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

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Conestoga-Rovers & Associates

N.Y.S. Department of Environmental Conservation

VOLUME I

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SECTION I

INTRODUCTION

LIST OF FIGURES

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.

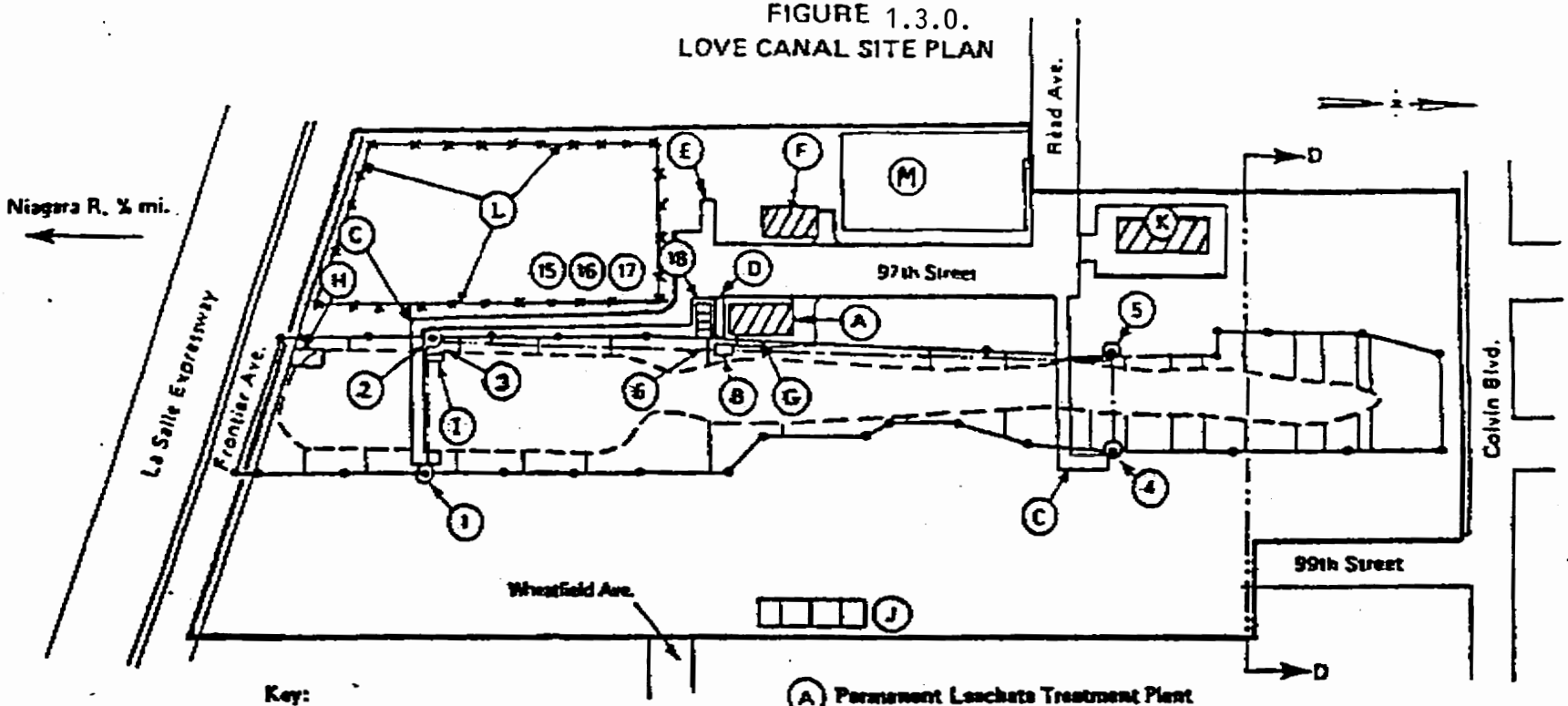
Average daily flows requiring treatment by the new treatment facility are expected to be in the 5,000 to 15,000 gallons per day range.

