



OPERATIONS AND MAINTENANCE MANUAL

**LOVE CANAL SITE
NIAGARA FALLS, NEW YORK**

**Prepared For:
Glenn Springs Holdings, Inc.**

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1.0 INTRODUCTION

This Operations and Maintenance Manual (O&M Manual) was prepared for Glenn Springs Holdings, Inc. (GSH) by Conestoga-Rovers & Associates (CRA) for the Love Canal Leachate Treatment Facility (LCTF). The LCTF is located adjacent to the Love Canal Landfill (Site).

This is an update of the October 2002 O&M Manual, which replaced the prior O&M Manual written by CRA in 1984 for the New York State Department of Environmental Conservation (NYSDEC) and revised by the NYSDEC in 1988 and 1994. That Manual consisted of three separate volumes:

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

Volume II was a compilation of individual manuals and has been integrated into the GSH maintenance system; it no longer exists as a separate volume but can be found in the administrative building. Volume III consisted of O&M procedures for specific unit operations. These procedures have been reviewed and incorporated as LCTF operating procedures. These procedures augment this O&M Manual but are no longer included as a separate volume.

The Love Canal Leachate Treatment Facility LCTF 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.

Operation of the Site was transferred from the NYSDEC to Occidental Chemical Corporation (OCC) in April 1995. Effective July 1, 1998, Site responsibility was assigned by OCC to GSH, an affiliate of OCC. Beginning October 1, 2008, GSH contracted CRA to perform operation, maintenance, monitoring, and reporting activities for the Site under direct management of GSH. A list of Site contacts for the management activities of the Leachate Treatment Facility at Love Canal is provided in Table 1.1. An updated contact list will be provided to the NYSDEC following any management changes for insertion into the current O&M Manual.

1.1 PURPOSE AND SCOPE OF O&M MANUAL

The purpose of this O&M 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
- 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 (6NYCRR 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.
- 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 (373-3.2(g))
- Preparedness and Prevention (373-3.3)
- Contingency Plans and Emergency Procedures (373-3.4)
- Use and Management of Containers (373-3.9)
- Tank Systems (373-3.10)

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, GSH complies with other applicable laws 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
- 6NYCRR 376 Land Disposal Restrictions

These regulations are referenced in the appropriate sections of this O&M Manual.

As previously noted, equipment operating procedures and manuals provided by the manufacturers or suppliers have been integrated into the GSH 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 O&M Manual and other designated reports is essential for safe, environmentally sound, efficient operation of the facility. Designated reports consist of the following:

- Love Canal Site Operations and Maintenance Manual (this O&M Manual).
- Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program.
- Health and Safety Plan.
- Integrated Contingency Plan including an Emergency Response Plan.

This O&M Manual will be updated as significant modifications are made to the system and reviewed on an annual basis. A formal internal review of the Love Canal Collection and Leachate Treatment System will be performed a minimum of every 5 years. Revisions of the O&M Manual will be distributed to the Site and appropriate operating personnel. Additionally, an updated O&M Manual will be submitted to the NYSDEC following any significant modifications to the system and after the completion of every five-year review. In the event of a management change, the contact list will be updated and submitted to the Department for insertion into the current manual.

1.2 DEFINITIONS

A brief description of terms used in this Manual follows:

APL	Aqueous phase liquid
cfm	Cubic feet per minute
CRA	Conestoga-Rovers & Associates
DCF	Dewatering Containment Facility
FRP	Fiberglass reinforced plastic
GPM	Gallons per minute
GSH	Glenn Springs Holdings, Inc.
HMI	Human Machine Interface
hp	Horsepower
LCTF	Love Canal Leachate Treatment Facility
MCC	Motor Control Center
MH	Manhole
NAPL	Non-aqueous phase liquid
NFWB	Niagara Falls Water Board
NYSDEC	New York State Department of Environmental Conservation
OCC	Occidental Chemical Corporation
PC	Pump Chamber
PID	Proportional-Integral-Derivative
PLC	Programmable Logic Controller
P&ID	Piping and instrumentation diagram
psi	Pounds per square inch
RCRA	Resource Conservation and Recovery Act
ROD	Record of decision
rpm	Rotations per minute
SIU	Significant industrial user
TDH	Total dynamic head
VFD	Variable frequency drive
VOC	Volatile organic compound
WAN	Wide-area network

1.3 BUILDING AND EQUIPMENT NOMENCLATURE

The equipment and buildings associated with the Site are listed below.

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 LCTF (Carbon Loading)
 - South Adjacent LCTF (Former Sludge Loading)
- 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)
- Southern Sector Collection System Storage Tank (PC-3) (LC-201)
- Northern/Central Sector Collection System Storage Tank (six chambers) (PC-3A) (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)

2.0 SITE DESCRIPTION

2.1 HISTORY

The Love Canal was initially designed to provide inexpensive hydroelectric power for industrial development around the turn of the 20th century, but was abandoned shortly after construction commenced. Between 1942 and 1952, Hooker Chemical and Plastics Corporation (now OCC) 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. A permanent treatment plant has been in operation since December 7, 1979. A 3-foot thick clay cap was installed in 1980. A 40-mil high density polyethylene (HDPE) liner covered by 18 inches of clean soil and vegetation was installed over the initial clay cap area in 1985 to decrease infiltration over the Canal and to enhance inward migration of groundwater from the surrounding area.

In October 1994, a Consent Judgment between OCC and the State of New York was approved by the court. This judgment required operation and maintenance activities for the Love Canal Site. On January 12, 1995, the NYSDEC reclassified the Site to a Class 4 Site. Operation of the Love Canal Site (Site) was transferred from the NYSDEC to OCC in April 1995. Effective July 1, 1998, Site responsibility was assigned by OCC to GSH, an affiliate of OCC. Beginning October 1, 2008, GSH contracted CRA to perform operation, maintenance, monitoring, and reporting activities for the Site under direct management of GSH.

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 ¼ mile north of the Niagara River. The location of the Site is shown on Figure 2.1, and the layout of the Site is shown on Figure 2.2. 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 2.3.

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 restricts vertical and horizontal groundwater migration. The measured hydraulic conductivity of the clay layer is on the order of 1×10^{-8} centimeters per second (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 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 was 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

Operation of remedial systems 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 Southern Sector of the Canal. The barrier drain was later extended to completely encompass the entire area of disposed waste within the Central and Northern Sectors of the Canal. The locations of the barrier drain and associated collection system are shown on Figure 3.1.

The remedial collection systems for the Site are the systems defined in the 1987 Record of Decision (ROD) and the Consent Judgment 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 components:

- Barrier Drain System (Section 3.1)
- Collection System (Pump Chambers) (Section 3.2)

In addition, installation of a 22-acre clay cap over the entire former Canal area was completed in October 1980 following completion of the barrier drain collection system. The purpose of the cap is to reduce infiltration of precipitation. The thickness of the clay cap is a minimum of 3 feet. In 1985, a second (40-acre) cap was installed over the initial clay cap area. The newer cap consists of a 40-mil HDPE liner covered by 18 inches of clean soil and vegetation.

In March 1999, the adjacent 102nd Street Landfill Site leachate collection system was connected to the Love Canal Site to facilitate the transfer of leachate from the 102nd Street Landfill into Love Canal's pump chamber PC-3 for treatment at the LCTF.

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, designed to intercept the shallow overburden lateral groundwater flow, consists of a trench approximately 4 feet wide that varies in depth from approximately 12 to 25 feet depending on location at the Site. Installed within the trench is a perforated vitrified clay tile pipe. The pipe is 6-inch diameter in the Central and Northern Sectors and both 6-inch and 8-inch diameter in the Southern Sector. The pipe is centered in a minimum of 2 feet of uniformly sized gravel, which is overlain with coarse sand extending to the existing ground surface present at the time of construction. Thirty-two lateral trenches, approximately 12 to 19 feet deep, filled with a minimum of 2 feet of gravel and overlain with sand similar to the barrier drain, were dug perpendicular to the barrier drain in the direction of the Canal. The majority of these laterals extend into the disposed waste. The total barrier drain system consists of 6,800 feet of trench and perforated vitrified clay tile pipe and an additional 2,100 feet of lateral trenches.

The barrier drain is graded from two highpoints, one in the southeast corner and the other in the northeast corner, toward a series of manholes which drain to four pump chambers (PC-1A/PC-2A in the Northern/Central Sector and PC-1/PC-2 in the Southern Sector) where the leachate is collected. The leachate is pumped from the pump chambers to two other pump chambers connected to underground holding tanks (PC-3A in the Northern/Central Sector and PC-3 in the Southern Sector) where it is temporarily stored. The leachate is then pumped to the LCTF where it is treated and discharged to the Niagara Falls Water Board (NFWB) sanitary sewer system under the Site's Significant Industrial User (SIU) Permit #44.

A typical cross-section of the barrier drain system, depicting the general location of the waste materials, the caps, and the barrier drain system is shown on Figure 3.2.

3.2 COLLECTION SYSTEM (PUMP CHAMBERS)

3.2.1 PROCESS DESCRIPTION

The collection system consists of two sectors, the Northern/Central and the Southern Collection Systems. The pump chambers in the Southern Collection System 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. GSH replaced all the suction lift pumps with submersible pumps, and the dry wells are no longer utilized.

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. The collection systems are shown schematically in the Process Flow Diagram (PFD) and the Process and Instrumentation Diagrams (P&IDs) located in Appendix A.

3.2.1.1 SOUTHERN COLLECTION SYSTEM

The barrier drain is graded for gravity flow toward a series of pump chambers (manholes) where the leachate is collected: on the east to Manhole 7 (MH-7) which is Pump Chamber 1 (PC-1) and on the west to MH-8 which is PC-2. Manholes MH-7 and MH-8 have a leachate storage capacity of approximately 2,200 gallons. The leachate is pumped from the manholes through a 4-inch diameter furan-coated steel forcemain to an underground holding tank adjacent to PC-3. PC-3 is located on the west side of the Canal where leachate is held prior to being pumped on demand (through a 4-inch diameter furan-coated steel forcemain) to the LCTF. PC-3 also accepts water pumped via forcemain from the 102nd Street Landfill. PC-3 is vented to atmosphere through a carbon Vent Sorb drum to remove volatile organic compound (VOC) emissions.

3.2.1.2 NORTHERN/CENTRAL COLLECTION SYSTEM

The barrier 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 an approximate 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 to PC-2A where it discharges into an 8-inch diameter vitrified clay pipe. The leachate from PC-2A is also pumped from the well into the 8-inch diameter vitrified clay pipe. The leachate in this pipe gravity flows to an underground holding tank system located adjacent to PC-3A, where it is held prior to being pumped through PC-3A to the LCTF. PC-3A also accepts water from the former dewatering containment facility (DCF), the sump in the drum barn, the floor drains within the treatment facility, and the two loading pads adjacent to the LCTF (the former sludge storage tank loading area and

the carbon trailer loading pad). PC-3A is vented to the atmosphere through a carbon Vent Sorb drum to remove VOC emissions.

3.2.2 EQUIPMENT DESCRIPTION

The Northern/Central Collection Holding Tank system is comprised of six individual approximate 4,300-gallon concrete underground tanks connected by furan-coated steel pipe. The total capacity of the holding tank system is 25,850 gallons. Each individual concrete holding tank has an 8-foot width, 12-foot length, and 6-foot depth. PC-3A is connected to the storage tank system by three 4-inch diameter furan-coated steel pipes and has the same liquid level as the tank. PC-3A is designed to overflow to PC-2 in the Southern 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 PC-3A 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. PC-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 contain two Gorman-Rupp pumps (Model S2B65-E2). These pumps are rated at 50 gallons per minute (GPM) @ 35 feet of total dynamic head (TDH). The pumps operate on an as needed basis (individually or simultaneously).

In the Southern Collection System, PC-1 (MH-7) and PC-2 (MH-8) each hold one Gorman-Rupp pump (Model S2B65-E2). These pumps are rated at 100 GPM @ 40 feet TDH. Pump Chamber 3 contains two Gorman-Rupp pumps (Model S2B65-E2). These pumps are each rated at 50 GPM @ 50 feet TDH. The pumps operate on an as-needed basis (individually or simultaneously).

There are two pump stations associated with the DCF. Water collected from the DCF drains to DCF pump chamber 3 (MH-6B). From there, the water is pumped via a 2-inch diameter HDPE forcemain to a 10,000-gallon underground storage tank (UST) (DCF pump chamber 4). The pump in DCF pump chamber 3 is a Flygt pump (Model 3085.092, 2.2 hp, 460 volt, 1,750 rpm). The pump in DCF pump chamber 4 is a Gorman-Rupp stainless steel vertical sump pump (Model S2B65-E2, 2 horsepower [hp], 115 volt, 3,450 rotations per minute [rpm]). Water from pump chamber #4 is pumped to PC-3A via a 6-inch diameter HDPE forcemain.

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 Gorman-Rupp stainless steel (Model S2B65-E2) submersible pumps (2 hp, 115 volt, 3,450 rpm). These pump the water to PC-3A, via a 4-inch diameter HDPE forcemain.

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 PC-1A and PC-2A pump into PC-3A. Therefore, the operator must set level permissives at the HMI, which allow the pumps in PC-1A and PC-2A to operate only if the level in PC-3A is not above the operator selected setpoint. This same level permissive requirement is required for the pumping of MH-7 and MH-8 (PC-1 and PC-2) to PC-3 and the pumping of PC-3A and PC-3 to the process Raw Water Tank.

The two pumps in the DCF run off of two level switches in each pump chamber. The pump starts at the high level permissive switch and pumps 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 the pump and high level alarms from high level switches in DCF pump chamber 4 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 B.

4.0 LEACHATE TREATMENT SYSTEM

The treatment process, shown schematically in the PFD and the P&IDs (located in Appendix A), consists of several process steps for the removal of various constituents prior to discharge into the NFWB 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 NFWB sanitary sewer system and ultimately the NFWB Publicly Owned Treatment Works (POTW) (see Appendix C for a copy of the Discharge Permit).

To bring the treatment system online, 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 removed using a vacuum truck or can be transferred to the Sludge Holding 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 LCTF 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-inch diameter forcemain from PC-3A and PC-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 6,000 gallons.

The Raw Water Feed Pump, which pumps from the Raw Water Tank to the Clarifier, is a Goulds 3196 Model 2x3-6 STX capable of pumping 150 GPM @ 115 feet 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-106), 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 percent, 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 percent, the PLC will shut down the pump to prevent any damage. The pump will also shut down if the downstream level in the

Filter Feed Tank (overflow from the Clarifier) rises above 70 percent. The pump will automatically restart when the Raw Water Tank level reaches 50 percent and the level in the Filter Feed Tank is below 60 percent. At this point, the PID block will adjust the pump frequency to maintain the 50-percent 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 motor control center (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 0 hertz, the pump will be stopped, and at 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 milliamp (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 2 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 HP 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.

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 3,000 gallons.

The Filter Feed Tank Discharge Pump is a Goulds 3196 Model 2x3-6 STX capable of pumping 150 GPM @ 115 feet TDH. The pump is controlled with a VFD.

4.3.3 INSTRUMENT/CONTROL OVERVIEW

The Filter Feed Tank is equipped with a level indicator and transmitter (LIT-107), 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 percent, 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 percent, the PLC will shut down the pump to prevent any damage. The pump will automatically restart when the tank level reaches 50 percent. At this point, the PID block will adjust the pump frequency to maintain the 50 percent 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 0 hertz, the pump will be stopped, and at 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 unit 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 pounds per square inch (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 VOCs. A carbon change is required when the leachate 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 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 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 drains from the Carbon Adsorption System to the NFWB sanitary sewer through an effluent valve and flow meter.

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 7,600-gallon vessel has a capacity to hold 20,000 pounds of activated carbon.

4.5.3 INSTRUMENT/CONTROL OVERVIEW

To prevent overpressurization, 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 via vacuum truck. Sludge also can be transferred to the Sludge Holding Tank from the Clarifier using compressed air at the discretion of the Operator.

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 changeouts decreases. The frequent changing of the bag filters is a direct indication that the sludge in the clarifier needs to be transferred.

The sludge, after it has been transferred to the vacuum truck from the clarifier or the Sludge Holding Tank, 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. The sludge is drummed after dewatering for off-Site disposal. The quantity of sludge/NAPL shipped off Site and the manifests are maintained at the Site and in the CRA Niagara Falls office. The quantity of sludge/NAPL generated each year will be reported in the annual Period Review Report (PRR). Procedures detailing the sludge transfer process are available in the LCTF Operating Procedures.

4.6.2 EQUIPMENT DESCRIPTION

The Sludge Holding Tank is a fiberglass reinforced plastic (FRP) 1,600-gallon tank. The tank has a 7-foot diameter and a height of 6 feet.

4.6.3 INSTRUMENT/CONTROL OVERVIEW

The level in the Sludge Holding Tank is monitored using level transmitter LIT-105. This level is displayed both locally and on the HMI screens.

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 leachate during tank breathing.

There are 13 vapor phase adsorption canisters currently in use at the Site. The LCTF has four canisters. These canisters contain activated carbon and are attached inline to the indoor process vessels. The Raw Water Tank and the Clarifier both vent to a canister. The Clarifier has a second vent, which discharges to a pair of canisters in parallel. The Filter Feed Tank and the Sludge Holding Tank vent to a canister in an accumulator.

The other nine canisters are utilized as part of the Barrier Drain Collection System and the Secondary Containment Systems. The adsorbers are located at PC-3 (2), PC-2 (2), PC-1 (2), PC-3A (1), DCF pump chamber 4 (1), and the Floor/Decon Pad Manhole.

The carbon is replaced as necessary based on volatile organic monitoring (see Section 6.1.2). 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, dewatering, and drumming the sludge.

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 LCTF 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

A 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 PC-3), and five A-B Micrologix 1500. Of the seven PLCs, there are six remote PLCs (one located at each of the pump chambers (PC-1, PC-2, PC-3, PC-1A, PC-2A, and PC-3A) 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 PC-3 PLC via a DH+ (Data Highway Plus) communication network.

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

The control components are scheduled to be upgraded in 2013.

5.1.2 HUMAN MACHINE INTERFACE

The PLC is tied in to an Intellution 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 B.

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

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 E provides a list of alarm messages for the collection and 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 F. (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 cannot 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 G. 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 shut down. 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 MH-7 Pump From Running
- Inhibit MH-8 Pump From Running
- Inhibit PC-3 Pump A From Running
- Inhibit PC-3 Pump B From Running
- Inhibit 102nd Street Well Pumps From Running
- Inhibit PC-1A Pump A From Running
- Inhibit PC-1A Pump B From Running
- Inhibit PC-2A Pump A From Running
- Inhibit PC-2A Pump B From Running
- Inhibit PC-3A Pump A From Running
- Inhibit PC-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 GSH Sites. This network allows for full control and alarming capabilities of the Collection System and the LCTF from any of the other connected GSH 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 7-day per week basis. This will consist of the following during the weekdays:

- 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. Verification of the operation of the components will ensure that the system functions as designed and daily operation continues uninterrupted.
- Perform a visual check: walk through the entire treatment building and check for leaks, overflows, malfunctioning equipment, or signs of vandalism, which may compromise the operation of the system. Document visual check and findings on daily inspection sheet and, if needed, forward any work orders to maintenance group.
- Visual check of drum warehouse fuel oil storage tank and dike for leaks. Visual check of stored drums for corrosion/leakage. Visual check of sump levels. Any leaks or damage must be noted and addressed immediately to ensure the continued proper operation of the treatment system.
- Check telephone system for proper operation.

- Visual check for fence integrity from the center of the Site to ensure that no obvious breaches are present that may allow trespassers into the Site.

The weekend inspections will consist of a modified version of the components listed above. A daily inspection log used by the operator is provided in Appendix H. Repairs and/or replacements will be performed as necessary.

6.1.2 MONTHLY INSPECTION/MONITORING

The following will be performed on a monthly basis:

- Check for breakthrough of carbon vent sorb drums (with photoionization detector)

Repairs and/or replacements will be performed as necessary.

6.1.3 SEMIANNUAL INSPECTION/MONITORING

6.1.3.1 BARRIER SYSTEM/PUMP CHAMBER INSPECTIONS

An inspection of each pump chamber and manhole will be conducted semiannually (spring and fall). This inspection will include:

- Visual inspection of chamber piping
- Verification of level probe performance
- Inspection of pump chamber and manhole integrity
- Inspection of pump chamber security
- Visual inspection of manhole bottom from ground surface to insure manholes are free of debris and that leachate is flowing freely.

The semiannual inspections will be recorded on the semiannual inspection log provided in Appendix H.

