VOLUME I

OPERATION & MAINTENANCE MANUAL

LOVE CANAL
REMEDIAL ACTION PROJECT

LEACHATE COLLECTION SYSTEM
AND TREATMENT FACILITY

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD
ALBANY, NEW YORK 12233

LANGDON MARSH
COMMISSIONER

December 1980 — Conestoga-Rovers & Associates

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VOLUME I

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SECTION I

INTRODUCTION

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1.1 Purpose of Manual

The purpose of this manual is as follows:

1)	To familiarize operator with the characteristics and treatability of the leachate collected from the Love Canal.	Familiarization
2)	To provide a general description of the collection and treatment systems.	
3)	To establish certain safety guidelines.	
4)	To provide a detailed description of all site and plant support systems in order that the operator may better understand detailed operating instructions.	Preparation
5)	To present operator with detailed instruction regarding the transfer, treatment and disposal of leachate and its by-products.	Operation
6)	To present operator with detailed instructions regarding the operation and maintenance of all site equipment.	
7)	To outline all operator responsibilities regarding monitoring, testing, reporting and the keeping of up-to-date, precise and complete plant records.	Testing & Records

Leachate Flow Characteristics

In 1978 a construction project was initiated to contain leachate migration from the Love Canal. During the construction phase two temporary leachate treatment plants were in operation, treating waste-water collected by a circumferential, perforated, drain tile.

Records for the temporary leachate treatment plants, during the construction phase, indicate the flows ranged from 5,000 to 75,000 gallons per day. These values were dependent upon antecedent rainfall conditions and the number of days the leachate had been allowed to collect in the underground system.

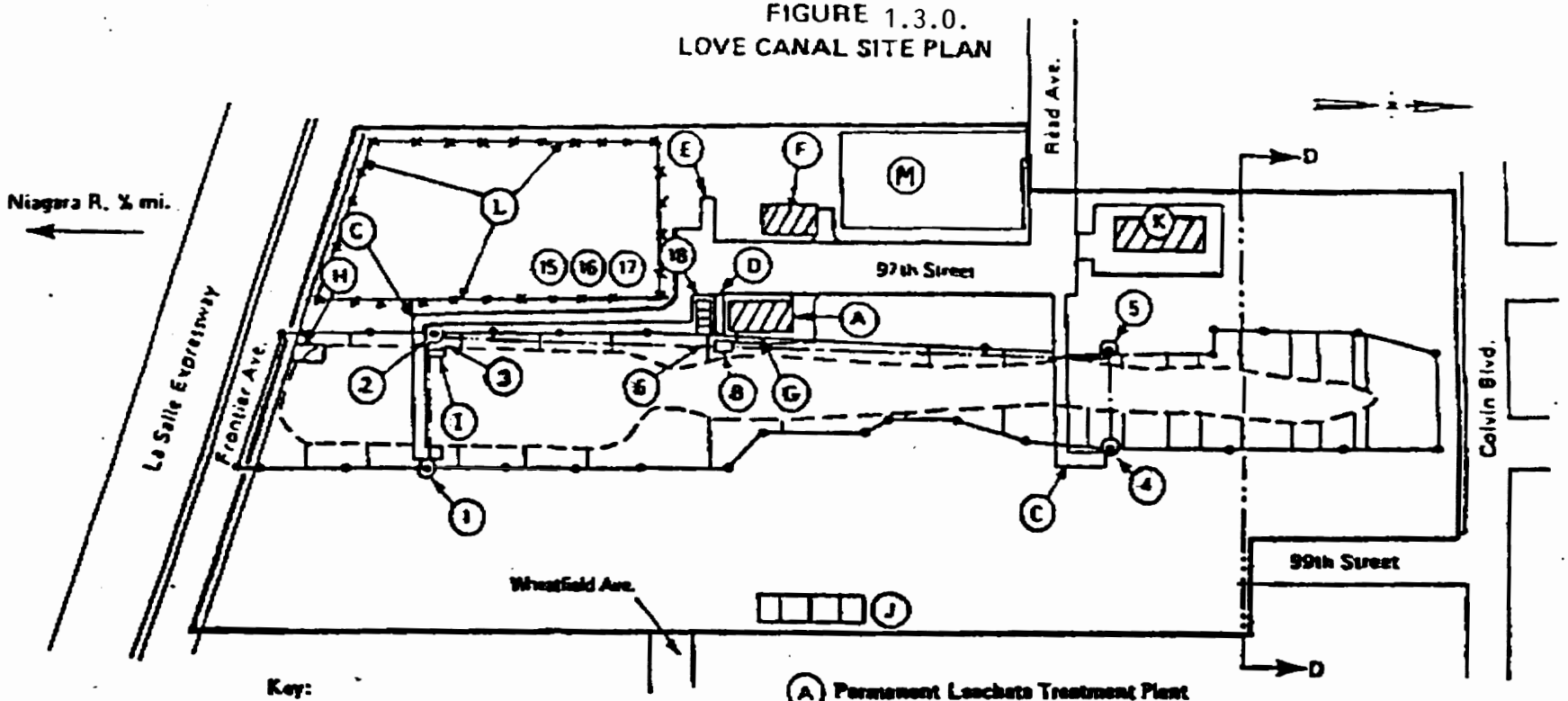
Average daily flows requiring treatment by the new treatment facility are expected to be in the 5,000 to 15,000 gallons per day range.

Installation of a 40 mil synthetic membrane cap completed in 1984 is expected to decrease infiltrate directly above the collection area and to enhance inward migration of the groundwater from the surrounding area.

The volume of leachate to be collected and treated is expected to decline and reach a steady state as the site is dewatered.

For an schematic of the Love Canal Site, see Figure 1.3.0.

FIGURE 1.3.0.
LOVE CANAL SITE PLAN



Key:

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

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

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

1.3 Collection System Description

1.3.1 Purpose

The purpose of the Love Canal collection system is to contain the lateral migration of chemically contaminated groundwater (leachate) emanating from the disposal area.

The collection system intercepts the lateral flow of leachate and transports it to centrally located storage facilities for subsequent treatment.

1.3.2 Containment System

The containment system consists of 6" diameter and 8" diameter drain tile which surround the Love Canal disposal site between Colvin Boulevard and Frontier Avenue. This drain tile is extra strength perforated clay pipe placed at the base of a trench backfilled with crushed stone and coarse sand. Migrating leachate is intercepted by the highly permeable granular fill in the trench and collected in the perforated pipe.

Wet wells, located at low points on the gravity drain lines, collect the flow of leachate. The leachate collected in these wells is intermittently pumped to larger underground holding tanks. Leachate can then be transferred on demand to the treatment facility by pumping from the storage tanks.

The southern sector and the central and northern sectors were designed and constructed as discrete systems and interface only at certain points. A site plan, Figure 1.3.1, showing the collection, pumping and storage systems is given on the following page.

1.3.3 Southern Sector

Leachate collected by drain lines on each side of the southern sector flows by gravity into wet wells located at low points (Figure 1.3.2). Manhole 7 (east) and manhole 8 (west) each contain the following:

1. Wet well - 1500 gallons storage capacity
2. 2" diameter suction lift piping and screen
3. Manhole cover, ladder and safety platform
4. Bubbler tube for the leachate level indicator controller (L.L.I.C.)

The leachate collected in the wet wells is pumped through a 4" diameter furan coated steel forcemain to a 25,000 gallon furan coated steel underground storage tank located on the west side of the canal. Pumps are located in concrete dry well pump chambers immediately adjacent to the canal side of the wet wells. Pump chamber 1 (east) includes the following:

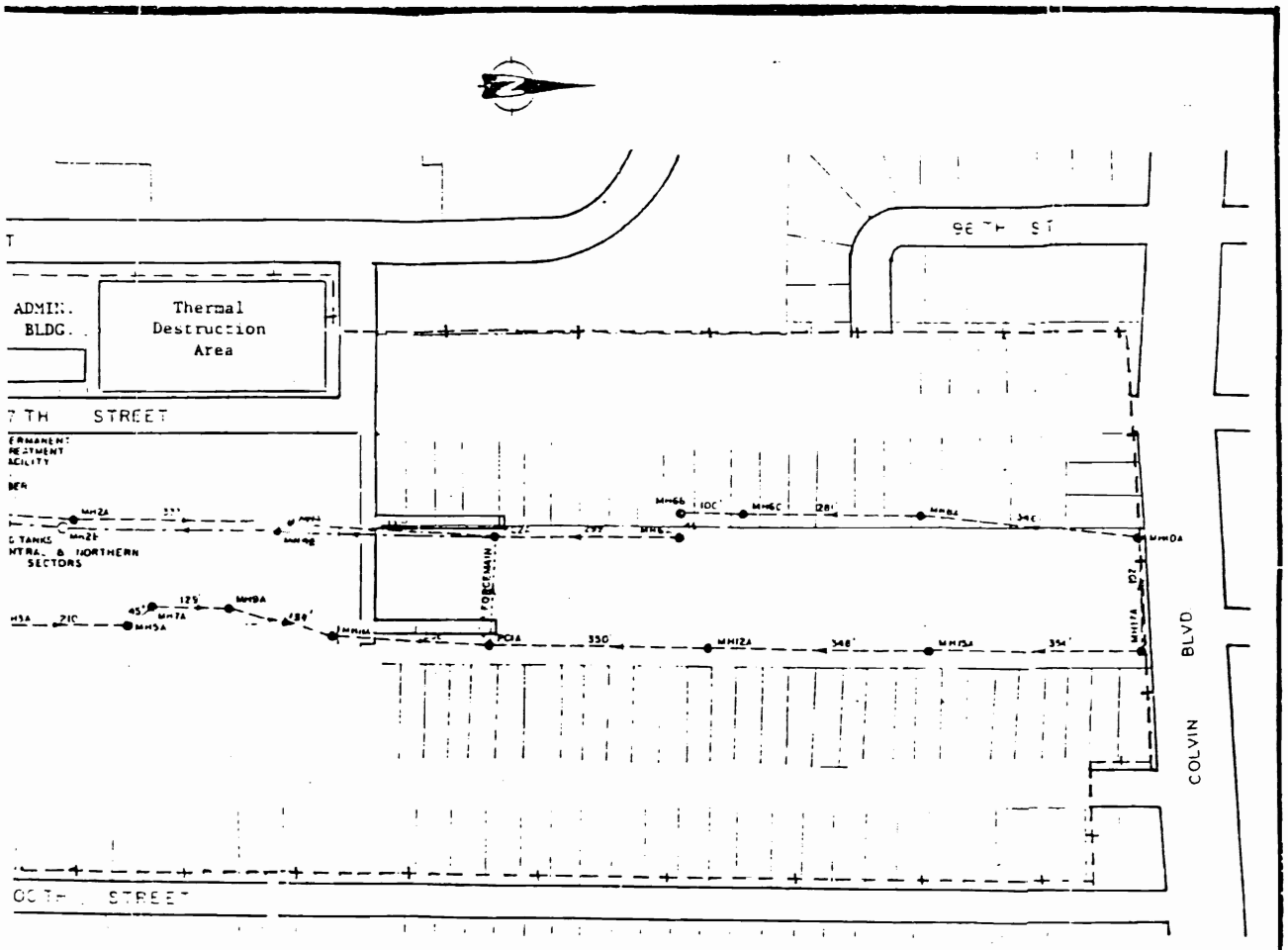


figure 1.3.1
LOVE CANAL CONTAINMENT
AND COLLECTION SYSTEM

1. 50 gpm self-priming horizontal end suction lift pump
2. 2" diameter suction lift and discharge piping
3. Two (2) pump isolating valves
4. Electrical unilock enclosure, wiring
5. Breaker Panel
6. Remote Telemetry Unit (RTU)
7. Manhole cover and ladder

Pump Chamber 2 (west) includes the following:

1. 75 gpm horizontal end suction lift pump
2. 2" diameter Suction lift with check valve and discharge piping
3. Two (2) pump isolating valves
4. Electrical unilock enclosure
5. Breaker panel
6. Remote Telemetry Unit (RTU)
7. Two (2) EXI-Mag flow meters and controllers
8. Manhole cover and ladder

Leachate stored in the South Holding Tank can be pumped on demand through a 4" diameter furan coated steel forcemain to the Treatment Plant by keying in through the MCRT or manually switching at the MDCP panel. Both are located in the Plant Office. Hands/Off/Auto switches are also within the field starter panel. Pump Chamber 3 located south of and adjacent to the storage tank contains the following:

1. Leachate level indicator controller and bubbler tubing
2. Two (2) 200 gpm rated submersible rail pumps (approx. 125 gpm actual)
3. Discharge piping
4. Two (2) pump isolating valves
5. Valve box on each gravity feed line
6. One (1) electrical unilock enclosure with HOA switches
7. One (1) breaker panel enclosure
8. One (1) Remote Telemetry Unit

1.3.4 Central and Northern Sectors

Leachate collected by drain lines on each side of the Northern and Central Sectors flows by gravity into wet wells located at low points (Figure 1.3.3). The north wells are combination sumps and pump chambers and each include the following:

1. Wet well - 1100 gallons storage capacity
2. Two (2) vertical submersible pumps rated at 50 gpm
3. Discharge piping and valves

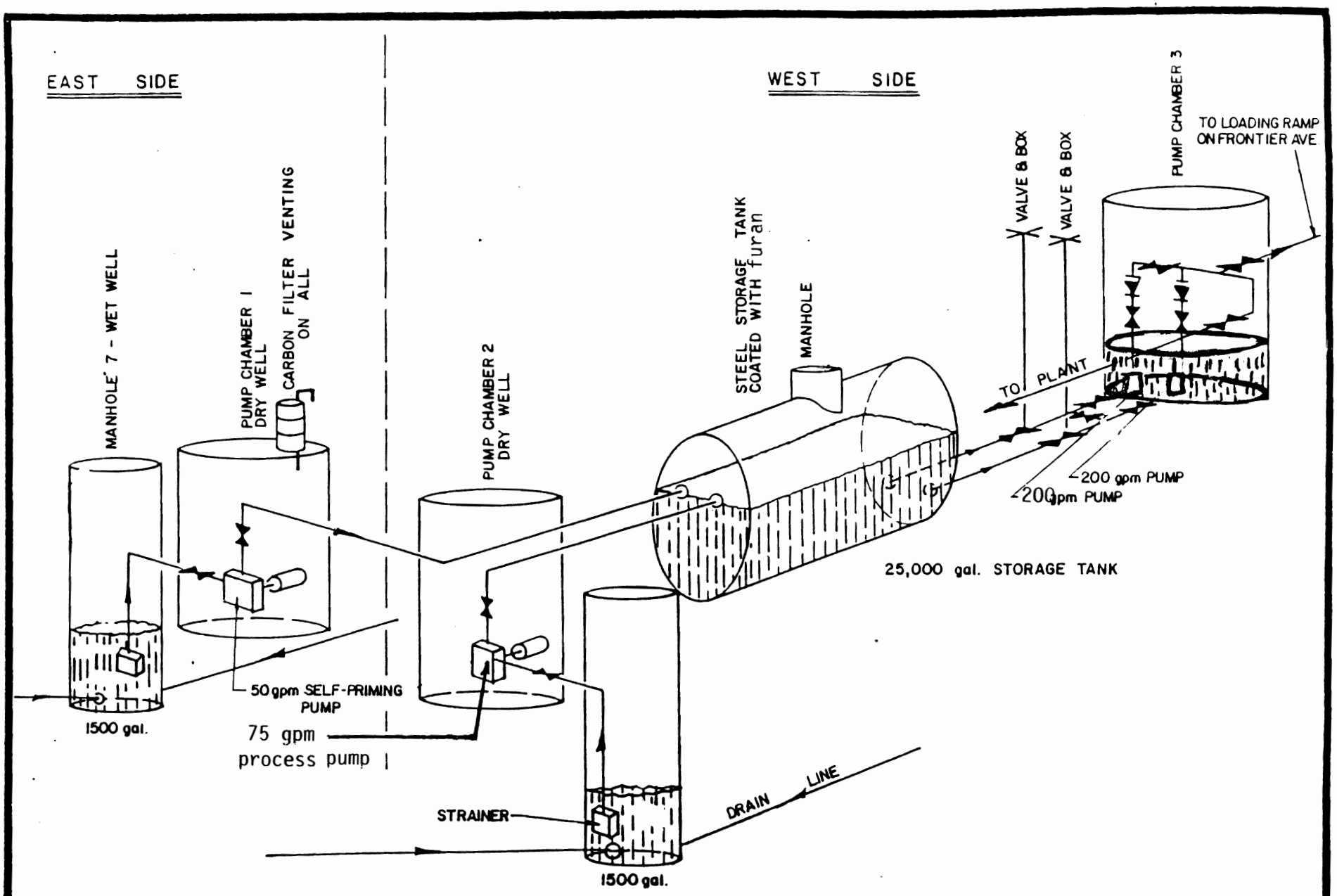


figure 1.3.2

COLLECTION SYSTEM SOUTHERN SECTOR

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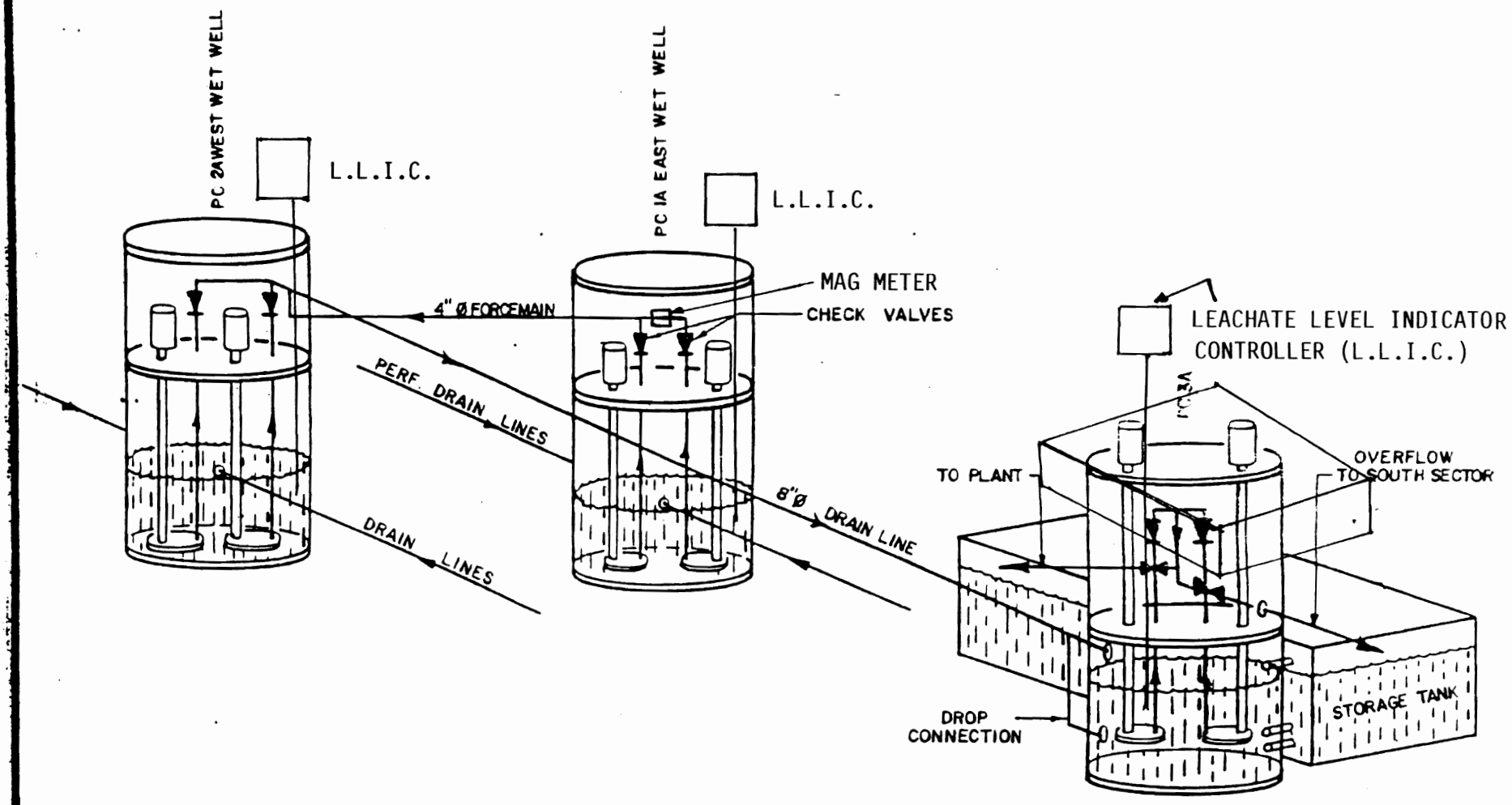

figure 1.3.3
COLLECTION SYSTEM
CENTRAL AND NORTHERN SECTOR

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4. Electrical Panel - Pump starters and HOA switches
5. Breaker Panel
6. Liquid level indicator controller and bubbler tube
7. Remote Telemetry Unit
8. Manhole cover, pump access cover, ladder and concrete safety platform

Leachate collected in Pump Chamber 1A (east) is pumped across the canal through a 4" diameter furan coated steel forcemain which discharges into a 8" diameter clay sewer. Leachate collected in Pump Chamber 2A is lifted out of the well and into the same sewer which runs from 2A to the north holding tank, located to the east of the Treatment Facility.

The Northern and Central Holding Tank is composed of six discrete concrete tanks each having a capacity of 5000 gallons. The individual tanks are interconnected by Furan coated steel pipe. As with Pump Chamber/Wetwell 3, leachate levels are continuously monitored by a liquid level indicated controller that reports to the RTU and then to the MDCP and MCRT in the Treatment Facility office. Should either the North or South Holding Tank become full, this device will automatically cause operation of Pumps in PC1, 1A, 2 and 2A to cease.

Once sufficient leachate accumulates in the storage tank it can be delivered to the plant by operating the pumps in Pump Chamber 3A, from the MCRT, MDCP, or the HOA switches in the field. Pump Chamber 3A, connected to the storage tank by three (3) 4" diameter Furan coated steel pipes and, therefore, having the same liquid level as the storage tank, includes the following:

1. Two (2) vertical submersible pumps rated at 50 g.p.m. (north) approximately 70 g.p.m. (south).
2. Liquid level indicator controller and bubbler tube.
3. Discharge pipe and valves.
4. Electrical unilock enclosure (starters).
5. Two (2) pump HOA switches.
6. Breaker Panel.
7. Remote Telemetry Unit.
8. Two (2) EXI-Mag Flow Controllers. One for PC-3A and one for PC-3.
9. Two (2) EXI-MAG flow Meters located in the valve chamber approximately 40' southwest (SW) of Pump Chamber 3A.
10. Pump bunker, manhole cover, ladder and safety platform.

1.4 Treatment Plant Description

1.4.1 Location

The permanent leachate treatment facility is located on 97th Street between Frontier and Read Avenues. It is sited on the west side on the Love Canal at the south end of the central sector. Refer to Figure 1.3.1.

1.4.2 Purpose

The treatment system is specifically designed for the removal of toxic material from the leachate before it is discharged to the city sewer system. The process is essentially based on activated carbon treatment, through adsorption. The facility may be best described as a detoxification system producing an effluent meeting discharge criteria set by the local municipality and the State of New York. Discharge criteria is contained within Section 4.2.3.

1.4.3 Process System

Collected leachate is supplied to the treatment plant through a 4" diameter forcemain on demand. It is treated by a multi-step process including clarification, filtration, and carbon adsorption. A flow diagram, Figure 1.4.1, outlining the treatment process and showing the relative positions of each stage of treatment is presented on the following page.

The following is a list of the various components of the treatment system.

1. Raw water holding tank - 5,940 gal.
2. Clarifier with flights and motor - 15,633 gal.
3. Filter feed tank - 2,910 gal.
4. Sludge holding tank - 1,580 gal.
5. Two (2) GAF bag filtration units
6. Two (2) carbon adsorbers; V1 and V2 (20,000 lbs. carbon capacity)
7. Transfer storage module; V3 (20,000 lbs. carbon capacity)
8. Air and water service control module
9. Three leachate level transmitter controllers and sensors
10. P1 - raw water feed pump
11. P2 & P3 - filter feed pumps
12. P4 - supernatant return and sludge pump
13. Three (3) 55 gallon activated carbon upflow vent sorb filter units
14. Radial flow vent sorb accumulator with cabinet.
15. Fiberglass venting system.
16. H_2O_2 Pump for H_2S odor reduction
17. Intro unit piping and valves.
18. Two (2) turbine flow meters.

19. One (1) EXI-MAG Flow Meter.

Love Canal leachate is conveyed to the Treatment Facility from the leachate collection system by pumping from the two (2) outside underground storage tanks via a valve chamber into the raw water tank. Once inside the plant, the leachate moves through the treatment process as outlined by the following:

1. The leachate is lifted from the raw water tank into the clarifier by an air-driven diaphragm pump.
2. The waste water flows slowly through the clarifier permitting the removal of solids, sludge and chemical precipitates by settlement. Detention time is approximately two hours.
3. The effluent from the clarifier flows over a weir and falls by gravity into a filter feed tank.
4. The clarified effluent is pumped from the filter feed tank by one and/or two diaphragm pumps through a stainless steel bag filtration unit housing 4-50 micron polypropylene filter bags, which removes suspended material.
5. The filtered water continues to flow under pressure through the Calgon system consisting of two (2) 8,000 gallon carbon filled adsorbers connected in series.
6. The leachate enters the top of the first or lead adsorber and flows downward through the carbon bed. The massive surface area of the activated carbon adsorb much of the organic chemicals in the waste water.
7. The treated 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.
8. The treated effluent from the polish adsorber is then released to the sanitary sewer.
9. Sludge from the clarifier is pumped as required to a sludge holding tank. Upon demand the stored sludge is pumped to an exterior storage facility.

1.4.4 Support Systems

The leachate treatment plant is equipped with two (2) major and various minor support systems. The compressed air and electrical services are responsible for operation of the pumps that move the leachate through the collection and treatment systems.

Detailed descriptions of the electrical, air and water support systems are presented in Section 2 of this manual. The remaining support systems are discussed in Section 5.

1.4.5 Plant Facilities

The Treatment Plant includes a number of personnel hygiene and safety facilities as listed below:

1. Washroom facilities including lockers and shelves, toilet, sink, shower and water heater.
2. Safety equipment and first aid station.
3. Two (2) emergency shower and eyewash stations.
4. Telephone service.
5. Emergency lighting.
6. Plant table, office desk, chairs, computer and printer desks.
7. Six (6) type ABC portable fire extinguishers.
8. HVAC system providing 25 air changes per hour.
9. Closed leachate treatment process vented through activated carbon filters.

1.5 Safety Guidelines

The purpose of this section is to enumerate the State of New York's recommended safety procedures and regulations and to introduce the reader to the various pieces of emergency protective equipment that is to be kept on site. Section 5, which details the operation of the individual process units includes further description of safety and emergency procedures.

1.5.1 Rules & Regulations

The operator must ensure that all work on the site including processing and repair work is done in a professional manner with due regard to the safety of all employees, maintenance personnel and the public.

Regarding the safety and protection of all persons working on the site, the operator must ensure that all work done is in compliance with the provisions of Industrial Code Rule Number 23, issued by the State of New York Department of Labor Board of Standards and Appeals. The work must also be done in compliance with Title 20 Code of Federal Regulations, Part 1926, and 1910 Occupational Safety and Health Regulations for Construction. Where a difference exists between the requirements of Rule Number 23 and Title 29, Part 1926, the more stringent requirements shall apply.