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
- 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

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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:

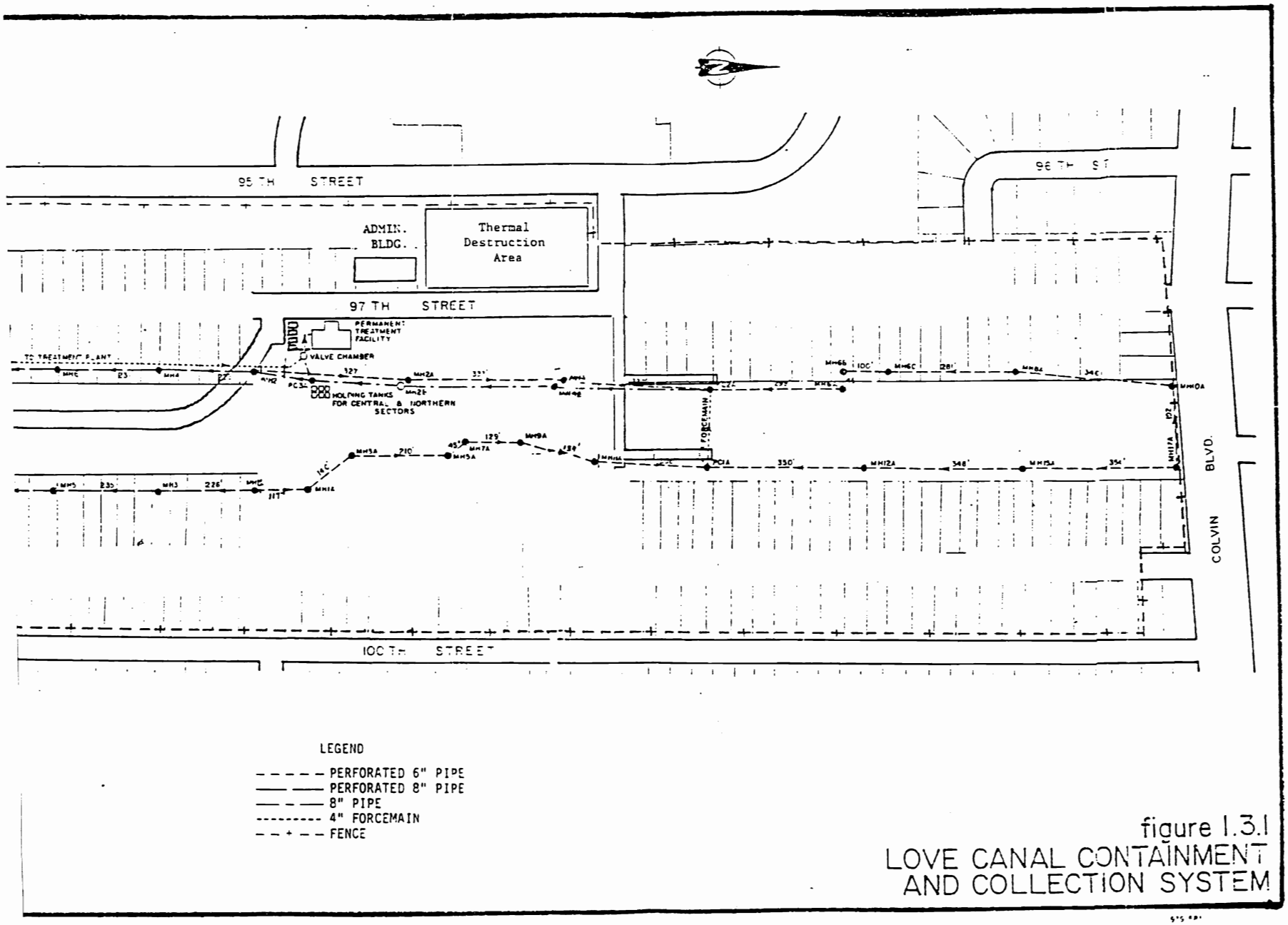

figure 1.3.1
