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Operation and Maintenance Manual

Love Canal Site
Niagara Falls, New York

Prepared for: Glenn Springs Holdings, Inc.

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Partners in Sustainability

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Section 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 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 management activities of the Leachate Treatment Facility at the Site 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 New York State Department of Environmental Conservation (NYSDEC) Hazardous Waste Management Facilities (6 NYCRR Subpart 373). Within these regulations, the Site meets the criteria for 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 wastes.
- 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. Furthermore, tanks and containers must be marked with additional labeling to identify their contents.
- Each container must be properly labeled and marked in accordance with Sections 372.2(a)(5) and 372.2(a)(6) of this Title.

- Full containers must be clearly labeled with the date, visible for inspection, on the day that they were completely filled.

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 and Related Standards for Generators, Transporters and Facilities
- 6NYCRR 376 Land Disposal Restrictions

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

Equipment operating procedures and manuals provided by the manufacturers or suppliers are maintained in the File Room in the Administration Building. As-built drawings for Site systems are also stored in the 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 OM&M Manual)
- Functional Process Description, Control System Upgrade
- Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program
- Site-Specific Health and Safety Plan, GSH Western New York Sites (HASP)
- Integrated Contingency Plan to comply with 6 NYCRR 373-3.3 and 3.4
- Waste Management Plan to comply with applicable New York State waste regulations

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 at a minimum 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 5-year review. In the event of a management change, the contact list will be updated and submitted to the NYSDEC for insertion into the most current manual.

1.2 Definitions

A brief description of the 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.
HASP	Health and Safety Plan
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
O&M	Operation and Maintenance
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
- Storage pad north of the Administration Building (not used)

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)
- DCF Storage Tank (LC-220)

Section 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 the Love Canal. The solid and liquid wastes deposited into the Canal included 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 located approximately 1/4 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, with 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 primarily a limestone rock grouping with a general thickness of about 100 feet. The major rock unit within the Clinton Formation is the Rochester Shale Member, which has a general thickness of approximately 60 feet. The Rochester Shale creates a vertical barrier which extends across the region.

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

2.2.3 Site Hydrogeology

Due to the primarily clayey nature of the subsurface soils at and surrounding the Love Canal, there is very little overburden groundwater movement. The clays act as an aquitard and restrict vertical and horizontal groundwater migration. The measured hydraulic conductivity of the clay layer is on the order of 1×10^{-8} 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 during 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.

Water bearing zones exist only within the upper portion of the Oak Orchard Formation. No water bearing zones were found at depth. In fact, no water bearing intervals were found below a depth of 75 feet into the bedrock.

2.2.4 Site Access

The entire Site is secured by a 8-foot chain link fence. Access to the Site is controlled through a main automatic gate located on 805 97th Street, and locked except to allow entry to and exit from the Site. Additional gates are located around the perimeter of the Site; however, these gates are always kept locked and used only when required by special activities. Entry to and

exit from the Site is controlled by individuals who possess gate keys or a transmitter for the automatic gate.

Section 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 entire 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 layout is provided on 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 two pump chambers (manholes) where the leachate is collected. Manhole 7 (MH-7), which is Pump Chamber 1 (PC-1), is located on the east side of the barrier drain and MH-8, which is PC-2, is located on the west side of the barrier drain. Manholes MH-7 and MH-8 each 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 force main) to the LCTF. PC-3 also accepts water pumped via forcemain from the 102nd Street Landfill. PC-3 and the underground holding tank are vented to the atmosphere through a vapor phase carbon 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 two pump chambers where the leachate is collected. PC-1A is located on the east side of the barrier drain and PC-2A on the west side of the barrier drain. 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 vapor phase carbon 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 is 8 feet wide, 12 feet long, and 6 feet deep. 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 25,380-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 contain 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. These trenches empty into a sump outside and adjacent to the drum barn. The sump houses duplex Gorman-Rupp stainless steel submersible pumps (Model S2B65-E2 with 2 hp, 115 volt, and 3,450 rpm). These units 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 AUTO at the Human-Machine Interface (HMI). When the remote switch is in AUTO and the HMI control is set to AUTO, 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.

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. There are set level permissives at the HMI, which allow the pumps in PC-1A, PC-2A, and DCF PC-4 to operate only if the level in PC-3A is not above the selected setpoint. This same level permissive requirement is required for the pumping of MH-7 and MH-8 (PC-1 and PC-2) and wet wells at the 102nd Street Landfill to PC-3 and the pumping of PC-3A and PC-3 to the process Raw Water Tank.

PC-2, PC-3 and the Southern Collection Holding Tank each have a high-high level switch that will disable the pumps in MH-7 and MH-8 if the level exceeds the selected setpoint. The pumps will remain disabled until the condition is cleared.

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 pump in DCF PC-3 will only operate if the level in DCF PC-4 is not above a selected setpoint. The flow from the DCF is measured with an magnetic flow meter, which is displayed on the HMI. The pump status for the pump and high level alarms from high level switches in DCF PC-3 and DCF PC-4 are also displayed on the HMI.

DCF PC-4 has a high-high level switch that will disable the pump in DCF PC 3 if the level exceeds the selected setpoint. The pump will remain disabled until the condition is cleared.

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.

Section 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 include the 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 the 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, the SEQ ENABLE button Start GWT must be selected on the HMI screen. This will enable both treatment system pumps (Raw Water Feed Pump and Filter Feed Tank Discharge Pump). The discharge valve (FCV-107) is opened automatically when the SEQ ENABLE button is pressed. This can also be done manually at the valve. Treatment system pumps may be operated manually by placing the Auto/Hand switch to Hand.

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 force main 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 controlled by the manual position of the flow control valve.

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 proportional-integral-derivative (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). Each piece of equipment is controlled by a different process variable. The position of the valve is set manually, and the pump speeds are based on the level in their respective tanks. The pumps will stop 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 permissives and status are displayed on the HMI screen to inform 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.

The Raw Water Tank has a high-high level switch that will disable the pumps in PC-3 and PC-3A if the level exceeds the selected setpoint. The pumps will remain disabled until the condition is cleared.

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 valve setting. 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 permissives and status are displayed on the HMI screen to inform 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.

The Filter Feed Tank has a high-high level switch that will disable the Raw Water Feed Pump if the level exceeds the selected setpoint. The pump will remain disabled until the condition is cleared.

4.4 Bag Filters

4.4.1 Process Description

The Filter Feed Tank Discharge Pump transfers water from the Filter Feed Tank to two sets of Bag Filters. Each set has two filters. One or both sets can be used. 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. 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.

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 leachate after the lead bed is monitored for VOCs at a minimum frequency of quarterly. 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 automatic effluent valve and analog and digital flow meters.

The SEQ ENABLE switch can be set to Stop GWT System, which will close the automatic effluent valve when the flow from FIT-107 is zero. This procedure also turns both the VFDs for the Raw Water Feed and Filter Feed Pumps, which shuts down the treatment system.

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

The effluent valve will automatically open when the SEQ ENABLE Start GWT is selected on the HMI, and will close when the SEQ ENABLE Stop GWT button is selected and the flow through FIT-107 is zero. The influent and effluent flows are 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 regeneration.

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 regeneration.

Section 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. The alarms are shown on the HMI screen. Notification to personnel is done via an autodialer and automated email distribution.

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.

The PLC that controls the collection and treatment system at the Love Canal Site is an Allen-Bradley Control Logix Processor. Remote locations (PC-1, PC-2, PC-3, PC-1A, PC-2A, and PC-3A) are controlled by Allen-Bradley Point IO hardware. The remote Point IO hardware controls the equipment and monitors the conditions at their respective pump chambers. Data is passed from the remote Point IO to the master PLC and vice versa. The main PLC is connected to the HMI.

The 102nd Street system is also controlled by Allen Bradley Point IO hardware is tied into the Love Canal system at the PC-3 via fiber optics.

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

The above control components reflect upgrades that were implemented in 2013.

5.1.2 Human Machine Interface

The PLC is tied in to an 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 setpoints are hard coded and allow the operator to 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 produces a daily report detailing pumping volume for each well, average water level for each well, and process tank levels. In addition, a real time well summary is available on the HMI.

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.

Float switches in addition to level transmitters are located in PC-3, PC-3A, and DCF PC-4 to alarm in high-high level conditions. A high-high level condition will disable any upstream pumping until the high-high level condition is cleared.

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

- Shutdown Treatment Plant
- 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
- Inhibit DCF Pump Chamber 4 Pump From Running
- Inhibit DCF Pump Chamber 3 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, S-Area Landfill and Niagara Plant (F-Area Treatment System)).

Section 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 6NYCRR 373-3.9 - Use and Management of Containers 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 terms.

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:

- Site inspection
- HMI data review

The Site inspection will verify the operation of each component of the Collection and Treatment System. Specifically, the inspection will include the following:

- A visual check: walk through the entire treatment building and drum barn; check for leaks from tanks/piping, overflows, malfunctioning equipment, or signs of vandalism. Document visual check and findings on daily inspection sheet.
- 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 communication systems for proper operation.
- Visual check for fence integrity from appropriate locations within 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 All findings and/or issues will be documented on the Daily Inspection Sheet presented in Appendix H. Repairs and/or replacements will be performed as necessary.

6.1.2 Weekly Inspection/Monitoring

The following will be performed on a weekly basis:

- Inspection of first aid kits
- Inspection of safety showers/eye wash stations

All findings and/or issues will be documented on the Weekly Inspection Sheet presented in Appendix H.

6.1.3 Monthly Inspection/Monitoring

The following will be performed on a monthly basis:

- Inspection of fire extinguishers
- Check for breakthrough of carbon vent sorb drums (with photoionization detector)
- Inspection of ladders
- Inspection of portable electrical equipment
- Inspection of autodialer - low battery light
- Inspection of exits - free of obstruction

- Inspection of exit/emergency lights
- Inspection of process vessels and tanks for corrosion or leaks
- Inspection of perimeter fence (cursory visual from a distance)
- Inspection of dielectric matting - free from damage, holes, cuts, or deterioration or imbedded objects that may affect its insulating properties

Repairs and/or replacements will be performed as necessary. The monthly inspections will be documented on the Monthly Inspection Sheet presented in Appendix H.

6.1.4 Quarterly Inspections/Monitoring

The calibration of the effluent flow meter will be checked on a quarterly basis. The results of the check will be indicated by a label placed on the equipment and/or recorded on a sheet filed at the Site.

6.1.5 Semi-annual Inspection/Monitoring

6.1.5.1 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 transducer reading
- 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 sheets provided in Appendix H.

6.1.5.2 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

- Detailed inspection of all access gates to ensure they are secure
- Inspection of landfill cap to determine condition of vegetated cover and for signs of erosion or subsidence

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

6.1.6 Annual Inspection/Monitoring/Maintenance

6.1.6.1 Back Flow Preventer Inspection

An inspection of the backflow preventers will be conducted annually by a certified third party. The third party will submit the completed inspection forms to the NFWB and the operator. The backflow preventers will be repaired or replaced as needed.

6.1.6.2 Level Switch Operation

An inspection of key level switches will be conducted on an annual basis. The inspection will involve activating each switch to ensure that the desired control action will occur. The key level switches that will be inspected are the high-high level switches in the treatment building and the high-high level switches in the tanks at PC-3, PC-3A, and DCF PC-4.

These inspections will be documented on the Annual Level Switch Inspection Sheet presented in Appendix H.

6.1.6.3 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. If cleanout of any manholes is required based on semiannual inspections, the cleanout will occur concurrently with the above NAPL cleanout.

6.1.6.4 Signage

Signs and labels on buildings and tanks will be inspected annually. Any signs or labels that have become illegible due to weathering or deterioration will be replaced.

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 distributed electronically via email to the Operator every morning.

6.3.1 Carbon Treatment Performance Monitoring

To ensure that organics are being removed by the Carbon Beds, samples are collected at a minimum of 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.

Item/Indicator	*Criteria*	*Response*
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
Note: 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 6, Chapter 4 of the NFWB Regulations (September 2006) 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:

Parameter	*Annual Avg. Limit*	*Daily Max Limit*	*Units*
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

In addition, treatment levels of 10 µg/L shall be achieved for the following compounds: trichloroethylene, tetrachloroethylene, monochlorotoluene, monochlorobenzenes, trichlorobenzenes, tetrachlorobenzenes, hexachlorocyclohexanes, and hexachlorobenzene.

Section 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.

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

7.2.3 Natural Gas

Natural gas enters the administration building at the southeast corner of the building and enters the treatment facility in the compressor room. A meter and 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.

Section 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.

Section 9.0 Personnel

9.1 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.

9.2 Training

9.2.1 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

9.2.2 Training Documentation

Upon completion of training to operate the facility, -the Operator will be required to complete a test to document their understanding of Site operations. Successful completion of the test is required. Completed tests will be kept on file at the Site.

Section 10.0 Records

10.1 Operating Inspection

Inspection sheets are filed in the Love Canal Control Room. These inspection sheets will be scanned monthly and saved electronically (e.g., as Adobe® Acrobat® files) at CRA's Niagara Falls office. Operations logbooks are used to record activities performed while on Site. Active logbooks are stored at the Site. Maintenance activities performed while on Site are recorded in a maintenance computer program database.

10.2 Maintenance/Calibration

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

Section 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
- Functional Process Description, Control System Upgrade

- 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 HASP, GSH Western New York Sites
- Integrated Contingency Plan

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.