6.1.3.2 LANDFILL CAP AND FENCE

An inspection of landfill cap and fence will be conducted semiannually (spring and fall). This inspection will include:

- Detailed inspection of the fence to ensure that no breaches are present that may allow trespassers into the Site
- Inspection of landfill cap for condition of vegetated over and signs of erosion or subsidence.

The semiannual inspections will be recorded on the semiannual inspection log provided in Appendix H.

6.1.4 ANNUAL INSPECTION/MONITORING/MAINTENANCE

6.1.4.1 BACK FLOW PREVENTER INSPECTIONS

An inspection of the backflow preventers will be conducted annually by a certified third party. The third party will supply completed inspection forms to the operator for submittal to the NFWB. The backflow preventers will be replaced as needed.

6.1.4.2 BARRIER SYSTEM/PUMP CHAMBER NAPL INSPECTIONS

An inspection for NAPL accumulation within the barrier s manholes and pump chambers will be conducted annually. Accumulated NAPL will be removed at this time.

6.1.4.3 BARRIER SYSTEM/PUMP CHAMBER SYSTEM CLEANOUT

The pump chambers, collection system USTs, and clarifier will be cleaned out of NAPL and sediment on an annual basis.

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. This may be accomplished through either a visit to the Site or examination of the HMI data through the WAN or dialup.

A Long-Term Groundwater Monitoring Program has been implemented to verify proper operation of the collection system. The program involves hydraulic monitoring

(measurement of water levels in monitoring wells on a quarterly basis), and chemical monitoring (sampling of monitoring wells for chemistry on an annual basis). Details of the program are presented in the document entitled "Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program," dated June 2013 (prepared by CRA).

6.3 TREATMENT PERFORMANCE MONITORING

A performance log is printed out automatically by the HMI software every morning and distributed electronically via email to the Operator.

6.3.1 CARBON TREATMENT PERFORMANCE MONITORING

To ensure that organics are being removed by the Carbon Beds, samples are collected quarterly between and after the beds. The samples are analyzed for VOCs. The following indicator parameter data are reviewed and used to determine the necessity of a carbon change, as summarized below. These indicator parameters reviewed are as per the NFWB SIU Permit #44, Section E, Item 2.

<i>Item/Indicator</i>	<i>Criteria</i>	<i>Response</i>
Interstage: chlorobenzenes (mono-, tri-, and tetra-), ethylene (tri- and tetra-), monochlorotoluene, hexachlorocyclohexanes, and hexachlorobenzene	>10 µg/L	Commence Process for carbon change
Effluent: chlorobenzenes (mono-, tri-, and tetra-), ethylene (tri- and tetra-), monochlorotoluene, hexachlorocyclohexanes, and hexachlorobenzene	>10 µg/L	Schedule immediate carbon change

Notes:

µg/L - Micrograms per liter.

6.4 ANALYTICAL PROGRAM

The effluent discharge criteria for the LCTF have been established in accordance with the Official Compilation of Codes, Rules and Regulations of the State of New York, Title 21, Chapter XXX of the NFWB Regulations (August 2003) and the NFWB SIU Permit No. 44 for the Site. Periodic testing of the effluent discharge is required as summarized in the following section. In addition, GSH and the NFWB have agreed to cease

discharge to the NFWB sewer during high rain conditions to avoid overloading the system. The letter outlining this agreement is included in Appendix C.

6.4.1 SAMPLING SCHEDULE

Sampling and process monitoring is summarized as a process schematic presented as Figure 6.1.

6.4.2 REQUIRED EFFLUENT QUALITY

The effluent limitations specified in the Site's discharge permit (#44) from the NFWB are as follows:

<i>Parameter</i>	<i>Annual Avg. Limit</i>	<i>Daily Max Limit</i>	<i>Units</i>
Flow	0.3	0.3	MGD
TSS	25	50	lbs./day
Soluble Organic Carbon	50	75	lbs./day

Notes:

TSS = total suspended solids.

MGD = million gallons per day.

lbs./day = pounds per day.

7.0 SYSTEM UTILITIES

7.1 EMERGENCY SHUTDOWN

This process is designed to automatically shut down in a safe manner in the event of an electrical utility failure. In the event of a power failure, all process equipment will shut down. 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 National Grid on 95th Street. Electricity to all or parts of the treatment building can be shut off in the electrical room across from the control room in the treatment building. The treatment building floor plan is shown on Figure 7.1. The electrical room includes the following equipment:

1. Main disconnect enclosure
2. 400A/600V (3 phase, 4 wire) SN safety switch
3. 400A/600V power panel
4. 75 kilovolt amp (KVA) transformer (480V primary, 120/208V secondary)
5. 120/240V lighting panel
6. High level interlock system fuse panel for process tanks
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 (MH-6B) disconnect and starter
10. Dewatering Containment Facility Pump Station No. 4 disconnect and starter
11. Security/Fire Logic Control Panel
12. Variable Frequency Drives

Northern, Central, and Southern Sectors

The Northern, 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-inch diameter, 4-wire cable feeds Power Panel-A (PP-A). PP-A, located in the Electrical Room, has a 120/208-volt, 225 amp main circuit breaker. PP-A feeds the multiple disk centrifugal pump (MDCP) pump logic controller, PP-N1 located at PC-2A, PP-N2 located at PC-1A, PP-C located at PC-3A behind the Treatment Facility, PP-S1 located at Pump Chamber 2, and PP-S2 located at PC-1.

7.2.2 CITY WATER

City water enters the facility at the south end of the treatment building and also on a separate line into the drum barn. A shut-off valve is located on the riser at this location. The water is supplied by a 4-inch diameter connection to the 8-inch diameter 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 City water system has an 80-psi service rating and is connected to the following by copper lines:

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

Schematic diagrams of the service module and water lines are provided on P&IDs in Appendix A.

City water, supplied to the service module by a 3-inch diameter copper line, is flow and pressure regulated as detailed on P&IDs in Appendix A. 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.

<i>Station</i>	<i>Location</i>
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 a shut-off 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 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 Model RS-25-100 compressor is out-of-service as it is no longer needed for the process. The compressors provide air required to transfer sludge from the Clarifier to the Sludge Holding Tank (two 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 overpressurization.

Air is supplied on demand for the sludge transfer by copper lines pressurized to 100 psi. 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 the P&IDs in Appendix A.

7.2.5 HVAC

The electrical and mechanical rooms are heated by 500- and 1,750-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 treatment building 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 floor level exhaust fans located on the east and west walls of the bay area (each fan is rated at 1,185 rpm at 4,100 cubic feet per minute [cfm]). In addition, there are six roof top fans. Three of the fans (rated at 1,650 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 fans are located on the roof at the south end, middle, and southeast ends of the plant. These fans are rated at 475 rpm/9,035 cfm, 945 rpm/4,070 cfm, and 945 rpm/4,070 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 LCTF operating 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 NFWB in accordance with the NFWB SIU Permit #44. Copies of the report are provided to NYSDEC.

Pursuant to Section 2.C. of Appendix B of the Consent Judgment between OCC and the State of New York, effective October 7, 1994, a Love Canal Operations and Monitoring Report is issued annually to the NYSDEC to summarize the activities that occurred at the Site over the past year. Per the NYSDEC's request, the Operations and Monitoring Report was change to the "Site Management Periodic Review Report" beginning in 2010. 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
- Evaluation of overall performance and chemical containment
- Institutional and engineering certification

A separate Love Canal annual report is submitted to the NYSDEC pursuant to Section 4 of Appendix B of the Consent Judgment between OCC and the State of New York. 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 Judgment, GSH 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 GSH.

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

9.0 PERSONNEL

9.1 ORGANIZATIONAL CHART

The organizational structure for GSH Western New York operating personnel is posted in the Love Canal Control Room.

9.2 STAFFING REQUIREMENTS

The Love Canal Collection and Treatment System is designed to operate with minimal staffing. The Site is designed to operate automatically (unmanned) with the exception of routine inspections and maintenance activities. According to the consent order and due to the historically high visibility of operations at the Site, GSH requires one operator to be on Site while the Treatment System is in operation.

9.3 TRAINING

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, Appendix I, and placed on file.

10.0 RECORDS

10.1 OPERATING INSPECTION

Inspection sheets are filed in the Love Canal Control Room. Operation and maintenance activities performed while on Site are recorded in a maintenance computer program database and/or in a spreadsheet saved on a server.

10.2 MAINTENANCE/CALIBRATION

Maintenance and calibration records for each piece of equipment are recorded and kept on file at the Site. Calibration labels are placed on equipment indicating the last date of calibration if applicable.

11.0 REFERENCES

11.1 LOVE CANAL DOCUMENTS

11.1.1 CONSENT ORDERS

- Partial Consent Decree – 1989
- Consent Judgment – 1994

The above Consent Orders (Civil Action No. 79-990C) were drawn up 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, OCC 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 Love Canal office building:

- Love Canal Landfill Collection and Aqueous Phase Liquid (APL) Treatment System Operation and Maintenance Manual
- Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program
- Waste Management Plan, GSH Western New York Sites

11.1.3 HEALTH AND SAFETY

The following plans can be found in the Love Canal office building:

- Site-Specific Health and Safety Plan GSH Western New York Sites
- Integrated Contingency Plan, Love Canal Site

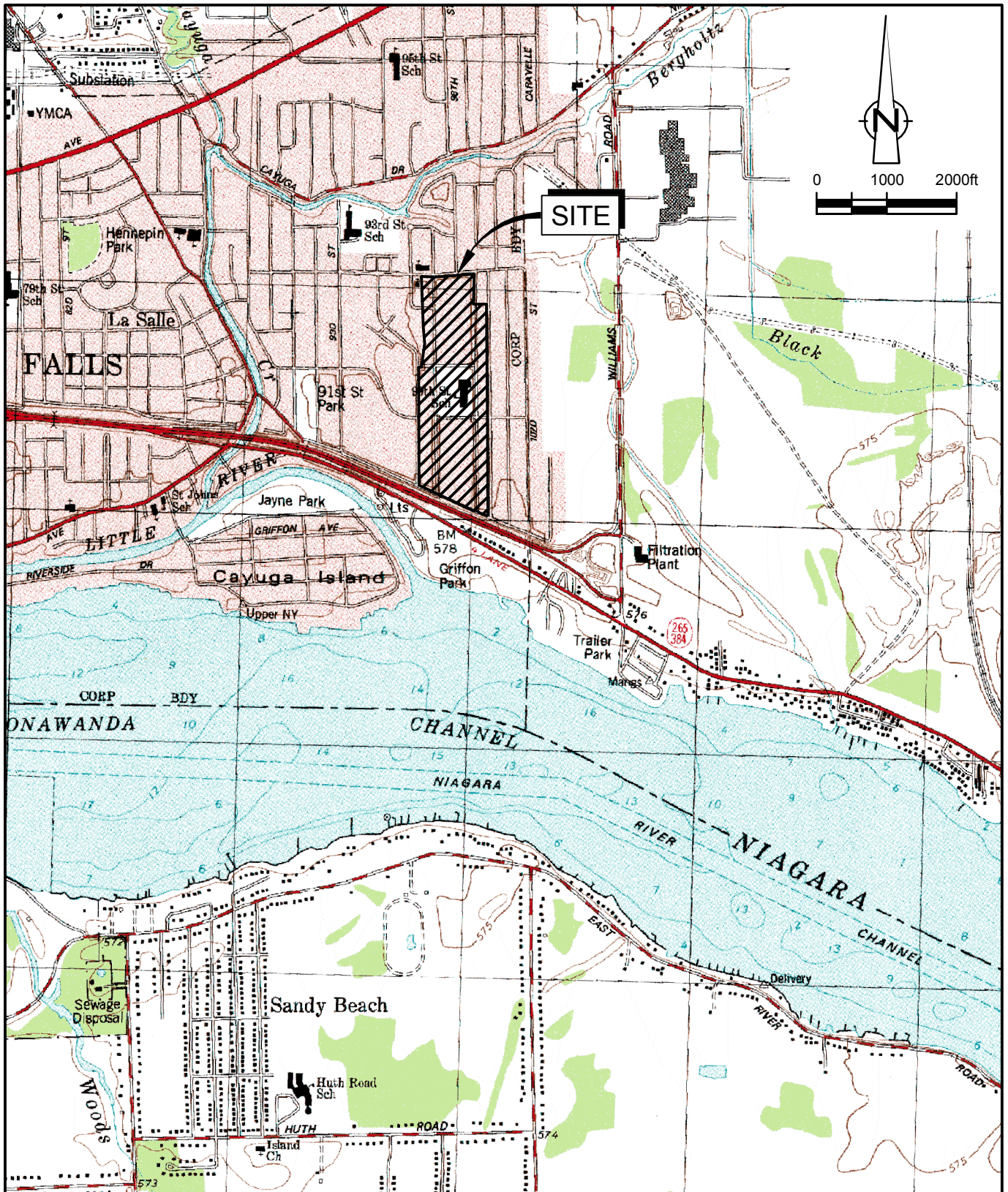
11.2 DRAWINGS

PFDs and P&IDs together for the Collection and Treatment System are attached as Appendix A. 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.

FIGURES

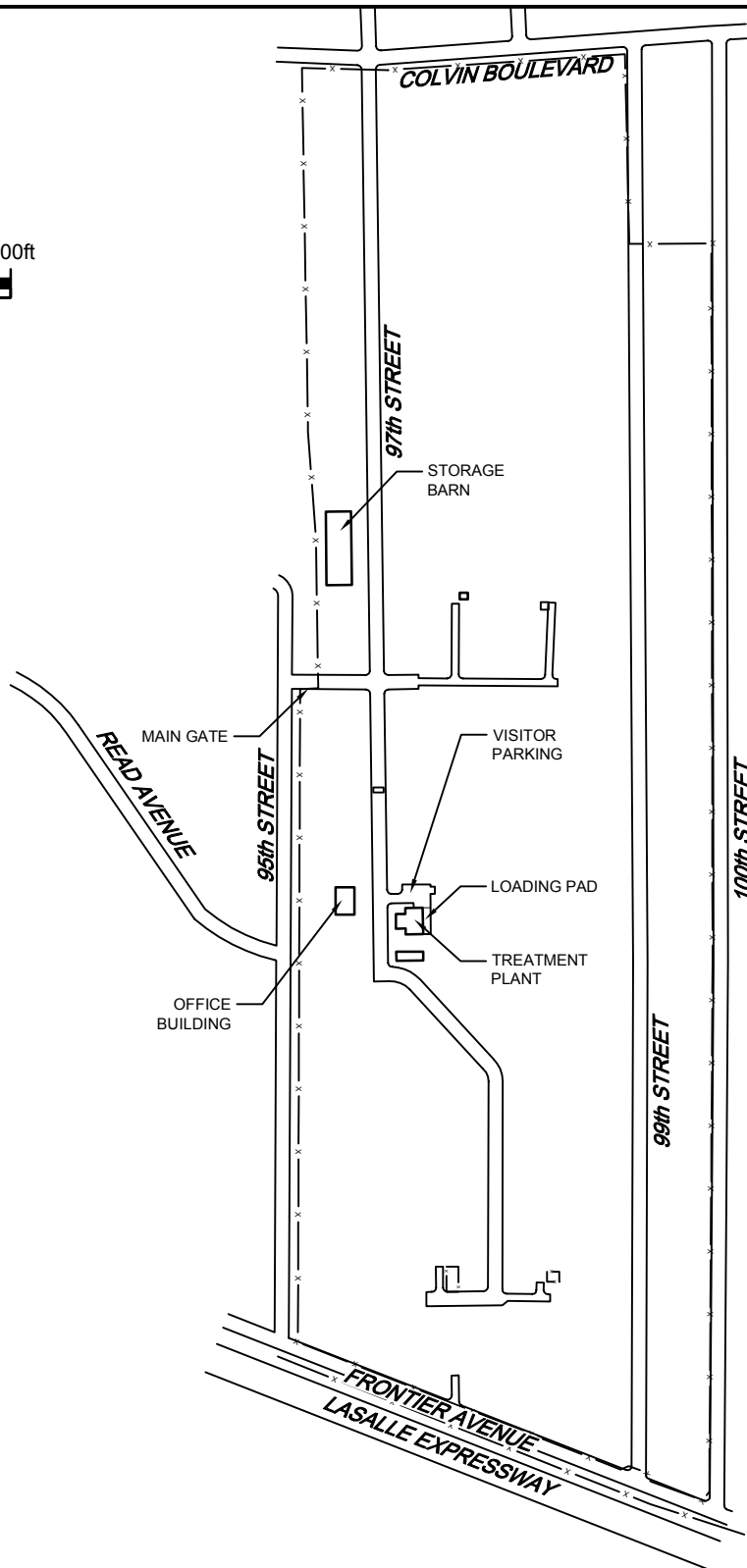
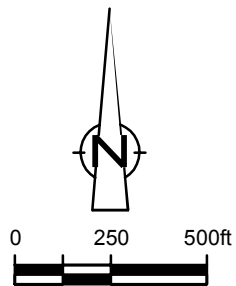


SOURCE: USGS QUADRANGLE MAP;
TONAWANDA WEST, NEW YORK, 1980

figure 2.1

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





LEGEND

— x — FENCELINE



figure 2.2
 SITE PLAN
 LOVE CANAL SITE
 GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York



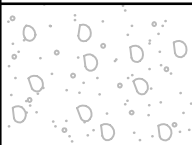

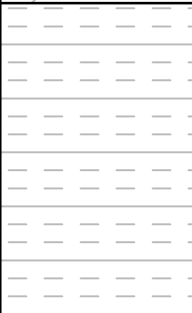
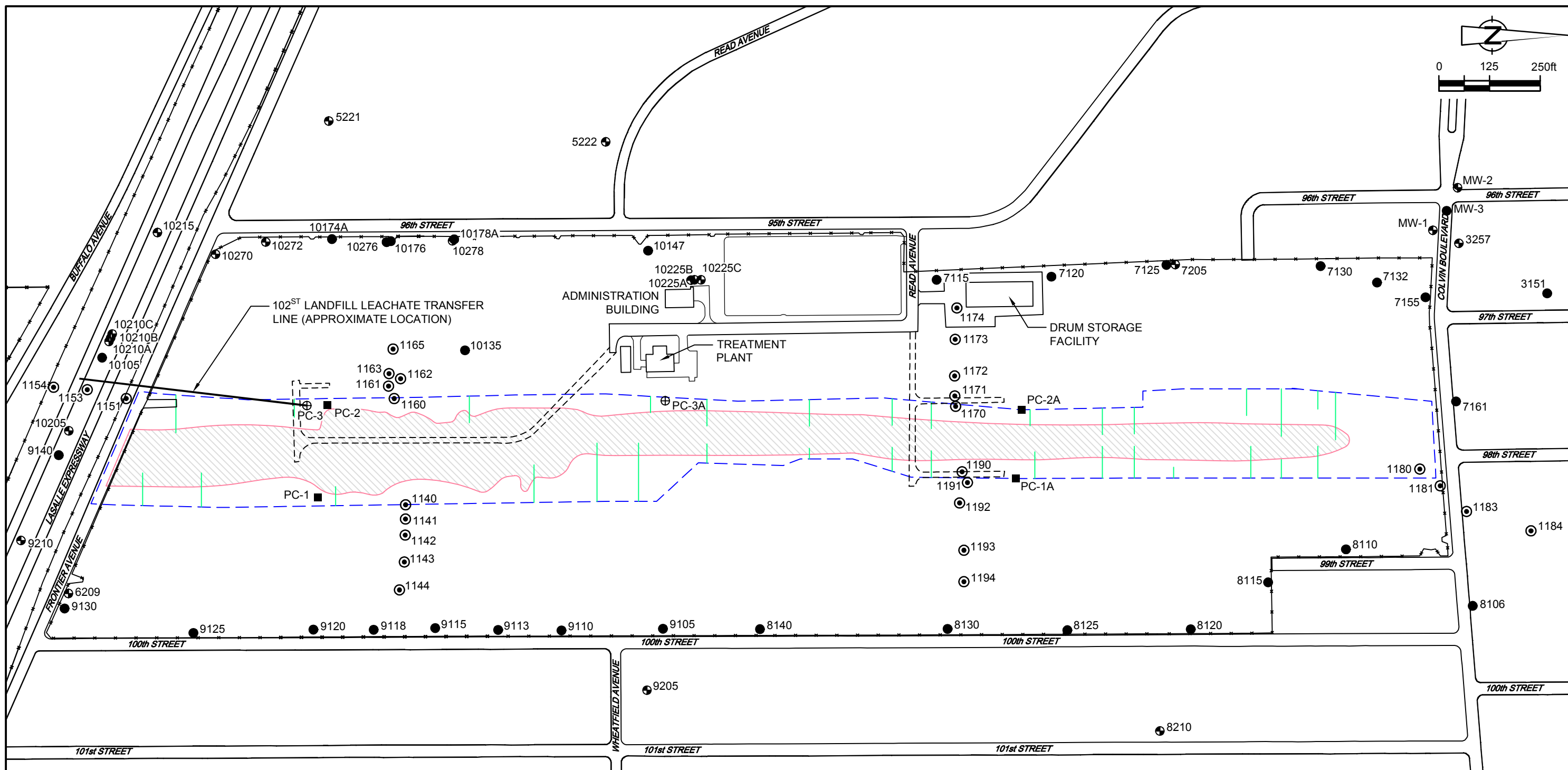
FORMATION	COLUMNAR SECTION	THICKNESS IN FEET	CHARACTER
FILL		0.1-3	LOCAL SOIL MATERIAL, INDUSTRIAL WASTE, CONSTRUCTION RUBBLE
GLACIOLACUSTRINE CLAY		6-29	REDDISH BROWN TO GRAY, SILTY, VARVED, IN UPPER PART GRADING TO VERY PLASTIC, MOIST TO WET, IN LOWER PART
TILL		1-25	REDDISH BROWN SILTY TO SANDY CLAY,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

figure 2.3
SITE GEOLOGICAL COLUMN
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York