LOVE CANAL CONTAINMENT AND COLLECTION SYSTEM

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

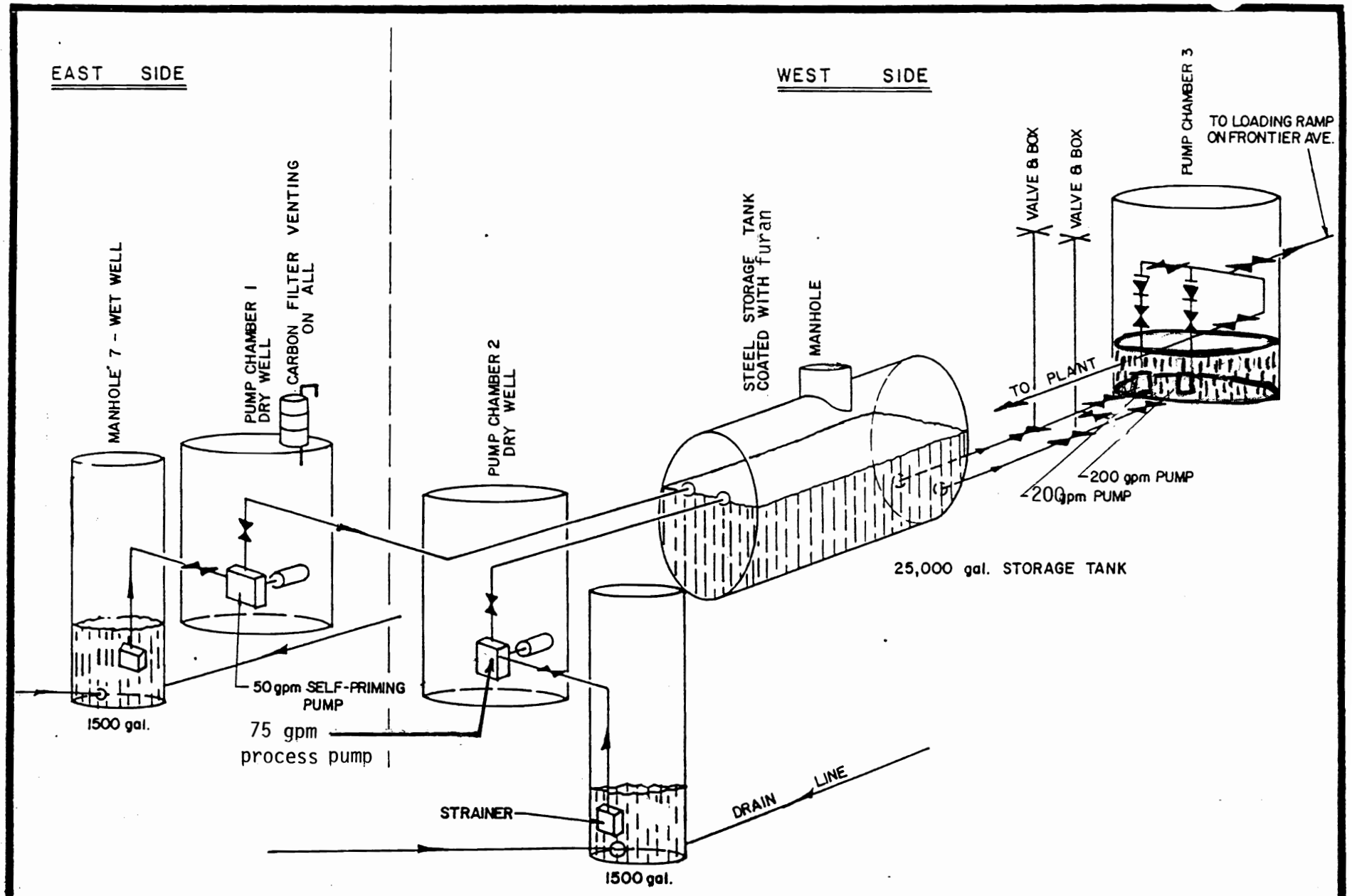

figure 1.3.2

COLLECTION SYSTEM SOUTHERN SECTOR

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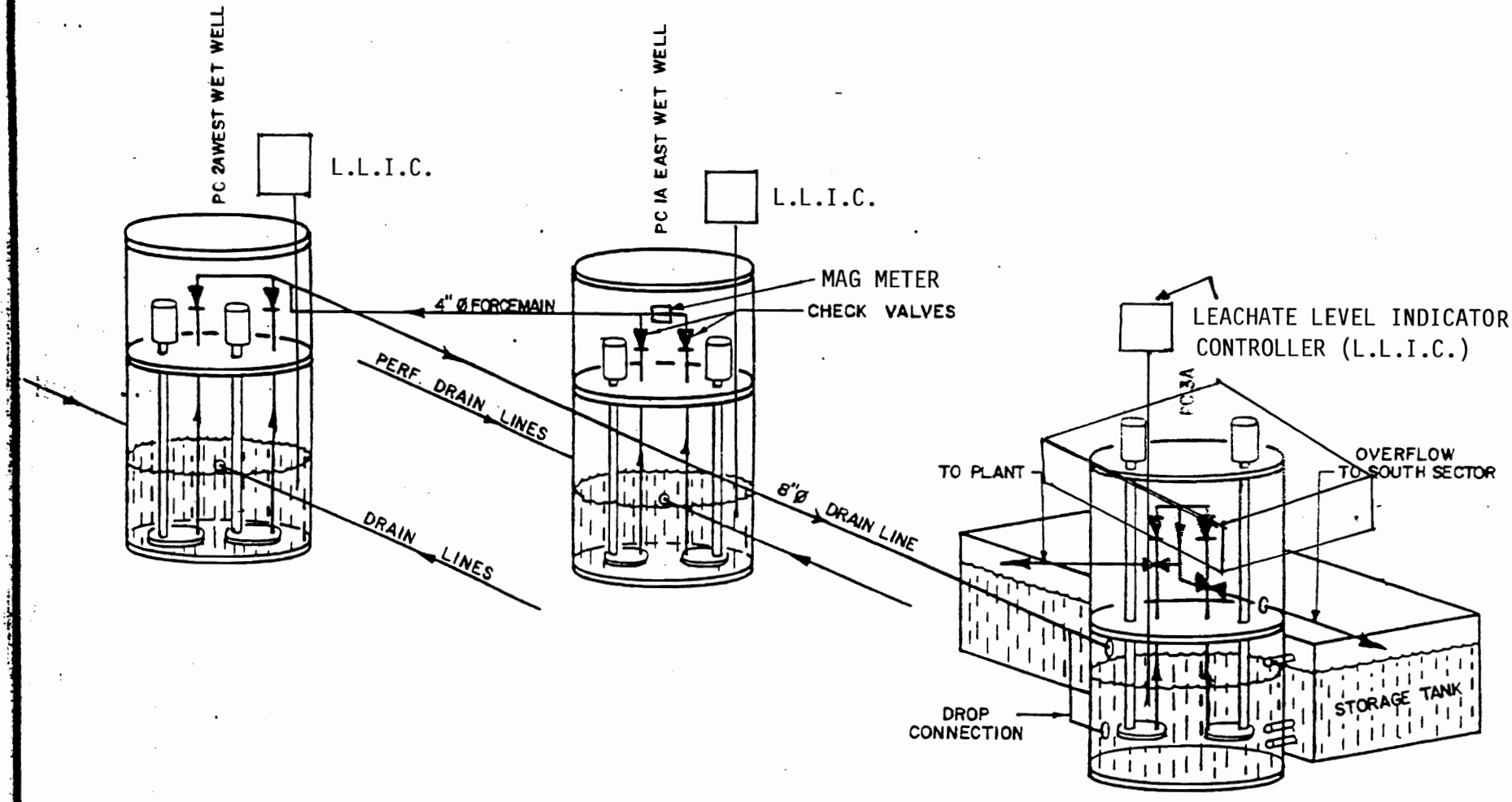

figure 1.3.3
COLLECTION SYSTEM
CENTRAL AND NORTHERN SECTOR

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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_20_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

List of Figures

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.