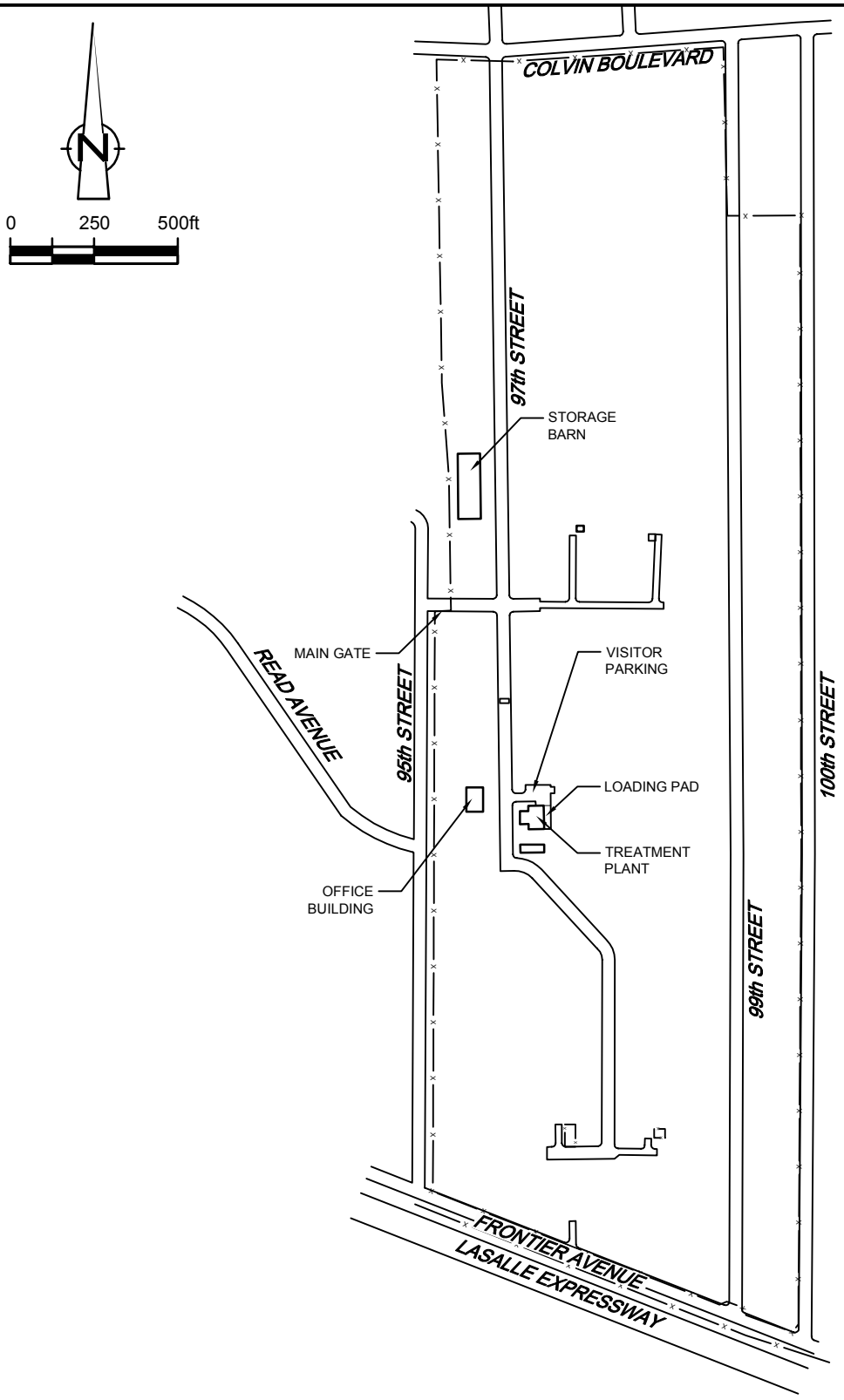
11.3 Equipment Vendor Manuals

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

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

09954-D23101(016)GN-WA002 JUN 7/2013

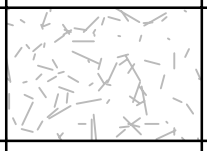
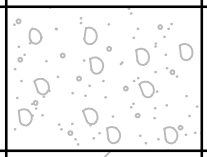
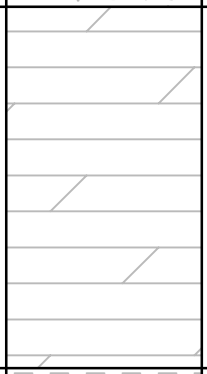
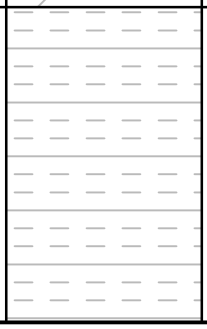
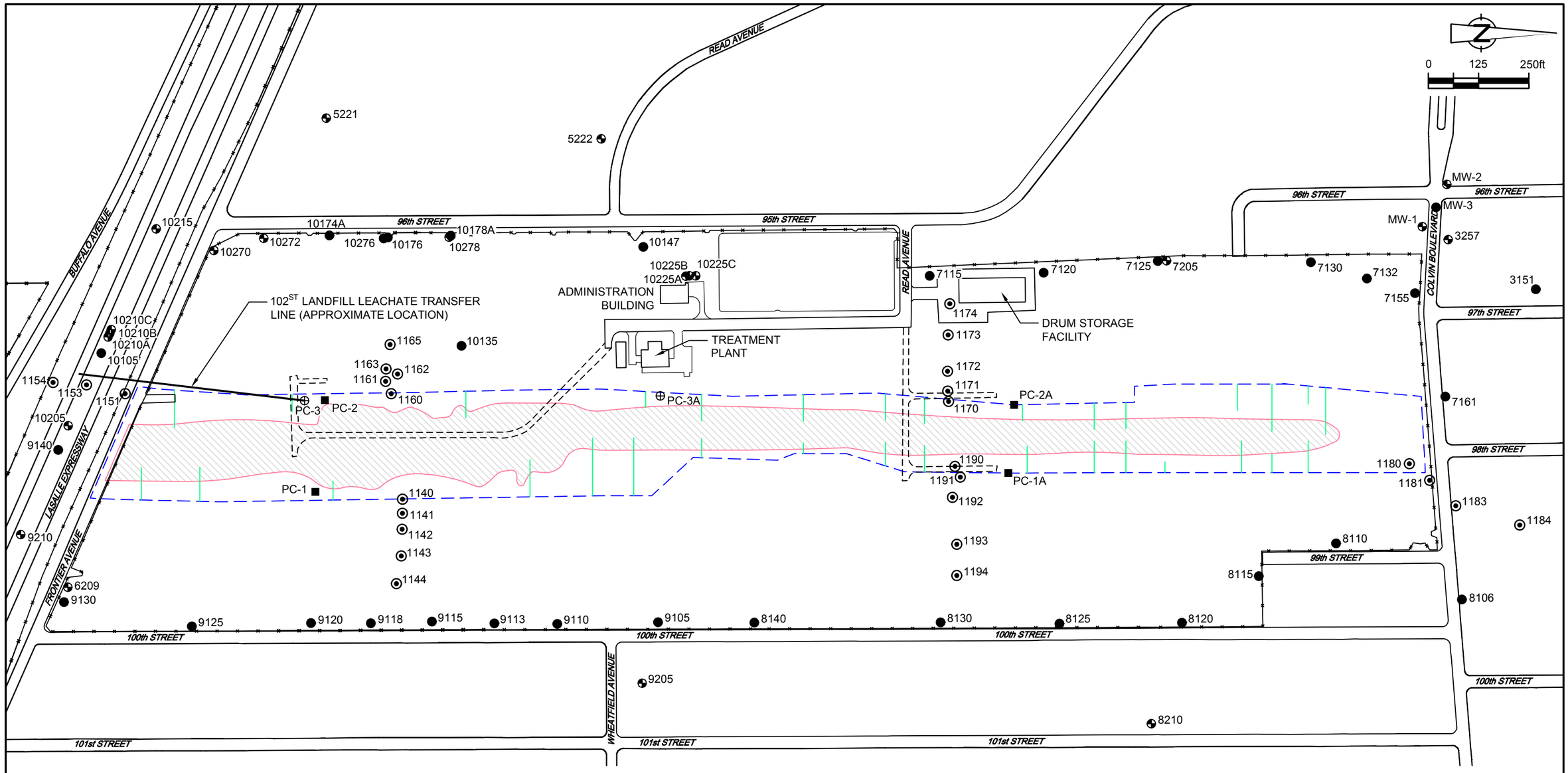
FORMATION	COLUMNAR SECTION	THICKNESS IN FEET	CHARACTER
FILL		0.1-3	LOCAL SOIL MATERIAL, INDUSTRIAL WASTE, CONSTRUCTION RUBBLE
GLACIOLACUSTRINE CLAY		6-29	REDDISH BROWN TO GRAY, SILTY, VARVED, IN UPPER PART GRADING TO VERY PLASTIC, MOIST TO WET, IN LOWER PART
TILL		1-25	REDDISH BROWN SILTY TO SANDY CLAY, 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