The following list of health rules is included due to the toxic and hazardous nature of the chemical leachate:

1. No smoking except for designated smoking areas on the site.
2. No eating or drinking except for designated areas.
3. Do not eat, drink or smoke before thoroughly washing hands.

4. Keep hands clean and away from face, mouth, etc.
5. No drinking of alcoholic beverages on site.
6. Take a shower and wash hair each day before leaving.
7. Be conscious of personal habits which may cause unnecessary chemical contacts.
8. Do everything possible to keep chemicals from being taken home.
9. All incidents of contact must be treated at once.
10. Wear protective clothing and equipment when required.

This list of ten (10) important health rules shall be posted in the treatment plant where it would be immediately visible to all employees and visitors.

In addition to the foregoing, modifications to, or additional safety procedures or regulations, may be appended by the New York State Department of Environmental Conservation.

1.5.2 Safety Equipment

In order to safeguard against injury which may result due to the various toxic chemicals encountered, protective clothing and other safety devices must be worn by all personnel handling waste materials. All confined spaces on the site (i.e. manholes, pump chambers and holding tanks) and in the plant (i.e. waste water tanks and carbon adsorbers) must be presumed to be hazardous. Appropriate safety measures should be taken before entering or working in a confined space. OSHA regulations applicable to respiratory protection in oxygen deficient atmospheres should be strictly adhered to.

Personal protective equipment includes hard hats, face masks, safety glasses, coveralls, gloves and boots and respiratory equipment. Personal protective equipment requirements vary with levels of protection, and are outlined by the following:

Level D Protection

1. Personal protective equipment
   - Coveralls
   - Gloves*
   - Boots/shoes, leather or chemical-resistant, steel toe and shank
   - Boots (outer), chemical-resistant (disposable)*
   - Safety glasses or chemical splash goggles
   - Hard hat (face shield)*
   - Escape mask*

Level C Protection

1. Personal protective equipment

- Full-face, air-purifying, cartridge/canister-equipped respirator (MSHA/NIOSH approved).
- chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls).
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant*
- Boots (outer), chemical-resistant, steel toe and shank*
- Boots (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*
- Escape mask*
- 2-Way radio communications (intrinsically safe)

Level B Protection

1. Personal protective equipment

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved)
- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical resistant coveralls).
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant, (disposable)*
- Hard hat (face shield)*
- 2-Way radio communications (intrinsically safe)

*Optional

1.5.3 Leachate Contact Safety

The leachate from the Love Canal collection and treatment system is of widely varying composition. The potentially hazardous properties of many of the chemicals found in the leachate, dictate that any contact with the leachate is serious and should be avoided.

Some of the contaminants present in the leachate may be adsorbed through the skin. Other chemicals have been found to have a markedly corrosive action upon all tissues of the body. Mists, gases and vapors can cause small burns, severe eye damage and respiratory difficulties.

In case of contact, remove all contaminated clothing and flush skin with copious amounts of water. If eyes are involved, they must be irrigated at once with an abundance of tepid water. In case of ingestion, a physician must be contacted immediately. Emergency first aid procedure is dependent upon the chemicals ingested. All incidents of contact must be treated at once and reported to the plant supervisor. A record of all such occurrences will be maintained in the treatment facility office.

SECTION 2

SUPPORT SYSTEMS

Section 2.1 Electrical Systems
2.1.1 North, Central and South Sectors*
2.1.2 Treatment Plant
2.1.3 HVAC

Section 2.2 Plant Air

Section 2.3 Plant Water
2.3.1 Hoses

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2.2.1 Compressed Air Schematic
2.2.2 Air Module Schematic
2.3.1 Water Module Schematic
2.3.2 Plant Water Schematic

2.1 Electrical Systems

2.1.1 North, Central and South Sectors*

The North, Central and Southern Sectors have power supplies that originate from the Treatment Facility's Electrical Room. A main distribution panel 277/480V, 3" diameter 4 wire stepped down by a 75 KVA Transformer 480V prim. - 120/208V. A 3" diameter 4w feeds power panel - A. Power Panel - A, located in the Electrical Room is 120/208 volts, 3" diameter 4 wire, 3P 225amp main circuit breaker. PP- A feeds the MDCP pump logic controller and then PP-N1 located at Pump Chamber 2A of the North Sector, PP-N2 located at Pump Chamber 1A, PP-C located at Pump Chamber 3A behind the Treatment Facility, PP-S1 located at Pump Chamber 2 of the South Sector, and PP-S2 located at Pump Chamber 1.

* The individual schedules, details, and one line diagram can be found on DWG. E-204 of the Love Canal Treatment Facility, October 1994 as-builts. It is recommended that this drawing be referred to.

Prior to the Pump and Electrical Renovation Project, the North and South Sectors received their power by overhead service lines from 100th St. and Frontier Ave. respectively. These overheads remain as a potential back-up power supply.

2.1.2 Treatment Plant

The power supply to the electrical room in the Treatment Plant is a 400 amp./600 volt, 3 0-4 wire service connection from Niagara Mohawk Power Commission (NMPC) on 95th Street. The electrical room includes the following equipment:

1. NMPC enclosure.
2. 400A/600V - 3 0-4 w SN safety switch.
3. 400 A/600V power panel.
4. 75 KVA transformer 480V prim - 120/208v Sec. 3 0.4W.
5. 1270/240v lighting panel.
6. High level interlock system fuse panel for process and sludge storage tanks plus motorized operated valve for sludge pump discharge.
7. 120/208v, 3 0-4 wire, 3P, 225A main circuit breaker power panel - A.
8. Clarifier motor disconnect and starter.
9. Dewatering Containment Facility Pump Station No. 3 disconnect and starter.
10. Dewatering Containment Facility Pump Station No. 4 disconnect and starter.
11. Security/Fire Logic Control Panel.

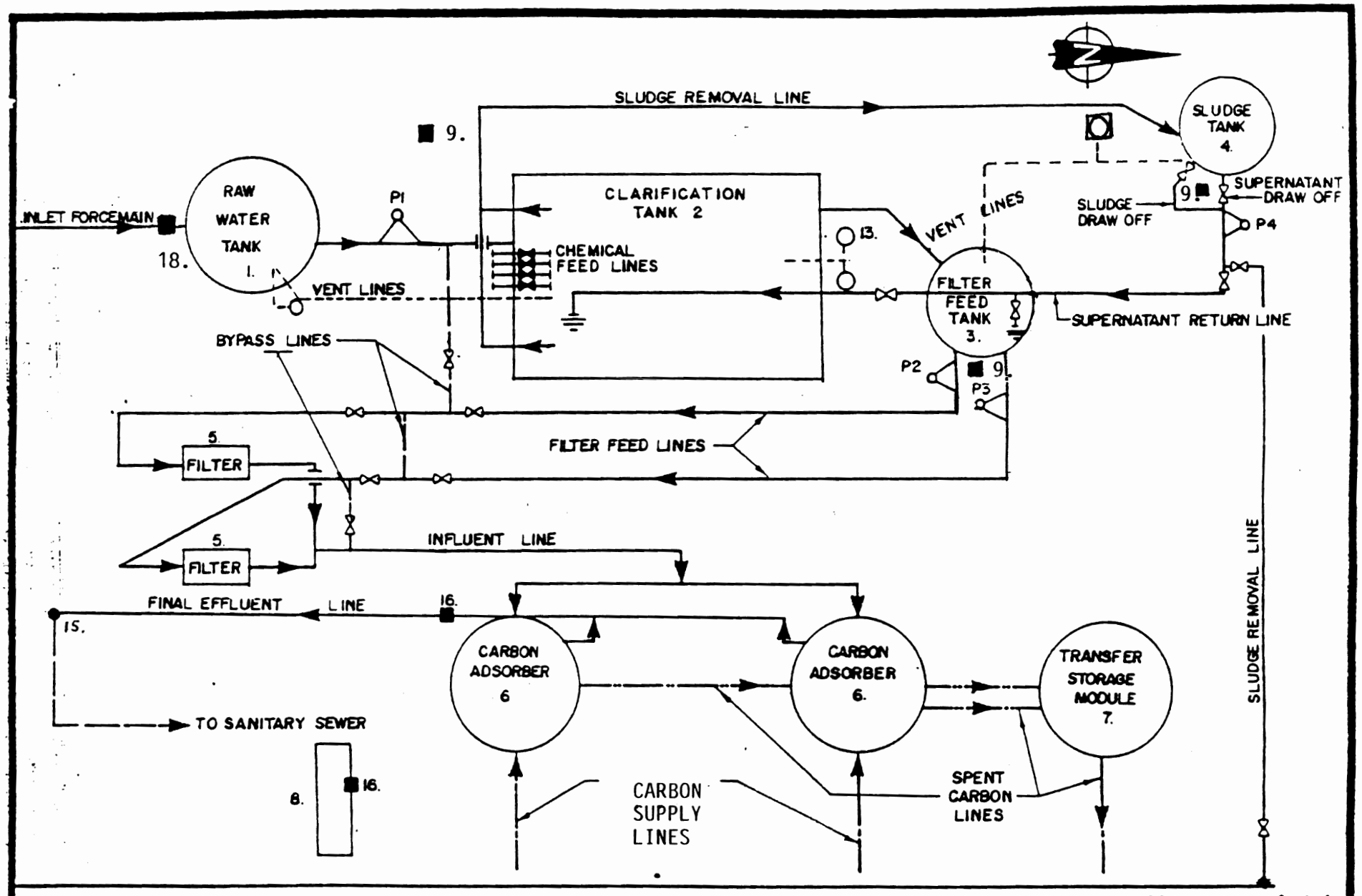

figure 14.1

TREATMENT PROCESS FLOW DIAGRAM

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Schematic wiring diagrams for the Plant and the Plant site can be located on prints E101-205 of the Love Canal Treatment Facility, October 1994 as-builts. In addition, schematic wiring diagrams are within each field, RTU and office MDCP relative to distributed process controllers.

The large power panel and the lighting panel are connected to approximately forty (40) pieces of equipment requiring an electrical service. Branch breaker schedules can be located on Print E-101.

2.1.4 HVAC

Heating and air conditioning is provided in the four rooms of the office area by a Bryant gas heat/electric cool rooftop unit. The temperature is controlled by a thermostat in the office. The electrical and mechanical rooms are also heated respectively by 500 and 1750 wall baseboard heaters.

Ventilating in the office, electrical and mechanical rooms is provided by a Penn Dome BB45 roof exhaust fan. A Penn Dome XQ60 roof exhaust fan provides ventilation for the washroom.

The plant area is heated by a Dravo Hastings LU-215 gas roof top unit. Temperature adjustment is accomplished by rotating a burner flame control at the unit. The same area is ventilated by two (2) floor level exhaust fans located on the east and west walls of the bay area, each fan is rated at 1185 rpm at 4100 cfm. In addition, there are six (6) roof top fans. Three of the fans are rated at 1650 rpm at 795 cfm each and are located and connected to the raw tank, the clarifier/filter feed tank and sludge holding tank. These are two speed fans. The remaining three (3) fans are located on the roof at the south end, middle and southeast ends of the plant. These fans are rated at 475 rpm/9035 cfm, 945 and rpm/4070 cfm, and 945 rpm/4070 cfm respectively. Consult Operation and Maintenance Manual Volume II for HVAC maintenance and service information.

2.2 Plant Air

Compressed air, supplied by two (2) stationary Worthington compressors located in the mechanical room of the treatment plant, is used for the following:

1. Operation of the raw water pump.
2. Operation of both filter feed pumps.
3. Operation of the sludge pump.
4. Operation of the two (2) vacuum air-lift sludge lines.
5. Pressurization of the three (3) carbon vessels for spent carbon transfers.
6. Assisting in spent carbon transfers in the case where the carbon bed becomes packed.

Air is supplied on demand to the first four operations by copper lines pressurized to 100 p.s.i.

The pressure in the air lines to operations 5 and 6 is regulated by control valves and gauges on the service module.

Schematic diagrams of the air supply lines and the service module, see Figures 2.2.1 and 2.2.2.

The compressors in the mechanical room require periodic maintenance. These maintenance schedules can be found printed on the machines. NOTE: The instruction manuals should be consulted prior to service and are located in Volume II.

Air line lubricators have been installed on each pump in the Treatment Plant. The manufacturer recommends this equipment on permanent pump installations. Operation and maintenance information on the lubricators is contained in Volume II.

2.3 Plant Water

Potable water, supplied by a 4"0 connection to the 8"0 city main in 97th Street, is used for carbon transfers, compressor cooling, personal hygiene and safety. A backflow preventer has been installed in this line.

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

1. Two (2) stationary air compressors;
2. Electric water heater;
3. Washroom facilities; shower, sink, toilet and urinal;
4. Two (2) emergency shower and eyewash stations;
5. Garden hose used for washdowns;
6. Carbon service module.

Schematic diagrams of the service module and water lines are given on Figures 2.3.1 and 2.3.2.

Plant water, supplied to the service module by a 3"0 copper line, is flow and pressure regulated as detailed by Figures 2.3.1 and 2.3.2. Water from the module is used for the following carbon transfer operations.

1. Water rinsing 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, transfer and delivery tanks.

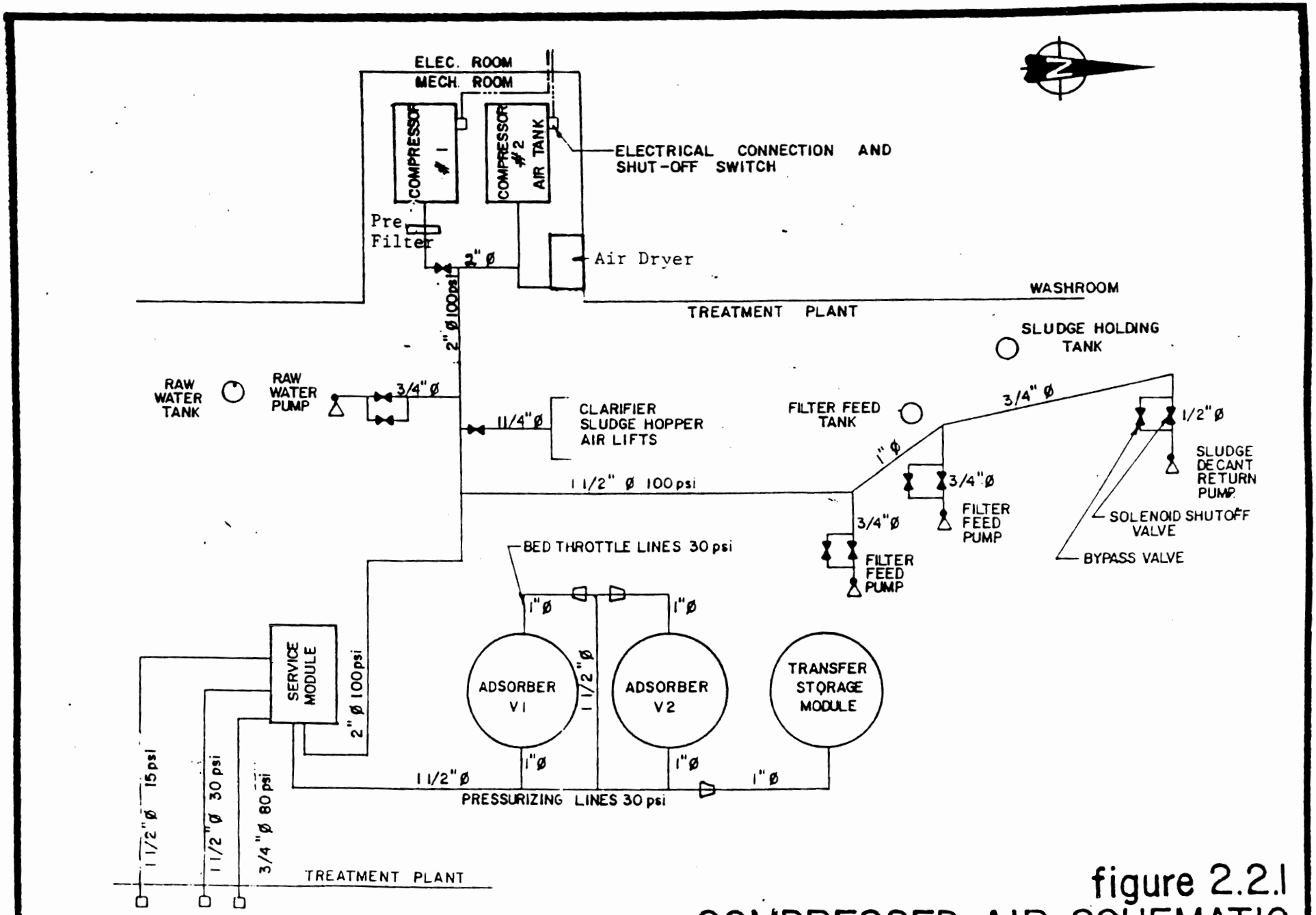
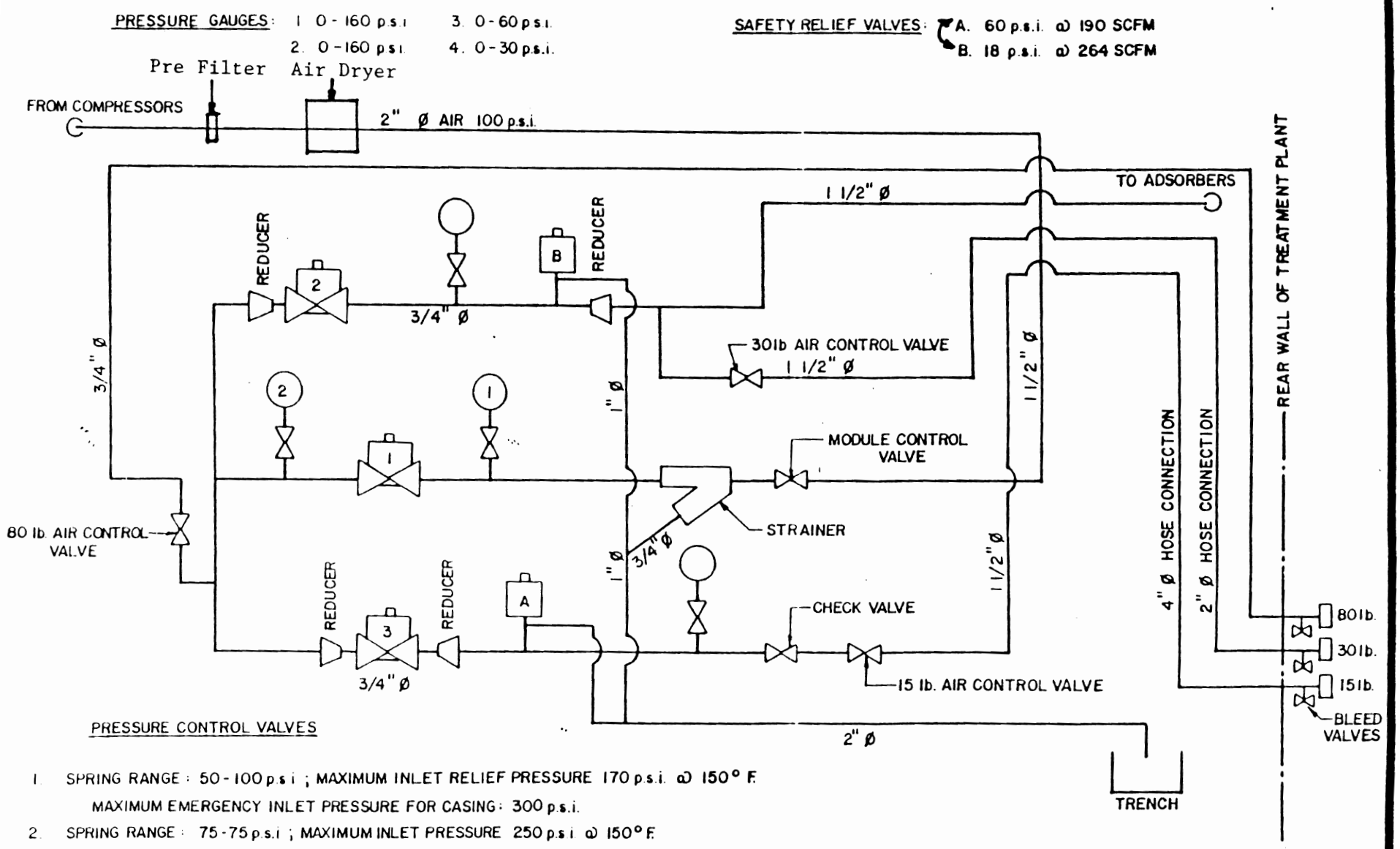


figure 2.2.1
COMPRESSED AIR SCHEMATIC



PRESSURE CONTROL VALVES

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

figure 2.2.2
AIR MODULE SCHEMATIC

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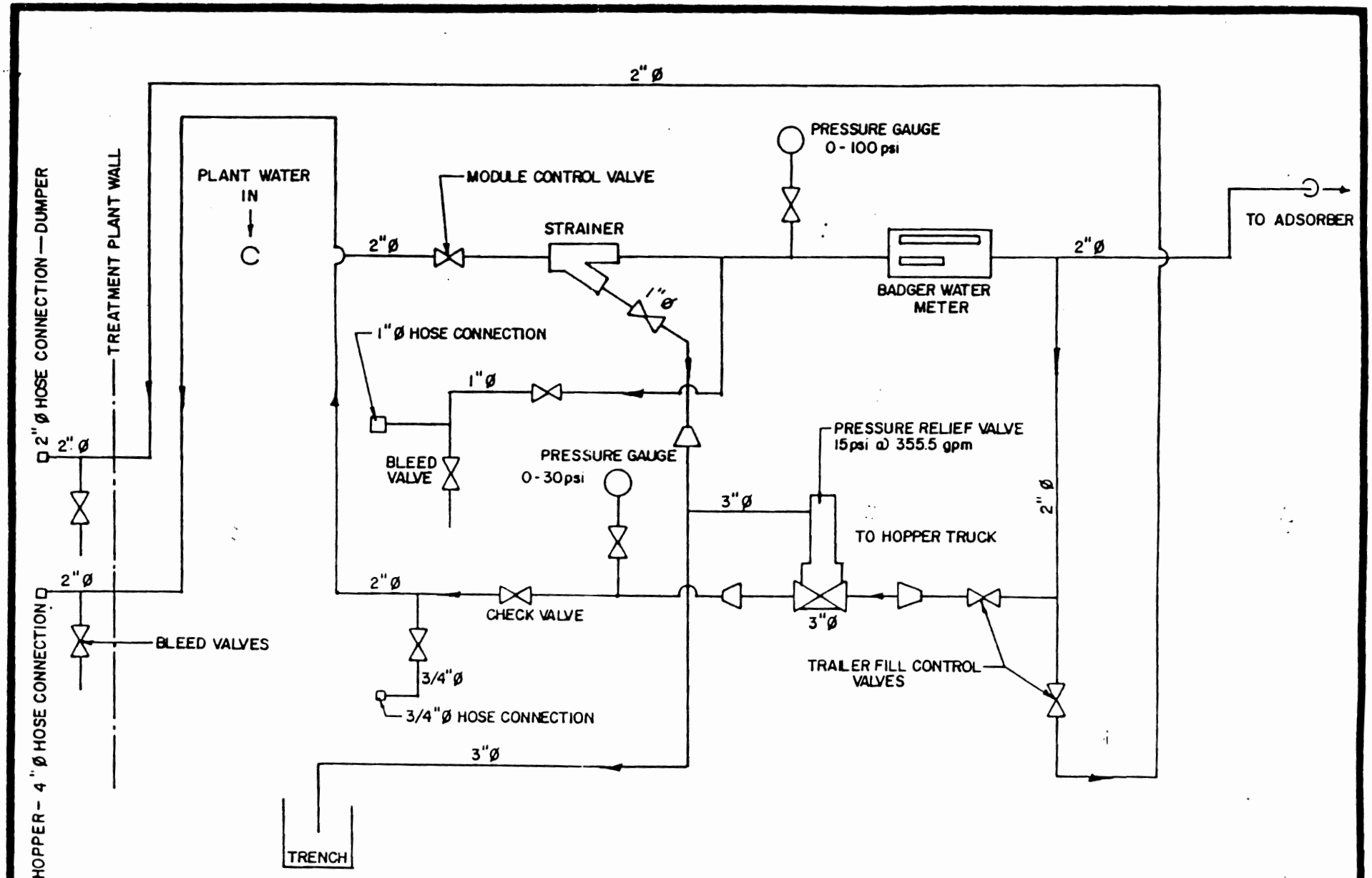

figure 2.3.1
WATER MODULE SCHEMATIC

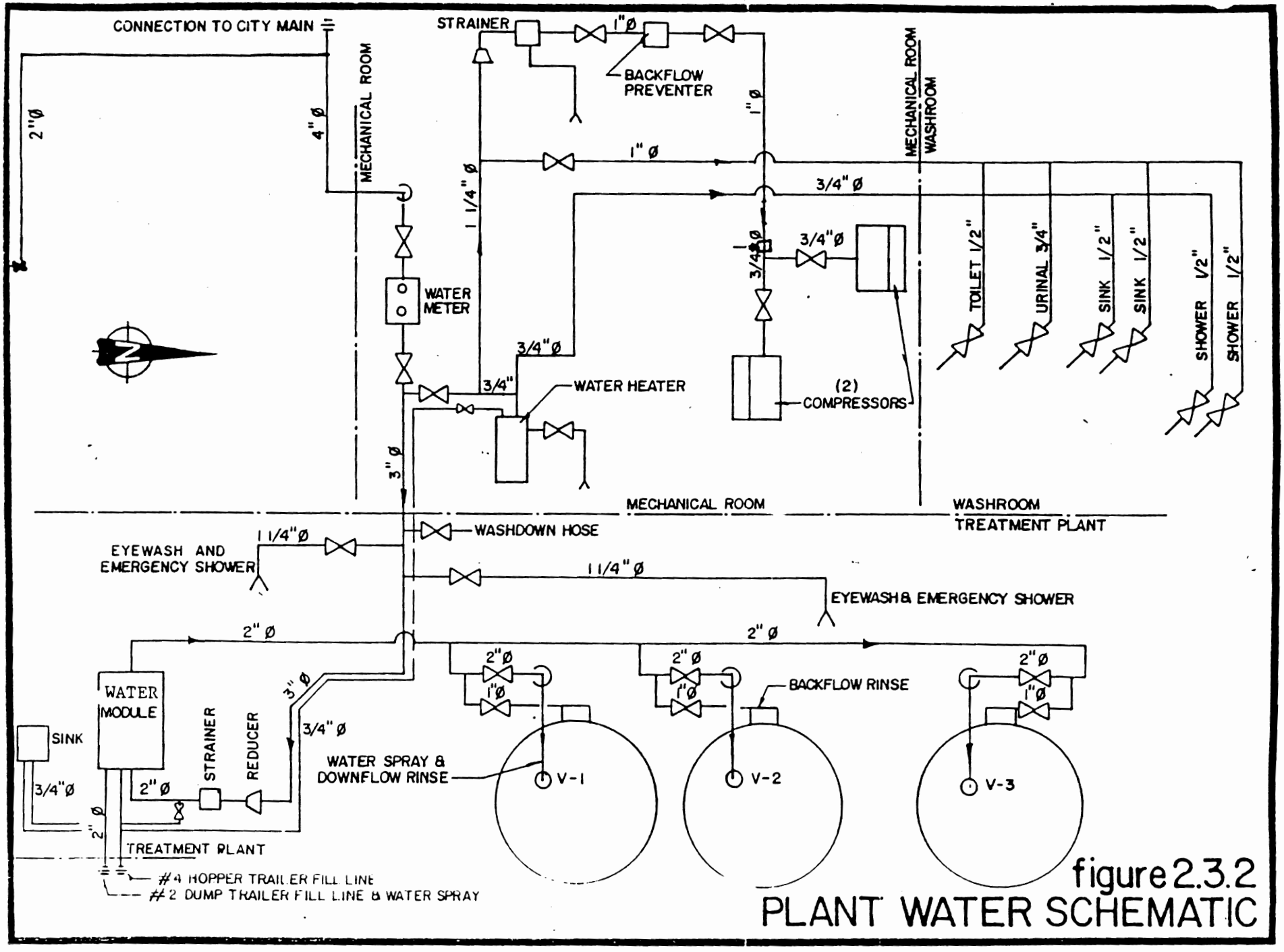

figure 2.3.2

PLANT WATER SCHEMATIC

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2.3.1 Hoses

All air and water connections to the carbon supply trailer are to be made using the following flexible hoses:

1. 4"0 carbon slurry hose (black) - two (2) 25' lengths
2. 3/4"0 air/water hose (red) - one (1) 50' length
3. 2"0 water hose (black) - one (1) 25' length, one (1) 50' length.