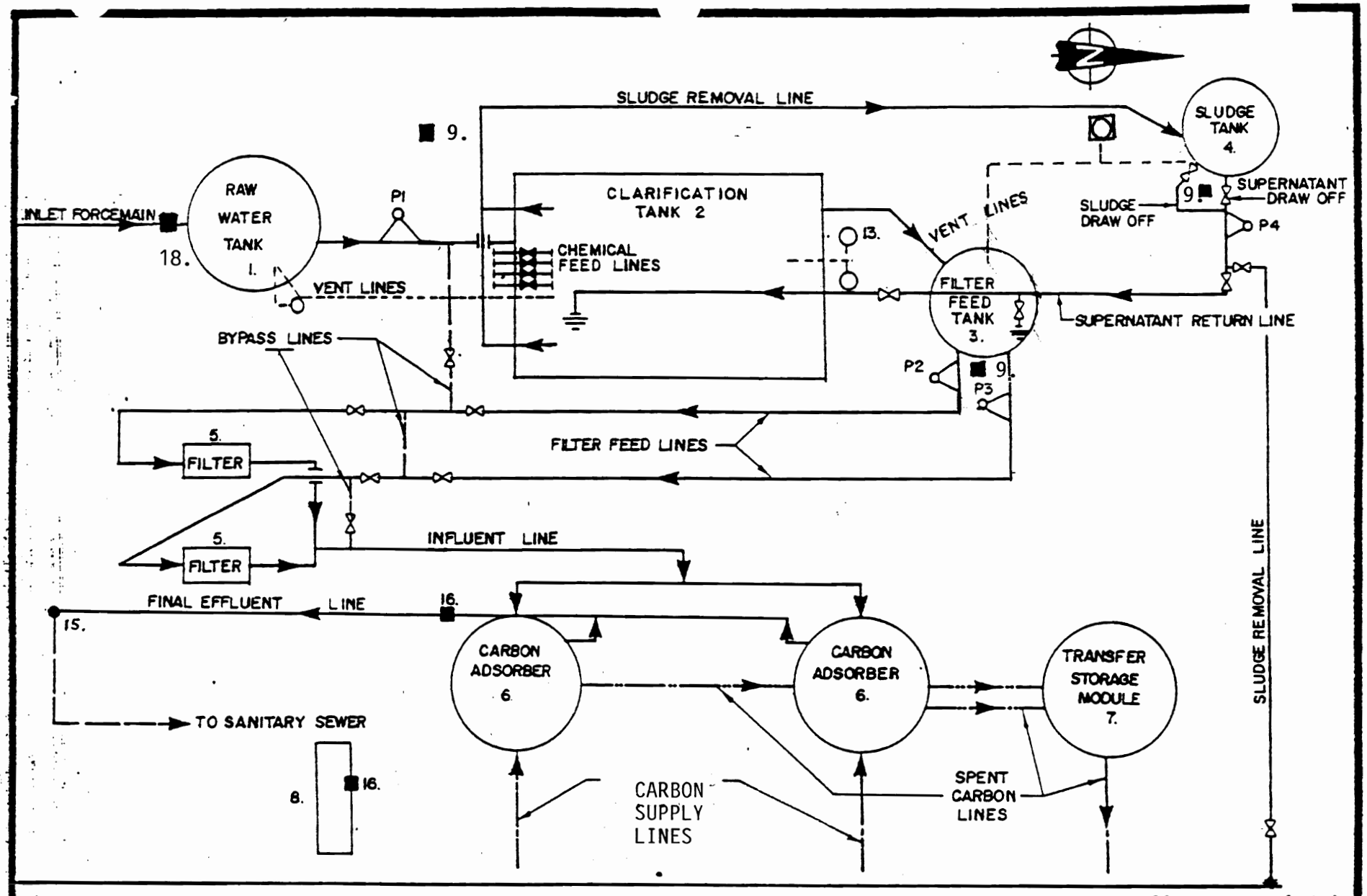

figure 14.1

TREATMENT PROCESS FLOW DIAGRAM

N.Y.S. D.E.C. RV-1986, 1994
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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.