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

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

figure 3.1

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

09954-D23101(016)GN-WA004 JUN 6/2013

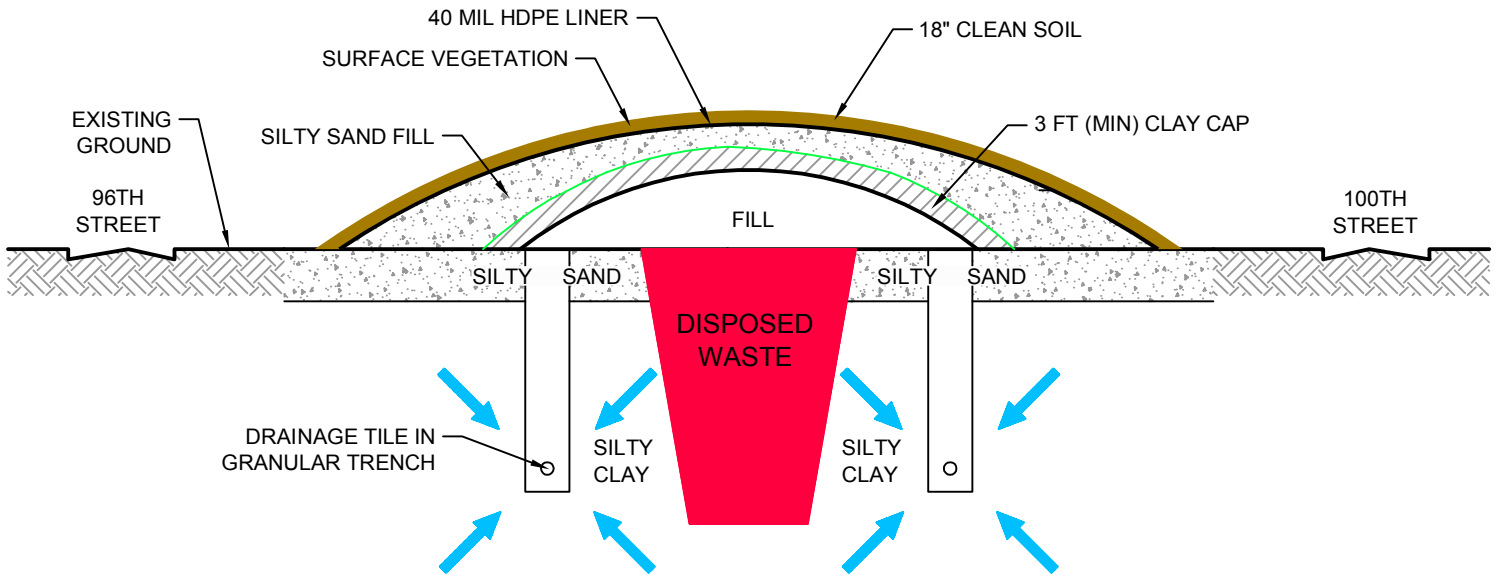


figure 3.2

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

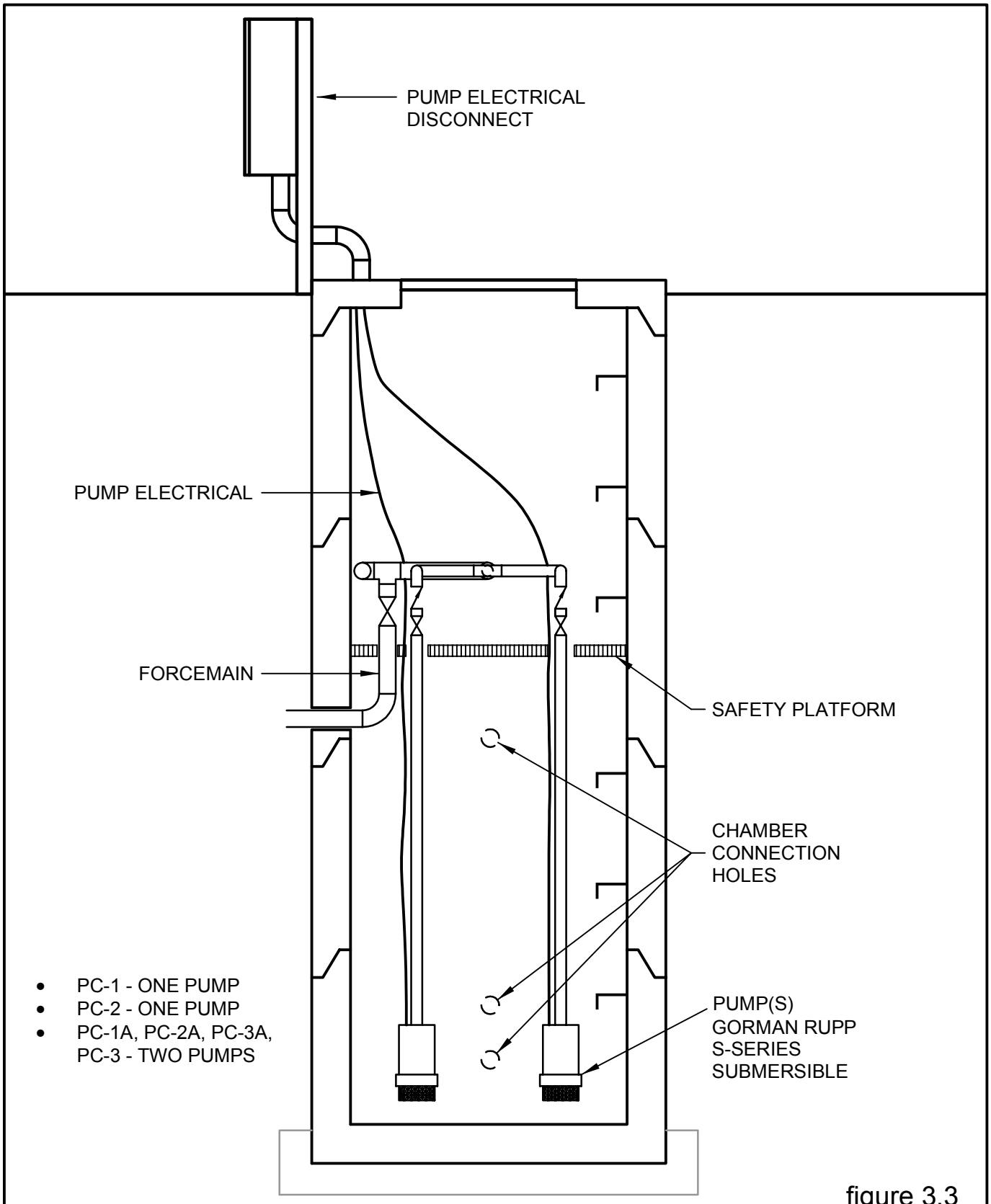


figure 3.3

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

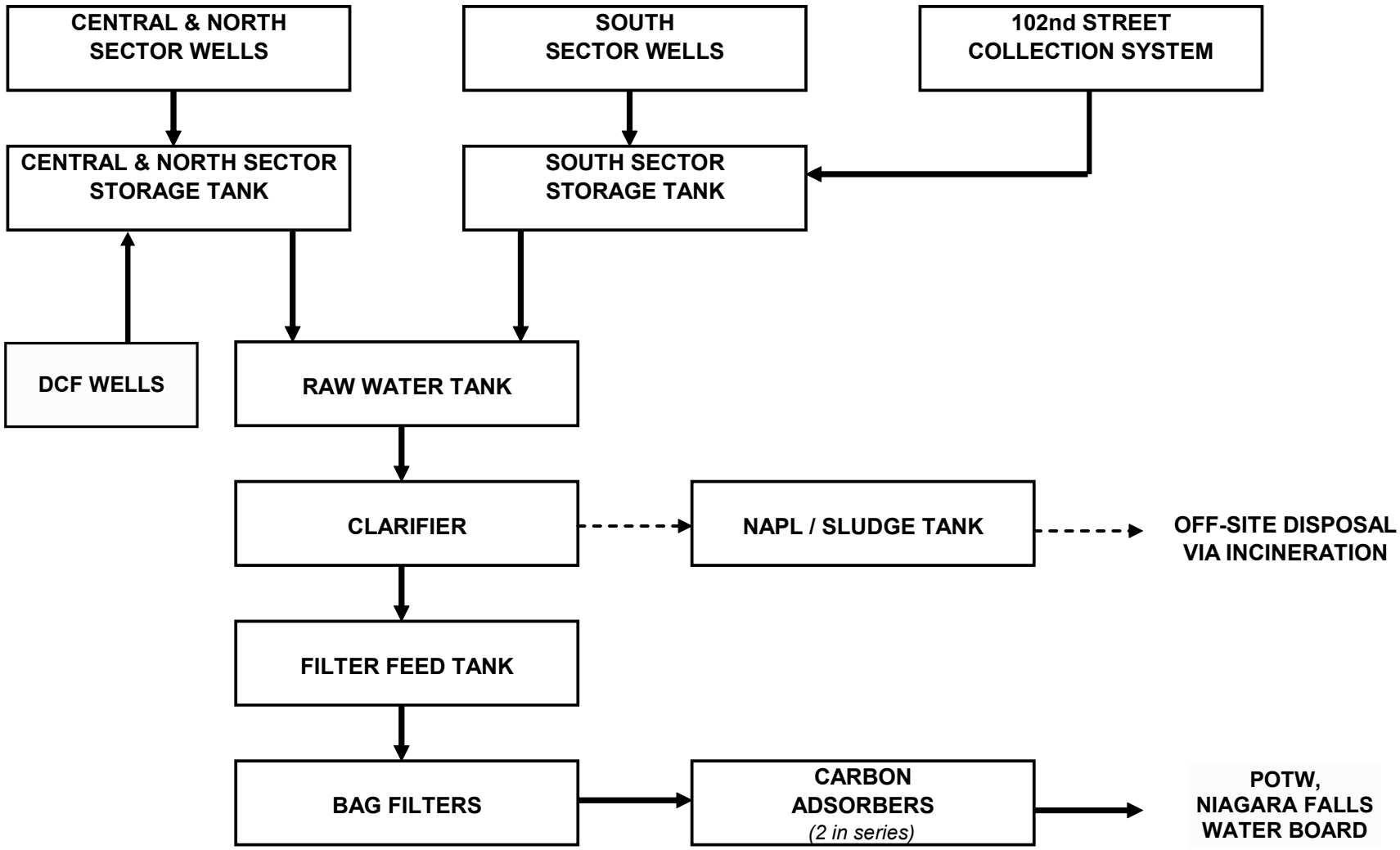


figure 4.1

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

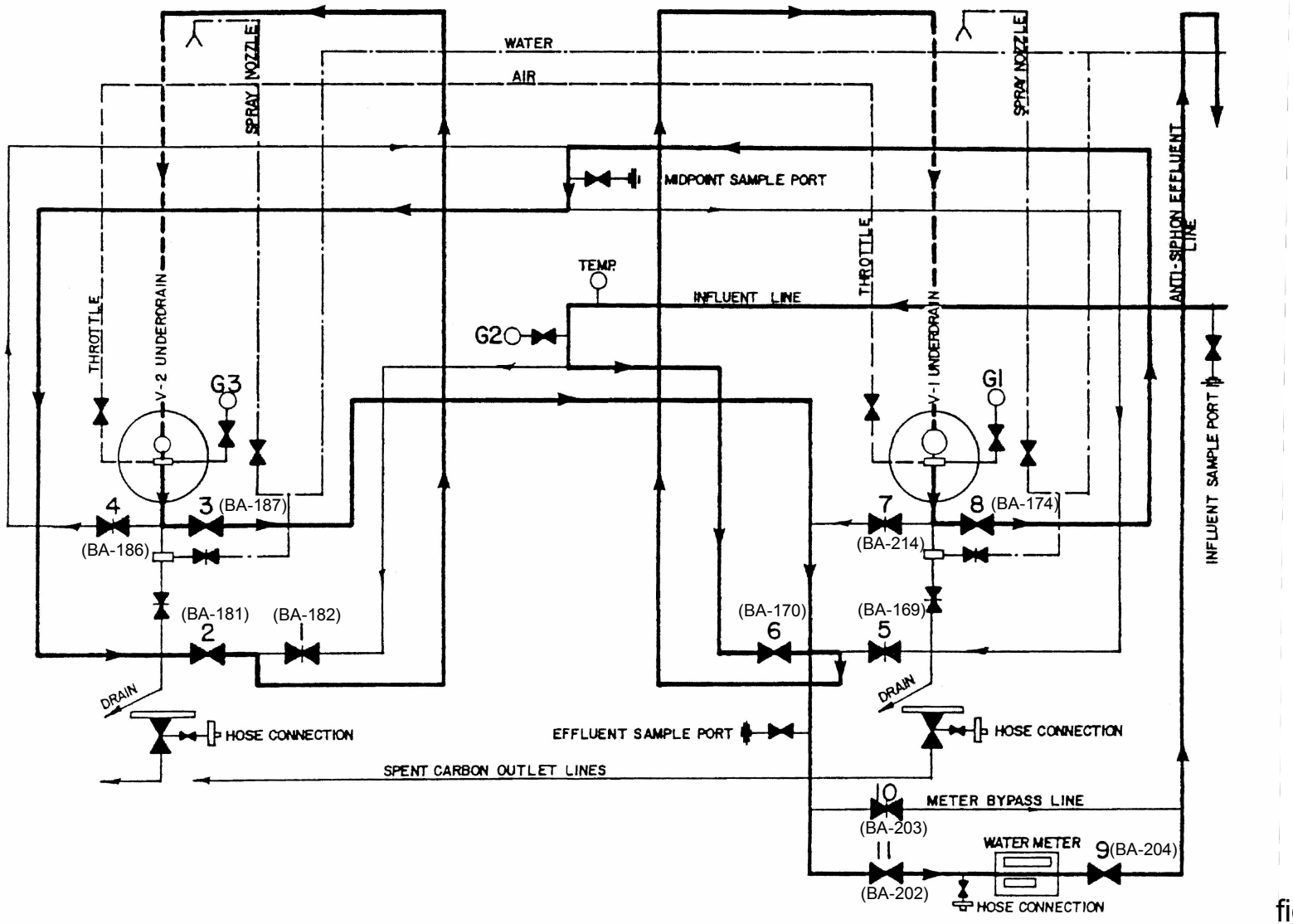
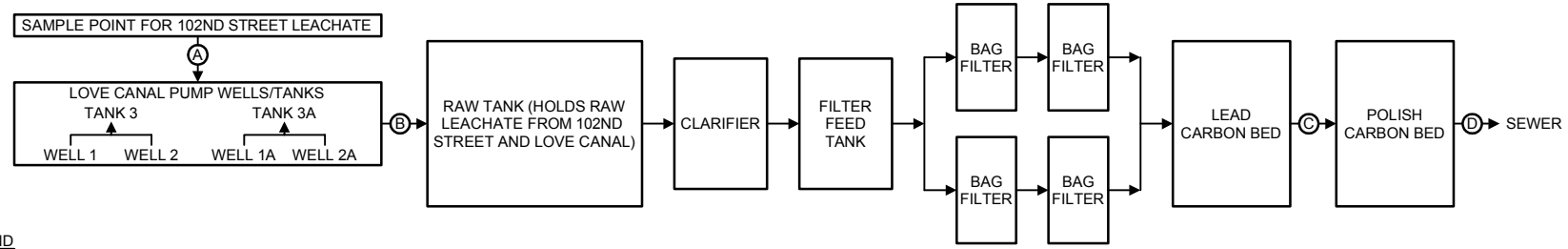


figure 4.2

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



LEGEND

Ⓐ 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

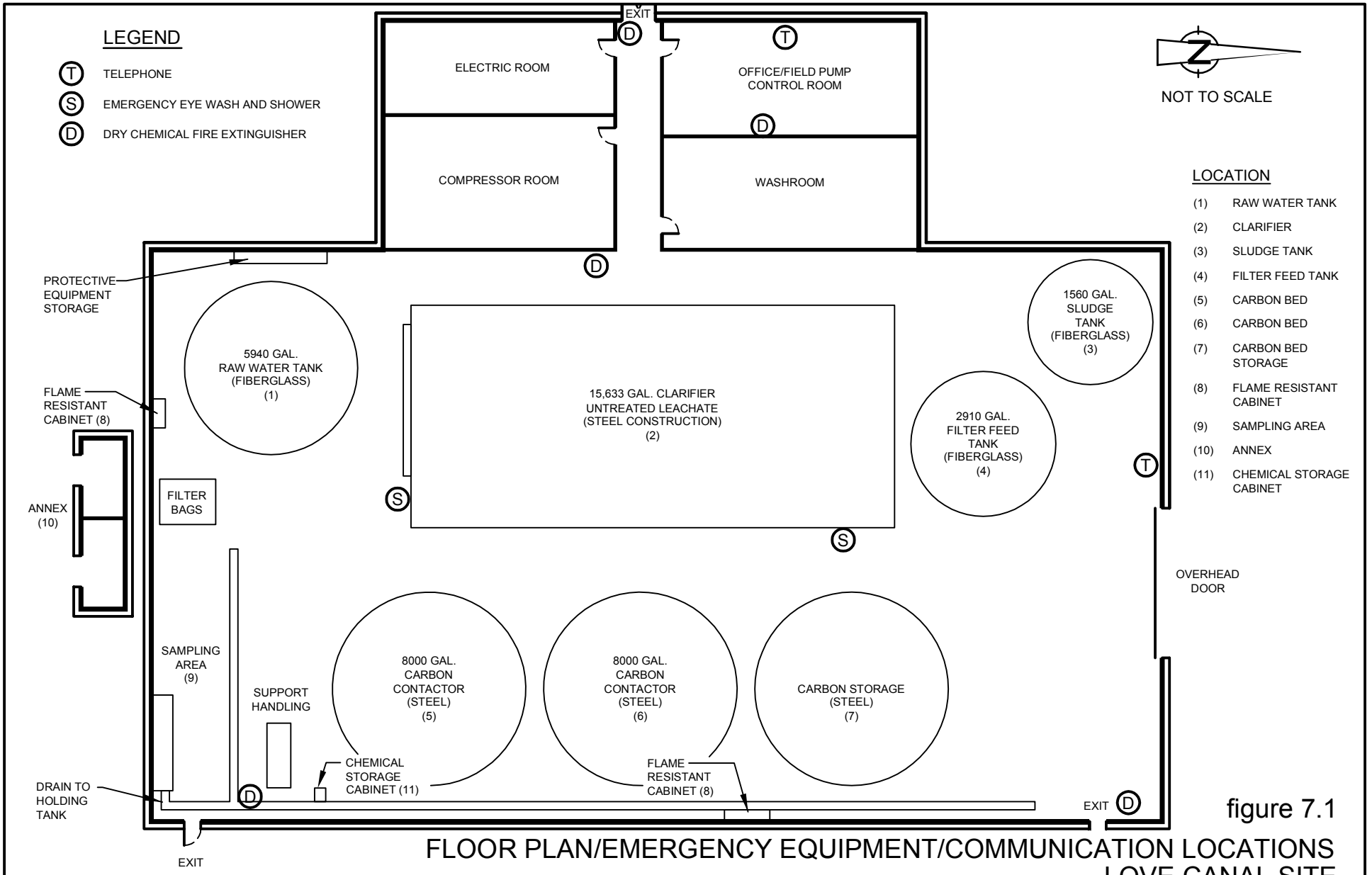


figure 7.1

FLOOR PLAN/EMERGENCY EQUIPMENT/COMMUNICATION LOCATIONS
LOVE CANAL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

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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
- TO / FROM SHEET No. — OFF PAGE CONNECTOR
- UTILITY — UTILITY IN/OUT

LINE SYMBOLS

- BA– " — BALL VALVE
- BU– " — BUTTERFLY VALVE
- DI– " — DIAPHRAM VALVE
- GA– " — GATE VALVE
- GL– " — GLOBE VALVE
- THREE WAY VALVE (FAIL OPEN TO PATH A–C)
- FOUR WAY VALVE (FAIL OPEN TO PATH A–C AND B–D)
- CH– " — CHECK VALVE
- REDUCER
- FLEXIBLE PIPE
- BLIND FLANGE
- HOSE CONNECTION
- SCREWED CAP, CLEANOUT
- Y–LINE STRAINER
- SPECIFICATION CHANGE
- LEVEL DEVICE, FLOAT TYPE
- BB — BLOCK & BLEED VALVE SETUP
- TP 1 — TIE POINT TO EXISTING SYSTEM
- RESTRICTION ORIFICE
- DRAIN
- FLOW STRAIGHTENING VANE
- SP 4 — SPECIALITY PART
- STATIC MIXER
- AV — AIR VENT, AUTOMATIC
- FILTER/REGULATOR/LUBRICATOR

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

INSTRUMENT SYMBOLS

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

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

- TARGET TYPE FLOW SENSOR
- SINGLE PORT PITOT TUBE
- AVERAGING PITOT TUBE
- M — MAGNETIC FLOWMETER
- TURBINE OR PROPELLER FLOWMETER
- POSITIVE–DISPLACEMENT FLOWMETER
- FI — VARIABLE AREA FLOWMETER
- PI — DIAPHRAM SEAL WITH PRESSURE LEAD LINE
- PI — DIAPHRAM SEAL (LINE–MOUNTED)
- XY — SIGNAL CONVERTER (INPUT/OUTPUT)
  [*E – VOLTAGE P – PNEUMATIC
  I – CURRENT B – BINARY (MODBUS, R5232...)
- PL COLOR — PILOT LIGHT
  A – AMBER
  G – GREEN
  R – RED

ELECTRICAL SYMBOLS

THESE SYMBOLS ARE FOR OCCIDENTAL CHEMICAL DRAWINGS ONLY

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

SUBSCRIPTS

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

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

TYPICAL ISA LETTER COMBINATIONS

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

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
- PAH, PAL, dP/dT, PDA — XAH, XAL, d/dT, PR

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

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

MISCELLANEOUS
PR – TREND

* NORMALLY ACCESSIBLE TO OPERATOR

- OLC SP — —

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

- NORMALLY BLIND OPERATION
  * NOT NORMALLY ACCESSIBLE TO OPERATOR
- I 99 — DISTRIBUTED CONTROL INTERCONNECTING LOGIC CONTROLLER OR PC WITH BINARY OR SEQUENTIAL LOGIC FUNCTIONS NUMBER IN DIAMOND REFERS TO SEQUENCE NUMBER

INSTRUMENT / PROCESS 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
KYA	KYNAR
PDE	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

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
5	10/13	JJE	AS BUILTS
4	01/14/13	JJE	CONTROL UPGRADE DESIGN
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

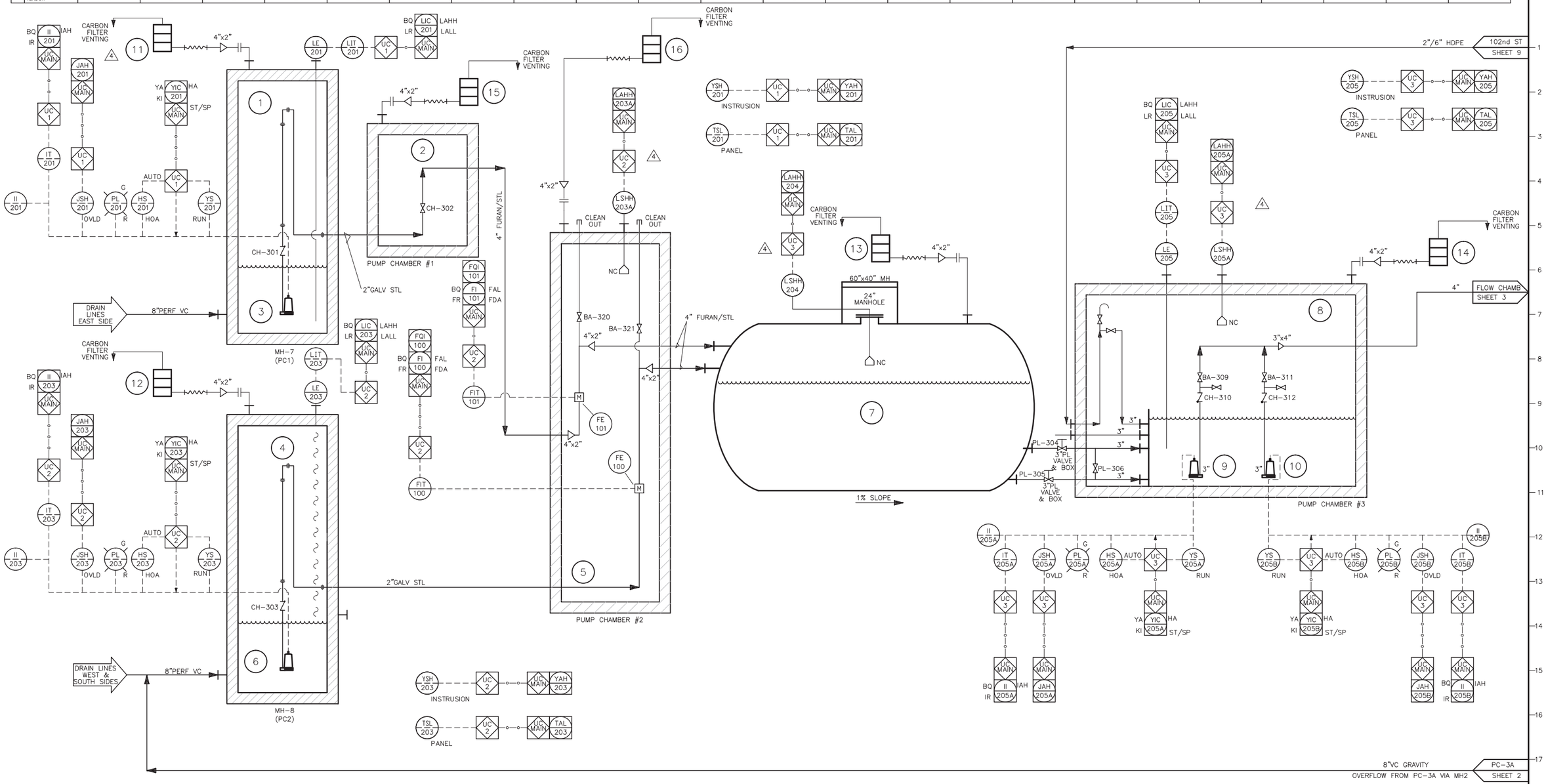
OXY

GLENN SPRINGS HOLDINGS 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	5

09954–00(027)EF–BU000 NOV 25/2013

PLANT ID.	PC1 (1)	– (2)	P-201 (3)	PC2 (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-A	PUMP CHAMBER No. 3 PUMP-B	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER							
DESCRIPTION: MATERIAL	CONCRETE	CONCRETE	316 SS	CONCRETE	CONCRETE	316 SS	STEEL (FURAN COAT.)	CONCRETE	316 SS	316 SS	POLYETHYLENE	POLYETHYLENE	POLYETHYLENE	POLYETHYLENE	POLYETHYLENE	POLYETHYLENE							
SIZE	–	–	2"	–	–	2"	132" x 406"	–	2"	2"	55 GALLON	55 GALLON	55 GALLON	55 GALLON	55 GALLON	55 GALLON							
CAPACITY	1500 GALLONS	–	–	1500 GALLONS	–	–	25380 GALLONS	–	–	–	–	–	–	–	–	–							
TEMP/PRESS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–							
HP/V/RPM	–	–	2HP/230V/3450	–	–	2HP/230V/3450	–	–	2HP/230V/3450	2HP/230V/3450	–	–	–	–	–	–							
WEIGHT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–							
MANUFACTURE	–	–	GORMAN-RUPP	–	–	GORMAN-RUPP	–	–	GORMAN-RUPP	GORMAN-RUPP	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS							
MODEL	–	–	S2B65-E2	–	–	S2B65-E2	–	–	S2B65-E2	S2B65-E2	200SCAP	200SCAP	200SCAP	200SCAP	200SCAP	200SCAP							
VENDOR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–							



NOTE △4
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
5	10/13	JJE	AS BUILTS
4	01/14/13	JJE	CONTROL UPGRADE DESIGN
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