These hoses are in the Treatment Room and used only for the purposes intended. The option exists where the carbon supplier can use their own air-supply and only use the facilities 4" carbon slurry and 2" water supply hoses.

SECTION 3
OPERATION AND MAINTENANCE SUMMARY

3.1 Daily Operations
- 3.1.1 Start Up
- 3.1.2 Collection
- 3.1.3 Treatment
- 3.1.4 Shut-down

3.2 Maintenance & Inspections
- 3.2.1 Preventive Maintenance Schedule
- 3.2.2 Inspections

3.1 Daily Operations

The following is a Summary of the operations to be carried out on a daily basis.

3.1.1 Start Up

1. Record all requested information on daily logs.
2. Perform and record daily, weekly, or monthly inspections as applicable.

3.1.2 Collection

The collection of leachate from the wetwells to the North and South Sector Holding Tanks is automatic. Pump activation is determined by the level of leachate in the wetwells set by the operator through the MCRT. Equipment settings are found in a computer printout located in the Administration Building files and Treatment Plant operating room. This printout should be examined every 6 months or reprinted when set point changes are made.

3.1.3 Treatment

1. Don level D; Level C Respirator; Protective Equipment to be carried - Protective Equipment may be reduced based on experience and equipment condition (A semi-annual air monitoring program may be necessary as the plant ages.)
2. Turn to the operations screen on the MCRT.
3. Observe the leachate level in storage tank/wetwell 3 and 3A. Determine if enough volume of leachate is present to warrant treatment. Displays of approximately 9.0 feet for PC-3 and 5.50 feet for PC-3A indicate that the storage tanks are at capacity and treatment is necessary.
4. Cursor over to the question "Are We Dancin Yet?" and satisfy by entering "Y". This opens the solenoid valve on the air line to the clarifier inlet double diaphragm pump.
5. Go to the MDCP and place the pumps in PC-3 and PC-3A in the auto position. NOTE: key switch has to be in the Auto position.
6. Return back to the MCRT. Cursor to the third line under Station 3A and change the N to a Y by keying Y and entering. This illuminates the MCRT that signifies MCRT keyboard control. Cursor to the next pump in the same station and perform the same procedure. Cursor to Station 3 and relinquish command to the MCRT.
7. Cursor down to the fourth line and under the same two stations, change the N to Y for pump(s) run. NOTE: Treatment discharge is approximately 120 gpm. Green run status lights will appear on the MDCP first with printer acknowledgement and then after a short delay the green pump symbol(s) will illuminate on the MCRT.
8. Turn the clarifier on by activating the starter in the Electrical Room. This step is discretionary. Past operations have been non-activation due to sludge characteristics.

9. Activate all process tank vapor control fans. Position at high. Fan starters are located on the west wall of the mechanical room. Additional engr. controls can be activated as needed.
10. Turn the air dryer on and allow for one cycle. Close the condensate release valve on the monorotor compressor. This valve is at floor level at the east end of the compressor.
11. Don ear protection.
12. Start the rollair compressor.
13. Start the monorotor compressor.
14. Turn the clarifier inlet pump on.
15. Reset the effluent meter to zero.
16. Open the effluent valve.
17. Close the adsorber vent valve on V_1 then V_2.
18. Start the north or south filter feed pump. Make certain that the respective inlet and outlet valving is open at the GAF, Bag Filters.
19. If hydrogen sulfide odors are present, open the discharge valve for hydrogen peroxide feed on the effluent pipe behind the bag filters.
20. Adjust field and plant pumping rates to maintain leachate equilibrium in the process vessels.
21. Monitor the MCRT at Stations 3 and 3A for the leachate level status as reported by their respective L.L.I.C.
22. Pumps in PC-1, 1A, 2 and 2A will activate at their setpoints to feed the holding tanks while the operators monitor and control the pumps in PC-3 and 3A that feed the plant. In this procedure, field dewatering and treatment occurs simultaneously.
23. Collect samples as scheduled and in the middle of the expected volume to treat.

3.1.4. Shut Down

1. Turn off the pumps at Station 3 and 3A through the MCRT. This is done by keying in N and entering to cease the run status.
2. At the MDCP, switch the pump(s) at 3 and 3A in the off position.
3. Turn off the clarifier inlet pump when the leachate level descends to 4" above the tank outlet.
4. Turn off the filter feed pump when the leachate level descends to 6" above the tank outlet.
5. Monitor the pressure gauge at the GAF Bag Filtration Unit. When the gauge reads approximately 0p.s.i., slowly close the effluent valve.
6. Close the hydrogen peroxide feed valve if in use.
7. Open the Vent Valve on the Lead Adsorber.
8. Open the Vent Valve on the Polish Adsorber.
9. Record the daily volume of leachate treated and the cumulative total.
10. Turn off the air compressors.

11. Turn off the air dryer.
12. Open the condensate release valve on the Monorotor Compressor.
13. Reset all process tank fans to low. Turn off floor and ceiling fans.
14. Turn clarifier off if activated.
15. Move cursor over to the question "Are we Dancin Yet?" and satisfy by entering "N". This closes the solenoid valve on the air line to the clarifier inlet double diaphram pump.
16. Record final leachate levels in PC-3 and PC-3A.
17. Turn the monitor down to darken the screen.
18 Complete daily logs.
19. Remove safety gear.
20. Decrease thermostats or shut off A/C, turn lights off, lock up, activate security system and exit.
21. Deliver samples to the laboratory when necessary.
22. Wash after delivery of laboratory samples.

Detailed instructions for all process related functions are given in Section 5.0

3.2. Maintenance and Inspections

The operators shall be responsible for the proper maintenance of the collection system, Treatment Facility, Administration Building, Drum/Decon Storage Facility and the site as stated in their work titles.

3.2.1. Maintenance Schedule

The operators shall keep a permanent detailed maintenance schedule of all facilities and equipment including an accurate record of all contractor services. These data shall be stored in the Administration Building Office.

3.2.2. Inspections

The chief operator or in his absence, the acting chief operator, shall perform daily, weekly, and monthly inspections of all facilities and equipment. All status shall be recorded on their respective forms. A unit given an ineffective status shall be remedied as soon as possible. These inspections are to comply to all pertaining Federal, State and local regulations.

SECTION 4
MONITORING, TESTING AND RECORDS

4.1 Monitoring

- 4.1.1 Wet Wells
- 4.1.2 Holding Tanks
- 4.1.3 Plant Process Tanks
- 4.1.4 Pressure Gauges
- 4.1.5 Flow Meters
- 4.1.6 Samples

4.2 Testing

- 4.2.1 Required Analyses and Schedule on Samples
- 4.2.2 Quality Control
- 4.2.3 Discharge Li tations

4.3 Plant Records

- 4.3.1 Daily Log
- 4.3.2 Sample Analysis Log
- 4.3.3 Monthly Report
- 4.3.4 Repair Log
- 4.3.5 Inventory Sheet
- 4.3.6 Sampling Schedule
- 4.3.7 Chapter 250 Sewer Use Ordinance
- 4.3.8 Waste water Discharge Permit

4.1 Monitoring

4.1.1 Wet Wells

The liquid level in all wetwells and combination wetwell/pump chambers are monitored by a liquid level indicator controller (L.L.I.C.) manufactured by E. G. Pump Controls of Jacksonville, Florida. An L.L.I.C. exists at wetwell/pump chambers 1A, 2A, 3A, 3 and wetwells 7 and 8 for Pump Chambers 1 and 2 respectively. This is a bubbler system where a small compressor continuously operates and injects air through a stainless steel tube. The resistance encountered by the air flow against the leachate is calibrated to report in feet. Pump activation and deactivation is determined by the operator by the use of the Genesis and ACCOL Programs. The operations screen on the MCRT clearly show the leachate levels and the field pump status.

4.1.2 Holding Tanks

The liquid level in the two (2) holding tanks on site (the 25,000 gallon tank in the South and the 30,000 gallon tank in the North) is continuously monitored by an L.L.I.C. at PC-3 and PC-3A. The liquid level in the storage tank is the same level as it's adjacent pump chamber/wetwell. Like the other site pump chambers and wetwells the liquid level is reported from the L.L.I.C. to the RTU to the MDCP and then to the MCRT. Command statements are present in ACCOL to shut down the feed pumps when a high level setpoint has been reached in either or both holding tanks. Only a reduction of liquid level by activating the pumps in chambers 3 and 3A will allow the feed pumps to recommence in auto status.

4.1.3 Plant Process Tanks

The liquid level in the raw water and filter feed tanks are to be regularly monitored by the plant operators on the MCRT screen and physical observations. Levels in these tanks should not exceed or descend below the level marks indicated. These marks have been established to minimize a spill volume in the unlikely event of a tank rupture and to prevent air entrapment within the double diaphragm pumps.

4.1.4 Pressure Gauges

Plant monitoring and control equipment includes pressure gauges at critical points in the process system. For example, the gauges at the bag filters can be used to determine, when the filters should be changed. Pressure gauge monitoring, as it pertains to each process unit, is discussed in Section 5.0 of this Volume.

4.1.5 Flow Meters

Plant monitoring equipment also includes one (1) magnetic flow meter and two (2) turbine flow meters. The magnetic meter is installed on the raw water tank inlet line. It can be used to determine the discharge rate from a pump or pair of pumps from PC-3 or PC-3A on volume balancing or troubleshooting.

The turbine meters are installed on the plant effluent and the plant water module. The meter on the effluent line is used to measure total and daily volumes of processed leachate. The meter on the water service is used to assist carbon transfers.

4.1.6 Samples

Sample lines are located within the fume hood on the south wall of the treatment bay area. There are points for the raw feed, after clarification, after filtration, at the carbon midpoint, and after carbon polish. Samples drawn from these points can be used to determine:

1) If the plant is meeting waste water discharge under the Love Canal Treatment System Permit Number 16 and Chapter 250 of the Sewer Use Ordinance.
2) If and when a carbon change is necessary.
3) Treatment phase removal efficiency.

The following sampling frequencies and guidelines have been developed to enable the Love Canal Leachate Treatment Facility to meet the above needs.

4.1.6.1 Guidelines for Sampling

1. Label all sample bottles with the following information:
   i. Sample ID number.
   ii. Analysis requested.
   iii. Date and time.
   iv. Sampling location.
   v. Sampler(s) name.
2. Samples should be taken after no less than 16,000 gallons of leachate have been treated. A mid-total flow sample is preferred.
3. Open sample line and allow to purge 2 - 5 minutes before sampling.
4. Rinse bottle with some of the sample and dispose.
5. Collect sample.
6. If metals are required: add approximately 15 ml. HNO_3 to reduce the pH to >2.0.
7. Refrigerate sample at 4 degrees C. until delivery to the laboratory.
8. All sampling at the Love Canal must be recorded in the sample log book that remains at the facility. The following information shall be recorded:

i. Sample date.
ii. Location, Comments, Analytical Requirements.
iii. Sample number.
iv. Chain of custody Y/N.
v. Total number of samples.
vi. Person delivering samples.
vii. Person sampling.

4.2 Testing

The operator shall utilize the services of qualified and experienced technicians to perform chemical analyses on samples collected under 4.1.6. Samples are to be analyzed in accordance with the Standard Procedures for the Analysis of Water and Waste water. Sample results shall be available within thirty (30) working days following sample delivery.

4.2.1 Required Analyses

See sampling schedule/flow diagram 4.3.6.

4.2.2 Quality Control

Quality control for all sample analyses can be found in the N.Y.S.D.E.C. Superfund and contract laboratory protocol. The operators are responsible for checking the quality control data included with analytical results.

4.2.3 Discharge Limitations

The established effluent discharge criteria is as follows: in accordance with all term and conditions of Chapter 250 of the City of Niagara Falls Municipal Code, Sewer Use Ordinance and Permit No. 16 of the Love Canal Treatment System. Refer to 4.3.7 and 4.3.8.

4.3 Plant Records

It is important to keep comprehensive, up-to-date and complete plant records. Preprinted forms containing the information as outlined, are prepared and supplied by the Department of Environmental Conservation. These records are expected to be inspected and/or copied by the Department of Environmental Conservation on a periodic basis.

4.3.1 Daily Log

The Daily Log must contain the following information:

1. Date, Time of Shift
2. Names of Plant Personnel
3. Levels in North and South holding tanks, start and finish
4. Total effluent flow readings; start and finish, and water meter readings
5. Sample notes, type, identification number
6. If and which set of bag filters were changed
7. Oil levels in compressors
8. Sludge level in holding tank
9. If and when sludge transfers took place
10. $H_2 0_2$ stock
11. Site visitors and daily notes
12. Maintenance performed
13. Repairs initiated or completed

4.3.2 Sampling Analysis Log

All test results of required analyses shall be recorded on separate preprinted forms. Dates and flow records are to be entered in this log as well as in the Daily Log.

4.3.3 Monthly Report

The Department of Environmental Conservation requires the Sr. Operator to submit a Monthly Report. It should be a summary of the Daily Logs and must contain the following:

1. Total Flow
2. # Days Processed
3. Mean Flow
4. Operational and Maintenance Events
5. Remedial and Research Activities

4.3.4 Repair Log

The operators are responsible for completing a Repair Log for all major repair work. It should be written in the "Notes" Section of the Daily Logs Part 2 and contain the following information:

1. Name of Company
2. Names of Personnel

3. Purpose
4. Work Performed
5. Duration
6. Results

4.3.5 Inventory Sheet

The operators shall keep an inventory of all tools, spare parts, and miscellaneous equipment stored in the Treatment Plant or Administration Building.

4.3.6 LOVE CANAL LEACHATE TREATMENT FACILITY
LEACHATE SAMPLING AS OF AUGUST 1994

FOR INTERNAL INFORMATION		REQUIRED BY CITY PERMIT
JANUARY SOC/TSS F,M,E Pest/PCB's E only	FEBRUARY SOC/TSS F,M,E Pest/PCB's E only	MARCH SOC/TSS F, M, E Quarterly E-only MS/MSD
APRIL SOC/TSS F,M,E Pest/PCB's E only	MAY SOC/TSS F,M,E Pest/PCB's E only	JUNE SOC/TSS F,M,E Quarterly E only MS/MSD
JULY SOC/TSS F,M,E Pest/PCB's E only	AUGUST SOC/TSS F,M,E Pest/PCB's E only	SEPTEMBER SOC/TSS F,M,E Quarterly E only MS/MSD
OCTOBER SOC/TSS F,M,E Pest/PCB's E only	NOVEMBER SOC/TSS F,M,E Pest/PCB's E only	DECEMBER SOC/TSS F,M,E Quarterly E only MS/MSD

F - Filtered
M - Mid-point
E - Effluent

Quarterly Analysis includes:

Base Neutral Priority Pollutants - includes: Dichlorotoluene, Trichlorotoluene,
Acid Priority Pollutants Tetrachlorotoluene, Dichlorobenzotrifluoride
Total Phenolics
Volahle Priority Pollutants - includes: monochlorotoluene, monochlorobenzotrifluoride
Priority Pollutant Metals (bi-annual)

Bottle Requirements
BNA - 5 - 1 l amber bottles VOA's - 4 Septa + 1 Trip blank
Total Phenols - 2 - 1 l amber.

SECTION 5

OPERATION OF FACILITIES

5.1 Leachate Collection System
- 5.1.1 Southern Sector
- 5.1.2 Northern and Central Sectors
- 5.1.3 Shutdowns
- 5.1.4 Safety

5.2 Raw Water Tank
- 5.2.1 Functional Description
- 5.2.2 Normal Operation
- 5.2.3 Emergency Operation and Shutdowns
- 5.2.4 Safety
- 5.2.5 Maintenance

5.3 Clarification Tank
- 5.3.1 Functional Description
- 5.3.2 Sludge Removal
- 5.3.3 Normal Operation
- 5.3.4 Emergency Operation
- 5.3.5 Shutdown
- 5.3.6 Maintenance

5.4 Filter Feed Tank
- 5.4.1 Functional Description
- 5.4.2 Normal Operation
- 54.3 Emergency Operation and Shutdown
- 5.4.4 Maintenance

5.5 GAF Filters
5.5.1 Functional Description
5.5.2 Normal Operation
5.5.3 Emergency Operation
5.5.4 Maintenance

5.6 Activated Carbon Treatment
5.6.1 Functional Description
5.6.2 Normal Operation
5.6.3 Alternate Operation
5.6.4 Daily Operation
5.6.5 Emergency Operation
5.6.6 Shutdowns
5.6.7 Safety
5.6.8 Maintenance

5.7 Sludge Holding Tank
5.7.1 Functional Description
5.7.2 Sludge Removal/Transferring to Storage Tanks
5.7.3 Safety
5.7.4 Maintenance

5.8 Spent Carbon Transfer
5.8.1 Functional Description
5.8.2 Normal Operation
5.8.3 Alternate Operation
5.8.4 Emergency Operation

5.9 Fresh Carbon Transfer
5.9.1 Functional Description
5.9.2 Normal Operation

5.10 Spent Carbon Removal
5.10.1 Maintenance

LIST OF FIGURES

5.7.1 Adsorber Sequencing Schematic

5.1 Leachate Collection System

5.1.1 Southern Sector

5.1.1.1 Functional Description

Leachate collected by the perforated drain lines falls by gravity to a 1200 gallon wet well located at the low point on each site of the Canal. The leachate is pumped out of the wet well automatically or on demand, through a 4"0 forcemain and is discharged to the holding tank on the west side of the Canal.
A liquid level indicating controller is installed in Pump Chamber/Wetwell No. 3. This device continuously monitors the level of leachate in the tank and wetwell. When the leachate has accumulated to the approximate height of (9) nine feet, pumps located in Pump Chamber 3 can be activated thru the MCRT or MDCP. These pumps will pull leachate from the holding tank and deliver it to the Treatment Facility for processing.

5.1.1.2 Normal Operation

1. All breaker switches in power panel A (PP-A Treatment Facility) and power panels S1 and S2 must remain in the 'ON' position.
2. Process pumps in PC-1 and PC-2 are automatically controlled thru the MCRT Genesis Program or manually controlled thru the MDCP.
3. During pump operation, monitor the leachate level status on the Operations Screen and the runtime maintenance screen for pump performance.
4. The pumps in PC-3 are each rated at 200 gpm before hydraulic heads and friction losses are accounted for, the operation of one pump is sufficient to maintain the loading to discharge rate. Plant discharge is approximately 120 gpm.
5. As with the pumps that feed the holding tank, it is necessary to monitor the leachate level status at PC-3 (Station 3) relative to the pumps that are loading the treatment facility.
6. Begin treatment operations.
7. When the leachate level status at PC-3 (Station 3) indicates 0.5 to 1.0 feet, process control will automatically shut down feed pumps, but it will be necessary for the operator to key in 'N' and enter to remove MCRT control and also turn the switches from the 'Auto' to the 'Off' position at the MDCP.
   Under normal operating conditions it is recommended that the system be utilized at lower pumping rates for contaminant removal efficiency.

5.1.1.3 Maintenance

The following maintenance is to be performed as required:

1. Inspect Pump Chambers 1 and 2 for leak tightness. Dewater and discharge any inflow/infiltration to the adjacent wet well. A utility pump, hose, and electrical cord are located within the sewer guard under the manhole cover.
2. Check pump alignment. The pumps in the Southern Sector require little or no maintenance. They have been installed with greased-for-life bearings. Periodically, alignment integrity of the flex coupling, and pump/motor shaft freedom should be checked. For more information on pump maintenance consult Volume II.

In the event that the pump in PC-1 loses prime (valve on suction side needed), it may be reprimed as outlined below.

1. Turn pump off at the MDCP and So panels.
2. Plan and utilize for confined space safety.
3. Equip with a supply of water and dispenser.
4. Remove the 1" threaded plug from the top of the pump casing. Fill casing until full replace plug.
5. Turn the pump breaker on at the So panel.
6. Turn the HOA switch on the starter to hand.
7. Allow the pump to run three to seven minutes to determine if prime was caught. Positive sound and visual observations are the change in running pitch and flow displayed at the controller at PC-2. NOTE: The South Sector Holding Tank and Pump Chamber/Wetwell #3 must be off high alarm to allow the pumps in either PC-1 or PC-2 to operate.
8. If the Pump fails to take prime, repeat the procedure.
9. If the pump fails to take prime after several attempts, service as required.

5.1.2 Northern and Central Sectors

5.1.2.1 Functional Description

Leachate collected by the barrier drain falls by gravity to a 1100 gallon wetwell/pump chamber located at the low point on each side of the Canal (PC 1A, PC2A). On a alternating timed basis, these pumps activate automatically when the leachate level setpoint is reached for pump run. Similarly they will deactivate at the low level setpoint. All setpoints can be determined thru the MCRT. All leachate is discharged into PC-3A and then back flows into the adjacent 30,000 gallon holding tank. The liquid level indicating controller on top of PC-3A monitors the amount of leachate within the pump chamber/wet well and the holding tank. Any additional amount of liquid that may enter

PC-3A after capacity is reached will overflow to wetwell No. 8 in the South Sector. Entry points are drains on the east and west decon pads and the treatment room trench.

5.1.2.2 Normal Operation

1. All breakers for PP-No and PP-C must be on. These breakers are located in PP-A of the plant's electrical room. All other breakers with exception of #9 spare must be on.

2. The Genesis Program runs 24 hours/day activating the pumps in PC-1A and PC-2A as necessary to keep the field dewatered. Due to this automation an observation must be made at the beginning of each shift at the amount of leachate in PC-3A and the holding tank.

3. If PC-3A and the holding tank are at a high level alarm which has prevented the pumps in PC-1A and PC-2A from activating, it is necessary for treatment operations to commence. Refer to Section 3.1.

5.1.2.3 Operational Concerns

Consider the following operational concerns. Remedial action for each condition is included.

l. Pump(s) running lights for PC-1A and PC-2A are on at the MCRT and MDCP

i. Tank level rising at PC-3A - o.k.
ii. Tank level not rising

a. Activate pumps in PC-3A. Observe Station 3A liquid level indicator controller (L.L.I.C.) if the level drops. The L.L.I.C. is working properly. This indicates that the pumps in PC-1A and/or PC-2A are not discharging. A flow meter at PC-1A will confirm/deny discharge. PC-2A does not have a flow meter, therefore, MH-4B will have to be pulled and an observation made to confirm/deny flow from PC-2A. MH-4B is located approx. 110' south of the pulp chamber access road for PC-1A and PC-2A on the western collection system in the central sector. This particular pipe is a gravity forcemain. If flow is not observed or is minimal with a combination of overload signals, this indicates that the discharge is obstructed, flex coupling torn, or the motor has gone bad. Always check the easiest most accessible items first working toward the more difficult. Exchanges are: starters, wiring, flex coupling, motor, and then pump.

2. Pump(s) running lights for PC-3A are on at the MCRT and MDCP.

i. Leachate is flowing through the mag-tube and displaying flow, leachate can be seen and heard entering the rain water tank. The rain water tank level transmitter controller is increasing in height. This is normal operation.

ii. Leachate not entering the rain tank.

a. As with the pumps in PC-lA and PC-2A check the easiest most accessible items first working toward the most difficult. Examples are starters, wiring, coupling, motor and then pump.

Most problems can be avoided by vacuuming these wetwells at l8 month intervals.

If inspecting and performing corrective measures on any of the components does not bring the pump(s) back on line, a "pull" will be necessary. A pump "pull" entails the implementation of lock out/ tag out and confined entry procedures. Motor and piping removal has to be performed along with the physical pulling of the pump by a crane. Once the pump is out of the wetwell it must be set on plastic and wrapped prior to transporting to the decon pad. The pump must be decontaminated prior to rebuilding.

5.1.2.4 Maintenance

1. Check all control lights on the MVCP and replace if necessary.
2. Ensure wetwell vacuuming at the minimum of l8 month intervals.
3. Thrust bearings are lubricated at the factory. Do not lubricate at too frequent intervals.
4. Greasing of steady bearings is dependent upon runtime. Generally, the grease cup must remain full with its stem in the outermost positions and only to recede l l/4" (inches).

For additional information on pump maintenance consult Volume II.

5.1.3 Shutdown

Shutdown durations is dependent upon the amount of leachate collecting during a particular season. For shutdowns that do not exceed two or three days, proceed as follows:

1. Ensure that the wetwells are empty at the end of the shift.
2. Ensure that all fiberglass process tanks are at the minimum level.
3. Ensure that pump control switches for PC-3 and PC-3A are off.
4. Ensure low speed fan control for exhaust/vapor removal.

5. Ensure adequate heat when necessary.
6. Ensure lighting and security.

For shutdown periods greater than three (3) days, the operator is instructed to do the following:

1. Notify the plant engineer/manager of all particulars regarding the shutdown.
2. Process all leachates stored in the underground storage tanks (if possible).

5.1.4 Safety

Before entering any manholes or pump chambers for inspections and maintenance, perform the following:

Implement the confined space entry plan. Some of the major points are:

1. Evaluate and procedurally plan the functions that are to be performed.
2. Obtain a confined space entry permit and list the procedural plan where applicable. Submit for approval.
3. Implement lock out/tag out procedures.
4. Use personnel quality of 3.
5. Set command/control area upwind.
6. Don level C protection for top personnel, remove manhole cover and commence ventilation.
7. Set up tripod and retracting system.
8. Equip descender in Level B and harness.
9. Test atmosphere at work level.
10. Attach descender to retractor if no explosive gases exist.
11. Descend
12. Continue to monitor atmosphere.
13. Perform job task.
14. Exit
15. Remove personal protective equipment. Respirator last. (Descender).
16. Bag P.P.E. by support team.
17. Secure manhole/hatch.
18. Shower

5.2 Raw Water Tank

5.2.1 Functional Description

Leachate collected in the underground storage tanks is pumped on demand to the raw water tank through a 4" forcemain. This vessel is used as additional storage to begin plant loading and batch treatment operations.

