Street Landfill Site, located immediately south of the Canal.

The Bedrock is comprised of several bedrock stratigraphic units. The uppermost Bedrock formation encountered is the dolomite of the Oak Orchard Formation, which is massive and dense. Although some porosity and permeability is present within the rock mass, the majority of the porosity and permeability occurs along fracture surfaces, bedding planes, partings and joints. Distribution of these features is irregular and unpredictable. The nature of the Bedrock is also evidenced by the wide range of hydraulic conductivities determined by the in situ response tests. These values vary between 6.9×10^{-6} and 9.4×10^{-2} cm/sec. The geometric mean hydraulic conductivity is 1.0×10^{-3} cm/sec.

The groundwater flow is toward the Niagara River with a very shallow gradient.

Waterbearing zones exist only within the upper portion of the Oak Orchard Formation. No waterbearing zones were found at depth. In fact, no waterbearing intervals were found below a depth of 75 feet into the Bedrock.

3.0 COLLECTION SYSTEMS

The Remedial Site systems, designed to prevent the off-site migration of chemical contaminants from the Site, began in October 1978 with the installation of a barrier drain

along the east and west sides of the south section of the Canal followed later with the central and north sections. The Barrier Drain and associated Collection System are described schematically on Figure 3.1.

Start-up and shutdown procedures for the collection system are maintained in the MSRM LCLTF operating procedures. The following is a detailed description of the components of the Collection System.

The remedial collection systems for the Site are the systems defined in the 1987 Record of Decision (ROD) and the Consent Judgement from 1994. These systems have been periodically modified to attain the objectives of the ROD. Presently, the remedial collection system is composed of the following programs:

- Barrier Drain System (Section 3.1)
- Collection System (Pump Chambers) (Section 3.2)
- Long Term Monitoring Wells

The remedial program for Love Canal was executed in a phased approach and divided into two segments: the southern sector and the central/northern sectors. These segments were designed and constructed as discrete systems and interface only at certain points.

The objectives and current components of the programs are discussed below.

3.1 BARRIER DRAIN SYSTEM

The barrier drain system surrounds Love Canal and is intended to intercept the shallow lateral groundwater flow and maintain an inward gradient towards the barrier drain, thus containing any lateral migration of chemically contaminated groundwater (leachate) emanating from the disposal area. It consists of a trench that is 15 to 25 feet deep (into the till, about 2-3 feet above the bedrock) and 4 feet wide surrounding the Love Canal site. Installed within the trench is either a 6-inch or an 8-inch diameter perforated vitrified clay tile drain pipe centered in 2 feet of uniformly sized gravel (or crushed stone) which is overlain to the surface with coarse sand. Migrating leachate is intercepted by the highly permeable granular fill in the trench and collected in the

perforated pipe. Lateral trenches filled with sand were dug perpendicular to the barrier drain in the direction of the Canal at select locations. The total Love Canal barrier drain system consists to 6,800 feet of collection tile; the system also includes an additional 2,100 feet of laterals.

Pump chambers, located at low points on the gravity drain lines, collect the flow of leachate. The leachate collected in these chambers is intermittently pumped to large underground holding tanks (see the following section). Leachate can then be transferred on demand to the treatment facility by pumping from the storage tanks.

A conceptual cross section of the Barrier Drain System is provided as Figure 3.2.

3.2 COLLECTION SYSTEM (PUMP CHAMBERS)

3.2.1 PROCESS DESCRIPTION

The collection system consists of two sectors, the Northern/Central (PC3A) and the Southern (PC3) Collection Systems. The pump chambers in the Southern Collection System sectors were originally designed to utilize a wet well (manhole) providing leachate storage capacity with an adjacent dry well containing a self-priming horizontal end suction lift pump. MSRM has replaced all the suction lift pumps with submersible pumps and the dry wells are no longer utilized. The Northern/Central collection system was originally designed (and continues to operate) with two Gould's 3171 vertical pumps at all wet pump chambers (1A, 2A & 3A).

In both the Northern/Central and the Southern Collection System the leachate flows by gravity from the Barrier Drain System to the Pump Chambers. The leachate is then pumped to the two underground holding tanks where it is pumped to the process Raw Water Tank on demand.

A typical pump chamber detail is provided as Figure 3.3. (For details on specific pump chambers, see the drawings on file in the Administration Building file room).

3.2.1.1 SOUTHERN COLLECTION SYSTEM

The tile drain is graded for gravity flow toward a series of pump chambers (manholes) where the leachate is collected: on the east to Manhole 7 and Pump Chamber 1 (PC-1) and on the west to Manhole 8 and Pump Chamber 2 (PC-2). Each pump chamber has a 1,500 gallon leachate storage capacity. The leachate is pumped from the manholes through a 4"-diameter furan-coated steel forcemain to an underground holding tank. PC-3 South, located on the west side of the Canal where leachate is held prior to being pumped on demand (through a 4"-diameter furan-coated steel forcemain) to the treatment facility. Pump Chamber 3 also accepts water from the 102nd Street Landfill. Pump Chamber 3 is vented to atmosphere through a carbon Vent Sorb drum to remove VOC emissions.

3.2.1.2 NORTHERN/CENTRAL COLLECTION SYSTEM

The tile drain is graded for gravity flow toward a series of pump chambers where the leachate is collected: on the east to PC-1A and on the west to PC-2A. Each pump chamber has a 1,100 gallon leachate storage capacity. The leachate from PC-1A is pumped across the Canal through a 4-inch diameter furan-coated steel forcemain, which discharges into an 8-inch diameter vitrified clay sewer line adjacent to PC-2A. The leachate from PC-2A is also pumped from the well into the adjacent sewer line. The leachate in the sewer line gravity flows to an underground holding tank located east of the LCLTF where it is held prior to being pumped through PC-3A to the treatment facility. PC-3A also accepts water from the DCF, the sump in the drum barn, the floor drains within the treatment facility, and the two loading pads adjacent to the LCLTF (the sludge storage tank loading area and the carbon trailer loading pad). PC-3A is vented to atmosphere through a carbon Vent Sorb drum to remove VOC emissions.

3.2.2 EQUIPMENT DESCRIPTION

The Northern/Central Collection Holding Tank is a 30,000 gallon concrete holding tank with an 8-foot width, 12-foot length, and 6-foot depth. This tank is constructed from six individual 5,000 gallon tanks connected by furan-coated steel pipe. PC3A is connected to the storage tank by three 4-inch diameter furan-coated steel pipes and has the same liquid level as the tank. PC3A is designed to overflow to Manhole No. 8 (PC2) in the

South Sector (via manholes MH-2, MH-4, and MH-6 of the west manhole collection system) where the leachate will be contained if the capacity in PC3A is exceeded.

The Southern Collection Holding Tank is constructed of furan-coated steel with a 25,000-gallon capacity. This cylindrical tank (former rail tank car) has an 11-foot diameter and a 34-foot length. Pump Chamber 3 is located south of and adjacent to the storage tank.

In the Northern/Central Collection System, the three pump chambers (PC-1A, PC-2A and PC-3A) each hold two Goulds vertical pumps (Model 3171ST). These pumps are rated at 50 gpm @ 35 TDH. The pumps operate on an as needed basis (individually or simultaneously).

In the Southern Collection System, the pump chambers, PC1 and PC2, each hold one Gorman-Rupp pump (Model S2B65-E2). These pumps are rated at 100 gpm @ 40 TDH. Pump Chamber 3 holds two submersible Homarail pumps (type CH44SE3/2DEX); these pumps are each rated at 50 gpm @ 50 TDH. The pumps operate on an as needed basis (individually or simultaneously).

There are two pump stations associated with the DCF. One is located at manhole 6B (MH6B), and one is located at the Underground Storage Tank (UST). MH6B or pump chamber #3 houses a Flygt explosion-proof submersible pump (2hp, 1750 rpm, 460 volt, 3 phase, 60 Hz) which is rated at 40 gpm @ 25 TDH. From MH6B the water is pumped to MH7 where is gravity flows to a 10,000 gallon UST. The UST or pump chamber #4 houses a Weil stainless steel vertical sump pump, which pumps the water to PC3A.

Water is also collected in a grated trench surrounding the drum barn. A trench also runs through the middle of the drum barn. This trench empties into a sump outside and adjacent to the drum barn. The sump houses duplex submersible pumps (2hp, 460 volt, 3 phase, 60 Hz) which are rated at 30 gpm @ 30 TDH. These pumps pump the water to PC3A.

3.2.3 INSTRUMENT/CONTROL OVERVIEW

All pump chamber pumps may be operated in either automatic or manual mode. For manual control, the remote switch at the pump must be set in the HAND position. For automatic control, this switch must be set to AUTO.

Automatic operation also requires that the pump be set to ENABLE at the Intellution Human-Machine Interface (HMI). When the remote switch is in AUTO and the HMI control is set to ENABLE, the pump will be controlled directly through the Programmable Logic Controller (PLC). When the water level reaches a pump start (high level) permissive elevation, the pump chamber pump energizes and begins operation. The pump will shut down when the pump stop (low level) permissive elevation is reached. These start/stop permissives are also set on the HMI screen by the operator.

In addition to the start/stop elevation control, the PLC also monitors downstream levels in the system to prevent system overflows. For example, both Pump Chambers 1A and 2A pump into chamber 3A. Therefore, the operator must set level permissives at the HMI which allow the pumps in chambers 1A and 2A to operate only if the level in 3A is not above the operator selected setpoint. This same level permissive requirement is required for the pumping of Manholes 6 and 7 (Pump Chambers 1 and 2) to Pump Chamber 3 and the pumping of Pump Chamber 3A and 3 to the process Raw Water Tank.

The two pumps in the DCF run off of two level switches in their respective pump chambers. The pumps start at the high level permissive switch, and pump down to the low level permissive switch. The flow from the DCF is measured with an ultrasonic flow meter, which is displayed on the DCF control panel on the northwest corner of the control room and on the HMI. The pump status for each pump and high level alarms from high level switches in each of the pump chambers is also displayed on the HMI.

The two pumps in the drum barn run off of three level switches in the sump. The pumps stop at the low level permissive switch, which is at the lowest point in the sump. As the water rises to the high level permissive switch, the primary pump will turn on. If the level continues to rise to the next level switch (second pump level permissive) the second pump will turn on. The pumps will continue to run until the level reaches the low level permissive. At this point, the pumps will alternate, and the primary pump will become the secondary pump for the next cycle. A sump high level alarm from a fourth level switch in the sump is displayed with an audio and visual alarm on the local control panel. The two switches for the pumps at the panel must both be in the ON position in order for the pumps to operate.

Normal operating permissive levels for the pumps in the collection system are listed in Appendix F.

4.0 LEACHATE TREATMENT SYSTEM

The treatment process, shown schematically in the Process Flow Diagram (PFD) and the Process and Instrumentation Diagrams (P&IDs) (located in Appendix C), consists of several process steps for the removal of various constituents prior to discharge into the City of Niagara Falls Sanitary Sewer System. The primary steps in the treatment process are process feed, clarification, filtration, and carbon treatment (Figure 4.1).

The Raw Water Feed Pump pumps leachate to the Clarifier from the Raw Water Tank for the first stage of solids removal. Leachate overflows from the Clarifier to the Filter Feed Tank and is then pumped to the series of bag filters.

After solids removal using the clarifier and the bag filters, the flow stream enters a train of two carbon beds in series. The carbon system is utilized to reduce the concentration of organic contaminants to below required discharge limits. After passing through the carbon beds, the water is directed to the City of Niagara Falls Sanitary Sewer System and ultimately the City of Niagara Falls POTW. (see Appendix E for a copy of the Discharge Permit).

To bring the treatment system on-line, both treatment system pumps (Raw Water Feed Pump and Filter Feed Tank Discharge Pump) must be enabled by pushing the PROCESS START button located on the HMI screen. The discharge valve (FCV-107) is opened automatically when the PROCESS START button is pressed. This can also be done manually at the valve or by pushing the VALVE OPEN button that is also located on the HMI screen. Treatment system pumps may be operated manually without selecting PROCESS START or opening the discharge valve.

The facility contains a solids handling system to handle solids generated during settling in the clarifier. Solids removed in the clarifier are transferred to the Sludge Holding Tank. Excess water throughout the solids handling system is returned to the system at the Filter Feed Tank. Solids removed from the Sludge Holding Tank are disposed of off-Site.

The treatment facility also has a vapor carbon adsorption system for the treatment of vent gases from process equipment.

Start-up and shutdown procedures for the treatment system are maintained in the MSRM LCLTF operating procedures.

4.1 RAW WATER TANK

4.1.1 PROCESS DESCRIPTION

The Raw Water Tank, located within the Treatment Building, collects leachate through a 4"-diameter forcemain from Pump Chambers 3A and 3. The Tank is vented through a vapor carbon drum to prevent any organic vapors (VOCs) from escaping into the Treatment Building. Leachate is then transferred from the Raw Water Tank to the Clarifier via the Raw Water Tank Discharge Pump.

4.1.2 EQUIPMENT DESCRIPTION

The Raw Water Tank is constructed of fiberglass with a diameter of 12 feet and a height of 7 feet. The tank has a capacity of 5,940 gallons.

The Raw Water Feed Pump which pumps from the Raw Water Tank to the Clarifier is a Goulds 3196STX model 2x3-6 capable of pumping 150 gpm @ 115 TDH. The pump is controlled with a Variable Frequency Drive (VFD).

4.1.3 INSTRUMENT/CONTROL OVERVIEW

The influent flow to the treatment system is monitored with a flow indicator and transmitter. This flow is monitored using flow transmitter FIT-106 and is displayed both locally and on the HMI screen. The flow transmitter is also used to control the flow rate into the treatment system using flow control valve FV-106. The system flow rate is selected on the HMI screen by the operator. Using this setpoint, the signal from the flow transmitter, and a proportional-integral-derivative (PID) control block, the PLC

continuously adjusts the flow control valve to maintain the flow setpoint. The valve will close completely if the PROCESS STOP button is selected from the HMI screen.

The Raw Water Tank is equipped with a level indicator and transmitter (LIT-1070) which monitors the depth of liquid within the tank. This level is displayed both locally and on the HMI screen. The level transmitter is also used to control the level in the tank using the Raw Water Feed Pump's VFD. Using a level setpoint of 50%, the signal from the level transmitter, and a PID control block, the PLC continuously adjusts the frequency of the pump to maintain the level setpoint. If flow to the process Raw Water Tank stops, and the tank level reaches 40%, the PLC will shutdown the pump to prevent any damage. The pump will also shutdown if the downstream level in the Filter Feed Tank (overflow from the Clarifier) rises above 70%. The pump will automatically restart when the Raw Water Tank level reaches 50% and the level in the Filter Feed Tank is below 60%. At this point, the PID block will adjust the pump frequency to maintain the 50% setpoint. This level control is only available if the process Raw Water Feed Pump selector switch is turned to AUTO. If the switch is turned to OFF, the pump can only be controlled manually using the variable frequency drive control, which is located in the MCC room, across from the control room. Manual control from the drive will also override any automatic controls, even if the switch is in AUTO. To switch from automated control (via the HMI screen and the PLC) to a manual control of the pump, toggle the F2 button on the VFD control pad located in the MCC room. The manual control mode will enable the pump to be turned on and off along with the ability to set the speed (0-60 hertz) at which the pump is to be operated. At zero (0) hertz the pump will be stopped, and at sixty (60) hertz the pump will operate at maximum capacity.

PID loops control the treatment pumps (Raw Water and Filter Feed Pumps) and the Influent Control Valve. Each piece of equipment is controlled by a different process variable. The position of the valve is based on flow rate into the system, and the speeds of the pumps are based on the level in their respective tanks. The pumps will stop and the valve will close if permissives in the system require them to do so, but the loops are independent from each other. However, if the flow into the system increases, the pump PID loops will compensate by increasing the frequency on the variable frequency drives. This will maintain the level in the tanks, and will compensate for the increased flow.

Level alarms are displayed on the HMI screen to alert the operator if the level in the tank exceeds the high setpoint, or the PLC receives a bad quality signal from the transmitter

for an extended period of time. A bad quality signal alarm occurs when the 4-20 mA signal from the transmitter is out of range.

The Raw Water Feed Pump is followed by a pressure gauge (remote read only). This gauge can be used to monitor pump performance and aid in troubleshooting any pump problems.

4.2 CLARIFIER

4.2.1 PROCESS DESCRIPTION

Leachate from the Raw Water Tank is pumped via the Raw Water Feed Pump to the Clarifier. The Clarifier is designed to facilitate the settling and the removal of solids, sludge and chemical precipitates from the leachate stream; the design retention time of the leachate stream is approximately two hours. Leachate flows over a weir and falls by gravity from the Clarifier to the Filter Feed Tank.

Solids are collected at the bottom of the Clarifier. The solids are then raked into sludge hoppers at the influent end of the tank by redwood collector flights driven by a one-quarter horsepower motor. The solids/NAPL sludge is transferred with the use of air from the treatment plant air compressor to a vacuum truck or the Sludge Holding Tank (which was designed to allow the sludge to thicken).

4.2.2 EQUIPMENT DESCRIPTION

The Clarifier is constructed of epoxy coated steel with a 15,633 gallon capacity as manufactured by Pure Stream, Inc.

4.2.3 INSTRUMENT/CONTROL DESCRIPTION

Sludge is transferred from the Clarifier to the Sludge Holding Tank at the operator's control using air from the air compressor. The operator can enable the sequence at the HMI screen to start the transfer of sludge.

4.3 FILTER FEED TANK

4.3.1 PROCESS DESCRIPTION

Leachate gravity flows from the Clarifier to the Filter Feed Tank. The Filter Feed Tank may also collect water from the Sludge Holding Tank based on system valving. From the Filter Feed Tank, water is pumped into the Bag Filters using the Filter Feed Tank Discharge Pump.

4.3.2 EQUIPMENT DESCRIPTION

The Filter Feed Tank is constructed of Fiberglass with a 9-foot diameter, a height of 6.5-feet, and a capacity of 2,910 gallons.

The Filter Feed Tank Discharge Pump is a Goulds 3196STX model 2x3-6 capable of pumping 150 gpm @ 115 TDH. The pump is controlled with a Variable Frequency Drive (VFD).

4.3.3 INSTRUMENT/CONTROL OVERVIEW

The Filter Feed Tank is equipped with a level indicator and transmitter (LIT-1080) which monitors the depth of liquid within the tank. This level is displayed both locally and on the HMI screen. The level transmitter is also used to control the level in the tank using the Filter Feed Tank Discharge Pump's variable frequency drive. Using a level setpoint of 50%, the signal from the level transmitter, and a PID control block, the PLC continuously adjusts the frequency of the pump to maintain the level setpoint. If flow to the Filter Feed Tank stops, and the tank level reaches 40%, the PLC will shutdown the pump to prevent any damage. The pump will automatically restart when the tank level reaches 50%. At this point, the PID block will adjust the pump frequency to maintain the 50% setpoint. This level control is only available if the Filter Feed Tank Discharge Pump switch is turned to AUTO. If the switch is turned to OFF, the pump can only be controlled manually using the variable frequency drive control, which is located in the MCC room, across from the control room. Manual control from the drive will also override any automatic controls, even if the switch is in AUTO. To switch from

automated control via the HMI screen and the PLC to a manual control of the pump, toggle the F2 button on the VFD control pad located in the MCC room. The manual control mode will enable the pump to be turned on and off along with the ability to set the speed (0-60 hertz) at which the pump is to be operated at. At zero (0) hertz the pump will be stopped, and at sixty (60) hertz the pump will operate at maximum capacity.

Level alarms are displayed on the HMI screen to alert the operator if the level in the tank exceeds the high setpoint, or the PLC receives a bad quality signal from the transmitter for an extended period of time. A bad quality signal alarm occurs when the 4-20 mA signal from the transmitter is out of range.

The Filter Feed Tank Discharge Pump is followed by a pressure gauge (remote read only). This gauge can be used to monitor pump performance and aid in troubleshooting any pump problems.

4.4 BAG FILTERS

4.4.1 PROCESS DESCRIPTION

The Filter Feed Tank Discharge Pump transfers water from the Filter Feed Tank to one of two series of Bag Filters. The Bag Filters are designed to capture any particles that were not removed from the leachate in the Clarifier, thus protecting the carbon bed. Particle loading in the carbon vessels will decrease the efficiency of the carbon to adsorb organic contaminants. From the Bag Filters, the leachate flows directly into the carbon beds.

4.4.2 EQUIPMENT DESCRIPTION

The Bag Filtration System consists of two parallel trains of GAF stainless steel bag filtration units (only one train is used at a time). Each train has two bag filter housings piped in series. Each housing holds a polypropylene bag filter rated at 50 microns.

4.4.3 INSTRUMENT/CONTROL OVERVIEW

Differential pressure transmitters are located around each train of bag filters. The differential pressure is displayed on the HMI screen. A high differential pressure drop across a running filter train of greater than 15.0 psi indicates the filter elements are plugging. This indicates that the operator is required to manually switch between the bag filter trains. The used filters are then drummed for disposal, and new filters are placed in the housings. The stand-by filters are then placed online, and the filters with the newly replaced bags are on standby.

Pressure gauges are also located at the inlet and outlet to each of the bag filter trains. This allows for local indication of the differential pressure.

4.5 LIQUID PHASE CARBON ADSORPTION

4.5.1 PROCESS DESCRIPTION

Leachate, now free of any solids, passes through a series of Carbon Beds. The Carbon Beds are designed to remove organic compounds from the leachate. The system consists of two carbon adsorbers in series, designated the lead and polish beds. The leachate enters the top of the first or lead adsorber and flows downward through the carbon bed; the surface area of the activated carbon adsorbs the organic chemicals in the leachate stream. The interstage water is collected in the bottom of the lead adsorber by an internal header system and conveyed to the top of the second or polish adsorber.

The quality of the leachate after the lead bed is monitored quarterly for phenol. A carbon change is required when the phenol sample shows evidence of significant breakthrough after the first interstage. The carbon bed monitoring sampling program is detailed in Section 6.3.1.

When breakthrough of phenol occurs, the spent carbon in the lead bed is replaced with fresh carbon, and the lead bed is then placed in service as the polish bed. The former polish bed becomes the lead bed. A third vessel, the Transfer Tank V-3, is maintained empty until a carbon change is required. This allows fresh carbon delivery to occur independently of the removal of the spent carbon. The spent carbon from the lead bed is either drummed, or transferred to a 30 cubic yard, HDPE container lined with a geo

mesh membrane. The container is equipped with drain plugs for dewatering. The spent carbon is then shipped off Site and incinerated.

Treated leachate gravity drains from the Carbon Adsorption System to the city sewer through an effluent valve and flowmeter,

4.5.2 EQUIPMENT DESCRIPTION

The Carbon Adsorption System, as manufactured by Calgon, consists of three epoxy lined carbon steel vessels designated V1, V2 and V3 (transfer storage). Each 8,000 gallon vessel has a capacity to hold 20,000 pounds of activated carbon.

4.5.3 INSTRUMENT/CONTROL OVERVIEW

To prevent over-pressurization, all vessels have a rupture disc with a pressure rating of 75 psi. All vessels also have remote pressure gauges to allow the operator to troubleshoot the process. A sight glass is available at all beds to aid the operator when transferring carbon.

The effluent valve will automatically open when the PROCESS START button on the HMI is pressed, and will close when the PROCESS STOP button is pressed. The effluent flow is displayed locally and on the HMI.

4.6 SOLIDS HANDLING

4.6.1 PROCESS DESCRIPTION

Due to the minimal amount of sludge accumulated, the sludge is generally removed directly from the clarifier sludge hopper. Sludge can be transferred to the Sludge Holding Tank from the Clarifier in the event sludge volumes increase. The outside Sludge Storage Tanks are not in service.

Sludge disposal is scheduled as needed by the Operator based on clarifier effluent quality. The operator determines that the clarifier effluent quality is deteriorating when

the duration between bag filter change-outs decreases. The frequent changing of the bag filters is a direct indication that the sludge in the clarifier needs to be transferred.

The Sludge/NAPL is removed with a vacuum truck. The sludge, after it has been transferred to the vacuum truck, will be allowed to settle. Any water will then be decanted off of the top of the sludge and recycled through the system for retreatment. After the sludge is dewatered, it is drummed for off-Site disposal. The quantity of sludge/NAPL shipped off-Site and the manifests are kept in the MSRM office. Date of shipment is documented on the manifest.

4.6.2 EQUIPMENT DESCRIPTION

The Sludge Holding Tank is an FRP 1,600 gallon tank. The tank has a 7-foot diameter and a height of 6-feet.

The Sludge Holding Tank Discharge Pump is a Warren Rupp Sandpiper diaphragm pump capable of pumping 90 gpm at pressures up to 125 psi. The pump uses air from the air compressor for operation.

The Sludge Storage Tanks are located South of the Treatment Building in an isolated diked area. There are four Sludge Storage Tanks. They are constructed of carbon steel, and have a capacity of 10,000 gallons. The tanks are a 10′ 6″ wide and 15′ long. There is a vacuum alarm system associated with the Sludge Storage Tanks. These alarms are displayed on a separate control panel on the southern wall of the control room. The alarms are not tied into the HMI since the Sludge Storage Tanks are currently not used.

Note: As stated above, the sludge storage tank system is not in service. The O&M Manual and Controls on the system will be modified before the system is returned to service, if needed.

4.6.3 INSTRUMENT/CONTROL OVERVIEW

The level in the Sludge Holding Tank is monitored using level transmitter LIT-1090. This level is displayed both locally and on the HMI screens. The Sludge Storage Tanks, if in use, may also have levels monitored via level transmitters LIT-1100, LIT-1120, LIT-1130, and LIT-1140. They may also be displayed both locally and on the HMI screens.

The Sludge Holding Tank Discharge Pump can be started by choosing the option to "Transfer Sludge to Sludge Storage Tanks" from the HMI "Sludge Transfer" Screen. Once the selection is made, the diaphragm pump will run. The pathway of the sludge can be followed by looking at the valving for each of the sludge storage tanks on the HMI screen. Closed valves are indicated in red and open valves are indicated in green.

4.7 VAPOR PHASE CARBON ADSORBERS

4.7.1 PROCESS DESCRIPTION

Vapor phase carbon adsorption is used for the removal of any volatile organics stripped from the water during tank breathing.

All indoor process tanks are connected to tank vent carbon adsorbers. The Raw Water Tank and the Clarifier both vent to a carbon drum. The Filter Feed Tank and the Sludge Holding Tank vent to the Clarifier. The Clarifier has a second vent, which discharges to a pair of carbon drums in parallel. The Filter Feed Tank and the Sludge Holding Tank are also tied to an accumulator. The Sludge Storage Tanks are all linked to their own individual vent carbon adsorbers. The carbon is replaced as necessary based on volatile organic monitoring. Spent vapor carbon is drummed in preparation for off-Site disposal.

4.8 WASTE DISPOSAL

4.8.1 SLUDGE DISPOSAL

Sludge collected either from the Clarifier or the Sludge Holding Tank is sent off-site for incineration. This is accomplished by transferring the sludge to a vacuum truck. Procedures detailing the sludge transfer process are available in the MSRM LCLTF Operating Procedures.

4.8.2 BAG FILTER DISPOSAL

Spent bag filters are drummed and coded as such, and then shipped off-Site for incineration.

4.8.3 MAIN CARBON

Spent carbon from the main adsorbers is drummed and/or bulk loaded into a 30 yard container and sent off-Site for incineration. Procedures detailing the carbon transfer process are available in the MSRM LCLTF Operating Procedures. An adsorber sequencing schematic is provided as Figure 4.2.

4.8.4 VAPOR CARBON DRUMS

Spent vapor carbon drums are sent off-Site for disposal.

5.0 CONTROL SYSTEMS

Love Canal Collection and Treatment Systems involve a variety of manual and automatic controls. As discussed in this Section, automatic controls turn on and off pumps, close valves, and act to provide safe, efficient operation of the collection and treatment systems. In addition, the control system initiates alarms and notifies personnel in the event of critical situations.

5.1 CONTROL COMPONENTS

5.1.1 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A programmable logic controller (PLC) is used as the primary control device. The PLC receives a series of digital inputs and analog inputs, and interprets them based on a written program. The PLC then sends a series of digital outputs and analog outputs to control pumps, valves, and a variety of other equipment. The PLC program is designed to operate the collection and treatment systems in a fail-safe manner. The PLC also serves to trigger alarms for the process.

There are seven PLCs which control the collection and treatment system at the Love Canal Site: one Allen-Bradley (A-B) SLC-505 (master PLC), one A-B SLC-504 (PLC for PC3) and five A-B Micrologix 1500. Of the seven PLCs there are six remote PLCs (one located at each of the pump chambers (PC1, PC2, PC3, PC1A, PC2A, and PC3A)), and

one master PLC located in the main control room. The remote PLCs control the equipment and monitor the conditions at their respective pump chambers. Data is passed from the remote PLCs to the master PLC and vice versa. The main PLC is connected to the HMI.

The 102nd Street PLC (A-B SLC-504) is tied into the Love Canal system at the PC3 PLC via a DH+ (Data Highway Plus) communication network.

System setpoints for the PLC program are detailed in Appendix F.

5.1.2 HUMAN MACHINE INTERFACE (HMI)

The PLC is tied in to an Intellution Human Machine Interface (HMI) software package that allows the operator to view the Collection and Treatment process from a computer screen. This system offers flexibility in process control and allows the operator efficient management of the collection and treatment processes. Alarms that are triggered by the PLC are displayed on the HMI screen.

In addition the interface allows the operator to change pertinent operational setpoints and enable/disable well pumps from the control room. System setpoints for the PLC program are detailed in Appendix F.

The operator is provided with all critical process information through the PLC/HMI interface. The HMI screen printouts are included in Appendix A.

The HMI prints a daily report detailing pumping volume for each well, average water level for each well, and process tank levels.

5.2 ALARMS

Alarms are set to advise the operator when conditions are not within the normal limits. The alarms are displayed on the HMI.

Appendix B provides a list of alarm messages for the Collection and Leachate Treatment Systems. These are the messages that will be displayed on the HMI alarm screen.

Potential operating problems and troubleshooting guides are detailed in Appendix G. (Control sequences described in Section 5.3 are meant to complement the troubleshooting section.)

5.3 OPERATIONAL CONTROLS AND SEQUENCES

The automated control of each piece of equipment is a combination of operational controls and sequences.

5.3.1 OPERATIONAL CONTROLS

Operational controls manage parameters that change within selected ranges during routine operation of a piece of equipment. These controls are typically used as part of the normal automated operation of the equipment. As an example, the level in a well is used to routinely start and stop a pump. In the Collection System, the pump chamber pumps are designed to operate in a routine manner without impacting critical alarms. Alarms are set to advise the operator when conditions are not within the normal limits.

The operator is provided with all critical process information in the control room. Equipment can be started and shut down from the control room through the HMI. The pump chambers demonstrate a type of operational control as follows:

5.3.1.1 PUMP CHAMBERS

The pump chambers all operate in a similar fashion. Each chamber is equipped with a variety of instrumentation to monitor and control operation of the pump.

The pump chambers are equipped with fixed level probes. If the HAND-OFF-AUTO switch local to the pump is in AUTO, the pump is enabled at the HMI, downstream levels permit pumping, and the level is above the high level setpoint, the pump will start. The pump will continue to operate until the level drops below the low level setpoint. The pump will also stop if the local switch is switched OFF, it is disabled

through the HMI/PLC or levels downstream are too high. The pump will continue to cycle on and off as the level in the pump chamber changes.

A more detailed description of the operational controls can be found in the Collection System and Leachate Treatment System sections above.

5.3.2 SEQUENCES

Sequences can be broken down into two types of sequences: routine and shutdown sequences.

Shutdown sequences are designed to provide failsafe operation of the treatment plant. Shutdown sequences are parameters or a series of parameters that indicate that equipment is operating out of normal limits or may be contributing to an undesirable condition. A shutdown sequence triggers an alarm and locks out the designated equipment without operator intervention. The equipment can not be restarted until an operator resets the shutdown sequence alarm.

When any of the shutdown sequences are tripped, an alarm statement will be posted on the HMI computer screen and specific automated control actions will occur.

Routine sequences are normal operating parameters or a series of parameters that define the normal operation of equipment. No alarms are associated with routine sequences.

Full shutdown and routine sequence descriptions are included in Appendix D. The system sequences are listed in the following two sections.

5.3.2.1 SHUTDOWN SEQUENCES

- Shutdown Treatment Plant: When the level in the floor drain is above the high level switch, the Treatment System will shutdown. The pumps that will be inhibited from running include the Raw Water Feed Pump, and the Filter Feed Pump. The above pumps will be enabled for normal operation when all applicable levels and conditions are cleared.

5.3.2.2 ROUTINE SEQUENCES

- Inhibit Manhole #7 Pump From Running
- Inhibit Manhole #8 Pump From Running
- Inhibit Pump Chamber #3 Pump A From Running
- Inhibit Pump Chamber #3 Pump B From Running
- Inhibit 102nd Street Well Pumps From Running
- Inhibit Pump Chamber #1A Pump A From Running
- Inhibit Pump Chamber #1A Pump B From Running
- Inhibit Pump Chamber #2A Pump A From Running
- Inhibit Pump Chamber #2A Pump B From Running
- Inhibit Pump Chamber #3A Pump A From Running
- Inhibit Pump Chamber #3A Pump B From Running
- Inhibit Raw Water Feed Pump From Running
- Inhibit Filter Feed Pump From Running

5.3.3 SEQUENCE OVERRIDE

The control system is not designed to permit a shutdown sequence override. If necessary, the system must be run in manual until the condition is corrected.

5.4 REMOTE ACCESS

The HMI system is part of a Wide Area Network (WAN) that connects several MSRM Sites. This network allows for full control and alarming capabilities of the Love Canal Collection System and the Love Canal Treatment Facility from any of the other connected MSRM Sites (Durez North Tonawanda, Hyde Park Landfill, and S-Area).

6.0 MONITORING

The operator is responsible for day-to-day operations of the facility including system monitoring, record keeping (records are maintained in the control room), and ensuring that potential problems are addressed through necessary maintenance. Monitoring requirements are described in general as follows:

6.1 ROUTINE OPERATIONS INSPECTION / MONITORING

The operator is responsible for day-to-day operations of the facility including system routine, preventive and required maintenance. These maintenance and monitoring procedures are designed to maintain compliance with the 5NYCRR 373-3.9 Container Management and 373-3.10 Tank Systems. Maintenance of the collection and treatment system components will be performed in accordance with the manufacturer's recommendations. Monitoring requirements and intervals are described subsequently in general.

6.1.1 DAILY INSPECTION / MONITORING

An inspection of system operation will be made on a seven day per week basis. This will consist of the following:

A) A visit to the site to perform an inspection, including viewing of the HMI data. The inspection should verify the operation of each component of the Collection and Treatment System.

B) Perform a visual check; walk through the entire treatment building and tank farm area; check for leaks, overflows, malfunctioning equipment or signs of vandalism. Document visual check and findings on daily inspection sheet and if needed forward any work orders to maintenance group.

C) Inspection of the Sludge Storage Tank Farm Dike for leakage into the secondary containment system.

D) Inspection of aboveground transfer lines and piping; includes inspection for leaks, corrosion, and excessive stress.

E) Inspection of process vessels and tanks; includes inspection for leaks, corrosion or cracks.

F) Check drum warehouse fuel oil storage tank and dike for leaks. Check stored drums for corrosion/leakage. Check sump levels.

G) Check security system. (administration building, treatment building, and drum barn)

H) Check telephone system for proper operation.

I) Check sample refrigerator for proper operations (4 degree C).

J) Check vehicles.

K) Check precipitation reading.

L) Inspect fence perimeter and signs for damage.

A sample inspection log used by the operator is provided as Figure 6.1. Repairs and/or replacements will be performed as necessary.

6.1.2 MONTHLY INSPECTION/MONITORING

The following will be performed on a monthly basis:

a. Inspection of Fire Extinguishers.

b. Check for breakthrough of carbon vent scrubbers (with HNU).

Repairs and/or replacements will be performed as necessary.

6.1.3 SEMI-ANNUAL INSPECTION/MONITORING

6.1.3.1 BARRIER SYSTEM/PUMP CHAMBER INSPECTIONS

An inspection of each pump chamber will be conducted semi-annually (spring and fall). This inspection will include:

A) Visual inspection of chamber piping.

B) Verification of level probe performance.

C) Inspection of pump chamber integrity.

D) Inspection of pump chamber security.

6.1.4 ANNUAL INSPECTION/MONITORING

6.1.4.1 BACK FLOW PREVENTER INSPECTIONS

An inspection of the backflow preventers will be conducted annually. The backflow preventers will be replaced as needed.

6.1.4.2 SLUDGE STORAGE TANK FARM CONTAINMENT DIKE INSPECTIONS

A Professional Engineer will assess the physical integrity of the containment dike. This inspection will identify any cracks, gaps or other structural anomalies that may impact the performance of the containment dike. The inspection reports are maintained in the Love Canal Landfill office.

6.2 ENVIRONMENTAL MONITORING

Every day an operator is required to verify operation of the components of the collection system. This is intended to verify that the well systems are providing adequate drawdown to provide containment of the various APL and NAPL plumes. This may be accomplished through either a visit to the site or examination of the HMI data through the WAN or dialup.

The Long Term Monitoring Wells are used to verify proper operation of the collection system. Well levels are taken quarterly, and wells are sampled for chemistry annually. The annual water chemistry sampling involves the sampling of wells that are sampled annually, wells that are sampled bi-annually, and wells that are selected by the DEC. These monitoring wells are in located in strategic areas that provide pertinent monitoring information regarding the contaminant plume within the site. A typical monitoring well detail is provided as Figure 6.2.