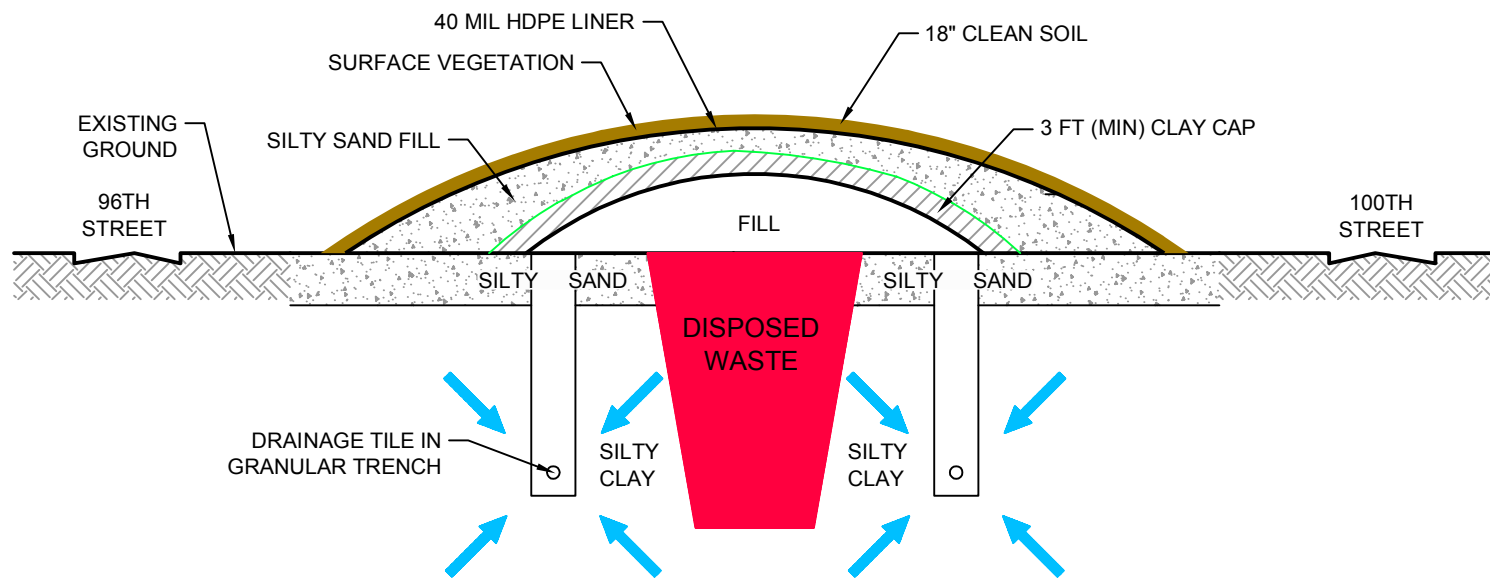


LEGEND

- | | | | |
|-----------|-----------------------------|---------|---|
| —x—x— | FENCE LINE | ● 10270 | BEDROCK OBSERVATION WELL |
| - - - - - | BARRIER DRAIN | ■ PC-1 | PUMP CHAMBER FOR LEACHATE COLLECTION |
| — — — — — | LATERAL TRENCH | ⊕ PC-3 | PUMP CHAMBER / UNDERGROUND LEACHATE STORAGE TANK FOR LEACHATE COLLECTION AND TRANSFER |
| ⊙ 7105 | PIEZOMETER | ▨ | APPROXIMATE LIMITS OF DISPOSED WASTE |
| ● 9120 | OVERBURDEN OBSERVATION WELL | | |

figure 3.1
BARRIER DRAIN, COLLECTION SYSTEM AND MONITORING WELLS
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

NOTE:
 WELL 3151 IS UNABLE TO BE LOCATED
 (ASSUMED TO BE PAVED OVER)




LEGEND
 GROUNDWATER FLOW

figure 3.2

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



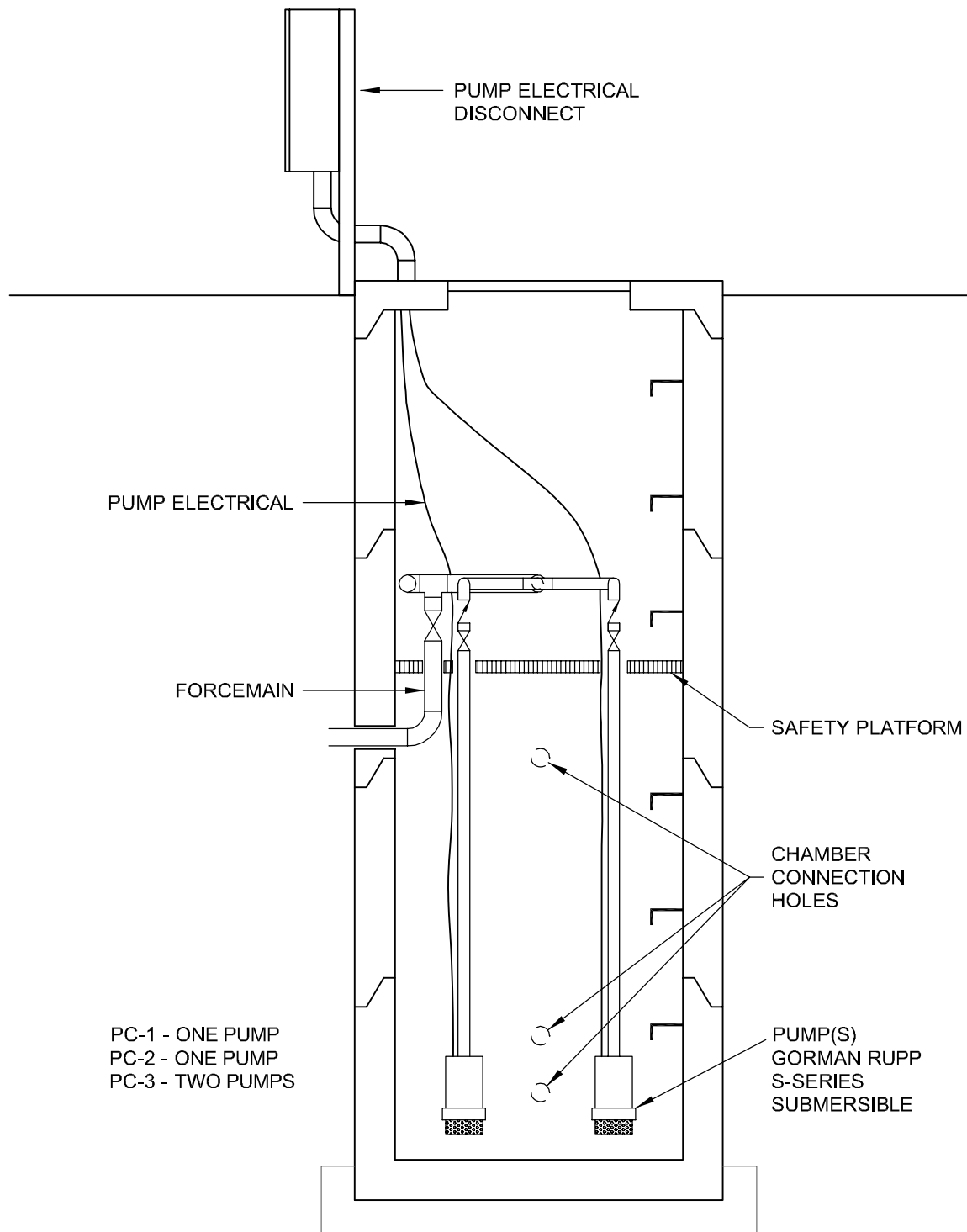


figure 3.3

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



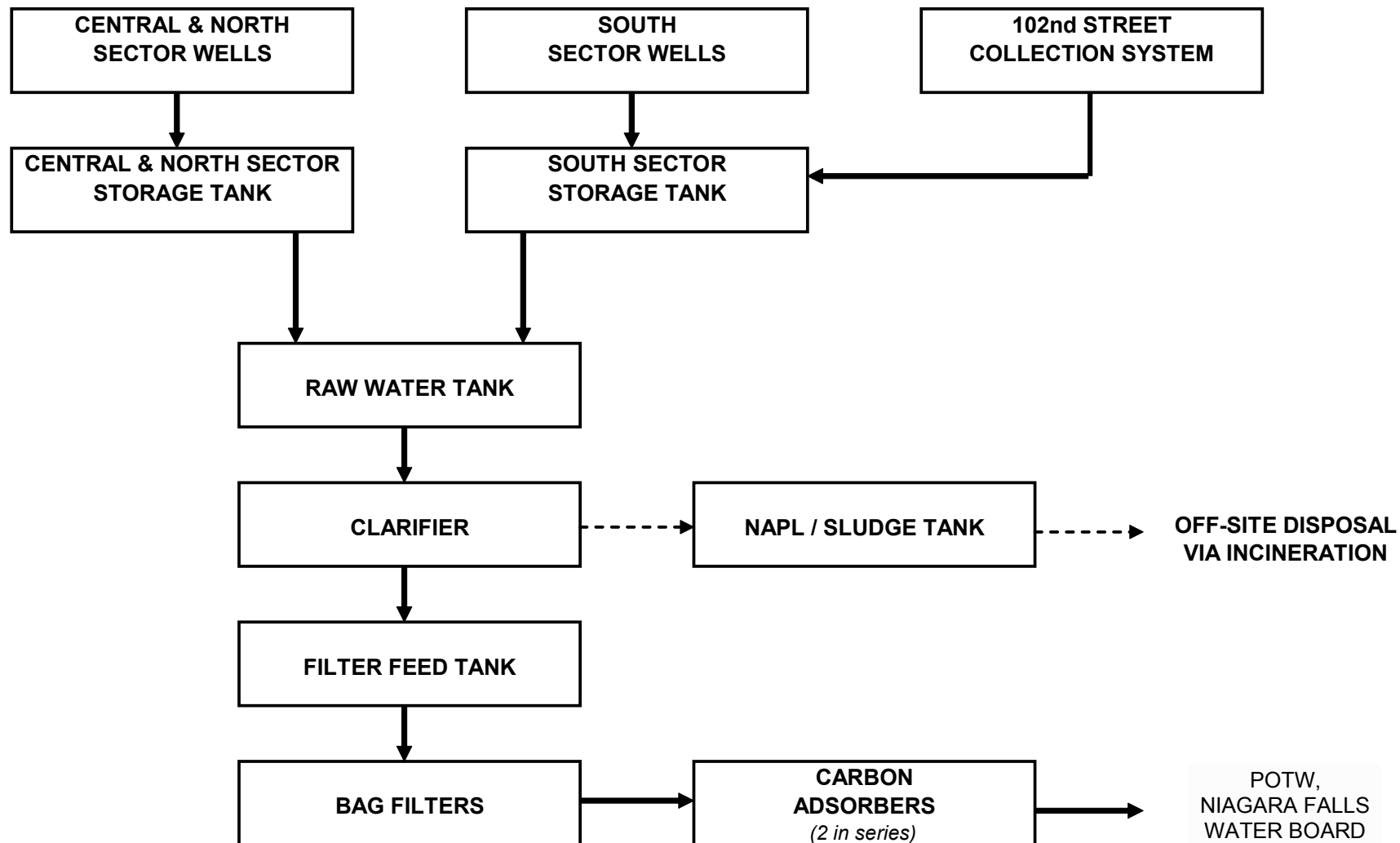


figure 4.1

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



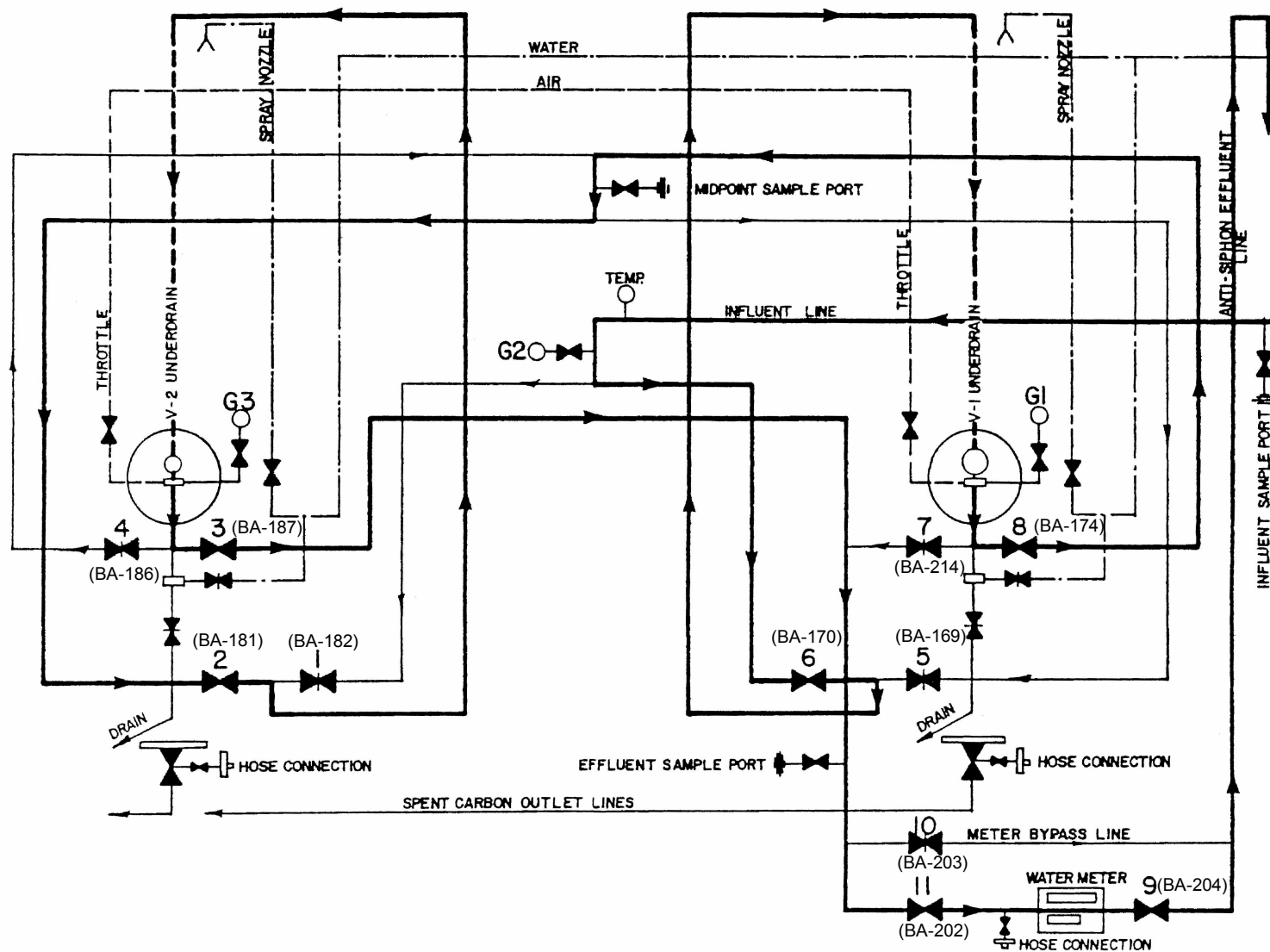
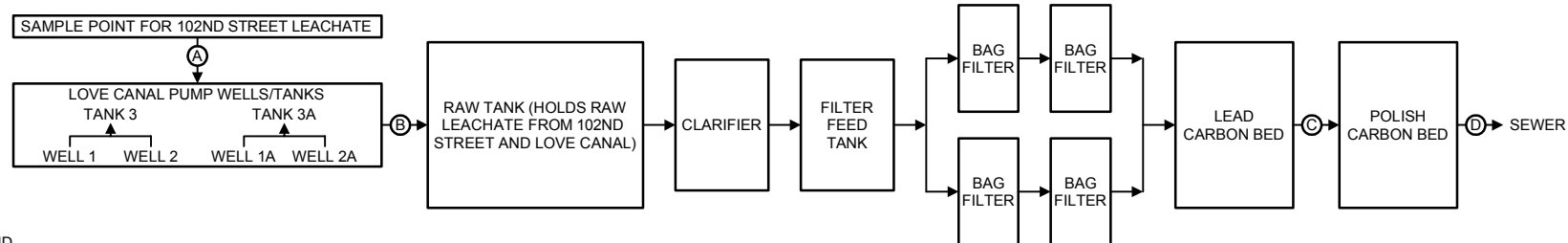


figure 4.2

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





LEGEND

(A) SAMPLE LOCATION

Frequency	Sample Location	Sample type	Sampler	Laboratory, T/A	Analyses	Sample Method	Driver	Permit/Action Levels
Monthly	D - Effluent	NA	Operator	NA	Flow, pH, Temperature	1	Flow - SIU Permit #44 pH, Temperature - Internal	Daily Max Discharge Limitations
Quarterly	A - 102nd Street	Grab	Operator	TA-Pitts STD	VOCs	2	Internal Use Only	Process Information
	D - Effluent	Lab Composite	Operator	TA-Pitts STD	SIU Permit #44 (1), SIU Permit #44 (2)	3	SIU Permit #44	Daily Max Discharge Limitations, Quarterly Treatment Levels
	B - Influent	Grab	Operator	TA-Pitts STD	SIU Permit #44 (2)	2	SIU Permit #44	Process Information, Quarterly Treatment Levels
	C - Interstage	Composite	Operator	TA-Pitts STD	SIU Permit #44 (2)	4	SIU Permit #44	Process Information, Quarterly Treatment Levels

SIU Permit #44 (1) - Quarterly Analytes

TSS, SOC, PPL VOCs, PPL Acid Extractables, PPL Base/Neutral, Hexachlorocyclohexanes/Pesticides, Total Phenols

SIU Permit #44 (2) - Quarterly Treatment System Check

Trichloroethylene, Tetrachloroethylene, Monochlorotoluene, Monochlorobenzenes, Trichlorobenzenes, Tetrachlorobenzenes, Hexachlorocyclohexanes, Hexachlorobenzene

Daily Max Discharge Limitations - Flow - 0.3 MGD, TSS - 50 lbs/d, SOC - 75 lbs/d, PPL VOCs (monitor only), PPL Acid Extractables (monitor only), PPL Base/Neutral (monitor only), Hexachlorocyclohexanes/Pesticides (monitor only), Total Phenols (monitor only)

Process Information - TSS, SOC, PPL VOCs, PPL Acid Extractables, PPL Base/Neutral, Hexachlorocyclohexanes/Pesticides, Total Phenols

Quarterly Treatment Levels - 10 µg/L

Notes:

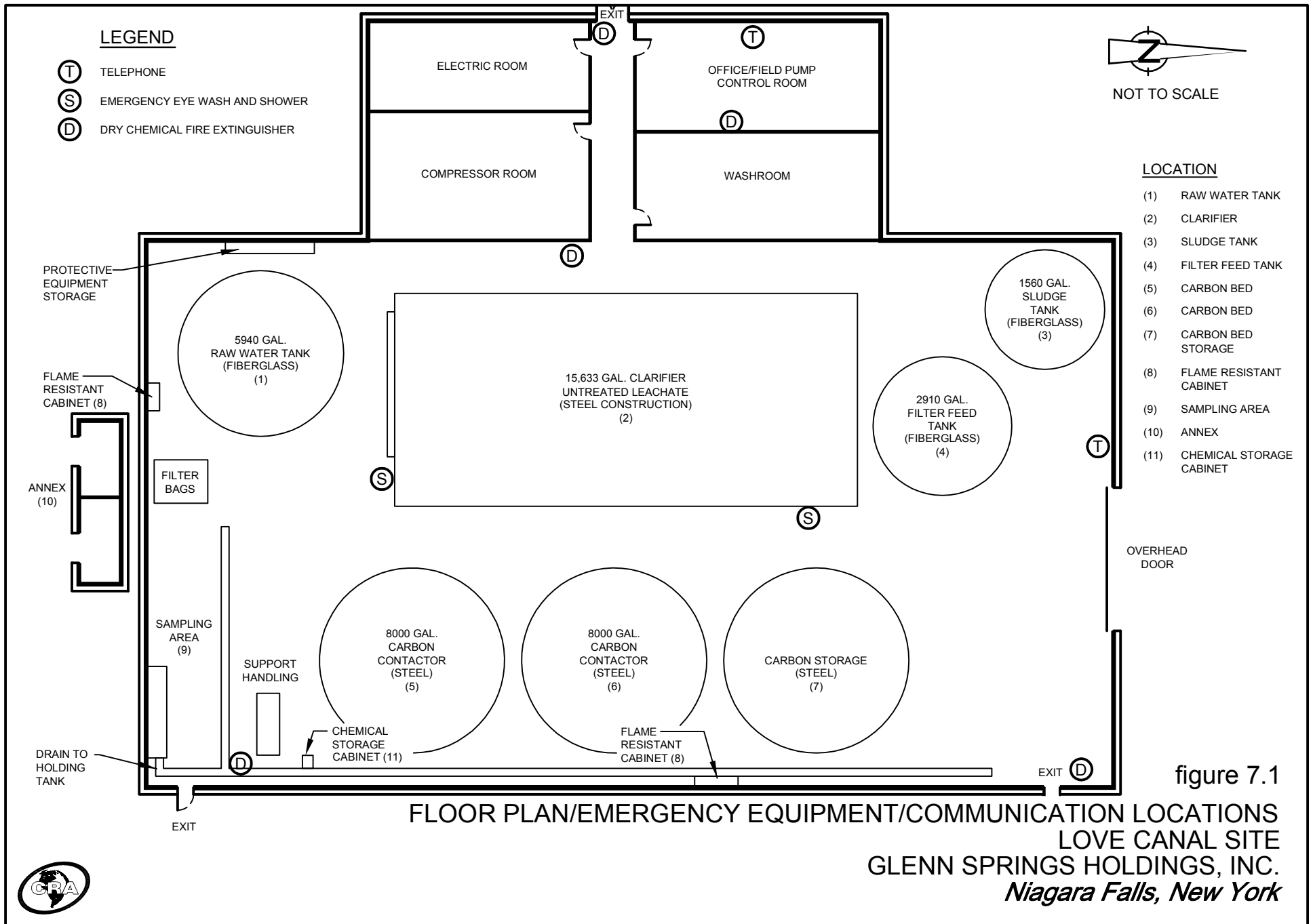
- Location A (102nd Street sample) is collected from PC-3.
- Location B (Influent) is collected before the Raw Tank.
- Location C (Interstage) is collected between the Lead Carbon Bed and the Polish Carbon Bed.
- Location D (Effluent) is collected from MS #1.

1. Flow will be continuously monitored with the use of a water meter or another acceptable flow metering device.
2. Grab sample.
3. Each sample will consist of four (4) grabs collected spaced throughout the batch discharge, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be composited in the laboratory and analyzed as one sample.
4. Composite sample over a 24-hour period. Composited by operator.

figure 6.1

PROCESS SAMPLING SCHEMATIC
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York





TABLES

TABLE 1.1

**SITE CONTACT LIST
LOVE CANAL LANDFILL SITE
NIAGARA FALLS, NEW YORK**

Joseph Branch (Glenn Springs Holdings, Inc. [GSH]
Western New York Operations Manager (WNYOM)
cell – 231-670-6809

Clint Babcock (GSH)
Western New York Operations Coordinator (WNYOC)
972-687-7506; cell – 859-421-4233

John Pentilchuk (Conestoga-Rovers & Associates [CRA])
Project Manager, reports to GSH
519-884-0510; cell - 519-572-5644

Dennis Hoyt (CRA)
Project Coordinator, reports to GSH
716-297-6150; cell – 716-345-1978

Darrell Crockett (CRA)
Facility Coordinator, reports to CRA PM/PC
cell 716-998-5804

APPENDIX A

PROCESS FLOW AND PIPING AND INSTRUMENTATION DIAGRAMS

PROCESS / INSTRUMENT LINES

	MAIN PROCESS LINE
	SECONDARY PROCESS LINE
	UNDEFINED SIGNAL
	PNEUMATIC SIGNAL
	ELECTRICAL SIGNAL
	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
	OFF PAGE CONNECTOR

UTILITY IN/OUT

LINE SYMBOLS

	BALL VALVE
	BUTTERFLY VALVE
	DIAPHRAM VALVE
	GATE VALVE
	GLOBE VALVE
	THREE WAY VALVE (FAIL OPEN TO PATH A-C)
	FOUR WAY VALVE (FAIL OPEN TO PATH A-C AND B-D)
	CHECK VALVE
	REDUCER
	FLEXIBLE PIPE
	BLIND FLANGE
	HOSE CONNECTION
	SCREWED CAP, CLEANOUT
	Y-LINE STRAINER
	SPECIFICATION CHANGE
	LEVEL DEVICE, FLOAT TYPE
	BLOCK & BLEED VALVE SETUP
	TIE POINT TO EXISTING SYSTEM
	RESTRICTION ORIFICE
	DRAIN
	FLOW STRAIGHTENING VANE
	SPECIALITY PART
	STATIC MIXER
	AIR VENT, AUTOMATIC
	FILTER/REGULATOR/LUBRICATOR

	FILTER/REGULATOR
	DAMPER OR LOUVER
	EQUIPMENT INSULATED WITH "X" OF INSULATION
	PULSATION DAMPER

INSTRUMENT SYMBOLS

	LOCALLY MOUNTED INSTRUMENTS
	PANEL MOUNTED INSTRUMENTS A = PANEL No. WHEN MORE THAN ONE PANEL IS PRESENT
	BEHIND BOARD MOUNTED INSTRUMENTS
	IN LINE INSTRUMENTS AS IDENTIFIED
	SIGHT GLASS
	RUPTURE DISC
	PRESSURE RELIEF VALVE
	VACUUM RELIEF VALVE
	CONSERVATION VENT
	PRESSURE REDUCING REGULATOR (SELF CONTAINED)
	BACKPRESSURE REGULATOR (SELF CONTAINED)
	LEVEL REGULATOR WITH MECHANICAL LINKAGE
	TEMPERATURE ELEMENT WITH THERMOWELL
	DIAPHRAM ACTUATOR, SPRING-OPPOSED
	CYLINDER ACTUATOR SPRING - OPPOSED
	ROTARY MOTOR ACTUATOR
	SOLENOID ACTUATOR
	HAND ACTUATOR OR HANDWHEEL
	AIR ACTUATED VALVE W/POSITIONER

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

	TARGET TYPE FLOW SENSOR
	SINGLE PORT PITOT TUBE
	AVERAGING PITOT TUBE
	MAGNETIC FLOWMETER
	TURBINE OR PROPELLER FLOWMETER
	POSITIVE-DISPLACEMENT FLOWMETER
	VARIABLE AREA FLOWMETER
	DIAPHRAM SEAL WITH PRESSURE LEAD LINE
	DIAPHRAM SEAL (LINE-MOUNTED)
	SIGNAL CONVERTER (INPUT/OUTPUT) [* E - VOLTAGE P - PNEUMATIC I - CURRENT B - BINARY (MODBUS, RS232...)]
	PILOT LIGHT A - AMBER C - GREEN R - RED

ELECTRICAL SYMBOLS

AT MOTOR	AT PANEL	ELSEWHERE	NOMENCLATURE
			START - MOMENTARY CONTACT
			START - GREEN ILLUMINATED BUTTON
			STOP - MOMENTARY CONTACT
			STOP - RED ILLUMINATED BUTTON
			START/STOP
			START/STOP - GREEN & RED ILLUMINATED BUTTONS
			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

LIGHTS	SUBSCRIPTS	PUSHBUTTONS
A = AMBER	ES = EMERGENCY STOP	J = JOG
B = BLUE	L = LOCAL PANEL	LO = LOCK OUT
C = CLEAR	SP = STOP	ST = START
G = GREEN		
R = RED		
W = WHITE		
Y = YELLOW		

TYPICAL ISA LETTER COMBINATIONS

		Controllers				Readout Devices		Switches and Alarm Devices *			Transmitters			Solenoids, Relays, Computing Devices	Primary Element	Test Point	Well or Probe	Viewing Device, Glass	Safety Device	
First-Letters	Initiating or Measured Variable	Recording	Indicating	Blind	Self-Actuated Control Valves	Recording	Indicating	High **	Low	Comb	Recording	Indicating	Blind							
A	Analysis	ARC	AIC	AC		AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP	AW			
B	Burner/Combustion	BRC	BIC	BC		BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE		BW	BG		
C	User's Choice																			
D	User's Choice																			
E	Voltage	ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE					
F	Flow Rate	FRC	FIC	FC	FCV, FICV	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT	FY	FE	FP		FG		
FQ	Flow Quantity	FQRC	FQIC			FQR	FQI	FQSH	FQSL				FQIT	FQT	FQY	FQE				
FF	Flow Ratio	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSL						FE					
G	User's Choice																			
H	Hand			HC						HS										
I	Current	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE					
J	Power	JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE					
K	Time	KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE					
L	Level	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL	LRT	LIT	LT	LY	LE		LW	LG		
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	PY	PE	PP				
PD	Pressure, Differential	PDR	PDIC	PDC	PDCV	PDR	PDI	PDSH	PDSL		PDR	PDIT	PDT	PDY	PE	PP			PSV, PSE	
Q	Quantity	QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE					
R	Radiation	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT	RY	RE		RW			
S	Speed/Frequency	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSL	SRT	SIT	ST	SY	SE					
T	Temperature	TRC	TIC	TC	TCV	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT	TY	TE	TP	TW		TSE	
TD	Temperature, Differential	TDRC	TDIC	TDC	TDCV	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT	TDY	TE	TP	TW			
U	Multivariable					UR	UI							UY						
V	Vibration/Machinery Analysis					VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE					
W	Weight/Force	WRC	WIC	WC	WCV	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT	WY	WE					
WD	Weight/Force, Differential	WDRC	WDIC	WDC	WDCV	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT	WDY	WE					
X	Unclassified																			
Y	Event/State/Presence		YIC	YC		YR	YI	YSH	YSL				YT	YY	YE					
Z	Position/Dimension	ZRC	ZIC	ZC	ZCV	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT	ZY	ZE					
ZD	Gauging/Deviation	ZDRC	ZDIC	ZDC	ZDCV	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT	ZDY	ZDE					

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 Possible Combinations:
FO (Restriction Orifice)
FRK, HIK (Control Stations)
FX (Accessories)

TJR (Scanning Recorder)
LLH (Pilot Light)
LCH (Level Control High)
PFR (Ratio)
KQI (Running Time Indicator)
QQI (Indicating Counter)

WKIC (Rate-of-Weight-Loss Controller)
HMS (Hand Momentary Switch)
LCL (Level Control Low)

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

INSTRUMENT / PROCESS LINES DESIGNATIONS

XXX	UNDERGROUND INSTRUMENTS
XXX	PROCESS INSTRUMENTS
XXX	VENDOR SUPPLIED INSTRUMENTS
XXX	UTILITY INSTRUMENTS
0000	UNDERGROUND LINES
1000	PROCESS LINES
2000	VENDOR SUPPLIED LINES
3000	UTILITY LINES
CS	CARBON STEEL PIPE
CSVD	CARBON STEEL VENT DUCT (12 GAUGE)
DVW	DRAIN VENT WASTE PIPE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
KYNAR	KYNAR
CPVC, SOLID	CPVC, SOLID
PVC	POLYVINYL CHLORIDE PIPE SCHEDULE 40
PVE	POLYVINYL CHLORIDE PIPE SCHEDULE 80
PPL	POLYPROPYLENE LINED/LINED DUCTILE PIPE
SS	STAINLESS STEEL
TFD	TEFLON
B	BARE
I	INSULATED
J	JACKETED AND INSULATED
TE	ELECTRICALLY TRACED AND INSULATED



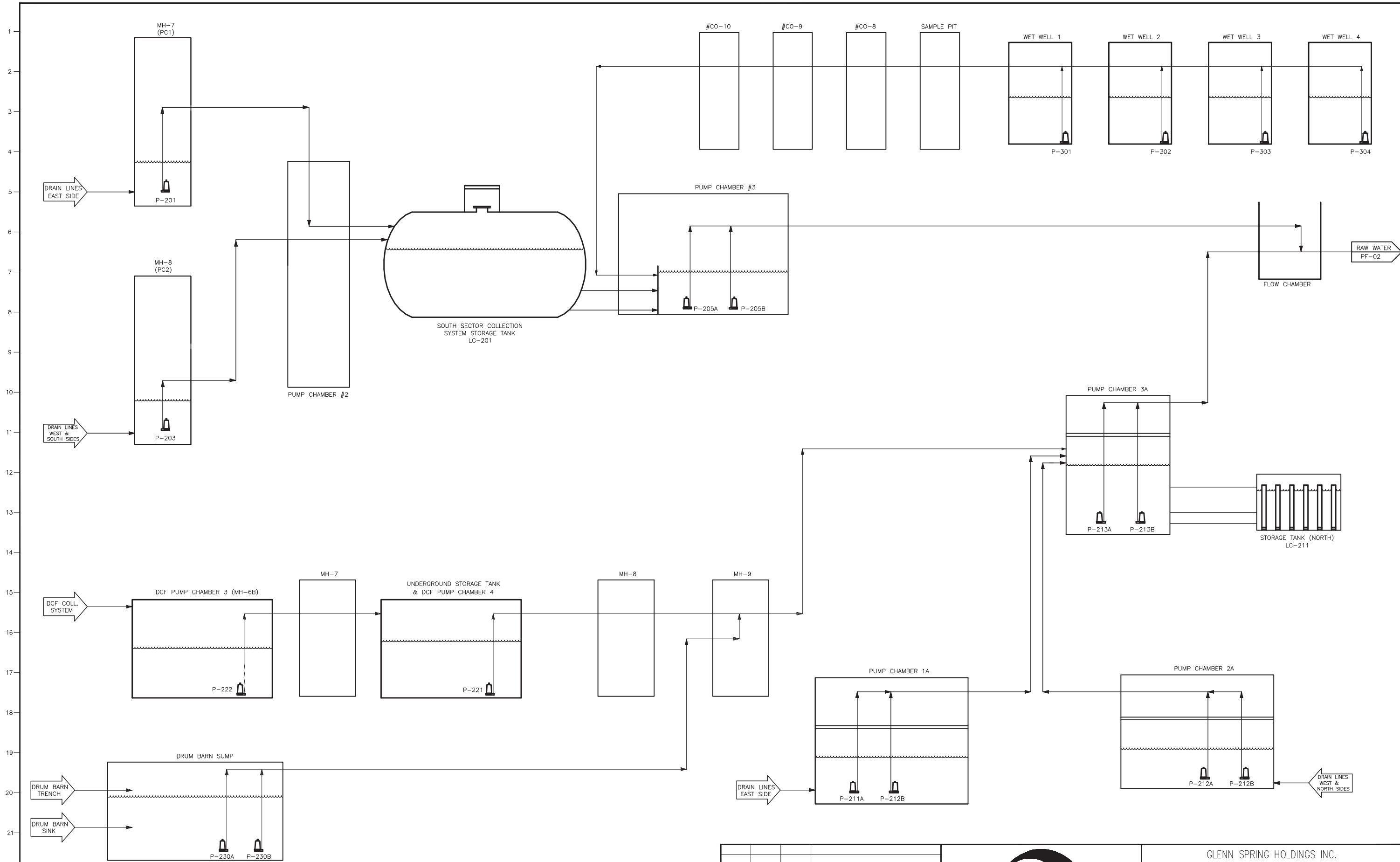
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2	02/01/01	JW	UPDATED INSTR./EQUIP./VALVE NUMBERS & EQUIP. DESC.
1	11/30/00	JGRW	AS BUILT



MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
LEGEND

DRAWN	BAB	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	2-23-96	CHK'D	-	PROJ. NO. 9954	9954-EF-00	3

09954-00(000)EF-NF000 MAY 12/2009



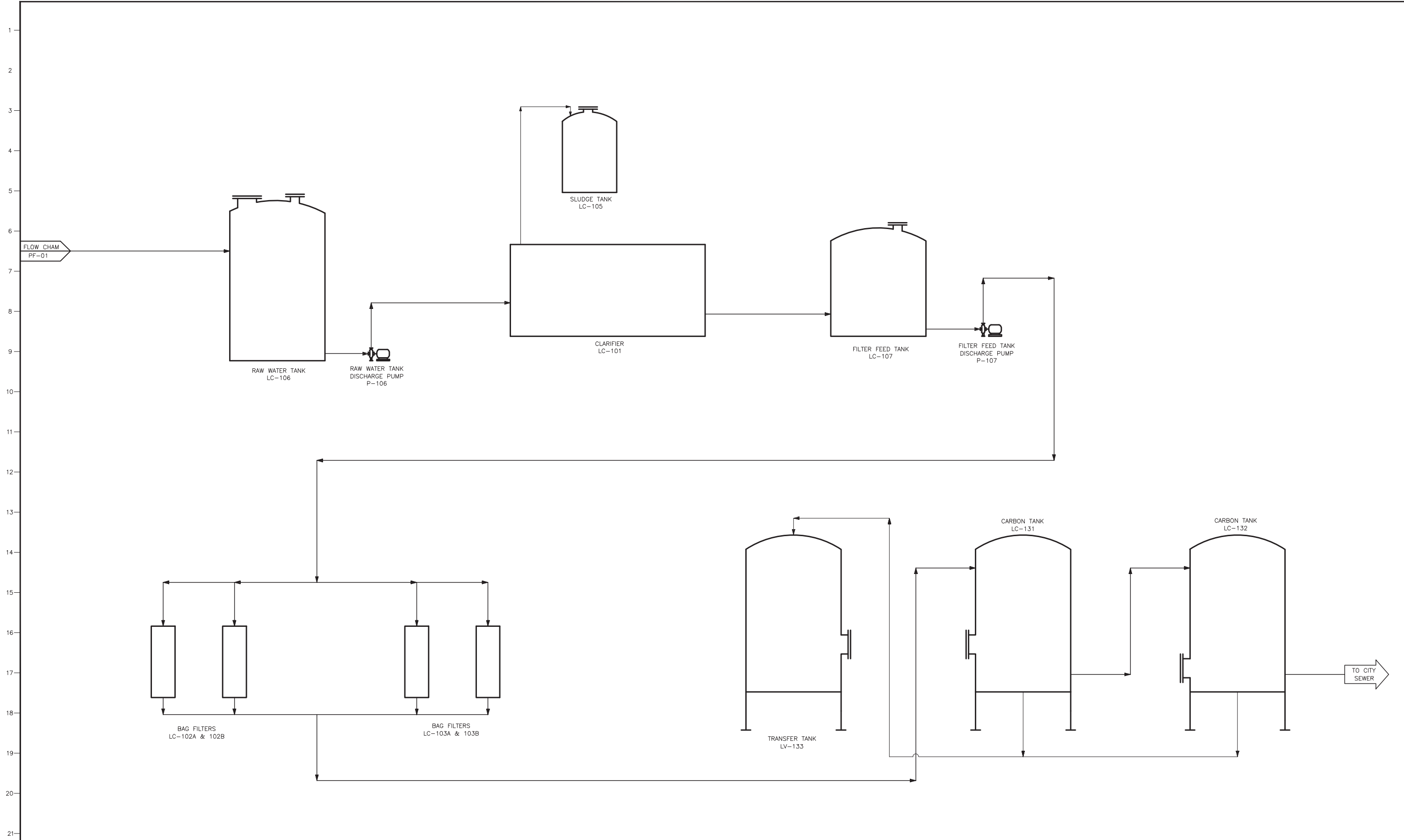
REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION