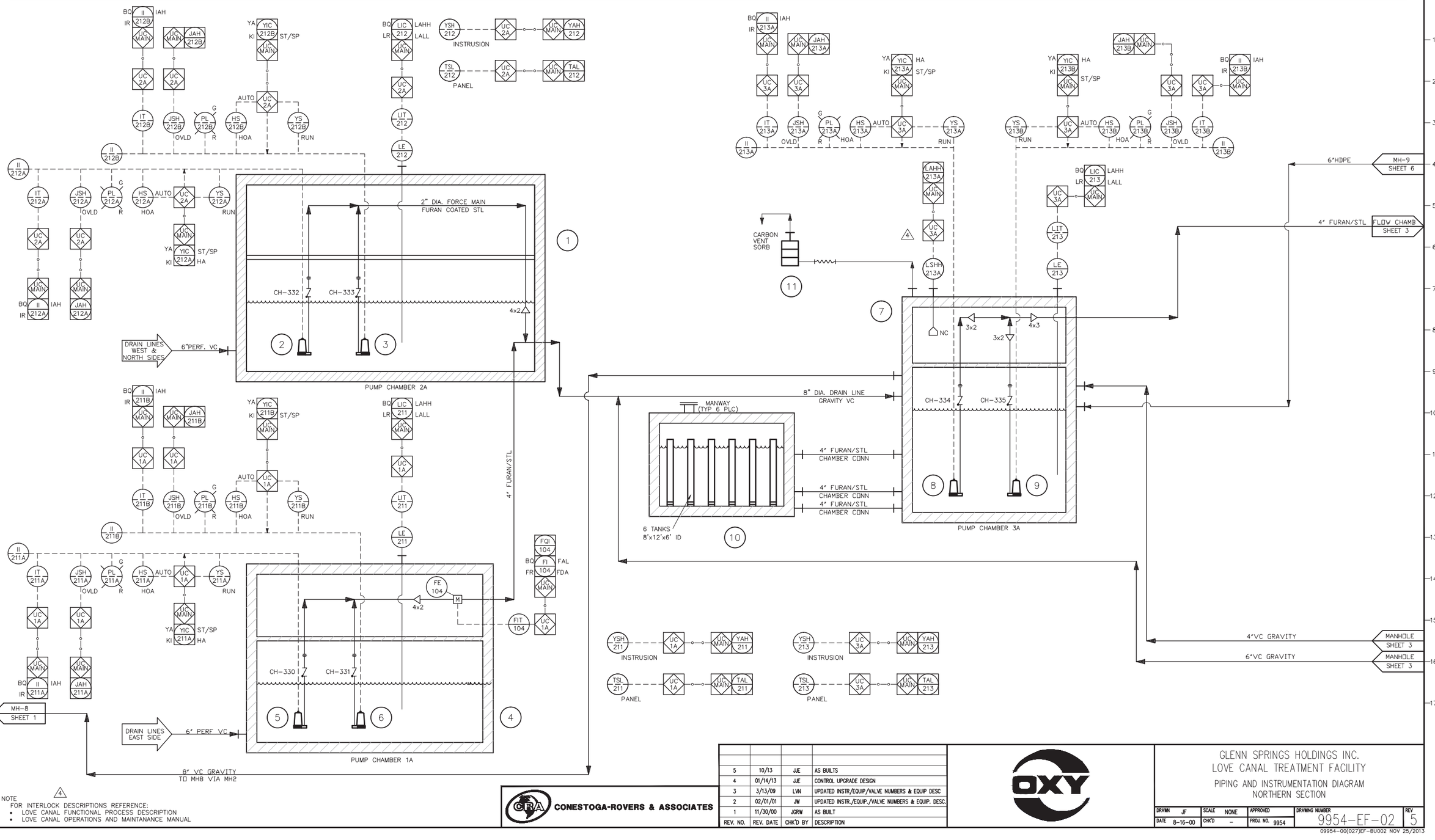
CONESTOGA-ROVERS & ASSOCIATES

GLENN SPRING HOLDINGS INC.
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
SOUTHERN SECTION

DRAWN	JF	SCALE	NONE	APPROVED		DRAWING NUMBER	REV
DATE	8-16-00	CHK'D	–	PROJ. NO.	9954	9954-EF-01	5

09954-00(027)EF-BU001 NOV 25/2013

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PLANT ID.		–	P-212A	P-212B	–	P-211A	P-211B	–	P-213A	P-213B	LC-211	–												
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 (NORTH)	CARBON VENT SCRUBBER												
DESCRIPTION	MATERIAL	CONCRETE	316 SS	316 SS	CONCRETE	316 SS	316 SS	CONCRETE	316 SS	316 SS	CONCRETE	POLYETHYLENE												
	SIZE	72" DIA.	2"	2"	–	2"	2"	60" DIA.	2"	2"	–	55 GALLON												
	CAPACITY	1100 GALLONS	–	–	1100 GALLONS	–	–	1100 GALLONS	–	–	25,850 GALLONS	–												
	TEMP/PRESS	–	–	–	–	–	–	–	–	–	–	–												
	HP/V/RPM	–	2HP/230V/3450	2HP/230V/3450	–	2HP/230V/3450	2HP/230V/3450	–	2HP/230V/3450	2HP/230V/3450	–	–												
	WEIGHT	–	–	–	–	–	–	–	–	–	–	–												
	MANUFACTURE	–	GORMAN–RUPP	GORMAN–RUPP	–	GORMAN–RUPP	GORMAN–RUPP	–	GORMAN–RUPP	GORMAN–RUPP	–	SEIMENS												
	MODEL	–	S2B65–E2	S2B65–E2	–	S2B65–E2	S2B65–E2	–	S2B65–E2	S2B65–E2	–	200 SCAP												
	VENDOR	–	–	–	–	–	–	–	–	–	–	–												



NOTE
4
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
5	10/13	JJE	AS BUILTS
4	01/14/13	JJE	CONTROL UPGRADE DESIGN
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

OXY

GLENN SPRINGS HOLDINGS 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	5

09954-00(027)EF-BU002 NOV 25/2013

	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		BAG FILTERS No. 1 (NORTH)	BAG FILTERS No. 2 (SOUTH)	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	CARBON VENT SCRUBBER	ACCUMULATOR CABINET	FLAME ARRESTOR	RAW WATER TANK DISCHARGE PUMP	FILTER FEED TANK DISCHARGE PUMP	CARBON VENT SCRUBBER	FLOW CHAMBER PUMP	CLARIFIER SLUDGE COLLECTOR DRIVE						
DESCRIPTION	MATERIAL	FIBERGLASS	EPOXY COATED STEEL	FIBERGLASS	FIBERGLASS		316 SS	316 SS	POLYETHYLENE	POLYETHYLENE	POLYETHYLENE	–	–	316SS/316SS	316SS/316SS	POLYETHYLENE	–	–						
	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	–	120V	.25/480/3 PH						
	WEIGHT	–	–	745 POUNDS	580 POUNDS		–	–	–	–	–	–	–	–	–	–	CORD & PLUG	–						
	MANUFACTURE	OWENS CORNING	PURE STREAM INC.	OWENS CORNING	OWENS CORNING		GAFLO	GAFLO	SEIMENS	SEIMENS	SEIMENS	TIGG CORP.	SHAND & JURS	GOULDS	GOULDS	SEIMENS	CONNECTOR	–						
	MODEL	106 MACW	–	83MAC	61.5MAC		RB2A	RB2A	200SCAP	200SCAP	200SCAP	–	94306	3196	3196	200SCAP	–	–						
	VENDOR	–	–	–	–		CUTLER METAL PROD.	CUTLER METAL PROD.	–	–	–	–	–	ESTABROOK	ESTABROOK	–	–	–						

BACK TO PC3A WW

CARBON LOADING PAD

PC3A SHEET 2 — FEED FROM NORTH WELLS 4"FURAN/STL

PC3 SHEET 1 — FEED FROM SOUTH WELLS 4"FURAN/STL

FQI 105; FI 105 (BQ, FAL, FR, FDA); UC MAIN; UC 3A; FIT 105; FE 105; LAHH 104; LSHH 104; NC

BU-336; M; CH-337; BU-313; CH-314; 4"SS; 4"SCH40; PL-100; 4" TFE; 4"x3"; 4"x3"; 4"x3/8"; BA-101

15 — FLOW CHAMBER

OUTSIDE | INSIDE BLDG

UC MAIN; UC 3A; FI 103 (BQ, FAL, FR, FDA); FQI 103; FIT 103; FE 103

SAMPLE LINE TO FUME HOOD; BA-102; 3/8" SS TUBING

DI-104; 1"; 4"; PL-103

1

4"

PL-105; 4"TFE; 4"x1"; PL-106; 4"x3"; 12

PI 106; BB-860; 4"x2"; BA-108; CH-107; HS 106 HOA; UC MAIN; YIC 106 YA KI ST/SP; YS 106 RUN

ATM VENT THRU ROOF; 4"x8"; 8"

4"; BA-123; 4"x1"; 4"VE; 7

4"VE

BQ LIC 106 LAHH LR LALL; UC MAIN; LAHH 106A; LSHH 106A; LIT 106; LE 106; 4

YAH 106; MFR 106; SI 106; SC 106; VFD FAULT; FAULT RESET; LOCAL/REMOTE

FQI 106; BQ FIC 106 FAL FR FDA; UC MAIN; FIT 106; FCV 106

PL-115; 3"x1"; BA-116; 4" FLEX; 8; 9; 4"VE

ATM VENT THRU ROOF; 8"VE

UC MAIN; LIT 105; BQ LI 105 LAHH LR LAH; LE 105

4"V-VE; 4; PL-125

PL-130; PL-135; 4"V-VE

BA-114; E; 3"; PL-112; PL-113; 16

1"-PVC; BA-119; BA-120; BA-121; BA-122; 2; 3"; 4"; 8"; PL-111

PL-109; PL-110; 4"

LAHH 107A; LSHH 107A; LIT 107; LE 107; BQ LIC 107 LAHH LR LALL; 4"; 2"; 4; NC; BFE; 8"CSL; 3

YAH 107; MFR 107; SI 107; SC 107; VFD FAULT; FAULT RESET; LOCAL/REMOTE

PL-136; 4"x2"; PL-138; BA-168; 4"x1"; PL-137; 4"x3"; NOTE 1; HS 107 HOA; UC MAIN; YIC 107 HA YA KI ST/SP; YS 107 RUN; 13

PI 107; BB-107

8"VE OR 10"; ATM VENT THRU ROOF; FLEX; FLAME ARRESTER; 11; 10

AIR COMPR SHEET 7

4"CSL

SAMPLE LINE TO FUME HOOD; BA-143; 4"x1/2"; 4"; 3"; 4"x3"; BA-146; 1"x1/2"; BA-148; 4"x1"; PI 102; DI-147; PL-144

SOUTH PL-141; NORTH PL-142; PL-166; PL-139; PL-140; HI

BA-153; 4"x1"; BA-155; 1"x1/2"; PI 103; DI-154

6A; 6B; PDT 102; PDT 103; BQ PDI 102 PDAH PDR; BQ PDI 103 PDAH PDR; UC MAIN

3"; 1"x1/2"; BA-151; 3"x1"; PL-152; PL-159; BA-145; 3"x1/2"; PL-160; 3"x1"; BA-158; 1"x1/2"; PL-161; 3"x1"

TRENCH

TRAILER PAD SUMP; 3"C.I.

LAH 113; LSH 113; NC; TRENCH

SINK SHEET 8

14; 2"PVC; VENT SORB

PC3A SHEET 2 — 4"VC

PC3A SHEET 2 — 6"VC

MAN HOLE

3"PVC HEADER IN TRENCH

OUTSIDE | INSIDE BLDG

3"PVC

TRENCH

BQ TI 100 TR TAL; UC MAIN; TIT 100 BUILDING TEMP

YAH 100; UC MAIN; YSL 100 PROCESS STOP PUSH BUTTON MTU

CARB FILTER SHEET 4

CARB FILTER SHEET 4

NOTE
1. INSTALL CHECK VALVE IN FUTURE.

NOTE 4
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
5	10/13	JJE	AS BUILTS
4	01/14/13	JJE	CONTROL UPGRADE DESIGN
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

OXY

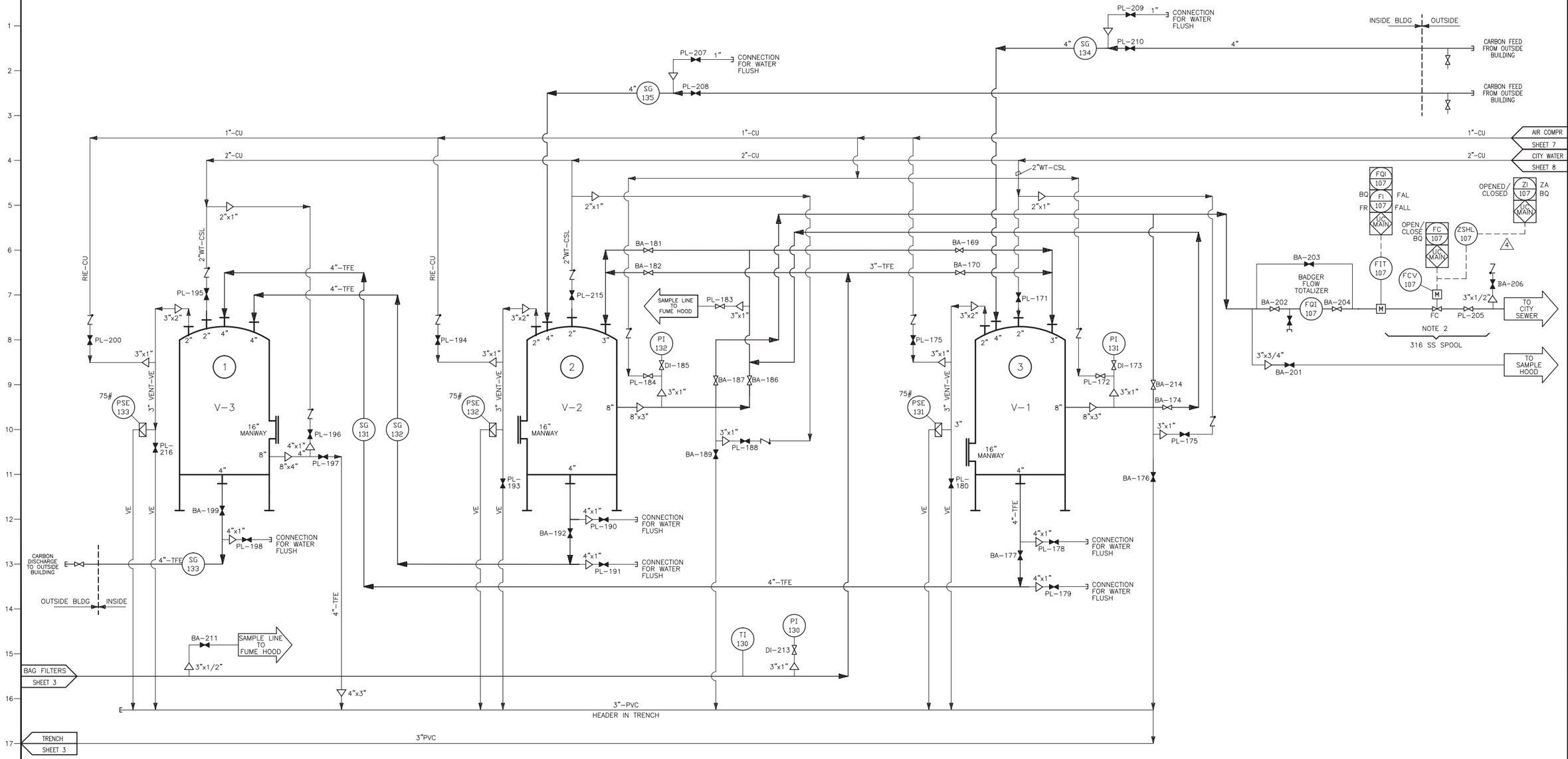
GLENN SPRINGS HOLDINGS INC
LOVE CANAL TREATMENT FACILITY

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-03	5

09954-00(027)EF-BU003 NOV 25/2013

	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	–	–	–																				



NOTE 4
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
5	10/13	JJE	AS BUILTS
4	01/14/13	JJE	CONTROL UPGRADE DESIGN
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

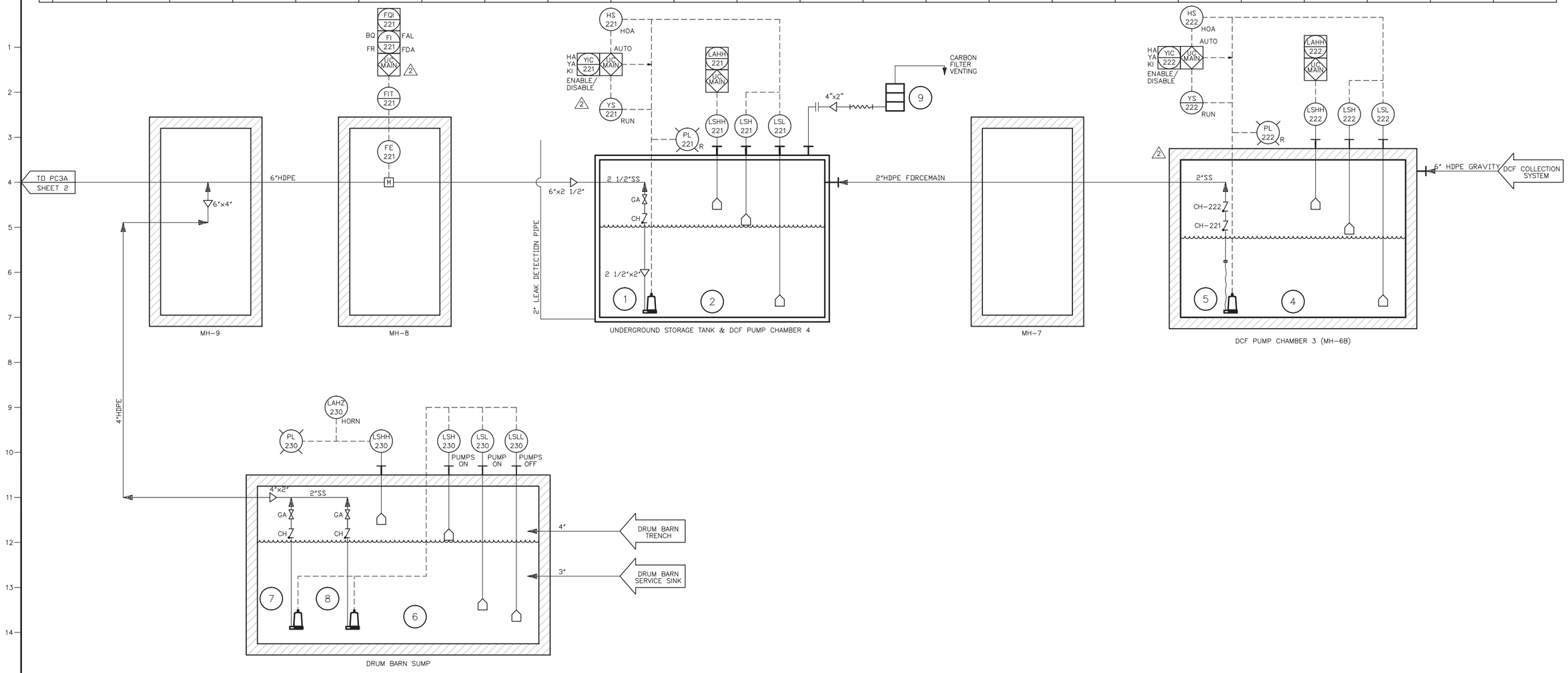
OXY

GLENN SPRINGS HOLDINGS 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	5

09954-00(027)EF-BU004 NOV 25/2013

PLANT ID.		P-221 (1)	LC-220 (2)	– (3)	– (4)	P-222 (5)	– (6)	P-230A (7)	P-230B (8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
NAME		DCF PUMP CHAMBER No. 4 PUMP	UST AND DCF PUMP CHAMBER No.4		DCF PUMP CHAMBER No. 3 (MANHOLE No. 6B)	DCF PUMP CHAMBER No. 3 PUMP	DRUM BARN SUMP	DRUM BARN SUMP PUMP-A	DRUM BARN SUMP PUMP-B	CARBON VENT SCRUBBER														
DESCRIPTION	MATERIAL	316 SS	DOUBLE WALL STL		CONCRETE	CAST IRON	CONCRETE	316 SS	316 SS	POLYETHYLENE														
	SIZE	2"	–		–	3"	–	2"	2"	55 GALLON														
	CAPACITY	–	10000 GALLONS		–	–	–	–	–	–														
	TEMP/PRESS	–	–		–	–	–	–	–	–														
	HP/V/RPM	2HP/460V/3450	–		–	2.2HP/460V/1750	–	2HP/460V/3450	2HP/460V/3450	–														
	WEIGHT	–	–		–	–	–	–	–	–														
	MANUFACTURE	GORMAN-RUPP	–		–	FLYGT	–	GORMAN-RUPP	GORMAN-RUPP	SIEMENS														
	MODEL	S2B65-E2	–		–	3085.092	–	S2B65-E2	S2B65-E2	200SCAP														
	VENDOR	–	–		–	–	–	–	–	–														