Additional monitoring of surface water, groundwater, groundwater levels, leachate, gas, or sediment is beyond the scope of this manual. Monitoring of these parameters is covered by the "Long-Term Monitoring Manual".

6.3 TREATMENT PERFORMANCE MONITORING

A performance log is printed out automatically by the HMI software every morning.

6.3.1 CARBON TREATMENT PERFORMANCE MONITORING

To ensure that organics are being removed by the Main Carbon Beds, samples are taken quarterly for phenol between, and after the beds, as summarized below.

ITEM/INDICATOR	*Criteria*	*RESPONSE(S) IF HI/LO*
Interstage: Phenol	> 10 mg/L	Schedule carbon change.
Effluent: Phenol	>1 mg/L	Process Shutdown.

6.4 ANALYTICAL PROGRAM

The effluent discharge criteria for the LCLTF has been established in accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code, Sewer Use Ordinance and The City of Niagara Falls Permit No. 44 for the facility. Periodic testing of the effluent discharge is required as summarized in the following section. In addition, MSRM and the City have agreed to cease discharge to the city sewer during high rain conditions to avoid overloading the system. The letter outlining this agreement is included in Appendix E.

6.4.1 SAMPLING SCHEDULE

SOURCE	*G-Grab C-Comp*	*ANALYSIS*	*FREQUENCY*	*REQUIRED BY*
Effluent (samples taken by City of Niagara Falls)	C	Soluble Organic Carbon	Annual	City Sewer Permit
Effluent	C	Flow*	Continuous	City Sewer Permit
		Soluble Organic Carbon	1/Quarter	City Sewer Permit
		Total Suspended Solids	1/Quarter	City Sewer Permit
		Volatile – Priority Pollutants	1/Quarter	City Sewer Permit
		Acid Extractable-Priority Pollutants	1/Quarter	City Sewer Permit
		Base/Neutral – Priority Pollutants	1/Quarter	City Sewer Permit
		Pesticides – Hexachlorocyclohexanes	1/Quarter	City Sewer Permit
		Total Phenols	1/Quarter	City Sewer Permit
Monitoring	G	Long Term Monitoring Well Levels*	1/Quarter	Consent Judgement
		Level Term Monitoring Well Chemicals	Annual	Consent Judgement

Samples go for off-Site laboratory analysis for all parameters except those marked with an asterisk "*", which are tested or measured on-Site.

6.4.2 REQUIRED EFFLUENT QUALITY

The effluent limitations specified in the facility's sewer discharge permit (44) from the City of Niagara Falls are as follows:

Parameter	Annual Ave. Limit	Daily Max. Limit	Units
Flow	0.3	0.3	MGD
TSS	6.25	16	lbs./day
Soluble Organic Carbon	50	75	lbs./day

7.0 SYSTEM UTILITIES

7.1 EMERGENCY SHUTDOWN

This process is designed to automatically shutdown in a safe manner in the event of an electrical utility failure. In the event of a power failure all process equipment will shutdown. The operating ranges for the treatment plant are set to accommodate any gravity drain that would occur on system shutdown.

7.2 UTILITIES

7.2.1 ELECTRICAL SYSTEMS

Treatment Plant

The power supply to the electrical room in the Treatment Plant is a 400 amp, 480 volt, 3 phase, 4 wire service from Niagara Mohawk on 95th Street. Electricity to all or parts of the treatment building can be shutoff in the electrical room across from the control room in the treatment building. The treatment building floor plan is shown on Figure 7.5. The electrical room includes the following equipment:

1. Main disconnect enclosure.
2. 400A/600V (3 phase, 4 wire) SN safety switch.
3. 400 A/600V power panel.
4. 75 KVA transformer (480V primary, 120/208V secondary).
5. 120/240V lighting panel.
6. High level interlock system fuse panel for process and sludge storage tanks plus motorized operated valve for sludge pump discharge.

7. 120/208V (3 phase, 4 wire) 225A main circuit breaker (Power Panel – A).
8. Clarifier motor disconnect and starter.
9. Dewatering Containment Facility Pump Station No. 3 disconnect and starter.
10. Dewatering Containment Facility Pump Station No. 4 disconnect and starter.
11. Security/Fire Logic Control Panel.
12. Variable Frequency Drives.

North, Central and South Sectors

The North, Central and Southern Sectors have power supplies that originate from the Treatment Facility's Electrical Room. A main distribution panel (277/480V) feeds a 75 KVA Transformer (480V primary – 120/208V secondary). From there a 3" diameter, 4-wire cable feeds Power Panel-A (PP-A). PP-A, located in the Electrical Room, has a 120/208 volt, 225amp main circuit breaker. PP-A feeds the MDCP pump logic controller, PP-N1 located at Pump Chamber 2A, PP-N2 located at Pump Chamber 1A, PP-C located at Pump Chamber 3A behind the Treatment Facility, PP-S1 located at Pump Chamber 2 and PP-S2 located at Pump Chamber 1.

7.2.2 PLANT WATER

City water enters the facility at the south end of the treatment building. A shutoff valve is located on the riser at this location. The water is supplied by a 4"0 connection to the 8"0 city main in 97th Street, and is used for carbon transfers, compressor cooling, personal hygiene and safety. A backflow preventer has been installed in this line.

This plant water system has an 80 p.s.i. service rating and is connected to the following by copper lines:

1. Two (2) stationary air compressors;
2. Electric water heater;
3. Washroom facilities; shower, sink, toilet and urinal;
4. Three (3) emergency shower and eyewash stations;
5. Hose used for washdowns;
6. Carbon service module;
7. Two (2) main back-flow preventers.

Schematic diagrams of the service module and water lines are provided on Figures 7.1 and 7.2.

Plant water, supplied to the service module by a 3"0 copper line, is flow and pressure regulated as detailed on Figures 7.1 and 7.2. Water from the module is used for the following carbon transfer operations:

1. Water rinsing of the spent carbon;
2. Preparing a carbon slurry in the hopper trailer;
3. Introducing water cushions to the carbon vessels;
4. Washing down the carbon heel from the adsorber, and transfer and delivery tanks.

7.2.2.1 SAFETY SHOWER SYSTEM

The emergency shower system is comprised of the three emergency shower and eyewash systems. The emergency shower and eyewash systems are fed by the city water lines. The following is a summary of the safety shower and eyewash station locations.

Station	Location
1	Treatment Building, northeast of the clarifier
2	Treatment Building, south of the clarifier
3	Drum Barn

7.2.3 NATURAL GAS

Natural gas enters the administration building at the southeast corner of the building, and enters the treatment facility in the compressor room. A meter and shutoff valve are located at both points, and are inspected annually by the gas company.

7.2.4 COMPRESSED AIR SYSTEM

The compressed air system consists of two (2) stationary Worthington compressors, a Model RS-25-100 and a Model Rollair 40-100, which are located in the compressor room next to the MCC room in the treatment building. The compressors provide air required

by the Sludge Holding Tank Discharge Pump, for transfer of sludge from the Clarifier to the Sludge Holding Tank (two (2) vacuum air-lift sludge lines), and for carbon changeouts. A Van Air refrigerated air dryer system dries the air prior to use in the system.

Because of the infrequent use, the Compressed Air System requires manual starting. Pressure gauges, switches, and temperature gauges function internally to protect the unit from over-pressurization.

Air is supplied on demand for the sludge pump and sludge transfer by copper lines pressurized to 100 p.s.i. The pressure in the air lines for carbon transfer is regulated by control valves and gauges on the service module.

The air module schematic and compressed air schematic are detailed on Figures 7.3 and 7.4.

7.2.5 HVAC

The electrical and mechanical rooms are heated by 500 and 1750 watt wall baseboard heaters respectively. Ventilating in the electrical and mechanical rooms is provided by a Penn Dome BB45 roof exhaust fan. A Penn Dome XQ60 roof exhaust fan provides ventilation for the washroom.

The plant area is heated by a Dravo Hastings LU-215 gas roof top unit. Temperature adjustment is accomplished by rotating a burner flame control at the unit. There is also a switch in the control room to change between summer and winter mode. The same area is ventilated by two (2) floor level exhaust fans located on the east and west walls of the bay area (each fan is rated at 1185 rpm at 4100 cfm). In addition, there are six (6) roof top fans. Three of the fans (rated at 1650 rpm and 795 cfm each) are connected to the raw tank, the clarifier/filter feed tank and sludge holding tank. These are two speed fans. The remaining three (3) fans are located on the roof at the south end, middle and southeast ends of the plant. These fans are rated at 475 rpm/9035 cfm, 945 rpm/4070 cfm, and 945 rpm/4070 cfm respectively. Exhaust fan and roof fan controls are located on the west wall of the air compressor room. Operation of fans during plant operations are detailed in the Operations and Maintenance Procedures.

8.0 REPORTS

8.1 QUARTERLY/ANNUAL REPORTS

The quarterly reports summarize the effluent sewer sampling that occurs. The quarterly reports are submitted to the City of Niagara Falls in accordance with the City of Niagara Falls Discharge Permit #44. Copies of the report are provided to DEC.

An Operations and Monitoring report is also issued with the annual report to the DEC to summarize the activities that occurred at the Site over the past year. This report includes:

- operations of the barrier drain and well collection systems;
- groundwater treatment including the treatment system, the effluent discharge, sampling, the annual precipitation and the quantity of sludge removed and sent off-Site to a permitted facility (noting location) for incineration;
- groundwater monitoring including groundwater quality, chemical monitoring, and hydraulic containment;
- process and non-process activities;
- community outreach including beautification, tours, and communications; and
- evaluation of overall performance and chemical containment.

The Love Canal annual report is submitted to the DEC pursuant to Section 2.C. of Appendix B of the Consent Judgement between OCC and the State of New York, effective October 7, 1994. It is a condensed version of the Operations and Monitoring Report, and covers those developments and activities that occurred throughout the calendar year. As per Section 4 of Appendix B of the Consent Judgement, MSRM makes the annual report available to the public at a location accessible to local residents. The annual report is also mailed to individuals on a regular short mailing list (not to exceed 50 copies). This list is maintained by MSRM.

Any other necessary recipients of the above reports are also maintained on the MSRM mailing list.

9.0 PERSONNEL

9.1 ORGANIZATIONAL CHART

The organizational structure for MSRM WNY operating personnel is posted in the Love Canal Control Room

9.2 STAFFING REQUIREMENTS

The Love Canal Collection and Treatment Systems is designed to operate with minimal staffing. The site is designed to operate automatically (unmanned) with the exception of routine inspections and maintenance activities. Due to the historically high visibility of operations at the Site, MSRM requires one operator to be on-Site while the Treatment System is in operation. MSRM has established its Western New York offices at the site, and numerous staff are at the site throughout each workday.

9.3 TRAINING

Training for the Operations Staff is covered in Section 4 (Training Program) of the "Site Specific Health and Safety Plan for Operation and Maintenance Activities at the Love Canal Treatment Facility". This Manual is kept in the Love Canal Control Room.

9.3.1 DETAILED JOB TRAINING

The on-the-job training required for a Love Canal Operator includes:

1. Review of other environmental and safety regulations applicable to operation of the Collection and APL Treatment Facility.
2. Detailed study and understanding of the "Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual".
3. Satisfactory performance of all required record keeping.
4. Demonstration of proficiency with Love Canal operating procedures.

9.3.2 TRAINING DOCUMENTATION

Upon completion of formal training to operate the facility, acknowledgement is documented on a sign-off sheet, Figure 9.1, and placed on file.

10.0 RECORDS

10.1 OPERATING INSPECTION

Operations inspection sheets are filed in the Love Canal Control Room. Operations logbooks are used to record activities performed while on-Site. Active logbooks are stored in the Love Canal Control Room. Logbooks are archived in the Love Canal files located in the office building.

10.2 MAINTENANCE/CALIBRATION

Maintenance and calibration records for each piece of equipment are filed in the Love Canal Control Room.

11.0 REFERENCES

11.1 LOVE CANAL DOCUMENTS

11.1.1 CONSENT ORDERS

- Partial Consent Decree – 1989; and
- Consent Judgement – 1994.

The above Consent Orders (Civil Action No. 79-990C) are between the United States of America, the State of New York, and UDC-Love Canal, Inc. (Plaintiffs), and Occidental Chemical Corporation, City of Niagara Falls, New York, and the Board of Education of the City of Niagara Falls (Defendants).

In 1995, GSHI/MSRM assumed responsibility for the O&M requirements set forth in the above Consent Orders.

11.1.2 MANUALS

- The following manuals can be found in the MSRM office building.
- Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual

11.1.3 HEALTH AND SAFETY

Site Specific Health and Safety Plan for Operation and Maintenance Activities at the Hyde Park Treatment Facility, Love Canal Treatment Facility, Durez North Tonawanda Treatment Facility, and Durez NT Inlet Cove. (Note: contains Contingency and Emergency Procedures as required under 6 NYCRR 373-3.4)

11.2 DRAWINGS

Process and Instrumentation Diagrams together with PLC Schematics for the Collection and Treatment System are attached as Appendix C. Significant equipment, instrumentation and process lines are depicted on these drawings as a reference for operating personnel.

11.3 EQUIPMENT VENDOR MANUALS

Manuals for individual equipment are stored in the Love Canal file room.

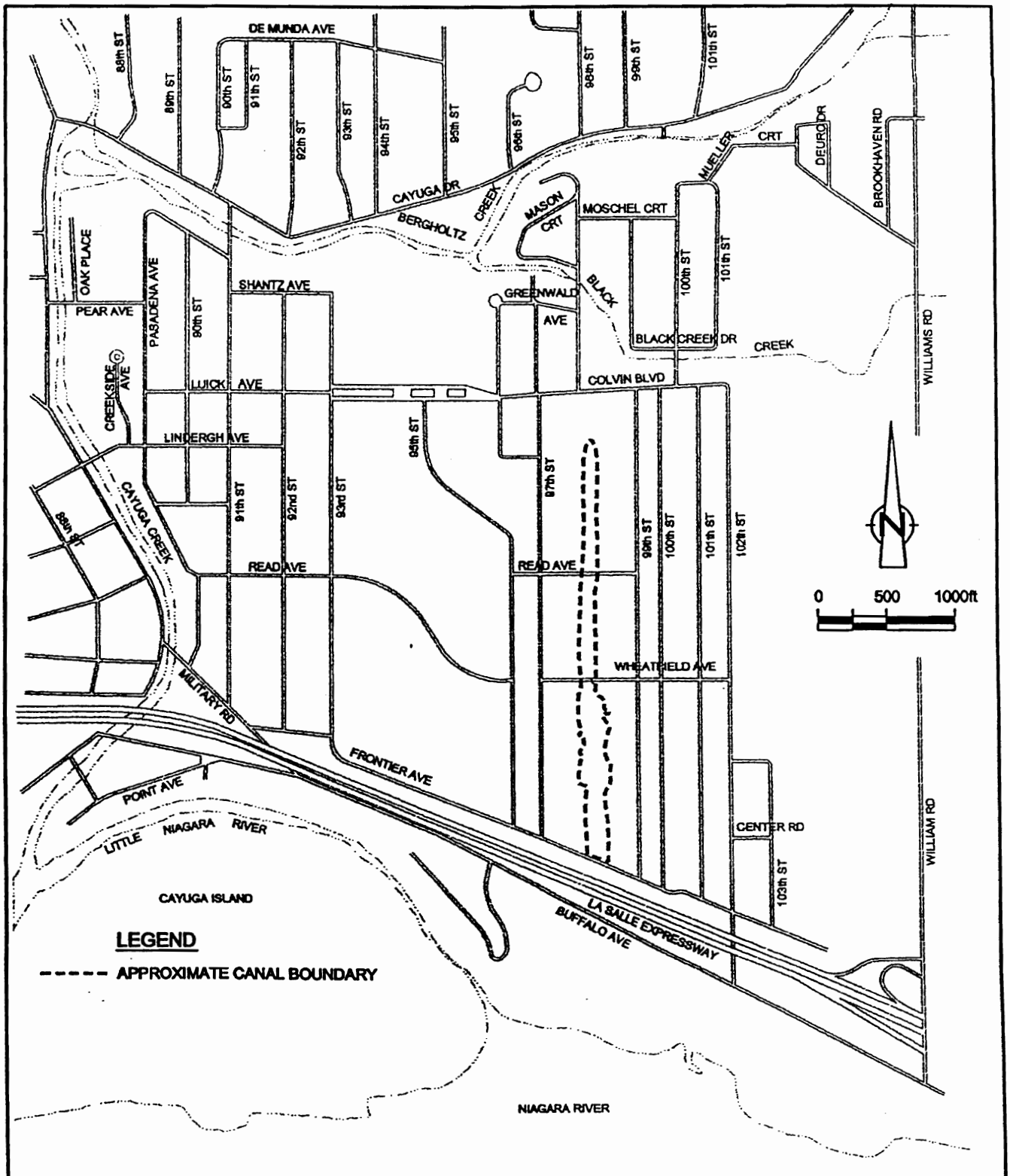


figure 2.1

SITE MAP
LOVE CANAL LANDFILL
GLENN SPRINGS HOLDINGS, INC.
Niagara falls, New York

09954-00(003)GN-NF006 DEC 12/2000

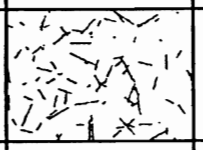
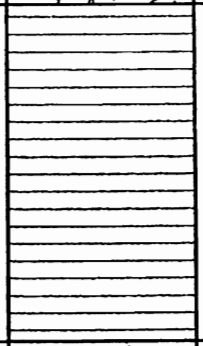
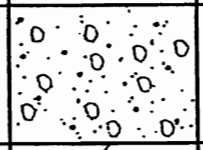
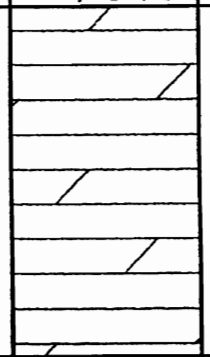
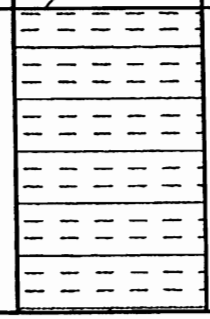
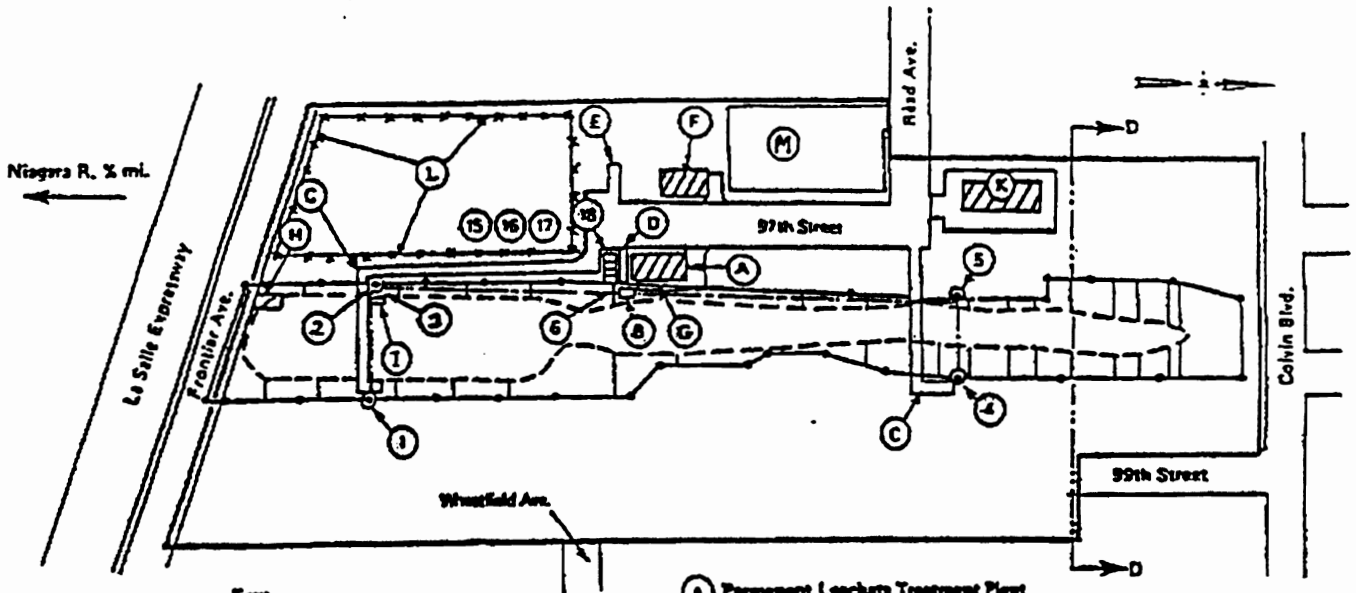
FORMATION	COLUMNAR SECTION	THICKNESS IN FEET	CHARACTER
FILL		0.1-3	LOCAL SOIL MATERIAL, INDUSTRIAL WASTE, CONSTRUCTION RUBBLE
GLACIOLACUSTRINE CLAY		6-29	REDDISH BROWN TO GRAY, SILTY, VARVED, IN UPPER PART GRADING TO VERY PLASTIC, MOIST TO WET, IN LOWER PART
TILL		1-25	REDDISH BROWN SILTY TO SANDY CLAY, GRAVEL AND COBBLES, SANDY ZONES, FIRM, MOIST
BEDROCK		160-180	LOCKPORT DOLOMITE
BEDROCK		~60	ROCHESTER SHALE

figure 2.2

SITE GEOLOGICAL COLUMN
LOVE CANAL LANDFILL
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York



Key:

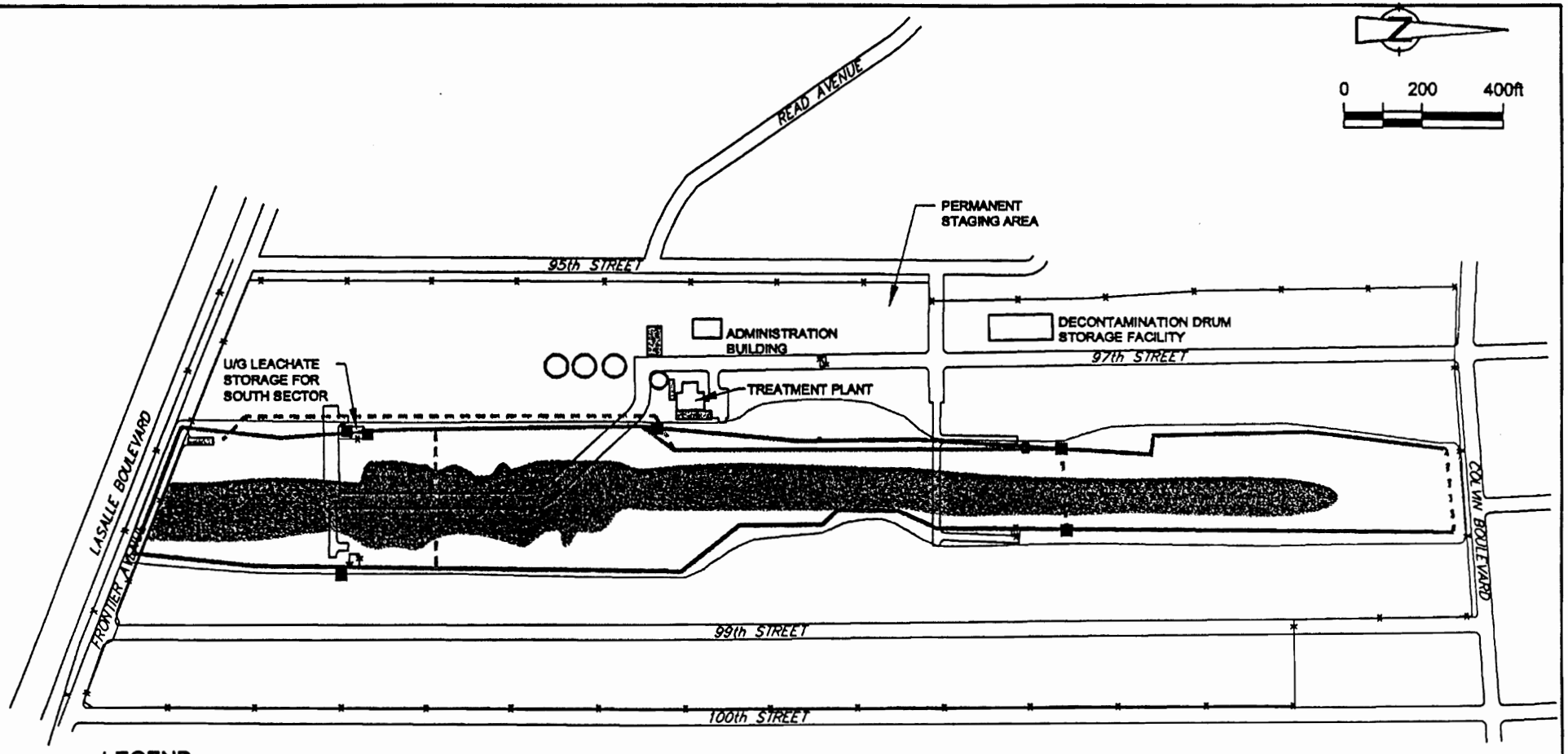
- Canal Boundary
- Barrier Drains, Laterals
- Forcemains
- Gravity Main—Parallels West Barrier Drain
- 8ft High Cyclone Fence
- Manholes
- Wetwells (with manholes)

(1) Pump Chamber No. 1 South Sector
(2) Pump Chamber No. 3 South Sector
(3) Pump Chamber No. 2 South Sector
(4) Pump Chamber No. 1A North Sector
(5) Pump Chamber No. 2A North Sector
(6) Pump Chamber No. 3A North Sector
(15)–(18) Sludge Storage Tanks

(A) Permanent Leachate Treatment Plant
(B) Underground Leachate Storage for North and Central Sectors
(C) Pump Access Road
(D) Concrete Pad
(E) Concrete Pad
(F) Administration Building
(G) Concrete Decontamination Pad
(H) Frontier Avenue Concrete Decontamination Pad
(I) Underground Leachate Storage for South Sector
(K) Drum Barn
(L) Dewatering Containment Facility
(M) Roll-off Staging Area

figure 2.3

SITE PLAN
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York



LEGEND

- FENCE LINE
- APPROXIMATE LIMITS OF DISPOSED WASTE
- PUMP CHAMBER
- SLUDGE STORAGE TANKS
- CONCRETE PAD
- PERFORATED PIPE
- 8"Ø PIPE
- 4"Ø FORCEMAIN
- EXISTING CLAY CAP

figure 3.1

BARRIER DRAIN SYSTEM AND COLLECTION SYSTEM
LOVE CANAL LANDFILL
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

CRA

09954-00(003)GN-NF011 FEB 07/2001

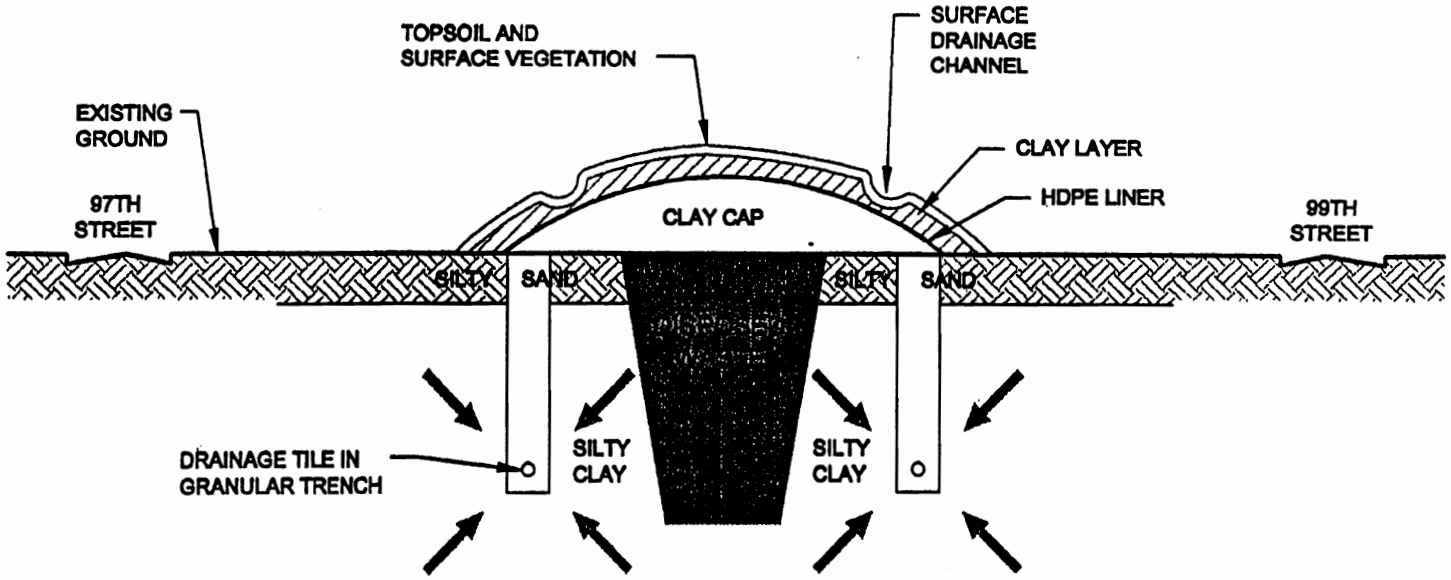


figure 3.2

TYPICAL BARRIER COLLECTION SYSTEM CROSS-SECTION
LOVE CANAL LANDFILL
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

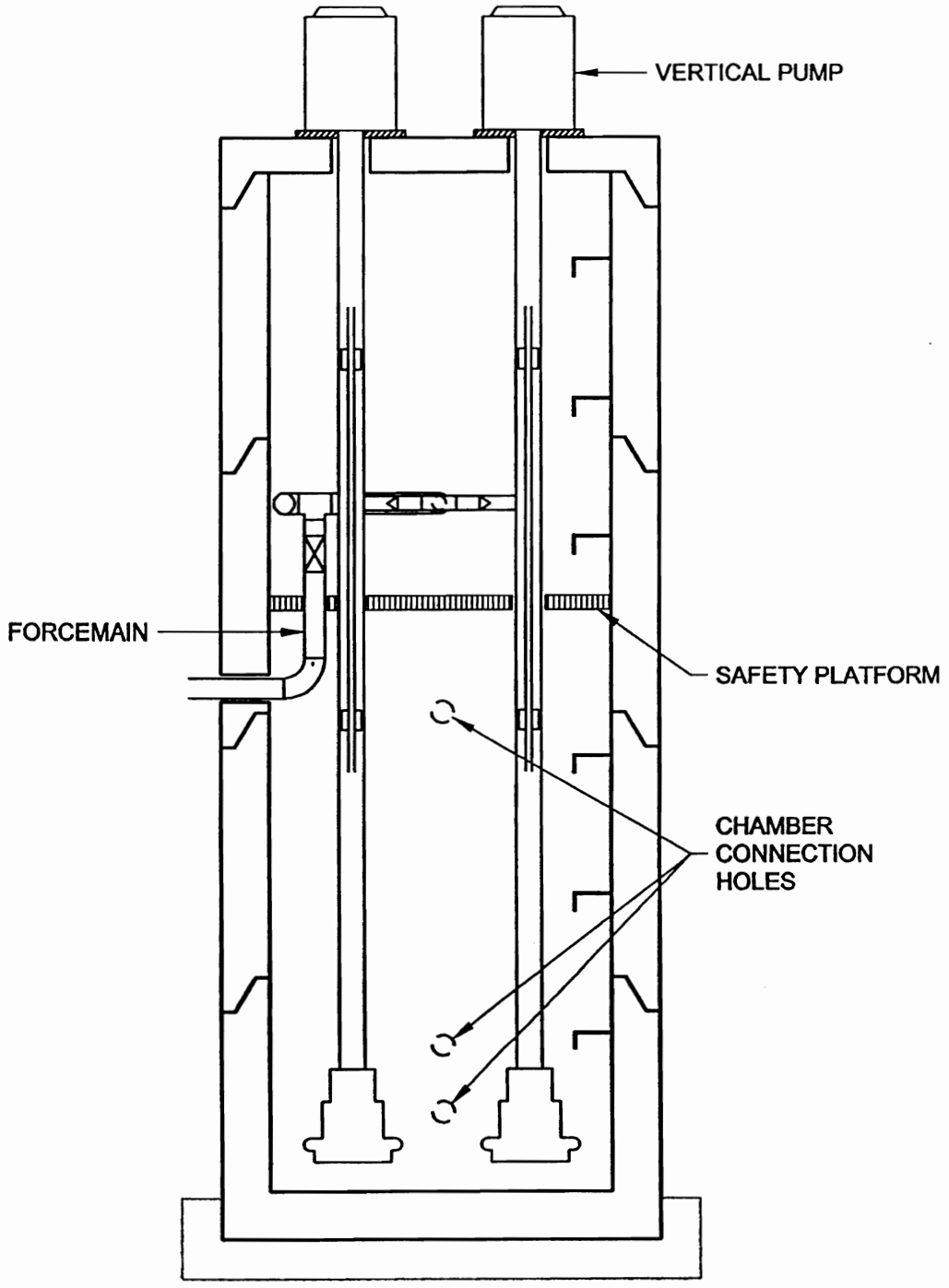


figure 3.3

TYPICAL PUMP CHAMBER
LOVE CANAL LANDFILL
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

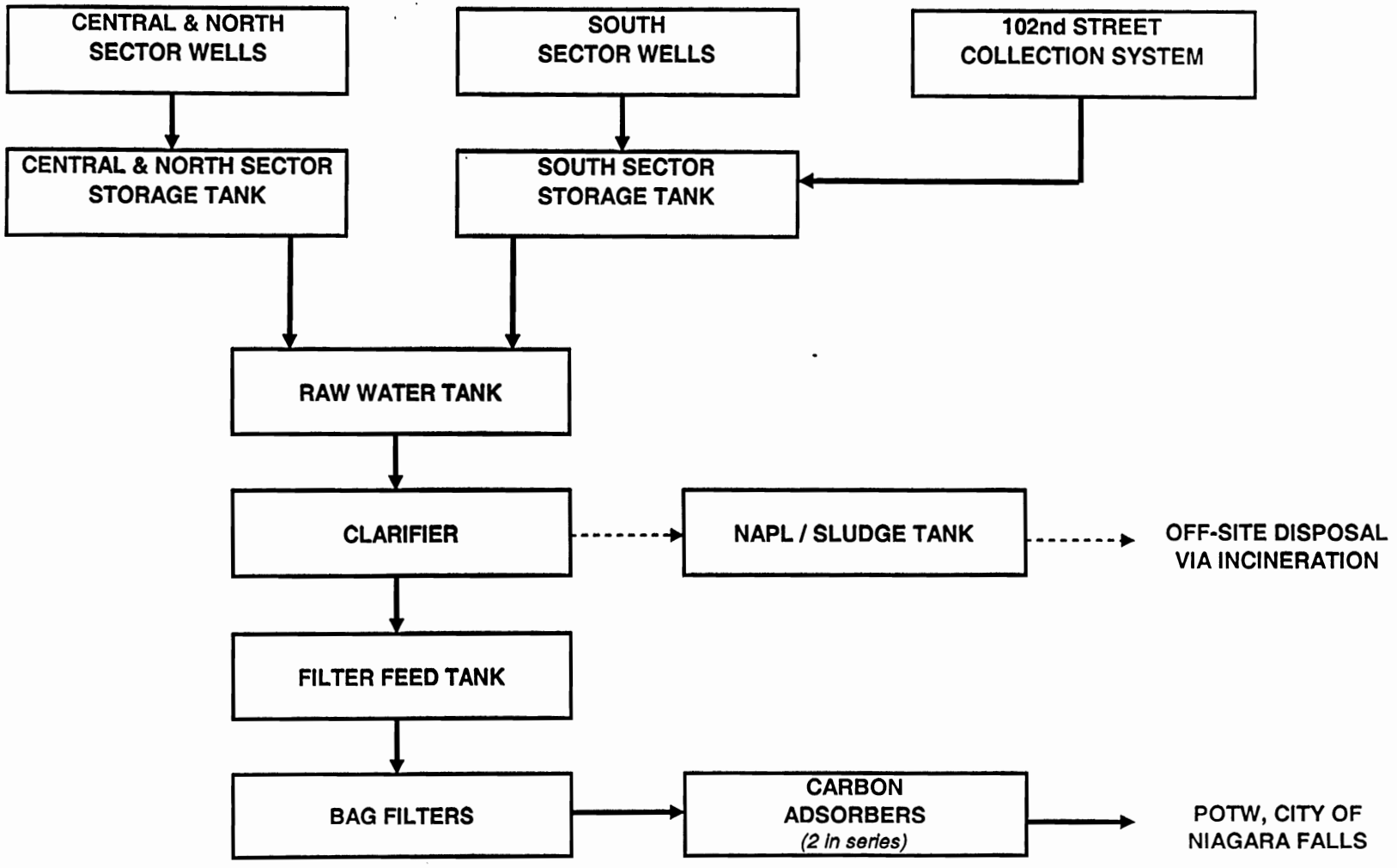


figure 4.1

LOVE CANAL TREATMENT FACILITY
PROCESS SCHEMATIC
MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
Niagara Falls, New York