GLENN SPRING HOLDINGS INC.
LOVE CANAL TREATMENT FACILITY
PROCESS FLOW DIAGRAM
COLLECTION SYSTEM

DRAWN	LVN	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	01-29-13	CHK'D	J.E.	PROJ. NO. 9954	9954-PF-01	

09954-00(027)PF-BU001 MAR 25/2013



REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION

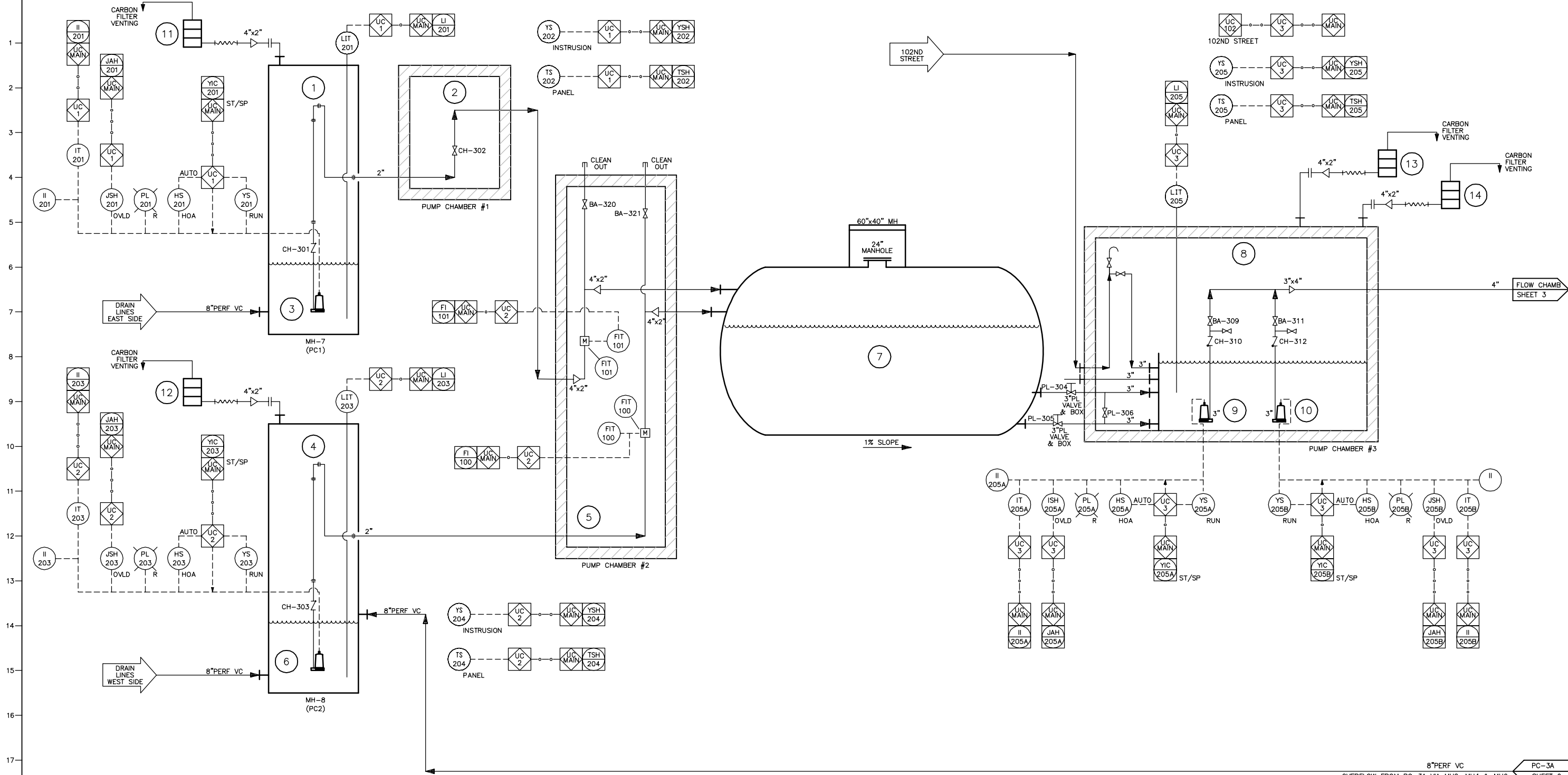


GLENN SPRING HOLDINGS INC.
LOVE CANAL TREATMENT FACILITY
PROCESS FLOW DIAGRAM
TREATMENT FACILITY

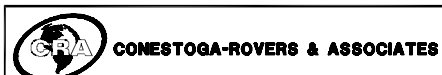
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DATE	01-29-13	CHK'D	JE	PROJ. NO. 9954	9954-PF-02	

09954-00(027)PF-BU001 MAR 25/2013

PLANT ID.	PC1	①	—	②	P-201	③	—	④	—	⑤	P-203	⑥	LC-201	⑦	—	⑧	P-205A	⑨	P-205B	⑩	—	⑪	—	⑫	—	⑬	—	⑭		⑮		⑯		⑰		⑱		⑲		⑳		㉑		㉒		㉓																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
NAME	MANHOLE No. 7 WET WELL	PUMP CHAMBER No. 1, DRY WELL EAST SIDE		MANHOLE No. 7 PUMP	MANHOLE No. 8 WET WELL	PUMP CHAMBER No. 2, DRY WELL WEST SIDE		MANHOLE No. 8 PUMP	SOUTH SECTOR COLLECTION SYSTEM STORAGE TANK	PUMP CHAMBER No. 3 WEST SIDE	PUMP CHAMBER No. 3 PUMP (HOMARAIL)	PUMP CHAMBER No. 3 PUMP (HOMARAIL)	CARBON VENT SCRUBBER (NIXTON N-100)	CARBON VENT SCRUBBER (NIXTON N-100)	CARBON VENT SCRUBBER (NIXTON N-100)	CARBON VENT SCRUBBER (NIXTON N-100)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												



8"PERF VC
OVERFLOW FROM PC-3A VIA MH2, MH4 & MH6
PC-3A
SHEET 2



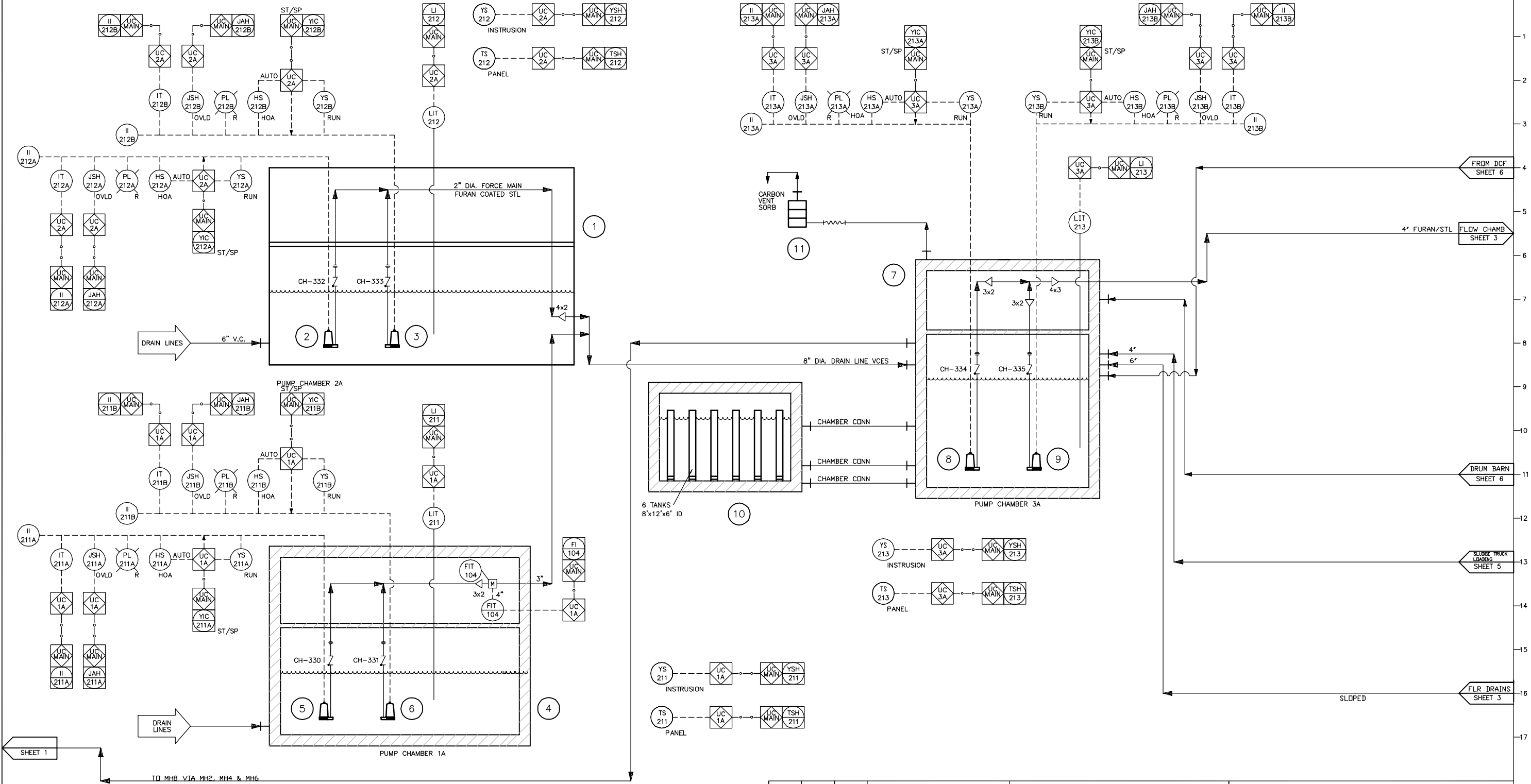
MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
SOUTHERN SECTION

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	3/13/09	LWN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC
2	02/01/01	JW	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC
1	11/30/00	JGRW	AS BUILT

DRAWN	JF	SCALE	NONE	APPROVED		DRAWING NUMBER	9954-EF-01	REV	3
DATE	8-16-00	CHK'D	-	PROJ. NO.	9954				

09954-00(00)EF-NF001 MAY 12/2009

PLANT ID.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NAME	PUMP CHAMBER No. 2A WEST WET WELL	PUMP CHAMBER No. 2A PUMP A	PUMP CHAMBER No. 2A PUMP B	PUMP CHAMBER No. 1A EAST WET WELL	PUMP CHAMBER No. 1A PUMP A	PUMP CHAMBER No. 1A PUMP B	PUMP CHAMBER No. 3A WEST WET WELL	PUMP CHAMBER No. 3A PUMP A	PUMP CHAMBER No. 3A PUMP B	STORAGE TANK	CARBON VENT SCRUBBER (NIXTON N-100)												
MATERIAL	-	316 SS	316 SS	CONCRETE	316 SS	316 SS	CONCRETE	316 SS	316 SS	CONCRETE	-												
SIZE	72" DIA.	2"	2"	-	2"	2"	60" DIA.	2"	2"	-	55 GALLON												
CAPACITY	1100 GALLONS	-	-	1100 GALLONS	-	-	1100 GALLONS	-	-	30000 GALLONS	-												
TEMP/PRESS	-	-	-	-	-	-	-	-	-	-	-												
HP/V/RPM	-	2HP/115V/3450	2HP/115V/3450	-	2HP/115V/3450	2HP/115V/3450	-	2HP/115V/3450	2HP/115V/3450	-	-												
WEIGHT	-	-	-	-	-	-	-	-	-	-	-												
MANUFACTURE	-	GORMAN-RUPP	GORMAN-RUPP	-	GORMAN-RUPP	GORMAN-RUPP	-	GORMAN-RUPP	GORMAN-RUPP	-	CALGON CORP.												
MODEL	-	S2B65-E2	S2B65-E2	-	S2B65-E2	S2B65-E2	-	S2B65-E2	S2B65-E2	-	VPR 4x10 VSP2295												
VENDOR	-	-	-	-	-	-	-	-	-	-	-												



REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	3/13/09	LVN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP. DESC.
2	02/01/01	JW	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP. DESC.
1	11/30/00	JGRW	AS BUILT

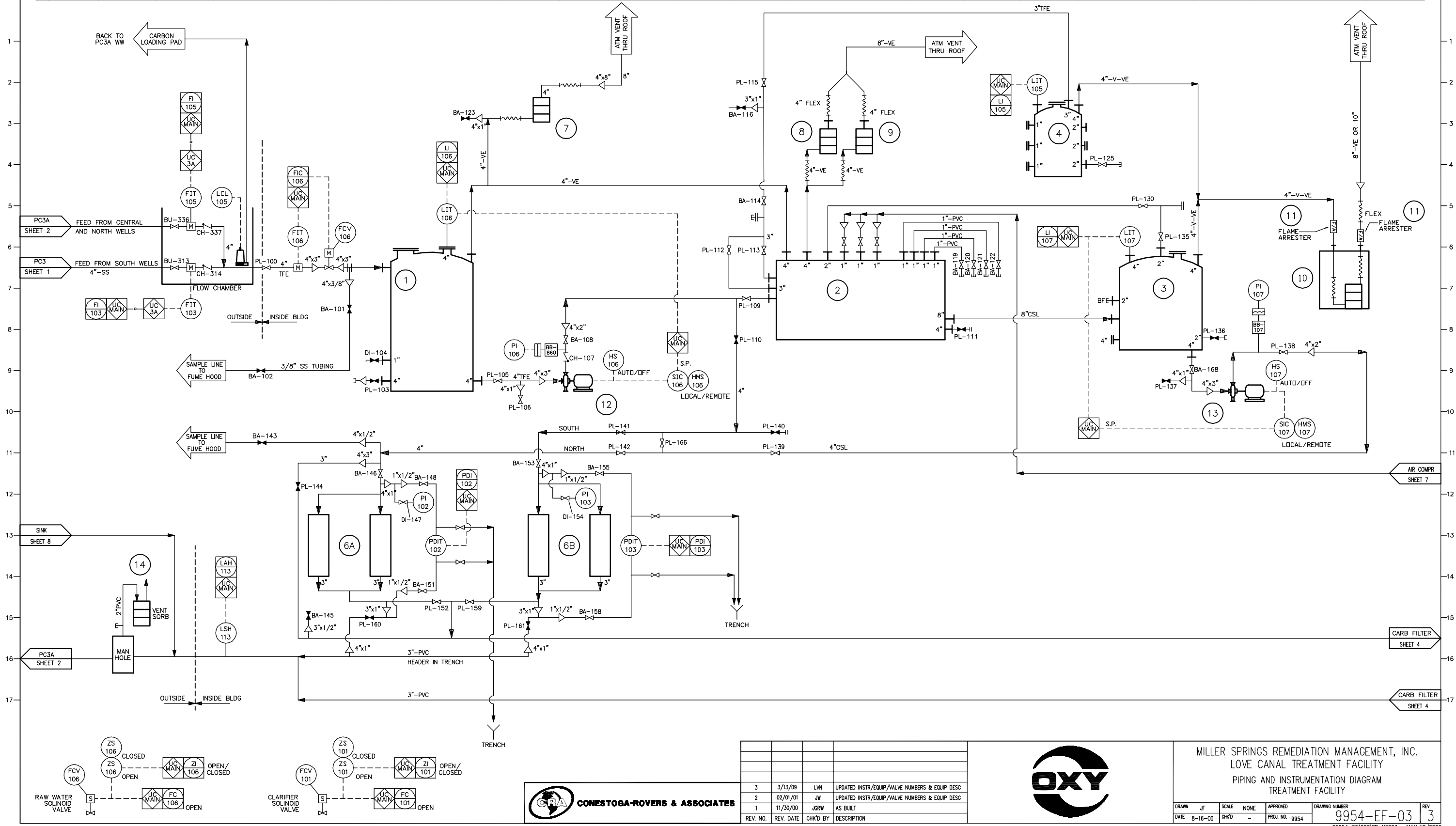


MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
NORTHERN SECTION

DRAWN	JF	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	8-16-00	CHK'D	-	PROJ. NO. 9954	9954-EF-02	3

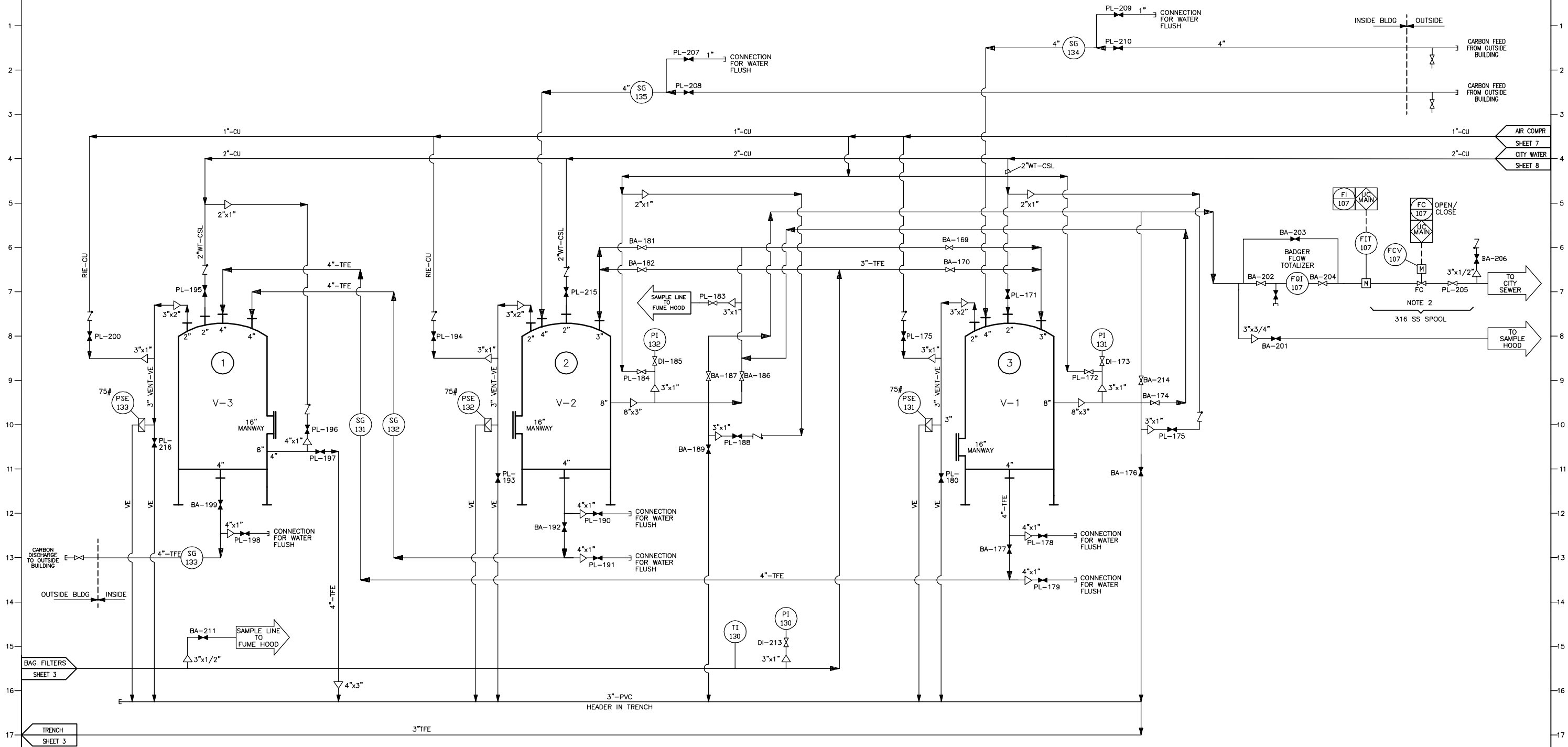
09954-00(00)EF-NF002 MAY 12/2009

PLANT ID.		LC-106	1	LC-101	2	LC-107	3	LC-105	4		5	LC-102A,B	6A	LC-103A,B	6B	-	7	-	8	-	9	-	10	-	11	P-106	12	P-107	13	-	14		15		16		17		18		19		20		21		22											
NAME		RAW WATER TANK		CLARIFIER (CLOW MECHANICAL CLARIFIER)		FILTER FEED TANK		SLUDGE TANK				NORTH BAG FILTERS		SOUTH BAG FILTERS		CARBON VENT SCRUBBER (NIXTON N-100)		CARBON VENT SCRUBBER (NIXTON N-100)		CARBON VENT SCRUBBER (NIXTON N-100)		ACCUMULATOR CABINET		FLAME ARRESTOR		RAW WATER FEED PUMP		FILTER FEED TANK DISCHARGE PUMP		CARBON VENT SCRUBBER (NIXTON N-100)																												
DESCRIPTION	MATERIAL	FIBERGLASS		EPOXY COATED STEEL		FIBERGLASS		FIBERGLASS				316 SS		316 SS		-		-		-		-		-		316SS/316SS		316SS/316SS		-																												
	SIZE	-		11' x 11' x 20'		-		-		-		-		-		55 GALLON		55 GALLON		55 GALLON		-		4"		2 x 3-6 STX		2 x 3-6 STX		55 GALLON																												
	CAPACITY	6000 GALLONS		15633 GALLONS		3000 GALLONS		1600 GALLONS		-		-		-		-		-		-		-		-		150 GPM @ 115'		150 GPM @ 115'		-																												
	TEMP/PRESS	-		-		-		-		150 PSI		150 PSI		-		-		-		-		-		-		-		-		-																												
	HP/V/RPM	-		-		-		-		-		-		-		-		-		-		-		-		10/460/3600		10/460/3600		-																												
	WEIGHT	-		-		745 POUNDS		580 POUNDS		-		-		-		-		-		-		-		-		-		-		-																												
	MANUFACTURE	OWENS CORNING		PURE STREAM INC.		OWENS CORNING		OWENS CORNING			GAFLO		GAFLO		CALGON CORP.		CALGON CORP.		CALGON CORP.		TIGG CORP.		-		-		GOULDS		GOULDS		CALGON CORP.																											
	MODEL	106 MACW		-		83MAC		61SMAC			RB2A		RB2A		VPD 4x10		VPD 4x10		VPD 4x10		-		-		94306		3196		3196		VPD 4x10																											
VENDOR	-		-		-		-			CUTLER METAL PROD.		CUTLER METAL PROD.		VSP2295		VSP2295		VSP2295		-		-		-		ESTABROOK		ESTABROOK		VSP2295																												