Inside the plant, the leachate is pumped out of the fiberglass raw water vessel and into the clarifier using an air driven pump, a level transmitter monitors and displays the volume of leachate in the raw water tank at the comptroller and MCRT. A flow meter does not exist on the pump discharge pipe. Pumping rates are determined by visually observing the leachate level within the tank and at the valve displayed on the controller.

5.2.2 Normal Operation

1. Turn MDCP switches to auto
2. Obtain control of PC-3 and PC-3A at the MCRT.
3. Enter "Y" for "Are we dancin yet?" on the MCRT.
4. Activate all two speed exhaust fans on high
5. Activate single speed exhaust fans as required.
6. Activate the air drier
7. Close the condensate release valve on the tank
8. Start the air compressor
9. Ensure air purifying respirator available and on person
10. Note g.p.m. reading on influent mag meter.
11. Open gate valve on the clarified inlet pump and set required pumping rate. This rate will range between 120-130 g.p.m.

The clarifier inlet pumping rate shall be determined by required clarifier detention time, chemical addition schemes if used and plant loading rates. It is recommended that the rate be as low as practical to ensure good sludge removal in the clarifier.

5.2.3 Emergency Operation and Shutdowns

1. If the raw water tank fills to approx. 90%, the level transmitter will cut off waste. Feed(s) from PC-3 and/or PC-3A.
2. If the clarifier inlet pump fails, shut off waste feed pumps thru the MCRT or MDCP if in manual.
3. If the filter feed tank fills to approx. 90%, the level transmitter will close the air solenoid valve to the clarifier inlet pump.

5.2.4 Safety

Observe all safety regulations concerning confined spaces should there be any reason for entering the fiberglass tanks. Protective level A or B is necessary depending upon the job task.

5.2.5 Maintenance

1. Check flanges and connections for leak tightness.
2. Pump maintenance. Replace diaphragms and ball checks every 18 to 24 months. Indications of diaphragm, and ball check wear can be determined by listening to the pump while in operation.
3. Check lubrications rate of air distribution valve. Experience has proven the rate necessary to be minimal. Consult Volume II for air line lubricator information.
4. Should dewatering be necessary, use 2"0 hose and quick-connect fitting on lower 4" valve and reducer at floor trench.
5. Remove sludge from tank should build-up occur. Vacuum services are required. Contract out.
6. The mag tube on the influent line requires little to no maintenance, if problems should occur, consult Volume II.
7. Level transmitter. Little to no maintenance is necessary. Consult Volume II for calibration and troubleshooting should the need arise.

5.3 Clarification Tank

5.3.1 Functional Description

Leachate pumped out of the raw water tank is discharged into the clarification tank. The leachate passes slowly through the steel vessel permitting the removal of settleable solids and chemical precipitates. NAPL (non-aqueous phase leachate which collects on the bottom of the clarifier is raked to the influent end of the tank by redwood collector flights driven by a one-quarter horsepower motor. This sludge is periodically airlifted out of the hoppers to the sludge holding tank which was designed to allow the sludge to thicken prior to tank storing. However, since water injection is necessary to assist sludge transferring to the outside storage tanks, thickening is not practiced in the sludge holding tank. Removal of the aqueous phase from the organic phase can be done in the outside storage tanks. The frequency of sludge removal is generally once every month or 200,000 gallons of discharged effluent whichever comes first.

5.3.2 Sludge Removal (Clarifier to Holding)

1. Bring up MCRT Love Canal menu.
2. Select sludge transfer.

3. Satisfy question do you want to transfer to the sludge holding tank. Enter "Y".
4. Record level.
5. Activate clarifier. Activation of the clarifier can be done prior to the transfer and then shut down. A minimum one hour has been used.
6. Don protective level C (air purifying respirator)
7. Activate clarifier/filter feed, sludge holding, and floor exhaust fans. Select fan speed high.
8. Activate air dryer.
9. Close air/condensate release valve on tank.
10. Activate compressors.
11. Tape sludge level on holding tank exterior and/or record from level transmitter.
12. Open gate valve on 1 1/4" air line to clarifier siphon. Turn approximately one revolution.
13. Observe loading by translucent tank riser at top of holding tank.
14. Continue transfer until waste passing through sludge line clears or tank becomes full.
15. Close gate valve.
16. Deactivate compressors. Depressurize.
17. Deactivate air dryer.
18. Tape sludge level height and/or record from Level Transmitter.
19. Measure distance between tapes or calculate from Level Transmitter.
20. Calculate transferred gallonage. One inch approx. equals 17.5 gallons. Record.
21. Reset exhaust fans to low for clarifier/filter feed and sludge holding tanks. Turn floor fans off. Note: Continued fan activation has been used in the past to ensure purge of the facility.
22. Exit to the administration building.
23. Remove air purifying respirator.
24. Complete transfer report.

The amount of sludge to be handled will depend on leachate characteristics, clarifier detention time and the amount of leachate processed between transfers.

5.3.3 Normal Operation (Leachate Treating)

Operator discretion is required on whether to activate the clarifier or not. Periodic sampling and analysis should be performed to determine the best results. Clarifier activation places more solids and organics in suspension reducing bag filters and carbon life. Therefore, past operating procedures have been non-activation.

5.3.4 Emergency Operations

Provision in piping has been made to bypass the clarification tank. Should leachate treatment be imperative during clarifier down time, the waste water can be pumped directly from the rain water tank through the filtration and absorption procedures. Treatment without the use of the clarifier is not recommended as it will produce a noticeable increase in the carbon exhaustion rate.

5.3.5 Shutdown

Should any maintenance work be required on the inside of the clarifier, the tank must be dewatered. Connect a 2" hose and quick-connect fitting to a 4" valve and reducer at the influent end of the tank. Connect the opposite end to a 4" pipe within the floor trench in front of the GAF pressurized bag filtration units. Contents of the tank are drained to PC-3A.

5.3.6 Maintenance

1. Clarifier flight motor requires periodic lubrication. Consult Volume II.
2. Don full face air purifying respirator, open hatch and check flight movement. Check shear pin in motor and drive chain first if flights are not moving. Due to the age of this tank, it has been recommended that the clarifier be thoroughly evaluated. See plans and specifications submitted for remedial options.
3. Change activated carbon filter canisters at north end of tank every three months.

5.4 Filter Feed Tank

5.4.1 Functional Description

Clarified leachate collected in the filter feed tank by gravity overflow from the clarification tank, if pumped through the remaining treatment processes. The two filter feed pumps are used to push the wastewater through the bag filters, the carbon adsorbers and into the final effluent line.

5.4.2 Normal Operations

1. Check that all two (2) and/or four (4) valves on the suction and discharge lines of the filter feed pumps are open.
2. Close valves on adsorber vent lines.
3. Open valve on effluent line.
4. Check that the influent and effluent valves are open on the filter(s) to process through.
5. Reset the effluent meter.

6. Open the gate valves on the north, south, or both filter feed pumps. Operation has been with one filter feed pump only.
7. Obtain a volume balance of leachate feed and discharge on the raw and filter feed tanks. This can be performed by monitoring the level transmitters and adjusting the gate valves accordingly.
8. Continue pumping until tank is empty and the clarifier inlet pump is off.

5.4.3 Emergency Operation and Shutdown

1. If the filter feed tank fills beyond 90% capacity, the level transmitter will close the air solenoid valve to the clarifier inlet pump and discharging will cease.

2. If the filter feed pump that is in operation malfunctions:

   i. change to the other parallel pumping system, or
   ii. sequence overhead valve cluster to use the other pump through the same filter.

5.4.4 Maintenance

1. Check flanges and connections for leak tightness.
2. Grease and adjust valves as required.
3. Pump maintenance. Replace diaphragms and ball checks every 18 to 24 months. Indications of diaphragm, and ball check wear can be determined by listening to the pump while in operation.
4. Check lubrication rate of air distribution valve. Experience has proven the rate necessary to be minimal. Consult Volume II for air line lubricator information.
5. Should the filter feed tank need dewatering, use a 2" 0 hose and quick connect fitting on the lower 2"0 plug valve. Drains to the floor trench.
6. High pressure wash and vacuum organic residues as necessary should build-up occur. Refer to Operation and Maintenance Manual, Volume III procedures or contract out.

5.5. GAF Filters

5.5.1 Functional Description

Leachate collected in the filter feed tank is pumped through stainless steel, bag filtration units which are in line to the carbon adsorbers. These filters permit the removal of suspended material which might otherwise enter the carbon beds. These filters, therefore, are able to reduce the rate of carbon exhaustion in the adsorbers and will reduce unnecessary carbon binding.

5.5.2 Normal Operation

Under normal operating conditions, the filter feed pumps (2) are connected to the filters (2) in parallel. The north pump discharges through the east filter and the south pump discharges through the west filter. It is necessary to operate only one pump at a time.

The filtration system is expected to operate in the 35 to 45 p.s.i. range as indicated by the pressure gauges at the filters, for one discharging pump. For both pumps discharging, the range will be 35 to 55 p.s.i. This of course is dependent on pumping rates, condition of bag filter (s) and carbon age.

Bag filters should be changed at our around 500,000 gallon intervals, or if pressure rises above 55 psig.

In the event that a bag filter change is required, the operator should do the following:

1. Shut feed pump off. Close the effluent valve.
2. Close valves on influent and effluent lines at filter.
3. Open valves on influent and effluent lines at other filter.
4. Start up other feed pump.
5. Don Level C protective equipment.
6. Open filter drain valve to floor trench on isolated filter.
7. Remove and replace bag filters and secure top as outlined in Volume III.
8. Filter is now ready to receive wastewater.

5.5.3 Emergency Operation

Provisions in piping have been made for the interconnection of the filter feed lines. Should one pump or one filter be out of service for a period of time, either pump can be run through either filter by properly sequencing the cluster of five (5) overhead valves.

Provisions in piping have also been made for the by-passing of the filters should this be necessary. Prolonged or frequent leachate treatment without the use of filters is not recommended.

5.5.4 Maintenance

1. Check all piping for leak tightness.
2. Check filters for leak tightness.
3. Change filter bags as required.
4. Grease and adjust valves as required.

5.6 Activated Carbon Treatment

5.6.1 Functional Description

The carbon adsorption system consists of two lined carbon steel free standing adsorbers piped for downflow series operation. These vessels are ASME coded for 75 p.s.i.g.

The dual adsorbers will be operated as a one-train, two-stage adsorption system in series. Provisions in piping have been made for single-stage operation. For a more complete description, consult the Bulk Handling System manual in Section 5.

Pretreated leachate is pumped from the filter feed tank through the bag filters and is directed to the adsorbers by a network of piping and valves which sequence the lead and polish vessels. Pressure and sample taps are provided for raw, clarified, filtered, midpoint and effluent readings. These are located under the fume hood.

5.6.2 Normal Operation (V-l Lead, V-2, Polish)

The adsorbers are connected in series. V-l is the lead adsorber, V-2 is the polish adsorber. Only the following valves, as numbered on Figure 5.7.l are left open during treatment.

1. Three (3) valves to pressure gauges gl, g2, and g3.
2. Valves 6,8,2,3,22 and 9 in order of flow sequence.

5.6.3. Alternate Operation (V-2 Lead, V-l Polish)

The adsorbers are connected in Series. V-2 is the lead adsorber, V-1 is the polish adsorber. Only the following valves are left open during treatment.

1. Three (3) valves to pressure gauges gl, g2, and g3.
2. Valves l,4,5,7,ll and 9 in order of flow sequence.

5.6.4 Daily Operation/Shutdown Mode

At the beginning of a treatment shift, Valve 9 on the effluent line will be closed to prevent siphoning of the carbon beds when the feed pumps are off. The vent valves at the rear of the adsorbers will be open to preclude a build up of hydrogen sulfide gas in the adsorbers.

A. Start-up - Feed pumps on

1. Reset meter on effluent line.
2. When leachate passes through vent line of lead adsorber, close vent valve.

3. When leachate passes through vent lines of polish adsorber, open valve 9 and close the remaining vent valve.
4. Note pressure of g2. Should be approximately 30 p.s.i.g. Will vary with carbon age and pump rate.
5. Note pressure on lead gauge. Should be 10 p.s.i.g. plus or minus 3 p.s.i. less than g2. Will vary with carbon age and pump rate.
6. Note pressure on polish gauge. Should be 10 plus or minus 3 p.s.i. less than lead gauge. Will vary with carbon age and pump rate.
7. Check vessels and piping for leak tightness.
8. The installation of flow meters on the discharge side of the filter feed pumps is recommended. A comparison against the effluent meter therefore could be made. Original sonic meters were inaccurate on lined pipe and the pulse discharge from the reciprocating pumps.
9. Take necessary samples (see section 4)

Note: Experience with the above procedure has blown adsorber rupture disks. Start-up has been:

1. Close the adsorber vents on V1 and V2.
2. Reset meter on effluent
3. Open effluent valve
4. Verify that the influent and effluent valves are open on the bag filter(s) relative to the filter feed pump that will be used
5. Open gate valve on pump selected

Optimum operations of the adsorption facilities is obtained if flow changes to the adsorbers occur slowly. Valves should be turned and pumping rates should be adjusted slowly to prevent hydraulic shock.

B. Shutdown - Feed pumps off.

1. Close valve 9 on effluent line.
2. Open vent valve slowly on lead adsorber. Leave open.
3. Open vent valve slowly on polish adsorber. Leave open.
4. Record readings:Total and daily flow (2).

5.6.5 Emergency Operation

Under normal operating procedures, both adsorbers will be on line and connected in Series. In the event that something occurs to warrant the shutdown of an adsorber, the flow shall be directed to the other adsorber and steps shall be taken immediately to remedy the situation.

Condition A. V-l Lead and V-2 Polish

Case (a) V-l malfunctions or requires a carbon change:

Divert influent feed to V-2 and isolate V-l.

l. Shut feed pumps off.
2. Close Valve 9 Vent V-l as outlined in Section 5.6.4B.
3. Close Valves 6, 2 and 8 and open Valve l.
4. Record isolation event.
5. Resume operations by opening Valve 9 if necessary.

Case (b) V-2 goes down:

Isolate V-2

l. Shut feed pumps off.
2. Close Valve 9, vent V-2 as outlined in Section 5.6.4B.
3. Close Valves 2, 3, and 8, and open Valve 7.
4. Record reason for isolation event.
5. Resume operations by opening Valve 9 if necessary.

Condition B. V-2 Lead and V-l Polish

Case (2) V-2 goes down or needs a carbon change:

Divert influent feed to V-l and isolate V-2.

l. Shut feed pumps off.
2. Close Valve 9, Vent V-l as outlined in Section 5.6.4B.
3. Close Valves l, 5 and 4 and open Valve 6.
4. Record reason for isolation event.
5. Resume operations by opening Valve 9 if necessary.

Case (b) V-l goes down:

Isolate V-l

1. Shut feed pumps off
2. Close Valve 9, vent V-l as outlined in Section 5.6.4B.
3. Close Valves 4, 7 and 5 and open 3.
4. Record reason for isolation event.
5. Resume operations by opening Valve 9 if necessary.

If the leachate collection system contains a significant amount of leachate, the treatment with one adsorber may be necessary. However, extensive or continuous use of single-stage treatment is not recommended as a reduction in effluent quality results.

If a major leak or failure occurs which would cause the adsorption system to be inoperative and repairs are beyond the scope of plant operations, the plant engineer/manager should be contacted immediately.

5.6.6 Shutdowns

For shutdown periods not exceeding one week, the same instructions that were given in Section 5.6.4 for daily shutdowns shall apply.

For extended shutdown periods, all feed pumps shall be shut down and the adsorbers shall be plant water rinsed (Section 5.9.2-A.5) and topped off with water. All process valves shall be closed and the adsorber vent valves left open for the duration of the shutdown.

5.6.7 Safety

Research efforts have confirmed that wet granular activated carbon confined in large vessels creates an oxygen demand. The resulting environment may be hazardous to human health.

The adsorbers shall not be entered without testing Oxygen and explosive gas levels plus following all appropriate safety measures for entering and working in confined spaces.

5.6.8 Maintenance

5.6.8.1 Carbon Replacement

Regular monitoring of the adsorber influent (filtered), mid-point and effluent waste water lines will be used as a guide in evaluating individual bed as well as the total carbon performance.

Occidental Chemical Corporation, based on sample test results and gauge readings, will be responsible for scheduling fresh carbon deliveries.

The City of Niagara Falls, expected to sample on an irregular basis, may report to the operator that the plant effluent is outside of specified discharge limitations. Should this occur, the operator is responsible for contacting the Plant Engineer/Manager for instructions regarding effluent evaluation and possible carbon replacement.

5.6.8.2 Equipment

Maintenance to be performed on the adsorbers and related process piping includes the following:

1. Check flanges and connections for leak tightness.
2. Grease and adjust valves.
3. Inspect gauges.
4. The installation of flow meters on the discharge side of the filter feed pump is recommended. A comparison against the effluent meter therefore could be made.
5. Oil effluent meter monthly (consult Volume II).

5.7. Sludge Holding Tank

5.7.1 Functional Description

Settleable solids and chemical precipitates which collect on the bottom of the clarifier are raked into (2) hoppers at the influent end of the tank. This material is removed once per month via air-lift through two risers into a common discharge line which outlets in the sludge holding tank. (see 5.3.2)

Provisions have been made to return the supernatant (clarified) leachate by sludge settling back to the clarifier. However, water injection is necessary to assist sludge transferring to the outside storage tanks, therefore, supernatant returning is not practiced.

5.7.2 Sludge Removal Transferring to Storage Tanks

1. Bring up Love Canal menu
2. Select sludge transfer
3. Select external storage tank to accept sludge
4. Adjust valves is necessary on waste feed lines to storage tank selected. (Manual operation on tank catwalks). Use of air purifying respirator required.
5. Confirm open status by green display on MCRT.
6. Record level from transmitter controller.
7. Satisfy question do you want to transfer to storage tank? Enter Y. Air line solenoid valve and motorized operating valve will open.
8. Don Level D with air purifying respirator available and on person.
9. Activate air dryer.
10. Close condensate release valve on the monorotor compressor.
11. Don ear protection.
12. Activate air compressors.
13. Open pump exhaust valve.
14. Open suction and discharge valves to and from sludge pump
15. Open gate valve for pump's air supply
16. Open gate valve on sludge pump until diaphragms reciprocate 1-2 cycles per second.
17. Inject water through 3/4" flex hose to slurry sludge and assist pump
18. Continue pumping until tank level is lowered to the suction inlet. Monitor transfer piping for leaks and rigidity of support hangers.
19. Close gate valve on water injection supply
20. Close gate valve on sludge pump to end transfer
21. Close gate valve on air supply line
22. Close pump exhaust valve
23. Close suction and discharge valves to sludge pump
24. Record level from transmitter controllers
25. Convert to inches and reference to gallons from chart in Volume II under T-Tanks.
26. Complete sludge transfer record

Note: If pump loses prime, open and close tank outlet valve. Repeat if necessary

5.7.3 Safety

1. If entering the sludge tank becomes necessary observe all regulations concerning confined spaces.

5.7.4 Maintenance

1. Check flanges and connections weekly.
2. Grease and adjust valves as required.
3. Replace diaphragms and ball checks as necessary. Diaphragms are made of neoprene and eventually deteriorates from chemical attack. The replacement expectancy is once every two to three years. Ball checks are made of teflon and are chemically inert to most substances. Their replacement frequency is unknown, but should be scheduled once every five years as preventive maintenance. Consult Volume II and III for repair procedures.
4. Air-line lubricator. The oil rate is pre-set and should not need adjusting. If an adjustment is necessary, refer to Pumps (Plant) and SCFM Table in Volume II.

5.8 Spent Carbon Transfer

5.8.1 Functional Description

When the carbon in the first (or lead) stage becomes exhausted, the adsorber is removed from service and the carbon is transferred to the transfer storage module V-3. Once the adsorber has been loaded with a fresh supply of carbon, the spent carbon is transferred from V-3 to lined, empty 55 gallon drums.

5.8.2 Normal Operation

The lead adsorber is removed from service and the plant is shut down. The polish adsorber is to be set up as the lead adsorber awaiting resumption of plant operations.

The days prior to a scheduled carbon change should be used to dewater the central storage tanks to a point where they can be allowed to sit until the two adsorbers are back on line.

Note that a carbon change produces about 10,000 gallons of water which goes to the central holding tank. Under normal operating procedures then, the tank level should be less than 50% at the start of a carbon change.

A. Preparation of Adsorber for Spent Carbon Removal

1. Divert influent feed to the polish adsorber (see Section 5.6.2).
2. Remove lead adsorber from service by closing all valves to and from the vessel.
3. Be sure all water valves on service module are closed.
4. Reset module water meter.
5. Open plant water valve to spray nozzle and adsorber vent valve to drain.
6. Open water module control valve and allow 3,500 gallons of water through the spent adsorber.

7. Shut the plant water spray valve and vent valve to drain.

B. Prepare Transfer Storage Tank (V-3) for Transfer

1. Open transfer tank vent valve.
2. Assure all other valves on V-3 are closed.
3. Reset water module meter.
4. Close drain valve to fume hood sink and vent valve to roof riser.
5. Open water valve to spray nozzle on transfer tank.
6. Allow 1,000 gallons of water to enter transfer tank as a water cushion.
7. Close water valve to spray nozzle on transfer tank to end water cushion placement. Transfer tank is now ready to accept the spent carbon.

C. Transfer Spent Carbon From Adsorber To V-3

1. Reset module water meter.

2. Open 30 p.s.i. air line valve (on vent line) slowly and pressurize the adsorber.
3. Open adsorber outlet valve one-third to three quarters and transfer carbon from the adsorber to the transfer tank.

   Note: One operator must monitor the sight glass and inject water while the other operator regulates the outlet valve.

4. When air is noted passing through the sight glass on spent carbon riser to V-3 (about 3 hours into transfer) open the spray nozzle valve on the adsorber.
5. Continue adding flush water until little or no carbon is seen passing through the sight glass.
6. Close water spray valve.
7. When only air is seen passing through the sight glass, the transfer is complete. Close the air valve to the adsorber.
8. Close the carbon outlet valve on the adsorber.
9. Open the adsorber vent valve slowly and depressurize the tank.
10. Close the vent valve on V-3.

D. Prepare Adsorber for Receiving Fresh Carbon

1. Reset water meter on module.
2. Open plant water valve to spray nozzle and place 1,500 gallons of water in adsorber.
3. Close water valve to spray nozzle to end water cushion placement.

The adsorber is now empty of carbon, vented, and is ready to receive a fresh charge of carbon. The transfer tank is full of spent carbon and vented, and is ready for final transfer.

The above operations (A, B, C, & D) should be carried out the day before a scheduled carbon change. Allow 4 hours to complete.

Note: Level D protective equipment with a air purifying respirator available and on person is required. It may be necessary to don the respirator during or at the end of these procedures.

5.8.3

There are slight variations to both the methods of water rinsing the spent carbon and the means of placing a water cushion in the transfer tank.

Water Rinsing:

The downflow method of water rinsing is quicker in that a larger water line is utilized. However, the backwashing method is more efficient, it does not cause unnecessary bed packing and will ensure that the bed remains flooded once rinsing is complete.

5.8.4 Emergency Operation

5.8.4.1 Treatment

During a carbon change one adsorber will be out of service and the plant will be down. If however, the collection system contains a significant amount of leachate at this time, the operator may decide that it is necessary to continue treating.

No change to the preceding list of transfer instructions is required to treat with one adsorber. Influent feed has been diverted to the polish adsorber and is already valved to outfall.

It is not recommended however, that single stage treatment be used extensively as there is considerable reduction in final effluent quality.

5.8.4.2 Carbon Transfers

During spent and fresh carbon transfers, the operator must constantly monitor slurry movement. Carbon packing in the adsorbers and blockages in the transfer lines have been known to occur.

The l"0 air and water lines to the underdrain on the adsorbers can be used to throttle the carbon bed should packing occur. Similarly, 3/4"0 hose connections are provided on the transfer lines at elbows and valves to assist in freeing the lines of blockages should this be a problem.

If a major leak, failure or blockage develops during transfer operations, the repairs are beyond the scope of plant operations, the plant engineer/manager should be contacted immediately.

5.9 Fresh Carbon Transfer

5.9.l Functional Description

The empty adsorber will be filled with activated carbon from a supply trailer that will back up to the rear wall of the plant. The carbon is transferred in a slurry by means of truck air pressure.

The trailer is first filled with water to create the slurry. A 4"0 slurry hose is connected to the adsorber fill line (black) and the trailer carbon outlet line. The trailer is then pressurized and the carbon slurry is pushed into the adsorber.

5.9.2 Normal Operation (Hopper Truck)

A. Fill Trailer With Water

1. Connect 2"0, 15 lb. water line(s) to trailer fill line, from the 4 x 2 plant water reducer.
2. Connect adsorber fill line to trailer carbon outlet line #2 using one or two 4"0 flexible hose(s).
3. Open trailer manways and vent line to vent trailer during filling.
4. Open trailer fill line valve #25.
5. Open plant water valve to fill trailer. The trailer filling can be watched by observing the water level through the trailer manways.
6. Close plant water valve.
7. Close trailer vent valve and manways.
   Note: Calgon or contracted carbon supplier usually performs.

B. Transfer Carbon to Adsorber

1. Make certain vent valve is open (Adsorber)
2. Open 4"0 black adsorber fill line.
3. Instruct truck operator to pressurize.
4. Monitor slurry movement by sight glass.
5. Continue transfer until only air and water is seen through sight glass.

6. Instruct truck operator to cut pressure.
7. Close adsorber fill line.
8. Rinse hoppers.
9. Disconnect, coil, and return all hoses to designated areas.
10. Sign receiving slip and file.

5.10 Removal of Spent Carbon from V-3

1. Connect 4" ball valve to 4" outlet line (black).
2. Couple 4" hose to ball valve.
3. Close vent valve on V3.
4. Open airline and pressurize to 30 p.s.i.
5. Open carbon outlet valve.
6. Man ball valve and regulate as crew member fills lined 55 gallon drums. When full, allow to decant overnight.
7. When air is noted passing through the sight glass, open the spray nozzle and rinse until little or no carbon can be seen.
8. Close carbon outlet valve (grey) and outlet valve (black).
9. When drums are completely drained of excess water, cover, rinse, band and stage within the drum storage facility.
10. Label drums as hazardous waste. Also paint manifest number in code.
11. Complete manifest.

Note: The technique of removing and drumming spent carbon from V-3 is variable.

5.10.1 Maintenance

Maintenance to transfer equipment is to be performed on a regular basis and includes the following:

1. Check flanges and connections for leak tightness.
2. Inspect pressure gauges.
3. Adjust regulators on service module.
4. Replace rupture disks and sight glasses as required.
5. Grease and adjust valves.
6. Keep walls, floor, truck pad and transfer lines clean.
7. Flush and clean transfer hoses.