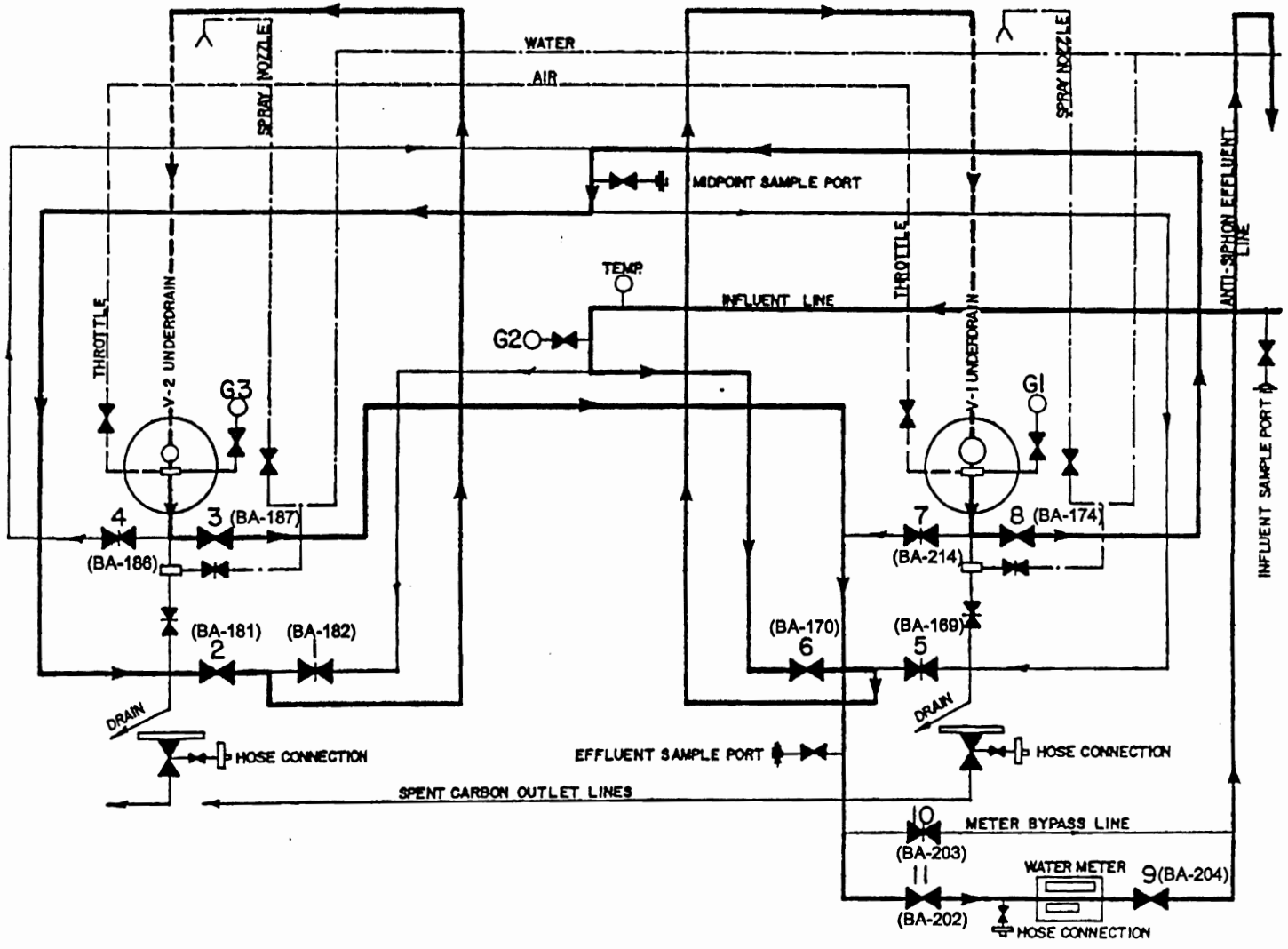


figure 4.2

ADSORBER SEQUENCING SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

LOVE CANAL DAILY

Date: _____ Inspected BY: _____

___ CHECK PERIMETER FENCING AND GATES FOR INTEGRITY SIGN POSTING GARBAGE / GROUNDS

___ CHECK DRUM WAREHOUSE FUEL OIL STORAGE TANK & DIKE FOR LEAKS, CHECK STORED DRUMS FOR CORROSION/LEAKAGE, SUMP LEVELS

___ CHECK SECURITY SYSTEM ADMINISTRATION, TREATMENT BLDG, DRUM BARN.

___ CHECK CONTAINMENT SYSTEM LEVELS COMPUTER SYSTEM OPERATION

___ CHECK RAW, FILTER FEED, CLARIFIER TANKS CARBON/ABSORBERS PUMPS/PIPNG

___ CHECK SLUDGE STORAGE TANKS FOR LEAKS, CHECK DIKE INTEGRITY

___ CHECK TELEPHONE SYSTEM FOR PROPER OPERATIONS

___ CHECK SAMPLE REFRIDGERATOR FOR PROPER OPERATIONS (4 DEG. C)

___ CHECK VECHILES

PRECIPITATION READING _____ INCHES MONTH TO DATE
(RESET BEGINING OF MONTH)

COMMENTS: _____

_____

_____

_____

SIGNATURE: _____

Figure 6.1

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

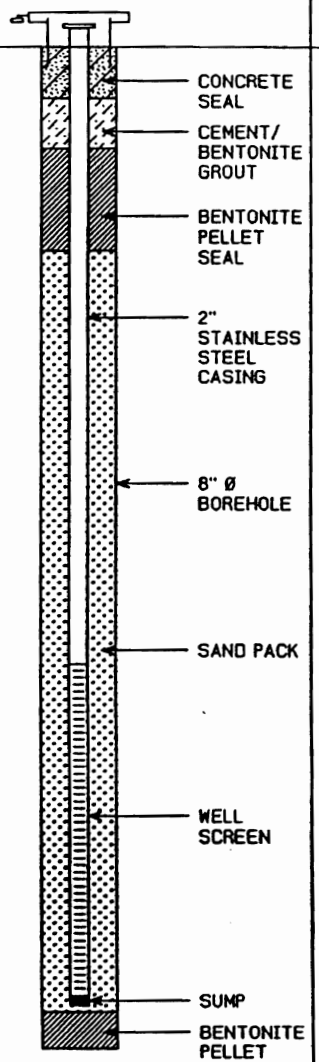
(WL-01)
Page 1 of 1

PROJECT NAME: LOVE CANAL LONG TERM MONITORING PROGRAM
PROJECT NUMBER: 6440
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: NIAGARA FALLS, NY

HOLE DESIGNATION: MW-8135
DATE COMPLETED: MAY 8, 1996
DRILLING METHOD: 4 ¼" ID HSA
CRA SUPERVISOR: K. LYNCH

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL
	REFERENCE POINT (Top of Riser)	578.03
	GROUND SURFACE	575.2
2.5	SM-SAND (FILL), little silt, trace gravel, medium dense, fine to medium sand, fine to medium subangular gravel, gray-brown, dry, grass and rootlets	574.0
5.0	ML-SILT, little clay and fine sand, trace coal, trace gravel, medium dense, fine subangular gravel, red-brown, brown and gray, moist	571.2
7.5	ML-SILT (NATIVE), little clay, little sand, medium stiff, laminated, red-brown, brown and gray, moist to wet	
	– slightly plastic, light gray fine sand lense (7.5 to 7.8ft BGS)	567.2
10.0	SW-SAND, some gravel, fine to coarse, light brown, moist to wet	566.1
12.5	CL-CLAY, some silt, trace gravel, stiff, red-brown, moist	564.3
15.0	CH-CLAY, trace silt, trace sand, very soft, highly plastic, massive, red-brown and brown, moist	
17.5		
20.0		
22.5		
25.0		549.9
27.5	CL-CLAY, little sand, little gravel, very soft, fine to medium subangular gravel, red-brown, moist	548.7
30.0	SC-SAND, some clay, little gravel, medium stiff to stiff, fine to medium subangular gravel, red-brown, moist	546.3
32.5	SM-SAND (TILL), some gravel, little silt, very stiff, fine to medium subangular gravel, red-brown, dry to moist	545.2
35.0	END OF HOLE @ 30.0ft BGS NOTES: 1. Soil samples retained for geologic record from 0.0 to 30.0ft BGS. 2. At completion a 2" stainless steel monitoring well was installed to 28.7ft BGS. 3. There was no water in borehole at completion.	
37.5		

MONITOR INSTALLATION



SCREEN DETAILS
Screened interval:
18.4 to 28.4ft BGS
Length: 10.0ft
Diameter: 2"
Slot Size: #10
Material: Stainless Steel
Sand Pack:
6.0 to 28.9ft BGS
Material: #0 Morie Sand

SAMPLE NUMBER	STATE	'N' VALUE	PID (ppm)
1SS		12	0
2SS		10	0
3SS		9	0
4SS		9	0
5SS		31	0
6SS		20	0
7SS		4	0
8SS		5	0
9SS		4	0
10SS		3	0
11SS		2	0
12SS		1	0
13SS		2	0
14SS		30	0
15SS		26	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼

Figure 6.2

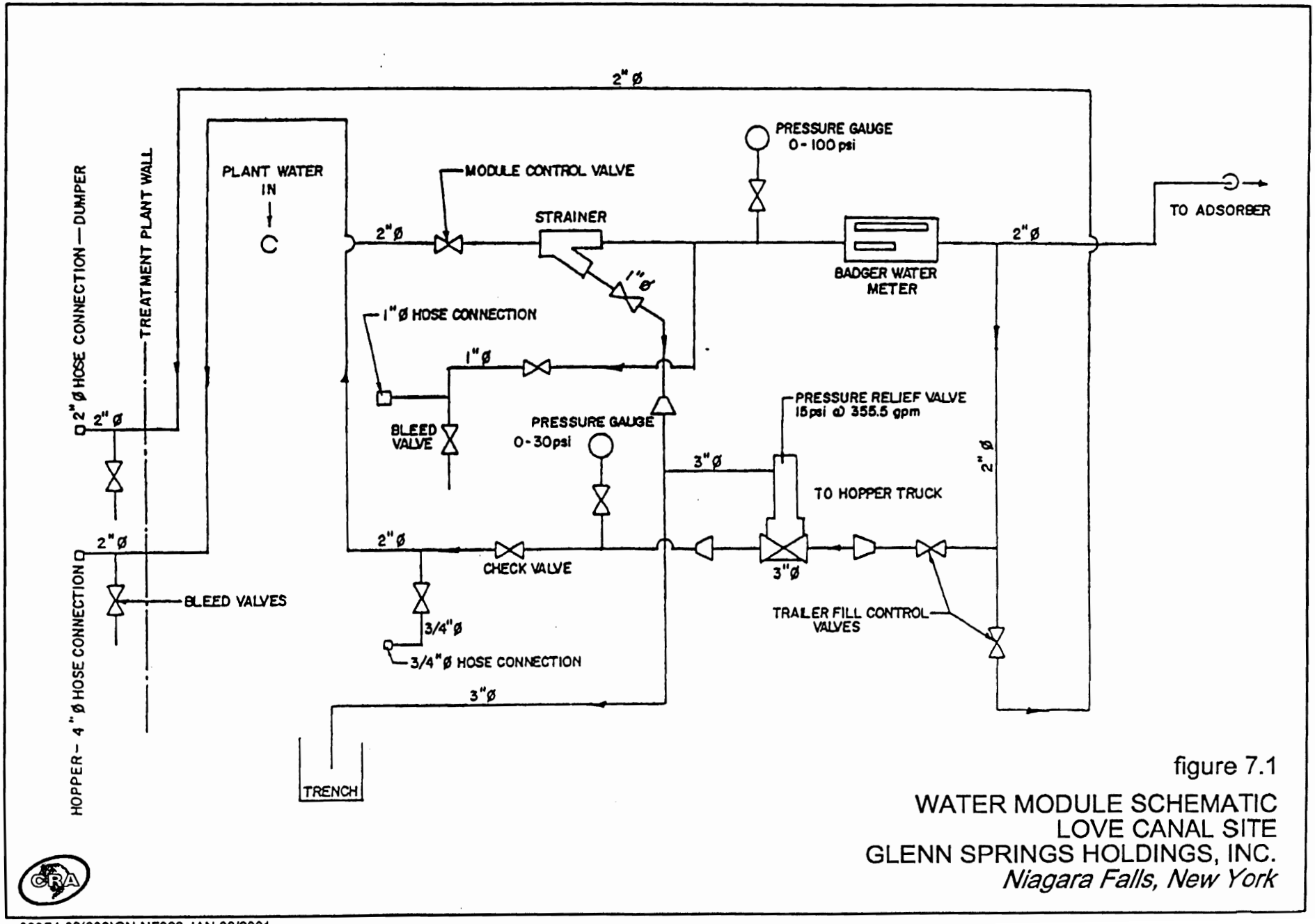


figure 7.1

WATER MODULE SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

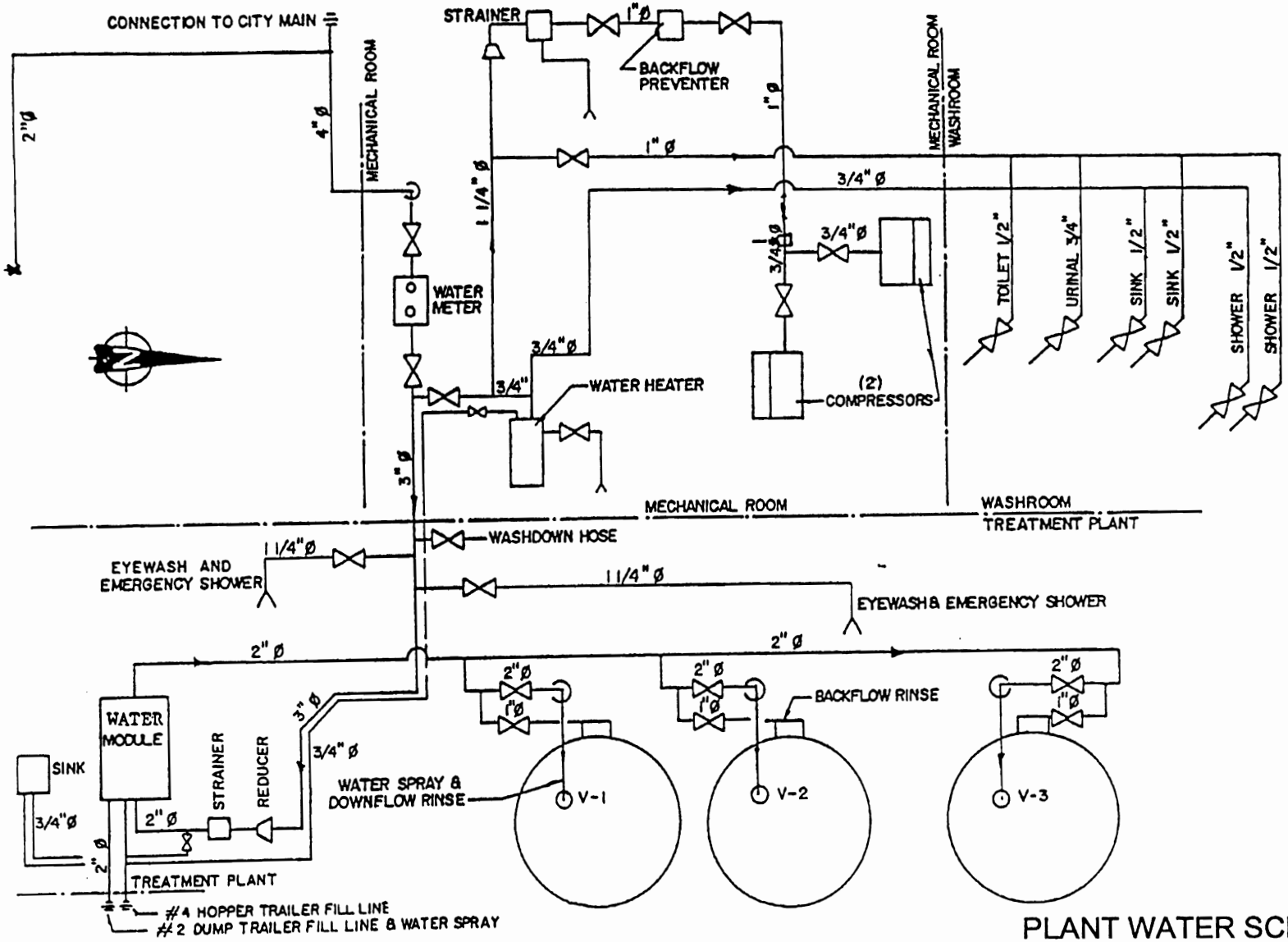
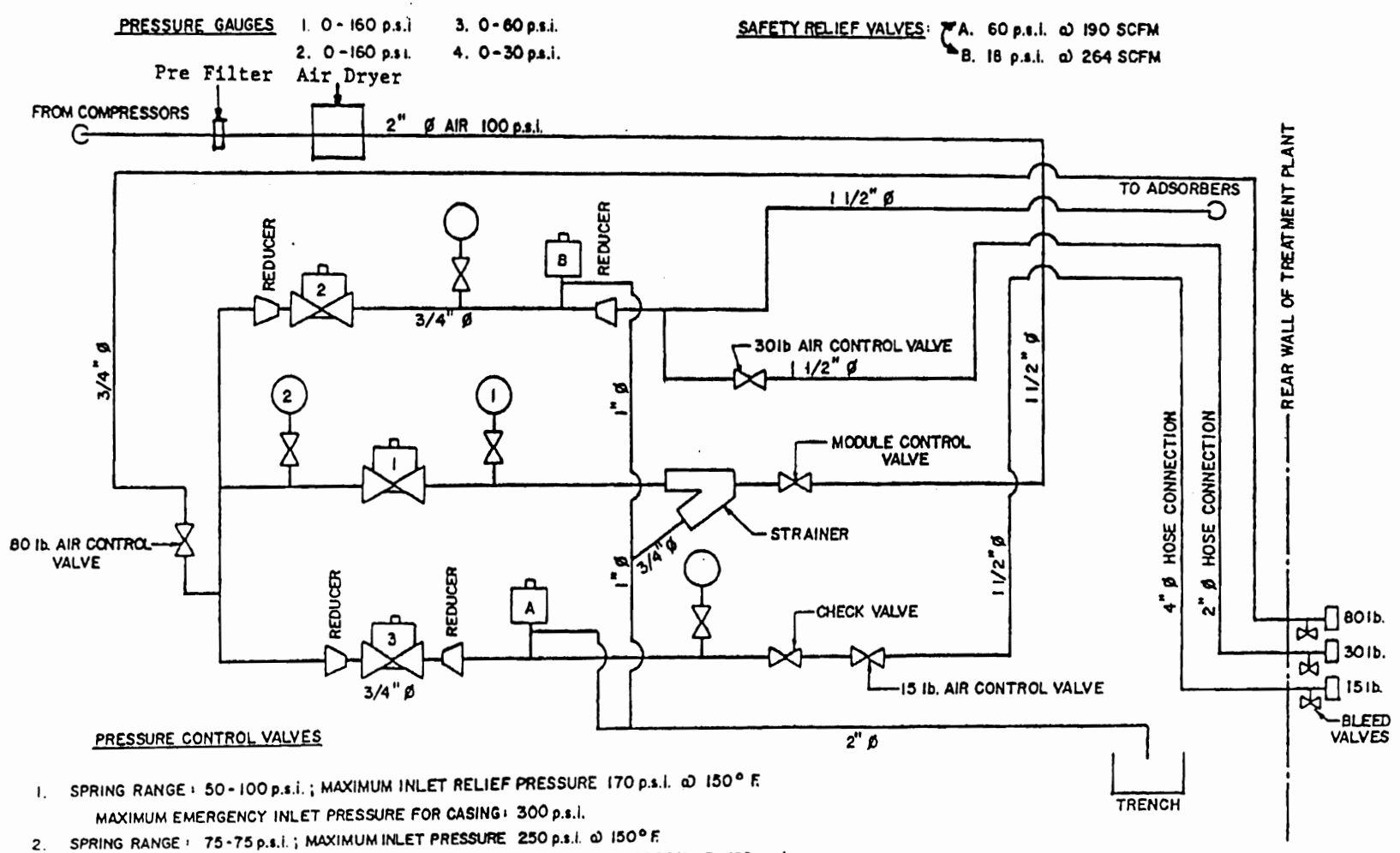


figure 7.2

PLANT WATER SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York



PRESSURE CONTROL VALVES

1. SPRING RANGE : 50 - 100 p.s.i. ; MAXIMUM INLET RELIEF PRESSURE 170 p.s.i. @ 150° F.
   MAXIMUM EMERGENCY INLET PRESSURE FOR CASING : 300 p.s.i.
2. SPRING RANGE : 75 - 75 p.s.i. ; MAXIMUM INLET PRESSURE 250 p.s.i. @ 150° F.
   MAXIMUM EMERGENCY INLET PRESSURE : 165 p.s.i. ; MAXIMUM OUTLET PRESSURE : 150 p.s.i.
3. SPRING RANGE : 5 - 15 p.s.i. ; MAXIMUM INLET PRESSURE 250 p.s.i. @ 150°F.
   MAXIMUM EMERGENCY INLET PRESSURE : 35 p.s.i. ; MAXIMUM OUTLET PRESSURE : 30 p.s.i.

figure 7.3

AIR MODULE SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

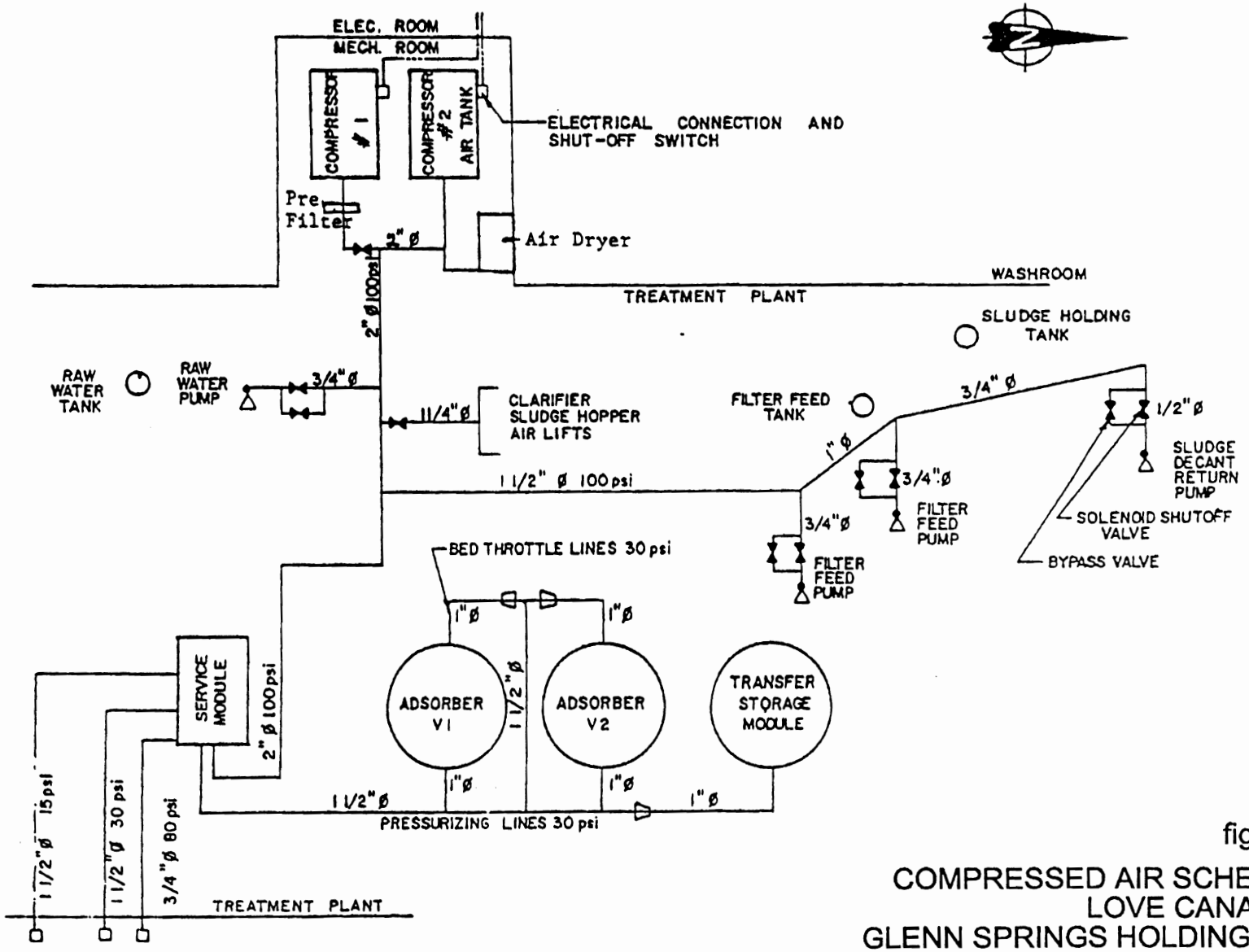


figure 7.4

COMPRESSED AIR SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

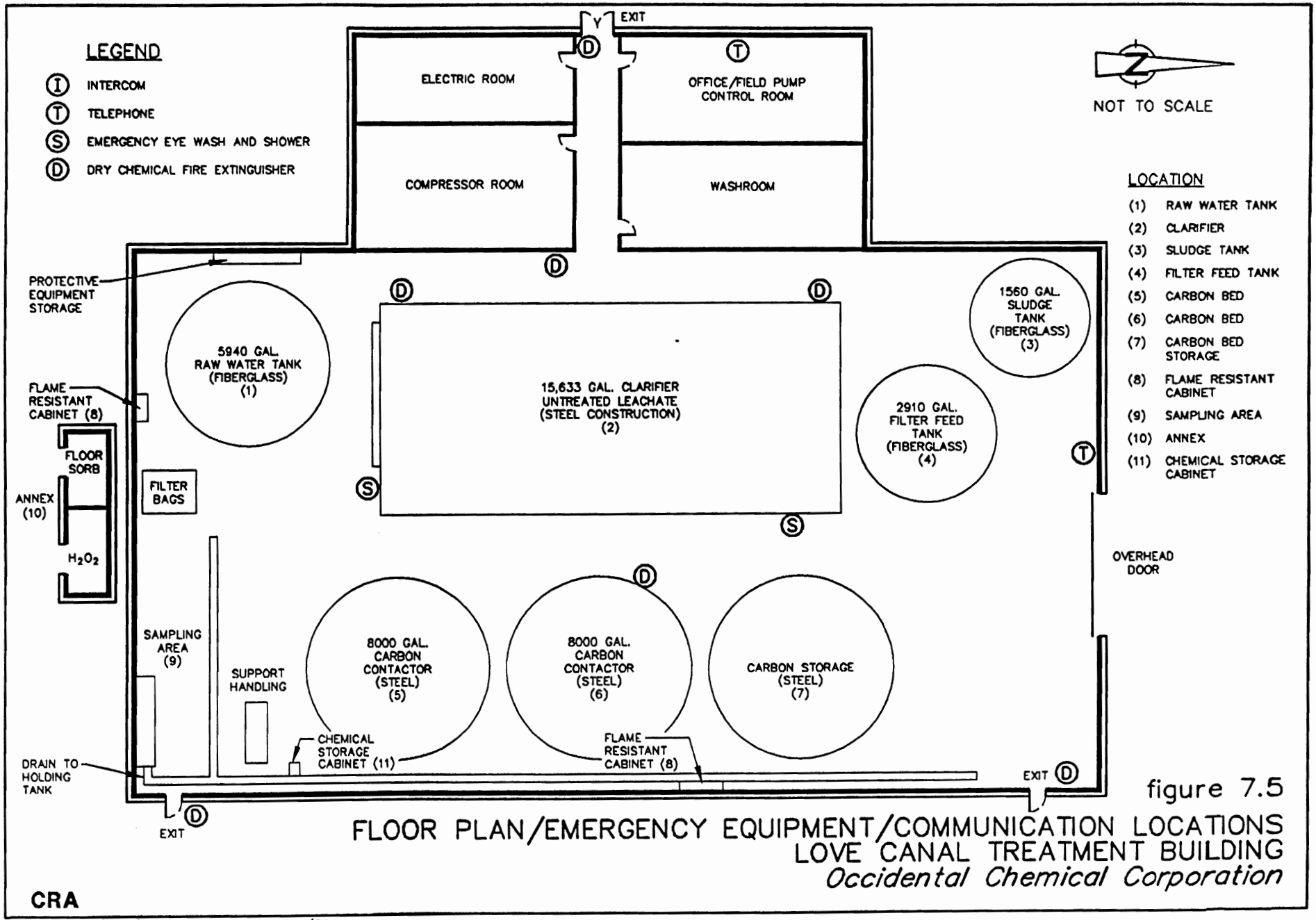


figure 7.5

FLOOR PLAN/EMERGENCY EQUIPMENT/COMMUNICATION LOCATIONS
LOVE CANAL TREATMENT BUILDING
Occidental Chemical Corporation

CRA

09904-04(003)GN-NF001 May 02/01

FIGURE 9.1

MILER SPRINGS REMEDIATION MANAGEMENT INC.
COLLECTION, STORAGE, AND TREATMENT SYSTEM
OPERATOR TRAINING ACKNOWLEDGEMENT

The undersigned has been formally trained on the Love Canal Leachate Treatment Facility in accordance with the Love Canal Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance (O&M) Manual.

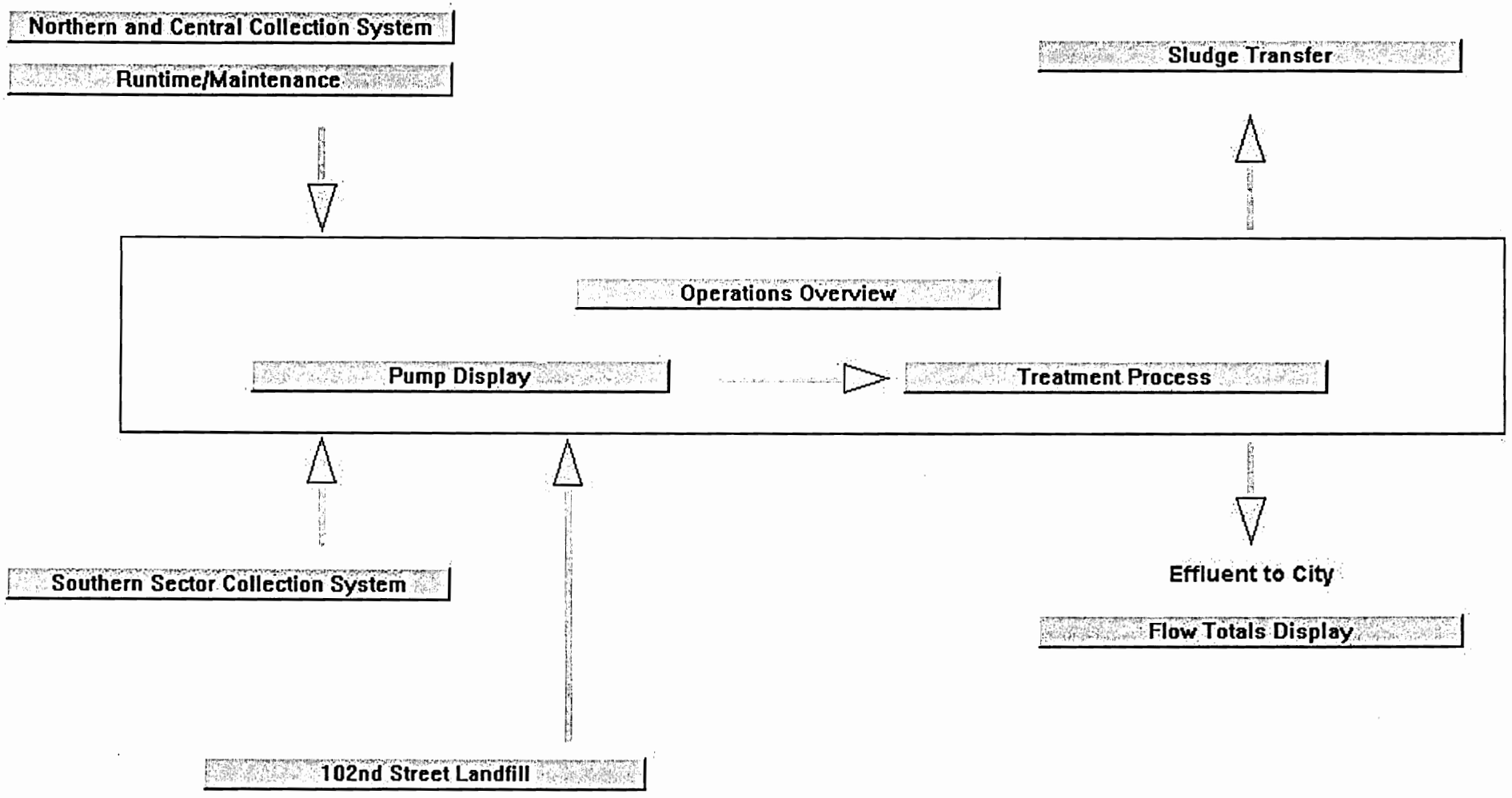
NAME:_____ DATE:_____

SUPERVISOR:_____ DATE:_____

APPENDIX A

SAMPLE HMI SCREENS

LOVE CANAL
FLOW MENU



Process DATADA

OPERATIONS

Valve Open

Valve Closed

STATION 1A	STATION 2A	STATION 3A	STATION 1	STATION 2	STATION 3
##.## ft.	##.## ft.	##.## ft.	##.## ft.	##.## ft.	##.## ft.
###.# gpm	###.# gpm	###.# gpm	###.# gpm	###.# gpm	###.# gpm
AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO
RUN RUN	RUN RUN	RUN RUN	RUN RUN	RUN RUN	RUN RUN

MISCELLANEOUS

102nd Str ####,###00 GALLONS TOTAL

GPM FLOW

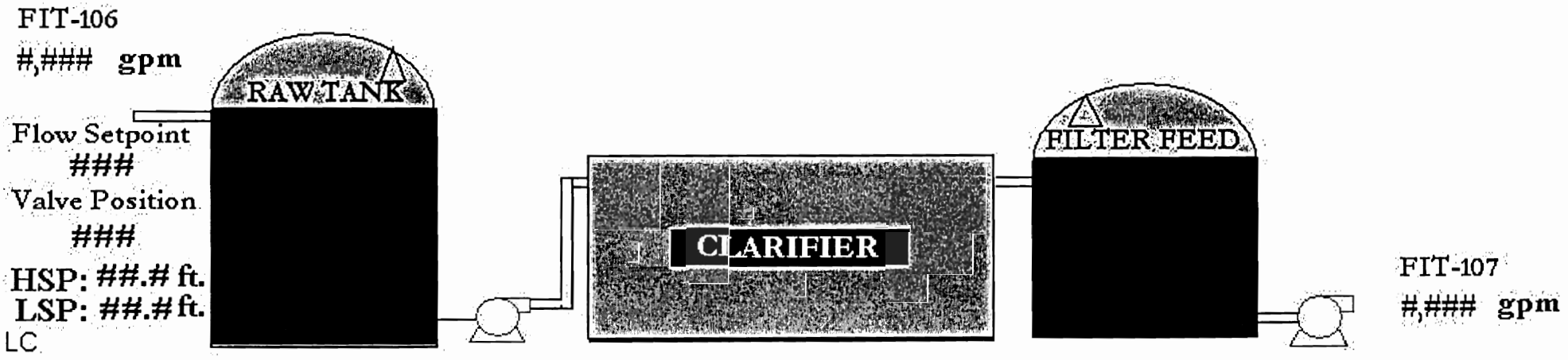
North Filter ###.# dpsi

South Filter ###.# dpsi

Plant Air ###.# psi

EFFLUENT

#,###,### GAL/D TOT



102nd STREET

WETWELL 1

OVLD
LV FT.
##.##

DATADAT

Enable/Disable

WETWELL 2

OVLD
LV FT.
##.##

DATADAT

Enable/Disable

WETWELL 3

OVLD
LV FT.
##.##

DATADAT

Enable/Disable

WETWELL 4

OVLD
LV FT.
##.##

DATADAT

Enable/Disable

LOVE
CANAL
HOLDING TK 3

###.## LEVEL
###.## LEV HI SP
###.## LEV LO SP

WELL LEVEL ELEV.