MILLER SPRINGS REMEDIATION MANAGEMENT, INC. LOVE CANAL TREATMENT FACILITY PIPING AND INSTRUMENTATION DIAGRAM TREATMENT FACILITY				
DRAWN	JF	SCALE	NONE	APPROVED
DATE	8-16-00	CHK'D	-	PROJ. NO. 9954
DRAWING NUMBER 9954-EF-03				REV 3
09954-00(000)EF-NF003 MAY 12/2009				

PLANT ID.	LC-133	①	LC-132	②	LC-131	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓
NAME	TRANSFER TANK V-3		TRANSFER TANK V-2		TRANSFER TANK V-1																					
DESCRIPTION	MATERIAL	LINED CARBON STEEL	LINED CARBON STEEL	LINED CARBON STEEL																						
	SIZE	-	-	-																						
	CAPACITY	7600 GALLONS	7600 GALLONS	7600 GALLONS																						
	TEMP/PRESS	75 PSIG @ 75°F	75 PSIG @ 75°F	75 PSIG @ 75°F																						
	HP/V/RPM	-	-	-																						
	WEIGHT	-	-	-																						
	MANUFACTURE	CALGON CORP.	CALGON CORP.	CALGON CORP.																						
MODEL	-	-	-																							
VENDOR	-	-	-																							



REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	3/13/09	LWN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC
2	02/01/01	JW	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC
1	11/30/00	JGRW	AS BUILT

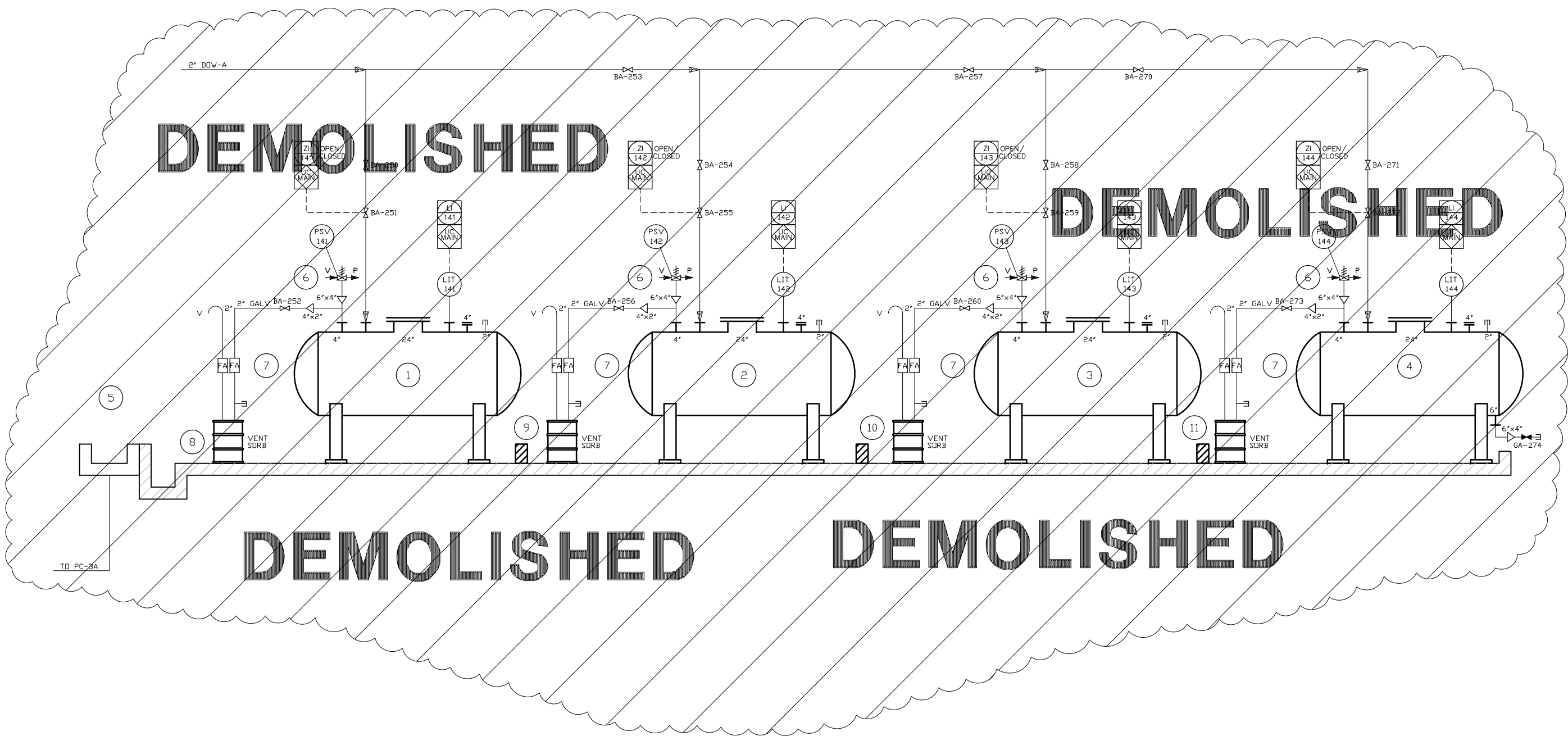


MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
TREATMENT FACILITY

DRAWN	JF	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	8-16-00	CHK'D	-	PROJ. NO. 9954	9954-EF-04	3

09954-00(000)EF-NF004 MAY 12/2008

PLANT ID.		LC-141	①	LC-142	②	LC-143	③	LC-144	④	-	⑤	-	⑥	-	⑦	-	⑧	-	⑨	-	⑩	-	⑪		⑫		⑬		⑭		⑮		⑯		⑰		⑱		⑲		⑳		\	㉑		㉒		㉓					
NAME		SLUDGE STORAGE TANK No. 1		SLUDGE STORAGE TANK No. 2		SLUDGE STORAGE TANK No. 3		SLUDGE STORAGE TANK No. 4		SLUDGE TRUCK LOADING		CONSERVATION VENT		FLAME ARRESTOR		CARBON VENT SCRUBBER (NIXTON N-100)		CARBON VENT SCRUBBER (NIXTON N-100)		CARBON VENT SCRUBBER (NIXTON N-100)		CARBON VENT SCRUBBER (NIXTON N-100)																															
DESCRIPTION	MATERIAL	CARBON STEEL		CARBON STEEL		CARBON STEEL		CARBON STEEL		-		-		-		-		-		-		-		-																													
	SIZE	10'-6"Wx15'-0"L		10'-6"Wx15'-0"L		10'-6"Wx15'-0"L		10'-6"Wx15'-0"L		-		6"		2"		55 GALLON		55 GALLON		55 GALLON		55 GALLON																															
	CAPACITY	10000 GALLONS		10000 GALLONS		10000 GALLONS		10000 GALLONS		-		SET @ 1"H2O		-		-		-		-		-																															
	TEMP/PRESS	-		-		-		-		-		-		-		-		-		-		-																															
	HP /V/RPM	-		-		-		-		-		-		-		-		-		-		-																															
	WEIGHT	-		-		-		-		-		-		-		-		-		-		-																															
	MANUFACTURE	-		-		-		-		-		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																															
	MODEL	-		-		-		-		-		-		-		-		-		-		-																															
VENDOR	-		-		-		-		-		-		-		-		-		-		-																																



MILLER SPRINGS REMEDIATION MANAGEMENT, INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
STORAGE TANKS

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
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2	02/01/01	JW	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC
1	11/30/00	JGRW	AS BUILT

DRAWN	JF	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	8-06-00	CHK'D	-	PROJ. NO. 9954	9954-EF-05	3

09954-00(000)EF-NF005 MAY 12/2009

This schematic diagram illustrates a water distribution system, likely for a building or industrial facility. The system is divided into three main sections: 'CITY WATER' (Sheet 8), 'CLARIFIER' (Sheet 3), and 'CARBON BEDS' (Sheet 4).

Water Sources and Inlets:

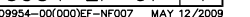
- CITY WATER (Sheet 8):** Enters from the bottom left via a 2" CU pipe, passing through a valve (GA-518) and a backflow preventer (BFP-520).
- CLARIFIER (Sheet 3):** Provides water to the system via a 2" CU pipe, passing through a valve (GA-403).
- CARBON BEDS (Sheet 4):** Provides water to the system via a 1" CU pipe, passing through a valve (GA-404).

System Components and Flow:

- Pumps:** Two pumps are shown, labeled 1 and 2, which draw water from the main supply line and pump it into the distribution network.
- Valves:** Numerous valves are indicated, including gate valves (GA-400, GA-401, GA-402, GA-403, GA-404, GA-405, GA-406, GA-407, GA-408, GA-409, GA-410, GA-411, GA-412, GA-413, GA-414, GA-415, GA-416, GA-417, GA-418, GA-419, GA-420, GA-421, GA-422, GA-423, GA-424, GA-425, GA-426, GA-427, GA-428, GA-429, GA-430, GA-431, GA-432), check valves (CV-400, CV-401, CV-402, CV-403, CV-404, CV-405, CV-406, CV-407, CV-408, CV-409, CV-410, CV-411, CV-412, CV-413, CV-414, CV-415, CV-416, CV-417, CV-418, CV-419, CV-420, CV-421, CV-422, CV-423, CV-424, CV-425, CV-426, CV-427, CV-428, CV-429, CV-430), and pressure-reducing valves (PRV-400, PRV-401, PRV-402, PRV-403, PRV-404, PRV-405, PRV-406, PRV-407, PRV-408, PRV-409, PRV-410, PRV-411, PRV-412, PRV-413, PRV-414, PRV-415, PRV-416, PRV-417, PRV-418, PRV-419, PRV-420, PRV-421, PRV-422, PRV-423, PRV-424, PRV-425, PRV-426, PRV-427, PRV-428, PRV-429, PRV-430).
- Pipes:** Various pipe sizes and materials are specified, including 1" CU, 1 1/2" CS, 3/4" CS, 2" CS, 3/4" CU, and 1 1/2" CU.
- Tanks and Storage:** A large storage tank (3) is shown, which receives water from the main supply line and provides water to the distribution network.
- Flow Direction:** Arrows indicate the direction of water flow throughout the system.

Notes and Details:

- The diagram includes a 'TRENCH' section where the main supply line is buried.
- The system is designed to provide water to various outlets, including '30# AIR', '15# AIR', '80# AIR', and 'SUPPLEMENTAL AIR SUPPLY'.
- The diagram is a schematic representation and does not show physical dimensions or exact locations of components.



APPENDIX B

OPERATION SETPOINTS

LOVE CANAL OPERATION SETPOINTS

Pump ON/OFF Levels

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

* Cannot be set by operator through the HMI.

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

APPENDIX C

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



PAGE 1 OF 15
PERMIT NO. 44

**NIAGARA FALLS WATER BOARD
WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT**

PERMIT NO. 44 Glenn Springs Holdings, Inc. -
Love Canal Leachate Treatment Facility

In accordance with all terms and conditions of the Niagara Falls Water Board Regulations Part 1960 and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: Glenn Springs Holdings, Inc. -
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 Niagara Falls Water Board Publicly-Owned Treatment Works (POTW).

Effective this 8th day of, January 2010
To Expire this 8th day of, January 2015

A handwritten signature in black ink, which appears to read "William Bolents".

William Bolents
Director of Administrative Services

Signed this 20TH day of December, 2009

DISCHARGE IDENTIFICATION

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

**WASTEWATER DISCHARGE PERMIT
REQUIREMENTS FOR:**

**ACTION
REQUIRED**

**REQUIRED DATE
OF SUBMISSION**

A. Discharges to the Niagara Falls Water Board (NFWB) Sewer

- | | | | |
|----|--|------|---------------------------|
| 1. | Identification of all discharges to the NFWB Sewer System on a current plant sewer map certified by a New York State licensed professional engineer. | None | Submitted
12/16/09 |
| 2. | Identification of each contributing waste stream to each discharge to the NFWB Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer. | None | Submitted
12/16/09 |
| 3. | Elimination of all uncontaminated discharges to the NFWB 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 NFWB Sewer System. | None | Previously
Established |

B. Wastewater Discharge Management Practices

- | | | | |
|----|--|------|----------------------|
| 1. | Identification of a responsible person(s) (day to day and in emergencies). | None | Performed by
NFWB |
|----|--|------|----------------------|

C. Slug Control Plan**

Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the Niagara Falls Water Board will evaluate the permittee, a minimum of once every two years for the need for a "Slug Control Plan." If a plan is required by the Niagara Falls Water Board, 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.

** This section applies to all pollutants limited by the Niagara Falls Water Board SPDES Permit and all prohibited wastewater discharges (See Section 1960.5 of the Niagara Falls Water Board Wastewater Regulations).

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 Niagara Falls Water Board) should be submitted with the analytical results.
2. All sampling for billing and pretreatment compliance purposes will be coordinated through the Niagara Falls Water Board 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 Niagara Falls Water Board Laboratory Technical Director. 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 Niagara Falls Water Board - 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 Niagara Falls Water Board Wastewater Regulations 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 Regulations constitutes a violation and is subject to enforcement actions(s) described in Section 1960.9 of said Regulations, and in the Niagara Falls Water Board Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide." In the event of a violation, including slug discharges or spills, the Niagara Falls Water Board must be notified immediately by phone and confirmed by letter within five (5) working days.

Any person adjudicated of violating any provision in the Niagara Falls Water Board Wastewater Regulations shall be assessed a fine in the amount of up to \$10,000. This amount is available for each violation, and each day of a violation is a separate incident for which penalties may be sought.

The person violating any of the provisions of the Niagara Falls Water Board Wastewater Regulations will be liable for any expense, loss, or damage occasioned 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 Niagara Falls Water Board Wastewater Regulations, or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under the Niagara Falls Water Board Wastewater Regulations will, upon conviction be punished by a fine up to \$5,000. Furthermore, the Niagara Falls Water Board may recover reasonable attorney's fees, court costs, court reporting fees, and other expenses of litigation by appropriate suit at law against the person found to have violated applicable laws, orders, rules, and permits required by the Niagara Falls Water Board Wastewater Regulations.

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 Niagara Falls Water Board - Wastewater Facilities 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 1960.5g of the Niagara Falls Water Board Wastewater Regulations, "Personnel as designated by the Director will be permitted at any time for reasonable cause to enter upon all properties served by the Niagara Falls Water Board for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Regulations."
10. As noted in Section 1960.5c of the Niagara Falls Water Board Wastewater Regulations, significant changes in discharge characteristics or volume must be reported immediately to the Niagara Falls Water Board - Wastewater Facilities.

11. As noted in Section 1960.6b of the Niagara Falls Water Board Wastewater Regulations, samples required to be collected via a 24-hour composite sampler must be retained refrigerated for an additional 24 hour plus un-refrigerated an additional 48 hours (total 72 hours).
12. As noted in Section 1960.5d of the Niagara Falls Water Board Wastewater Regulations, all "SIU's will keep on file for a minimum of three years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the Niagara Falls Water Board - Wastewater Facilities."
13. As noted in Section 1960.6g of the Niagara Falls Water Board Wastewater Regulations, "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 Niagara Falls Water Board Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the Niagara Falls Water Board – Wastewater Facilities 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 that 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 Niagara Falls Water Board for consideration of revised permit limits

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

- a) Flow quantities will be derived from the Wastewater 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 Niagara Falls Water Board agrees to accept wastewater processed from the Glenn Springs Holdings (GSH) 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 GSH shall ensure sufficient feed, inter-stage (breakthrough), and effluent analysis to ensure timely carbon changes. Treatment levels of 10 ug/l shall be achieved and verified with quarterly composite sample analysis for the following compounds: trichloroethylene, tetrachloroethylene, monochlorotoluene, monochlorobenzenes, 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 is based on GSH's previous assertions that there is no reason to anticipate the presence of tetrachlorodibenzo-p-dioxins in the discharge from the treatment facility. The Niagara Falls Water Board 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 Niagara Falls Water Board determines on any basis that the discharge of these wastewater to the POTW is interfering with the operation of that facility, the Niagara Falls Water Board will direct GSH 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 LCLTF 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 Niagara Falls Water Board will require the permittee to cease discharge from the LCLTF during these surcharge events.

A notification procedure has been established by the Niagara Falls Water Board to formalize the communication between the Niagara Falls Water Board 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		UNITS	MINIMUM MONITORING REQUIREMENTS	
	ANNUAL AVERAGE	DAILY MAXIMUM		MEASUREMENT FREQUENCY	SAMPLE TYPE
#1 Flow	0.3	0.3	MGD	Continuous	4
#1 Total Suspended Suspended	25	50	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 FOOTNOTES

- (1) Each sample will consist of four (4) grabs collected spaced throughout the **batch** discharge, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.
- (2) Each sample will consist of four (4) grabs collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.
- (3) Each sample will consist of a 24-hour, **flow proportioned** composite sample collected from the monitoring point.
- (4) Flow will be monitored continuously with the use of a water meter or another acceptable flow metering device.
- (5) Each sample will consist of a 24-hour, **time proportioned** composite sample collected from the monitoring point.
- (6) Reserved
- (7) Same as (3), however, five (5) samples will be collected per quarter from the monitoring point and analyzed by and at the Niagara Falls Water Board's expense.
- (8) Four (4) grab samples will be collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. Each grab will be **analyzed and reported separately**.
- (9) A grab sample is defined as an aliquot collected over a period of not more than 15 minutes.

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
Chlorodibromomethane	Di-N-Butyl Phthalate
Monochlorobenzene	Di-N-Octyl Phthalate
Dichlorobromomethane	Diethyl Phthalate
Chloroform	Nitrosodiphenylamine
Dichloroethylenes	Dichlorobenzenes
Bromoform	Dichlorotoluene
Dichloropropylenes	Acenaphthlene
Ethylbenzene	Fluoranthene
Tetrachloroethanes	Chrysene
Tetrachloroethylene	Napthalene
Toluene	Benzo (a) Anthracene
Trichloroethanes	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

I:\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 may be 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

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

February 28, 2000

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

/

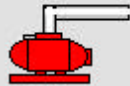
drft\word\data\al zacpfel communications rev.

APPENDIX D

SAMPLE HMI SCREENS

102nd STREET

WETWELL 1



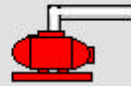
OVLD
LV FT.

###.##

DATADAT

Enable/Disable

WETWELL 2



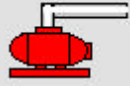
OVLD
LV FT.

###.##

DATADAT

Enable/Disable

WETWELL 3



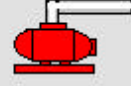
OVLD
LV FT.