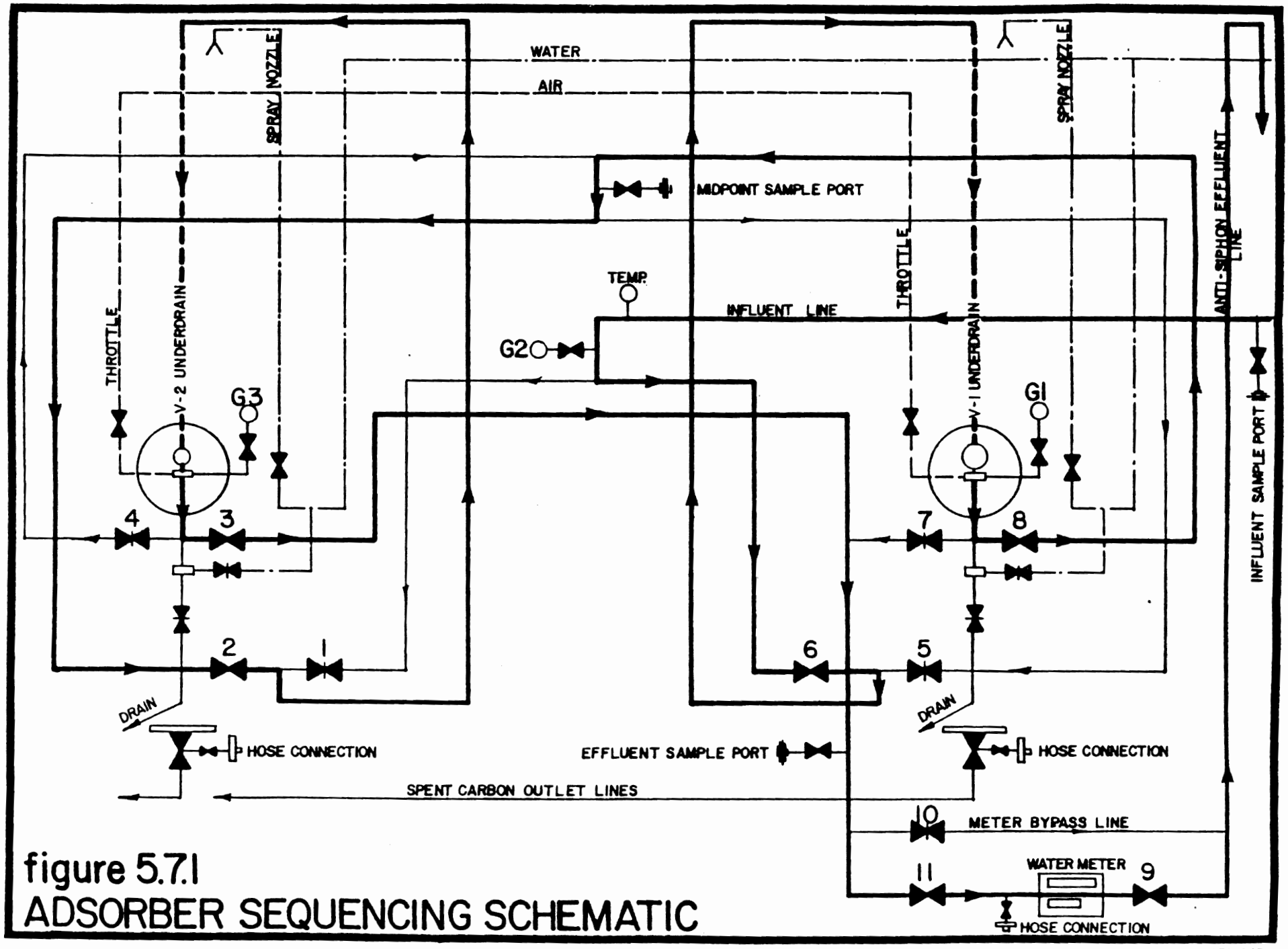

figure 5.7.1
ADSORBER SEQUENCING SCHEMATIC

979-583

SECTION 6

Operating Manual

BULK HANDLING SYSTEM

FOR

"LOVE CANAL" LEACHATE TREATMENT FACILITY

NIAGARA FALLS, NEW YORK

BY

CALGON CORPORATION

PITTSBURGH, PENNSYLVANIA

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PROJECT NO. 8209U

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OPERATING MANUAL

BULK HANDLING SYSTEM
PROJECT NO. 8209U

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1.0 INTRODUCTION

This manual covers a general description of the carbon transferring procedures for the bulk handling system located at the Love Canal Leachate Treatment Facility at Niagara Falls, New York.

The procedures set forth herein represent the best information currently available for the installation. in event improved operating techniques are developed in the future by Calgon, such information will be issued for incorporation in this manual.

2.0 DESCRIPTION OF FACILITIES

2.1 GENERAL DESCRIPTION

The equipment provided for the adsorption system consists of two lined carbon steel free standing adsorbers with underdrains. one lined carbon steel transfer tank with underdrain, two dual bag filters, all carbon slurry piping, utility piping and all associated instrument and controls.

The dual adsorbers will be operated as a one-train, two-stage adsorber system in series with provisions for possible parallel operation. Spent carbon will be transferred from the carbon adsorber to the transfer tank prior to delivery of activated carbon in a Calgon Environmental Systems trailer. The delivered carbon will be loaded directly into an empty adsorber. After the delivery is made, the spent carbon will be transferred from the transfer tank directly into the empty trailer and returned to Calgon for reactivation.

2.2 PROCESS DESCRIPTION

This is a general process description of the operation at the granular activated carbon leachate treatment facility located at the Love Canal, Niagara Falls, New York. The flow diagrams should be consulted in conjunction with the description of facilities.

Pretreated leachate liquid is pumped through the two existing bag filters, to achieve maximum solids removal, then sent to the activated carbon leachate treating system. The impurities in the stream are adsorbed on the activated carbon as the liquid is passed through the beds. The flow is regulated by the control system on a continuous basis.

2.2 PROCESS DESCRIPTION (CONTINUED)

Two adsorbers are each filled with approximately 20,000 lbs. of granular activated carbon. Leachate feed enters the top of the vessels, in series, flows downwards through the carbon beds, and leaves through a pipe lateral system located at the bottom of the vessels. The treated water leaving the adsorbers is discharged through a tie-in at the battery limits, to the sanitary sewer.

When the carbon in an adsorber becomes saturated with the impurities adsorbed from the leachate, the adsorber must be taken out of service to remove the spent carbon and replace it with fresh carbon. Prior to removal from the adsorber, the spent carbon will be rinsed, downflow, with plant water to displace interstitial impurities from the carbon bed.

Before the adsorber is recharged with fresh carbon, the spent carbon must be removed. This is accomplished by pressurizing the adsorber with 30 p.s.i. plant air and transferring the spent carbon as a water slurry to the transfer tank. Approximately 1600 gallons of plant water is then introduced into the empty adsorber to cover the underdrain and protect it during carbon loading.

Upon arrival at the site, the Calgon Environmental Systems bulk trailer containing activated carbon is topped off with water to produce a slurry. The trailer transfer lines will then be hooked up to the adsorber and the trailer pressurized with 15 p.s.i. plant air. The activated carbon slurry will then be transferred to the adsorber. The vessel will then be ready to be placed into service in the polish position.

The spent carbon in the transfer tank can then be transferred to the trailer. This is accomplished by pressurizing the transfer tank with 30 p.s.i. plant air and transferring the spent carbon as a water slurry to the empty trailer. Water spray injection through a nozzle located on the top vessel will aid in the complete transfer of slurry to the Calgon Environmental Systems trailer. Once the trailer is loaded, about 3,500 gallons of motive water will be drained off down the area drain to the sump. The spent carbon can then be returned to Calgon for reactivation.

When the first stage or lead bed of the dual adsorber module is taken off line for carbon replacement, the adsorber which has ben in the second or polish position becomes the lead bed and, or such, carries the adsorption load alone for a short period of time. Then, when the recharged adsorber is ready, it is put back on line and becomes the second stage adsorber.

By placing the partly exhausted carbon in the lead position and the fresh carbon in the polish position the carbon system is utilized to its maximum efficiency. The alternating of adsorber position occurs each time a carbon replacement is made.

3.0 START-UP

3.1 PRELIMINARY STEPS

a. Check all vessels and piping for leak tightness. Also pressure test the vessels.

b. Check all machinery for rotation, lubrication, freedom of movement, alignment, clearances, guards, etc.

c. Check electrical system for shorts, and check heater and breaker sizes.

3.2 FILLING THE ADSORBERS

At the conclusion of the above preliminary steps, the adsorbers are to be filled with carbon from the CCS Trailers. The carbon is transferred into the vessels as a slurry through the transfer lines located near the top of the adsorbers. To unload a trailer it must be filled with water prior to beginning the transfer sequence. While transferring the carbon, the valves in the transfer lines to the adsorbers and the valves in the vent lines shall be fully open. All other valves should be in the closed position.

The trailer driver/operator will connect the necessary hoses and will operate all valves, control devices, etc., associated with the trailer. Under no circumstances should the hopper trailer be connected to a pressure source greater than 15 p.s.i.g. When all of the carbon has been transferred from the trailer into the vessel, as evidenced by either the sound of the flow through the hose and pipeline or observation through the sight glass, the air shall be shut off, the transfer valves closed, the trailer pressure vented, and the transfer line disconnected. The vent valves can then be closed.

3.3 PLACING SYSTEM IN OPERATION

3.3.1 Flow Control

For normal operation, the flow shall be established by setting the control system for the required flow rate. The flow rate may have to be set at a higher figure depending upon the quantity of wastewater to be processed. A flow totalizer located in the effluent line can be used to monitor flow.

Best performance will occur under stable flow conditions and frequent fluctuations in the flow could cause problems in effluent quality. Therefore, it is highly desirable to set the initial flow at a rate that can be readily maintained.

3.3.2 Adsorption System Start-up

To put the adsorption system on stream, follow the procedure described below.

The pretesting facilities (pumps, clarifier filters, etc.) shall be fully flooded and operating at the desired feed conditions. Leachate to the carbon adsorbers shall be free from debris and other extraneous material. This wastewater shall be run to drain until the systems are operating as required. When this has been accomplished, the inlet valve to the facility can be opened and the system put on stream.

4.0 OPERATING MODES

4.1 SEQUENCE OF EVENTS

4.1.1 Description

The purpose of this section is to outline the sequence of events which occur when an adsorber needs to be recharged with fresh carbon or when a load of exhausted carbon needs to be removed. The events refer to the operations which are outlined in more detail in the referenced sections.

4.1.2 Normal Carbon Replacement

Prior to carbon replacement, the following conditions should exist, namely, two adsorbers full of carbon and on-stream, and the transfer tank empty.

When it becomes necessary to replace carbon in an adsorber, the following sequence of events will occur:

1. Switch treating system feed to the polish adsorber and take the exhausted lead adsorber off the line.

2. Water rinse the spent carbon.

3. Transfer spent carbon to empty transfer tank.

4. Transfer fresh carbon from CCS Trailer to empty adsorber.

5. Place freshly filled adsorber in polish position in the adsorption train.

6. Transfer rinsed spent carbon from transfer tank to CCS Trailer.

At the conclusion of this sequence, the conditions which existed prior to the transfer will again be in existence, namely, two adsorbers will be full of carbon on-stream and the transfer tank will be empty.

4.1.3 Exhausted Carbon Removal

The spent carbon will be drained of interstitial water, then returned to Calgon for reactivation.

4.2 ADSORBER SEQUENCING

4.2.1 Description

The adsorbers are designed for downflow operation and can be operated as single stage units or as a two-stage system as indicated by the following:

a. Adsorber A - lst Stage, Adsorber B - 2nd Stage

b. Adsorber B - Single Stage

c. Adsorber B - lst Stage, Adsorber A - 2nd Stage

d. Adsorber A - Single Stage

When the carbon in an adsorber becomes saturated with the impurities adsorbed from the leachate, the adsorber must be taken out of service to remove the spent carbon.

The spent carbon must be thoroughly rinsed with water prior to its removal. During the rinsing period, the leachate treating system will be operated as a single-stage system. Upon completion of the rinsing, the

carbon will be transferred to the transfer tank to await removal back to Calgon by a CCS Trailer. The spent carbon will be transferred to the CSS Trailer following the delivery of fresh carbon to an empty adsorber.

Each time the first stage adsorber of a train is taken off the line for carbon replacement, the adsorber which has been the second stage unit becomes the first stage unit. This places the freshest carbon in service on the most completely treated water. When the next adsorber is ready for carbon replacement, the procedure is repeated. This rotating of one adsorber and then the other occurs each time recharging takes place.

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MAINTENANCE AND SAFETY PRECAUTIONS FOR THE JOHN DEERE SNOWBLOWER

Purpose: Snow removal at treatment plant, Admin. Bldg., Public Information Office, around pump chambers and drum area.

Description: John Deere two-stage, 8 H.P., 26" cut. Manual shift with 5 forward speeds and one reverse speed.
Controls consist of shift lever, auger disengage and engage lever, throttle lever, off, slow and fast lever and key switch.
Snowblower is equipped with electric start and tire chains.
Safety shut-down controls are situated on handlebars for instant emergency shut down.

Purposes of Maintenance:

1. Prolong the life of the machine.
2. Prevent an accidental breakage which may result in injury.

Maintenance Procedures:

1. Always check oil level before using. Keep level at proper marking on dipstick using 50W-30 oil.
2. Change engine oil as recommended in Owner's Manual. This comes about in late January.
3. Grease with Plastilube all points as indicated in Owner's Manual.
4. Check oil level in auger drive housing. Keep filled to proper level.
5. Odd numbered years, this machine is taken to D.W. Carl in Pekin, N.Y. for complete service. Change all oils, adjust drives, tune-up engine, replace worn or broken parts.
6. For additional information refer to O & M Vol. II.

Safety Precautions:

1. Always shut down machine before starting to unplug chute or free auger.
2. Keep a firm grip on machine handlebars for emergency shutdowns.
3. Observe area for persons in the path of discharge chute. Machine throws gravel and foreign objects as well as snow.
4. Refill gas tank after using.

OPERATIONAL AND MAINTENANCE PROCEDURE
REPLACEMENT OF BLOWER BELTS FOR THE
DRAVO HASTINGS MAKE-UP AIR UNIT
STANDARD OPERATING PROCEDURE (S.O.P.)
SITE IDENTIFICATION NUMBER 9-32-020 LOVE CANAL

PURPOSE: To maintain 24 hr. make-up air through the Treatment Room for consistent air exchanges to minimize or eliminate concentrations of volatile organic compounds.

DESCRIPTION: One direct fired make-up air system manufactured by Dravo Hastings Model Number LU215-9-756 (HR-2). This unit is located on the north end of the plant's second story roof. It's dimensions are roughly 13' in length 7' in width and 2' in height.

PERSONNEL & EQUIPMENT NEEDED:
- Personnel Quantity of two
- One 3/4" box wrench
- One 3' - 4' 2" x 4" board
- WD-40 or equivalent
- Two B-51 belts
- Safety glasses
- Tyvek coveralls
- Gloves

SAFETY PRECAUTIONS:
- Do not replace belts under high wind conditions
- Report to third personnel of maintenance event
- Use a tool belt
- Use care in ascending and descending to and from roofs

PROCEDURE:

1. On the unit's east side, release the four spring loaded clips to remove the metal access panel.

2. Ahead is the rectangular controller, turn the power-disconnect handle to the "OFF" position. This action will cause the blower to stop and dampers to close.

3. Below the controller. Locate the square metal panel to access the belts, motor, and adjusting carriage. Release the four spring loaded clips.

4. Spray WD-40 on the 3/4" motor travel nuts and turn counter-clockwise with the 3/4" open end box wrench. Push the motor toward the blower until sufficient belt slack exits.

5. Remove the worn or broken fragments of belts

from pulleys and associated areas.

6. Using two belts, size B-51 and working from the inside toward the out, place the belt around the blower pulley and then the motor pulley.

7. When both belts are on, push the motor toward the plenum using the 2" x 4" board.

8. Adjust the belt(s) tension by tightening the opposite pair of 3/4" nuts in an alternating sequence. Always check the tension after a tightening series.

9. Close the door on the rectangular controller and turn the power disconnect handle to the "ON" position. This action will cause the dampers to open. Once fully open, the blower will activate. NOTE: The blower switch on the remote controller within the plant office must be in the "ON" position.

10. Observe the belt(s) running performance and adjust accordingly.

11. Replace the belt access panel.

12. Replace the controller's access panel.

FREQUENCY: As needed. Inspect belt integrity and tension during Spring and Fall.

SERVICE/
SUPPLIER:

- Permanent Site Staff
- Hastings Industries, Inc.
  Hastings, Nebraska

March 1, 1989

OPERATIONAL AND MAINTENANCE PROCEDURE
REPLACEMENT OF VAPOR PHASE CARBON ADSORPTION CANISTERS
STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To insure safe exhaust emissions and provide high quality ambient air at the Love Canal Treatment Facility.

DESCRIPTION: There are four, vapor phase, adsorption canisters currently in use at the Love Canal Treatment Facility. These canisters contain activated carbon and are attached, inline, to the process vessels as follows: one to the raw tank, two on the clarifier and the final one to the filter feed and sludge holding tank. Using rooftop fans, vapors are pulled from the vessels, passed through the carbon and exhausted into the atmosphere.

SAFETY PRECAUTIONS:

1. The canisters connect directly to the process vessels, therefore, use of protective clothing and respiratory protection is required.

2. Each canister weighs in the excess of 400 lbs.. Proper lifting and handling techniques must be followed.

3. The manufacturer warns of the possibility of the buildup of latent heat if venting organic peroxides through activated carbon. The exact composition of the vapors that will be passed through the canister at any given time is unknown and diverse, therefore, it is necessary to soak the carbon with water, for at least one hour, prior to installation.

4. Charge canisters with water slowly to prevent carbon dust emmissions.

PROCEDURE:

1. Move the required number of canisters from outside storage to the area near the bag filters in the treatment facility.

2. Open 4" bungs on the top and side of canister.

3. Charge each canister with water utilizing the garden hoses.

4. When the canisters are full, allow to stand for at least one hour.

5. While canisters are standing begin to remove the canister to be changed.

O&M SOP Replacement of carbon adsorption canisters (cont.)

6. Loosen all the flange bolts that connect the canister to the suction pipe.

7. Loosen the flexible hose portion that connects the canister to the exhaust line.

8. Remove the 4" threaded nipple from the top of the canister. Replace with 4" bung plug from new canister.

9. Remove the flange section from the side of the canister and replace with 4" bung plug from new canister.

10. Label spent canister with a proper hazardous waste label and mark drum with date of removal.

11. Move spent canister to the outside decontamination pad for later staging.

12. When new canisters have soaked for one hour or longer loosen the 3/4" plug located at the bottom of the drum and allow the canister to drain. (To completely drain the canister tip slightly and support until water stops flowing.)

13. Place canister into service by reversing removal steps.

14. Mark in service date on the card attached to the exhaust pipe or directly on the canister.

FREQUENCY:

1. Change the raw tank and filter feed/sludge holding tank every 3 mos. and change the two clarifier canisters every 6 months.

2. Order new canisters from contractor every year.

SERVICE/SUPPLIERS:

TIGG Corporation
31 Moffett St.
P.O. Box 11661
Pittsburgh, PA 15243
(412) 563-4300

Mr. Robert Byron

August 12, 1994

DEWATERING OF INFILTRATE INFLOW OF SOUTH SECTOR PUMP CHAMBERS

PURPOSE: To protect Non-Submersible motors and pumps from damage or failure.

DESCRIPTION: Pump Chamber (PC) 1 and 2 in the South Sector contain horizonal motors and pumps. PC-1 and 2 dewater leachate from their respective wetwells and discharge to a 25,000 gallon holding tank situated between PC-2 and PC-3. PC-3 transfers the stored leachate to the Treatment Facility for treatment.

PROCEDURE: Don a air-purifying respirator, tyvek, coveralls, nitrile gloves, and boots. Lift the manway cover and angle it on the rim to slide partially off. Be sure to lift with your knees, not your back. Remove the plastic concave manway guard and set aside. Allow the pump chamber to vent.

If pumpable water volume exists, lower and place the blue "Little Giant" submersible utility pump with hose and electrical cord into PC-1 or PC-2. This equipment is located on top of the pump chambers during the Spring, Summer, and Fall. Lift the manhole cover of the adjacent wetwell and fit the end of the discharge hose through a small opening. It is not necessary to remove the cover completely. To do so will result in higher organic concentrations around the work area. Plug the electrical cord into chamber mounted exterior outlets. Monitor the dewatering process. When the pump begins to suck air, lift and pull the pump out by the discharge hose while still running. To unplug the pump while lifting will allow the water within the hose to gravity feed back into the chamber. Unplug and coil all hoses and cords around the pump. Replace the manway guard and cast manway covers.

FREQUENCY: Inspect and dewater after consistent rainfalls or large snow melts.

PERSONNEL & EQUIPMENT NEEDED: 1 man
Equipment is at chambers

SAFETY EQUIPMENT & PRECAUTIONS

1. Don the Personal Protective Equipment (P.P.E.) as described in the Procedures.
2. Lift with your knees.
3. Do not enter the chamber without implementing the confined space procedure.

TIME CLOCK SETTING OF PLANT EXTERIOR LIGHTING

PURPOSE: To assure that plant exterior lighting comes on at dusk through all seasons for safety and security purposes.

DESCRIPTION: Four exterior lights exist outside the Treatment Facility. Three are above exit mandoors and one is to the West of the overhead door that faces North.

On a seasonal cycle, the time clock which is located on the South wall of the Electrical Room must be adjusted for different sunrise and sunset times.

A twenty-four hour clock exists within a 7¼" x 3½' x 3½' gray enclosure. All ON and OFF times are activated by pointers that can be set anywhere on the circular face.

PROCEDURE:

1. Locate the time clock on the South wall of the plant Electrical Room and open the enclosure door.
2. Switch the unit to the "OFF" position.
3. With the use of snub-nose pliers, loosen the pointer screws and place at the desired "ON" and "OFF" times. Tighten screws.
4. To test, rotate the dial clockwise until the pointers trip the "ON/OFF" switch at the set positions.
5. Confirm light or non-light activity by checking the exterior light above the entrance door after each trip.
6. Set to the current time. Switch the unit back to the "ON" positio
7. Shut the enclosure door.

FREQUENCY: Once per season.

PERSONNEL & EQUIPMENT NEEDED:
One Operator or
Maintenance Assistant
One Snub-nose pliers.

SAFETY EQUIPMENT & PRECAUTIONS:

1. Turn the clock off when setting trip pointers.
2. Only use a clockwise rotation when testing.

SERVICE/ SUPPLIER: Permanent site staff.

Operation and Maintenance Procedure
Annual Service, Worthington Screw Type
Air Compressor Model ROLLAIR 40-110

STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To prevent costly breakdown of essential machinery due to oil fouling and varnish deposition.

DESCRIPTION: Leachate treatment at the Love Canal Site #9-32-020 is primarily pneumatic with air supplied by two Worthington Air Compressors, a 25 RS 110 Monorotor and a ROLLAIR 40-110 screw type compressor. This procedure is for annual service on the latter model.

SAFETY PRECAUTIONS:

1. Compressed air is very dangerous! Make sure system is depressurized before servicing.
2. Procedure involves removal of hot oil. Use caution when handling oil.

PROCEDURE:

1. Run compressor to heat oil until oil temperature gauge reads 120 F (gauge located by the filler neck and sight glass).
2. Shut down compressor and bleed down pressure.
3. Connect hose from drill pump to main sump drain.
4. Open petcock and activate drill motor to operate pump.
5. Pump out oil from main reservoir into a 5 gallon container.
6. When pump no longer pumps oil, place small flat dish (1" aluminum pan) under hole by oil drain.
7. Remove drill motor and pump w/hose assembly.
8. Allow oil to gravity drain from sump into plate.
9. Place hose assembly w/pump onto oil cooler bonnet drain petcock.

10. Repeat 5 - 8

11. Remove old oil filters (FLR-412 x 2) taking care not to dump out oil from filters.

12. Oil gaskets on two new FLR-412's and re-install, 1/4 turn past hand tight.

13. Mark date and operation hours of change with a paint stick onto surface of oil filters.

14. Close both the main sump petcock and the oil cooler bonnet petcock.

15. Refill compressor through filter neck with approximately 4.5 gallons of Valvoline Super HPO 20W HD oil until oil level in sight glass is 3/4 full. Do not mix oils and do not use multi-viscosity oils.

16. Replace filler cap and tighten.

17. Loosen cover to air cleaner element ELM-44. Remove.

18. Replace with a new ELM-44. Replace cover.

19. Grease motor bearings with 4-5 shots of high quality #2 lithium grease.

20. Recheck all fittings for tightness.

21. Run compressor to check for leaks.

SUPPLIES NEEDED:

1. 5 gallons Valvoline Super HPO 20W HD oil.

2. (2) Worthington oil filters FLR-412.

3. (1) Worthington air cleaner element ELM-44.

4. 1/2" drill motor.

5. Drill pump w/hose assembly located in plant Electrical Room.

6. Clean up rags.

7. Container for spent oil.

8. Garbage bags.

9. Standard #2 lithium grease and grease gun.

SERVICE/
SUPPLIES:

Pump & Compressor Equip. Inc.
570 Elk Street
Buffalo, New York 14210

(716) 823-1504

Operation and Maintenance Procedure
Annual Service, Worthington Monorotor Air Compressor
Model RS-25-110

STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To prevent costly breakdown of essential machinery, due to oil fouling and varnish deposition.

DESCRIPTION: The treatment process at the Love Canal Site #9-32-020 is pneumatic, with air being supplied by two Worthington Air Compressors. This procedure is for the annual service for model RS-25-110, monorotor compressor.

SAFETY PRECAUTIONS:

1. Compressed air is very dangerous! Make sure system is depressurized before servicing.
2. Procedure involves the removal of hot oil. Use caution when handling oil.

PROCEDURE:

1. Run compressor to heat the oil to approximately 120 degrees F. (Place hand on the oil filter to determine temperature).
2. Shut down compressor and bleed down pressure.
3. Connect hose to oil drain at the east end of the compressor.
4. Open petcock and drain oil directly into a five gallon container.
5. After the oil slows to a slight flow, drain oil from oil filter at the north end of the compressor.
6. Remove old filter and discard.
7. Oil gasket on the new filter with a few drops of clean oil and install 1/4 turn past hand tight. Mark new filter with date and operation hours with a paint stick.
8. Close oil petcock to filter.

9. Close oil petcock to mail oil sump.

10. Fill main sump through filler neck with approximately 3.5 gallons of Valvoline HD 20W Super HPO High Detergent oil or until oil level in sight glass is about 3/4 full. Do not mix oils or use multi viscosity oils!

11. Replace cap on filler neck and tighten.

12. Remove old air filter and clean chamber with a rag.

13. Replace filter with a new ELM-91. Replace cover and tighten. Discard old filter.

14. Grease motor bearings with standard lithium base, #2 grease about 4-5 pumps should suffice.

15. Check every fitting that was removed for tightness.

16. Start compressor and allow to come to full pressure and check for leaks.

SUPPLIES NEEDED:

1. 4 gallons Valvoline Super HPO 20W HD oil.

2. (1) Worthington oil filter FLR-412.

3. (1) Worthington air cleaner element ELM-91.

4. Standard #2 lithium grease and grease gun.

5. Clean rags.

6. Container for used oil.

7. Oil drain hose.

SERVICE/ SUPPLIES:

Pump and Compressor Equip. Inc.
570 Elk Street
Buffalo, New York 14210

(716) 823-1504

February 13, 1989

OPERATION AND MAINTENANCE PROCEDURE FOR REMOVAL AND REPLACEMENT OF ZOOK, IMPERVIOUS, GRAPHITE RUPTURE DISKS STANDARD OPERATING PROCEDURE (SOP)

PURPOSE: To insure protection from overpressurization of the carbon adsorption vessels at the Love Canal Treatment Facility.