NOTE
(2) FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	10/13	JE	AS BUILTS
2	01/14/13	JE	CONTROL UPGRADE DESIGN
1	3/13/09	LWN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC

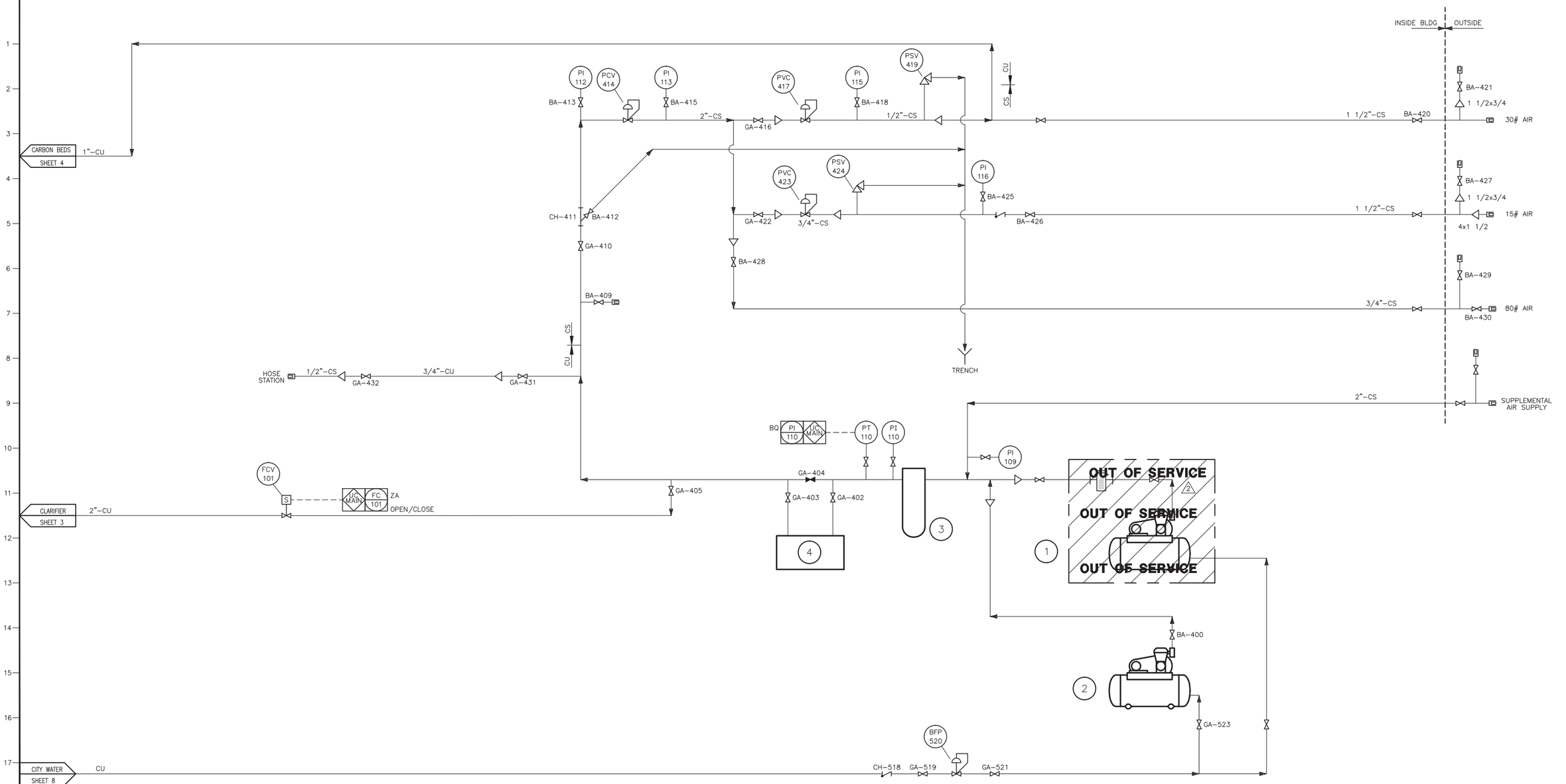
OXY

GLENN SPRINGS HOLDINGS INC
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
DCF / DRUM BARN

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

09954-00(027)EF-BU006 NOV 25/2013

PLANT ID.	–	1	M–111	2		3		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NAME			COMPRESSOR		FILTER		DRYER																				
DESCRIPTION: MATERIAL			–																								
SIZE			–																								
CAPACITY			–																								
TEMP./PRESS			–																								
HP/V/RPM			–																								
WEIGHT			–																								
MANUFACTURE	WORTHINGTON		WORTHINGTON																								
MODEL	25RS11012		ROLLAIR 40–100																								
VENDOR			–																								



NOTE
2
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	10/13	JE	AS BUILTS
2	01/14/13	JE	CONTROL UPGRADE DESIGN
1	3/13/09	LVN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC

OXY

GLENN SPRINGS HOLDINGS INC
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
TREATMENT FACILITY

DRAWN	SCALE	APPROVED	DRAWING NUMBER	REV
ZM	NONE		9954–EF–07	3
DATE 7–12–01	CHK'D –	PROJ. NO. 9954		

09954–00(027)EF–BU007 NOV 25/2013

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	HOT WATER TANK																						
DESCRIPTION: MATERIAL																							
SIZE																							
CAPACITY																							
TEMP./PRESS																							
HP/V/RPM																							
WEIGHT																							
MANUFACTURE																							
MODEL																							
VENDOR																							

CARBON BEDS
SHEET 4
2"–CU
PI 111
GA–544
FQI 545
BA–542
GA–343
4x3/4
BA–546
BA–547
PI 114
PSV 549
BA–550
CH–551
BA–548
BA–552
TRENCH
BA–541
CH–540
GA–539
BFP 536
CH–534
GA–535
GA–537
GA–538
TO ATMOSPHERE
GA–434
BA–433
SINK
FUME HOOD SINK
3"
BA–167
BA–162
3"x1"
4"x3"
TRENCH
SHEET 3
3/4"–CS
GA–513
GA–512
CH–511
GA–510
GA–515
L.P. DRAIN
SAFETY SHOWER SS #1
DRAIN
HOSE STATION
3/4"–CS
BA–525
GA–524
2"–CU
GA–526
BFP 530
GA–527
CH–528
BA–529
BA–531
GA–532
HOSE STATION
SAFETY SHOWER SS #2
DRAIN
GA–504
GA–502
CITY WATER
GA–500
METER
GA–503
GA–501
CH–505
GA–506
CH–507
CH–508
GA–509
CS
CU
2"–CS
OUTSIDE
INSIDE BLDG
GA–553
1
REST ROOM
1"
1"
GA–517
GA–516
AIR COMPR
SHEET 7

NOTE 2
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
3	10/13	JE	AS BUILTS
2	01/14/13	JE	CONTROL UPGRADE DESIGN
1	3/13/09	LVN	UPDATED INSTR/EQUIP/VALVE NUMBERS & EQUIP DESC

CONESTOGA-ROVERS & ASSOCIATES

OXY

GLENN SPRINGS HOLDINGS INC
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
TREATMENT FACILITY

DRAWN	LVN	SCALE	NONE	APPROVED		DRAWING NUMBER	REV
DATE	7-12-01	CHK'D	–	PROJ. NO.	9954	9954–EF–08	3

09954–00(027)EF–BU008 NOV 25/2013

PLANT ID.	P-201 (1)	P-202 (2)	P-203 (3)	P-204 (4)	– (5)	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
NAME	WET WELL #1 PUMP	WET WELL #2 PUMP	WET WELL #3 PUMP	WET WELL #4 PUMP	COMPOSITE SAMPLER																		
DESCRIPTION: MATERIAL	–	–	–	–	–																		
SIZE	–	–	–	–	–																		
CAPACITY	10 GPM @ 100'	10 GPM @ 100'	10 GPM @ 100'	10 GPM @ 100'	–																		
TEMP/PRESS	–	–	–	–	–																		
HP/V/RPM	.5HP/460V/	.5HP/460V/	.5HP/460V/	.5HP/460V/	–																		
WEIGHT	–	–	–	–	–																		
MANUFACTURE	–	–	–	–	–																		
MODEL	–	–	–	–	XN-5																		
VENDOR	–	–	–	–	–																		

PC3
SHEET 1

DOUBLE WALL

UC MAIN LAH 3 — UC 102 — LSH 3 — NC

CLEANOUT & LEAK DETECTION MANHOLE #10 AT LOVE CANAL

DOUBLE WALL

UC MAIN LAH 2 — UC 102 — LSH 2 — NC

CLEANOUT & LEAK DETECTION MANHOLE #CO-9

DOUBLE WALL

UC MAIN LAH 1 — UC 102 — LSH 1 — NC

CLEANOUT & LEAK DETECTION MANHOLE #CO-8

DOUBLE WALL

UC MAIN LAH 5 — UC 102 — LSH 5 — NC

SAMPLE PIT

SS HDPE — 5 — FE 5 — HDPE SS — FIT 5 — UC 102 — BQ FI 5 FAL FR FDA — UC MAIN

CLEANOUT MANHOLE #CO-1

CLEANOUT MANHOLE #CO-2

CLEANOUT MANHOLE #CO-3

CLEANOUT MANHOLE #CO-4

YSH 102 — UC 102 — UC MAIN YAH 102
INTRUSION

BQ LIC 4 LAHH LR LALL — UC MAIN — UC 102 — LT 4 — FQI 4 — BQ FI 4 FAL FR FDA — UC MAIN

CLEANOUT MANHOLE #CO-7

BQ LIC 3 LAHH LR LALL — UC MAIN — UC 102 — LT 3 — FQI 3 — BQ FI 3 FAL FR FDA — UC MAIN

HDPE SS 2" — SS HDPE 2"

CLEANOUT MANHOLE #CO-6

CLEANOUT MANHOLE #CO-5

BQ LIC 2 LAHH LR LALL — UC MAIN — UC 102 — LIT 2 — LE 2

BQ LIC 1 LAHH LR LALL — UC MAIN — UC 102 — LT 1 — FQI 1 — BQ FI 1 FAL FR FDA — UC MAIN

2" — 2"

HDPE 304SS 1" 1" — FIT 4 — PI 4 — FE 4 — YA KI YIC 4 ST/SP JAH 4 — UC MTU — UC 102 — YS 4 RUN — HS 4 HOA — JSH 4 OVLD — PL 4 G — 4 — 21.7 FT
WET WELL #4

HDPE 304SS 1" 1" — FIT 3 — PI 3 — FE 3 — YA KI YIC 3 ST/SP JAH 3 — UC MTU — UC 102 — YS 3 RUN — HS 3 HOA — JSH 3 OVLD — PL 3 G — 3 — 21.7 FT
WET WELL #3

HDPE 304SS 1" 1" — FIT 2 — PI 2 — FE 2 — YA KI YIC 2 ST/SP JAH 2 — UC MTU — UC 102 — YS 2 RUN — HS 2 HOA — JSH 2 OVLD — PL 2 G — 2 — 21.7 FT
WET WELL #2

HDPE 304SS 1" 1" — FIT 1 — PI 1 — FE 1 — YA KI YIC 1 ST/SP JAH 1 — UC MTU — UC 102 — YS 1 RUN — HS 1 HOA — JSH 1 OVLD — PL 1 G — 1 — 21.7 FT
WET WELL #1

NOTE
FOR INTERLOCK DESCRIPTIONS REFERENCE:
- LOVE CANAL FUNCTIONAL PROCESS DESCRIPTION
- LOVE CANAL OPERATIONS AND MAINTANANCE MANUAL

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
2	10/13	JJE	AS BUILTS
1	01/14/13	JJE	CONTROL UPDRADE DESIGN

OXY

GLENN SPRINGS HOLDINGS INC
LOVE CANAL TREATMENT FACILITY
PIPING AND INSTRUMENTATION DIAGRAM
102ND STREET

DRAWN	SCALE	APPROVED	DRAWING NUMBER	REV
LVN	NONE		9954-EF-09	2
DATE 01-14-13	CHK'D –	PROJ. NO. 9954		

09954-00(027)EF-BU009 NOV 25/2013

MH-7
(PC1)

DRAIN LINES
EAST SIDE

P-201

MH-8
(PC2)

DRAIN LINES
WEST &
SOUTH SIDES

P-203

PUMP CHAMBER #2

SOUTH SECTOR COLLECTION
SYSTEM STORAGE TANK
LC-201

#CO-10

#CO-9

#CO-8

SAMPLE PIT

WET WELL 1

WET WELL 2

WET WELL 3

WET WELL 4

P-301

P-302

P-303

P-304

PUMP CHAMBER #3

P-205A

P-205B

FLOW CHAMBER

RAW WATER
PF-02

PUMP CHAMBER 3A

P-213A

P-213B

STORAGE TANK (NORTH)
LC-211

DCF COLL.
SYSTEM

DCF PUMP CHAMBER 3 (MH-6B)