###.##

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

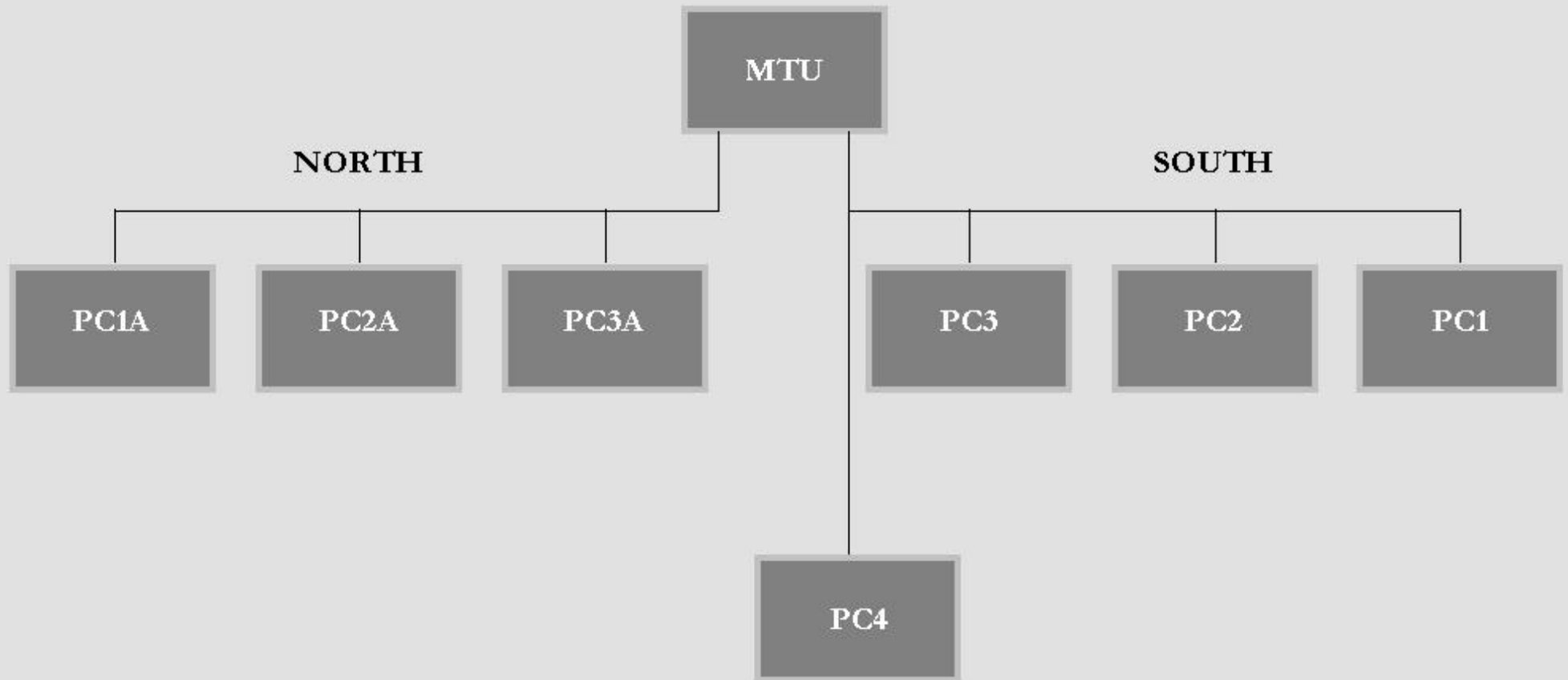
DISCHARGE SAMPLE PIT

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

LC

Note: The HMI system is scheduled to be updated during the summer of 2013.

COMMUNICATION DISPLAY



LC

Note: The HMI system is scheduled to be updated during the summer of 2013.

FLOW TOTALS

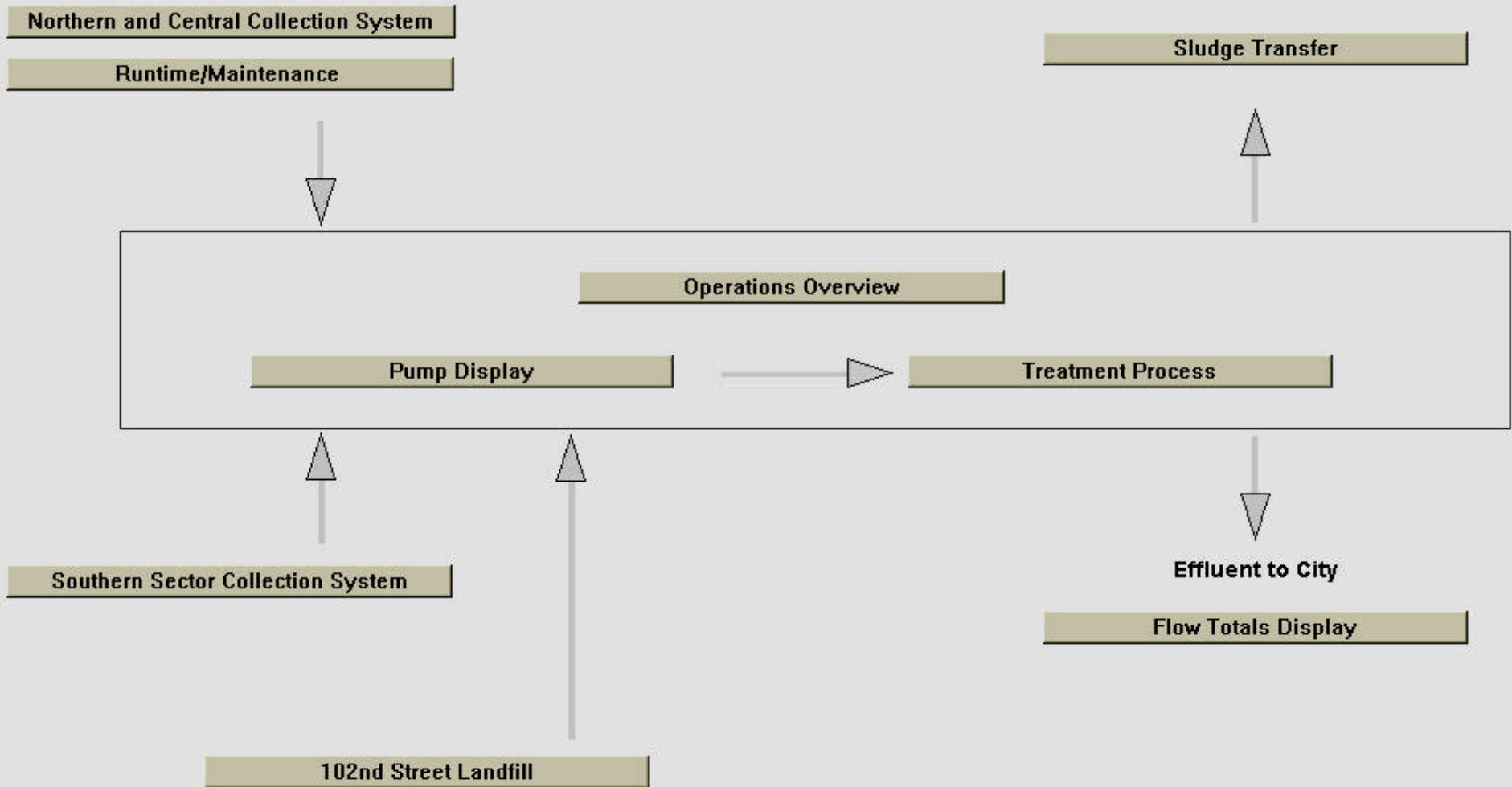
FUNCTIONS		STATION PC1	STATION PC2	STATION PC3	STATION PC1A	STATION PC2A	STATION PC3A	TREATMENT PLANT	DCF
LEVEL	FT.	##.##	##.##	##.##	##.##	###.##	##.##	##.##	
FLOW	GPM	###.##	###.##	###.##	###.##		###.##	###.##	###.##
						(Hours.Minutes)			
FLOW TOT	CDAY	###,###	###,###	###,###	###,###	##.## ##.##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

PDAY = PREVIOUS DAY CDAY = CURRENT DAY

LC

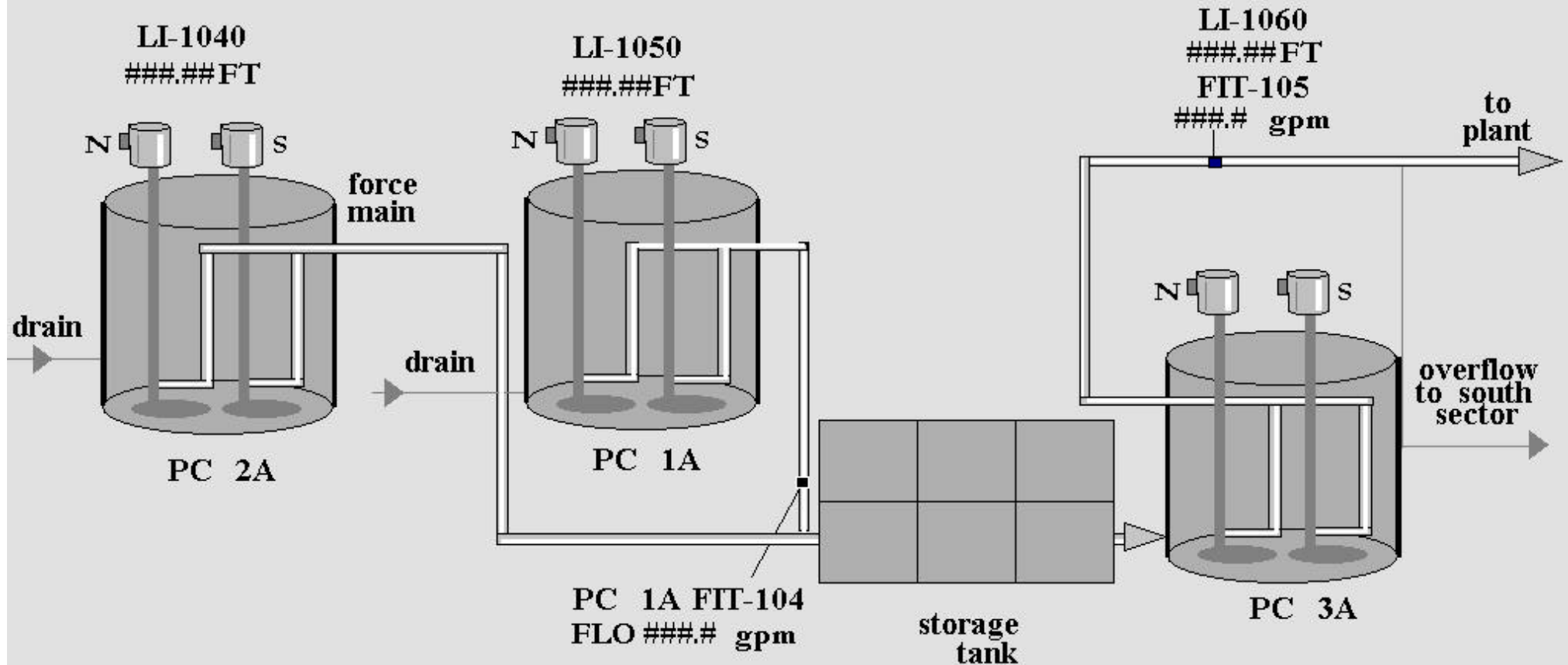
Note: The HMI system is scheduled to be updated during the summer of 2013.

LOVE CANAL FLOW MENU



Note: The HMI system is scheduled to be updated during the summer of 2013.

NORTHERN AND CENTRAL SECTOR COLLECTION SYSTEM



LC

Note:

The Gould's vertical 3171 pumps in PC-1A, PC-2A, and PC-3A have all been replaced with Gorman-Rupp pumps, which is not reflected in the HMI Screen Figure above. The HMI system is scheduled to be updated during the summer of 2013.

OPERATIONS

Valve Open

Valve Closed

STATION 1A



###.## ft.

####.# gpm

STATION 2A



###.## ft.

####.# gpm

STATION 3A



###.## ft.

####.# gpm

STATION 1



###.## ft.

####.# gpm

STATION 2



###.## ft.

####.# gpm

STATION 3



###.## ft.

####.# gpm

AUTO RUN
AUTO RUN

AUTO RUN
AUTO RUN

AUTO RUN
AUTO RUN

AUTO RUN
AUTO RUN

AUTO RUN
AUTO RUN

AUTO RUN
AUTO RUN

MISCELLANEOUS

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

GPM FLOW

North Filter ###.# dpsi

South Filter ###.# dpsi

Plant Air ###.# psi

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

FIT-106

#,### gpm

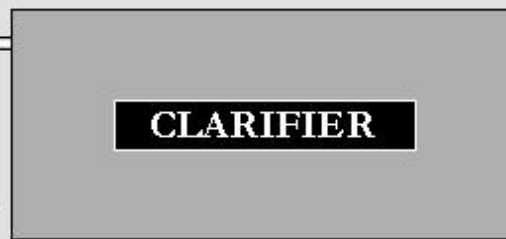
Flow Setpoint
###

Valve Position
###

HSP: ##.# ft.

LSP: ##.# ft.


LC

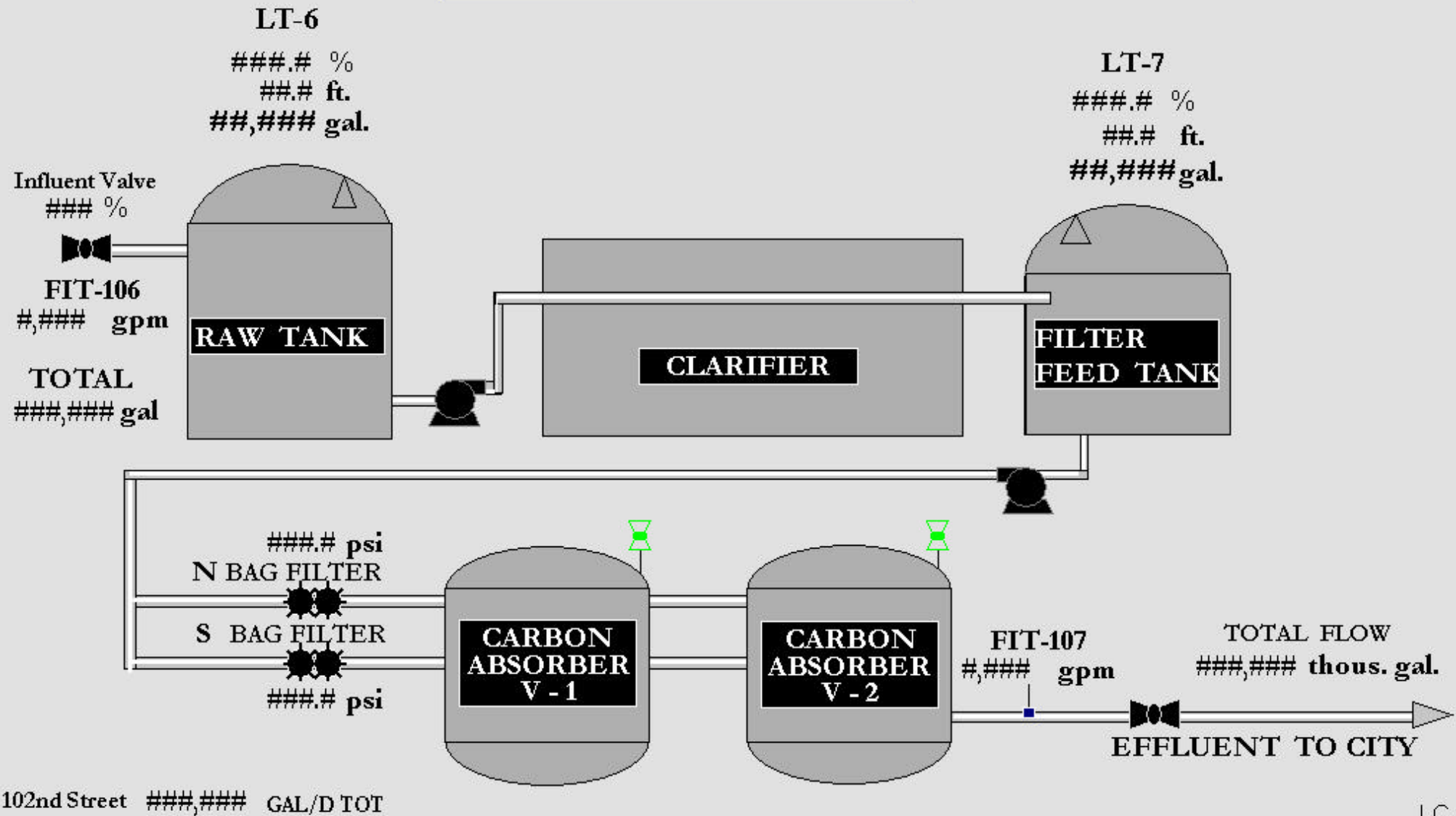


FIT-107
#,### gpm

Note: The HMI system is scheduled to be updated during the summer of 2013.

TREATMENT PROCESS

N 



Note: The HMI system is scheduled to be updated during the summer of 2013.

PUMP DISPLAY

STATION 1A



###.## gpm

AUTO AUTO

STATION 2A



###.## gpm

AUTO AUTO

STATION 3A



###.## gpm

AUTO AUTO

STATION 1



###.## gpm

AUTO AUTO

STATION 2



###.## gpm

AUTO AUTO

STATION 3



###.## gpm

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: ###.##
LSP: ###.##

HSP: ###.##
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

Note: The HMI system is scheduled to be updated during the summer of 2013.

RUNTIME/MAINTENANCE DISPLAY

PC1A

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

PC2A

PUMP N	PUMP S
##.##	##.##
##.##	##.##
##.##	##.##
ALRM	ALRM
DATA	DATA

PC3A

PUMP N	PUMP S
##.##	##.##
##.##	##.##
##.##	##.##
ALRM	ALRM
DATA	DATA

PC1

FUNCTIONS		PUMP N
CURRENT DAY	HRS	##.##
PREVIOUS DAY	HRS	##.##
AMP		##.##
OVERLOAD		ALRM
RUN STATUS		DATA

PC2

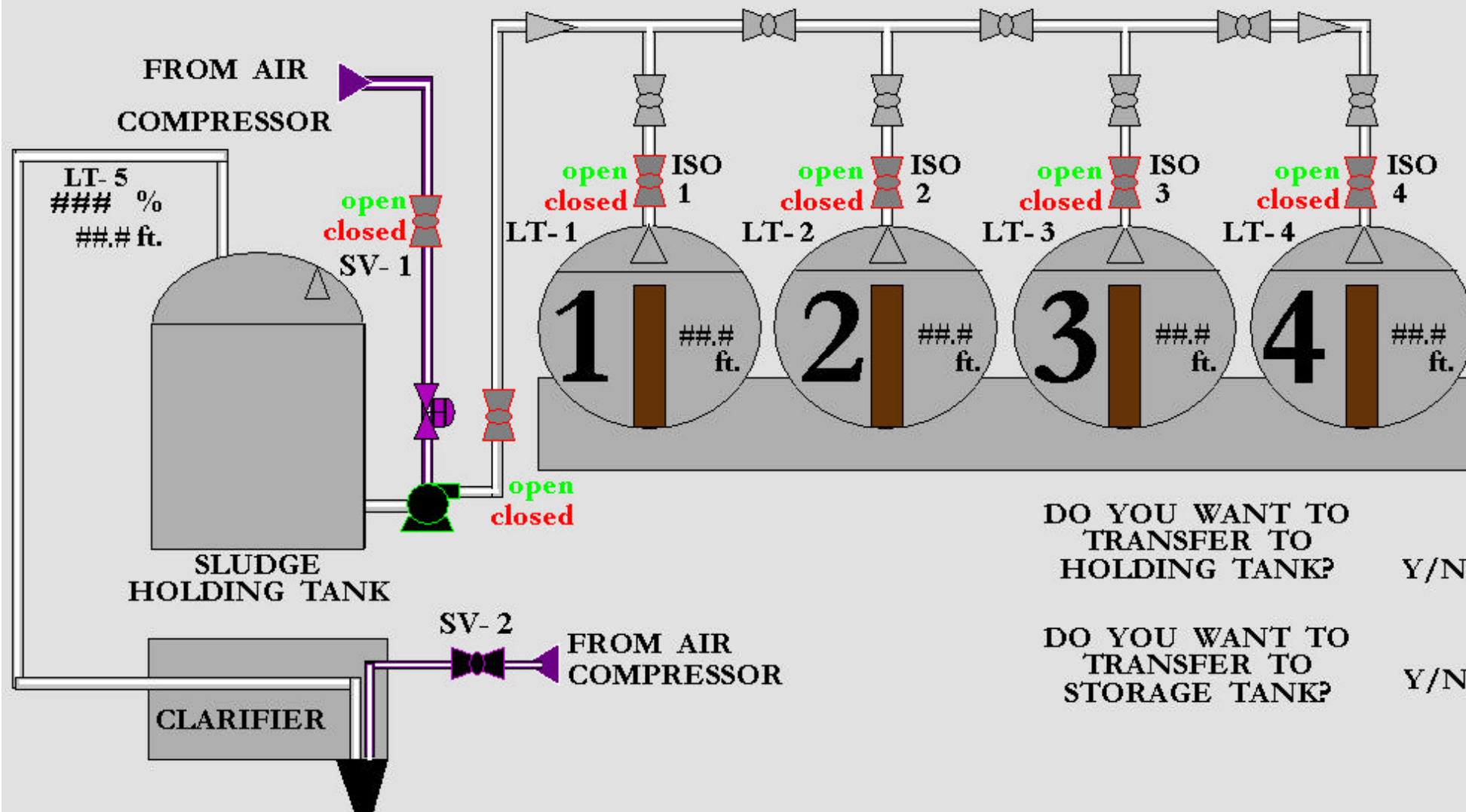
PUMP N
##.##
##.##
##.##
ALRM
DATA

PC3

PUMP E	PUMP W
##.##	##.##
##.##	##.##
##.##	##.##
ALRM	ALRM
DATA	DATA

Note: The HMI system is scheduled to be updated during the summer of 2013.