###.## LEVEL
###.## LEV HI SP
###.## LEV LO SP

###.## LEVEL
###.## LEV HI SP
###.## LEV LO SP

###.## LEVEL
###.## LEV HI SP
###.## LEV LO SP

###.## LEVEL
###.## LEV HI SP
###.## LEV LO SP

LEAK DETECTION

S. Pit Leak Detection
MH8 Leak Detection
MH9 Leak Detection
MH10 Leak Detection

PUMPING TOTALS

GPM FLOW
###,### RUNTIM TOT
###,###00 FLOW TOT
#,###00 PREV FLOW TOT

GPM FLOW
###,### RUNTIM TOT
###,###00 FLOW TOT
###,###00 PREV FLOW TOT

GPM FLOW
###,### RUNTIM TOT
###,###00 FLOW TOT
##,###00 PREV FLOW TOT

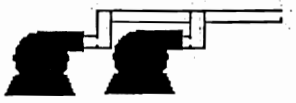
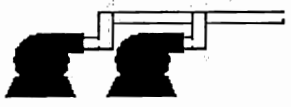
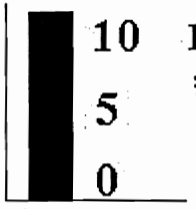
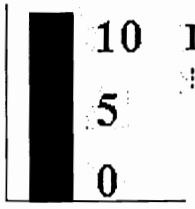
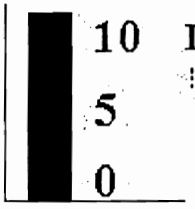
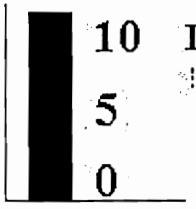
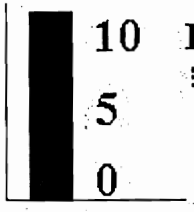
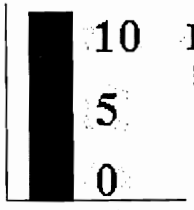
GPM FLOW
###,### RUNTIM TOT
###,###00 FLOW TOT
##,###00 PREV FLOW TOT

DISCHARGE SAMPLE PIT

GPM FLOW
###,###00 GALLONS TOTAL
###,###00 FLOW TOT
###,###00 PREV FLOW TOT

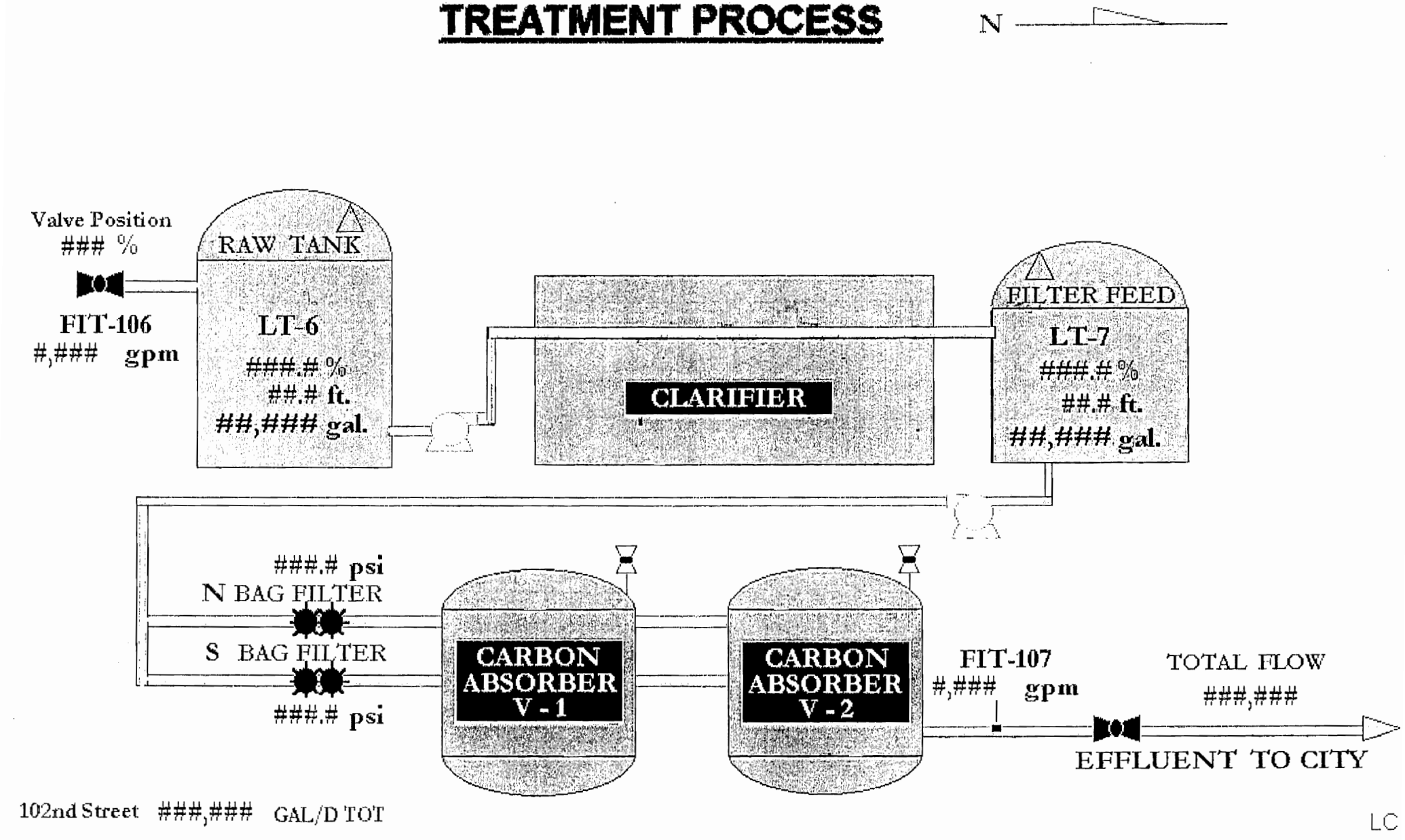
LC

PUMP DISPLAY

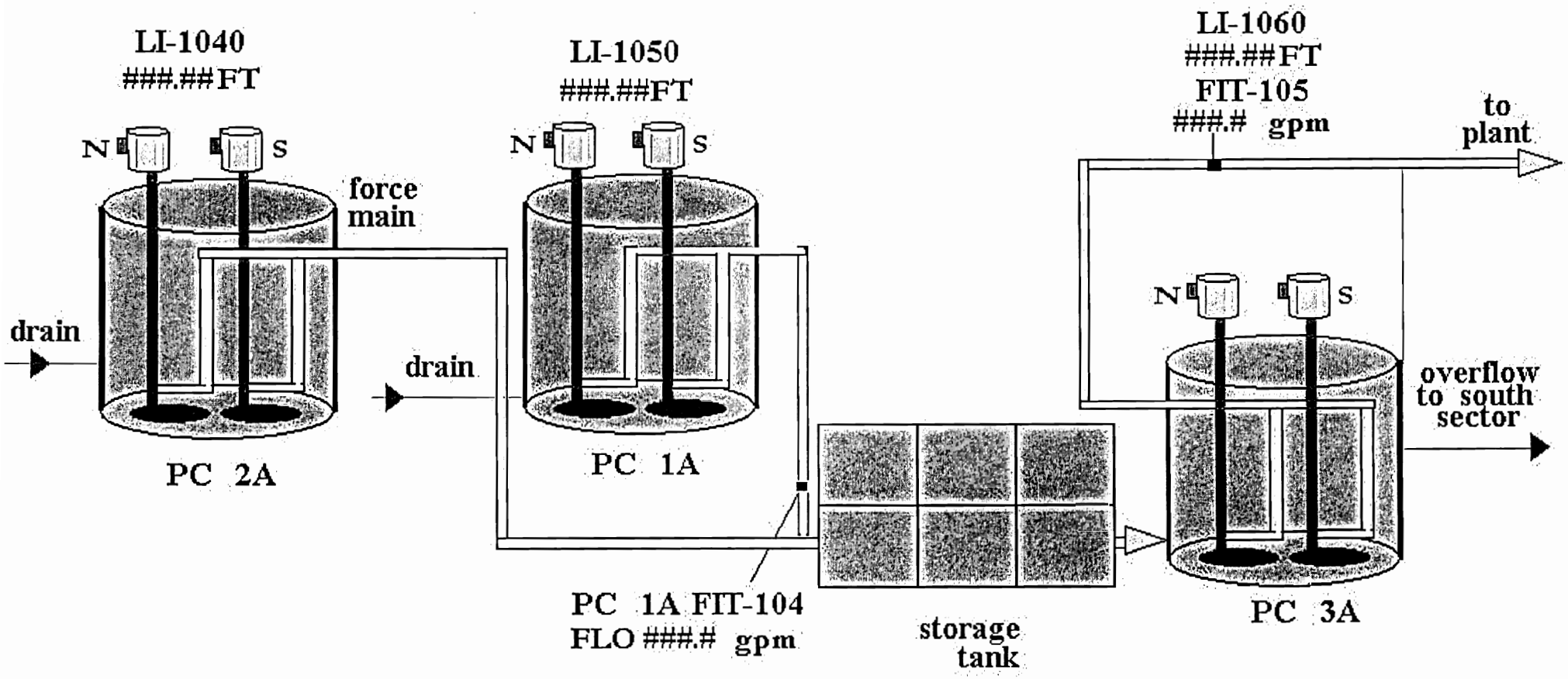
STATION 1A	STATION 2A	STATION 3A	STATION 1	STATION 2	STATION 3
					
 10 5 0 LV ft. ##.##	 10 5 0 LV ft. #.##	 10 5 0 LV ft. #.##	 10 5 0 LV ft. #.##	 10 5 0 LV ft. #.##	 10 5 0 LV ft. #.##
###.# gpm	###.# gpm	###.# gpm	###.# gpm	###.# gpm	###.# gpm
AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO	AUTO AUTO
WETWELL LEVELS					
HASP: ###.#	HASP: ###.#	HASP: ###.#	HASP: ###.#	HASP: ###.#	HASP: ###.#
HSP: ###.#	HSP: ###.#	HSP: ###.#	HSP: ###.#	HSP: ###.#	HSP: ###.#
LSP: ###.#	LSP: ###.#	LSP: ###.#	LSP: ###.#	LSP: ###.#	LSP: ###.#
TANK PERMISSIVE LEVELS					
		HSP: ###.#			HSP: ###.#
		LSP: ###.#			LSP: ###.#
ALARMS					
OVLD OVLD	OVLD OVLD	OVLD OVLD	OVLD	OVLD	OVLD OVLD
RTU DOOR	RTU DOOR	RTU DOOR	RTU DOOR	RTU DOOR	RTU DOOR
RTU L TEMP	RTU L TEMP	RTU L TEMP	RTU L TEMP	RTU L TEMP	RTU L TEMP

LC

TREATMENT PROCESS

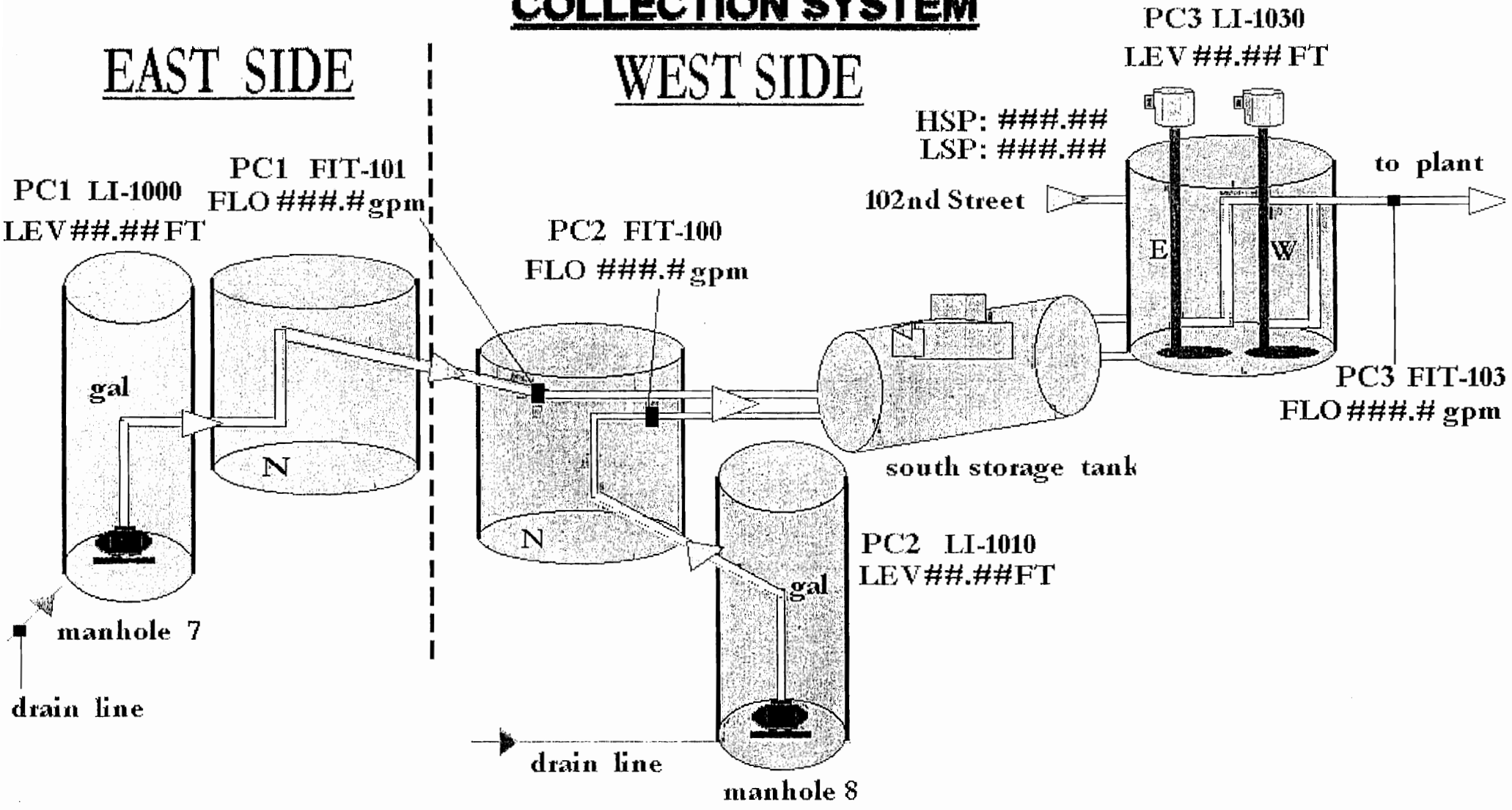


NORTHERN AND CENTRAL SECTOR COLLECTION SYSTEM



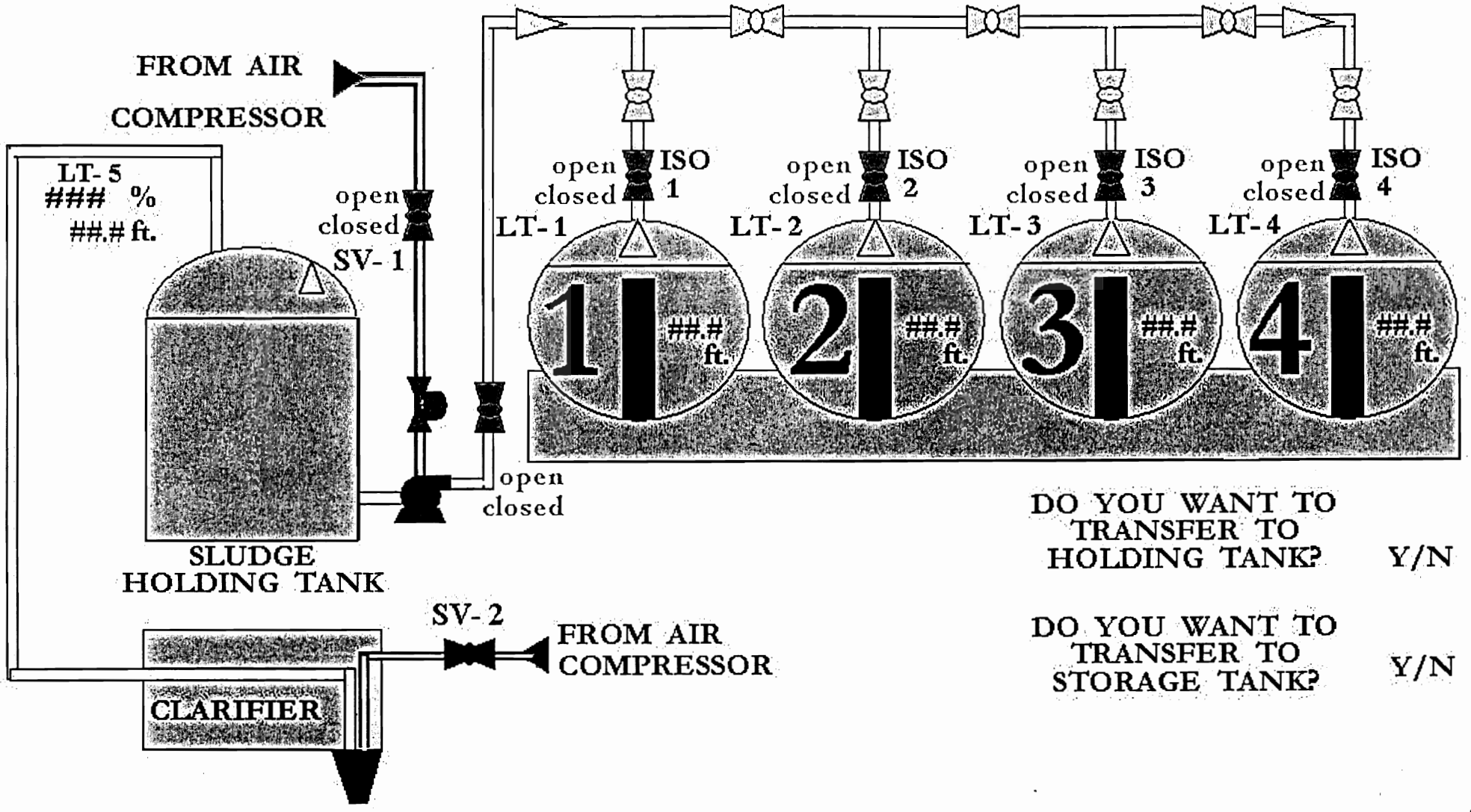
LC

SOUTHERN SECTOR COLLECTION SYSTEM



LC

SLUDGE TRANSFER



DO YOU WANT TO TRANSFER TO HOLDING TANK? Y/N

DO YOU WANT TO TRANSFER TO STORAGE TANK? Y/N

LC

FLOW TOTALS

FUNCTIONS		STATION PC1	STATION PC2	STATION PC3	STATION PC1A	STATION PC2A		STATION PC3A	TREATMENT PLANT	DCF	
LEVEL	FT.	##.##	##.##	##.##	##.##	###.##		##.##	##.##		
FLOW	GPM	###.#	###.#	###.#	###.#			###.#	###.#	###.#	
						(Hours.Minutes)					
FLOW TOT CDAY		###,###	###,###	###,###	###,###	##.##	##.##	###,###	###,###	###,###	Gal
FLOW TOT PDAY		###,###	###,###	###,###	###,###	##.##	##.##	###,###	###,###	###,###	Gal

PDAY = PREVIOUS DAY CDAY = CURRENT DAY

LC

RUNTIME/MAINTENANCE DISPLAY

FUNCTIONS	PC1A PUMP N	PC1A PUMP S	PC2A PUMP N	PC2A PUMP S	PC3A PUMP N	PC3A PUMP S
CURRENT DAY HRS	##.##	##.##	##.##	##.##	##.##	##.##
PREVIOUS DAY HRS	##.##	##.##	##.##	##.##	##.##	##.##
AMP	##.##	##.##	##.##	##.##	##.##	##.##
OVERLOAD	ALRM	ALRM	ALRM	ALRM	ALRM	ALRM
RUN STATUS	DATA	DATA	DATA	DATA	DATA	DATA

FUNCTIONS	PC1 PUMP N	PC2 PUMP N	PC3 PUMP E	PC3 PUMP W
CURRENT DAY HRS	##.##	##.##	##.##	##.##
PREVIOUS DAY HRS	##.##	##.##	##.##	##.##
AMP	##.##	##.##	##.##	##.##
OVERLOAD	ALRM	ALRM	ALRM	ALRM
RUN STATUS	DATA	DATA	DATA	DATA

APPENDIX B

ALARMS

Love Canal Alarm List

Filter Feed Tank (LT-7) Level (Ft)
North Bag Filter Differential Pressure
Station PC1 Pump N Amp 1
Station PC1A Pump N Amp 1
Station PC2 Pump N Amp 1
Station PC2A Pump N Amp 1
Station PC3 Pump E Amp 1
Station PC3A Pump E Amp 1
Station PC1 Pump S Amp 1
Station PC1A Pump S Amp 1
Station PC2 Pump S Amp 1
Station PC2A Pump S Amp 1
Station PC3 Pump W Amp 1
Station PC3A Pump W Amp 1
Raw Tank (LT-6) Level (Ft)
Sludge Holding Tank (LT-5) Level (Ft)
South Bag Filter Differential Pressure
Holding Tank 1 (LT-1) Level (Ft)
Holding Tank 2 (LT-2) Level (Ft)
Holding Tank 3 (LT-3) Level (Ft)
Holding Tank 4 (LT-4) Level (Ft)
Station PC1 Wetwell Level
Station PC1A Wetwell Level
Station PC2 Wetwell Level
Station PC2A Wetwell Level
Station PC3 Wetwell Level
Station PC3A Wetwell Level
102nd Street Com Panel Intrusion Alarm
102nd Street S.Pit Leak Detected Alarm
102nd Street MH8 Leak Detected Alarm
102nd Street MH9 Leak Detected Alarm
102nd Street MH10 Leak Detected Alarm
102nd Street Pump 1 Failed
102nd Street Pump 1 Overload Alarm
102nd Street Pump 2 Failed
102nd Street Pump 2 Overload Alarm
102nd Street Pump 3 Failed
102nd Street Pump 3 Overload Alarm
102nd Street Pump 4 Failed

102nd Street Pump 4 Overload Alarm
RTU L Temp PC1
RTU L Temp PC1A
RTU L Temp PC2
RTU L Temp PC2A
RTU L Temp PC3
RTU L Temp PC3A
Station PC1 Intrusion Alarm
Station PC1A Intrusion Alarm
Station PC2 Intrusion Alarm
Station PC2A Intrusion Alarm
Station PC3 Intrusion Alarm
Station PC3A Intrusion Alarm
Station PC1 Pump N Overload Alarm
Station PC1A Pump N Overload Alarm
Station PC2 Pump N Overload Alarm
Station PC2A Pump N Overload Alarm
Station PC3 Pump E Overload Alarm
Station PC3A Pump E Overload Alarm
Station PC1 Pump S Overload Alarm
Station PC1A Pump S Overload Alarm
Station PC2 Pump S Overload Alarm
Station PC2A Pump S Overload Alarm
Station PC3 Pump W Overload Alarm
Station PC3A Pump W Overload Alarm
Filter Feed Tank Level BQA
Raw Water Tank BQA

APPENDIX C

DRAWINGS

KEY MAP

DRAWING INDEX

DWG. N º	REV. N º	DATE	TITLE
9954-EF-00	2	02-01	P & ID - LEGEND
9954-EF-01	2	02-01	P & ID - SOUTHERN SECTION
9954-EF-02	2	02-01	P & ID - NORTHERN SECTION
9954-EF-03	2	02-01	P & ID - TREATMENT FACILITY
9954-EF-04	2	02-01	P & ID - TREATMENT FACILITY
9954-EF-05	2	02-01	P & ID - STORAGE TANKS
9954-EF-06	0	02-01	P & ID - DCF/DRUM BARN
9954-E-1	2	02-01	PLC NETWORK ARCHITECTURE
9954-E-2	2	02-01	MTU CONTROL PANEL LAYOUT
9954-E-3	2	02-01	PLC CONTROL PANEL WIRING DIAGRAM
9954-E-4	2	02-01	PLC CONTROL PANEL WIRING DIAGRAM
9954-E-5	2	02-01	PLC CONTROL PANEL WIRING DIAGRAM
9954-E-6	2	02-01	PLC CONTROL PANEL WIRING DIAGRAM
9954-E-7	2	02-01	PLC CONTROL PANEL WIRING DIAGRAM
9954-E-8	2	02-01	102nd STREET PLC CONTROL PANEL WIRING DIAGRAM
9954-E-9	2	02-01	102nd STREET PLC CONTROL PANEL WIRING DIAGRAM
9954-E-10	2	02-01	102nd STREET PLC CONTROL PANEL WIRING DIAGRAM
9954-E-11	2	02-01	REMOTE RTU WIRING DIAGRAM
9954-E-12	2	02-01	REMOTE RTU-3 WIRING DIAGRAM

LOVE CANAL
PLC REPLACEMEN

AS-BUILT PACKAG

MILLER SPRINGS REMEDIATION MANAG

LOVE CANAL TREATMENT F

CONESTO

CAPILLARY TUBE

ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)

ELECTROMAGNETIC OR SONIC SIGNAL (NOT GUIDED)

INTERNAL SYSTEM LINK

HYDRAULIC SIGNAL

MECHANICAL LINK

ELECTRICAL BINARY SIGNAL

MAIN PROCESS FLOW INDICATION

SECONDARY PROCESS FLOW INDICATION

TO / FROM SHEET No.

OFF PAGE CONNECTOR

UTILITY

UTILITY IN/OUT

LINE SYMBOLS

BA– BALL VALVE

BU– BUTTERFLY VALVE

DI– DIAPHRAM VALVE

GA– GATE VALVE

GL– GLOBE VALVE

THREE WAY VALVE (FAIL OPEN TO PATH A–C)

FOUR WAY VALVE (FAIL OPEN TO PATH A–C AND B–D)

CH– CHECK VALVE

REDUCER

FLEXIBLE PIPE

BLIND FLANGE

HOSE CONNECTION

SCREWED CAP, CLEANOUT

Y–LINE STRAINER

SPECIFICATION CHANGE

LEVEL DEVICE, FLOAT TYPE

SB BLOCK & BLEED VALVE SETUP

TP/1 TIE POINT TO EXISTING SYSTEM

RESTRICTION ORIFICE

DRAIN

FLOW STRAIGHTENING VANE

SP/4 SPECIALITY PART

STATIC MIXER

AV AIR VENT, AUTOMATIC

FILTER/REGULATOR/LUBRICATOR

PULSATION DAMPER

INSTRUMENT SYMBOLS

LOCALLY MOUNTED INSTRUMENTS

PANEL MOUNTED INSTRUMENTS
A = PANEL No. WHEN MORE THAN ONE PANEL IS PRESENT

PNL A

BEHIND BOARD MOUNTED INSTRUMENTS

IN LINE INSTRUMENTS AS INDENTIFIED

SG SIGHT GLASS

RUPTURE DISC

PRESSURE RELIEF VALVE

VACUUM RELIEF VALVE

V P CONSERVATION VENT

PRESSURE REDUCING REGULATOR (SELF CONTAINED)

BACKPRESSURE REGULATOR (SELF CONTAINED)

LEVEL REGULATOR WITH MECHANICAL LINKAGE

TE TEMPERATURE ELEMENT WITH THERMOWELL

DIAPHRAM ACTUATOR, SPRING–OPPOSED

CYLINDER ACTUATOR SPRING – OPPOSED

M ROTARY MOTOR ACTUATOR

S SOLENOID ACTUATOR

HAND ACTUATOR OR HANDWHEEL

AIR ACTUATED VALVE W/POSITIONER

ATO/FC

VALVE FAIL SYMBOLS
ATO – AIR TO OPEN
ATC – AIR TO CLOSE
FO – FAIL OPEN
FC – FAIL CLOSED
FL – FAIL LOCKED (LAST POSITION)
FI – FAIL INDETERMINATE

TURBINE OR PROPELLER FLOWMETER

POSITIVE–DISPLACEMENT FLOWMETER

FI VARIABLE AREA FLOWMETER

PI DIAPHRAM SEAL WITH PRESSURE LEAD LINE

PI DIAPHRAM SEAL (LINE–MOUNTED)

XY SIGNAL CONVERTER (INPUT/OUTPUT)
[*E – VOLTAGE P – PNEUMATIC
I – CURRENT B – BINARY (MODBUS, RS232...)

PL COLOR PILOT LIGHT
A – AMBER
G – GREEN
R – RED

ELECTRICAL SYMBOLS

	AT MOTOR	AT PANEL	ELSEWHERE	NOMENCLATURE
THESE SYMBOLS ARE FOR OCCIDENTAL CHEMICAL DRAWINGS ONLY				START – MOMENTARY CONTACT
				START – GREEN ILLUMINATED BUTTON
	S	S	S	STOP – MOMENTARY CONTACT
	S	S	S	STOP – RED ILLUMINATED BUTTON
				START/STOP
				START/STOP – GREEN & RED ILLUMINATED BUTTONS
	R	R	R	PILOT LIGHT LENS
				START – STOP W/GREEN RUNNING PILOT LIGHT
				START – STOP W/GREEN RUNNING PILOT LIGHT AND RED STOP PILOT LIGHT
				SELECTOR SWITCH 2 POSITION
				SELECTOR SWITCH 3 POSITION
				PUSHBUTTON WITH MUSHROOM HEAD

SUBSCRIPTS

LIGHTS
A = AMBER
B = BLUE
C = CLEAR
G = GREEN
R = RED
W = WHITE
Y = YELLOW

PUSHBUTTONS
ES = EMERGENCY STOP
J = JOG
L = LOCAL PANEL
LO = LOCK OUT
SP = STOP
ST = START

C	User's Choice											
D	User's Choice											
E	Voltage	ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET
F	Flow Rate	FRC	FIC	FC	FCV, FICV	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT
FQ	Flow Quantity	FQRC	FQIC			FQR	FQI	FQSH	FQSL			FQIT	FQT
FF	Flow Ratio	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSL				
G	User's Choice												
H	Hand		HIC	HC						HS			
I	Current	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT
J	Power	JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT
K	Time	KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT
L	Level	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT
M	User's Choice												
N	User's Choice												
O	User's Choice												
P	Pressure/Vacuum	PRC	PIC	PC	PCV	PR	PI	PSH	PSL	PSHL	PRT	PIT	PT
PD	Pressure, Differential	PDRC	PDIC	PDC	PDCV	PDR	PDI	PDSH	PDSL		PDRT	PDIT	PDT
Q	Quantity	QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT
R	Radiation	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT
S	Speed/Frequency	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST
T	Temperature	TRC	TIC	TC	TCV	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT
TD	Temperature, Differential	TDRC	TDIC	TDC	TDCV	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT
U	Multivariable					UR	UI						
V	Vibration/Machinery Analysis					VR	VI	VSH	VSL	VSHL	VRT	VIT	VT
W	Weight/Force	WRC	WIC	WC	WCV	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT
WD	Weight/Force, Differential	WDRC	WDIC	WDC	WDCV	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT
X	Unclassified												
Y	Event/State/Presence		YIC	YC		YR	YI	YSH	YSL				YT
Z	Position/Dimension	ZRC	ZIC	ZC	ZCV	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT
ZD	Gauging/Deviation	ZDRC	ZDIC	ZDC	ZDCV	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT

Note: This table is not all-inclusive.
* A, alarm, the annunciating device, may be used in the same fashion as S, switch, the actuating device.
** The letters H and L may be omitted in the undefined case.

Other Feasible Combinations:
FO (Restriction Orifice)
FRK, HIK (Control Stations)
FX (Accessories)
TJF (Scanning Recorder)
LLH (Float Light)
LCH (Level Control High)
PFR (Rat
KOI (Run
QQI (Indi

DISTRIBUTED CONTROL / SHARED DISPLAY INSTRUMENTS

INDICATOR/CONTROLLER/RECORDER OR ALARM POINTS – USUALLY USED TO INDICATE VIDEO DISPLAY
* NORMALLY ACCESSIBLE TO OPERATOR

DISTRIBUTED CONTROL INTERCONNECTING LOGIC CONTROLLER OR PC WITH BINARY OR SEQUENTIAL LOGIC FUNCTIONS
* NORMALLY ACCESSIBLE TO OPERATOR

PAH PAL dP/dT PDA — XAH XAL d/dT PR

INPUT ALARMS
PAH – HIGH
PAL – LOW
dP/dT – RATE CHANGE
PDA – DEVIATION

OUTPUT ALARMS
XAH – HIGH
XAL – LOW
d/dT – RATE CHANGE

MISCELLANEOUS
PR – TREND
* NORMALLY ACCESSIBLE TO OPERATOR

OLC SP_ _

OLC – OPERATIONAL LIGHTED CONTROL
OA – OPERATIONAL ALARM (STATUS)
SP – STOP/INHIBIT FUNCTION FROM CRT
ST – START/ENABLE FUNCTION FROM CRT
A – AUTO ON/OFF FUNCTION FROM CRT
O – OFF FUNCTION FROM CRT
H – HAND/MANUAL FUNCTION FROM CRT

NORMALLY BLIND OPERATION
* NOT NORMALLY ACCESSIBLE TO OPERATOR

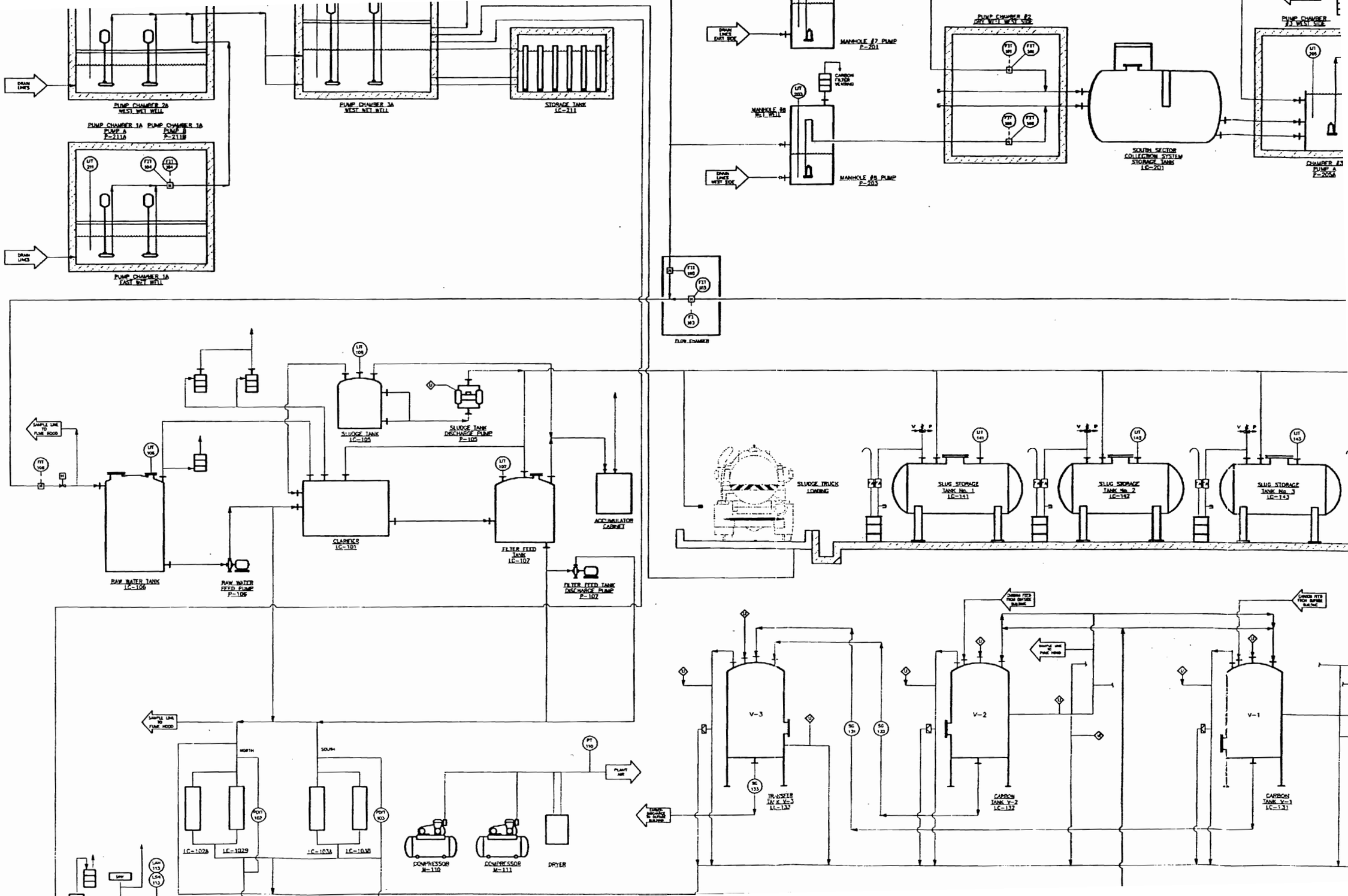
I/99 DISTRIBUTED CONTROL INTERCONNECTING LOGIC CONTROLLER OR PC WITH BINARY OR SEQUENTIAL LOGIC FUNCTIONS NUMBER IN DIAMOND REFERS TO SEQUENCE NUMBER