DESCRIPTION: Located in the vent lines of the three carbon adsorption vessels are impervious, graphite, rupture disks. Each disk will rupture at a burst pressure of 75 p.s.i. allowing pressure to be released through the vent line thus protecting the vessel from damage. A ruptured disk is suspect if unable to maintain carbon vessel pressure or there is an indication of rushing air/leachate through a closed vent or if the discharge at the badger meter does not coincide with filter feed discharge.

SAFETY PRECAUTIONS:

1. Wear protective clothing and respiratory protection.
2. Use caution when removing old disk to prevent injury from broken fragments.

PROCEDURE:

1. Isolate and remove carbon vessel from service. (See O & M vol. 1 for isolation of carbon vessel procedure).
2. Loosen bolts on vent flange containing the rupture disk.
3. Remove old disk and gaskets.
4. Replace new gaskets and disk. Make sure the disk is properly placed and centered over the opening.
5. Replace bolts and tighten.
6. Return vessel to service reversing procedure number 1.

FREQUENCY:

Replace if necessary. Check for rupture after every carbon transfer.

SERVICE/SUPPLIERS:

ZOOK Enterprises Inc.
P.O. Box 419
Chagrin Falls, OH 44022
(216)543-1010

February 2, 1990

OPERATION AND MAINTENANCE PROCEDURE
OVERPACKING OF DETERIORATING METAL DRUMS
STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To prevent the inadvertent discharge of hazardous material from deteriorating metal drums.

DESCRIPTION: Current procedures at the Love Canal Facility site # 9-32-020 requires the use of D.O.T. 17H or 17E landfill drums to dispose of any contaminated material accumulated during normal processes. In addition, carbon removed from the contact vessels is currently stored in these drums to await final disposal. Over time these drums deteriorate and may require overpacking into larger 85 gal. salvage drums to prevent the discharge of material from these drums.

SAFETY PRECAUTIONS:

1. Overpacking can be VERY DANGEROUS and can cause SEVERE INJURY. Care must be taken not to hurry, become fatigued or become complacent during the operation.

2. Deteriorating drums present an inadvertent discharge problem therefore level "B" protection should be utilized by the ground workers to include air purifying respirators. The operator should have a respirator at hand.

3. Plastic should be used to prevent contamination or a drum liner can be taped over the outside of the drum before transport to and into the overpack.

4. Overpacking involves the use of the 545-A Ford tractor, therefore, caution should be used when working in proximity to the vehicle.

5. Drums to be overpacked could be on a pallet stacked more than 2 high. Care should be taken to avoid being close to the area when the pallet is being removed.

6. Drums are heavy and the floorsorb used comes in 50 lb. bags, proper lifting procedures should be used.

7. Lifting of the drums involves either lifting with a drum chain or by a sling. Caution must be taken when the drum is being lifted to avoid a falling drum.

8. Pinch points and escape routes must be noted by ground workers.

PROCEDURE:

1. Determine which drum(s) require overpacking.

PROCEDURE: (cont.)

2. Isolate the pallet containing the drum(s) to be overpacked and remove it to a clear working area.

3. Remove lid from either a plastic or a steel 85 gal. salvage drum.

4. Place 1/4 bag of floorsorb in the bottom of the overpack.

5. Determine if the drum can be lifted by the top of the rim. If not the drum must be lifted with the use of a sling.

6. If the drum lifting chain can be used, place the ears of the chain over the ring of the drum.

7. Slowly direct the tractor operator to lift the forks enough to take up the slack in the chain.

8. Lift the drum high enough to place a drum liner over the drum and tape it to the top of the drum.

9. If a sling must be used then sling the drum as close to the top as is practical.

10. Repeat steps 7 and 8.

11. Move away from the drum while it is being lifted and transported.

12. Once the drum is over the overpack, guide the drum into the overpack as it is being lowered.

13. Remove the chain or sling.

14. Place the remainder of the floorsorb around the drum.

15. Put the cover on the overpack and tighten the ring.

16. Mark the overpack with the following information:
    1. Drum contents.
    2. Drum log number.
    3. Date overpacked.
    4. Responsible party for overpacking.
    5. Sequential number of overpack, 1,2,3...5,6,7...etc.

17. Place the overpack onto a pallet with only overpacks, secure and move the pallet to the overpack storage area.

18. Clean up any spills, leakage, bags, floorsorb etc.....

SPECIAL REQUIREMENTS: This operation should, ideally, require three(3) workers. Two(2) ground workers and one(1) operator.

FREQUENCY: As needed.

SERVICE/SUPPLIERS:

OVERPACKS
Greif Bros. Inc.
Hyde Park Blvd.
Niagara Falls, NY

(716) 278-1465

FLOORSORB
Hubbs & Howe/D.J. Mead Inc.
2200 Harlem Rd.
Buffalo, NY 14225

(716) 895-7937

INSPECTION OF PLANT FLOOR FANS

PURPOSE: To check belt integrity, tension, alignment, abnormal running noise on exhaust fans 7 and 8.

DESCRIPTION: Two Penn Model Number Rex -28B floor exhaust fans, located on the east and west exterior walls of the plant's southern half. Each consist of a 36" x 36" duct plenum base approx. 4' x 6" high to a 24" diameter duct stack that transists to a 26" diameter discharge with gravity damper.

PERSONNEL & EQUIPMENT NEED:

- one operator or maintenance assistant
- 6' step ladder
- 1/4" drive and socket set
- Tyvek coverall
- protective eye glasses

SAFETY PRECAUTIONS:

- don eye protection
- turn "OFF" the power disconnect
- stabilize step ladder before ascending
- stay clear of belt and pulleys when testing

PROCEDURE:

1. Turn "OFF" the power disconnect switch located above the plenum on the lower left hand side of the fan shroud.

2. Using a 6' step ladder and 1/4" drive with 3/8" socket attain a safe workable height and remove the shroud.

3. Inspect the belt for alignment, integrity, and tension around the pulley.

4. Turn "ON" the power disconnect switch along with the "ON" push button at the respective starter in the Compressor Room.

5. Observe the belt when running. Look for excessive slack and incorrect alignment.

6. If needed, turn "OFF" the power disconnect switch, loosen the pulley adjustment brackets and adjust the alignment and belt tension. Tension should not exceed 1/2".

   In case of poor belt integrity, replace with number A-46. This belt can be found in the storage room of the Administration Building.

7. Turn "ON" the power disconnect switch and observe the running performance. If satisfied, turn "OFF" the power disconnect and replace the shroud.

8. Turn "ON" the power disconnect so that operation can be controlled from the starters in the Compressor Room.

OTE: If abnormal running noise is heard in any test phase, turn the fan off immediately and consult the manufacturer's catalog cuts in Volume 2. This Volume can be found in the Storage Room of the Administration Building.

FREQUENCY: Spring and Fall

SERVICE/
SUPPLIER:

- Permanent Site Staff
- Penn Ventilator Co., Inc.
  Philadelphia, Pa.

August 12, 1994

OPERATION AND MAINTENANCE PROCEDURE FOR REMOVAL/REPLACEMENT, INLINE AIR FILTER HANKISON, MODEL 3106 STANDARD OPERATING PROCEDURE (SOP)

PURPOSE: To insure quality removal of airborne oils and particulates from compressed air after the compressors and before the air dryer.

DESCRIPTION: Located on the south facing wall of the compressor room in the Love Canal Leachate Treatment Facility is a Hankison, Model 3106, inline, air filter. The unit is approximately 3 feet high and 8 inches in diameter.

SAFETY PRECAUTIONS: Compressed air is dangerous and care should be taken to insure that the system is depressurized before servicing.

PROCEDURE:

1. Shut down compressor and depressurize the system by opening the air bleed on the 25RS-110 air compressor.
2. Remove condensate drain pipe from bottom of filter.
3. Remove the 10 cap screws from the bottom of the filter body, insure that the plastic dome and "o" ring are present.
4. Remove filter from body by turning counter-clockwise.
5. Replace with new filter obtained from the equipment storage room in the administration building.
6. Tighten filter hand tight, do not use a wrench.
7. Carefully clean float assembly, plastic dome and filter body bottom with mineral spirits and wipe dry.
8. Replace "o" ring if necessary, re-assemble float assembly and filter body, reversing disassembly procedure.
9. Replace drain pipe, pressurize system and check for leaks.

FREQUENCY:

Replace filter annually. Clean float assembly every 6 (six) months.

SERVICE/SUPPLIERS:

Hankison Inc.
Canonsburg, PA 15317
(412) 745-1555

Rengib Assoc.
1191 Hertel Ave.
Buffalo, NY 14216
(716) 834-4225

August 12, 1994

HV FILTER CLEANING: TREATMENT PLANT DRAVO HASTINGS

PURPOSE: To lower the dust concentration and particulates in the work area by maintaining an effective surface entrapment area on the filters.

To avoid unit shutdown (lockout) due to obstructed filters.

DESCRIPTION: 20" x 20" x 2" steel mesh encased in an aluminum frame.

PROCEDURE TO CLEAN: Shut down unit at the control located on the North wall of the plant office. Ascend up the two Lapeyre stairs. Remove the filter chamber access panel located on the East side of the unit (See photograph). Remove filters. Clean by using high pressure air. The airline hose is located West of the overhead door as you face North. Filters can either be lowered to the ground or the airline lifted to the roof. The air compressors are located in the Compressor Room which is opposite the Southwest corner of the clarifier. It is only necessary to activate one compressor. Make sure that the condensate release valve is closed below the East end of RS-25 tank and the Van-Air drier is activated first. Clean filters with the wind at your back. Reinstall filters and cover to filter chamber. Seal with silicone caulk.

PERSONNEL & EQUIPMENT NEEDED:

Personnel Quantity of 2
Safety Glasses
1/4" Drive Socket Set
Silicone Caulk and Gun
Air Line Hose w/Nozzle

SAFETY PRECAUTIONS:

1. Shut off power at the Dravo controller located on the North wall of the Plant Office.
2. Don a Tyvek and safety glasses.
3. Do not attempt to filter clean during high wind conditions.

February 13, 1989

OPERATIONAL AND MAINTENANCE PROCEDURE FOR BAG [redacted] REPLACEMENT, BAG FILTRATION UNIT GAF CORPORATION, GAFLO, MODEL RB-2A STANDARD OPERATING PROCEDURE (SOP)

PURPOSE: To insure continued operation of the bag filtration system and to insure quality removal of filtrate from the process flow.

DESCRIPTION: Located at the south end of the Love Canal Leachate Treatment Facility are two, stainless steel, GAFLO RB-2A pressure filters as manufactured by the GAF Corporation, 140 West 51st. St., New York, NY 10020. These filters are situated in the process flow, downstream of the the clarifier and upstream of the carbon adsorption system.

SAFETY PRECAUTIONS:

1. Wear protective clothing and respiratory protection when servicing.
2. The system contains leachate under pressure when in operation; therefore, caution should be taken when servicing.
3. Check to insure that the system is isolated and depressurized before loosening the speedbar knobs.
4. Use caution when removing spent bags to limit spread of hazardous materials.
5. Thoroughly clean area when finished.

PROCEDURE:

To remove and replace bags and "O" rings.

1. Before donning protective equipment, obtain 4, #442 viton "o"rings, 4, #445, viton "o" rings and 2, #333, viton "o" rings from the equipment storage room located in the administration building and 4, 50 micron polypropylene filter bags from the metal cabinet located along the west wall of the treatment facility by the raw tank.
2. Isolate filter vessel to be serviced by closing the 4" plug valve before the vessel and closing the 3" plug valve after the vessel.
3. Depressurize the vessel by opening the 1" plug valve on the drain line.

O & M (SOP) BAG FILTRATION UNIT (cont.)

PROCEDURE (cont.):

4. Visually inspect the outside of the vessel paying particular attention to the speedbar knobs and swing eyebolts, if worn or damaged, replacements can be obtained from the equipment storage room at the administration building.

5. Dress in appropriate level "C" clothing, with boots and polylaminated tyveks.

6. Observe the pressure guage on the pipe, before the vessel. When it reads zero loosen the eight speedbar knobs turning counterclockwise using a flat 1" valve handle. At this time replace any damaged swing eyebolts or speedbar knobs.

7. Lift the cover of the vessel.

8. Remove the spent filter bags from the vessel and place in a garbage bag.

9. Wipe the top of the filter vessel and the lip of the retainer basket with a rag, place rag in the garbage bag.

10. Inspect the upper "O" rings (#442 (2)) if worn or damaged, replace.

11. Inspect the inlet pipe "O" ring (#333 (1)) if worn or damaged, replace.

12. Remove the retainer baskets, inspect for wear or damage. If there is damage order new baskets from the factory.

13. Inspect the lower retainer basket "O" rings (#445 (2)) if worn or damaged, replace.

14. Replace the retainer basket and install 2 new, 50 micron polypropylene filter bags. Turning the filter bags inside out before replacement allows for easier removal.

15. Gently lower cover and tighten the speedbar knobs alternating sides and criscrossing from front to back. For example; left front, right rear, right front, left rear and so on until vessel lid is tight.

16. Slowly pressurize the vessel and check for leaks.

17. Repeat the above procedure from #1 and #5 thru #16 inclusive, for the remaining vessel.

O&M (SOP) BAG FILTRATION UNIT (cont.)

FREQUENCY:

Approx. every 500,000 gallons of process, or more frequently if the pressure on the vessel increases rapidly during process.

SERVICE/SUPPLIERS:

American Felt and Filter Co.
34 John St.
Newburgh, NY 12550
(800) 431-8708
(914) 561-3560

HVAC FILTER REPLACEMENT ADMINISTRATION BUILDING

Purpose: Filters are used to remove dust particulates from the outside air and to remove dust particulates circulating through cold air returns.

Description: Disposable filters are 20" x 20" x 1" paper framed, treated spun fiberglass.

Purpose of Maintenance:

Lower the dust concentration and particulates in the work area.

Locations: electrical room, 2 filters in overhead unit. Hallway cold air return. Garage cold air return.

Frequency of Maintenance:

Semi-annually

Procedure to Replace:

Shut off unit. Using a 6' stepladder in electrical room, using pliers twist wing nuts to open position, remove access panel, change filters and replace panel. In hallway and garage, using a flat blade screwdriver twist retaining lugs to open position and remove grill, change filters and replace grill. Log date change on attached date strip.

Safety Precautions:

1. Shut off electricity.
2. Properly position stepladder.

August 12, 1994

HYDROGEN PEROXIDE 50%

PURPOSE: To suppress hydrogen sulfide odors that is generated by treating through anaerobic carbon columns.

DESCRIPTION: Hydrogen peroxide is pumped or siphoned into the effluent pipe located behind the pressure filters on the South wall. Use and/or dosage rate is dependent upon H2S odors and their concentrations. Its source is located within a block storage room between the South wall and pad. The specific room is identified by an oxidizer sign affixed to the door. After treating approximately 50,000 gallons of leachate determined by the badger meter, the 30 gallon drum will need replacing. Replacement frequency will vary depending upon the position selected of the ball valve.

PROCEDURE TO REPLACE:

1. Don tyvek boots, gloves, and splash shield. Protective Equipment is located within the middle storage cabinet, west of the raw leachate tank.
2. Remove suction tube and cap bung.
3. Move spent drum aside. Leave in same room.
4. Position full drum.
5. Remove fill or suction bung. Do not remove operating vent.
6. Insert suction tubing. Hydrogen peroxide will automatically fill and continue to flow by siphon.

PRECAUTIONS: Hydrogen peroxide is an oxidizer. The storage room is to be kept free of dirt and incompatible chemicals. If a spill occurs within the rooms or on the operator, the affected area must be flushed with copious amounts of water. Water sources are located at the South end of the clarifier (emergency shower), Southeast corner of the treatment room (hose), and the outside South wall of the Treatment Facility (hose). Flushing must continue until oxidizing (foaming) cannot be seen. See attached Material Safety Data Sheet (MSDS) and floor plan at the beginning of this volume.

SUPPLIER: Chemical Distributors in Buffalo is the contact for restocking. Four thirty-gallon drums per call is generally the norm. Their telephone number is 1-856-2300.

August 12, 1994

LEACHATE TREATING

PURPOSE: To treat hazardous waste that is collected by the barrier drain and wetwells.

DESCRIPTION: Leachate is collected in four wetwells that are low points of the gravity fed barrier drain. Pumps are activated and transfer the leachate to combination wetwell/storage tanks. When capacity is reached, plant feed pumps are activated to begin the treatment process.

PROCEDURE:

1. Don Level D protective equipment.

2. Complete the daily and operating day inspection logs.

3. Turn to the operations screen of the MCRT.

4. Observe the leachate level in storage tank wetwell 3 and 3A. Determine if enough volume of leachate is present to warrant treatment. Displays of approximately 9' 0" for PC3 and 6'0" for PC3A indicate that the storage tanks are at capacity and treatment is necessary.

5. Move cursor over to the question Are We Dancin Yet? and answer by entering Y. This opens the Solenoid Valve on the air line to the Raw Leachate Double-Diaphram Pump.

6. Go to the MDCP and place the pumps in PC3 and PC3A in the auto position (NOTE: key switch must be in the auto position).

7. Return back to the MCRT. Move cursor to the third line under Station 3A and change the"N" to "Y" by keying "Y" and entering. This illuminates the MCRT that signifies MCRT keyboard control. Move cursor to the next pump in the same station and perform the same procedure. Move cursor to Station 3 and relinquish command to the MCRT.

8. Move cursor down to the fourth line and under the same two stations, change the "N" to "Y"or pump(s) discharge. NOTE: Treatment is approximately 120 gpm only one (1) pump from each station is necessary for a balanced operation. Occasionally pump on/off alternating will need to be maintained. Green run status lights will appear on the MDCP with printer acknowledgement first. Then, after a short delay, the green symbol (8) will illuminate on the MCRT.

9. Turn the clarifier on by activating the starter in the Electrical Room. This step is discretionary. Past operations have been non-activation due to sludge characteristics.

10. Activate all organic vapor control fans. Position at high. Starters are located on the west wall of the Mechanical Room.

11. Turn the air dryer on and allow for one cycle. Close the condensate release valve on the Monorotor compressor. This valve is at the east end of the compressor at floor level.

12. Don ear protection.

13. Start the Rollair Compressor.

14. Start the Monorotor Compressor.

15. Turn the clarifier inlet pump on.

16. Reset the effluent meter to zero.

17. Open the effluent valve.

18. Close the adsorber vent valve on V_1, then V_2.

19. Start the north or south filter feed pump. Make certain that the respective inlet and outlet valving is open at the GAF Bag Filters.

20. Open the discharge valve for Hydrogen Peroxide Feed. This valve is located on the effluent pipe behind the bag filters. Only dose H_2O_2 if H2S odors are present.

21. Adjust field and plant pumping rates to maintain leachate equilibrium in the process vessels.

22. Monitor the MCRT at stations 3A and 3 for the leachate level status as reported by their respective liquid level indicator controller (L.L.I.C.).

23. Pumps in PC1, 1A, 2 and 2A will activate at their setpoints for simultaneous storage and plant feed to occur.

24. Collect samples in the middle of the expected volume to treat.

FREQUENCY: When Leachate Storage Tanks reach capacity and/or remedial activity demand.

PERSONNEL AND EQUIPMENT NEEDED: Two Operators
Equipment is in place.

SAFETY EQUIPMENT AND PRECAUTIONS:

1. Level D personal protective equipment with Air Purifying Respirator hanging.

2. Fan activation on High.

LEACHATE TRANSFER FROM PC-3A TO RAW TANK BY GASOLINE PUMP

PURPOSE: To transfer leachate from PC-3A to the raw leachate tank in the event that the two permanent vertical lift pumps fail.

DESCRIPTION: Honda 3" 5 HP trash pump or equivalent set on top of PC-3A. Suction and Discharge sides are coupled with 3" semi-rigid corrugated plastic hose. The hoses are placed or connected to their respective receiving and destination points.

PROCEDURE:

1. Don in Protective Level C.
2. Transport and set pump on PC-3A.
3. Check gas and oil. Add if necessary.
4. Open hatch doors and remove manway cover at first level.
5. Couple 20' - 25' 3" semi-rigid corrugated plastic hose to suction side of pump. Lower the hose into the wetwell to one foot from the bottom. The distance from the top of PC-3A to the bottom is approximately 20'.
6. Open the Southeast exit door of the Treatment Room.
7. Couple 100' of 3" semi-rigid corrugated plastic hose to the discharge side of the pump. Couple the remaining end to the intake port located on the East side of the raw leachate tank.
8. Open valve on intake port.
9. Prime pump.
10. Start pump and set discharge rate by throttle.
11. Prepare and begin to leachate treat.
12. Set discharge rate on clarifier inlet pump to the discharge rate from the gas pump. This can be done by observing the leachate level within the raw tank.
13. Occasionally check the gasoline level so that treatment operations are not interrupted.
14. Continue to remove leachate from PC-3A and the storage tank until the Northern and Central Sectors are dewatered.
15. For shutdown, cease gas pump operations. Lower the level in the raw leachate tank to its minimum. Uncouple the suction hose and remove from PC-3A. Lay the hose on a piece of plastic and wrap. Transport and store it within the sludge containment structure.
16. Uncouple the discharge hose from the pump. Lift and walk toward the raw leachate tank to remove all leachate within the hose. Close the intake port to prevent backflow. Drain any remaining leachate at the floor drain by the pressure filters. Transport and store the hose within the sludge containment structure.
17. Close pump access doors and/or manway. Transport and store pump within the Drum/Decon Storage Facility.

FREQUENCY: As needed until the permanent pumps are in full service.

PERSONNEL AND EQUIPMENT NEEDED:	Two operators or one operator and one maintenance assistant One trash pump with fuel and oil One 20' - 25' 3" hose One 100' 3" hose Plastic Duct tape One hammer
SAFETY EQUIPMENT AND PRECAUTIONS:	Air Purifying Respirator Tyvek coverall Gloves Boots Duct tape Personnel should check for leaks at all couplings and continuous suction and discharge runs at start up and during pumping operations. Exercise care when handling all equipment that has contacted leachate. Be conscious of ways that leachate could escape and alter handling and/or containment methods if necessary.
SERVICE AND SUPPLIER:	Permanent Site Staff

POWER RESET OF MAIN GATE OPERATOR

PURPOSE: To allow vehicle access to and from the site by using a remote or stationary activator to operate the horizontal sliding gate. On occasion a high West wind will angle the gate when in operation. This will cause the striking plate to be missed and therefore cause motor run on. An incorporated safety feature will automatically shut down the motor to prevent burn-out. However, the operator must be reset to reestablish slide operation on demand.

DESCRIPTION: 8' x 12' framed galvanized chain link fence with a 2' x 2' x 2½' mechanical controller. Both the gate and controller are located at 95th St. and Read Ave.

PROCEDURE TO RESET: Remove the red weather shield from the grey controller. Loosen the clamps to the top of the controller. Remove top and push the blue button to power reset. The gate will activate by opening and automatically closing. Replace the controller cover and weather shield. It may be necessary to use the manual gate if high winds persist.

The gate operator has also overloaded due to snow obstruction in its slide path. Remove snow and reset as previously described.

FREQUENCY: As necessary to maintain automatic operation from portable or stationary activators.

PERSONNEL & EQUIPMENT NEEDED: Personnel quantity of 1
Flat Head Screwdriver

SAFETY PRECAUTIONS: Remain clear of slide operator after reset button is pushed.

SERVICE/ SUPPLIER: Ber-National Service
260 Elmwood Avenue
Buffalo, New York 14222
716/823-5561

Removal of teflon lined process piping. Replace with stainless steel. Treatment Plant.

Purpose: To provide a more uniform and less restricted leachate flow, reducing pump pressures after the bag filters, as the discharge lines from the North and South filter feed pumps merge into one 3" tee.

Description to Fabricate: Using two 3" 316.s.s 125# 90° long radius elbows and three 3" 316.s.s. 125# slip-on flanges, a 3" flow directing tee was fabricated and welded using stoody stainless steel 316-16 AC-DC coated electrodes. The power source from the Lincoln electric arc AC-DC 225/125 ampere welder.

Description to Install: Remove 5/8" x 2½" bolts, remove standard teflon tee. Position replacement stainless steel flow directing tee and bolt securely into place using 1/8" full-faced red neophrene rubber gaskets.

Frequency to Maintain: As needed.

Safety Precautions:
1.) Support piping before removing tee to insure rigidity.
2.) Wear level C protection, safety shoes, hard hat.

Suppliers:

I.D.S. Division of Great Lakes Supply
6900 Mooradian Drive
Niagara Falls, NY
Phone 285-6631 14304

Falls Welding Inc.
6375 Packard Road
Niagara Falls, NY 14304
Phone 284-7889

Removal of teflon lined process piping. Replace with stainless steel. Treatment Plant.

Purpose: To access process piping for tranquilizer installation in discharge of Raw Sandpiper Pump Line.

Description: Teflon line 3" flanged 125# concentric reducer replaced with fabricated 316 s.s. flanged concentric reducer.

Procedure to Fabricate: Using a 4" x 3" flanged 125# stainless steel concentric reducer, cut a 2¼" diameter hole through the side using E-6011 electrodes with the power source from a Lincoln electric arc AC-DC 275/175 ampere welder. Electrically weld a 2" threaded 3000# 316 s.s. coupling on center of opening, using stoody stainless steel 316-16 AC-DC coated electrodes with the power source from the Lincoln electric arc AC-DC 225/125 ampere welder.

Procedure to Install: Remove 5/8" x 2½" bolts, remove concentric reducer, position replacement reducer and bolt securely into place using 1/8" full-faced red rubber neophrene gasket. Pipe tranquilizer into place using two 2" x close 316 s.s. threaded nipples and one 2" 316 s.s. 90° elbow. Tighten fittings securely with a 24" pipe wrench.

Frequency to Maintain: As needed.

Safety Precautions:
1) Support piping before removing to insure rigidity.
2) Wear Level C protection, safety shoes, hard hat.

Suppliers:

Robert James Sales Inc.
269 Hinman Ave.
Buffalo, NY 14216 Phone 874-6300

Falls Welding Corp.
6375 Packard Road
Niagara Falls, NY 14304 Phone 284-7889

Removal of teflon lined process piping. Replace with stainless steel. Treatment Plant.

Purpose: To access process piping for tranquilizer installation in discharge of North Filter Feed Pump Line.

Description: Teflon line 3" flanged 125# 90° elbow replaced with fabricated 316 s.s. flanged 90° elbow.

Procedure to Fabricate: Using a 3" flanged 125# stainless steel 90° elbow, cut a 2¼" diameter hole through the side using E-6011 electrodes with the power source from a Lincoln electric arc AC-DC 275/175 ampere welder. Electrically weld a 2" threaded 3000# 316 s.s. coupling on center of opening, using stoody stainless steel 316-16 AC-DC coated electrodes with the power source from the Lincoln electric arc AC-DC 225/125 ampere welder.

Procedure to Install: Remove 5/8" x 2½" bolts, remove 90° elbow, position replacement 90° elbow and bolt securely into place using 1/8" full-faced red rubber neophrene gasket. Pipe tranquilizer into place using two 2" x close 316 s.s. threaded nipples and one 2" 316 s.s. 90° elbow. Tighten fittings securely with a 24" pipe wrench.

Frequency to Maintain: As needed.

Safety Precautions:
1) Support piping before removing to insure rigidity.
2) Wear Level C protection, safety shoes, hard hat.