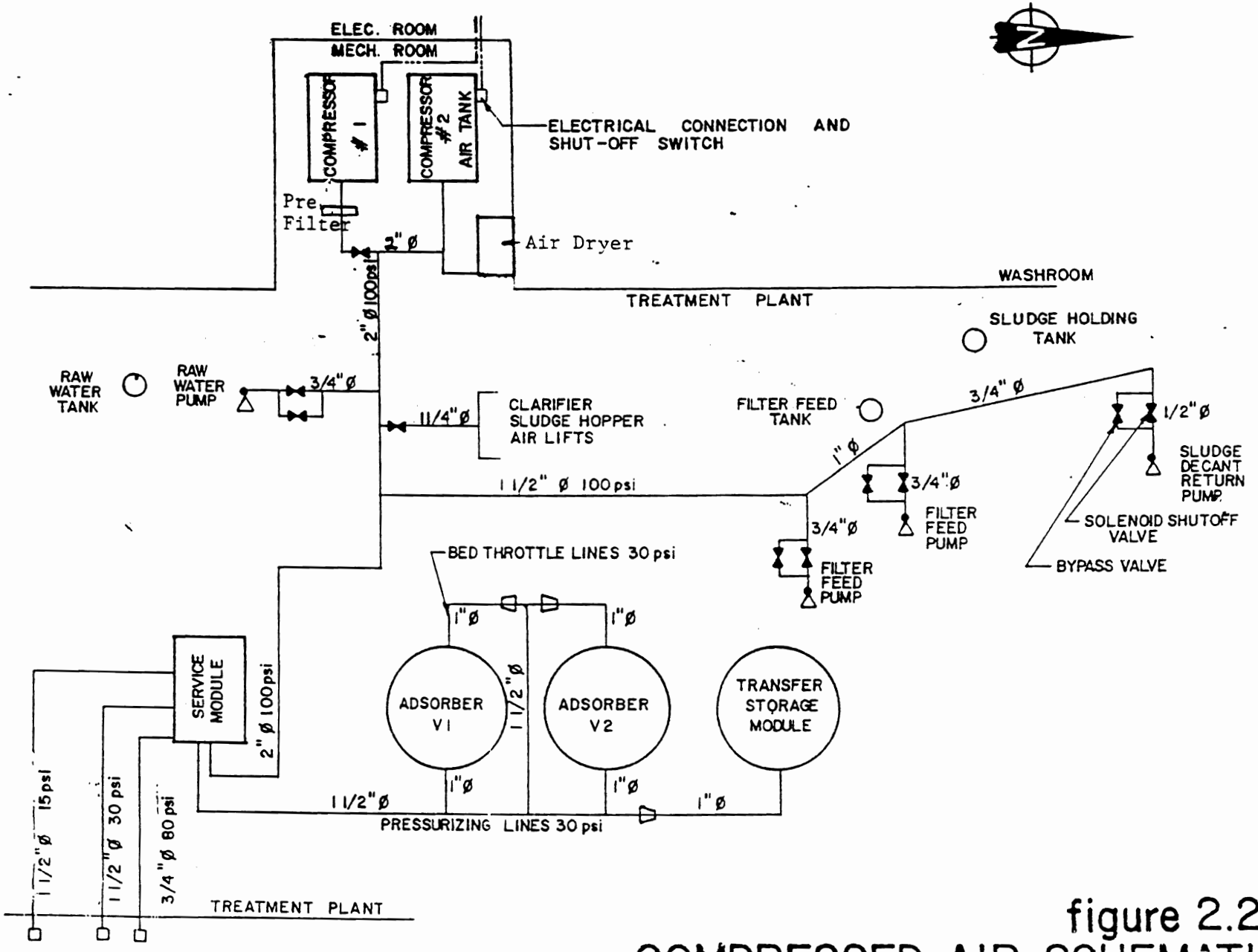

figure 2.2.1
COMPRESSED AIR SCHEMATIC

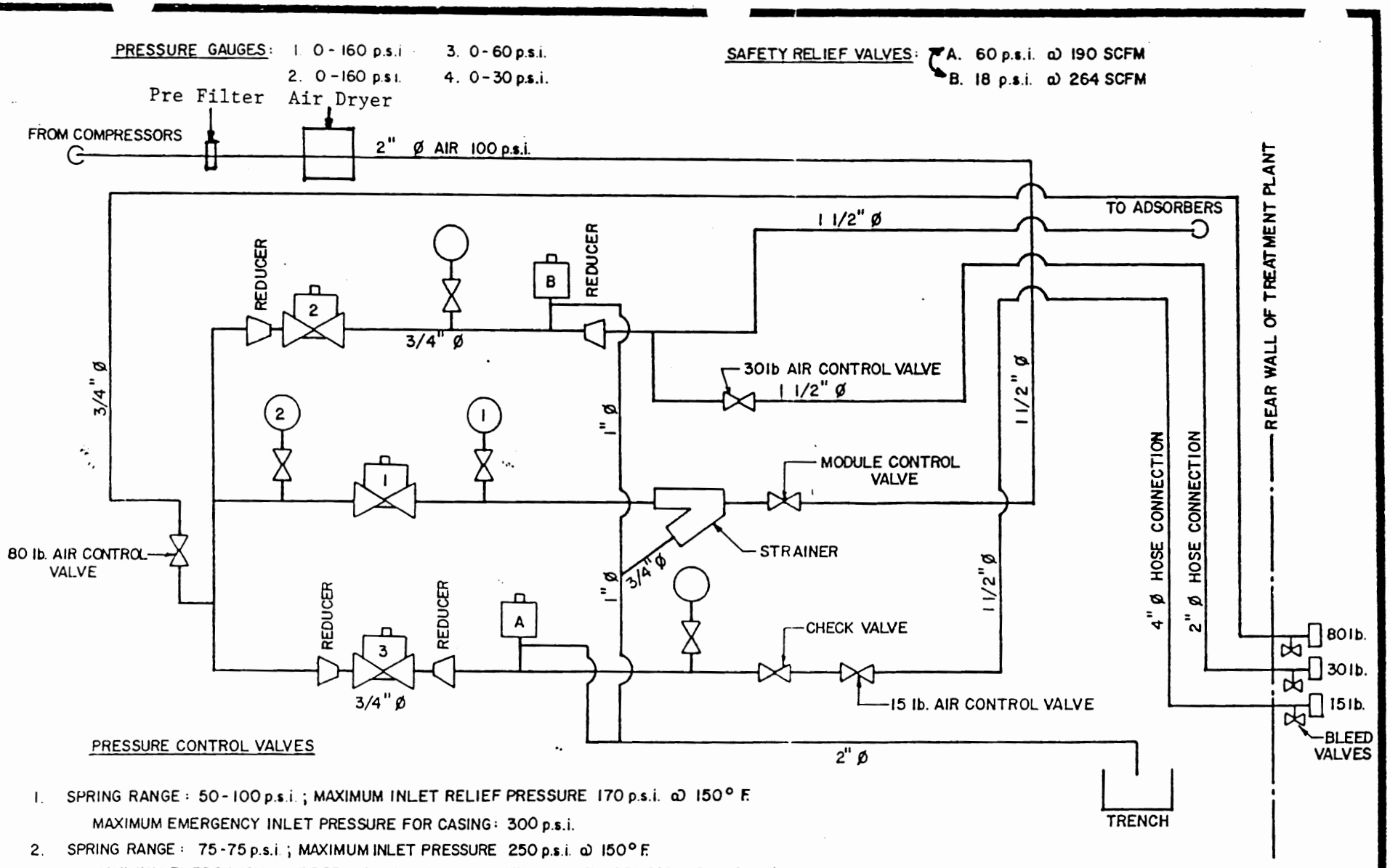