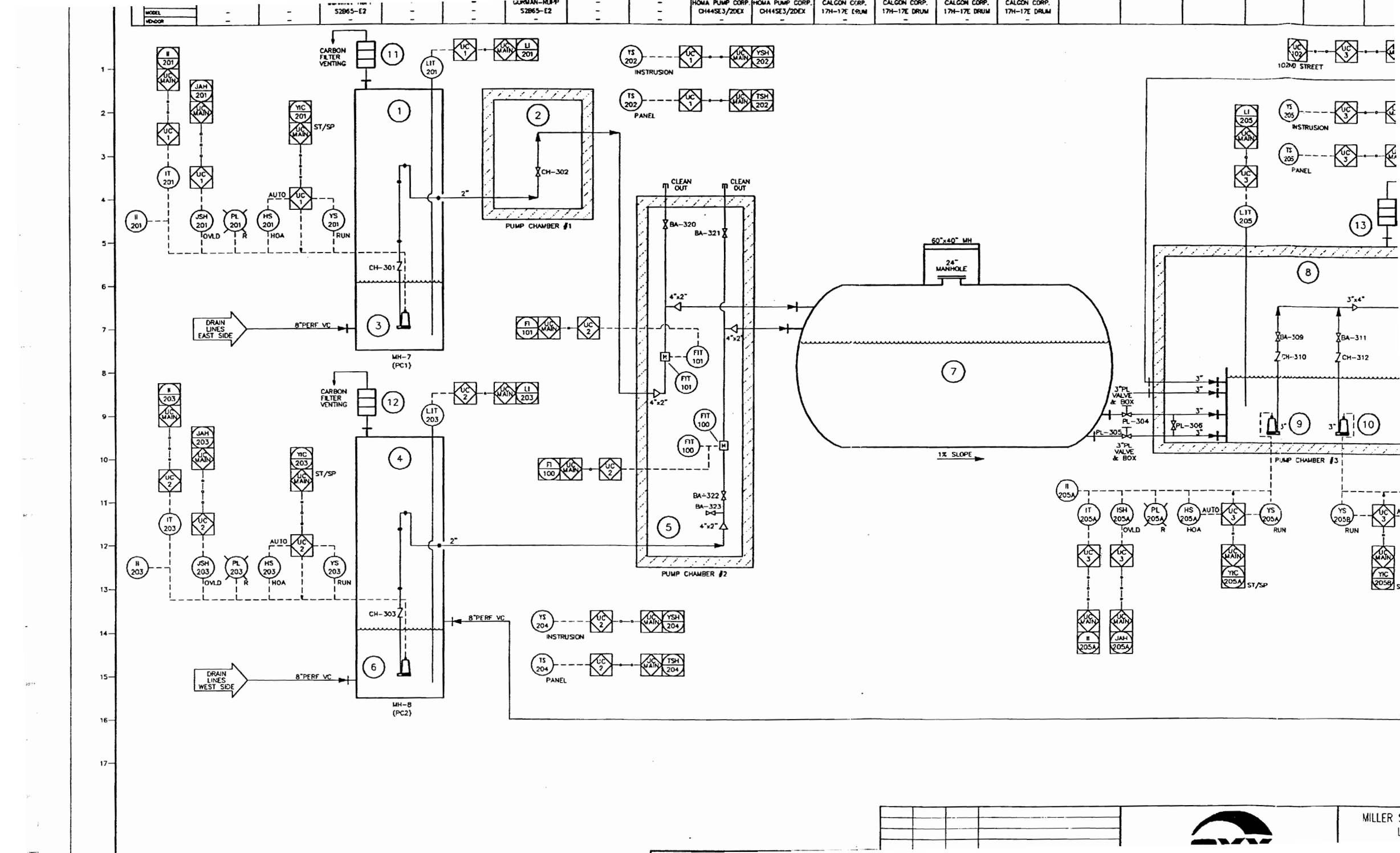
INSTRUMENT / PROCESS

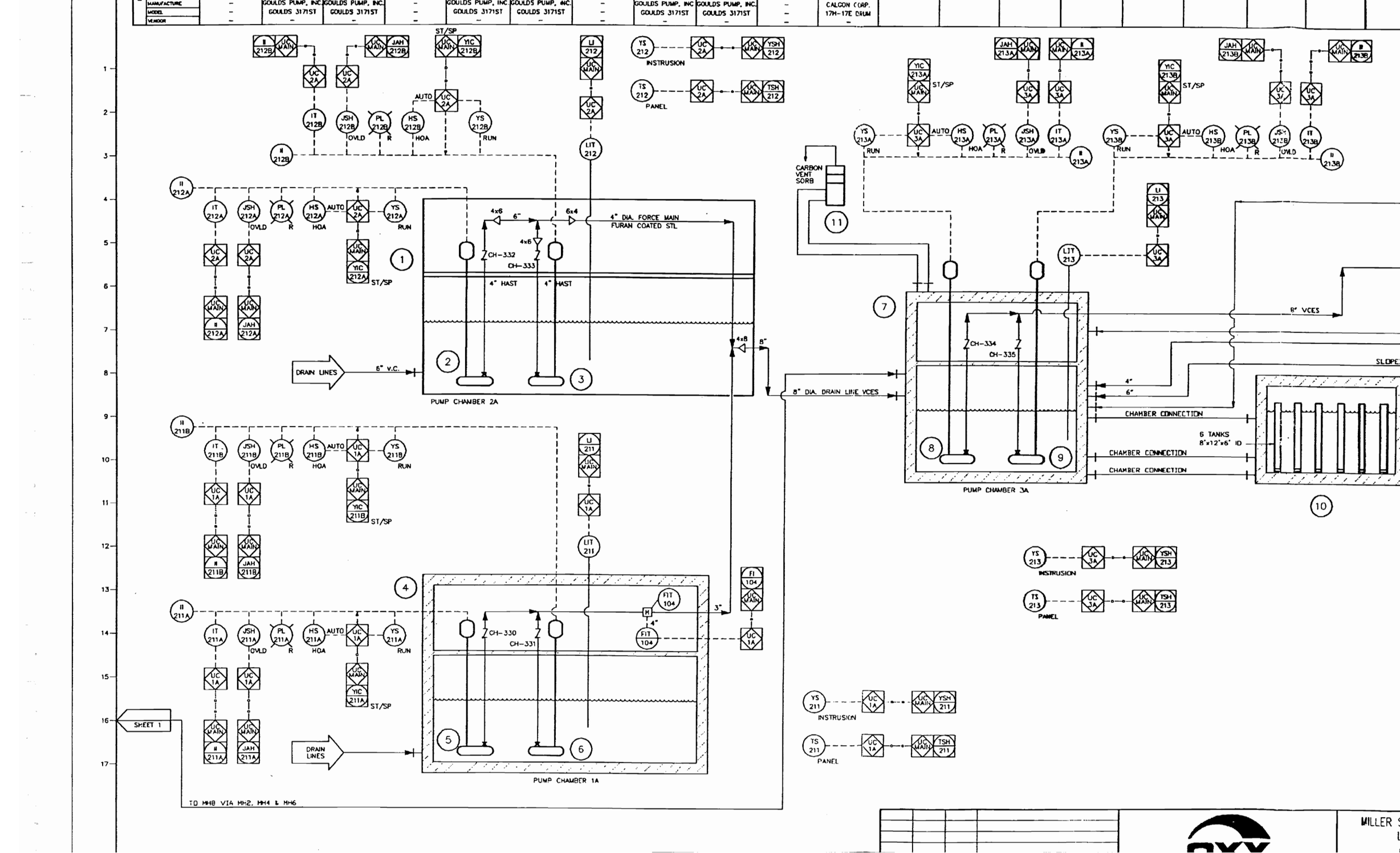
XXX	UNDERGROUND
XXX	PROCESS INSTR
XXX	VENDOR SUPPLI
XXX	UTILITY INSTRUM
0000	UNDERGROUND
1000	PROCESS LINES
2000	VENDOR SUPPLI
3000	UTILITY LINES
CS	CARBON STEEL
CSVD	CARBON STEEL
DVW	DRAIN VENT WA
HDPE	HIGH DENSITY P
KYA	KYNAR
PDS	CPVC, SOLID
PVC	POLYVINYL CHL
PVE	POLYVINYL CHL
PPL	POLYPROPYLENE
SS	STAINLESS STEE
TFD	TEFLON
B	BARE
I	INSULATED
J	JACKETED AND
TE	ELECTRICALLY T

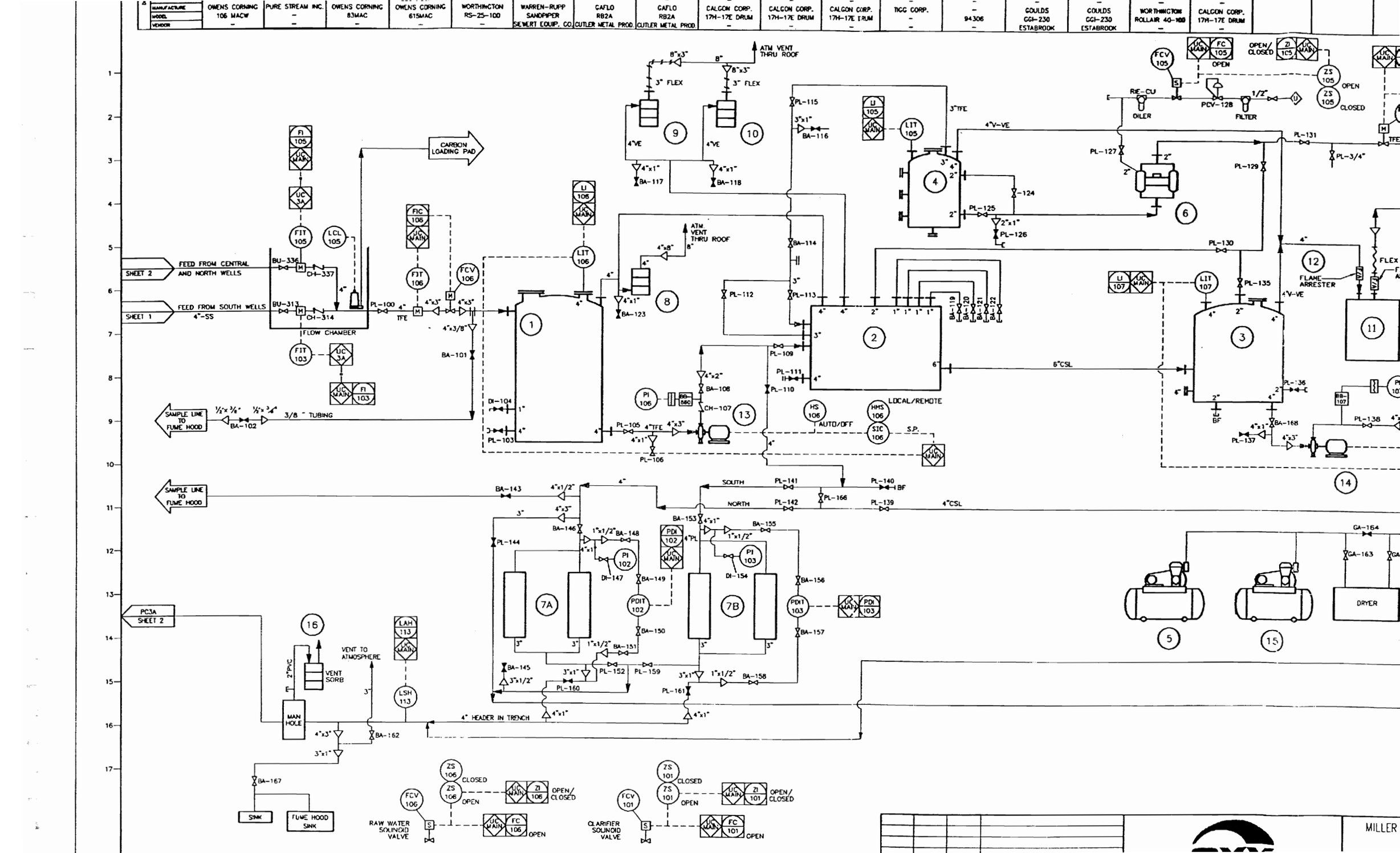
MILLER

OXY

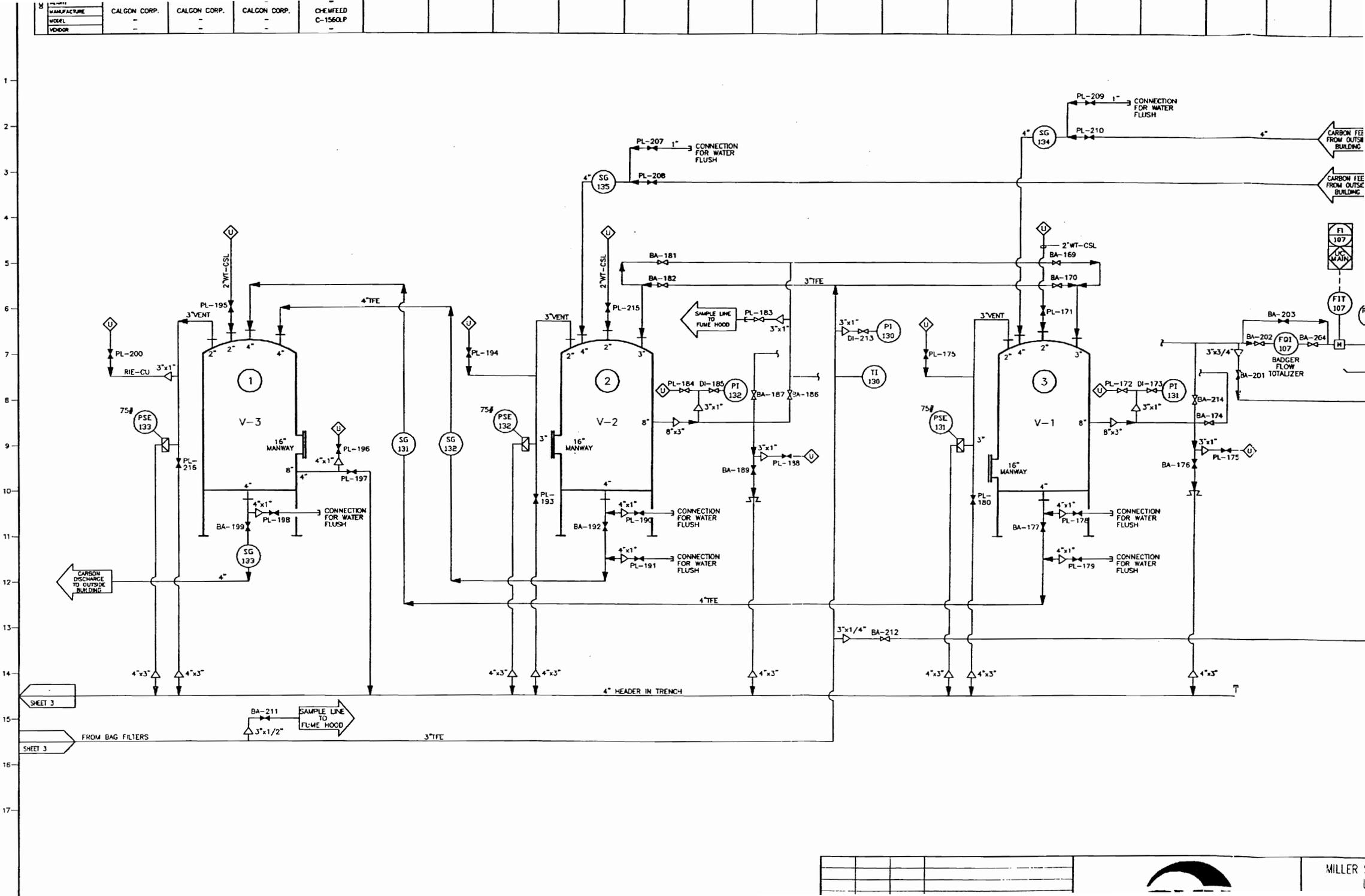

PUMP CHAMBER 2A
WEST WET WELL
PUMP CHAMBER 3A
WEST WET WELL
STORAGE TANK
LC-211
PUMP CHAMBER 1A PUMP A P-211A
PUMP CHAMBER 1A PUMP B P-211B
PUMP CHAMBER 1A
EAST WET WELL
DRAIN LINES
MANHOLE #7 PUMP
P-201
MANHOLE #8 PUMP
P-203
PUMP CHAMBER #2
SOUTH SECTOR
COLLECTION SYSTEM
STORAGE TANK
LC-201
FLOW CHAMBER
SLUDGE TANK
LC-105
SLUDGE TANK
DISCHARGE PUMP
P-105
CLARIFIER
LC-101
FILTER FEED
TANK
LC-107
ACCUMULATOR
CABINET
RAW WATER TANK
LC-106
RAW WATER
FEED PUMP
P-106
FILTER FEED TANK
DISCHARGE PUMP
P-107
SLUDGE TRUCK
LOADING
SLUG STORAGE
TANK No. 1
LC-141
SLUG STORAGE
TANK No. 2
LC-142
SLUG STORAGE
TANK No. 3
LC-143
NORTH
SOUTH
LC-102A
LC-102B
LC-103A
LC-103B
COMPRESSOR
M-110
COMPRESSOR
M-111
DRYER
V-3
V-2
V-1
TRANSFER
TANK V-3
LC-133
CARBON
TANK V-2
LC-132
CARBON
TANK V-1
LC-131

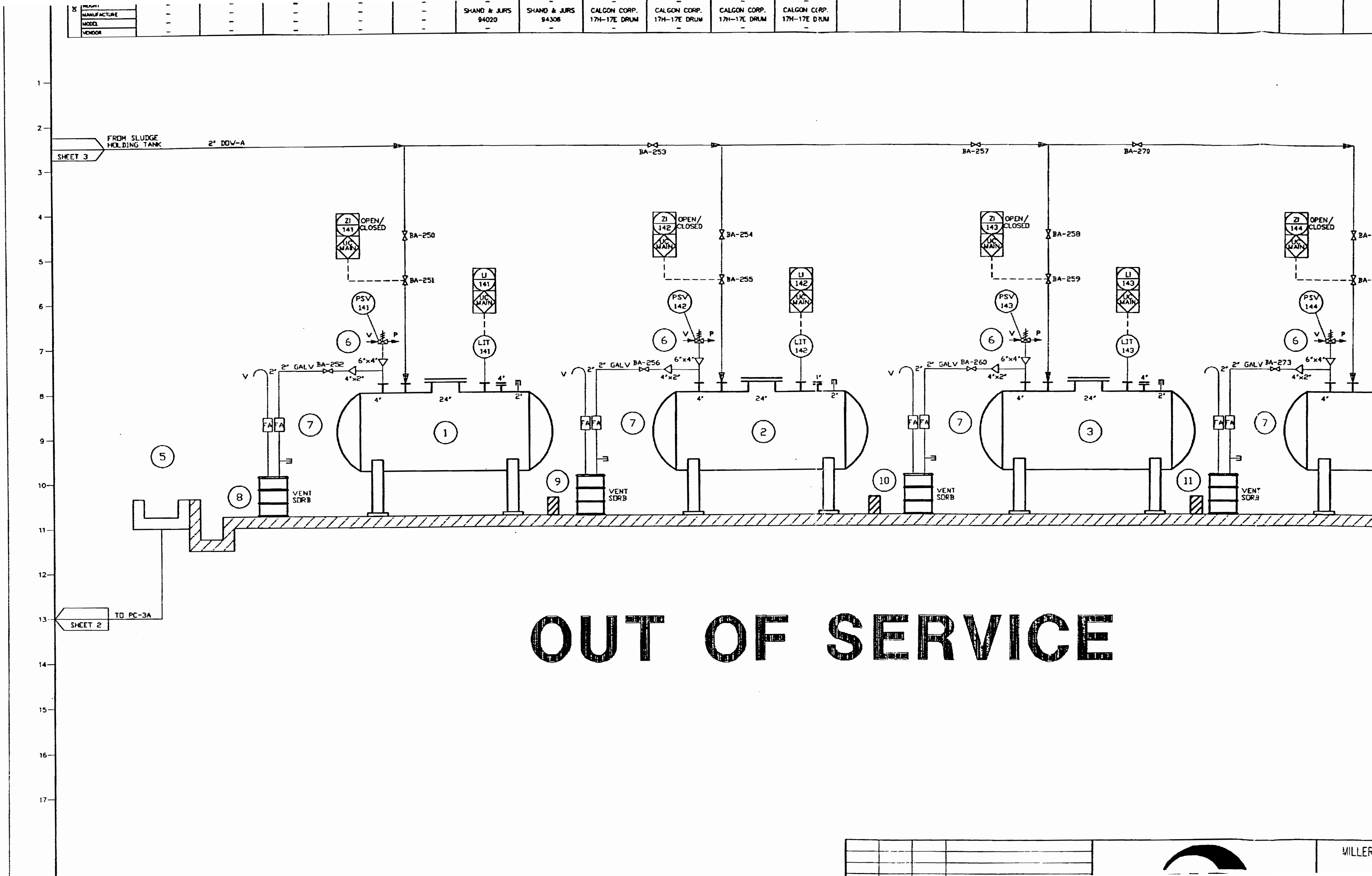

CARBON FILTER VENTING
LIT 201
LIT 203
LIT 205
PUMP CHAMBER #1
PUMP CHAMBER #2
PUMP CHAMBER #3
CH-301
CH-302
CH-303
CH-310
CH-312
BA-320
BA-321
BA-322
BA-323
BA-309
BA-311
CLEAN OUT
CLEAN OUT
60"x40" MH
24" MANHOLE
1% SLOPE
8"PERF VC
DRAIN LINES EAST SIDE
DRAIN LINES WEST SIDE
MH-7 (PC1)
MH-8 (PC2)
INSTRUSION
PANEL
ST/SP
AUTO
OVLD
HOA
RUN
102ND STREET
3"PL VALVE & BOX
PL-304
PL-305
PL-306
FIT 101
FIT 100
4"x2"
3"x4"
2"
3"


MANUFACTURE
MODEL
VENDOR
GOULDS PUMP, INC.
GOULDS 3171ST
CALGON CORP.
17H-17E DRUM
ST/SP
INSTRUSION
PANEL
AUTO
OVLD
HOA
RUN
CARBON VENT SORB
4" DIA. FORCE MAIN
FURAN COATED STL
4" HAST
8" DIA. DRAIN LINE VCES
DRAIN LINES
6" V.C.
CH-332
CH-333
CH-334
CH-335
CH-330
CH-331
PUMP CHAMBER 2A
PUMP CHAMBER 3A
PUMP CHAMBER 1A
CHAMBER CONNECTION
6 TANKS
8'x12'x6' ID
SLOPE
SHEET 1
TO MH8 VIA MH2, MH4 & MH6
MILLER


MANUFACTURE
MODEL
VENDOR
OWENS CORNING 106 MACW
PURE STREAM INC.
OWENS CORNING 83MAC
OWENS CORNING 615MAC
WORTHINGTON RS-25-100
WARREN-RUPP SANDPIPER SEWERT EQUIP. CO.
GAFLO RB2A CUTLER METAL PROD.
GAFLO RB2A CUTLER METAL PROD.
CALGON CORP. 17H-17E DRUM
CALGON CORP. 17H-17E DRUM
CALGON CORP. 17H-17E DRUM
TGG CORP.
94306
GOULDS GGI-230 ESTABROOK
GOULDS GGI-230 ESTABROOK
WORTHINGTON ROLLAIR 40-100
CALGON CORP. 17H-17E DRUM
ATM VENT THRU ROOF
CARBON LOADING PAD
FEED FROM CENTRAL AND NORTH WELLS
SHEET 2
FEED FROM SOUTH WELLS
SHEET 1
4"-SS
FLOW CHAMBER
SAMPLE LINE TO FUME HOOD
3/8 " TUBING
SAMPLE LINE TO FUME HOOD
PC3A SHEET 2
VENT TO ATMOSPHERE
VENT SORB
MAN HOLE
4" HEADER IN TRENCH
SINK
FUME HOOD SINK
RAW WATER SOLNOID VALVE
CLARIFIER SOLNOID VALVE
RIE-CU
DILER
PCV-128
FILTER
OPEN/CLOSED
OPEN
CLOSED
FLAME ARRESTER
LOCAL/REMOTE
AUTO/OFF
S.P.
6"CSL
SOUTH
NORTH
4"CSL
DRYER
BF
MILLER

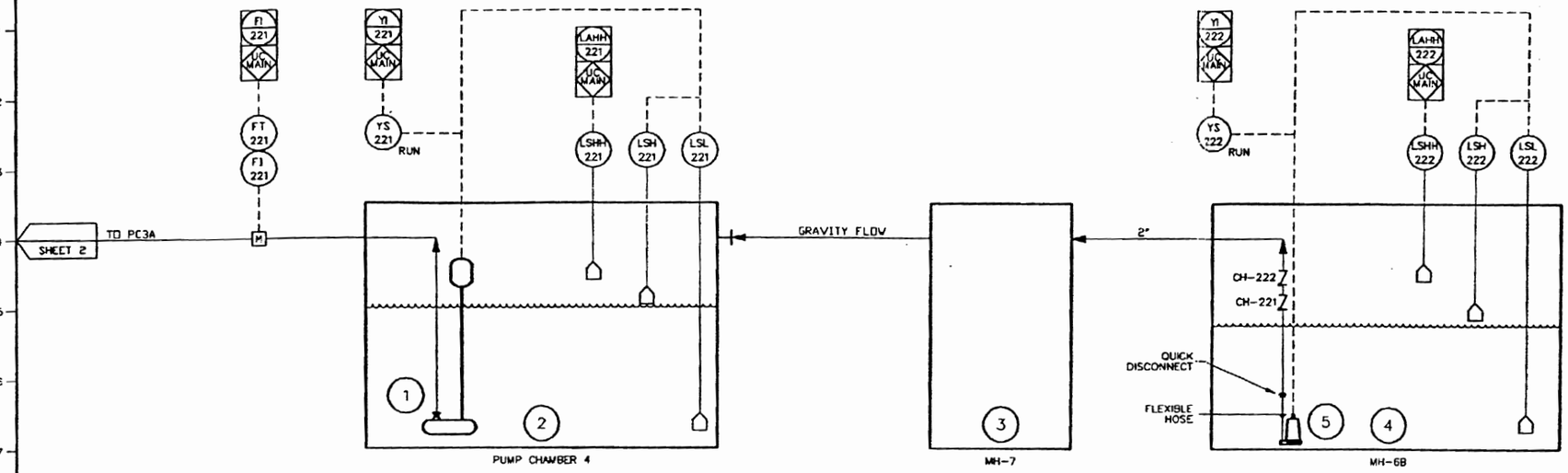
MANUFACTURE	CALGON CORP.	CALGON CORP.	CALGON CORP.
MODEL	–	–	–
VENDOR	–	–	CHEMFEED C-156QLP

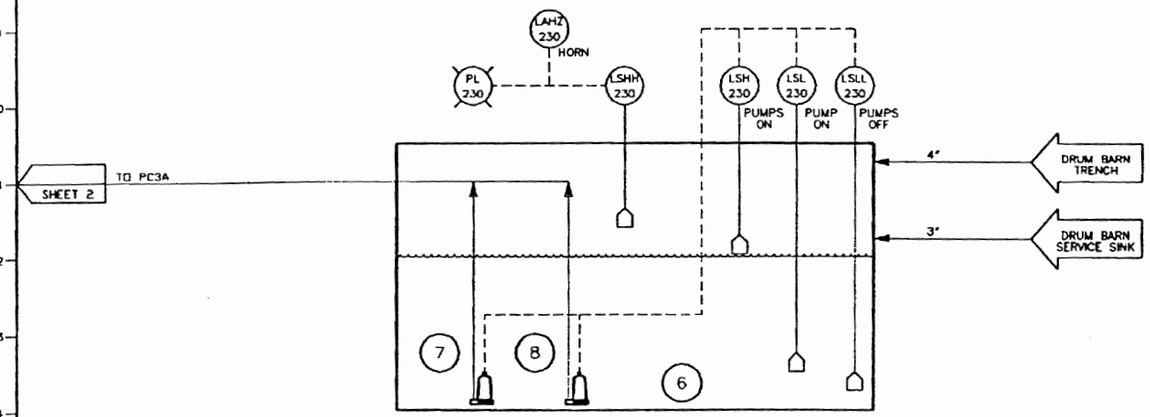


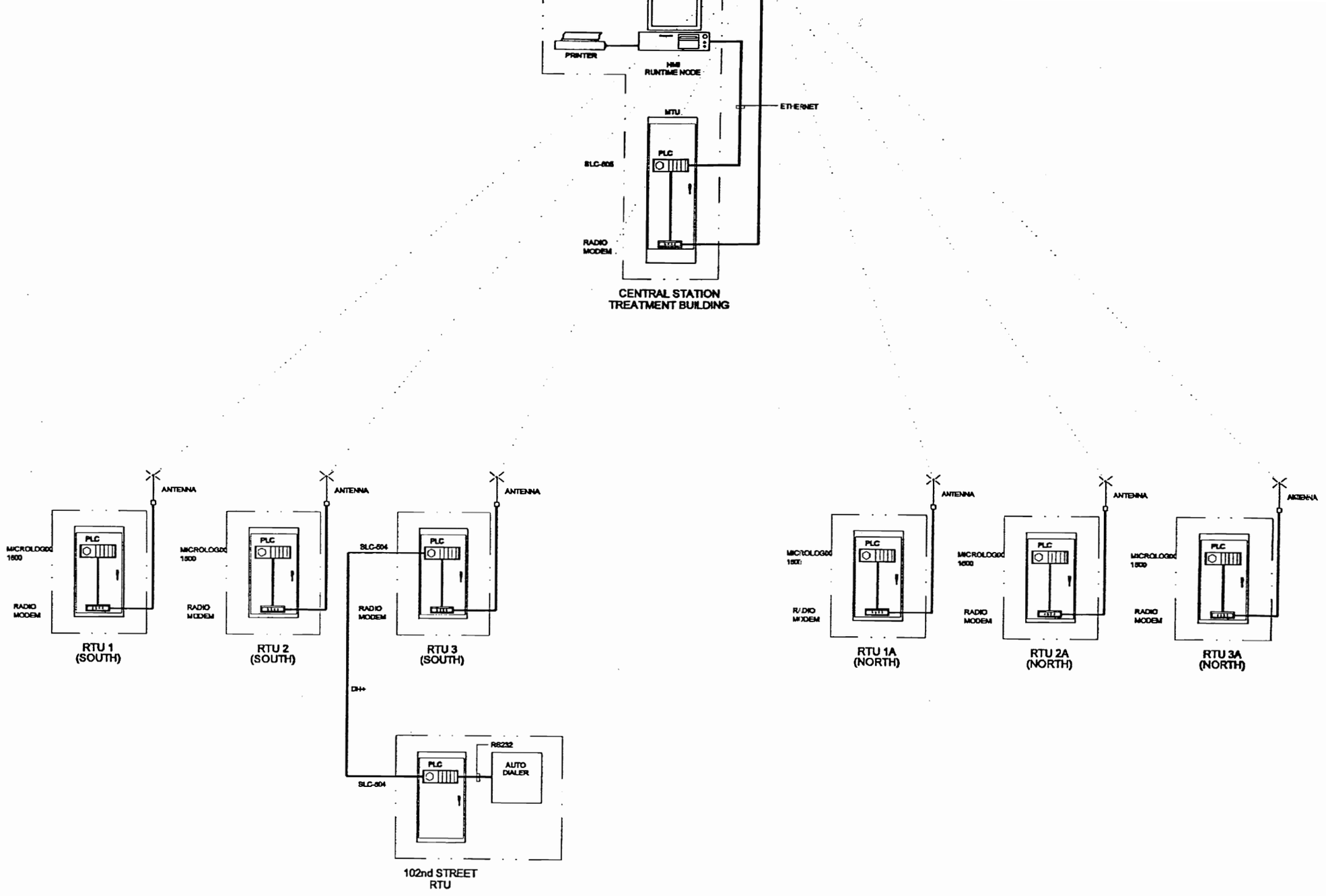


MANUFACTURE
MODEL
VENDOR
SHAND & JURS 94020
SHAND & JURS 94306
CALGON CORP. 17H-17E DRUM
CALGON CORP. 17H-17E DRUM
CALGON CORP. 17H-17E DRUM
CALGON CORP. 17H-17E DRUM
SHEET 3
FROM SLUDGE HOLDING TANK
2" DOV-A
BA-250
BA-251
BA-252
BA-253
BA-254
BA-255
BA-256
BA-257
BA-258
BA-259
BA-260
BA-270
BA-273
ZI 141 OPEN/CLOSED
ZI 142 OPEN/CLOSED
ZI 143 OPEN/CLOSED
ZI 144 OPEN/CLOSED
UC MAIN
LI 141
LI 142
LI 143
LIT 141
LIT 142
LIT 143
PSV 141
PSV 142
PSV 143
PSV 144
2" GALV
6"x4"
4"x2"
24"
VENT SORB
FA
SHEET 2
TO PC-3A
OUT OF SERVICE
MILLER

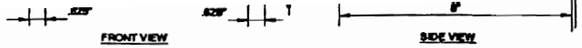
DESIGN																							
WEIGHT																							
MANUFACTURE	WEIL				2HP/460/1750		2HP/460/	2HP/460/															
MODEL																							
VENDOR																							



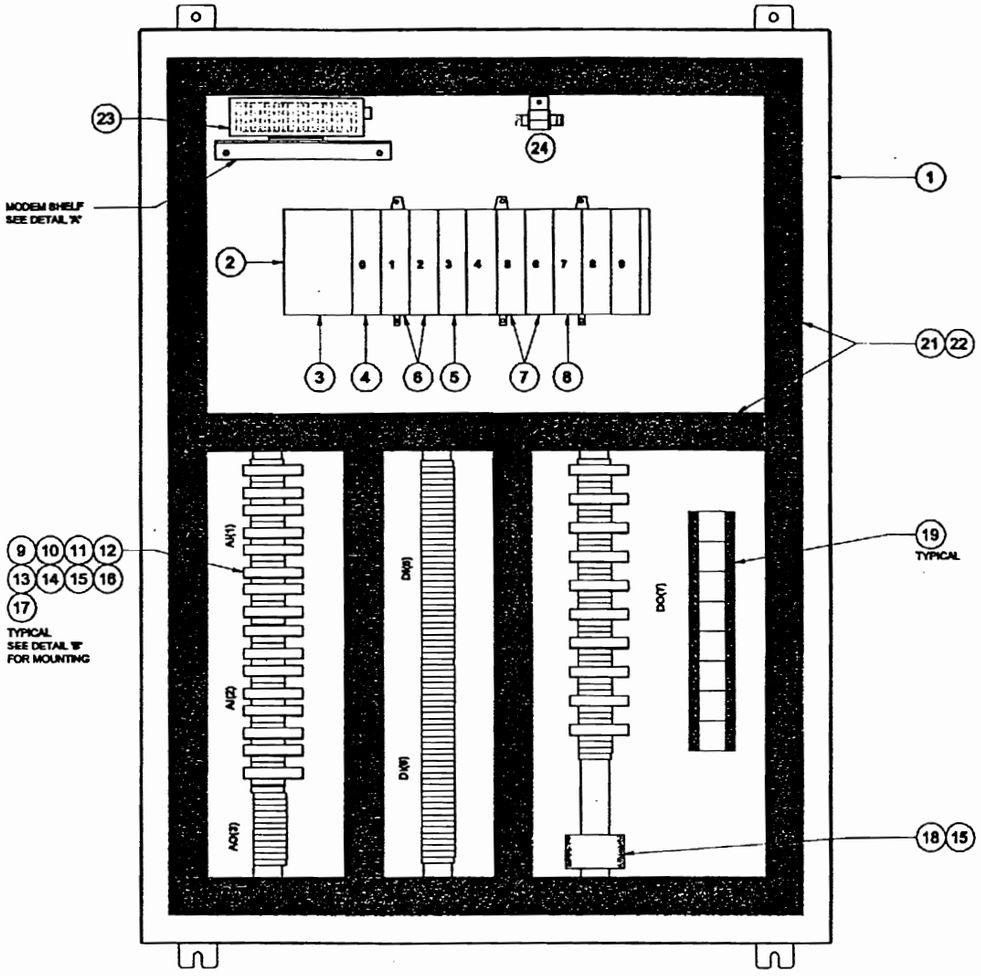



PRINTER
HMI
RUNTIME NODE
ETHERNET
MTU
PLC
SLC-505
RADIO
MODEM
CENTRAL STATION
TREATMENT BUILDING
ANTENNA
MICROLOGIX
1500
PLC
RADIO
MODEM
RTU 1
(SOUTH)
RTU 2
(SOUTH)
SLC-504
RTU 3
(SOUTH)
DH+
RS232
AUTO
DIALER
102nd STREET
RTU
RTU 1A
(NORTH)
RTU 2A
(NORTH)
RTU 3A
(NORTH)

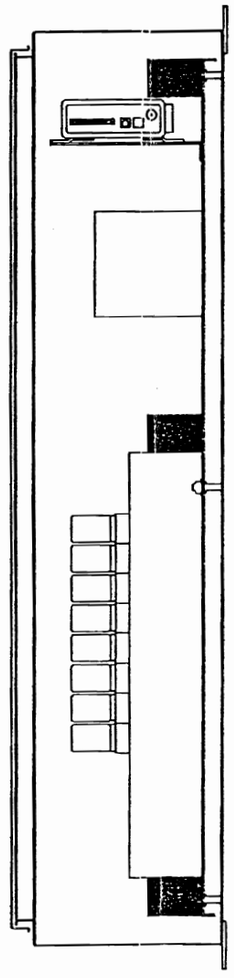
MILLER



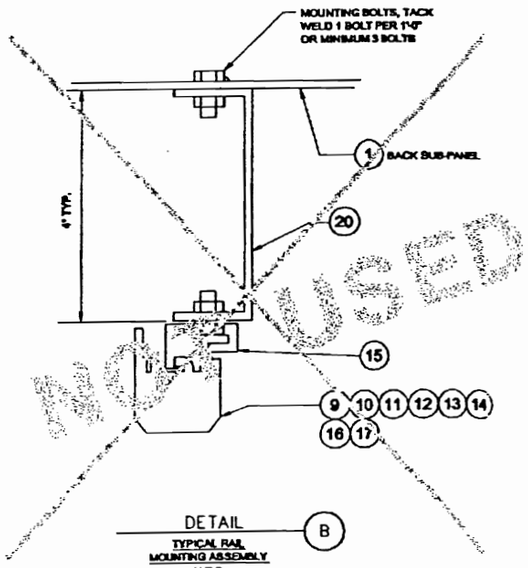
DETAIL A
MODEM SHELF
N.T.S.



FRONT VIEW
WITH DOORS REMOVED



SIDE VIEW
LOOKING THRU RIGHT SIDE



DETAIL B
TYPICAL RAIL
MOUNTING ASSEMBLY
N.T.S.