Suppliers:

Robert James Sales Inc.
269 Hinman Ave.
Buffalo, NY 14216 Phone 874-6300

Falls Welding Corp.
6375 Packard Road
Niagara Falls, NY 14304 Phone 284-7889

Removal of teflon lined process [redacted] Replace with stainless steel. Treatment Plant.

Purpose: To access process piping for tranquilizer installation in discharge of South Filter Feed Pump Line.

Description: Teflon line 3" flanged 125# 90° elbow replaced with fabricated 316 s.s. flanged 90° elbow.

Procedure to Fabricate: Using a 3" flanged 125# stainless steel 90° elbow, cut a 2¼" diameter hole through the side using E-6011 electrodes with the power source from a Lincoln electric arc AC-DC 275/175 ampere welder. Electrically weld a 2" threaded 3000# 316 s.s. coupling on center of opening, using stoody stainless steel 316-16 AC-DC coated electrodes with the power source from the Lincoln electric arc AC-DC 225/125 ampere welder.

Procedure to Install: Remove 5/8" x 2½" bolts, remove 90° elbow, position replacement 90° elbow and bolt securely into place using 1/8" full-faced red rubber neophrene gasket. Pipe tranquilizer into place using two 2" x close 316 s.s. threaded nipples and one 2" 316 s.s. 90° elbow. Tighten fittings securely with a 24" pipe wrench.

Frequency to Maintain: As needed.

Safety Precautions:
1) Support piping before removing to insure rigidity.
2) Wear Level C protection, safety shoes, hard hat.

Suppliers:

Robert James Sales Inc.
269 Hinman Ave.
Buffalo, NY 14216 Phone 874-6300

Falls Welding Corp.
6375 Packard Road
Niagara Falls, NY 14304 Phone 284-7889

SNOWPLOWING AND MAINTENANCE

One-Ton Truck Plate #87-4005

PURPOSE: Snow removal on site roadways, drives, parking areas, access roads, and Public Information Office.

DESCRIPTION: Meyers. Model: C-8, 96" long. Plowing width at maximum angle is 84". Height is 28" with a ½"x6" cutting edge. Adjustable runners. Controls are located inside cab, left side of console. Levers for angle left or right, up or down, and plow lights. Pull switch for revolving safety light.

MAINTENANCE PROCEDURES:
1. Keep hydraulic power unit filled using Meyer hydraulic fluid M-1.
2. Keep 70 amp/hr battery and 60 amp alternator in a serviced condition.
3. Maintain truck as manufacturer suggests.

FREQUENCY OF MAINTAINING:
1. Check vehicle engine oil before using.
2. Vehicle receives scheduled maintenance as per O.G.S. checklist at 7,500, 15,000, 22,000, 30,000.

SAFETY PRECAUTIONS:
1. Turn on plow lights and rotating cab light when plowing.
2. Maximum plowing speed under ideal conditions 20 m.p.h.
3. Fully angle blade and carry as low as safely permissable for over the road travel.
4. Keep over the road speed under 40 m.p.h.

For additional information refer to Meyer snowplow operation and maintenance manual located in glove box of truck.

Supplier and/or Service Contact: T-W Truck Equippers
2025 Walden Avenue
Buffalo, NY 14225
(716) 683-2250

INVESTIGATION OF POOR DISCHARGE FROM NORTH & CENTRAL SECTOR FIELD PUMPS

PURPOSE: To determine and or confirm if a North or Central Sector Field Pump is discharging below manufacture's specifications or below normal flow experienced by past observations relative to the MCRT level status display, the raw leachate tank, and the open channel forcemain.

DESCRIPTION: Combination pump chamber and wetwells 1A, 2A, and 3A are located in the Northeast, Northwest, and Central areas of the Love Canal site. PC-1A and 2A collect leachate by perforated tile pipe which is part of the barrier drain from the North and South. When leachate is sufficient by the L.L.L.C., Gould Model 3171 pumps in 1A and 2A will automatically activate. PC-3A pumps are activated upon treatment demand.

Poor discharge can be suspected if little to no increase is observed from the L.L.L.C. at PC-3A. NOTE: PC-3A plant feed pumps are off.

PROCEDURE: If poor discharge is suspected from PC-1A and 2A, go to the flow inspection manhole 4B located approximately 132' south of the pump chamber access road. (See collection system schematic). Remove the manhole cover and have the second operator activate the pumps in wetwells 1A or 2A which ever has the discharge problem. Operate one pump at a time and compare flows to determine which is the faulty pump.

If poor discharge is suspected from PC-3A, operate one pump at a time and monitor the leachate level status at the MCRT, influent mag meter, and amount of leachate coming into the raw water tank.

In all situations listen for abnormal pump/motor running noise.

A descent may have to be made for closer observation. If this decision is made, the confined space procedure must be put into effect. There are no exceptions.

No discharge with the motor running could be caused by a worn or cracked flex-coupling or broken shaft. Low or zero discharge with an eventual overload of the motor could mean an obstructed discharge. Normal flow with an eventual overload of the motor could mean an electrical problem. All of the above has occurred by the above causes. Tag the switch "Do Not Operate" at the pump control panel.

FREQUENCY: As needed if poor discharge is observed on the MCRT level status or if pump motors overload.

PERSONNEL AND EQUIPMENT NEEDED:	PC-1A & 2A	PC-3A
	Two Operators	Two Operators
	Two 2-way Radios	Two 2-way radios
	One Pick	
	One Crowbar	
	One Spotting Light	

SAFETY EQUIPMENT & PRECAUTIONS:	PC-1A & 2A (Flow observer at MH-4B)	PC-3A
	Gloves Tyvek coverall Air purifying Respirator	Gloves Tyvek coverall Air purifying Respirator
	The flow observer is to free the manhole cover and slide it to the side using the axe pick and crowbar. He is not to lift the cover with his hands. To do so may result in injured fingers from a slip. The manhole is at grade. Proper placement of tools, footing, and the stance used to observe is essential.	

SERVICE AND SUPPLIER:

Permanent site staff for replacement of shaft flex coupling, pump pull and clearing of impellar and discharge pipe.

ELECTRICAL

McGill Electric
Phone: 716/284-8120

Ferguson Electric
Phone: 716/285-2516

CIR Electric
Phone: 716 822-1416

PUMP REPAIR

Pump and Compressor
Phone: 716 823-1504

Niagara Electric Motor
Phone: 716 695-2953

VACUUM SERVICE

Sevenson Industrial
Phone: 716/284-0431

March 2, 1989

OPERATION AND MAINTENANCE PROCEDURE
REPAIR OF SB 1 1/2-A, SandPIPER, DOUBLE DIAPHRAGM, SLUDGE [redacted]
STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To insure optimum performance and decrease occurance of non-scheduled repair of the sludge transfer pump.

DESCRIPTION: The transfer of sludge from the sludge holding tank to the sludge storage tanks at the Love Canal Leachate Treatment Facility relies on the operation of one SB 1 1/2-A, SandPIPER, double diaphragm, pump as manufactured by the Warren-Rupp/Houdaille Manufacturing Co. In addition to the movement of sludge from holding to storage a SB1 1/2-A pump is used for mixing sludge within Storage Tank #3.

SAFETY PRECAUTIONS:

1. Wear protective level "B" when servicing this pump.

2. These pumps contain sludge under pressure when in operation!

3. Care should be taken to insure that the valves isolating the suction and discharge lines are closed and the pump has been isolated from its air supply. Also insure that the pump has been depressurized.

4. Precautions should be taken to prevent contamination from sludge spillage during repair.

PROCEDURE:

To complete a normal disassembly and rebuild of the SB 1 1/2-A to include; changing the pilot valve assembly, diaphragms, pilot valve actuator pins, manifold gaskets, manifold seat gaskets and ball check valves.

1. Obtain the necessary replacement parts from the equipment storage room at the administration building.

2. Obtain the necessary protective equipment and repiratory protection from the treatment facility.

3. Collect all the necessary tools: 1/2", 9/16", 3/4", & 1" box end wrenches, torque wrench, small pointed prybar, razor scraper, 1/4" drive socket set, 10" & 12" adjustable wrenches, and a small can.

4. Don protective equipment.

O&M sop Repair SB 1 1/2-A (cont.)

5. Isolate pump from supply air and process flow.

6. Remove the bolts from the threaded flanges on the suction and discharge of the pump. Loosen the capscrews slowly. * There will be a small discharge of sludge from the pump and pipe. Catch with a small can.

7. Loosen the lock nuts connecting the manifold to the diaphragm chamber.

8. Loosen one V-band clamp and carefully remove the diaphragm chamber. * There will be a small discharge of sludge from the chamber. Catch with small can.

9. Remove the diaphragm from the diaphragm rod.

10. Loosen the other V-band clamp and remove the diaphragm and rod from the pump as an entire assembly.

11. Clamp the inner plate in a vise and remove the outer diaphragm plate.

12. Replace the worn diaphragm with a new one. Replace outer diaphragm plate and torque to 35 ft. lbs..

13. Return the assembly to the pump body. Check the rubber diaphragm bumpers if worn or damaged replace.

14. Place the diaphragm and rod assembly into the pump secure by placing the outer cover over the diaphragm and tightening the V-band clamp.

15. Thread and tighten the other diaphragm and plate torque to 25 ft. lbs.

16. Remove the manifold bolts and lift the discharge flange from the manifold.

17. Remove the manifold, inspect all parts if any are worn or damaged replace.

18. Check the condition of the ball check valves, if they are swollen, pitted, out of round, or otherwise damaged, replace.

19. Scrape the gaskets from the faces of the manifold and replace.

20. Re-assemble in reverse order.

21. Replace the manifold gaskets and rebolt the manifold to the diaphragm cover.

O&M sop Repair SB 1 1/2 A (cont.)

22. Check all components, re-connect the piping.

23. Open supply and discharge lines and air supply line, cycle pump to check for leakage.

FREQUENCY:

Replace diaphragms when performance diminishes.

SERVICE/SUPPLIERS:

Warren Rupp/Houdaille Co. Inc.
800 N. Main St.
P.O. Box 1568
Mansfield, OH 44901
(419) 524-8388

Siewert Equipment Sales Co.
175 Akron St.
Rochester, NY 14609
(716) 482-9640

Bradley Combination Drench Safety [redacted] Units. Treatment Plant and Administration Building.

Purpose: To cleanse chemicals and neutralize acids from an employee who may have been accidentally contaminated.

Description: Drench shower; 10" yellow cycolac plastic model 524-070. Stay open chrome plated 1" brass valve operated by stainless steel pull rod with triangular handle. Pull open, push closed. Eye-wash, 10" yellow cycolac plastic bowl with twin aerated eye-wash heads. Chrome plated ½" I.P.S. stay open brass valve, hand operated by stainless steel push flag handle. 3 g.p.m. flow control assures a safe steady flow under varying water pressures. The Admin. Bldg. safety shower has a spring loaded valve to close. Hold to open.

Purpose to Maintain: To assure an operable and ample water source for fast flushing.

Procedure to Maintain: Weekly testing is necessary to insure operation and to flush system. Adjust or replace worn parts.

Frequency of Maintenance: As needed.

Safety Procedures:
1. Be familiar with locations and operations.
2. Keep area around safety shower accessible.

Supplier: Kolstad Associates
422 Niagara Falls Boulevard
Buffalo, N.Y. 14223

Phone: (716) 834-1445

August 12, 1994

SLUDGE REMOVAL-CLARIFIER TO HOLDING TANK

PURPOSE: To meet effluent quality standards and extend life of filter bags and adsorber carbon.

DESCRIPTION: 20' x 11' x 11' - 16,000 gallon clarifier used to physically settle solids and chemical precipitates. Detention time is approxi. 2 1/2 hours when leachate treating. Sludge is raked to the influent end where it is air-lifted from two hoppers and transferred to an indoor holding tank.

PROCEDURE:

1. Bring up MCRT Love Canal Menu.
2. Select "Sludge Transfer".
3. Satisfy Question "Do you Want to Transfer to the Sludge Holding Tank?" Enter "Y".
4. Record level.
5. Activate clarifier.
6. Don Protective Level C.
7. Activate clarifier/filter feed, sludge holding, and floor exhaust fans. Select fan speed high.
8. Activate compressors.
9. Mark sludge level on holding tank exterior. Tape.
10. Open wheel valve on 1 1/4" air line to clarifier siphon. Turn one revolution.
11. Observe loading by translucent tank riser at top of holding tank.
12. Continue transfer until waste passing through sludge line clears or tank becomes full.
13. Close wheel valve.
14. Deactivate compressors. Depressurize.
15. Tape sludge level height.
16. Measure distance between tapes.
17. Calculate transferred gallonage. 1 inch equals 17.5 gallons. Record.
18. Reset exhaust fans to low for clarifier/filter feed and sludge holding tanks. Turn floor fans off.
19. Doff Protective Level C.
20. Complete report.

NOTE: The amount of sludge to be handled will depend on leachate characteristics, clarifier detention time and the amount of leachate processed between transfers.

Maximum thickening should be sought to minimize future destruction costs.

FREQUENCY: Once per month.

SAFETY PRECAUTIONS:

1. Fan activation.
2. Use of Protective Level C.

SERVICE OR CONSULTING CONTACT:

Pure Stream Corporation
P.O. Box 68
Florence, Kentucky 41042
Telephone: 606/283-2121
John Wheaton, Engr., Doug Ammerman, Parts

September 28, 1994

SLUDGE REMOVAL - HOLDING TANK TO STORAGE

PURPOSE:

1. For acceptance capacity on next sludge removal from clarifier to holding tank
2. Keep internal storage to a minimum.

DESCRIPTION:

1,580 gallon fiberglass tank with specialized resins to protect against chemical attack

PROCEDURE:

1. Bring up Love Canal Menu
2. Select "Sludge Transfer"
3. Select external storage tank to accept sludge
4. Adjust valves if necessary on waste feed lines to storage tank selected (manual operation on tank catwalks) Use of air-purifying respirator required
5. Confirm by green MCRT open status display.
6. Record level from transmitter controllers
7. Satisfy Question "Do you want to transfer to storage tank?" Enter "Y". Air line solenoid valve and motorized operating valve will open.
8. Don level D(C)* with air purifying respirator available and on person
9. Activate air dryer
10. Close condensate release valve on the monorotor compressor.
11. Don ear protection
12. Activate air compressors
13. Open pump exhaust valve
14. Open suction and discharge valves to and from sludge pump.
15. Open gate valve for pump's air supply.
16. Open gate valve on sludge pump until diaphrams reciprocate, 1-2 cycles per second
17. Inject water through 3/4" flux hose to slurry sludge and assist pump
18. Continue pumping until tank level is lowered to the suction inlet, monitor transfer piping for leaks and rigidity of support hangers
19. Close gate valve on water injection supply
20. Close gate valve on sludge pump to end transfer
21. Close gate valve on air supply line
22. Close pump exhaust valve
23. Close suction and discharge valves to sludge pump
24. Record level from transmitter controllers
25. Convert to inches and reference to gallons from chart in Volume 2 under T-Tanks
26. Complete sludge transfer record

NOTE: If pump loses prime, open and close tank outlet valve. Repeat if necessary.

FREQUENCY: Approx. Tri-annual

SAFETY PRECAUTIONS:

1. Level D(C) *

2. Monitor of transfer piping

*Level D with an air-purifying respirator available and on person

PRECIPITATION DEWATERING OF SLUDGE CONTAINMENT CELLS

PURPOSE: To remove precipitation that collects within sludge containment cells that is intended for sludge in the unlikely event of a tank rupture.

DESCRIPTION: 22' x 15' x 4' cells that are located beneath the sludge storage tanks on the South side of the Treatment Facility.

PROCEDURE: Obtain the black submersible utility pump (Spunky) from the West storage room of the two room storage building located on the South side of the Treatment Facility.

Obtain 75' of electrical cord from the horizontal storage cabinets located on the West wall of the Treatment Room. All electrical cords are kept in the fourth cabinet from the bottom.

Place the submersible pump in the sump hole under storage Tank #1. Direct the 1½" plastic discharge hose toward the drain on the Plasma Arc pad. Plug the cord into the yellow outlet labeled G.F.I. (Ground Fault Interrupter). Monitor the dewatering process. If discharge ceases with significant volume left, unplug the unit and clear impeller obstruction. Dewater cells 2, 3, and 4 respectively.

FREQUENCY: As needed.

PERSONNEL & EQUIPMENT NEEDED:
1 man
1 utility pump w/discharge hose
1 electrical cord (75')

SAFETY EQUIPMENT & PRECAUTIONS:
Nitrile gloves
Tyvek coverall
Watch footing on berm and ladders
Only use the outlet labeled G.F.I.

December 29, 1988

MAINTENANCE AND OPERATIONAL VERIFICATION PROCEDURE FOR SLUDGE STORAGE TANK LEAK DETECTION SYSTEM STANDARD OPERATING PROCEDURE (SOP)

PURPOSE: To insure positive operation of the sludge storage tank leak detection system, and determine if there are any existing leaks.

DESCRIPTION: Located to the south of the Love Canal Leachate Treatment Facility are four 10,000 gallon, double walled sludge storage tanks. Each tank has a leak detection system activated by a loss of vacuum between the double walls which triggers an audible alarm outside of the treatment facility and both an audible and visual alarm within the facility.

SAFETY PRECAUTIONS:

1. Wear protective clothing and respiratory protection when drawing a vacuum.

2. When drawing a vacuum use caution so as to not overdraw the system.

3. Use normal caution when handling compressed gas.

4. When pressurizing the system caution must be taken to avoid overpressurizing the system.

PROCEDURE:

To verify the operation of the sludge storage tank leak detection system:

1. Unlock the control box, using key #59 obtained from either the administration building office or the treatment facility office.

2. Locate the quick disconnect fitting to the left of the tank level gauge.

3. Push the knurled ring towards the rear of the box and with a screwdriver release the vacuum until the alarm horn sounds. At this time verify if the visual alarm in the treatment room and the audible and visual alarm in the treatment facility office are working.

4. Check to see if the vacuum switch controller is set according to the following specifications.

Tank No.	Left Set Point (Inches Hg)	Right Set Point (Inches Hg)
1	25	4
2	20	4
3	20	8
4	20	8

Make the necessary corrections if any of the settings are not according to the above specifications.

Sludge Storage Tank Leak Detection System Procedure (Cont.)

5. If any of these alarms are not working place a service call immediately. Please see the service and suppliers section of this SOP.

To re-establish vacuum:

1. Obtain the vacuum pump from the equipment storage room at the administration building.

2. Push knurled ring on the quick disconnect fitting toward the rear of the control box and insert the nipple end of the vacuum pump. Start the pump and draw a vacuum to a level specified.

Tank No.	Vacuum Range (Inches Hg)	Vacuum Level (Inches Hg)	Alarm (Inches Hg)
1	20 to 25	23	15
2	12 to 17	17	4
3	12 to 17	17	2
4	12 to 17	17	3

3. When a desired level is obtained and with the pump still running push the knurled ring rearward and quickly remove the hose.

To ascertain tank wall failure (inner or outer):

1. Using a clear vacuum hose from the pump to the nipple end and capturing the vacuum exhaust in a gas sampling bag, draw a vacuum on the system following the above procedure.

2. Draw a vacuum until there is evidence of liquid in the vacuum exhaust or enough exhaust has been collected for Draeger tube testing.

3. If no liquid is evident, test the exhaust sample with a polytest Draeger tube or H.nu to acknowledge the presence of any vapors of concern.

4. If vapors are present, fine tune the indication by using various Draeger tubes specific for known sludge constituents, such as, toluene, benzene, carbon tetrachloride, total xylenes or chlorobenzene. The presence of any of these chemicals may indicate the failure of the inner tank wall warranting immediate further investigation and corrective action.

5. If the visible product test and the polytest are negative but the system still will not maintain a vacuum, this may indicate outer wall failure or vacuum connection leak.

Sludge Storage Tank Leak Detection System Procedure (Cont.)

To determine vacuum connection leak:

1. Pressurize the system to 2 psig with compressed nitrogen from an 18 cf cylinder and a two stage regulator fitted with a compatible hose nipple located in the equipment storage room of the administration building. The use of nitrogen insures the introduction of a dry, contaminate free atmosphere within the double walls.

2. Open the cylinder.

3. Set the delivery pressure to 2 psig.

4. Push the knurled ring rearward and connect the nipple end of the hose.

5. Deliver 2 psig of nitrogen into the system.

6. Coat all fittings with liquid soap and water or Snoop. Bubbling of the coating would indicate connection leak. If bubbles are not apparent this may indicate the possibility of inner or outer wall failure warranting prompt investigative and corrective action.

7. If there is indication of outer wall failure coat entire surface of the tank with a soap film and/or place a call to a leak detection service.

FREQUENCY:

Check vacuum gauges monthly. Verify operation of alarm system every 6 (six) months. Pressure test if necessary.

SERVICE/SUPPLIERS:

1. Nitrogen Supply:
   Falls Welding Supply Co., Inc.
   6375 Packard Road
   Niagara Falls, NY 14302
   (716) 284-7889

2. Eletrical Services:
   McGill Electric Inc.
   931 Niagara Avenue
   Niagara Falls, NY 14305
   (716) 284-8120

3. Vacuum Switches:
   IMO Delaval Inc.
   Barksdale Control Div.
   Pittsburgh, PA
   (800) 321-6070

4. Tank Leak Detection Service:
   Elmwood Tank and Piping Co.
   200 Fire Tower Road
   Tonawanda, NY
   (716) 694-0106

Imo Delaval Inc. has changed its name to **Imo Industries I**
Effective July 1, 1989, the new remittance address for the **Barksdale Controls Division** is:

Barksdale Controls Division
Imo Industries Inc.
P. O. Box 545

August 12, 1994

FILTER FEED TANK CLEANING

PURPOSE: To remove non-aqueous phase leachate from the inside walls to extend filter bag and carbon life.

To improve visibility while monitoring leachate levels.

DESCRIPTION: 2,910 gallons fiberglass tank that is gravity fed, from the clarifier. Collected leachate is pumped by one or two air driven pumps to pressure filters.

PROCEDURE TO CLEAN:

1. Place high pressure washer outside of overhead door.
2. Couple water supply to high pressure washer with garden hose at sludge tank. Activate flow.
3. Place personnel lift as close as possible to tank manway.
4. Place breathing air cylinder and airline near tank, but away from work paths. Install regulator and couple airline.
5. Don Level A protective equipment. Use Saranex Sack Suit or equivalent.
6. Activate high pressure washer. After sufficient water discharge is noticed, turn switch to high pressure steam.
7. Ascend to manway hatch. Open.
8. Clean area furthest from manway first. Use 3-2' wand sections.
9. Remove extensions as cleaning proceeds back toward the manway.
10. Close hatch.
11. Doff Level A protective equipment Saranex Sack Suit and gloves. Drum.
12. Decon support equipment in Level C if necessary.
13. Return equipment to proper location.
14. Doff Level C protective equipment. Drum.
15. Shower

CLEANING FREQUENCY: Operators discretion is to be used. Residual build up is dependent upon treatment repetitions.

SAFETY PRECAUTIONS: Mechanical atomization occurs from high pressure steam cleaning. It is important that all dermal and inhalation exposure routes be protected.

MAINTENANCE AND SAFETY PROCEDURE FOR THE JOHN DEERE 160 LAWN TRACTOR
Equipped with Rear Bagger

Purpose:

1. Keeping lawn area in a presentable condition. Admin. Bldg., Treatment Plant and Public Information Office.
2. Trimming grass close to the fence surrounding the Love Canal complex.
3. Trimming around monitoring wells.

Description: John Deere - Model 160 - manual clutch shifting transmission with 5 forward speeds and one reverse speed. 38" cut equipped with rear bagger.
Controls consist of: down stop lever for height of cut, clutch pedal, break pedal, lift lever, throttle lever, key switch, power take off switch, gear shift lever, park brake knob.
Two very important safety controls: you cannot remove yourself from the machine without first shutting down power take-off and putting transmission into neutral. Machine will stall out to prevent accidental injury to operator.

Purpose of Maintenance:

1. Extend machine life.
2. Prevent breakdowns resulting in unexpected and time consuming delays.

Maintenance Procedures:

1. Check oil level before using. Keep level at proper mark on dip stick using John Deere Torq.-Gard Supreme 30 Wt. Winter usage necessitates 5W-20 oil.
2. Weekly: Thoroughly air blow engine fins, air intake screen and surrounding engine compartment clean and free of any accumulations of dust, grass and foreign debris. Air supply is located inside treatment plant bay door.
3. After 25 hours of operation (roughly mid July) change engine oil and grease wheel spindles.
4. Change oil in mid September for additional usage and winter storage.
5. On even numbered years, this machine is taken to D.W. Carl in Pekin, N.Y. for complete service. Change all oils, drive belts, and replace worn or broken parts. For additional maintenance or troubleshooting refer to O & M Volume II.

Safety Precautions:

1. Inspect top of Blade Cutter Assembly for dried cutting debris. Blow clean, using plant air, to prevent a possible fire from overheated belts slipping thru this excess material.
2. We have two sets of cutter blades. One set with a standard "pitch", to be used without bagger chute and one set called "High lift blades" to be used with bagger chute. DO NOT USE high lift blades without bagger chute installed. The high pitch tends to throw foreign objects in all directions with great velocity and could possibly injure a passerby.
   Blade changing is accomplished by raising blade carrier and propping with a 4 x 4 block.
   Remove one cap screw for each blade using a 5/8" box wrench. Install the proper set, going through the reverse procedure. Always sharpen removed set with surface grinder when storing.
3. Refill gas tank after using, and when engine cools, not only to comply with the old adage "An empty tank is more dangerous than a full one", but also to prevent moisture build-up inside the void space in a tank that is not kept full.
4. Always set parking brake when parking. Machine will roll resulting in personal injury or equipment damage.

5. Remove ignition key to prevent battery discharge.

February 13, 1989

OPERATION AND MAINTENANCE PROCEDURE FOR REMOVAL/CLEANING/REPLACEMENT, INLINE, CONDENSATE DRAINING DEVICE HANKISON, SNAP-[redacted] MODEL 503 STANDARD OPERATING PROCEDURE (SOP)

PURPOSE: To remove condensate from the compressed air before it enters and as it leaves the Van-Air refrigerated air dryer.

DESCRIPTION: Located in the compressor room of the Love Canal Leachate Treatment Facility, at the rear of the Van-Air air dryer are two Model 503, Snap-Trap condensate drains. Both polycarbonate drains are standard service.

SAFETY PRECAUTIONS:

1. Compressed air is dangerous and care should be taken to insure that the system is depressurized before servicing.

PROCEDURE:

1. Depressurize system by opening the air bleed on the 25RS-110 air compressor.
2. Remove the bowls from their threaded connection.
3. Check condition of "o" ring replace if worn or damaged.
4. Remove the float assembly from the bowls.
5. Wipe the inside of each bowl and the outside of the floats.
6. Re-assemble float and bowl assembly, replace if necessary.
7. Re-thread bowls to their connections.
8. Re-pressurize system and check for leaks.

FREQUENCY:

Clean bowls and floats weekly. Replace if worn or damaged.

SERVICE/SUPPLIERS:

Hankison Inc.
Canonsburg, PA 15317
(412) 745-1555

Rengib Assoc.
1191 Hertel Ave.
Buffalo, NY 14216
(716) 834-4225

POWER VEGETATION TRIMMING

PURPOSE: To maintain vegetation height for aesthetics and accessibility.