P-222

MH-7

UNDERGROUND STORAGE TANK
& DCF PUMP CHAMBER 4

P-221

MH-8

MH-9

PUMP CHAMBER 1A

P-211A

P-212B

DRAIN LINES
EAST SIDE

PUMP CHAMBER 2A

P-212A

P-212B

DRAIN LINES
WEST &
NORTH SIDES

DRUM BARN SUMP

DRUM BARN
TRENCH

DRUM BARN
SINK

P-230A

P-230B

CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
1	10/13	JE	AS BUILTS

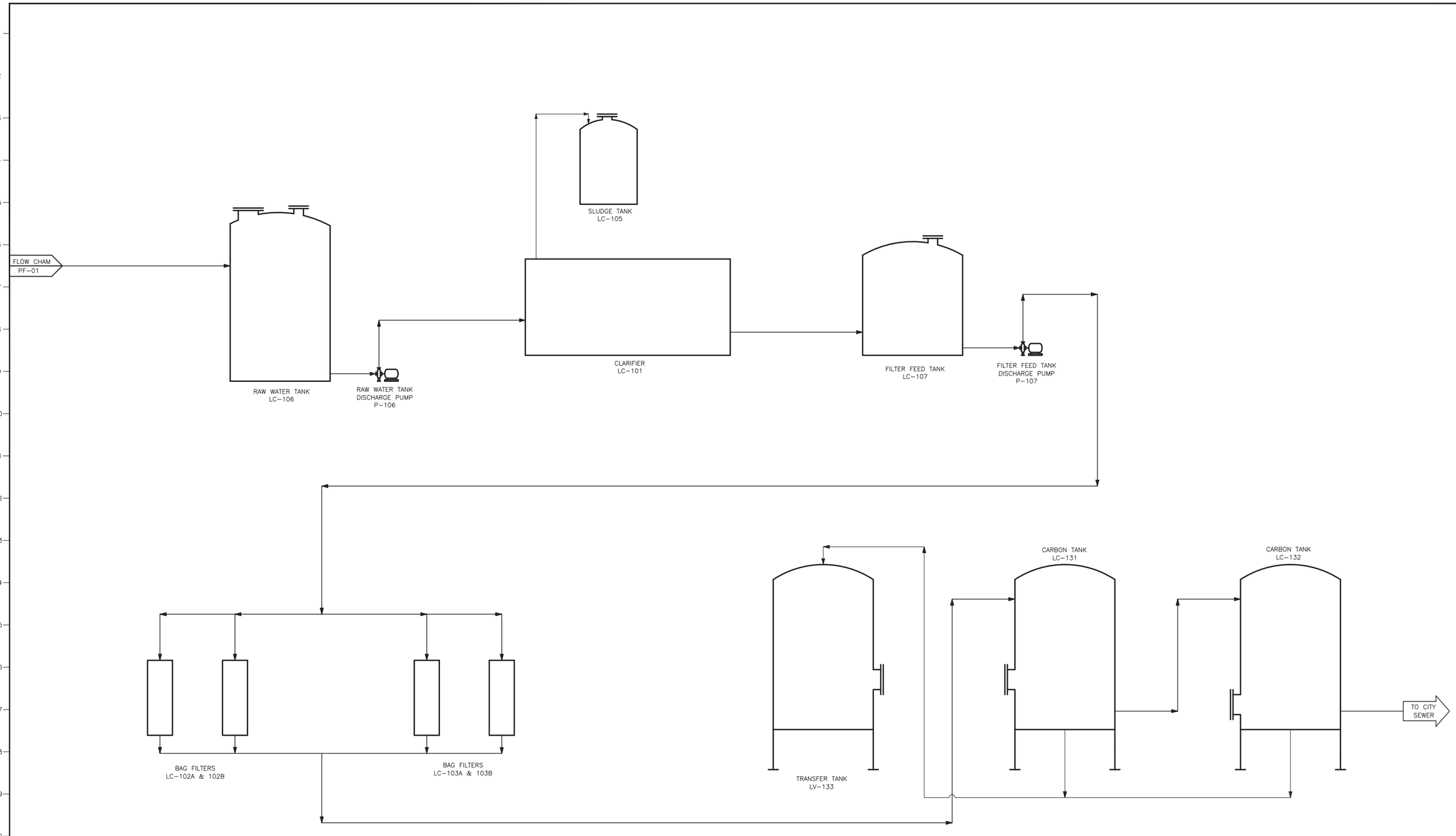
OXY

GLENN SPRING HOLDINGS INC.
LOVE CANAL TREATMENT FACILITY

PROCESS FLOW DIAGRAM
COLLECTION SYSTEM

DRAWN	LVN	SCALE	NONE	APPROVED	DRAWING NUMBER	REV
DATE	10/13	CHK'D	JE	PROJ. NO. 9954	9954-PF-01	1

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



CONESTOGA-ROVERS & ASSOCIATES

REV. NO.	REV. DATE	CHK'D BY	DESCRIPTION
1	10/13	JE	AS BUILTS

GLENN SPRING HOLDINGS INC.
LOVE CANAL TREATMENT FACILITY

PROCESS FLOW DIAGRAM
TREATMENT FACILITY

DRAWN	LVN	SCALE	NONE	APPROVED		DRAWING NUMBER	REV
DATE	10/13	CHK'D	JE	PROJ. NO.	9954	9954-PF-02	1

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

Appendix B

Operation Setpoints

APPENDIX B

LOVE CANAL OPERATION SETPOINTS

Pump ON/OFF Levels

Pump	*State*	*Level*
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	3.7 ft. 2.7 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	2.8 ft. 1.8 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. 1.5 ft.
PC1 Pump (Permissive from PC3)	ON - REMOTE AUTO OFF - REMOTE AUTO OFF - REMOTE MANUAL	6.0 ft. 7.0 ft. 8.0 ft.
PC2 Pump (Permissive from PC2)	ON OFF	5.0 ft. 1.5 ft.
PC2 Pump (Permissive from PC3)	ON - REMOTE AUTO OFF - REMOTE AUTO OFF - REMOTE MANUAL	6.0 ft. 7.0 ft. 8.0 ft.
PC1A Pumps A and B (Permissive from PC1A)	ON OFF	2.5 ft. 1.5 ft.
PC1A Pumps A and B (Permissive from PC3A)	ON - REMOTE AUTO OFF - REMOTE AUTO OFF- REMOTE MANUAL	6.0 ft. 7.0 ft. 8.0 ft.
PC2A Pumps A and B (Permissive from PC2A)	ON OFF	3.8 ft. 1.8 ft.
PC2A Pumps A and B (Permissive from PC3A)	ON - REMOTE AUTO OFF - REMOTE AUTO OFF - REMOTE MANUAL	6.0 ft. 7.0 ft. 8.0 ft.

* Cannot be set by operator through the HMI.

Pump	*State*	*Level*
102nd Street Well Pump #1	ON	7.8 ft.
(Permissive from Wetwell #1)	OFF	7.6 ft.
102nd Street Well Pump #2	ON	8.2 ft.
(Permissive from Wetwell #2)	OFF	8.0 ft.
102nd Street Well Pump #3	ON	7.6 ft.
(Permissive from Wetwell #3)	OFF	7.4 ft.
102nd Street Well Pump #4	ON	8.0 ft.
(Permissive from Wetwell #4)	OFF	7.8 ft.
102nd Street Well Pumps #1, 2, 3, and 4	ON	5.8 ft.
(Permissive from PC3)	OFF	6.8 ft.
DCF3	ON - REMOTE	DCF4 NO HI-HI ALARM
(Permissive from DCF4)	OFF - REMOTE	DCF4 HI-HI ALARM
DCF4	OFF - REMOTE MANUAL	8.0 ft.
(Permissive from PC3A)		

Appendix C

Niagara Falls Water Board Discharge Permit No. 44 and City of Niagara Falls Letter to Cease Discharge

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 9th day of, January 2015
To Expire this 9th day of, January 2020

for

Paul J. Drof
Executive Director of Niagara Falls Water Board

Signed this 31TH day of December, 2014

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 12/24/14
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 12/24/14
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.

6. 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 exceedence.

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 <u>not</u> 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 <u>not</u> 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. The results of the daily flow readings will be compiled and submitted in a Monthly Flow Report by the 15th day of the following month.

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 if 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	Monthly
#1	Total Suspended Solids	Quarterly
#1	Volatile - Priority Pollutants	Quarterly
#1	Acid Extractables - Priority Pollutants	Quarterly
#1	Base/Neutral - Priority Pollutants	Quarterly
#1	Total Phenols	Quarterly

Discharge Monitoring Compounds

Volatile	Base/Neutrals Extractables
Benzene	Dimethyl Phthalate
Carbon Tetrachloride	Butyl Benz Phthalate
Chlorodibromethane	Di-N-Butyl Phthalate
Monochlorobenzene	Di-N-Octyl Phthalate
Dichlorobromethane	Diethyl Phthalate
Chloroform	Nitrosodiphenylamine
Dichloroethylenes	Dichlorobenzenes
Bromoform	Dichlorotoluene
Dichloropropylenes	Acenaphthlene
Ethylbenzene	Fluoranthene
Tetrachloroethanes	Chrysene
Tetrachloroethylene	Napthalene
Toluene	Benzo (a) Anthracene
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

City of Niagara Falls, New York

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

March 9, 1998

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

Dear Mr. Tubridy:

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

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

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

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel

Albert C. Zaepfel
Industrial Monitoring Coordinator

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

7.DOC

Appendix D

Sample HMI Screens

REMOTE STOP
NOT ACTIVE

LOVE CANAL - GROUND WATER TREATMENT OVERVIEW

2:58:01 PM 04/11/2014

Step 1 **RESET ALARMS** — Global Alarm Reset

Step 2 **START GWT** — SEQ ENABLED

FROM PUMP CHAMBER 3

FROM PUMP CHAMBER 3A

LAHH-104
NORMAL

Flow Chamber

FIT-106
-0.3 gpm
FAL-106
NORMAL

Raw Water Tank

LIT-106
45.9 %
3.2 ft
LAHH-106A
NORMAL
LAHH-106
NORMAL
LALL-106
NORMAL

HS-REMOTE
SI-106
16.6 Hz
27.7 %

Raw Water Tank Permissives	
Remote Auto OFF Setpt	40 %
Remote Auto ON Setpt	50 %

Filter Feed Tank Permissives	
Remote Auto OFF Setpt	70 %
Remote Auto ON Setpt	60 %

Clarifier

Filter Feed Tank

LIT-107
49.8 %
3.3 ft
LAHH-107A
NORMAL
LAHH-107
NORMAL
LALL-107
NORMAL

HS-REMOTE
SI-107
39.7 Hz
66.2 %

Filter Feed Tank Permissives	
Remote Auto OFF Setpt	40 %
Remote Auto ON Setpt	50 %

TI-100
61.6 °F
TAL-100
NORMAL

LAH-113
NORMAL

Building Trench

M
FCV-101

PI-110
-0.2 psig

LIT-105
-0.1 %
0.0 ft
LAHH-105
NORMAL
LAH-105
NORMAL

Sludge Tank

F102
PDT-102
5.0 psi
PDAH-102
NORMAL

F103
PDT-103
4.7 psi
PDAH-103
NORMAL

Vessel 1

Vessel 2

Liquid Phase Carbon Vessels

M
FCV-107

TO SEWER

FIT-107
82.1 gpm
FAL-107
NORMAL
FALL-107
NORMAL

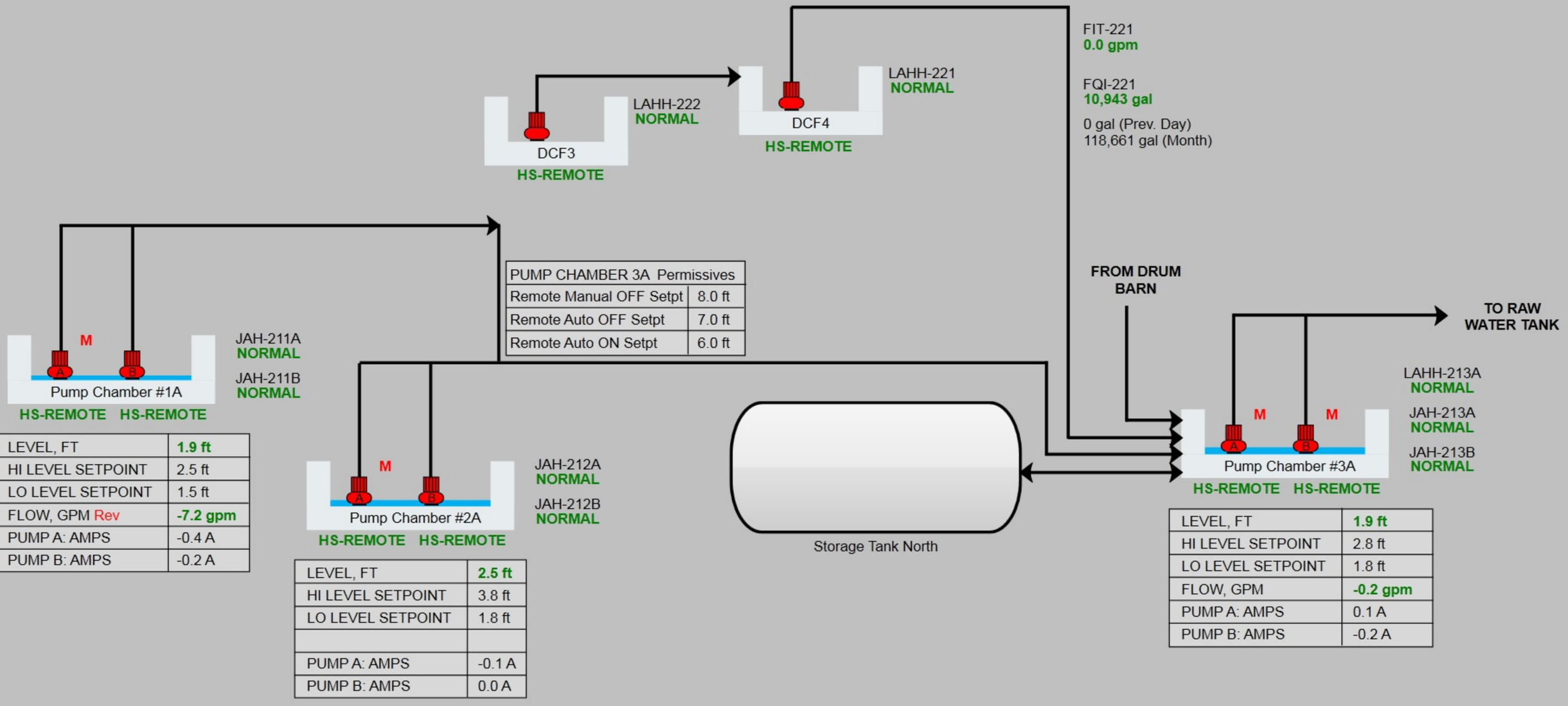
FQI-107
56,947 gal
75,258 gal (Prev. Day)
321,308 gal (Month)

REMOTE STOP
NOT ACTIVE

LOVE CANAL - NORTH SECTION OVERVIEW

Global Alarm Reset

1:36:51 PM 04/11/2014



REMOTE STOP
NOT ACTIVE

LOVE CANAL - PROCESS OVERVIEW

2:56:24 PM 04/11/2014

Step 1 **RESET ALARMS** — Global Alarm Reset

Step 2 **START GWT** — SEQ ENABLED

102nd STREET
- WW #1 — Auto
- WW #2 — Auto
- WW #3 — Auto
- WW #4 — Auto

SOUTH SECTOR
- PC1 — Auto
- PC2 — Auto

NORTH SECTOR
- PC1A N — Manual
- PC1A S — Auto
- PC2A N — Manual
- PC2A S — Auto

DRUM BARN SUMP

LAHH-205A NORMAL
FIT-103 12.1 gpm
LIT-205 3.1 ft
Pump Chamber #3 (M, M; A, B)
HS-REMOTE HS-REMOTE

LAHH-213A NORMAL
FIT-105 -0.2 gpm
LIT-213 2.0 ft
Pump Chamber #3A (M, M; A, B)
HS-REMOTE HS-REMOTE

FIT-221 0.0 gpm
LAHH-221 NORMAL
LAHH-222 NORMAL
DCF4 HS-REMOTE
DCF3 HS-REMOTE

FIT-106 -1.7 gpm
FAL-106 NORMAL
LAHH-104 NORMAL

Raw Water Tank
LIT-106 3.4 ft 48.8 %
LAHH-106A NORMAL
LAHH-106 NORMAL
LALL-106 NORMAL

HS-REMOTE
SI-106 16.6 Hz 27.7 %

Clarifier

Filter Feed Tank
LIT-107 3.3 ft 50.0 %
LAHH-107A NORMAL
LAHH-107 NORMAL
LALL-107 NORMAL

HS-REMOTE
SI-107 39.7 Hz 66.2 %

F102
PDT-102 4.9 psi
PDAH-102 NORMAL

F103
PDT-103 4.6 psi
PDAH-103 NORMAL

Vessel 2
Vessel 2
Liquid Phase Carbon Vessels

TO SEWER
FIT-107 83.6 gpm
FQI-107 56,816 Daily Gallons
FAL-107 NORMAL
FALL-107 NORMAL

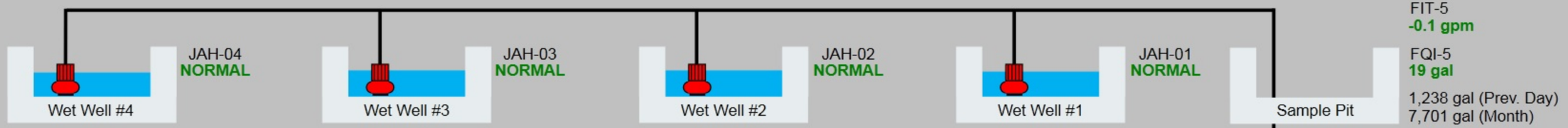
Process Overview (F1)	Well Summary (F2)	South Section (F3)	North Section (F4)	GWT Overview (F5)	(F6)	(F7)	(F8)	(F9)	(F10)	Motor Runtime (F11)	Interlock Summary (F12)	Drawings & Manuals (CRTL-1)	Trends (CRTL-2)	PLC System (CTRL-3)	Alarm Summary (CTRL-4)	Alarm History (CTRL-5)	EXIT HMI (CTRL-6)

REMOTE STOP NOT ACTIVE

LOVE CANAL - SOUTH SECTION & 102nd STREET OVERVIEW

Global Alarm Reset

2:55:06 PM 04/11/2014



LEVEL, MSL	561.2 MSL
LEVEL, FT	7.0 ft
HI LEVEL SETPOINT	7.8 ft
LO LEVEL SETPOINT	7.6 ft
FLOW, GPM	0.0 gpm

LEVEL, MSL	561.4 MSL
LEVEL, FT	7.6 ft
HI LEVEL SETPOINT	8.2 ft
LO LEVEL SETPOINT	8.0 ft
FLOW, GPM BQ	-1.9 gpm

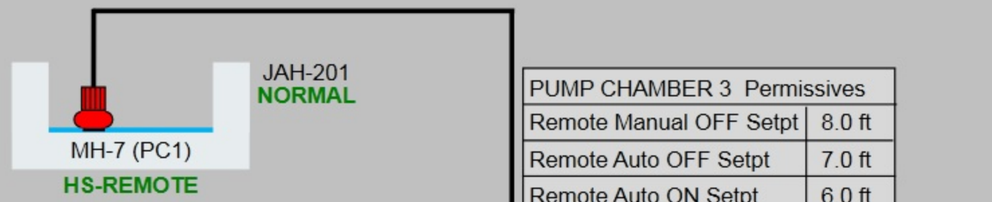
LEVEL, MSL	561.3 MSL
LEVEL, FT	7.5 ft
HI LEVEL SETPOINT	7.6 ft
LO LEVEL SETPOINT	7.4 ft
FLOW, GPM BQ	19.6 gpm

LEVEL, MSL	561.2 MSL
LEVEL, FT	7.2 ft
HI LEVEL SETPOINT	8.0 ft
LO LEVEL SETPOINT	7.8 ft
FLOW, GPM	0.0 gpm

PUMP CHAMBER 3 Permissives	
Remote Auto OFF Setpt	6.8 ft
Remote Auto ON Setpt	5.8 ft