★ 5
★ 6
★ 7
★ 8
★ 9
★ 10
★ 11
★ 12
★ 13
★ 14
★ 15
★ 16
★ 17
★ 18
★ 19
★ 20
★ 21
★ 22
★ 23
★ 24
25

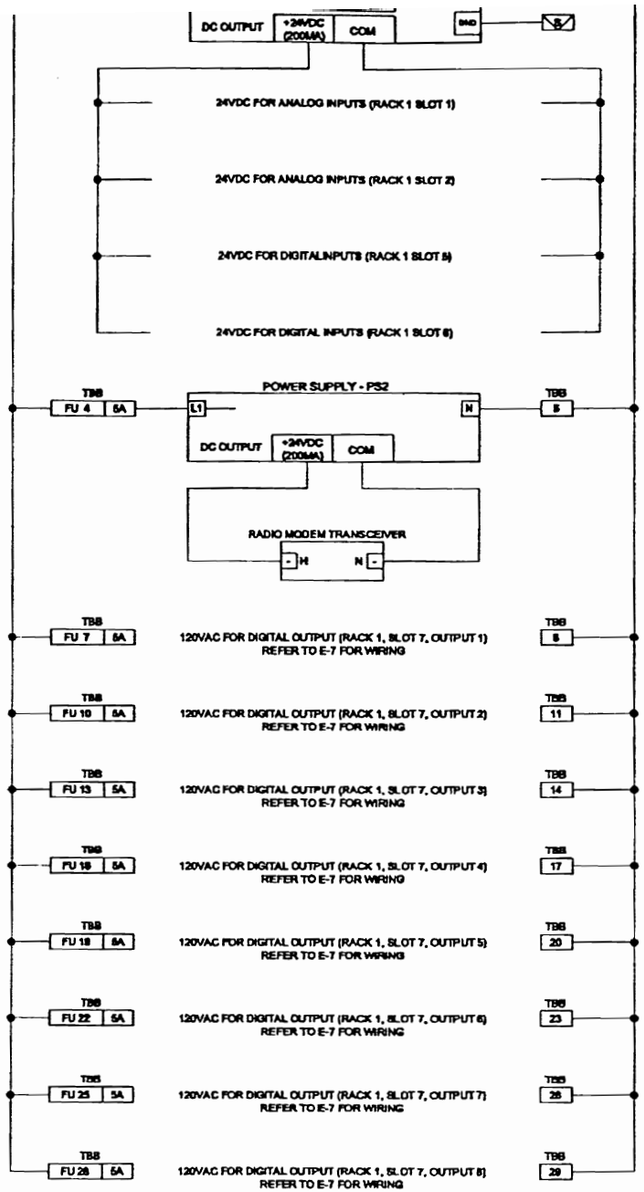
★ INDICATES

GENERAL NO

1. ALL WIRING SHALL B
120VAC - #14 AW
24VDC (POWER)
24VDC (ANALOG)
24VDC (DIGITAL)

2. CONNECTIONS SHAL
WIRING DIAGRAMS

MILLER



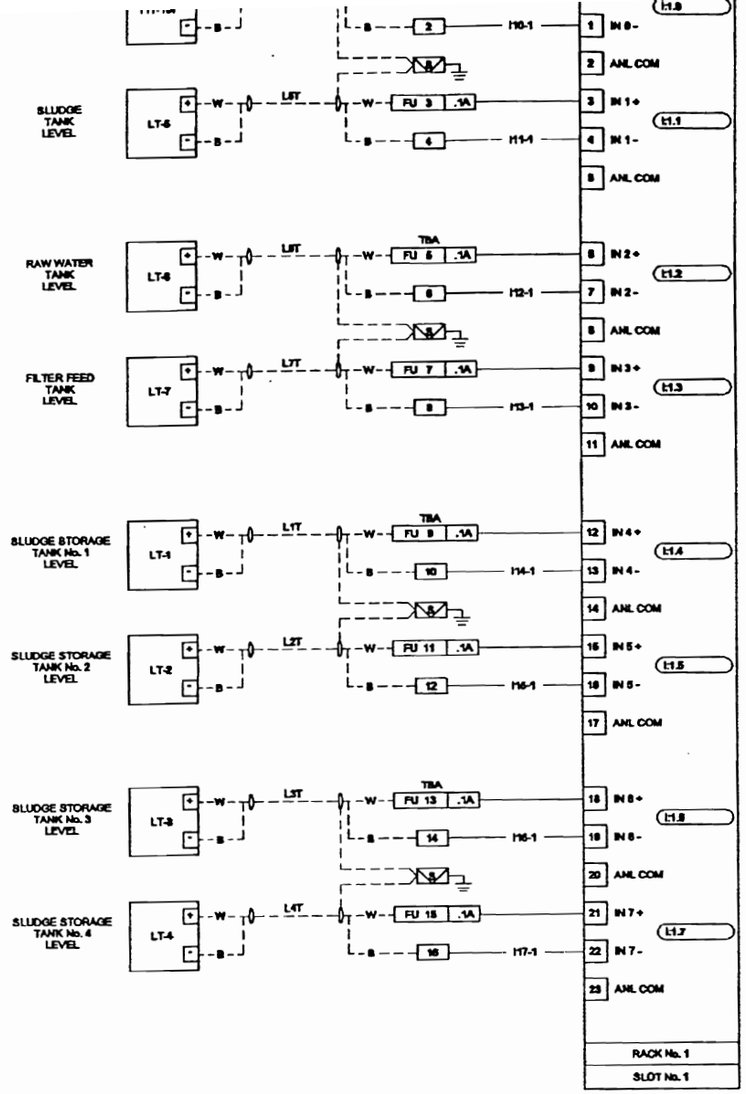
LEGEND

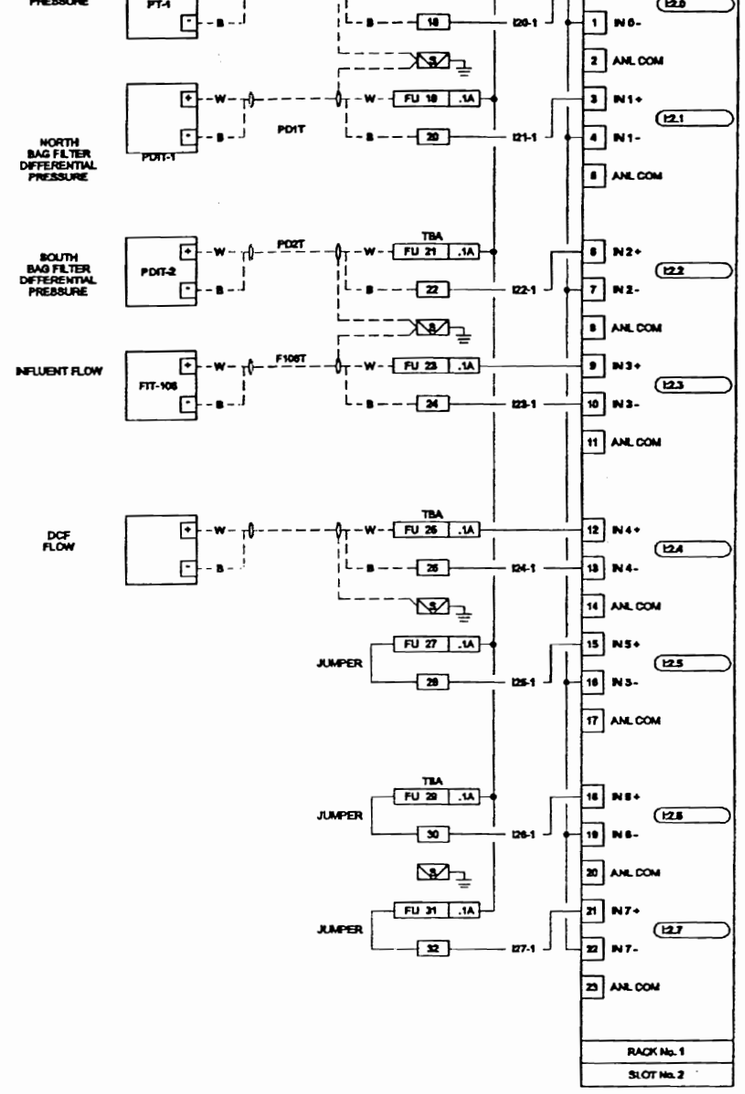
- - - - INDICATES FIELD WIRING

o INDICATES FIELD DEVICE TERMINAL

□ INDICATES PLC CABINET TERMINAL

MILLER

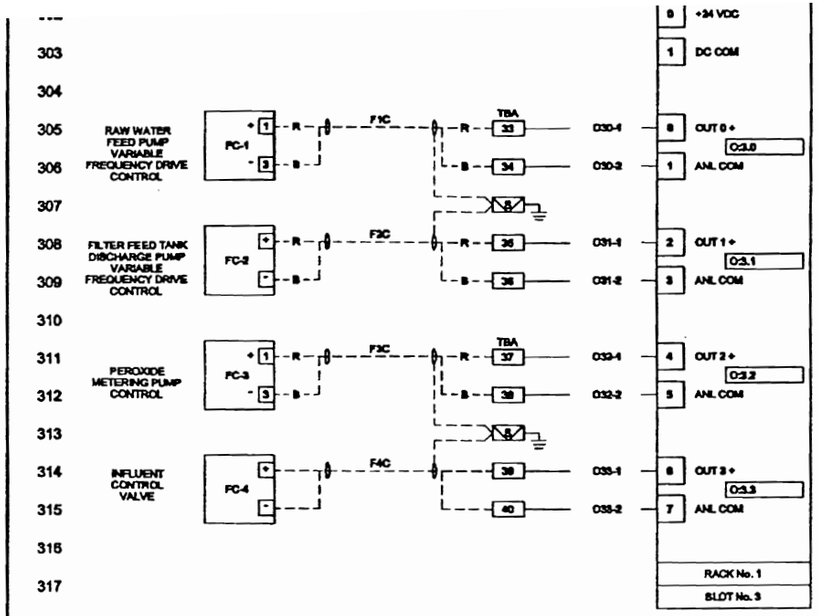




LEGEND

- INDICATES FIELD WIRING
- o INDICATES FIELD DEVICE TERMINAL
- □ INDICATES PLC CABINET TERMINAL

MILLER



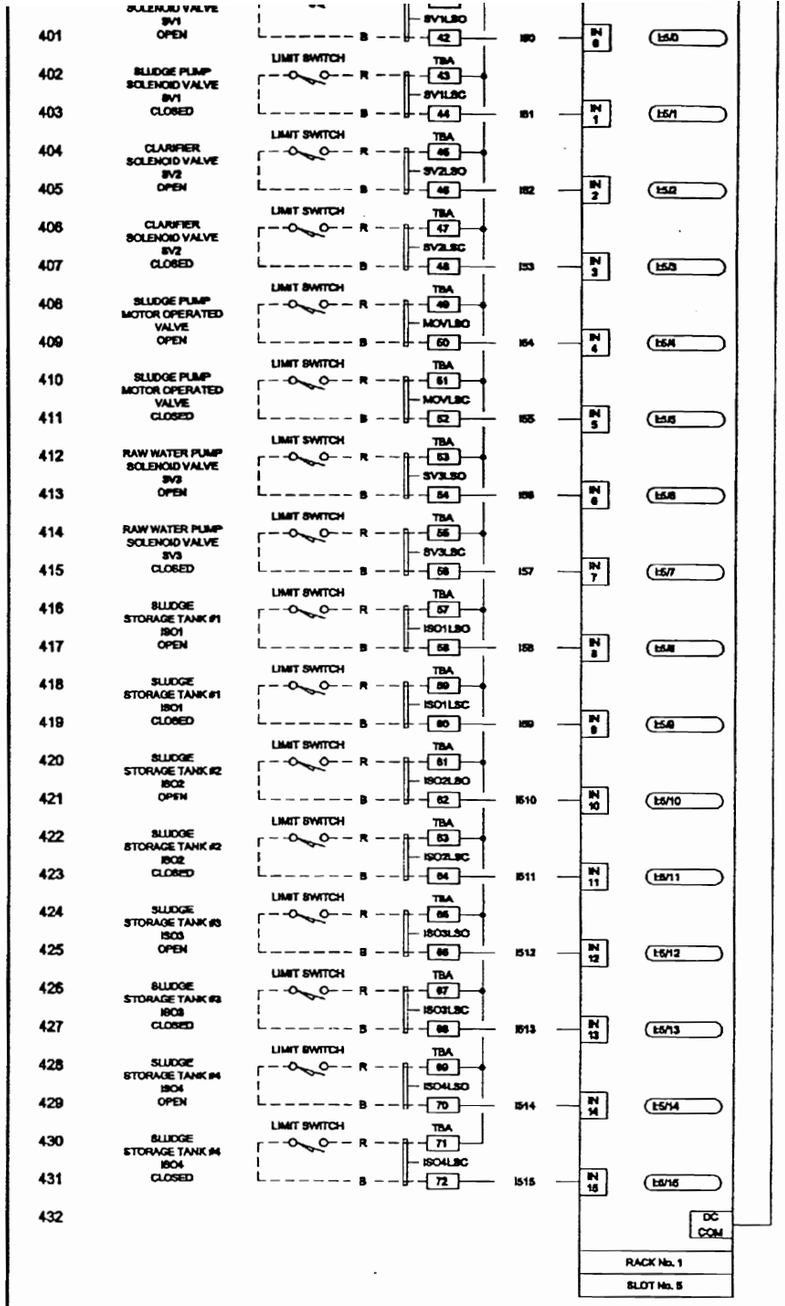
LEGEND

- - - - INDICATES FIELD WIRING

o INDICATES FIELD DEVICE TERMINAL

□ INDICATES PLC CABINET TERMINAL

MILLER S


401 SOLENOID VALVE SV1 OPEN
402 SLUDGE PUMP SOLENOID VALVE SV1 CLOSED
403
404 CLARIFIER SOLENOID VALVE SV2 OPEN
405
406 CLARIFIER SOLENOID VALVE SV2 CLOSED
407
408 SLUDGE PUMP MOTOR OPERATED VALVE OPEN
409
410 SLUDGE PUMP MOTOR OPERATED VALVE CLOSED
411
412 RAW WATER PUMP SOLENOID VALVE SV3 OPEN
413
414 RAW WATER PUMP SOLENOID VALVE SV3 CLOSED
415
416 SLUDGE STORAGE TANK #1 ISO1 OPEN
417
418 SLUDGE STORAGE TANK #1 ISO1 CLOSED
419
420 SLUDGE STORAGE TANK #2 ISO2 OPEN
421
422 SLUDGE STORAGE TANK #2 ISO2 CLOSED
423
424 SLUDGE STORAGE TANK #3 ISO3 OPEN
425
426 SLUDGE STORAGE TANK #3 ISO3 CLOSED
427
428 SLUDGE STORAGE TANK #4 ISO4 OPEN
429
430 SLUDGE STORAGE TANK #4 ISO4 CLOSED
431
432
LIMIT SWITCH
R
B
TBA
SV1LSO
SV1LSC
SV2LSO
SV2LSC
MOV1LSO
MOV1LSC
SV3LSO
SV3LSC
ISO1LSO
ISO1LSC
ISO2LSO
ISO2LSC
ISO3LSO
ISO3LSC
ISO4LSO
ISO4LSC
42
43
44
46
47
48
49
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61
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63
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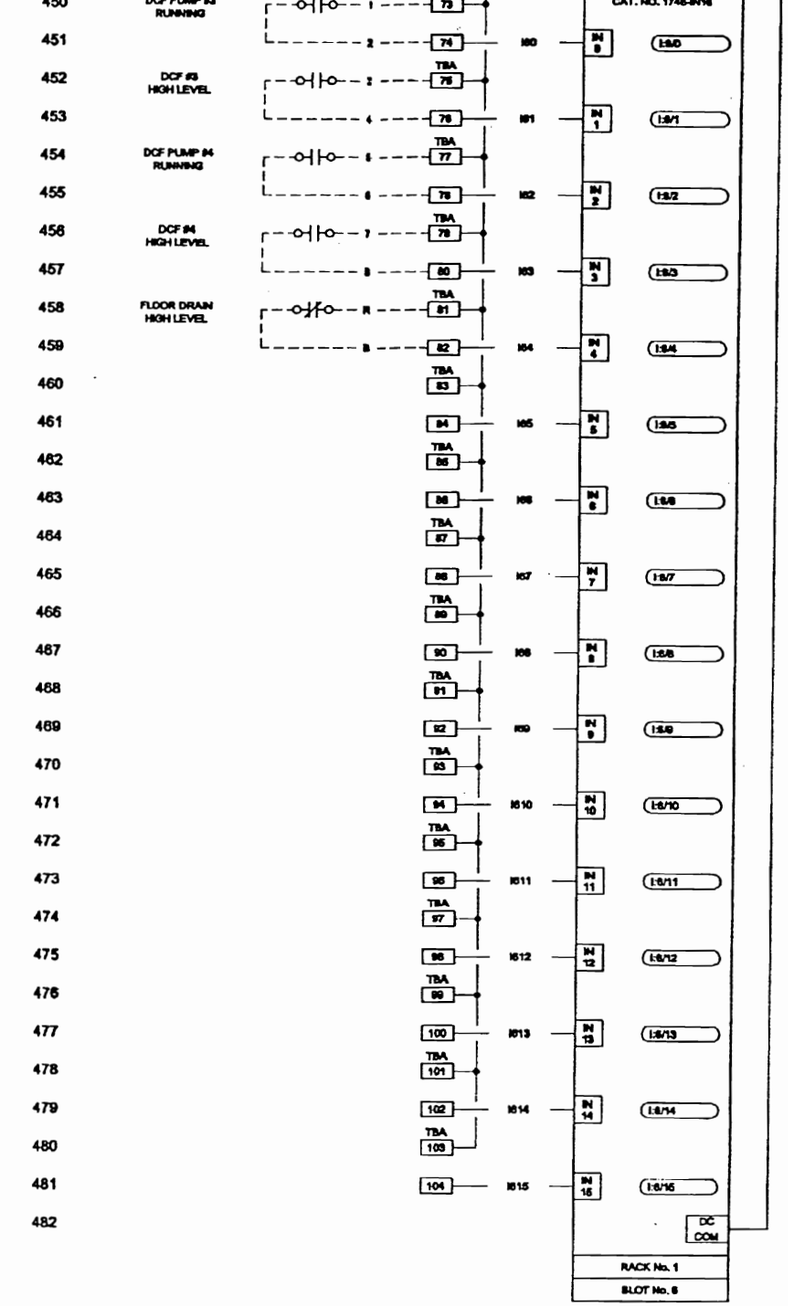
66
67
68
69
70
71
72
I:5/0
I:5/1
I:5/2
I:5/3
I:5/4
I:5/5
I:5/6
I:5/7
I:5/8
I:5/9
I:5/10
I:5/11
I:5/12
I:5/13
I:5/14
I:5/15
IN 0
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
IN 7
IN 8
IN 9
IN 10
IN 11
IN 12
IN 13
IN 14
IN 15
DC COM
RACK No. 1
SLOT No. 5


450 DCF PUMP #3 RUNNING
451
452 DCF #3 HIGH LEVEL
453
454 DCF PUMP #4 RUNNING
455
456 DCF #4 HIGH LEVEL
457
458 FLOOR DRAIN HIGH LEVEL
459
460
461
462
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472
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477
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481
482
CAT. NO. 1746-IN16
TBA
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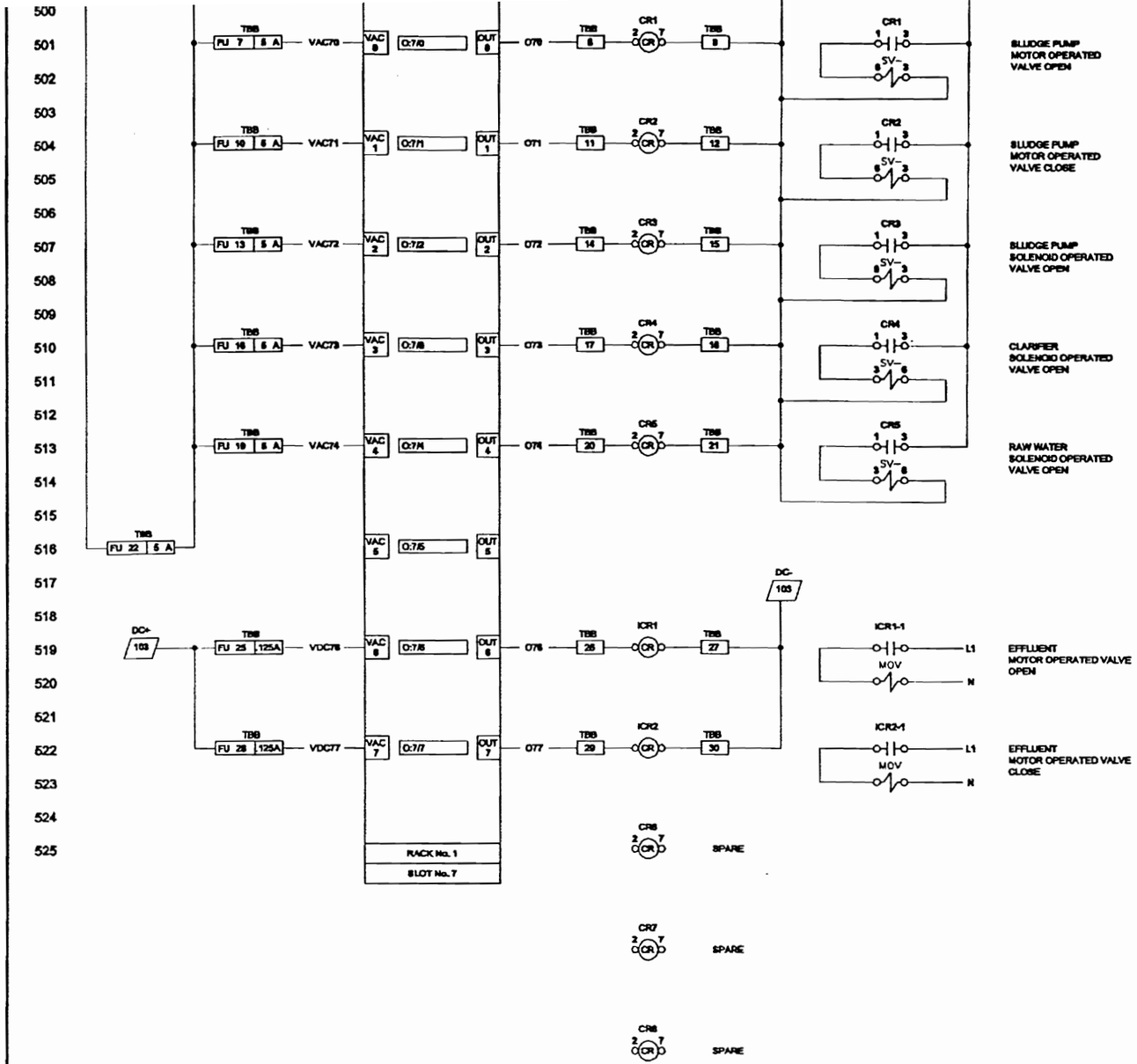
100
101
102
103
104
I:6/0
I:6/1
I:6/2
I:6/3
I:6/4
I:6/5
I:6/6
I:6/7
I:6/8
I:6/9
I:6/10
I:6/11
I:6/12
I:6/13
I:6/14
I:6/15
IN 0
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
IN 7
IN 8
IN 9
IN 10
IN 11
IN 12
IN 13
IN 14
IN 15
DC COM
RACK No. 1
SLOT No. 6

MILLER



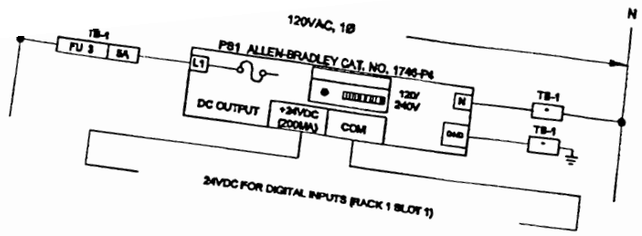
LEGEND

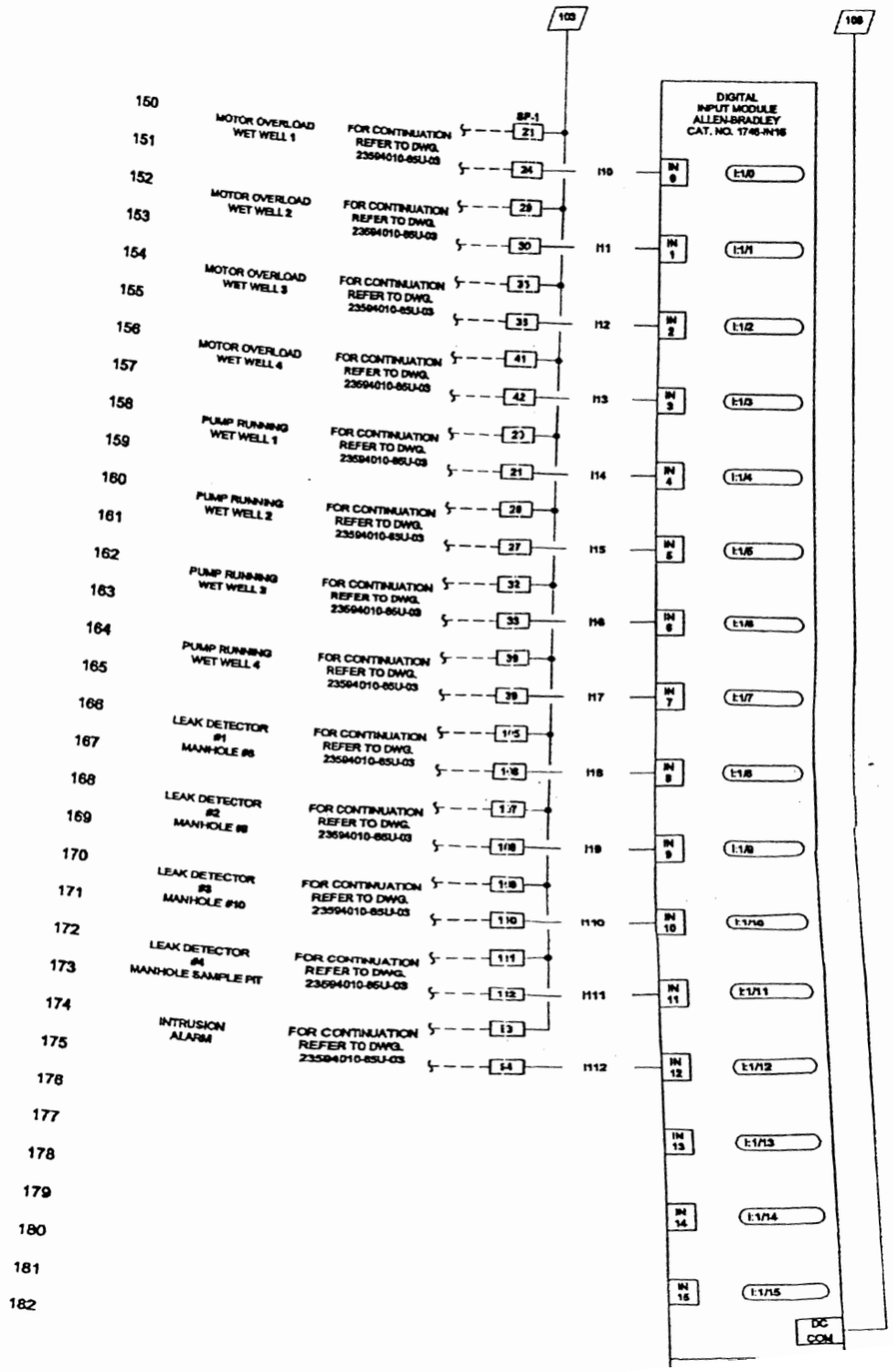
- - - - INDICATES FIELD WIRING

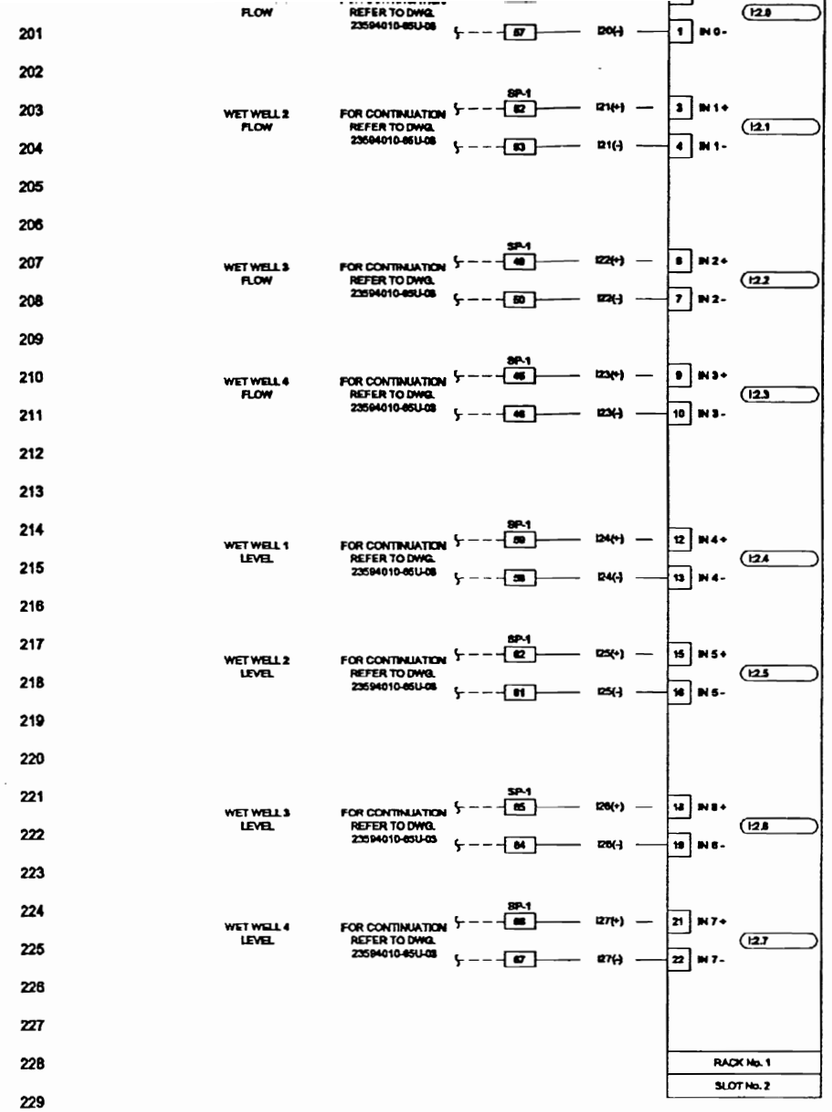
○ INDICATES FIELD DEVICE TERMINAL

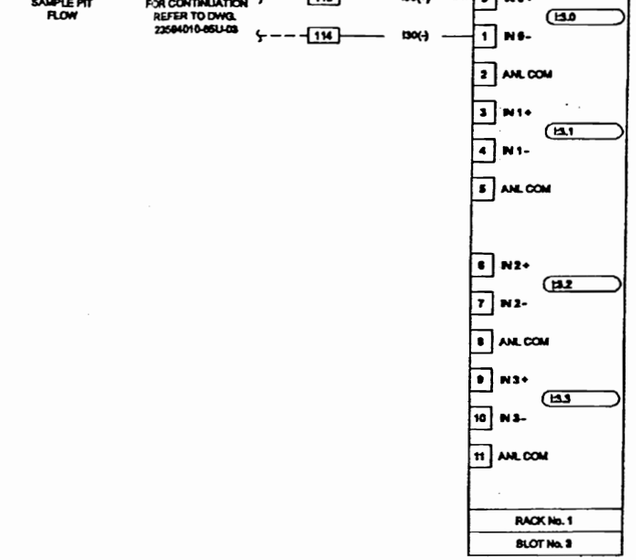
□ INDICATES PLC CABINET TERMINAL

MILLER S


120VAC, 1Ø
N
TB-1
FU 3
8A
L1
PS1 ALLEN-BRADLEY CAT. NO. 1746-P4
DC OUTPUT
+24VDC (200MA)
COM
120/ 240V
N
GND
TB-1
TB-1
24VDC FOR DIGITAL INPUTS (RACK 1 SLOT 1)


105
106
DIGITAL INPUT MODULE ALLEN-BRADLEY CAT. NO. 1746-IN16
MOTOR OVERLOAD WET WELL 1
MOTOR OVERLOAD WET WELL 2
MOTOR OVERLOAD WET WELL 3
MOTOR OVERLOAD WET WELL 4
PUMP RUNNING WET WELL 1
PUMP RUNNING WET WELL 2
PUMP RUNNING WET WELL 3
PUMP RUNNING WET WELL 4
LEAK DETECTOR #1 MANHOLE #8
LEAK DETECTOR #2 MANHOLE #9
LEAK DETECTOR #3 MANHOLE #10
LEAK DETECTOR #4 MANHOLE SAMPLE PIT
INTRUSION ALARM
FOR CONTINUATION REFER TO DWG. 23594010-85U-03
BP-1
I:1/0
I:1/1
I:1/2
I:1/3
I:1/4
I:1/5
I:1/6
I:1/7
I:1/8
I:1/9
I:1/10
I:1/11
I:1/12
I:1/13
I:1/14
I:1/15
DC COM

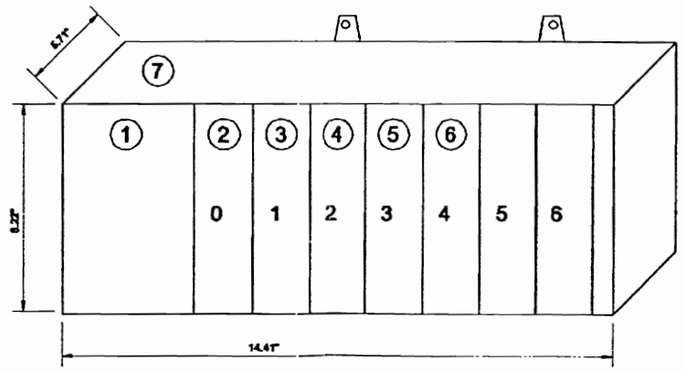




LEG
INDI
INDI
INDI

MILLER SPRIN
LOVE

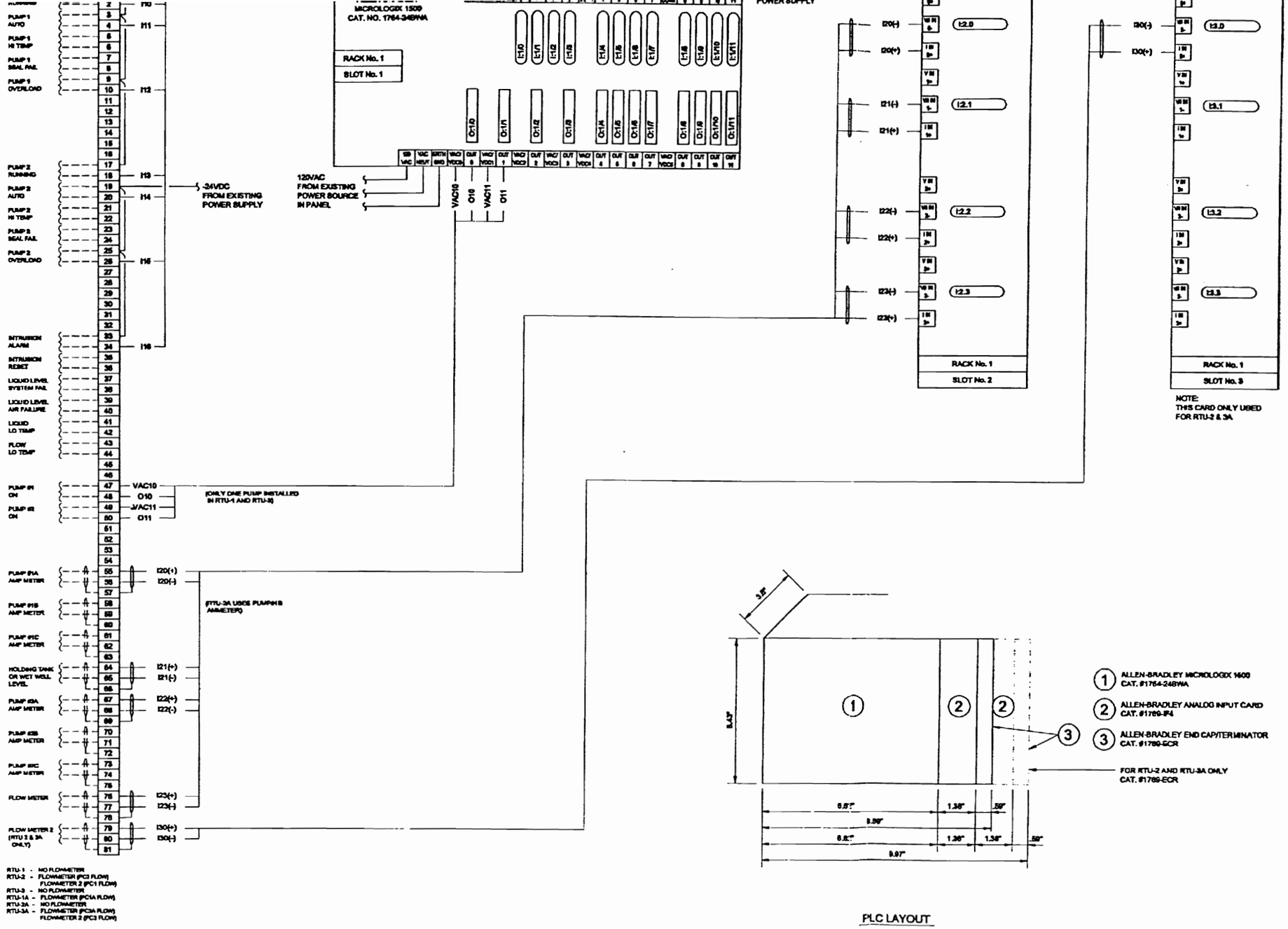
300										
301	STOP WELL PUMP 4	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-180	TB-3 1	VAC40	VAC 0	O:4/0	OUT 0	O40	SP-1/84X 1	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-100
302										
303										
304	STOP WELL PUMP 3	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-180	TB-3 2	VAC41	VAC 1	O:4/1	OUT 1	O41	SP-1/84X 2	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-100
305										
306										
307	STOP WELL PUMP 2	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-180	TB-3 3	VAC42	VAC 2	O:4/2	OUT 2	O42	SP-1/84X 3	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-100
308										
309										
310	STOP WELL PUMP 1	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-180	TB-3 4	VAC43	VAC 3	O:4/3	OUT 3	O43	SP-1/84X 4	FOR CONTINUATION REFER TO DWG. 23584010-SK-270-100
311										
312										
313					VAC 4	O:4/4	OUT 4			
314										
315										
316					VAC 5	O:4/5	OUT 5			
317										
318										
319					VAC 6	O:4/6	OUT 6			
320										
321										
322					VAC 7	O:4/7	OUT 7			
323										
324										
325						RACK No. 1				
						SLOT No. 4				