SLUDGE TRANSFER



LC

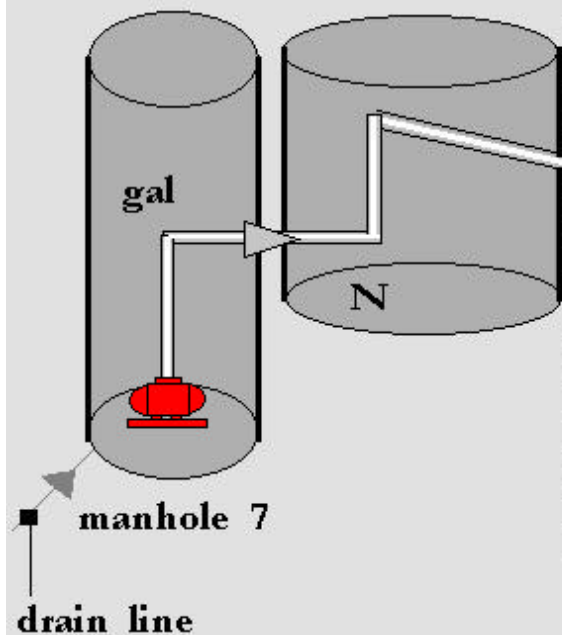
Note:

The sludge storage tanks shown in the above HMI Screen Figure have been removed from the system. Sludge is now transferred directly from the clarifier to a vacuum truck or to the sludge holding tank by operator discretion. The HMI system is scheduled to be updated during the summer of 2013.

SOUTHERN SECTOR COLLECTION SYSTEM

EAST SIDE

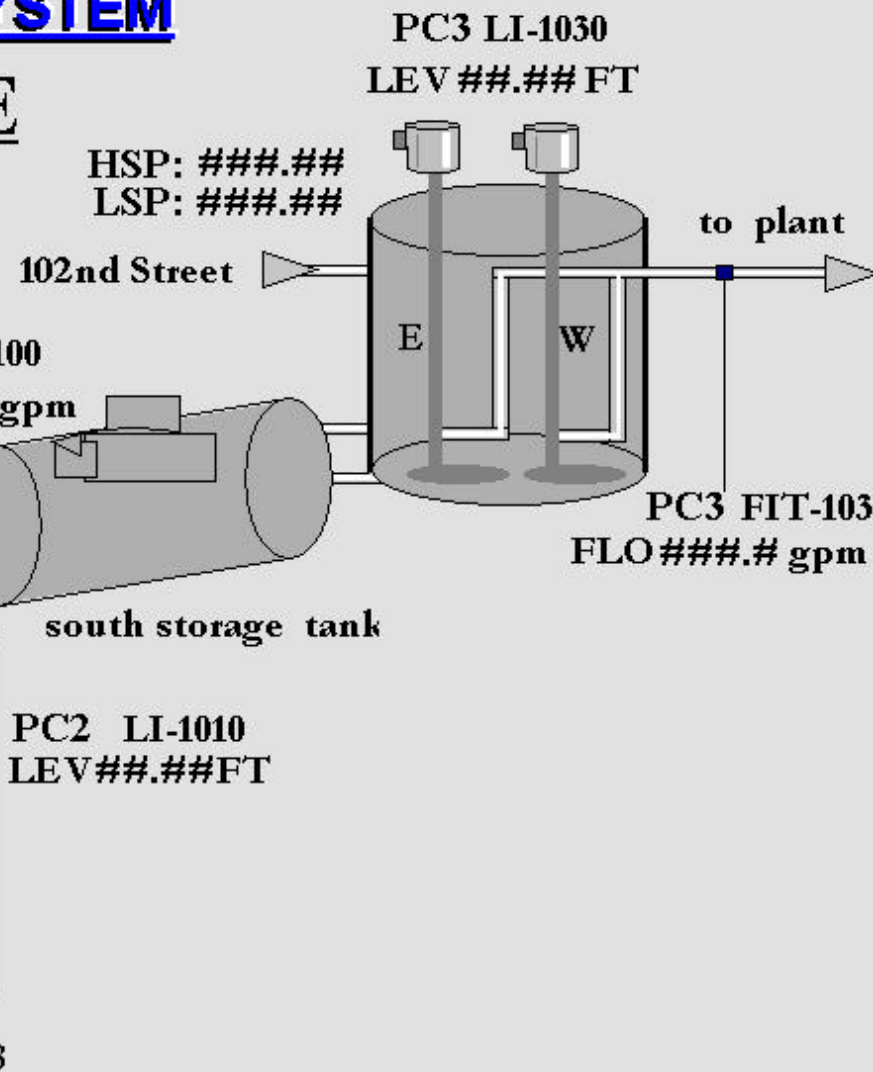
PC1 LI-1000
LEV ##.## FT



WEST SIDE

PC1 FIT-101
FLO ###.## gpm

PC2 FIT-100
FLO ###.## gpm



LC

Note:

PC-3 currently contains the same or similar Gorman-Rupp pump as in PC-1 and PC-2, not the Gould's vertical 3171 pumps shown above. The HMI system is scheduled to be updated during the summer of 2013.

APPENDIX E

LIST OF ALARMS

LOVE CANAL LIST OF ALARMS

Filter Feed Tank (LIT-107) Level (Ft), identified as LT-1 on HMI screen

North Bag Filter Differential Pressure

Station PC1 Pump Amp 1

Station PC1A Pump A Amp 1

Station PC2 Pump Amp 1

Station PC2A Pump A Amp 1

Station PC3 Pump A Amp 1

Station PC3A Pump A Amp 1

Station PC1A Pump B Amp 1

Station PC2A Pump B Amp 1

Station PC3 Pump B Amp 1

Station PC3A Pump B Amp 1

Raw Tank (LT-6) Level (Ft)

Sludge Holding Tank (LIT-105) Level (Ft), identified as LT-5 on HMI screen

Raw Water Tank (LTI-106) Level (Ft), identified as LT-6 on HMI screen

South Bag Filter Differential Pressure

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

LOVE CANAL LIST OF ALARMS

Station PC3A Intrusion Alarm
Station PC1 Pump Overload Alarm
Station PC1A Pump A Overload Alarm
Station PC2 Pump Overload Alarm
Station PC2A Pump A Overload Alarm
Station PC3 Pump A Overload Alarm
Station PC3A Pump A Overload Alarm
Station PC1A Pump B Overload Alarm
Station PC2A Pump B Overload Alarm
Station PC3 Pump B Overload Alarm
Station PC3A Pump B Overload Alarm
Filter Feed Tank Level BQA
Floor Drain Level High

LOVE CANAL LIST OF ALARMS

Station PC3A Intrusion Alarm
Station PC1 Pump Overload Alarm
Station PC1A Pump A Overload Alarm
Station PC2 Pump Overload Alarm
Station PC2A Pump A Overload Alarm
Station PC3 Pump A Overload Alarm
Station PC3A Pump A Overload Alarm
Station PC1A Pump B Overload Alarm
Station PC2A Pump B Overload Alarm
Station PC3 Pump B Overload Alarm
Station PC3A Pump B Overload Alarm
Filter Feed Tank Level BQA
Floor Drain Level High

APPENDIX F

POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
PUMP CHAMBERS			
1. Too little or no water to treatment system	<ul style="list-style-type: none"> • Pump problems • Power failure • Pump chambers dry • Line leaks • Lines plugged • PLC malfunction • High system pressure • Influent valve malfunction 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Influent valve malfunction • PLC malfunction 	<ul style="list-style-type: none"> • Repair or replace • Reset PLC, and call for programming assistance 	
3. PC1, PC2, PC1A, and PC2A dry	<ul style="list-style-type: none"> • Drain system damaged or plugged • Faulty level transmitter 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • PC1, PC2, PC1A, or PC2A pumps not running • Power failure • Lines to chambers plugged • PLC malfunction • High system pressure • Faulty level transmitter 	<ul style="list-style-type: none"> • 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

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
5. PC1, PC2, PC1A, and PC2A full	<ul style="list-style-type: none"> • PC1, PC2, PC1A, or PC2A pumps not running • Power failure • Lines from chambers plugged • PLC malfunction • High system pressure • Faulty level transmitter 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Excessive heat generated by equipment in the panel or by outside source • Faulty heater • Faulty temperature switch 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Someone has opened the door on the panel • Faulty switch 	<ul style="list-style-type: none"> • 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**

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
9. Motor overload tripped or amps high	<ul style="list-style-type: none"> The motor to the respective pump is drawing excessive current 	<ul style="list-style-type: none"> Replace or repair motor and/or pump 	Station PC1 Pump AMP 1 Station PC1A Pump A AMP 1 Station PC2 Pump AMP 1 Station PC2A Pump A AMP 1 Station PC3 Pump A AMP 1 Station PC3A Pump A AMP 1 Station PC1A Pump B AMP 1 Station PC2 Pump B AMP 1 Station PC2A Pump B AMP 1 Station PC3 Pump B AMP 1 Station PC3A Pump B AMP 1 Station PC1 Pump Overload Alarm Station PC1A Pump A Overload Alarm Station PC2 Pump Overload Alarm Station PC2A Pump A Overload Alarm Station PC3 Pump A Overload Alarm Station PC3A Pump A Overload Alarm Station PC1A Pump B Overload Alarm Station PC2A Pump B Overload Alarm Station PC3 Pump B Overload Alarm Station PC3A Pump B Overload Alarm
TREATMENT BUILDING			
Raw Water Tank			
1. High level	<ul style="list-style-type: none"> Flow from pump chambers too high Discharge line plugged or valve shut Raw Water Feed Pump not running Instrument malfunction 	<ul style="list-style-type: none"> Verify, correct Find plug and clean, or open valve Electrical or instrument problem, repair Check instrument 	Raw Water Tank (LTI-106) Level (Ft), identified as LT-6 on HMI screen
2. Low level	<ul style="list-style-type: none"> Tank leak Raw Water Feed Pump pumping too fast Instrument malfunction Feed to tank too low 	<ul style="list-style-type: none"> Repair Verify level instruments, VFD Check instrument Check flow setpoint (see above) 	Raw Water Tank BQA
Raw Water Feed Pump and Filter Feed Pump			

**LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING**

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
1. High pressure	<ul style="list-style-type: none"> Discharge line plugged or valve shut 	<ul style="list-style-type: none"> Find plug and clean or open valve 	
2. Pump not reacting (design flow rate/design head)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Not primed Suction line plugged or valve shut Direction of rotation wrong Entrained air Plugged impeller Damaged pump shaft/impeller 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Insufficient NPSH Entrained air 	<ul style="list-style-type: none"> Recalculate NPSH available/required Check and repair 	
5. Excessive noise from wet end	<ul style="list-style-type: none"> Cavitation Abnormal fluid rotation Impeller rubbing 	<ul style="list-style-type: none"> Recalculate NPSH available/required Redesign suction piping Check/reset clearance and outboard bearing assembly 	
6. Excessive noise from power end	<ul style="list-style-type: none"> False brinelling Thrust overload on bearing Misalignment Bearing damage 	<ul style="list-style-type: none"> Correct vibration source Remount bearings Remount properly Refer to manufacturer's instructions 	
7. Pump not running	<ul style="list-style-type: none"> VFD in manual Auto mode on VFD needs to be reset 	<ul style="list-style-type: none"> Press [F2] on VFD to place VFD in AUTO Turn HOA switch on pump from AUTO 	

**LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING**

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
		to OFF and back to AUTO	
Filter Feed Tank 1. High level 2. Low Level	<ul style="list-style-type: none"> Flow from clarifier too high Discharge line plugged or valve shut Filter Feed Pump not running Instrument malfunction Bag filters plugged Carbon vessels plugged <ul style="list-style-type: none"> Tank Leak Filter Feed Pump pumping too fast Instrument malfunction Feed to tank too low 	<ul style="list-style-type: none"> Verify, correct Find plug and clean or open valve Electrical or instrument problem, repair Check instrument Replace bag filters Backwash or change carbon <ul style="list-style-type: none"> Repair Verify level instruments, VFD Check instrument Check flow from clarifier/Raw Water Tank 	Filter Feed Tank (LIT-107) Level (Ft), identified as LT-1 on HMI screen Filter Feed Tank Level BQA
Clarifier 1. High level	<ul style="list-style-type: none"> Flow from Raw Water Tank too high Discharge line plugged 	<ul style="list-style-type: none"> Verify, correct Find plug and clean 	

**LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING**

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
Effluent metering pump (If needed) <ol style="list-style-type: none"> Pump loses prime Fitting Leakage at tubing Failure 	<ul style="list-style-type: none"> Dirty check valve Ball checks not seating/sealing properly Drum allowed to run dry Loose fittings Broken or twisted gasket Chemical attack Worn tube ends Chemical attack Too much pressure at discharge Check valves not sealing Output dials not at maximum Suction lift too high 	<ul style="list-style-type: none"> Clean or replace Clean or replace Replace drum and prime pump Tighten fittings Check/replace gasket Replace pump Cut off end of tubing and replace Replace pump Check ball check valves and injectors Clean or replace Prime with output dials at maximum Decrease suction lift 	
Sludge Tank <ol style="list-style-type: none"> High level 	<ul style="list-style-type: none"> Flow from clarifier tank too high Discharge line plugged or valve shut Instrument malfunction 	<ul style="list-style-type: none"> Verify, correct Find plug and clean or open valve Check instrument 	Sludge Holding Tank (LIT-105) Level (Ft), identified as LT-5 on HMI screen

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

<i>Problem</i>	<i>Potential Sources of Problems</i>	<i>Solution</i>	<i>Associated Alarms</i>
Bag Filters 1. High differential pressure 2. Low differential pressure	<ul style="list-style-type: none"> Plugged bags Leaks Hole in bag Instrument malfunction 	<ul style="list-style-type: none"> Change bags Repair leaks Change bags Check instrument 	North Bag Filter Differential Pressure South Bag Filter Differential Pressure
Carbon Vessels 1. High differential pressure 2. Low differential pressure 3. Carbon in the effluent 4. Excessive flow out vent line	<ul style="list-style-type: none"> Plugged carbon Bed not flooded Plugged line Leaks Instrument malfunction Closed valves in the GAC system Faulty pressure relief valve or rupture disk Internal mechanical (underdrain) failure Broken rupture disk 	<ul style="list-style-type: none"> 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 Replace or repair (Replace rupture disk when source of overpressurization, if any, is removed) Remove carbon and repair Replace rupture disk when source of overpressurization is removed (check manufacturer's instructions) 	

APPENDIX G

SEQUENCE SUMMARY

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

<i>SEQ</i>	<i>Description</i>
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 102 nd 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.
- 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.

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 H

INSPECTION LOG SHEETS



Glenn Springs Holdings, Inc.

A subsidiary of Occidental Petroleum

WNY Daily Inspection Sheet

Date: _____

Time: _____

Love Canal: _____ S-Area: _____

Hyde Park: _____ NT: _____

102nd St: _____

Inspected By: _____

Weekend Inspection: Y N

☐☐

Satisfactory

Y / N

Security: Fence Integrity; Postings/Signs; Buildings; and Lighting.

Y / N

Vehicles: Secure; and Properly Operating.

Y / N

Communications: Phone Systems; Network(s); Auto-dialers; and HMI's.

Y / N

Utilities: Gas; Electric; and Water/Sewer.

Y / N

House Keeping: Garbage; Fence Lines; Walkways/Roadways; Control Room; Locker Room; Offices; Auxiliary Buildings; Maintenance Work Areas; MCC's; and Process.

Y / N

HMI Data: Reviewed data. Wells Operating at Set Point (Any Discrepancy Noted in Comments).

Y / N

Process: Tanks and Associated Piping and Transfer Lines; Containment; and Sumps.

Y / N

Storage Dikes: Tanks; Decanters; Sumps; and Piping.

Y / N

Containment: Secondary and Leak Detection.

Y / N

Container Storage Area: Container(s) Non-Leaking, Non-Corroded; Closed; Labeled; and Contained (Stored containers meet all applicable regulations).

Earliest Stored

Drum Date

(< 90 Days)

Quantity

of Containers

COMMENTS:

If any Inspections item(s) are NOT Satisfactory comment above and describe what corrective actions were taken.

Signature:



Glenn Springs Holdings, Inc.

A subsidiary of Occidental Petroleum

Love Canal Semiannual Barrier System / Pump Chamber Inspections

Date: _____
Inspector: _____

Weather: _____

Check the Following as Appropriate:

Visual Inspection of chamber piping
Verification of level probe performance
Inspection of pump chamber integrity
Inspection of pump chamber security

Wells	Satisfactory	Needs Maintenance
PC-1		
PC-2		
PC-3A		
PC-1A		
PC-2A		
PC-3A		

Comments:

Signature: _____



Glenn Springs Holdings, Inc.

A subsidiary of Occidental Petroleum

Love Canal Semi-Annual Barrier Drain Manhole Inspection

Date _____

Sector	MH No.	Location	Water Y/N	Level Feet	Debris Y/N	Structure OK	Cleaning Y/N	Comments
North Colvin	MH-10A	NW						
	MH-8A	NW						
	MH-6C	NW						
	MH-6B	NW						
	MH-6A	NW						
	PC-2A	NW						
	MH-4A	NW						
	MH-2A	NW						
	MH-2	SW						
	MH-4	SW						
	MH-6	SW						
	MH-8/PC2	SW						
	MH-10	SW						
South Frontier	MH-12	SW						
	MH-14	SW						
North Colvin								
	NH-17A	NE						
	MH-15A	NE						
	MH-13A	NE						
	PC1A	NE						
	MH-11A	NE						
	MH-9A	NE						
	MH-7A	NE						
	MH-5A	NE						
	MH-3A	NE						
	MH-1A	NE						
	MH-1	SE						
	MH-3	SE						
	MH-5	SE						
	MH-7/PC1	SE						
	MH-9	SE						
	MH-11	SE						
South Frontier	MH-13	SE						

Signature: _____



Glenn Springs Holdings, Inc.

A subsidiary of Occidental Petroleum

Love Canal Landfill Cap and Fence Inspection Sheet

Date: _____
Inspector: _____

Weather: _____

Inspection Item

Inspect For

Comments and Remarks:

(Note: If repair/maintenance is recommended, describe its location/extent and identify on Maintenance Repair Form. If no deficiency, note as such).

1. Landfill Cover

- | | |
|----------------------|---|
| Vegetated Soil Cover | <ul style="list-style-type: none">- erosion- exposure of the HDPE Liner- areas of insufficient grass coverage- length of grass- dead/dying grass- washouts- settlement causing ponding of water- slope instability- burrowing by animals- rooting of trees |
| Perimeter Fence | <ul style="list-style-type: none">- integrity of fence- integrity of gates- integrity of locks- placement and condition of signs |

APPENDIX I

OPERATOR TRAINING ACKNOWLEDGEMENT FORM

APPENDIX I

**GLENN SPRINGS HOLDINGS, 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 Operation and Maintenance (O&M) Manual.

NAME: _____

DATE: _____

SUPERVISOR: _____

DATE: _____