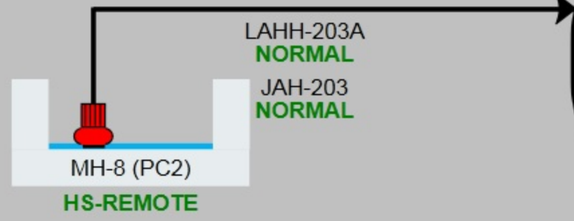
LEAK DETECTION

- SAMPLE PIT
- MANHOLE #8
- MANHOLE #9
- MANHOLE #10

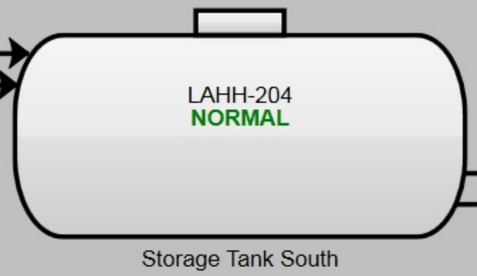


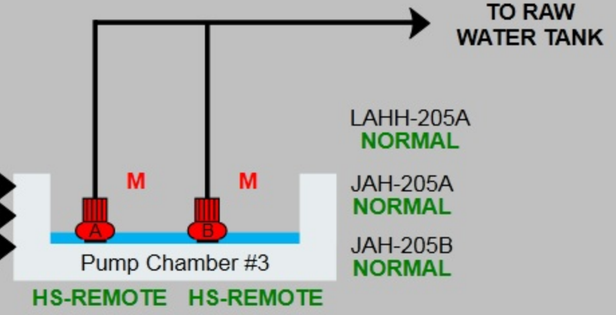
PUMP CHAMBER 3 Permissives	
Remote Manual OFF Setpt	8.0 ft
Remote Auto OFF Setpt	7.0 ft
Remote Auto ON Setpt	6.0 ft

LEVEL, FT	1.7 ft
HI LEVEL SETPOINT	2.5 ft
LO LEVEL SETPOINT	1.5 ft
FLOW, GPM	-0.2 gpm
PUMP: AMPS	-0.2 A



LEVEL, FT	1.9 ft
HI LEVEL SETPOINT	5.0 ft
LO LEVEL SETPOINT	1.5 ft
FLOW, GPM	-0.4 gpm
PUMP: AMPS	-0.1 A





LEVEL, FT	2.8 ft
HI LEVEL SETPOINT	3.7 ft
LO LEVEL SETPOINT	2.7 ft
FLOW, GPM	17.4 gpm
PUMP A: AMPS	0.0 A
PUMP B: AMPS	0.2 A

Appendix E

List of Alarms

APPENDIX E

LOVE CANAL LIST OF ALARMS

No.	*Tag*	*Description*
1.	UA-100A	Controller Power Up In Run Mode
2.	UA-100B	MTU-100 Controller Battery Bad Alarm
3.	UA-100C	MTU-100 PLC Controller Major Fault Alarm
4.	UA-100D	PLC System Hardware Problem Alarm
5.	YA-PB-100	Love Canal Process Stop Push Button Active
6.	JAL-PS3	MTU-100 Control Panel 24VDC Power Supply 3 Fault Alarm
7.	YA-ETH-A	MTU-100 Ethernet Switch-A Port Communication Alarm
8.	YA-ETH-B	MTU-100 Ethernet Switch-B Port Communication Alarm
9.	YA-ETH-C	RTU-3 Ethernet Switch Port Communication Alarm
10.	YA-ETH-D	RTU-102 Ethernet Switch Port Communication Alarm
11.	BQ-100-20	MTU-100 Enclosure Analog Input 2-0 Bad Quality (FIT-107)
12.	BQ-100-21	MTU-100 Enclosure Analog Input 2-1Bad Quality (LIT-105)
13.	BQ-100-22	MTU-100 Enclosure Analog Input 2-2 Bad Quality (LIT-106)
14.	BQ-100-23	MTU-100 Enclosure Analog Input 2-3 Bad Quality (LIT-107)
15.	BQ-100-24	MTU-100 Enclosure Analog Input 2-4 Bad Quality (FIT-106)
16.	BQ-100-30	MTU-100 Enclosure Analog Input 3-0 Bad Quality (SI-106)
17.	BQ-100-31	MTU-100 Enclosure Analog Input 3-1 Bad Quality (SI-107)
18.	BQ-100-34	MTU-100 Enclosure Analog Input 3-4 Bad Quality (PT-110)
19.	BQ-100-35	MTU-100 Enclosure Analog Input 3-5 Bad Quality (PDT-102)
20.	BQ-100-40	MTU-100 Enclosure Analog Input 4-0 Bad Quality (PDT-103)
21.	BQ-100-41	MTU-100 Enclosure Analog Input 4-1 Bad Quality (TIT-100)
22.	BQ-100-42	MTU-100 Enclosure Analog Input 4-2 Bad Quality (ZSHL-107)
23.	BQ-100-50	MTU-100 Enclosure Analog Output 5-0 Bad Quality (SC-106)
24.	BQ-100-51	MTU-100 Enclosure Analog Output 5-1 Bad Quality (SC-107)
25.	BQ-100-53	MTU-100 Enclosure Analog Output 5-3 Bad Quality (FCV106)
26.	FAL-106	Raw Water Tank Influent Water Flow Alarm Low
27.	FAL-107	Treatment Facility Effluent Water Flow Alarm Low
28.	FALL-107	Treatment Facility Effluent Water Flow Alarm Low Low
29.	FDA-106	Raw Water Tank Influent Water Flow Reverse Alarm

No.	*Tag*	*Description*
30.	HA-106	Raw Water Tank Discharge Pump HOA NOT in Auto Alarm
31.	HA-107	Filter Feed Tank Discharge Pump HOA NOT in Auto Alarm
32.	LAH-105	Sludge Tank Level Alarm High
33.	LAH-113	Treatment Facility Trench Level Alarm High
34.	LAHH-105	Sludge Tank Level Alarm High High
35.	LAHH-106A	Raw Water Tank Level Alarm High High
36.	LAHH-106	Raw Water Tank Water Level Alarm High High
37.	LAHH-107A	Filter Feed Tank Level Alarm High High
38.	LAHH-107	Filter Feed Tank Water Level Alarm High High
39.	LALL-106	Raw Water Tank Water Level Alarm Low Low
40.	LALL-107	Filter Feed Tank Water Level Alarm Low Low
41.	PDAH-102	Bag Filters No.1 (North) Pressure Differential Alarm High
42.	PDAH-103	Bag Filters No.2 (South) Pressure Differential Alarm High
43.	TAL-100	Treatment Facility Building Temperature Alarm Low
44.	YA-106	Raw Water Tank Discharge Pump Fault Alarm - Logic
45.	YA-107	Filter Feed Tank Discharge Pump Fault Alarm - Logic
46.	YAH-106	Raw Water Tank Discharge Pump Fault Alarm - VFD
47.	YAH-107	Filter Feed Tank Discharge Pump Fault Alarm - VFD
48.	ZA-107	Treatment Facility Effluent Water Flow Control Valve Fail Alarm
49.	BQ-100-25	MTU-100 Enclosure Analog Input 2-5 Bad Quality (FIT-221)
50.	FAL-221	DCF Pump Chamber No.4 Effluent Water Flow Alarm Low
51.	FDA-221	DCF Pump Chamber No.4 Effluent Water Flow Reverse Alarm
52.	HA-221	DCF Pump Chamber No.4 HOA NOT in Auto Alarm
53.	HA-222	DCF Pump Chamber No.3 HOA NOT in Auto Alarm
54.	LAHH-221	DCF Pump Chamber No.4 Level Alarm High High
55.	LAHH-222	DCF Pump Chamber No.3 Level Alarm High High
56.	YA-221	DCF Pump Chamber No.4 Pump Fault Alarm - Logic
57.	YA-222	DCF Pump Chamber No.3 Pump Fault Alarm - Logic
58.	BQ-201-30	RTU-1 Enclosure Analog Input 3-0 Bad Quality (IT-201)
59.	BQ-201-31	RTU-1 Enclosure Analog Input 3-1Bad Quality (LIT-201)
60.	HA-201	Manhole No.7 Pump HOA NOT in Auto Alarm
61.	IAH-201	Manhole No.7 Pump Amps Alarm High

No.	*Tag*	*Description*
62.	JAH-201	Manhole No.7 Pump Overload Alarm
63.	LAHH-201	Manhole No.7 Water Level Alarm High High
64.	LALL-201	Manhole No.7 Water Level Alarm Low Low
65.	TAL-201	RTU-1 Enclosure Temperature Alarm Low
66.	YA-201	Manhole No.7 Pump Fault Alarm - Logic
67.	YAH-201	RTU-1 Enclosure Intrusion Alarm
68.	YAH-201-30	RTU-1 Enclosure Analog Input 3-0 Surge Alarm (IT-201)
69.	YAH-201-31	RTU-1 Enclosure Analog Input 3-1 Surge Alarm (LIT-201)
70.	YAH-201-120	RTU-1 Enclosure 120VAC Surge Alarm
71.	BQ-203-30	RTU-2 Enclosure Analog Input 3-0 Bad Quality (IT-203)
72.	BQ-203-31	RTU-2 Enclosure Analog Input 3-1 Bad Quality (LIT-203)
73.	BQ-203-33	RTU-2 Enclosure Analog Input 3-3 Bad Quality (FIT-100)
74.	BQ-203-40	RTU-2 Enclosure Analog Input 4-0 Bad Quality (FIT-101)
75.	FAL-100	Manhole No.8 Effluent Water Flow Alarm Low
76.	FAL-101	Manhole No.7 Effluent Water Flow Alarm Low
77.	FDA-100	Manhole No.8 Effluent Water Flow Reverse Alarm
78.	FDA-101	Manhole No.7 Effluent Water Flow Reverse Alarm
79.	HA-203	Manhole No.8 Pump HOA NOT in Auto Alarm
80.	IAH-203	Manhole No.8 Pump Amps Alarm High
81.	JAH-203	Manhole No.8 Pump Overload Alarm
82.	LAHH-203A	Pump Chamber No.2 Level Alarm High High
83.	LAHH-203	Manhole No.8 Water Level Alarm High High
84.	LALL-203	Manhole No.8 Water Level Alarm Low Low
85.	TAL-203	RTU-2 Enclosure Temperature Alarm Low
86.	YA-203	Manhole No.8 Pump Fault Alarm - Logic
87.	YAH-203	RTU-2 Enclosure Intrusion Alarm
88.	YAH-203-30	RTU-2 Enclosure Analog Input 3-0 Surge Alarm (IT-203)
89.	YAH-203-31	RTU-2 Enclosure Analog Input 3-1 Surge Alarm (LIT-203)
90.	YAH-203-33	RTU-2 Enclosure Analog Input 3-3 Surge Alarm (FIT-100)
91.	YAH-203-40	RTU-2 Enclosure Analog Input 4-0 Surge Alarm (FIT-101)
92.	YAH-203-120	RTU-2 Enclosure 120VAC Surge Alarm
93.	BQ-205-30	RTU-3 Enclosure Analog Input 3-0 Bad Quality (IT-205A)

No.	*Tag*	*Description*
94.	BQ-205-31	RTU-3 Enclosure Analog Input 3-1 Bad Quality (LIT-205)
95.	BQ-205-32	RTU-3 Enclosure Analog Input 3-2 Bad Quality (IT-205B)
96.	HA-205A	Pump Chamber No.3 Pump-A HOA NOT in Auto Alarm
97.	HA-205B	Pump Chamber No.3 Pump-B HOA NOT in Auto Alarm
98.	IAH-205A	Pump Chamber No.3 Pump-A Amps Alarm High
99.	IAH-205B	Pump Chamber No.3 Pump-B Amps Alarm High
100.	JAH-205A	Pump Chamber No.3 Pump-A Overload Alarm
101.	JAH-205B	Pump Chamber No.3 Pump-B Overload Alarm
102.	LAHH-204	Storage Tank (South) Level Alarm High High
103.	LAHH-205A	Pump Chamber No.3 Level Alarm High High
104.	LAHH-205	Pump Chamber No.3 Water Level Alarm High High
105.	LALL-205	Pump Chamber No.3 Water Level Alarm Low Low
106.	TAL-205	RTU-3 Enclosure Temperature Alarm Low
107.	YA-205A	Pump Chamber No.3 Pump-A Fault Alarm - Logic
108.	YA-205B	Pump Chamber No.3 Pump-B Fault Alarm - Logic
109.	YAH-205	RTU-3 Enclosure Intrusion Alarm
110.	YAH-205-30	RTU-3 Enclosure Analog Input 3-0 Surge Alarm (IT-205A)
111.	YAH-205-31	RTU-3 Enclosure Analog Input 3-1 Surge Alarm (LIT-205)
112.	YAH-205-32	RTU-3 Enclosure Analog Input 3-2 Surge Alarm (IT-205B)
113.	YAH-205-120	RTU-3 Enclosure 120VAC Surge Alarm
114.	BQ-211-30	RTU-1A Enclosure Analog Input 3-0 Bad Quality (IT-211A)
115.	BQ-211-31	RTU-1A Enclosure Analog Input 3-1 Bad Quality (LIT-211)
116.	BQ-211-32	RTU-1A Enclosure Analog Input 3-2 Bad Quality (IT-211B)
117.	BQ-211-33	RTU-1A Enclosure Analog Input 3-3 Bad Quality (FIT-104)
118.	FAL-104	Pump Chamber No.1A Effluent Water Flow Alarm Low
119.	FDA-104	Pump Chamber No.1A Effluent Water Flow Reverse Alarm
120.	HA-211A	Pump Chamber No.1A Pump-A HOA NOT in Auto Alarm
121.	HA-211B	Pump Chamber No.1A Pump-B HOA NOT in Auto Alarm
122.	IAH-211A	Pump Chamber No.1A Pump-A Amps Alarm High
123.	IAH-211B	Pump Chamber No.1A Pump-B Amps Alarm High
124.	JAH-211A	Pump Chamber No.1A Pump-A Overload Alarm
125.	JAH-211B	Pump Chamber No.1A Pump-B Overload Alarm

No.	*Tag*	*Description*
126.	LAHH-211	Pump Chamber No.1A Water Level Alarm High High
127.	LALL-211	Pump Chamber No.1A Water Level Alarm Low Low
128.	TAL-211	RTU-1A Enclosure Temperature Alarm Low
129.	YA-211A	Pump Chamber No.1A Pump-A Fault Alarm - Logic
130.	YA-211B	Pump Chamber No.1A Pump-B Fault Alarm - Logic
131.	YAH-211	RTU-1A Enclosure Intrusion Alarm
132.	YAH-211-30	RTU-1A Enclosure Analog Input 3-0 Surge Alarm (IT-211A)
133.	YAH-211-31	RTU-1A Enclosure Analog Input 3-1 Surge Alarm (LIT-211)
134.	YAH-211-32	RTU-1A Enclosure Analog Input 3-2 Surge Alarm (IT-211B)
135.	YAH-211-33	RTU-1A Enclosure Analog Input 3-3 Surge Alarm (FIT-104)
136.	YAH-211-120	RTU-1A Enclosure 120VAC Surge Alarm
137.	BQ-212-30	RTU-2A Enclosure Analog Input 3-0 Bad Quality (IT-212A)
138.	BQ-212-31	RTU-2A Enclosure Analog Input 3-1 Bad Quality (LIT-212)
139.	BQ-212-32	RTU-2A Enclosure Analog Input 3-2 Bad Quality (IT-212B)
140.	HA-212A	Pump Chamber No.2A Pump-A HOA NOT in Auto Alarm
141.	HA-212B	Pump Chamber No.2A Pump-B HOA NOT in Auto Alarm
142.	IAH-212A	Pump Chamber No.2A Pump-A Amps Alarm High
143.	IAH-212B	Pump Chamber No.2A Pump-B Amps Alarm High
144.	JAH-212A	Pump Chamber No.2A Pump-A Overload Alarm
145.	JAH-212B	Pump Chamber No.2A Pump-B Overload Alarm
146.	LAHH-212	Pump Chamber No.2A Water Level Alarm High High
147.	LALL-212	Pump Chamber No.2A Water Level Alarm Low Low
148.	TAL-212	RTU-2A Enclosure Temperature Alarm Low
149.	YA-212A	Pump Chamber No.2A Pump-A Fault Alarm - Logic
150.	YA-212B	Pump Chamber No.2A Pump-B Fault Alarm - Logic
151.	YAH-212	RTU-2A Enclosure Intrusion Alarm
152.	YAH-212-30	RTU-2A Enclosure Analog Input 3-0 Surge Alarm (IT-212A)
153.	YAH-212-31	RTU-2A Enclosure Analog Input 3-1 Surge Alarm (LIT-212)
154.	YAH-212-32	RTU-2A Enclosure Analog Input 3-2 Surge Alarm (IT-212B)
155.	YAH-212-120	RTU-2A Enclosure 120VAC Surge Alarm
156.	BQ-213-30	RTU-3A Enclosure Analog Input 3-0 Bad Quality (IT-213A)
157.	BQ-213-31	RTU-3A Enclosure Analog Input 3-1 Bad Quality (LIT-213)