figure 2.2.2
AIR MODULE SCHEMATIC

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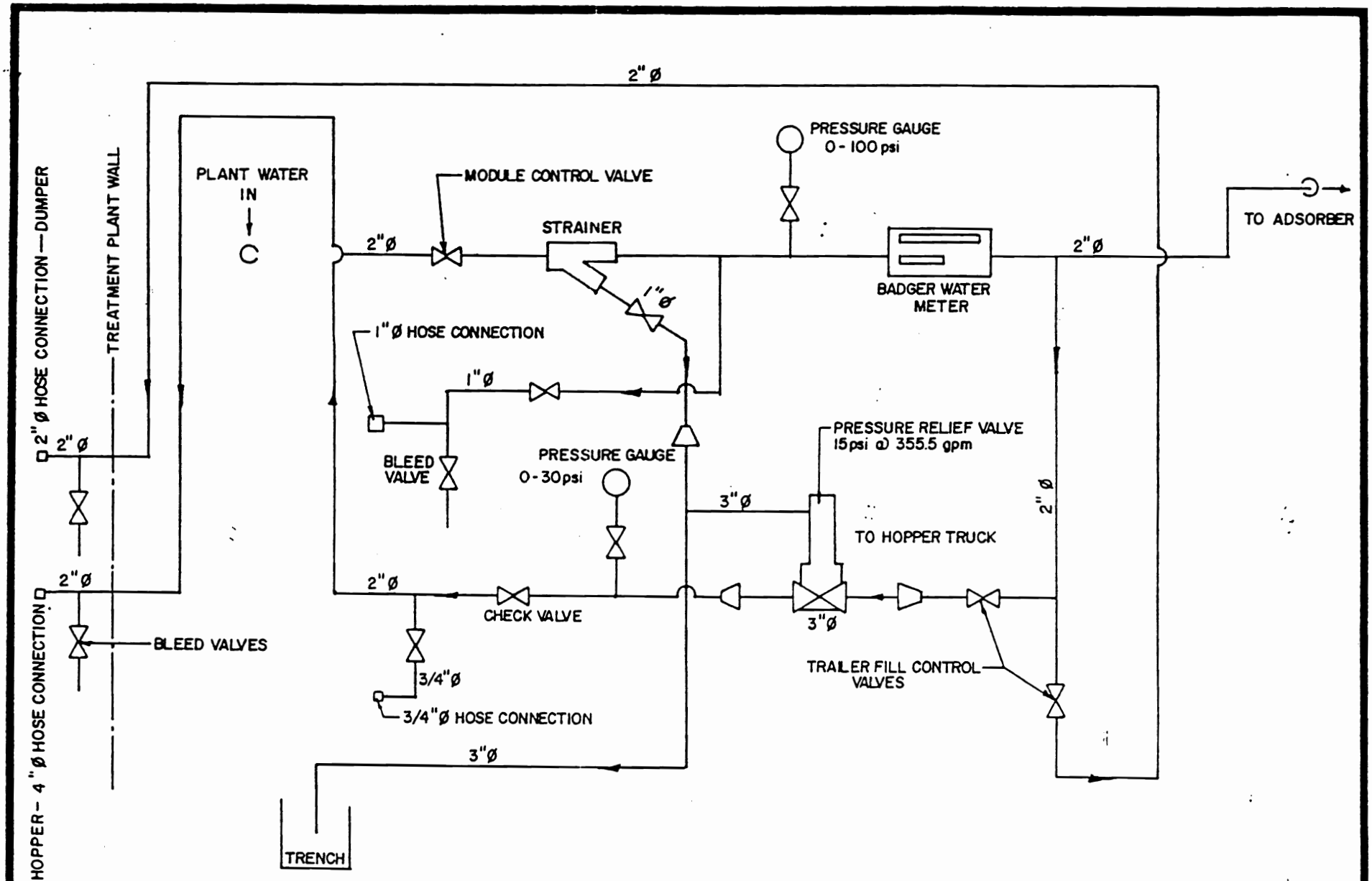