1. ALLEN-BRADLEY POWER SUPPLY CAT. #1746-P4
2. ALLEN-BRADLEY SLC-504 PROCESSOR CAT. #1747-L541
3. ALLEN-BRADLEY DIGITAL INPUT CARD CAT. #1746-IN16
4. ALLEN-BRADLEY ANALOG INPUT CARD CAT. #1746-NI8
5. ALLEN-BRADLEY ANALOG INPUT CARD CAT. #1746-NI4
6. ALLEN-BRADLEY DIGITAL OUTPUT CARD CAT. #1746-OX8
7. ALLEN-BRADLEY 7-SLOT CHASSIS CAT. #1746-A7

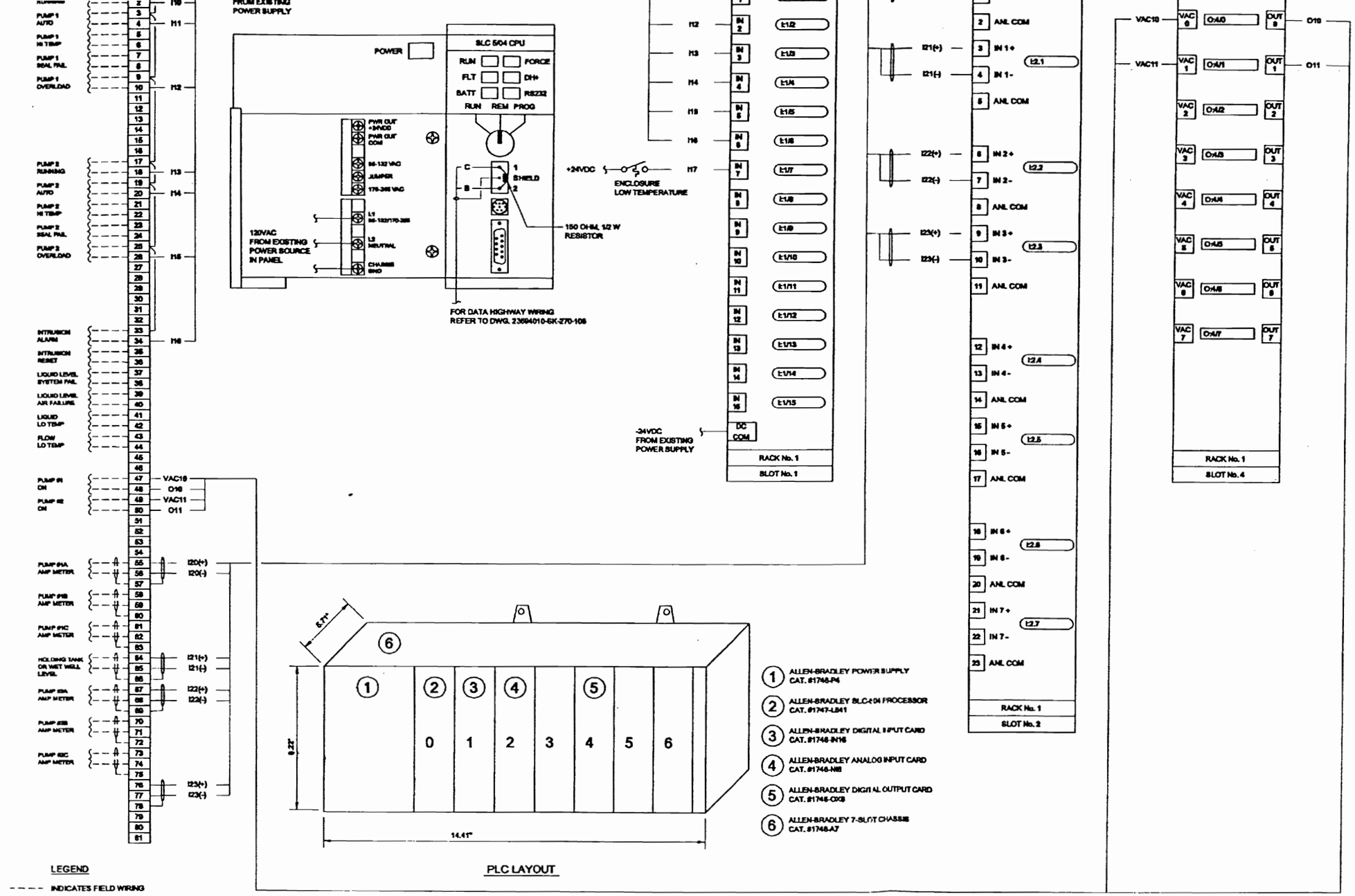
PLC LAYOUT

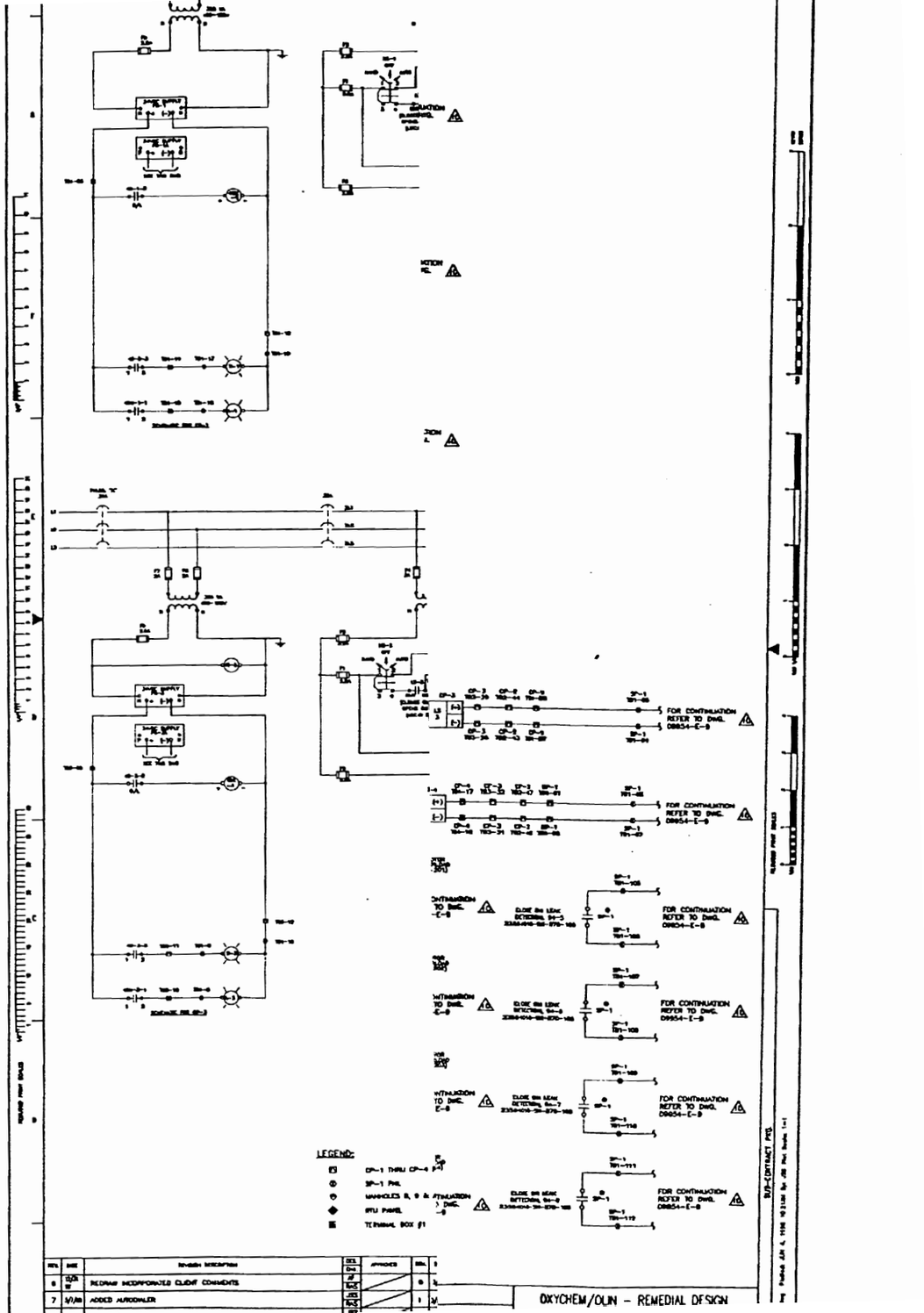
MILLER SPRIN
LOVE

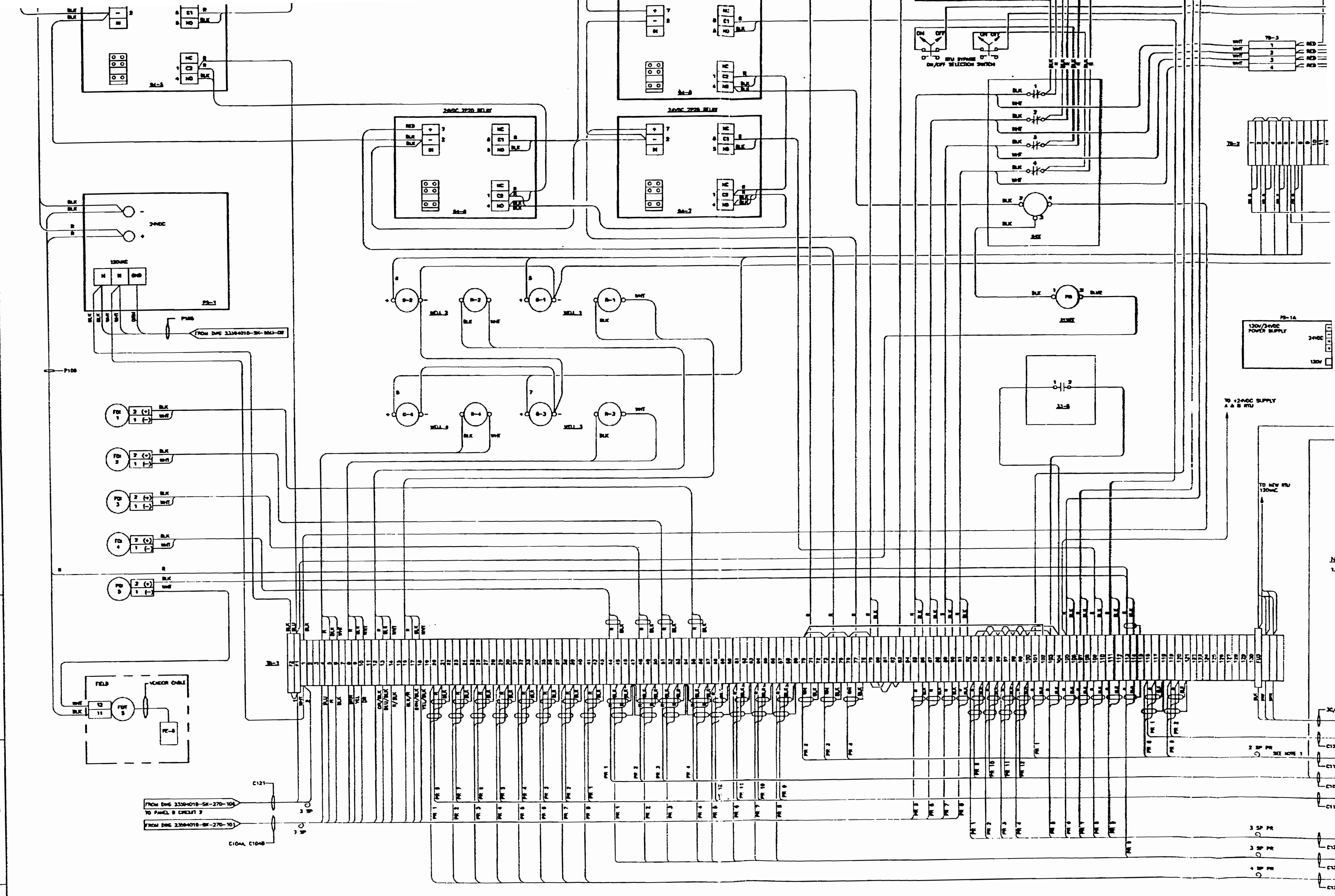


PLC LAYOUT

MILLER SP
LO


SLC 5/04 CPU
POWER
RUN
FORCE
FLT
DH+
BATT
RS232
RUN REM PROG
120VAC FROM EXISTING POWER SOURCE IN PANEL
150 OHM, 1/2 W RESISTOR
+24VDC
ENCLOSURE LOW TEMPERATURE
-24VDC FROM EXISTING POWER SUPPLY
FOR DATA HIGHWAY WIRING REFER TO DWG. 23694010-SK-Z70-108
RACK No. 1
SLOT No. 1
RACK No. 1
SLOT No. 2
RACK No. 1
SLOT No. 4
PUMP 1 AUTO
PUMP 1 HI TEMP
PUMP 1 SEAL FAIL
PUMP 1 OVERLOAD
PUMP 2 RUNNING
PUMP 2 AUTO
PUMP 2 HI TEMP
PUMP 2 SEAL FAIL
PUMP 3 OVERLOAD
INTRUSION ALARM
INTRUSION RESET
LIQUID LEVEL SYSTEM FAIL
LIQUID LEVEL AIR FAILURE
LIQUID LO TEMP
FLOW LO TEMP
PUMP #1 ON
PUMP #2 ON
PUMP #1A AMP METER
PUMP #1B AMP METER
PUMP #1C AMP METER
HOLDING TANK OR WET WELL LEVEL
PUMP #2A AMP METER
PUMP #2B AMP METER
PUMP #2C AMP METER
ANL COM
IN 1 +
IN 1 -
IN 2 +
IN 2 -
IN 3 +
IN 3 -
IN 4 +
IN 4 -
IN 5 +
IN 5 -
IN 6 +
IN 6 -
IN 7 +
IN 7 -
DC COM
VAC
OUT
ALLEN-BRADLEY POWER SUPPLY CAT. 81746-P4
ALLEN-BRADLEY SLC-504 PROCESSOR CAT. 81747-L541
ALLEN-BRADLEY DIGITAL INPUT CARD CAT. 81746-IN16
ALLEN-BRADLEY ANALOG INPUT CARD CAT. 81746-NI8
ALLEN-BRADLEY DIGITAL OUTPUT CARD CAT. 81746-OX8
ALLEN-BRADLEY 7-SLOT CHASSIS CAT. 81746-A7
6.77"
9.22"
14.41"
PLC LAYOUT
LEGEND
INDICATES FIELD WIRING
INDICATES FIELD DEVICE TERMINAL
INDICATES PLC CABINET TERMINAL


FOR CONTINUATION REFER TO DWG. D9854-E-8
LEGEND:
OXYCHEM/OLIN - REMEDIAL DESIGN



REV.	DATE	REVISION DESCRIPTION	DES. / CHK.	APPROVED	REV.	DATE	REVISION DESCRIPTION	DES. / CHK.	APPROVED	[illegible]	REFERENCE DRAWINGS
6	5/7/98	ADDED AUTODIALER	JSS / RAS		0	3/4/97	ISSUED FOR APPROVAL	DED / AKT	TWH 3/4/97		
7	5/3/98	AS BUILT	JSS / AKT		1	3/21/97	ISSUED FOR APPROVAL	DEG / AKT	TWH 3/21/97		

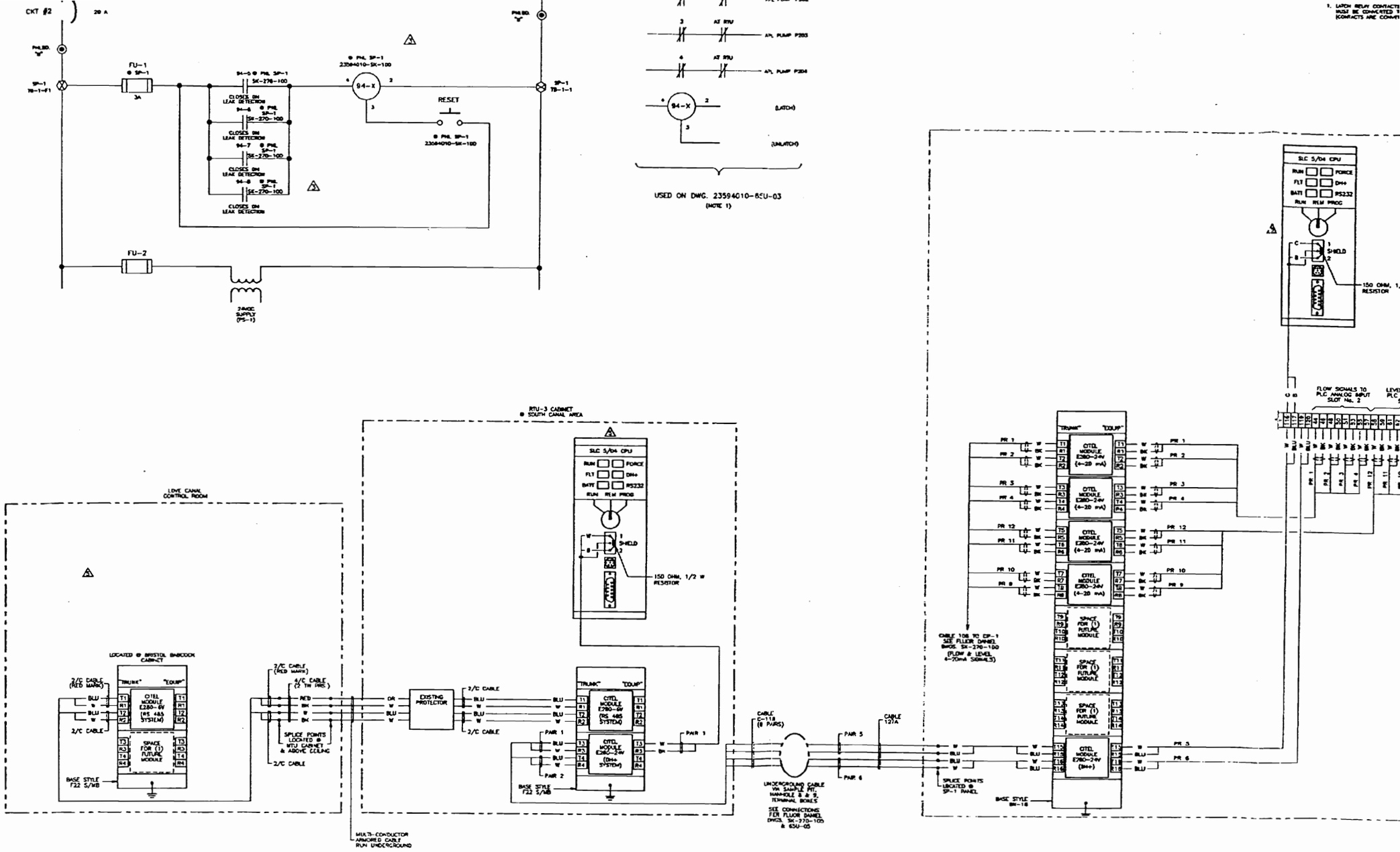
[illegible]	REFERENCE DRAWINGS
2350-4010-SK-270-001	CONTROL PANEL (SP-1)
2350-4010-E3W-03	ELEMENTARY WIRING DIAGRAM

FLUOR DANIEL

JRC

PG

OXYCHEM/
102nd



NO.	DATE	REVISION DESCRIPTION	DES CHK	APPROVED
6	08-30-00	C&A SERVICES - UPDATED DWG. FOR LOVE CANAL PLC REPLACEMENT AS BUILT	DLK SM	

NO.	DATE	REVISION DESCRIPTION	DES CHK	APPROVED
0	6/15/99	ISSUED FOR APPROVAL	DLK RJB	
1	12/1/99	ETHERNET SCOPE CHANGE	DLK RJB	
2	12/6/99	ISSUED FOR CONSTRUCTION	DLK RJB	

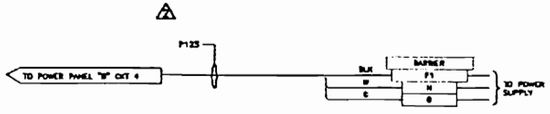
REFERENCE DRAWINGS	DWG NO.	REFERENCE DRAWINGS
	23594010-SK-270-001	CONTROL PANEL (SP-1)

FLUOR DANIEL

OXYCHEM/
102nd
NIAGA

		RTU		SP-1	SP-1/1B3	SP-1/94X
	DESCRIPTION	CARD NO	TERMINAL NO	TERMINAL NO	TERMINAL NO	TERMINAL NO
DIGITAL	INTRUSION CP-4	1	TB2-1, TB2-2	87		
			TB3-1, TB2-3	88		
	INTRUSION CP-3	1	TB3-1, TB2-3	95		
			TB2-1, TB2-3	96		
	INTRUSION CP-2	1	TB3-1, TB2-3	98		
			TB3-1, TB2-3	100		
	INTRUSION CP-1	1	TB2-1, TB2-3	83		
			TB3-1, TB2-3	84		
	INTRUSION SP-1	1	TB3-1, TB2-3	103		
			TB2-1, TB2-3	104		
DIGITAL	MOTOR OVERLOAD WET WELL 4	1	TB1-1	41		
			TB1-3	42		
	MOTOR OVERLOAD WET WELL 3	1	TB2-1	36		
			TB2-3	38		
	MOTOR OVERLOAD WET WELL 2	1	TB1-1	28		
			TB1-3	30		
	MOTOR OVERLOAD WET WELL 1	1	TB2-4	33		
			TB2-5	34		
DIGITAL	PUMP RUNNING WET WELL 4	1	TB1-4	38		
			TB1-5	39		
	PUMP RUNNING WET WELL 3	1	TB2-4	33		
			TB2-6	33		
	PUMP RUNNING WET WELL 2	1	TB1-4	36		
			TB1-6	37		
	PUMP RUNNING WET WELL 1	1	TB2-7	20		
			TB2-6	21		
DIGITAL	LEAK DETECTOR #1 MANHOLE #8	1	TB1-7	105		
			TB1-8	106		
	LEAK DETECTOR #2 MANHOLE #8	1	TB2-7	107		
			TB2-9	108		
	LEAK DETECTOR #3 MANHOLE AT LOAD CHANNEL	1	TB1-7	109		
			TB1-9	110		
	LEAK DETECTOR #4 MANHOLE SAMPLE PIT	1	TB2-10	111		
			TB2-11	112		
ANALOG	WET WELL 4 FLOW	3	TB1-1	45		
			TB3-1	46		
	WET WELL 3 FLOW	3	TB1-5	50		
			TB2-3	49		
	WET WELL 2 FLOW	3	TB1-3	53		
			TB2-3	54		
	WET WELL 1 FLOW	3	TB1-4	57		
			TB2-4	56		
ANALOG	LEVEL SWITCH #4 WET WELL 4	4	TB1-1	58		
			TB2-1	59		
	LEVEL SWITCH #3 WET WELL 3	4	TB1-2	61		
			TB2-2	62		
	LEVEL SWITCH #2 WET WELL 2	4	TB1-3	64		
			TB2-3	65		
	LEVEL SWITCH #1 WET WELL 1	4	TB1-4	67		
			TB2-4	68		
ANALOG	SAMPLE PIT FLOW	4	TB1-5	113		
			TB2-5	114		
DIGITAL OUTPUT	STOP WELL PUMP 4	2	TB1-1			1
			TB2-1		TB3-1	
	STOP WELL PUMP 3	2	TB1-2			2
			TB2-2		TB3-2	
	STOP WELL PUMP 2	2	TB1-3			3
			TB2-3		TB3-3	
	STOP WELL PUMP 1	2	TB1-4			4
			TB2-4		TB3-4	

PARALLEL ALL FIVE ALARMS INTO ONE POINT



REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
0	01/07	ISSUED FOR CONSTRUCTION		
1	06/07	ISSUED FOR CONSTRUCTION		
2	4/7/08	ADDED AUTODIALER		

FLUOR DANIEL

OXY

APPENDIX D

SEQUENCES

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQ	*Description*
1	Shutdown Treatment Plant
2	Inhibit Manhole #7 Pump From Running
3	Inhibit Manhole #8 Pump From Running
4	Inhibit Pump Chamber #3 Pump A From Running
5	Inhibit Pump Chamber #3 Pump B From Running
6	Inhibit 102nd Street Well Pumps From Running
7	Inhibit Pump Chamber #1A Pump A From Running
8	Inhibit Pump Chamber #1A Pump B From Running
9	Inhibit Pump Chamber #2A Pump A From Running
10	Inhibit Pump Chamber #2A Pump B From Running
11	Inhibit Pump Chamber #3A Pump A From Running
12	Inhibit Pump Chamber #3A Pump B From Running
13	Inhibit Raw Water Feed Pump From Running
14	Inhibit Filter Feed Pump From Running

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 1 REVISION No: 0 August 16, 2000

SHUTDOWN TREATMENT PLANT

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent system operation on Floor Drain High Level.

The following control actions will take place:

- The system will be inhibited from running. The system will be turned to SYSTEM STOP.
- The Raw Water pump motor will be inhibited from running.
- The Filter Feed pump motor will be inhibited from running.
- The Influent Valve will close.

When any of the conditions listed below occur:

- Level in the floor drain is above the high level switch for 5 seconds. LAH will alarm.

After ALL conditions below occur:

- Level in the floor drain is below the high limit switch. LAH will clear.

Then ....

- The Treatment System will be enabled for normal operation.
- SEQ-1 clears.

The operator may ....

- Turn the Process to SYSTEM START.
- Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 2 REVISION No: 0 November 22, 2000

INHIBIT MANHOLE #7 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Manhole #7 (PC1) Pump from running in the automatic mode.

The following control actions will take place:

- The Manhole #7 Pump motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in the Manhole #7 falls below the low setpoint permissive.
- Level in Pump Chamber #3 rises above the high setpoint permissive.
- Hand-Off-Auto switch for Manhole #7 Pump is switched out of AUTO.
- Manhole #7 Pump is disabled on the HMI.

After ALL conditions below occur:

- Level in the Manhole #7 rises above the high setpoint permissive.
- Level in Pump Chamber #3 falls below the low setpoint permissive.
- Hand-Off-Auto switch for Manhole #7 Pump is switched to AUTO.
- Manhole #7 Pump is enabled on the HMI.

Then ....

- The Manhole #7 Pump motor will run.
- SEQ-2 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 3 REVISION No: 0 November 22, 2000

INHIBIT MANHOLE #8 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Manhole #8 (PC2) Pump from running in the automatic mode.

The following control actions will take place:

- The Manhole #8 Pump motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in the Manhole #8 falls below the low setpoint permissive.
- Level in Pump Chamber #3 rises above the high setpoint permissive.
- Hand-Off-Auto switch for Manhole #8 Pump is switched out of AUTO.
- Manhole #8 Pump is disabled on the HMI.

After ALL conditions below occur:

- Level in the Manhole #8 rises above the high setpoint permissive.
- Level in Pump Chamber #3 falls below the low setpoint permissive.
- Hand-Off-Auto switch for Manhole #8 Pump is switched to AUTO.
- Manhole #8 Pump is enabled on the HMI.

Then ....

- The Manhole #8 Pump motor will run.
- SEQ-3 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 4 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #3 PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #3 (PC3) Pump A from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #3 Pump A motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #3 falls below the low setpoint permissive.
- Level in the Raw Water Tank rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3 Pump A is switched out of AUTO.
- Pump Chamber #3 Pump A is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #3 rises above the high setpoint permissive.
- Level in Raw Water Tank falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3 Pump A is switched to AUTO.
- Pump Chamber #3 Pump A is enabled on the HMI.

Then ....

- The Pump Chamber #3 Pump A motor will run.
- SEQ-4 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 5 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #3 PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #3 (PC3) Pump B from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #3 Pump B motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #3 falls below the low setpoint permissive.
- Level in the Raw Water Tank rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3 Pump B is switched out of AUTO.
- Pump Chamber #3 Pump B is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #3 rises above the high setpoint permissive.
- Level in Raw Water Tank falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3 Pump B is switched to AUTO.
- Pump Chamber #3 Pump B is enabled on the HMI.

Then ....

- The Pump Chamber #3 Pump B motor will run.
- SEQ-5 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 6 REVISION No: 0 November 22, 2000

INHIBIT 102ND STREET WELL PUMPS FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent the four (4) 102nd Street Well Pumps (WW-1, WW-2, WW-3 and WW-4) from running in the automatic mode.

The following control actions will take place:

- The four (4) 102nd Street Well Pump motors will be inhibited from running.

When any of the conditions listed below occur:

- *Level in the respective well falls below the low setpoint permissive.
- *Level in Pump Chamber #3 rises above the high setpoint permissive.
- *The respective well pump is disabled on the HMI.
- Hand-Off-Auto switch for the respective pump is switched out of AUTO.
- Leak Detection alarm occurs. (Sample Pit, MH-8, MH-9 and MH-10).
- Level controller at the wells is not within pump permissive.

After ALL conditions below occur:

- *Level in the respective well rises above the high setpoint permissive.
- *Level in Pump Chamber #3 falls below the low setpoint permissive.
- *The respective well pump is enabled on the HMI.
- Hand-Off-Auto switch for the respective pump is switched to AUTO.
- Leak Detection alarm is resolved and reset.
- Level controller at the wells is within pump permissive.

Then ....

- The four (4) 102nd Street Well Pump motors will run.
- SEQ-6 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

- By activating the bypass switch on the 102nd Street PLC panel, the conditions marked with an * will be bypassed.

Note:
The local reset button must be pressed in order to reset Leak Detection Alarms.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 7 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #1A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #1A (PC1A) Pump A from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #1A Pump A motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #1A falls below the low setpoint permissive.
- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #1A Pump A is switched out of AUTO.
- Pump Chamber #1A Pump A is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #1A rises above the high setpoint permissive.
- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #1A Pump A is switched to AUTO.
- Pump Chamber #1A Pump A is enabled on the HMI.

Then ....

- The Pump Chamber #1A Pump A motor will run.
- SEQ-7 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 8 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #1A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #1A (PC1A) Pump B from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #1A Pump B motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #1A falls below the low setpoint permissive.
- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #1A Pump B is switched out of AUTO.
- Pump Chamber #1A Pump B is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #1A rises above the high setpoint permissive.
- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #1A Pump B is switched to AUTO.
- Pump Chamber #1A Pump B is enabled on the HMI.

Then ....

- The Pump Chamber #1A Pump B motor will run.
- SEQ-8 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 9 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #2A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #2A (PC2A) Pump A from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #2A Pump A motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #2A falls below the low setpoint permissive.
- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #2A Pump A is switched out of AUTO.
- Pump Chamber #2A Pump A is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #2A rises above the high setpoint permissive.
- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #2A Pump A is switched to AUTO.
- Pump Chamber #2A Pump A is enabled on the HMI.

Then ....

- The Pump Chamber #2A Pump A motor will run.
- SEQ-9 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 10 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #2A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #2A (PC2A) Pump B from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #2A Pump B motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #2A falls below the low setpoint permissive.
- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #2A Pump B is switched out of AUTO.
- Pump Chamber #2A Pump B is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #2A rises above the high setpoint permissive.
- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #2A Pump B is switched to AUTO.
- Pump Chamber #2A Pump B is enabled on the HMI.

Then ....

- The Pump Chamber #2A Pump B motor will run.
- SEQ-10 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 11 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #3A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #3A (PC3A) Pump A from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #3A Pump A motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Level in the Raw Water Tank rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3A Pump A is switched out of AUTO.
- Pump Chamber #3A Pump A is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Level in Raw Water Tank falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3A Pump A is switched to AUTO.
- Pump Chamber #3A Pump A is enabled on the HMI.

Then ....

- The Pump Chamber #3A Pump A motor will run.
- SEQ-11 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 12 REVISION No: 0 November 22, 2000

INHIBIT PUMP CHAMBER #3A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent Pump Chamber #3A (PC3A) Pump B from running in the automatic mode.

The following control actions will take place:

- The Pump Chamber #3A Pump B motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber #3A falls below the low setpoint permissive.
- Level in the Raw Water Tank rises above the high setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3A Pump B is switched out of AUTO.
- Pump Chamber #3A Pump B is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber #3A rises above the high setpoint permissive.
- Level in Raw Water Tank falls below the low setpoint permissive.
- Hand-Off-Auto switch for Pump Chamber #3A Pump B is switched to AUTO.
- Pump Chamber #3A Pump B is enabled on the HMI.

Then ....

- The Pump Chamber #3A Pump B motor will run.
- SEQ-12 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the local Hand-Off-Auto switch. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 13 REVISION No: 0 November 22, 2000

INHIBIT RAW WATER FEED PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent the Raw Water Feed Pump from running in the automatic mode.

The following control actions will take place:

- The Raw Water Feed Pump motor will be inhibited from running.

When any of the conditions listed below occur:

- The system START/STOP selector on the HMI is STOPPED.
- Level in the Raw Water Tank falls below the low setpoint permissive.
- Level in the Filter Feed Tank rises above the high setpoint permissive.
- Off-Auto switch for the Raw Water Feed Pump is switched out of AUTO.
- The VFD for the Raw Water Feed Pump is in MANUAL (Toggle F2 at the VFD).

After ALL conditions below occur:

- The system START/STOP selector on the HMI is STARTED.
- Level in the Raw Water Tank rises above the high setpoint permissive.
- Level in Filter Feed Tank falls below the low setpoint permissive.
- Off-Auto switch for Raw Water Feed Pump is switched to AUTO.
- The VFD for the Raw Water Feed Pump is in AUTO (Toggle F2 at the VFD).

Then ....

- The Raw Water Feed Pump motor will run.
- SEQ-13 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the VFD. Manual operation will override all sequences.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

Note:
If the VFD is in AUTO, the sequence has cleared and the pump still won't run, the VFD may need to be reset. To do this, turn the HOA switch from AUTO to OFF and then back to AUTO.

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

SEQUENCE 14 REVISION No: 0 November 22, 2000

INHIBIT FILTER FEED PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-5, Electrical Drawings.

Purpose: To prevent the Filter Feed Pump from running in the automatic mode.

The following control actions will take place:

- The Filter Feed Pump motor will be inhibited from running.

When any of the conditions listed below occur:

- The system START/STOP selector on the HMI is STOPPED.
- Level in the Filter Feed Tank falls below the low setpoint permissive.
- Off-Auto switch for the Filter Feed Pump is switched out of AUTO.
- The VFD for the Filter Feed Pump is in MANUAL (Toggle F2 at the VFD).

After ALL conditions below occur:

- The system START/STOP selector on the HMI is STARTED.
- Level in the Filter Feed Tank rises above the high setpoint permissive.
- Off-Auto switch for Filter Feed Pump is switched to AUTO.
- The VFD for the Filter Feed Pump is in AUTO (Toggle F2 at the VFD).

Then ....

- **The Filter Feed Pump motor will run.**
- SEQ-14 clears.

The operator may ....

- Turn the pump off, or run the pump manually at any time from the VFD. Manual operation will override all sequences.

Note:
If the VFD is in AUTO, the sequence has cleared and the pump still won't run, the VFD may need to be reset. To do this, turn the HOA switch from AUTO to OFF and then back to AUTO.

APPENDIX E

CITY OF NIAGARA FALLS DISCHARGE PERMIT NO. 44
CITY OF NIAGARA FALLS LETTER TO CEASE DISCHARGE

CITY OF NIAGARA FALLS

DEPARTMENT OF WASTEWATER FACILITIES

SIGNIFICANT INDUSTRIAL USER

WASTEWATER DISCHARGE PERMIT

PERMIT NO. 44 Occidental Chemical Corporation - Love Canal Leachate Treatment Facility

In accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code; Sewer Use Ordinance, as adopted by City Council on July 25, 1983; et seq. and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: Occidental Chemical Corporation - Love Canal Leachate Treatment Facility

Located at: 805 - 97th Street, Niagara Falls, NY 14304

Classified by SIC No(s): 4952

For the contribution of wastewater into the City of Niagara Falls Publicly-Owned Treatment Works (POTW).

Effective this 6th day of, January 2000

To Expire this 6th day of, January 2005

Albert C. Zaufal - for

William G. Bolents, Jr.
Acting Director of Wastewater Facilities
Signed this 17TH day of December, 1999

DISCHARGE IDENTIFICATION

OUTFALL	DESCRIPTION	LOCATION	RECEIVING
#1	97th Street Discharge	97th Street	Carbon Treated Leachate from Love Canal and 102nd Street landfill

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
A. Discharges to the City Sewer		
1. Identification of all discharges to the City Sewer System on a current plant sewer map certified by a New York State licensed professional engineer.	None	Submitted 12/14/99
2. Identification of each contributing waste stream to each discharge to the City Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer.	None	Submitted 12/14/99
3. Elimination of all uncontaminated discharges to the City Sewer System. All uncontaminated flows should be clearly identified on a current sewer map certified by a New York State licensed professional engineer.	N/A	
4. Establishment of a control manhole that is continuously and immediately accessible for each discharge to the City Sewer System.	None	Previously Established
B. Wastewater Discharge Management Practices		
1. Identification of a responsible person(s) (day to day and in emergencies).	None	Previously Submitted
C. Slug Control Plan**		
1. Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the City will evaluate the permittee, a minimum	None	Performed by City

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
of once every two years for the need for a "Slug Control Plan." If a plan is required by the City then the plan will contain, at a minimum, the following elements: a) Description of discharge practices, including non-routine batch discharges; b) Description of stored chemicals; c) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow-up written notification within five days; d) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.		
2. A written commitment from a responsible party of manpower, equipment and materials required to expeditiously control and remove any harmful quantity discharged.	None	Previously Submitted

** This section applies to all compounds limited by the City's SPDES Permit and all prohibited wastewater discharges (See Section 250.5.1-A of the Sewer Use Ordinance)

D. General Wastewater Discharge Permit Conditions

1. Flow monitoring should be performed concurrently with any Wastewater Discharge Permit sampling and should be reported at the same time as analytical results. If it is not feasible to perform flow monitoring, an estimate of flow (method of estimated flow preapproved by the City of Niagara Falls) should be submitted with the analytical results.