No.	*Tag*	*Description*
158.	BQ-213-32	RTU-3A Enclosure Analog Input 3-2 Bad Quality (IT-213B)
159.	BQ-213-40	RTU-3A Enclosure Analog Input 4-0 Bad Quality (FIT-105)
160.	BQ-213-41	RTU-3A Enclosure Analog Input 4-1 Bad Quality (FIT-103)
161.	FAL-103	Pump Chamber No.3 Effluent Water Flow Alarm Low
162.	FAL-105	Pump Chamber No.3A Effluent Water Flow Alarm Low
163.	FDA-103	Pump Chamber No.3 Effluent Water Flow Reverse Alarm
164.	FDA-105	Pump Chamber No.3A Effluent Water Flow Reverse Alarm
165.	HA-213A	Pump Chamber No.3A Pump-A HOA NOT in Auto Alarm
166.	HA-213B	Pump Chamber No.3A Pump-B HOA NOT in Auto Alarm
167.	IAH-213A	Pump Chamber No.3A Pump-A Amps Alarm High
168.	IAH-213B	Pump Chamber No.3A Pump-B Amps Alarm High
169.	JAH-213A	Pump Chamber No.3A Pump-A Overload Alarm
170.	JAH-213B	Pump Chamber No.3A Pump-B Overload Alarm
171.	LAHH-104	Flow Chamber Level Alarm High High
172.	LAHH-213A	Pump Chamber No.3A Level Alarm High High
173.	LAHH-213	Pump Chamber No.3A Water Level Alarm High High
174.	LALL-213	Pump Chamber No.3A Water Level Alarm Low Low
175.	TAL-213	RTU-3A Enclosure Temperature Alarm Low
176.	YA-213A	Pump Chamber No.3A Pump-A Fault Alarm – Logic
177.	YA-213B	Pump Chamber No.3A Pump-B Fault Alarm – Logic
178.	YAH-213	RTU-3A Enclosure Intrusion Alarm
179.	YAH-213-30	RTU-3A Enclosure Analog Input 3-0 Surge Alarm (IT-213A)
180.	YAH-213-31	RTU-3A Enclosure Analog Input 3-1 Surge Alarm (LIT-213)
181.	YAH-213-32	RTU-3A Enclosure Analog Input 3-2 Surge Alarm (IT-213B)
182.	YAH-213-40	RTU-3A Enclosure Analog Input 4-0 Surge Alarm (FIT-105)
183.	YAH-213-41	RTU-3A Enclosure Analog Input 4-1 Surge Alarm (FIT-103)
184.	YAH-213-120	RTU-3A Enclosure 120VAC Surge Alarm
185.	BQ-102-50	RTU-102 Enclosure Analog Input 5-0 Bad Quality (FIT-1)
186.	BQ-102-51	RTU-102 Enclosure Analog Input 5-1 Bad Quality (FIT-2)
187.	BQ-102-52	RTU-102 Enclosure Analog Input 5-2 Bad Quality (FIT-3)
188.	BQ-102-53	RTU-102 Enclosure Analog Input 5-3 Bad Quality (FIT-4)
189.	BQ-102-60	RTU-102 Enclosure Analog Input 6-0 Bad Quality (LT-1)

No.	*Tag*	*Description*
190.	BQ-102-61	RTU-102 Enclosure Analog Input 6-1 Bad Quality (LT-2)
191.	BQ-102-62	RTU-102 Enclosure Analog Input 6-2 Bad Quality (LT-3)
192.	BQ-102-63	RTU-102 Enclosure Analog Input 6-3 Bad Quality (LT-4)
193.	BQ-102-70	RTU-102 Enclosure Analog Input 7-0 Bad Quality (FIT-5)
194.	FAL-1	Wet Well 1 Effluent Water Flow Alarm Low
195.	FAL-2	Wet Well 2 Effluent Water Flow Alarm Low
196.	FAL-3	Wet Well 3 Effluent Water Flow Alarm Low
197.	FAL-4	Wet Well 4 Effluent Water Flow Alarm Low
198.	FAL-5	Sample Pit Effluent Water Flow Alarm Low
199.	FDA-1	Wet Well 1 Effluent Water Flow Reverse Alarm
200.	FDA-2	Wet Well 2 Effluent Water Flow Reverse Alarm
201.	FDA-3	Wet Well 3 Effluent Water Flow Reverse Alarm
202.	FDA-4	Wet Well 4 Effluent Water Flow Reverse Alarm
203.	FDA-5	Sample Pit Effluent Water Flow Reverse Alarm
204.	JAH-1	Wet Well 1 Pump Overload Alarm
205.	JAH-2	Wet Well 2 Pump Overload Alarm
206.	JAH-3	Wet Well 3 Pump Overload Alarm
207.	JAH-4	Wet Well 4 Pump Overload Alarm
208.	LAH-1	102nd Street Manhole No.8 Level Alarm High
209.	LAH-2	102nd Street Manhole No.9 Level Alarm High
210.	LAH-3	102nd Street Manhole No.10 Level Alarm High
211.	LAH-5	102nd Street Sample Pit Level Alarm High
212.	LAHH-1	Wet Well 1 Water Level Alarm High High
213.	LAHH-2	Wet Well 2 Water Level Alarm High High
214.	LAHH-3	Wet Well 3 Water Level Alarm High High
215.	LAHH-4	Wet Well 4 Water Level Alarm High High
216.	LALL-1	Wet Well 1 Water Level Alarm Low Low
217.	LALL-2	Wet Well 2 Water Level Alarm Low Low
218.	LALL-3	Wet Well 3 Water Level Alarm Low Low
219.	LALL-4	Wet Well 4 Water Level Alarm Low Low
220.	YA-1	Wet Well 1 Pump Fault Alarm – Logic or HOA in Hand
221.	YA-2	Wet Well 2 Pump Fault Alarm – Logic or HOA in Hand

No.	*Tag*	*Description*
222.	YA-3	Wet Well 3 Pump Fault Alarm – Logic or HOA in Hand
223.	YA-4	Wet Well 4 Pump Fault Alarm – Logic or HOA in Hand
224.	YAH-102	RTU-102 Enclosure Intrusion Alarm
225.	YAH-102-50	RTU-102 Enclosure Analog Input 5-0 Surge Alarm (FIT-1)
226.	YAH-102-51	RTU-102 Enclosure Analog Input 5-1 Surge Alarm (FIT-2)
227.	YAH-102-52	RTU-102 Enclosure Analog Input 5-2 Surge Alarm (FIT-3)
228.	YAH-102-53	RTU-102 Enclosure Analog Input 5-3 Surge Alarm (FIT-4)
229.	YAH-102-60	RTU-102 Enclosure Analog Input 6-0 Surge Alarm (LT-1)
230.	YAH-102-61	RTU-102 Enclosure Analog Input 6-1 Surge Alarm (LT-2)
231.	YAH-102-62	RTU-102 Enclosure Analog Input 6-2 Surge Alarm (LT-3)
232.	YAH-102-63	RTU-102 Enclosure Analog Input 6-3 Surge Alarm (LT-4)
233.	YAH-102-70	RTU-102 Enclosure Analog Input 7-0 Surge Alarm (FIT-5)
234.	YAH-102-120	RTU-102 Enclosure 120VAC Surge Alarm

Appendix F

Potential Operating Problems/Troubleshooting

APPENDIX F

LOVE CANAL
POTENTIAL OPERATING PROBLEMS/TROUBLESHOOTING

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

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

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
9. Motor overload tripped or amps high	• The motor to the respective pump is drawing excessive current	• Replace or repair motor and/or pump	Station PC1 Pump 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			Raw Water Tank (LTI-106) Level (Ft), identified as LT-6 on HMI screen
1. High level	• Flow from pump chambers too high • Discharge line plugged or valve shut • Raw Water Feed Pump not running • Instrument malfunction	• Verify, correct • Find plug and clean, or open valve • Electrical or instrument problem, repair • Check instrument	Raw Water Tank BQA
2. Low level	• Tank leak • Raw Water Feed Pump pumping too fast • Instrument malfunction • Feed to tank too low	• Repair • Verify level instruments, VFD • Check instrument • Check flow setpoint (see above)	

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
Raw Water Feed Pump and Filter Feed Pump			
1. High pressure	• Discharge line plugged or valve shut	• Find plug and clean or open valve	
2. Pump not reacting (design flow rate/design head)	• Insufficient NPSH • System head greater than anticipated • Entrained air • Direction of rotation wrong • Impeller too small • Impeller clearance too large • Plugged impeller/suction line • Wet end parts worn	• Recalculate NPSH available/required • Reduce system head • Release air • Reverse 2 of 3 leads (phase) • Replace • Reset clearance • Clean • Repair/replace	
3. No discharge when pump running	• Not primed • Suction line plugged or valve shut • Direction of rotation wrong • Entrained air • Plugged impeller • Damaged pump shaft/impeller	• Repeat priming • Find plug and clean, or open valve • Reverse 2 of 3 leads (phase) • Release air • Clean • Replace	
4. Pump operates for short period, then loses prime	• Insufficient NPSH • Entrained air	• Recalculate NPSH available/required • Check and repair	
5. Excessive noise from wet end	• Cavitation • Abnormal fluid rotation • Impeller rubbing	• Recalculate NPSH available/required • Redesign suction piping • Check/reset clearance and outboard bearing assembly	
6. Excessive noise from power end	• False brinelling • Thrust overload on bearing • Misalignment	• Correct vibration source • Remount bearings • Remount properly	
7. Pump not running	• Bearing damage	• Refer to manufacturer's instructions	

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
	• VFD in manual • Auto mode on VFD needs to be reset	• Press [F2] on VFD to place VFD in AUTO • Turn HOA switch on pump from AUTO to OFF and back to AUTO	
Filter Feed Tank 1. High level 2. Low Level	 • Flow from clarifier too high • Discharge line plugged or valve shut • Filter Feed Pump not running • Instrument malfunction • Bag filters plugged • Carbon vessels plugged • Tank Leak • Filter Feed Pump pumping too fast • Instrument malfunction • Feed to tank too low	 • Verify, correct • Find plug and clean or open valve • Electrical or instrument problem, repair • Check instrument • Replace bag filters • Backwash or change carbon • 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	• Flow from Raw Water Tank too high • Discharge line plugged	• Verify, correct • Find plug and clean	

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
Effluent metering pump (If needed)			
1. Pump loses prime	• Dirty check valve • Ball checks not seating/sealing properly • Drum allowed to run dry	• Clean or replace • Clean or replace • Replace drum and prime pump	
2. Fitting	• Loose fittings • Broken or twisted gasket • Chemical attack	• Tighten fittings • Check/replace gasket • Replace pump	
3. Leakage at tubing	• Worn tube ends • Chemical attack	• Cut off end of tubing and replace • Replace pump	
4. Failure	• Too much pressure at discharge • Check valves not sealing • Output dials not at maximum • Suction lift too high	• Check ball check valves and injectors • Clean or replace • Prime with output dials at maximum • Decrease suction lift	
Sludge Tank			Sludge Holding Tank (LIT-105) Level (Ft), identified as LT-5 on HMI screen
1. High level	• Flow from clarifier tank too high • Discharge line plugged or valve shut • Instrument malfunction	• Verify, correct • Find plug and clean or open valve • Check instrument	

Problem	*Potential Sources of Problems*	*Solution*	*Associated Alarms*
Bag Filters 1. High differential pressure 2. Low differential pressure	 • Plugged bags • Leaks • Hole in bag • Instrument malfunction	 • 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	 • 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	 • 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 over pressurization is removed (check manufacturer's instructions)	

Appendix G

Sequence Summary

APPENDIX G

SEQUENCE SUMMARY FOR LOVE CANAL LANDFILL SITE

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

SEQUENCE 1 **REVISION No: 1** **May 9, 2014**

SHUTDOWN TREATMENT PLANT

Reference: P&ID Drawings Sht. 1-4 & 6, 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 START GWT SYSTEM.
- Manual operation will override all sequences.

SEQUENCE 2 **REVISION No: 1** **May 9, 2014**

INHIBIT MANHOLE #7 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 3 **REVISION No: 1** **May 9, 2014**

INHIBIT MANHOLE #8 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 4 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #3 PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 5 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #3 PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 6 **REVISION No: 1** **May 9, 2014**

INHIBIT 102ND STREET WELL PUMPS FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- *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 and the high-high alarm is cleared.
- *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 7 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #1A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 8 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #1A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 9 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #2A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 10 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #2A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 11 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #3A PUMP A FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 12 **REVISION No: 1** **May 9, 2014**

INHIBIT PUMP CHAMBER #3A PUMP B FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 13 **REVISION No: 1** **May 9, 2014**

INHIBIT RAW WATER FEED PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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 or triggers high-high alarm.
- 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 and the high-high alarm is cleared.
- 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 14 **REVISION No: 1** **May 9, 2014**

INHIBIT FILTER FEED PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, 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.

SEQUENCE 15 **REVISION No: 0** **May 8, 2014**

INHIBIT PUMP CHAMBER DCF PC-4 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, Electrical Drawings.

Purpose: To prevent DCF Pump Chamber 4 Pump from running in the automatic mode.

The following control actions will take place:

- The DCF Pump Chamber 4 Pump motor will be inhibited from running.

When any of the conditions listed below occur:

- Level in Pump Chamber 3A is above the high-high setpoint permissive.
- Hand-Off-Auto switch for DCF Pump Chamber 4 Pump is switched out of AUTO.
- DCF Pump Chamber 4 Pump is disabled on the HMI.

After ALL conditions below occur:

- Level in Pump Chamber 3A drops below the high-high setpoint permissive and alarm is cleared.
- Hand-Off-Auto switch for DCF Pump Chamber 4 Pump is switched to AUTO.
- DCF Pump Chamber 4 Pump is enabled on the HMI.

Then ....

- The DCF Pump Chamber 4 Pump motor will run.
- SEQ-15 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 16 **REVISION No: 0** **May 8, 2014**

INHIBIT PUMP CHAMBER DCF PC-3 PUMP FROM RUNNING

Reference: P&ID Drawings Sht. 1-4 & 6, Electrical Drawings.

Purpose: To prevent DCF Pump Chamber 3 Pump from running in the automatic mode.

The following control actions will take place:

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

When any of the conditions listed below occur:

- Level in DCF Pump Chamber 4 is above the high-high alarm level.
- Hand-Off-Auto switch for DCF Pump Chamber 3 Pump is switched out of AUTO.
- DCF Pump Chamber 4 Pump is disabled on the HMI.

After ALL conditions below occur:

- Level in DCF Pump Chamber 4 is below the high-high alarm level.
- Hand-Off-Auto switch for DCF Pump Chamber 4 Pump is switched to AUTO.
- DCF Pump Chamber 4 Pump is enabled on the HMI.

Then ....

- The DCF Pump Chamber 3 Pump motor will run.
- SEQ-16 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.

Appendix H

Inspection Forms

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

WEEKLY INSPECTION LOG SHEET

Date: _____ Inspected By: _____

____ First aid kits inspected and recorded on kit log

____ Safety Showers/Eye Wash Stations inspected (clean, adequate flow) and recorded on tags

Repairs/Replacements Required: _____

_____

_____

_____.

Glenn Springs Holdings, Inc.
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MONTHLY INSPECTION LOG SHEET

Date: _____ Inspected By: _____

____ Fire extinguisher inspection conducted and recorded on fire extinguisher tags

____ Check for breakthrough (>20 ppm) of carbon vent sorb drums (with PID)

Indicate drums requiring replacement _____

____ Ladders inspected and recorded on tags

____ Portable electrical equipment, extension cords, hand tools inspected

____ Autodialer - low battery light

____ Exits (free of obstructions, clear path to exit)

____ Exit Lights/Emergency Lights (operational)

____ Visual inspection of all process vessels and tanks (leaks, corrosion)

____ Perimeter Fence (cursory visual from distance - no obvious damage, signage in place)

____ Dielectric matting -free from damage, holes, cuts, or deterioration or imbedded objects that may affect its insulating properties

Repairs/Replacements Required: _____

_____

_____

_____.

Glenn Springs Holdings, Inc.
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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						
	MH-12	SW						
South Frontier	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.
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SEMIANNUAL LANDFILL CAP AND FENCE INSPECTION

Site: _____

Date: _____ **Weather:** _____

Inspector: _____

Inspection Item	Inspect For	
1. Landfill Cover	- signs of erosion	Y / N
	- exposure of the HDPE Liner	Y / N
	- areas of insufficient grass coverage	Y / N
	- signs of dead/dying grass	Y / N
	- presence of washouts	Y / N
	- settlement causing ponding of water	Y / N
	- signs of slope instability	Y / N
	- signs of burrowing by animals	Y / N
	- presence of rooting trees	Y / N
2. Perimeter Fence	- breaches in fence	Y / N
	- gates secure	Y / N
	- locks in place	Y / N
	- missing or illegible signage	Y / N

Comments/Remarks **(Note: If repair/maintenance is recommended, describe its location/extent below)**

_____

_____

_____

_____

_____

_____

_____

_____

Glenn Springs Holdings, Inc.
A subsidiary of Occidental Petroleum

Love Canal Semiannual Barrier System / Pump Chamber Inspections

Date: _____ ***Weather:*** _____
Inspector: _____ _____

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-3		
PC-1A		
PC-2A		
PC-3A		

Comments:

Signature: _____

Glenn Springs Holdings, Inc.

A subsidiary of Occidental Petroleum

ANNUAL LEVEL SWITCH INSPECTION

Site: Love Canal

Date: _____ **Weather:** _____

Inspector: _____

Inspection Item **Trigger level switch to verify interlock functioning**

			Interlock functioning
1. **Level Switch Operation**	- PC-3	LAHH-205A	Y / N
	- PC-3A	LAHH-213A	Y / N
	- DCF PC-4	LAHH-221	Y / N
	- Raw Water Tank	LAHH-106A	Y / N
	- Filter Feed Tank	LAHH-107A	Y / N
	- Treatment Facility Trench	LAH-113	Y / N
	- Leak Detection MH No. 8	LSH-1	Y / N
	- Leak Detection MH No. 9	LSH-2	Y / N
	- Leak Detection MH No. 10	LSH-3	Y / N
	- Sample Pit	LSH-5	Y / N

Comments/Remarks **(Note: If repair/maintenance is recommended, describe its location/extent below)**