DESCRIPTION: John Deere and Stihl 2-cycle powered rotary string trimmer.

PROCEDURE: Don safety shield or glasses. Lay unit on level surface and set choke. Place switch in "on" position. Pull rope to start. Weed whip in a rational fashion only. Remove all hazards such as stones, gravel, etc. that could become an uncontrolled projectile. Be conscious of nearby personnel relative to their distance from your operation.

FREQUENCY: Clear vegetation as needed.

SAFETY PRECAUTIONS:

1. Read manufacturer's manual
2. Wear a safety shield or glasses
3. Wear long pants
4. Wear safety shoes
5. Be conscious of nearby personnel
6. Clear vegetation only

LOCATION: On the North wall of the Treatment Room, just East of the overhead door.

SUPPLIERS/ SERVICE:

John Deere
D.W. Carl
5152 Town Line Road
Sanborn, New York 14132
716/731-5615

Outdoor Equipment Distributors
4287 Ridge Rd.
Lockport, NY 14094

VALVE CLEANING (PLANT)

PURPOSE:

To assure positive opening and closing action for flow diverting when necessary.

To prevent back injury by having to use minimal work in opening or closing valves.

DESCRIPTION:

Over 60 teflon plug valves that range in size from 3/4" to 4". Depending upon their location in the process flow, these valves can be of little importance or very critical.

PROCEDURE TO CLEAN:

1. Loosen all retaining bolts on flange and remove valve.
2. Replace valve with a previously serviced one.
3. Mount valve on valve holder located on NW leg of VIII.
4. Loosen the hexagonal set screw on the valve stop collar and remove.
5. Loosen the four plug retaining collar bolts.
6. Using a wedge and a hammer, pry the plug retaining collar free from the body.
7. Ascertain the location of the teflon palking rings, either on the plug stem or in the collar. Note their sequence and number.
8. Using a valve handle, free plug from body.
9. Soak all parts in a mixture on Citrikleen and water 1:4 ratio.
10. After soaking at least 4 hours, remove all loose particles with a "parts" brush.
11. Remove from moisture and wipe with a rag.
12. Place the plug in a vise and carefully sand the plug using various grits of emery cloth from coarse to fine. (Do not over sand!)
13. Place valve body back on the valve holder and repeat Step 12 on the inside of the valve body.
14. Using high pressure air, blow all parts clean.
15. Lubricate all parts with silicone grease and reassemble valve in reverse order.
16. Valve is now ready for return to service.

By systematically removing and replacing valves, no part of the operation is sacrificed for any length of time. There are concerns, however, when servicing the valves.

SAFETY PRECAUTIONS:

1. Wear all protective equipment, as necessary.
2. Wear respiratory protection, with dust filters, when blowing and sanding parts.
3. Citrikleen is a skin irritant. Avoid contact and use in an area with adequate ventilation.
4. Valves are heavy. Use proper lifting methods and caution when removing, mounting, and replacing them.

CHECK OR COMPLETE:

1. If a gasket is needed.
2. If all bolts are tight.
3. Valve service record.

Teflon valves of this type are very expensive, in addition the direct replacement valves and parts are obsolete. When it becomes necessary to replace a valve, replacement will be with a high quality, 316 stainless steel ball valve. The stainless steel has been proven able to withstand attack from the leachate and represents a considerable cost saving measure.

TREATMENT PLANT CLARIFIER AND SLUDGE TANKS #1 #2 #3 #4
Primer Paint Rowe's Epoloid 7-F-20 Touch-up

PURPOSE:	Primer paint of metal thickness test spots and rust spots.
DESCRIPTION:	Exposed metal surfaces due to paint removal for metal thickness testing and rusting from element exposure.
PURPOSE OF MAINTENANCE:	Prevent external rusting thereby preserving the useful life of the vessels.
MAINTENANCE PROCEDURES:	1.) Scrape loose paint from area at bottom of tanks parallel to concrete saddles. 2.) Wire brush thoroughly removing loose rust. 3.) Paint areas using Rowe's epoloid 7-F-20 fast dry primer.
FREQUENCY OF MAINTENANCE:	As needed.
SAFETY PRECAUTIONS:	1.) Remove all ignition sources from area. 2.) Wear respirator, gloves and body covering. 3.) Wear eye protection. 4.) Wash hands and face before eating, drinking, smoking or using toilet facilities. 5.) Maintain adequate ventilation.
SUPPLIER:	Rowe Products 3857 Hyde Park Boulevard Niagara Falls, New York 14305 Phone: (716) 285-9348

OPERATING AND MAINTENANCE PROCEDURE
SECURITY SYSTEMS FOR ADMINISTRATION BUILDING AND TREATMENT PLANT
Standard Operating Procedure (S.O.P.)
Site Identifiction #9-32-020 Love Canal

PURPOSE: Inform section personnel the operation of the alarm system to minimize false alarms and maximize security at the Treatment Plant and Administration Building.

DESCRIPTION: Treatment Plant is secured by a Magnum Alert 850 NAPCO Security System with a digital code entry keypad monitored by "Security Today".

Administration Building is secured by a Simplex 2001 timed recorder with a timed by-pass, activated by an outside security key lock, also monitored by "Security Today".

PROCEDURES: Treatment Plant: Enter building thru locked entry/exit office door west side. The digital keypad immediately to your right will be sounding a steady tone indicating an entry delay is in progress. Immediately enter the four digit code 1, 3, 7, 9 by depressing the respective #'s on keypad. The mini-tone sound will cease and the red indicator lignt will go out with the green light coming on indicating security has not been breached and entry is properly executed.

NOTE: In the event you enter the wrong code, wait two seconds before trying again. If you are unable to properly execute the dis-arming procedure within 60 seconds, the outside light alarm bell will start ringing and "Security Today" will be alerted as to the breached security. The monitoring firm may then proceed to notify the Police Department or they may call you on the telephone to identify yourself and ask for the secret password. The secret password may be obtained from the Section Chief or Treatment Plant Operator.

Arming the security system before you leave: Secure tne 3 exit doors and the overhead door. Secure any loose objects that may waver in line with the motion detectors. Check tne green status light at the digit key keypad. If it glows steadily, enter the four digit code 1, 3, 7, 9. The red armed/alarm light will come on and the green status light will go off. Leave immediately tnrough the exit/entry door before the delay time of 60 seconds runs out. Pull the door tightly shut. System is now armed.

NOTE: In the event you are unable to execute the arming procedures, raise the hinged key-pad cover plate and push and hold #3. Compare the displayed number with the printed notes. Check the indicated zone for secureness and re-arm the system.

Administration Building: To enter the Admin. Bldg., insert security key into key lock to the right of North entrance door. By turning key all the way to the right, a bypass timer is activated for 60 seconds to allow access through locked North door. One step inside and to your right is the control panel, open panel door and flip extreme left toggle switch lever UP to by-pass position on block labeled Security Control. System is now de-activated.

NOTE: By looking through window before and after you insert key into outside security by-pass lock, you can see if the amber timer light comes on when you unlock circuit. This light will be closest to you.

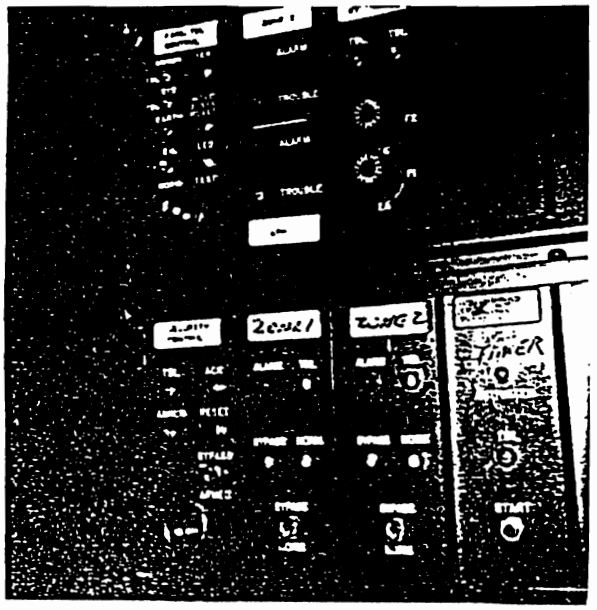
When leaving Admin. Bldg., secure all doors and windows, turn out all lights. At control panel, you will see Zone 1 and Zone 2 amber by-pass lights flashing. Push timer switch start button and amber timer light will come on, move security activating toggle switch, on your extreme left, to the armed position and exit building immediately. Building is now armed and secured.

NOTE: If Zone 1 red alarm light is lit prior to arming, you must re-secure the doors. If Zone #2 red alarm light is lit, check and secure the windows, the system cannot be armed properly with any red alarm light on.

MAINTENANCE: Refer to "Security Today", the firm monitoring the systems.

Security Today Inc. 1-882-5050

For additional information, contact the Treatment Plant Operators.



NOTES: Zone #1 Doors and Motion Detectors
Zone #2 Windows

October 28, 1994

ELECTRICAL SYSTEM LOCK OUT/TAG OUT STANDARD OPERATING PROCEDURE (S.O.P.)

PURPOSE: To ensure the protection of operator/maintenance personnel in preventing/avoiding personal injury

DESCRIPTION: Electrical starters exist at field pump chambers/wetwells, and within the treatment facility, drum/decon storage facility, and administration building. These starters must be locked out/tagged out from any energy transmission prior to the performance of any required task.

PROCEDURE:

1. Identify the types of energy sources used, potential hazards and control devices.
2. Notify all affected employees.
3. Turn off all operating controls.
4. Locate all energy sources.
5. Lock out/tag out all switches and energy controls in the "off" or "safe" position.
6. Test the operating controls. Put all controls in the "on" position. Be sure nobody can get hurt before testing. Lock, tag, clear, try.
7. Return all operating controls to the "off" position.
8. Perform required task.
9. Remove lock out/tag out devices only after the equipment is fully assembled and all affected employees have been notified. Each lock out/tag out device must be removed by the person who put it on.

Note: There are differences in the mechanical configuration of the equipment starters. Disconnect handles are not present at field pump chambers/wetwells 1A, 2A, 3A, 1 & 2. Therefore, the procedure below must be followed.

1. Notify all affected employees.

2. Turn the pump control switch "off" within the power component enclosure. Tag.

3. Switch the pump breaker "off" within the power panel. Tag.

4. Clear and test by turning the pump control switch to the hand position within the power component enclosure.

5. Return the pump control switch to the "off" position.

6. Perform required task.

7. Remove lock out/tag out devices only after the equipment is fully assembled and all affected employees have been notified. Each lock out/tag out device must be removed by the person who put it on.

A summary of the above procedures are on the power component enclosure.

The following are inflow and electrical/mechanical potentials associated with Love Canal pump chambers and their lock out/tag out actions:

PC1 (Wetwell/ MH#7)	Gravity inflow potential
PC1 (Drywell)	Motor starter. No inflow potential (lock out motor - PC1)
PC2 (Wetwell/ MH #8)	Gravity inflow potential, accepts overflow from PC3A (lock out) PC1A, PC2A, DCF, DDSF sump, unplug butterfly valve sump)
PC2 (Drywell)	Motor starter. Inflow potential from PC1 only if the piping from PC1 is disconnected, otherwise no potential. (lock out PC2 motor)
PC3 (Tank)	No electrical. Inflow potential by force from PC1 and PC2. (lock out PC1, PC2)
PC3 (Wetwell)	Motor starters - directly connected to PC3 holding tank flow by force from PC1 and PC2. Valves connect tank to wetwell and can be open or closed. (lock out PC3 motors, PC1, PC2 close connection valves)
PC1A (Upper level)	Motor starters. No inflow potential (lock out PC1A)

PC1A (Lower level)	Motor starters. Gravity inflow, force inflow from dewatering facility. (lock out PC1A, Dewatering Facility)
PC2A (Upper level)	Motor starters. Inflow potential by force from PC1A (lock out PC1A and PC 2A)
PC2A (Lower level)	Motor starters. Gravity inflow only (lock out PC2A)
PC3A (Upper level)	Motor starters. No inflow potential (lock out PC3A)
PC3A (Lower level)	Motor starters - Inflow by force from DCF holding tank ~10,000 gallons. Inflow from south and east containment pad, inflow from treatment plant floor trench and carbon vessel vents and by-passes, inflow by force from DDSF collection sump and butterfly valve sump. (lock out - PC1A, PC2A, PC3A, DDSF sump, DCF pump, unplug butterfly valve sump. Be aware of containment pad and treatment plant inflow potential.)
FREQUENCY:	Any time work has to be performed on a component drive by electrical, mechanical, hydraulic, or pneumatic systems in the field or within the facilities. This procedure is in addition to the annual 8-hour Refresher Training in which this topic is covered, plus the chart posted conspicuously within the Administration Building.

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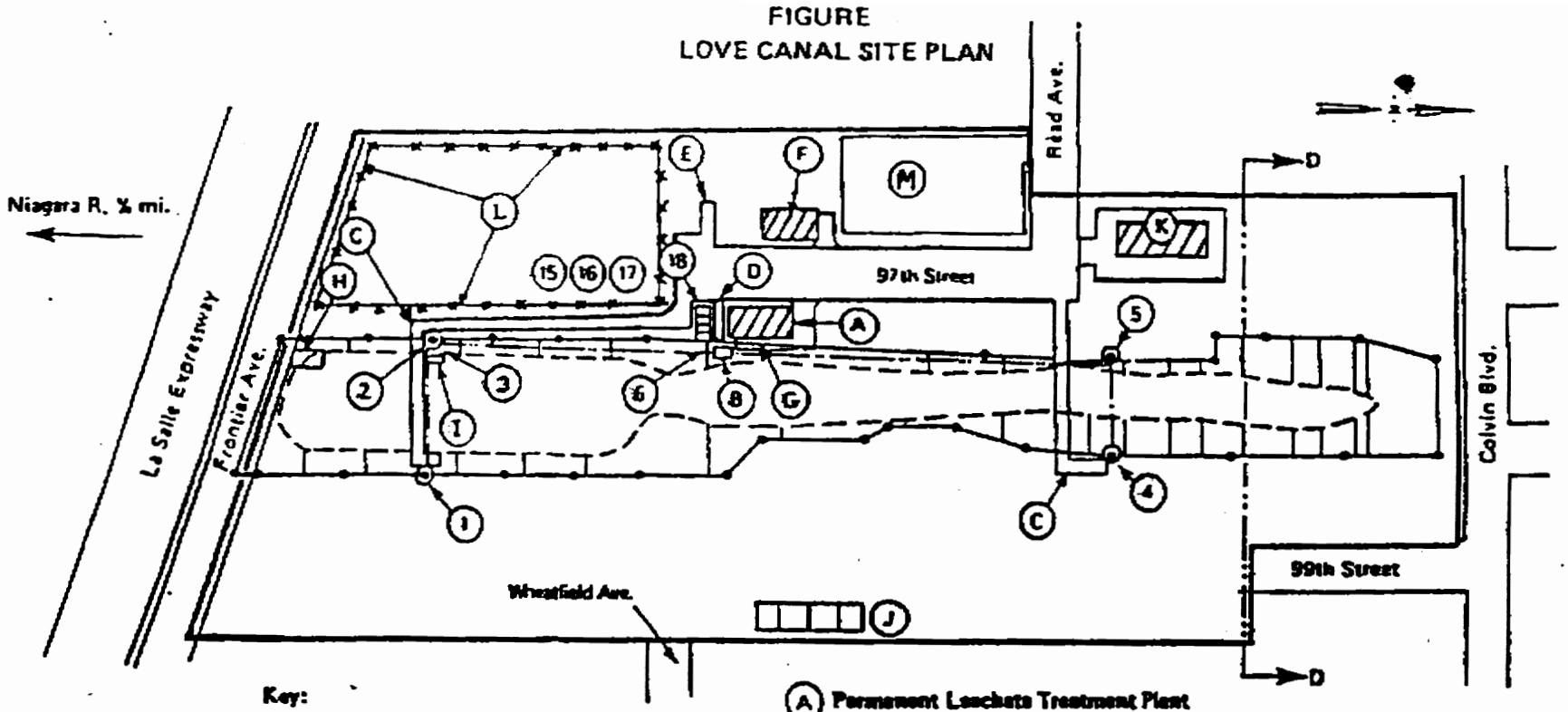
FIGURE
LOVE CANAL SITE PLAN



Key:

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

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

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

09/11/90, Oct. 94

OPERATION AND MAINTENANCE PROCEDURE
SAMPLING OF LONG TERM MONITORING WELLS
STANDARD OPERATING PROCEDURE

PURPOSE:

To ensure repeatable, high quality samples of groundwater from the area surrounding the Love Canal Containment Facility.

DESCRIPTION:

There are currently 47 monitoring wells that are required to be sampled as part of the Love Canal Long Term Monitoring Program (LTM). These wells are located both within the fenced confines of the Love Canal Containment Facility and throughout the surrounding Emergency Declaration Area (EDA). Capable of providing groundwater samples from various geologic strata these wells are screened at various depths from 9 feet to 223 feet.

Of the 47 wells 20 require annual sampling and 27 require bi-annual sampling. The 27 bi-annual wells are split into two groups with each group being sampled alternatively every other year. Because these wells are the first indication of failure of the Love Canal Containment system it is essential that the strictest attention to detail be followed to ensure high quality samples.

SAFETY PRECAUTIONS:

1. Some of the wells in the LTM have produced samples with high levels of contamination. Proper safety precautions must be taken to prevent personal and ground contamination from these "hot" wells.

2. Slip, trip and fall hazards abound with this task and care must be taken to minimize this risk of personal injury.

3. This task involves heavy lifting, therefore, proper lifting techniques must be followed.

4. There is contact with compressed air at high pressure so caution must be exercised.

5. There is an element of risk from electrical shock. Proper ground fault interruption must be used.

6. There is a risk from refueling hot compressors/generators. Care must be taken when performing this task.

7. There is risk from cuts and injury from razor knives used for cutting tubing and string. Use caution.

8. Caution must be taken and samplers need to be aware when sampling areas where there is traffic, such as the LaSalle Expressway.

9. Careful handling of sample bottles must be followed to prevent breakage and possibility of injury.

DISCUSSION:

In sampling of LTM wells three types of purge methods are utilized. Purging by hand bail to dry method, peristaltic pump purge three to five volumes or until dry with a high volume masterflex pump, or the Geoguard deep well air lift pump. Each method has a slightly different approach to the set up for the purge.

PROCEDURE:

A. Prior planning is important before anything is purged or sampled.

1. Prepare a list of materials and equipment that will be needed.

2. Ensure all equipment is in working order, belts, hoses, batteries, etc.

3. Purchase bailers, tubing, (three types are needed, coaxial for the Geoguard, drive tubing for the masterflex. These items must be purchased far enough in advance to allow arrival.

4. Block an appropriate period of time to purge wells. Most can be purged in about one hour but some take much longer.

B. Set-up and pre-purge/sample procedure.

1. Determine which wells are to be sampled, i.e., the 20 required annual wells, and the semi-annual group, plus any additional wells, if necessary or required, that need to be sampled.

2. Look up individual wells in the purge record book to determine actual purge times, quirks or problems with the well.

3. List all wells with their normal purge time to come up with a workable schedule. (NYSDEC utilized the NYSDOH lab, therefore, was restricted to the number of wells that could be sampled in any given week.)

4. Determine which wells will be chosen for the QA/QC i.e., MS/MSD, split samples, etc. (This is important due to the fact that some of the wells have faults, or may not yield enough water for all required samples.)

5. When this has been done determine the number of bottles required for this sampling and order them or consolidate them.

   a. BNA analysis for NYSDOH required 1 - 2.3 1 amber bottle.
   b. Pesticide/PCB analysis, 1 - 1 liter bottle.
   c. VOA's 2 - 40 ml septa (amber).
   d. Exception to the above: MS/MSD requires as 1 gallon jug (amber) for BNA/Pest/PCB. MS/MSD for VOA's requires four additional 40 ml septa.

6. Ensure that full chain of custody is maintained for the sample bottles.

7. Label bottles. It is advantageous to pre-label all bottles to eliminate the need to do this in the field. Some of the problems that arise when doing this in the field are; lost marker, wet bottles, forgotten labels, etc... Pre-labeling allows sampler to concentrate on the job at hand -- getting a good sample with the least chance of contamination.

8. Determine which wells are to be done using what purge method. Order adequate amounts of tubing for each well. For example, NYSDEC orders about 600 - 1000 ft. of 3/8 ID 1/2 OD food grade vinyl tubing from KD Supply in North Tonawanda approx. 6-9 weeks in advance of sampling each year. Geoguard tubing is dedicated to the well in most cases, but if needed it must be ordered from Geoguard, Medina, NY.

9. Miscellaneous items that need to be ordered if not on hand. (see misc. list attached).

10. Load all equipment required to purge well onto truck NYSDEC used a 1-ton stake body for this purpose (equipment list attached).

C. PURGING USING A HIGH VOLUME PERISTALTIC PUMP:

1. Pull vehicle approximately the length of a 25 ft. extension cord downwind from the chosen well.

2. Run extension cord to the well.

3. Unload the high volume masterflex pump and graduated purge bottles from the vehicle.

4. Set up table at well and put purge sheets, H.nu, specific conductivity meter, pH meter, Plopper, calculator, etc... on it.

5. Put masonry tray under table.

6. Unlock well.

7. Take a background H.nu reading.

8. Take a headspace reading from the well by just opening the well cap enough to insert the probe into the headspace and take the reading.

9. Remove the riser cap and plop the well to ascertain the depth to water reading.

10. Calculate the volume of water in the well by subtracting the depth to water from the bottom depth of the well. Using this number multiply it by .163 to determine the volume of a 2" well or .653 to determine the volume of a 4" well.

11. Don clean disposable gloves.

12. Cut a sufficient length of tubing to allow well to purge, (this must be to the bottom if the well runs dry).

NOTE: Peristaltic pumps will only purge to an effective depth of approx. 28 ft. if the well does not recover sufficiently to overcome this depth another purge method must be chosen. Note on the purge sheets.

13. Insert the tubing into the hole approximately 6 feet below the water surface.

14. Start the generator, plug in the masterflex, rinse gloves.

15. Log the time of initial water.

16. Grab initial water sample in the purge sample jar, put tubing into the graduated purge jugs to determine amount purged.

17. Check sample for temperature, sp. cond., pH and note any peculiarities about water, color, particulates, floc etc...

18. Discard this sample and rinse jar and all probes.

19. At first well volume repeat steps 15 - 18.

20. Repeat this at least 3 to 5 well volumes until readings stabilize or well runs dry.

21. After the final well volume reload all equipment onto vehicle, remove the tubing from the well with the pump running to prevent water from going back into the well.

22. Recap and re-lock the well.

23. Move to next well.

D. PURGING USING THE HAND BAIL TECHNIQUE:

1. Remove the purge jugs from the vehicle.

2. Set up following the above steps 4 - 20.

3. Select a disposable bailer suitable for well, i.e. top weighted, standard, double weighted bottom, etc....

4. Don disposable gloves.

5. Tie cotton string to bailer making sure knot is secure.

6. Lower bailer to the bottom of the well and leave 3 feet slack in the line.

7. Cut line and tie around hand.

8. Begin to pure the well following above steps 15 - 20.

9. Use caution when following the above steps to ensure there is no cross contamination to well. Its best to have second person doing data collection.

10. Deep well bailing technique is slightly different - at well 10210A where there is 223 feet of well you must lower the bailer to the bottom of well and allow 3 feet slack in the line. Attach the string securely to the hose reel carts, and place this directly over the well.

11. Bail well by reeling and allowing bailer to drop into the well steadily. (The above well requires the use of a stainless steel bailer to have enough weight.) Check string frequently for knots becoming loose, and fatigue.

12. When bailer starts to hang up on the side of the well, replace string.

E. PURGING WITH AN AIR-LIFT PUMP (GEO-GUARD):

1. Make sure battery in the controller is fully charged.

2. Test run controller. Make sure solenoid switch activates.

3. Ensure that compressor is full of oil and is fully fueled.

4. Arrive at the well and unload compressor. Place the compressor the length of the airhose downwind of the well.

5. Set up the tubing racks to hold tubing above the wells.

6. Unload purge bottles from vehicle.

7. Follow set up steps 4 - 11 as above in Section C.

8. Don disposable gloves.

9. Assemble the pump portion of Geo-guard.

   a. Connect end valve to bottom tube.
   b. Put connector onto the bottom tube.
   c. Connect head tube to end tube.
   d. Assemble dip tube by connecting ball check to dip tube. Connect the two pieces of the dip tube using compression fitting.
   e. Connect dip tube ball check to head piece shoving check into opening.
   f. Connect coaxial tubing to the head piece with the large compression fitting. (Note that there is a stainless steel tube connected to the inside tube this has to be secure and is placed into the headpiece. Make sure the dip tube doesn't become dislodged. It is also important that the total length of the dip tube is slightly less than the length of the pump tubes.)

10. Put tubing onto the tubing rack and lower the assembled pump into the well approximately 20' below surface of the water.

11. Connect the exhaust valve to tubing reel and to the controller.

12. Start compressor and set controller to about 9:00 exhaust and 9:00 pressure.

13. Turn controller on.

14. Follow steps 15 - 20 after initial water.

15. Check the controller frequently and set exhaust and pressure to maintain smooth flow.

16. Lower the pump into the well as the level drops if this is necessary.

E. PROCEDURE TO SAMPLE A WELL:

1. Check all bottles against chain of custody.

2. Label all bottles except for time and date.

3. Load all bottles into coolers or boxes to be transported to the field.

4. Freeze all ice packs.

5. Check and load all materials necessary to sample.

a. Chain of custody sheets.
b. Clipboard.
c. Pencil/marker.
d. String - cotton only, placed in a ziploc bag.
f. Disposable bailers.
g. Razor knife.
h. Masonry tray.
i. Table.
j. Sprayer bottle, and jug of D.I. water.
k. Bottles.

6. Move to well, shut off engine and allow exhaust to dissipate.

7. Set up table.

8. Place masonry tray beneath table.

9. Gather specific bottles, labeled for the well.

10. Note sample time and date on the chain of custody.

11. Note sample time and date on the bottle label.

12. Open well.

13. Don disposable gloves and rinse with D.I. water.

14. Tie string to bailer and lower into well until it hits water. Leave about 3' - 6' slack string.

15. Wind string around hand two to three wraps and cut off.

16. Pull up first bailer full and waste into masonry tray (if there is not enough water in the well to complete sample eliminate this step and only waste a little to wash the top of the bailer with sample water before placing into the bottle.

17. Lower bailer slowly into the water and pull second bailer full. Take volatile samples first, pesticides, then BNA's.

18. When finished dispose of bailer and string.

19. Load samples, and equipment.

20. Lock well, and move to next sample location.

GENERAL NOTES AND OBSERVATIONS:

1. Try to avoid rush hour traffic when sampling expressway wells. Exhaust from the traffic could lead to false voa readings.

2. Avoid sampling in the rain.

3. Try to standardize and repeat same steps at each well.

4. Park generator downwind of the well and avoid refueling during the purge.

5. Always rinse pvc gloves before sampling with deionized water.

6. make sure your knot on the bailer is tight.

7. Rinse plopper well with D.I. water before using on the next well.

8. Always use a D.I. water blank for one of your field blanks.

9. The use of disposable tubing and bailers reduces the risk of contamination.

10. Prior preparation is 95% of this task. Time taken to anticipate problems reduces the time spent when problems occur.

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