2. All sampling for billing and pretreatment compliance purposes will be coordinated through the City of Niagara Falls's Industrial Monitoring Coordinator.

3. All analysis must be performed by a State certified laboratory using analytical methods consistent with 40 CFR 136 and quality control provisions as required by the City of Niagara Falls's Environmental Chemist. The permittee will report the results as directed in Section G of this permit. Results should be reported using the Method Detection Limit (MDL). Reporting results less than MDL will be indicated in the report by a less than sign (<) followed by the numeric MDL concentration reported by the laboratory. In these cases the pollutant load will be calculated and reported as zero (0). The MDL will be defined as the level at which the analytical procedure referenced is capable of determining with a 99% probability that the substance is present. The value is determined in reagent water. The precision at this level is +/- 100%.

4. An estimate of relative production levels for wastewater contributing processes at the time of any pretreatment compliance sampling will be submitted upon request of the Director of Wastewater Facilities.

5. All samples will be handled in accordance with EPA approved methods. Chain of Custody records will be submitted with all sampling results.

6. All conditions, standards and numeric limitations of Section 250 of the Sewer Use Ordinance are hereby incorporated into this permit by reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said ordinances constitutes a violation and is subject to enforcement actions(s) described in Section 250.9 of said ordinances, and in the City of Niagara Falls's Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide." In the event of a violation, including slug discharges or spills, the City of Niagara Falls must be notified immediately by phone and confirmed by letter within five (5) working days.

   Any person adjudicated of violating any provision in the Sewer Use Ordinance shall be assessed a fine in the amount of up to $5,000. This amount is available for each violation, and each day of a violation is a separate incident for which penalties may be sought.

6. The person violating any of the provisions of the Sewer Use Ordinance will be liable to the City for any expense, loss, or damage occasioned by the City by reason of such violation. The expense, loss or damage will be taken to be the extent determined by the Director.

   In addition, any person who knowingly makes any false statements, representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to the Sewer Use Ordinance, or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under the Sewer Use Ordinance will, upon conviction be punished by a fine up to $5,000. Furthermore, the City of Niagara Falls may recover reasonable attorney's fees, court costs, court reporting fees, and other expenses of litigation by appropriate suit at law against the The person violating any of the provisions of the Sewer Use Ordinance will be liable to the person found to have violated applicable laws, orders, rules and permits required by the Sewer Use Ordinance.

7. In accordance with Federal Regulation CFR 40, Part 403.12(g), any exceedance of a numeric limitation noted by the SIU must be re-sampled, analyzed and resubmitted to the City of Niagara Falls's Wastewater Facilities (WWF) within 30 days.

   Specifically, if any limit that is *listed* in Section F of this permit is exceeded, then the permittee will undertake a short term monitoring program for that pollutant. Samples will be collected identical to those required for routine monitoring purposes and will be collected on each of at least *two (2)* operating days and analyzed. Results will be reported in both concentration and mass, and will be submitted within *30* days of becoming aware of the exceedance.

8. Sampling frequency for any permitted compounds may be increased beyond the requirements set forth in Section F and G of this permit. If the permittee monitors (sample and analysis) more frequent than required under this permit, all results of this monitoring must be reported.

9. As noted in Section 250.6.2 of the Sewer Use Ordinance, "Personnel as designated by the Director will be permitted at any time for reasonable cause to enter upon all properties served by the City of Niagara Falls WWF for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Ordinance."

10. As noted in Section 250.5.3 of the Sewer Use Ordinance, significant changes in discharge characteristics or volume must be reported immediately to the WWF.

11. As noted in Section 250.5.4 of the Sewer Use Ordinance, samples required to be collected via a 24-hour composite sampler must be retained refrigerated for an additional 24 hour plus unrefrigerated an additional 48 hours (total 72 hours).

12. As noted in Section 250.5.4 of the Sewer Use Ordinance, all "SIU's will keep on file for a minimum of five years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the WWF."

13. As noted in Section 250.6.8 of the Sewer Use Ordinance, "Permits are issued to a specific user for a specific monitoring station. A permit will not be reassigned or transferred without the approval of the Director which approval will not be unreasonably withheld. Any succeeding owner or user to which a permit has been transferred and approved will also comply with all the terms and conditions of the existing permit."

14. The Annual Average Limitation is equivalent to the specific SIU allocation, and will be defined as the permissible long term average discharge of a particular pollutant. These limitations are listed in Section F of this permit. The computation of the Annual Average will be as follows; for each compound listed in Section G of this permit, the Annual Average will be the average of the present monitoring quarter and three previous quarters ' data.

15. The Daily Maximum Limitation will be defined as the maximum allowable discharge on anyone day. The Daily Maximum Limitation will allow for periodic short term discharge fluctuations. These specific limitations are listed in Section F of this permit.

16. Enforcement of the Annual Average Limitation will be based on the reported average of the last four quarters data vs. the Annual Average Limited listed in Section F of this permit. Enforcement of the Daily Maximum Limitation will be based on individual analysis results vs. the Daily Maximum Limit listed in Section F of this permit. These results may be obtained from self monitoring (Section G), City of Niagara Falls Verification, incident investigation or billing samples.

17. The City of Niagara Falls's Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the City of Niagara Falls WWF SPDES Permit. The limits defined in the procedure are values which are based on the quantity of substances discharged which can be easily related to the Treatment Plant's removal capacity.

The pollutants listed in this procedure which are not specifically listed in Section F and G of this permit may be present in the permittee's wastewater discharge, but at levels which do not require specific permit limitations. Consequently, if any of the limits listed in this procedure, for pollutants not identified in Section F and G of this permit, are exceeded then the permittee will undertake a short-term, high intensity monitoring program for that pollutant. Samples identical to those required for routine monitoring purposes will be collected on each of at least three operating
days and analyzed. Results will be expressed in terms of both concentration and mass, and will be submitted no later than the end of the third month following the month when the limit was first exceeded.

If levels higher than the limit are confirmed, the permit may be reopened by the City of Niagara Falls for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

   a) Flow quantities will derived from the Treatment Facility flow meter.

   b) Charges for TSS, SOC and Substances of Concern shall be developed based on Quarterly Self Monitoring data.

2. Love Canal Leachate Treatment Facility (LCLTF)

The City of Niagara Falls agrees to accept wastewater processed from Occidental Chemical Corporation (OCC) LCLTF. These waters in addition to Love Canal wastewater shall include wastewater from the 102nd Street remedial site. This approval is subject to the following conditions:

   a) The LCLTF shall be properly operated and maintained at all times.

   b) To ensure proper operation OCC shall ensure sufficient feed, interstage (breakthrough), and effluent analysis to ensure timely carbon changes. Treatment levels of 10 μ/L shall be achieved and verified with quarterly composite sample analysis for the following compounds: trichloroethylene, tetrachloroethylene, monochlorotoluene, mono-, chlorobenzenes, trichlorobenzenes, tetrachlorobenzenes, hexachlorocyclohexanes and hexachlorobenzene.

E. Specific Wastewater Discharge Permit Conditions

2. Love Canal Leachate Treatment Facility (LCLTF) Continued

c) The issuance of this approval if based on OCC's previous assertions that there is no reason to anticipate the presence of tetrachlorodibenzo-p-dioxins in the discharge from the treatment facility. The City of Niagara Falls hereby reserves the right to collect samples from the treatment facility effluent and analyze such wastewaters for their chemical constituents, including tetrachlorodibenzo-p-dioxins. If such analysis indicates the presence of tetrachlorodibenzo-p-dioxins, this approval may be withdrawn. If at anytime, the City of Niagara Falls determines on any basis that the discharge of these wastewater to the POTW is interfering with the operation of that facility, the City of Niagara Falls will direct OCC to discontinue the discharge.

d) These pretreated wastewaters shall be discharged to the POTW via Outfall MS # 1.

e) Periodically wet weather flow in the area around Love Canal results in surcharged sewers. The resultant surcharge requires overflow at combined sewer and storm sewer overflow points. Other points in the sewer shed require manual bypass pumping. Consequently, to minimize this overflow, the City of Niagara Falls will require the permittee to cease discharge from the LCLTF during these surcharge events.

A notification procedure has been established by the City of Niagara Falls to formalize the communication between the City of Niagara Falls and the permittee to halt and resume the LCLTF discharge. This procedure by reference is hereby incorporated as a condition of this permit.

F. Discharge Limitations & Monitoring Requirements

During the Period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) will be limited and monitored by the permittee as specified below.

OUTFALL NUMBER/ EFFLUENT PARAMETER	DISCHARGE LIMITATIONS ANNUAL AVERAGE	DISCHARGE LIMITATIONS DAILY MAXIMUM	UNITS	MINIMUM MONITORING REQUIREMENTS MEASUREMENT FREQUENCY	MINIMUM MONITORING REQUIREMENTS SAMPLE TYPE
#1 Flow	0.3	0.3	MGD	Continuous	4
#1 Total Suspended Suspended	6.25	16.0	lbs/d	1/Qtr.	1
#1 Soluble Organic Carbon	50	75	lbs/d	1/Qtr.	1
#1 Volatile - Priority Pollutants (See Attached list Section G)	MONITOR	ONLY	lbs/d	1/Qtr.	1
#1 Acid Extractable - Priority Pollutants (See attached list Section G)	MONITOR	ONLY	lbs/d	1/Qtr.	1
#1 Base/Neutral - Priority Pollutants (See attached list Section G)	MONITOR	ONLY	lbs/d	1/Qtr.	1
# 1 Pesticides - Hexachlorocyclohexanes	MONITOR	ONLY	lbs/d	1/Qtr.	1
#1 Total Phenols	MONITOR	ONLY	lbs/d	1/Qtr.	1

F. Discharge Limitations & Monitoring Requirements Continued

SAMPLE TYPE DOOTNOTES

(1) The sample will consist of a laboratory composite of four grabs collected equally throughout the batch discharge period.

(2) The sample will consist of a 24-hour laboratory composite of four grab samples, one taken each six hours, collected for each outfall.

(3) The sample will consist of a 24-hour flow proportion composite sample collected from each monitoring station.

(4) Flow will be monitored continuously via water meters.

(5) The sample will consist of a 24-hour time proportion composite sample from each approved discharge monitoring point.

(6) Determination of quantities will be derived from five (5) 24 hour time proportion composite samples collected from each approved monitoring point.

(7) Same as (3), however, five (5) samples will be collected per quarter from the monitoring station and analyzed by and at the City of Niagara Falls's expense.

G. Discharge Monitoring Reporting Requirements

During the period beginning the effective date of this permit and lasting until its expiration date, discharge monitoring results will be summarized and reported by the permittee; Monthly - 14 days after monitoring period, Quarterly - by the last day of the monitoring period = February 28, May 31, August 31, November 30. Semiannual reports will be submitted on the last day of the monitoring period = February 28, August 31. The annual average for each parameter listed in Section F, will be computed and reported quarterly. The individual sample analysis for present quarter will also be reported quarterly unless directed otherwise in this permit.

OUTFALL NO	PARAMETER	REPORTING FREQUENCY
#1	Flow	Quarterly
#1	Total Suspended Solids	Quarterly
#1	Volatile - Priority Pollutants	Quarterly
#1	Acid Extractables - Priority Pollutants	Quarterly
#1	Base/Neutral - Priority Pollutants	Quarterly
#1	Total Phenols	Quarterly

Discharge Monitoring Compounds

Volatile	Base/Neutrals Extractables
Benzene	Dimethyl Phthalate
Carbon Tetrachloride	Butyl Benz Phthalate
Chlorodibromethane	Di-N-Butyl Phthalate
Monochlorobenzene	Di-N-Octyl Phthalate
Dichlorobromethane	Diethyl Phthalate
Chloroform	Nitrosodiphenylamine
Dichloroethylenes	Dichlorobenzenes
Bromoform	Dichlorotoluene
Dichloropropylenes	Acenaphthlene
Ethylbenzene	Fluoranthene
Tetrachloroethanes	Chrysene
Tetrachloroethylene	Napthalene
Toluene	Benzo (a) Anthracene
Triohloroethanes	Pyrene
Trichloroethylene	Trichlorobenzene
Methylene Chloride	Trichlorotoluene
Vinyl Chloride	Hexachlorobutadiene
Monochlorotoluenes	Tetrachlorobenzene
Monochlorobenzotrifluoride	Hexachlorocyclopentadiene
	Hexachlorobenzene
	Dichlorobenzotrifluoride

Discharge Monitoring Compounds

Acids	Pesticides
Monochlorophenol	Alpha, beta, delta, gama – hexachlorocyclohexane
Dichlorophenol	
Monochlorocresol	
Trichlorophenol	
Pentachlorophenol	

Conventionals	
Total Phenols	
Total Suspended Solids	
Soluble Organic Carbon	

H. Comments/Revisions

F:\ADMIN\WINWORD\ZAEPFEL\SIU\PERMITS\LOVCAN44

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

March 9, 1998

Mr. Donald Tubridy, Site Manager
Glenn Springs Holdings Inc.
Love Canal Treatment Facility
805 – 97th Street
Niagara Falls, NY 14304

Dear Mr. Tubridy:

The City of Niagara Falls and the Occidental Chemical Corporation have mutually agreed that conditional to accepting leachate from the 102nd Street Landfill, pretreated at the Love Canal Leachate Treatment Facility (LCLTF), a communication procedure to cease discharge during wet weather is required. This procedure is outlined below.

(a) During elevated sewer flows in the LaSalle area during wet weather, the Outside Sewer Maintenance (OSM) Crew Leader will contact the Shift Operation Supervisor (SOS) at the treatment plant.
(b) The SOS will call Occidental Chemical Corporation Love Canal Leachate Treatment Facility staff member, Darrell Crocket at (716) 283-0111 and notify him or leave a recorded message to stop the LCLTF discharge.
(c) After the wet weather condition has subsided the OSM Crew Leader will again contact the SOS to notify him of the conditions in the sewer.
(d) The SOS will immediately call the LCLTF (Darrell Crocket) and inform him to resume discharge. Details of the phone communications will be recorded in the SOS's Log Book at the treatment facility.

If you have questions during these events, the SOS maybe contacted at (716) 286-4973.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:md
Cc: D. Crocker
R. Roll
File: 44 A

7.DOC

MILLER SPRINGS REMEDIATION MANAGEMENT INC.
805 – 97th Street, Niagara Falls, NY 14304
A Subsidiary of Occidental Petroleum Corporation

Telephone (716) 283-0112
WNY Operation Office
Fax (716) 283-2856

February 28, 2000

Albert Zaepfel
Industrial Monitoring Coordinator
Niagara Falls Wastewater Facilities
P.O. Box 69
Niagara Falls, NY 14302-0069

Re: Communications, Love Canal & 102 nd Street Discharge Update

Dear Mr. Zaepfel:

I would like to make some changes to our previous "do not operate" contact procedures when ever the City POTW can not handle the discharge water flow's from the Miller Springs, Love Canal Site.

The primary Love Canal contact person will be **Brian Downie, at 283-0111 ext. 28** or on his cell telephone 622-8388 between the hours of 8 am. To 4:00 p.m. Monday through Friday. Please make sure who ever is making the contact telephone call that they talk to Brian himself. On off-hours or if Brian can not be reached in person, please call our **24-hour emergency answering service at 286-1821.** As in the past, we will contact the operator at the city POTW before any effluent is discharged at Love Canal.

If you have any questions, please do not hesitate to call me at 283-0112.

Sincerely

Don Tubridy
Site Manager

XC:
George Luxbacher
Brain Downie
Scott Parkhill
Darrell Crockett

drf\word\data\al zaepfel communications rev.

APPENDIX F

SYSTEM SETPOINTS

Love Canal Operation Setpoints

Pump ON/OFF Levels

Pump	State	Level
Raw Water Feed Pump	ON	50% *
(Permissive from Raw Water Feed Tank)	OFF	40% *
Raw Water Feed Pump	ON	60% *
(Permissive from Filter Feed Tank)	OFF	70% *
Filter Feed Pump	ON	50% *
(Permissive from Filter Feed Tank)	OFF	40% *
PC3 Pump A and B	ON	2.5 ft.
(Permissive from PC3)	OFF	2.0 ft.
PC3 Pump A and B	ON	5.0 ft.
(Permissive from Raw Water Feed Tank)	OFF	6.0 ft.
PC3A Pump A and B	ON	2.5 ft.
(Permissive from PC3A)	OFF	2.0 ft.
PC3A Pump A and B	ON	5.0 ft.
(Permissive from Raw Water Feed Tank)	OFF	6.0 ft.
PC1 Pump	ON	2.5 ft.
(Permissive from PC1)	OFF	2.0 ft.
PC1 Pump	ON	6.0 ft.
(Permissive from PC3)	OFF	7.0 ft.
PC2 Pump	ON	2.5 ft.
(Permissive from PC2)	OFF	2.0 ft.
PC2 Pump	ON	6.0 ft.
(Permissive from PC3)	OFF	7.0 ft.
PC1A Pumps A and B	ON	2.5 ft.
(Permissive from PC1A)	OFF	2.0 ft.
PC1A Pumps A and B	ON	6.0 ft.
(Permissive from PC3A)	OFF	7.0 ft.
PC2A Pumps A and B	ON	2.5 ft.
(Permissive from PC2A)	OFF	2.0 ft.
PC2A Pumps A and B	ON	6.0 ft.
(Permissive from PC3A)	OFF	7.0 ft.

* Cannot be set by operator through the HMI.

Pump	State	Level
102nd Street Well Pump #1	ON	562.1 AMSL
(Permissive from Wetwell #1)	OFF	561.8 AMSL
102nd Street Well Pump #2	ON	562.1 AMSL
(Permissive from Wetwell #2)	OFF	561.8 AMSL
102nd Street Well Pump #3	ON	562.1 AMSL
(Permissive from Wetwell #3)	OFF	561.8 AMSL
102nd Street Well Pump #4	ON	562.1 AMSL
(Permissive from Wetwell #4)	OFF	561.8 AMSL
102nd Street Well Pump #1, 2, 3 and 4	ON	5.0 ft.
(Permissive from PC3)	OFF	6.5 ft.

APPENDIX G

POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
PUMP CHAMBERS			
1. Too little or no water to treatment system	• Pump problems • Power failure • Pump chambers dry • Line leaks • Lines plugged • PLC malfunction • High system pressure • Influent valve malfunction	• Repair or replace • Check power, disconnects, breakers, etc. • Verify • Find leaks and repair • Find plugs and clean • Reset PLC, and call for programming assistance • Verify valve positions • Repair or replace	Station PC3 Wetwell Level Station PC3A Wetwell Level
2. Too much water to system	• Influent valve malfunction • PLC malfunction	• Repair or replace • Reset PLC, and call for programming assistance	
3. PC1, PC2, PC1A, and PC2A dry	• Drain system damaged or plugged • Faulty level transmitter	• Find problem and repair • Repair or replace	Station PC1 Wetwell Level Station PC1A Wetwell Level Station PC2 Wetwell Level Station PC2A Wetwell Level
4. PC3 and PC3A dry	• PC1, PC2, PC1A, or PC2A pumps not running • Power failure • Lines to chambers plugged • PLC malfunction • High system pressure • Faulty level transmitter	• Repair or replace • Check power, disconnects, breakers, etc. • Find plugs and clean • Reset PLC, and call for programming assistance • Verify valve positions • Repair or replace	Station PC3 Wetwell Level Station PC3A Wetwell Level

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
5. PC1, PC2, PC1A, and PC2A full	• PC1, PC2, PC1A, or PC2A pumps not running • Power failure • Lines from chambers plugged • PLC malfunction • High system pressure • Faulty level transmitter	• Repair or replace • Check power, disconnects, breakers, etc. • Find plugs and clean • Reset PLC, and call for programming assistance • Verify valve positions • Repair or replace	Station PC1 Wetwell Level Station PC1A Wetwell Level Station PC2 Wetwell Level Station PC2A Wetwell Level
6. PC3 and PC3A full	• PC1, PC2, PC1A, or PC2A pumps running • PC3 or PC3A pumps not running • Power failure • Lines from chambers plugged • PLC malfunction • High system pressure • Faulty level transmitter	• Check flows and controls (are pumps in hand) • Repair or replace • Check power, disconnects, breakers, etc. • Find plugs and clean • Reset PLC, and call for programming assistance • Verify valve positions • Repair or replace	Station PC3 Wetwell Level Station PC3A Wetwell Level
7. RTU panel high temperature	• Excessive heat generated by equipment in the panel or by outside source • Faulty heater • Faulty temperature switch	• Find heat source and resolve • Repair or replace heater • Repair or replace switch	RTU L Temp PC1 RTU L Temp PC1A RTU L Temp PC2 RTU L Temp PC2A RTU L Temp PC3 RTU L Temp PC3A
8. RTU panel intrusion	• Someone has opened the door on the panel • Faulty switch	• Confirm and correct • Repair or replace switch	Station PC1 Intrusion Alarm Station PC1A Intrusion Alarm Station PC2 Intrusion Alarm Station PC2A Intrusion Alarm Station PC3 Intrusion Alarm Station PC3A Intrusion Alarm

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
9. Motor overload tripped or amps high	• The motor to the respective pump is drawing excessive current	• Replace or repair motor and/or pump	Station PC1 Pump N AMP 1 Station PC1A Pump N AMP 1 Station PC2 Pump N AMP 1 Station PC2A Pump N AMP 1 Station PC3 Pump E AMP 1 Station PC3A Pump E AMP 1 Station PC1 Pump S AMP 1 Station PC1A Pump S AMP 1 Station PC2 Pump S AMP 1 Station PC2A Pump S AMP 1 Station PC3 Pump W AMP 1 Station PC3A Pump W AMP 1 Station PC1 Pump N Overload Alarm Station PC1A Pump N Overload Alarm Station PC2 Pump N Overload Alarm Station PC2A Pump N Overload Alarm Station PC3 Pump E Overload Alarm Station PC3A Pump E Overload Alarm Station PC1 Pump S Overload Alarm Station PC1A Pump S Overload Alarm Station PC2 Pump S Overload Alarm Station PC2A Pump S Overload Alarm Station PC3 Pump W Overload Alarm Station PC3A Pump W Overload Alarm
TREATMENT BUILDING			
Raw Water Tank			Raw Tank (LT-6) Level (ft.) Raw Water Tank BQA
1. High level	• Flow from pump chambers too high • Discharge line plugged or valve shut • Raw Water Feed Pump not running • Instrument malfunction	• Verify, correct • Find plug and clean, or open valve • Electrical or instrument problem, repair • Check instrument	
2. Low level	• Tank leak • Raw Water Feed Pump pumping too fast	• Repair • Verify level instruments, VFD	

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
	• Instrument malfunction • Feed to tank too low	• Check instrument • Check flow setpoint (see above)	
Raw Water Feed Pump and Filter Feed Pump			
1. High pressure	• Discharge line plugged or valve shut	• Find plug and clean or open valve	
2. Pump not reacting (design flow rate/design head)	• Insufficient NPSH • System head greater than anticipated • Entrained air • Direction of rotation wrong • Impeller too small • Impeller clearance too large • Plugged impeller/suction line • Wet end parts worn	• Recalculate NPSH available/required • Reduce system head • Release air • Reverse 2 of 3 leads (phase) • Replace • Reset clearance • Clean • Repair/replace	
3. No discharge when pump running	• Not primed • Suction line plugged or valve shut • Direction of rotation wrong • Entrained air • Plugged impeller • Damaged pump shaft/impeller	• Repeat priming • Find plug and clean, or open valve • Reverse 2 of 3 leads (phase) • Release air • Clean • Replace	
4. Pump operates for short period, then loses prime	• Insufficient NPSH • Entrained air	• Recalculate NPSH available/required • Check and repair	
5. Excessive noise from wet end	• Cavitation • Abnormal fluid rotation • Impeller rubbing	• Recalculate NPSH available/required • Redesign suction piping • Check/reset clearance and outboard bearing assembly	

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
6. Excessive noise from power end	• False brinelling • Thrust overload on bearing • Misalignment • Bearing damage	• Correct vibration source • Remount bearings • Remount properly • Refer to manufacturer's instructions	
7. Pump not running	• VFD in manual • Auto mode on VFD needs to be reset	• Press [F2] on VFD to place VFD in AUTO • Turn HOA switch on pump from AUTO to OFF and back to AUTO	
Filter Feed Tank			Filter Feed Tank (LT-7) Level (ft.) Filter Feed Tank Level BQA
1. High level	• Flow from clarifier too high • Discharge line plugged or valve shut • Filter Feed Pump not running • Instrument malfunction • Bag filters plugged • Carbon vessels plugged	• Verify, correct • Find plug and clean or open valve • Electrical or instrument problem, repair • Check instrument • Replace bag filters • Backwash or change carbon	
2. Low Level	• Tank Leak • Filter Feed Pump pumping too fast • Instrument malfunction • Feed to tank too low	• Repair • Verify level instruments, VFD • Check instrument • Check flow from clarifier/Raw Water Tank	
Clarifier			
1. High level	• Flow from Raw Water Tank too high • Discharge line plugged	• Verify, correct • Find plug and clean	

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
Effluent metering pump (If needed)			
1. Pump loses prime	• Dirty check valve • Ball checks not seating/sealing properly • Drum allowed to run dry	• Clean or replace • Clean or replace • Replace drum and prime pump	
2. Fitting	• Loose fittings • Broken or twisted gasket • Chemical attack	• Tighten fittings • Check/replace gasket • Replace pump	
3. Leakage at tubing	• Worn tube ends • Chemical attack	• Cut off end of tubing and replace • Replace pump	
4. Failure	• Too much pressure at discharge • Check valves not sealing • Output dials not at maximum • Suction lift too high	• Check ball check valves and injectors • Clean or replace • Prime with output dials at maximum • Decrease suction lift	
Sludge Tank			Sludge Holding Tank (LT-5) Level (ft.)
1. High level	• Flow from clarifier tank too high • Discharge line plugged or valve shut • Instrument malfunction	• Verify, correct • Find plug and clean or open valve • Check instrument	

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
Bag Filters			North Bag Filter Differential Pressure South Bag Filter Differential Pressure
1. High differential pressure	• Plugged bags	• Change bags	
2. Low differential pressure	• Leaks • Hole in bag • Instrument malfunction	• Repair leaks • Change bags • Check instrument	
Carbon Vessels			
1. High differential pressure	• Plugged carbon • Bed not flooded • Plugged line • Leaks • Instrument malfunction • Closed valves in the GAC system	• Backwash or change carbon • Open vent valve to release pressure • Find plugged area and clean • Repair leaks • Check instrument • Check all valves for correct positions	
2. Low differential pressure	• Faulty pressure relief valve or rupture disk	• Replace or repair (Replace rupture disk when source of overpressurization, if any, is removed)	
3. Carbon in the effluent	• Internal mechanical (underdrain) failure	• Remove carbon and repair	
4. Excessive flow out vent line	• Broken rupture disk	• Replace rupture disk when source of over pressurization is removed (check manufacturer's instructions)	

APPENDIX H

PROCEDURES INDEX

Love Canal Operations and Maintenance Procedures

NUMBER	TITLE	SECTION
ENVIRONMENTAL		
LC-001	Overpacking of Deteriorating 55 Gallon Drums.	Environmental
SECURITY		
LC-002	Power Reset of Main Gate Operator.	Security
LC-003	Security Systems for Administration Building, Treatment Building and Drum Barn.	Security
TREATMENT		
LC-004	Belt Replacement on the Hastings Treatment Process Air Make-up Unit.	Treatment
LC-005	Replacement of Vapor Phase Carbon Adsorption Canisters.	Treatment
LC-006	Dewatering of Infiltrate/Inflow of South Sector Pump Chambers.	Treatment
LC-007	Removal and Replacement of Zook, Impervious, Graphite Rupture Disks on the Main Carbon Beds.	Treatment
LC-008	Inspection Treatment Room Floor Fans.	Treatment
LC-009	Filter bag replacement on the Gaflo, Model RB-2A Leachate Filtration Bag Systems.	Treatment
LC-010	Start-Up Leachate Treatment Facility.	Treatment
LC-011	Shutdown Leachate Treatment Facility.	Treatment
LC-012	Emergency Transfer of Leachate from PC-3A to the LCTF.	Treatment
LC-013	Investigation of Poor Discharge from North & Central Sector Field Pumps.	Treatment
LC-014	Transfer of Sludge/NAPL from the Clarifier	Treatment

LC-015	Transfer of Sludge/NAPL from the Holding Tank to External Storage Tanks.	Treatment
LC-016	Dewatering of Precipitation from inside of Sludge/NAPL Containment Dike.	Treatment
LC-017	Leak Detection Procedures for the Sludge/NAPL Storage Tanks.	Treatment
LC-025	Bulk Handling System (Carbon Transfer)	Treatment

UTILITIES

LC-018	Annual Service, Worthington Screw Type Air Compressor Model Rollair 40-110.	Utilities
LC-019	Annual Service, Worthington Screw Type Air Compressor Models-25-110.	Utilities
LC-020	Removal/Replacement, Inline Air Filter, Hankison Model 3106 Air Dryer.	Utilities
LC-021	Dravo Hastings Treatment Plant Make-up Air Unit, Cleaning and Replacement of Air Filters.	Utilities
LC-022	Replacement of Administration Building HVAC Filters.	Utilities
LC-023	Use of and Testing of Site's Emergency Shower/Eyewash Stations.	Utilities
LC-024	Removal/Cleaning/Replacement, Inline, Condensate Draining Device Hankison, Snap-Trap, Model 503.	Utilities

Procedures Removed from Procedure List

Note: The following procedures have been removed for the reason indicated:

DEC #	Procedure	Reason	Date
001	Operation, Maintenance, and Safety Procedures of the Snow blower.	Not Applicable	11/00
005	Time Clock Setting for the Plant's External Lighting.	Automated by photo eye	11/00
014	Replacement of Hydrogen Peroxide Drums.	Not Applicable Hydrogen Peroxide no longer used.	11/00
018	Replacement of Process Piping.	Not Applicable Piping not changed out.	11/00
019	Replacement of Process Piping for Pump Tranquilizers.	Not Applicable Pumps Eliminated	11/00
020	Snowplowing and Maintenance.	Not Applicable Equipment not used	11/00
022	Repair of Plant's SB 1 ½ A Sludge Pump.	Not Applicable Pump not used	11/00
028	Cleaning of Filter Feed Tank.	Not Applicable	11/00
029	Maintenance of the Lawn Tractor and Safety Guidelines when Operating.	Contractor maintains Lawns	11/00
031	Power Trimming of Site Vegetation.	Contractor maintains Lawns	11/00
033	Paint Touch-up of Plant Clarifier and Sludge/NAPL Storage Tanks	Not Applicable	11/00
035	Lock Out and Tag Out Procedure	Covered in SOP SR-13	11/00
036	Long Term Sampling Procedures	Covered in Long Term Monitoring Manual	11/00

APPENDIX I

OWNER'S MANUALS INDEX

Love Canal Operations Owners Manuals

Item	Manufacture	Model	Function
A			
Air Compressor	Worthington	Rollair-40-110	Plant Air
Air Compressor	Worthington	RS Rotary, RS-25	Plant Air
Air Exchanger	ITT Standards		
Arrestor, Flame	L&J Technologies	94306	Process Ventsorber
C			
Carbon	Calgon	Type BPL Granular Carbon	Vapor Phase Canisters
Carbon	TIGG Corp.	NIXTOX Vapor Phase Canisters	Vapor Phase Canisters
Clarifier	Clow Waste Treatment Div.		Process Clarifier
D			
Disks	Zook Enterprise	Graphite Rupture Disks/Gaskets	Carbon Bed Vent Line
Dryer, Air	Van Air Systems Inc.	RA-400	Process Air Dryer
E			
Exhaust Fan	Penn Ventilation Corp.	Penn Fumex	Process Roof and Wall Exhaust Fans
F			
Filters	GAF	Gaflo RB-2A	Process Bag Filters
Filters	Hankinson Corp.	Model 503 Snap Trap	Air Dryer Filter
Filters	Hankinson Corp.	Model 3106	Inline Air Process Filter

Love Canal Operations Owners Manuals

Item	Manufacture	Model	Function
Filters	Black & Decker	Bowl Filter	
G			
Gage	Weather Measurer Weather Tronics	Model 6021-A,B	Tipper Bucket Rain Gage
Gage	Weather Measurer Weather Tronics	6410, 6411	Precipitation Gage Wind Screen
H			
Hood	LabConco	47716	Process Fume Hood
HVAC	Hastings	Direct Fired Make-up Air Systems, LU-215-9-756	Process Air Makeup
HVAC	Carrier	58ED 76,000 BTU Horizontal, Center Fired Furnace	HVAC 1
HVAC	Bryant	Commercial Outdoor Combination Gas Heating /Electric Cooling	Treatment Building Heating/Cooling
I			
Instrument	Badger Meter, Inc.	Compu-Sonic Model 4100	DCF Flow Meter
Instrument	Badger Meter, Inc.	Recordall II Turbo Meter	Effluent Mechanical Flow Meter
Instrument	Controlotron	System 1010X	Effluent Flow Meter FIT-107
Instrument	Electromagnetic	MUT 1100	PC-1 & PC-2 Flow Meter
Instrument	Endress & Hauser	EXIMAG, FIT1950	Flow Meter; Influent (FIT-106), PC-1A, PC-2A, PC-3 & 3A
Instrument	HNU Systems Inc.	Model P1 101	Photoionization Analyzer
Instrument	Kessler-Ellis Products	BAT R/T	102nd T. Flow WW-1-4 & Sample Pit

Item	Manufacture	Model	Function
Instrument	Magnetrol	Echotel III Series 311 Ultrasonic Mon-Contact Continuous Level Transmitter	Sludge Storage, Raw, Filter & Sludge Holding Tanks Level
Instrument	Red Lion Controls	Model PAXD 1/8 Din Universal DC Input Panel Meter	PC-1, 1A, 2, 2A, 3A & 102nd St. Local Digital Indicator
Instrument	MSA	Model 260	Combustible Gas and Oxygen Meter
P			
PLC	Allen Bradley Rockwell Automation	Discrete I/O Modules	
PLC	Allen Bradley Rockwell Automation	SLC 5/03, 5/04 & 5/05 Module Processors	
PLC	Allen Bradley Rockwell Automation	Compact 1769-IF4 Analog Input Module	
PLC	Allen Bradley Rockwell Automation	SLC 500 Power Supplies	
PLC	Allen Bradley Rockwell Automation	SLC 500 Analog Input Module	
PLC	Allen Bradley Rockwell Automation	MicroLogix 1500 Programmable Controller Base Units	
Pump	Goulds	Model 3196	Process Pumps Raw & Filter Feed
Pump	Goulds	Model 3171 Vertical Pump	PC-1A, PC-2A & PC-3A Pumps
Pump	Gorman-Rupp	S2B65-E2 230/3 Submersible	PC-1 & PC-2 Pumps
Pump	Homa	CH424, CH445 Stainless Steel Submersible pump	PC-3 Pumps
Pump Level Control	Syrelec	NR Series	PC-3 Pump level control
Pump Check Valve	Durabla	Excalibur Silent Check Valve	PC-3 Check Valve
Pump Control	Telemecanique / Square D	Altivar 66	VSD Pump Controls Raw & Filter Feed

Love Canal Operations Owners Manuals

Item	Manufacture	Model	Function
Pump Utility	Little Giant	Water Wizard submersible pump	Utility Pump
Pump Trash	C.H. & E Manufacturing Co.	3100 series, 3" Trash Pump	Trash Pump
Pump Self-priming	Gorman Rupp	Model 11 ½ A2-8 3-hp Engine Driven Centrifugal	Portable Pump
Pump	Flygt	Sump pump	DCF Pump Station #3
Preventer	Watts	Series 900	Back-flow preventers
R			
Regulator	Black & Decker	Cat. No. 22015,16,17,18,19	Air Regulator
Regulator	Fisher Controls	Type 95L & 95H Pressure Regulator	Air, Water & Gas Regulator
S			
Safety Eyewash/ Shower	Bradley	Model S1931	Safety Eyewash/ Drench Shower
T			
Trap	Armstrong	Compressor Drain	Air Compressor Drain Trap
Trap	Sarco	Type FA	Compressor Air Drain Trap
Tank	Owens/Corning	Model 106, 20 Mil. Fiberglass, 5940 gallons	Raw Water Tank
Tank	Buffalo Tank Div. Bethlehem Steel Corp.	125in dia. x 15ft 8in, 10,000 gallon	Sludge Storage Tank
Tank	Clemmer Industries	Doubled Walled Storage Tanks Vac-U-Test	

Item	Manufacture	Model	Function
V			
Valve	Apollo	87-200 (3"), 87-208 (2") 316 Stainless Steel Class 150 Full Port	Sludge Storage; Transfer Lines and PC-2
Valve	Shand & Jurs	Model 94020 Pressure/Vacuum Breather Valve	Process Tanks
Valve	Worcester Controls	Series 75 Electric Valve Actuator	Effluent Valve
Valve	Flowserve	Automax Valve Automation Systems (Valve, poistioner & controller)	Influent Valve
Vent	Shand & Jurs	Model 94130 Pressure only Breather Vent	Sludge Tanks
Ventsorb	Calgon	Ventsorb Activated Carbon Drums	Process Ventsorbs
Vacuum	Cadillac	Drum Top Vacuum	Exchange Carbon for Ventsorbs
W			
Winch	Thern Inc.	Worm Gear Hand Winch	Hand Winch used for pump retrieval