figure 2.3.1
WATER MODULE SCHEMATIC

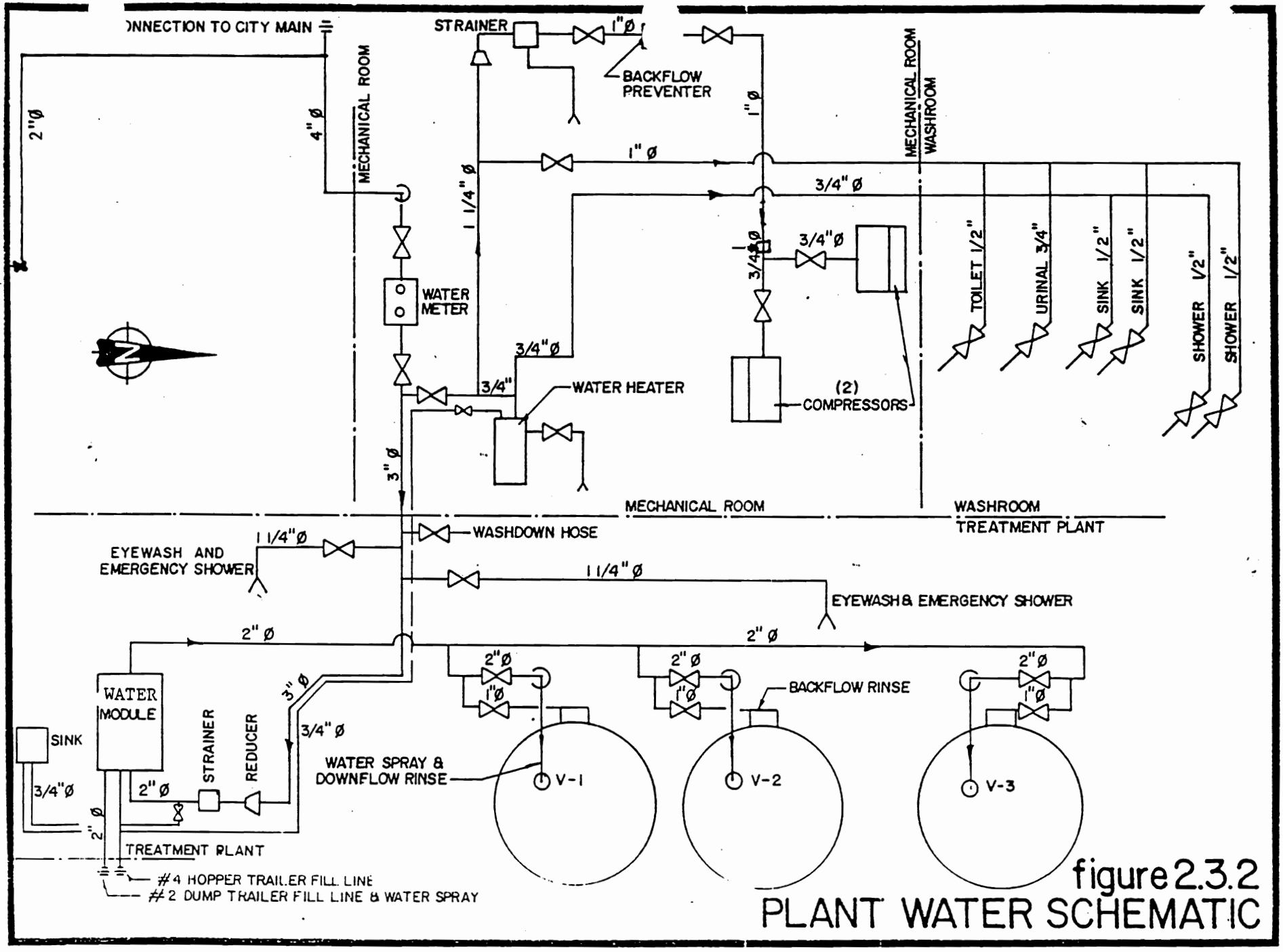

figure 2.3.2
PLANT WATER SCHEMATIC

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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

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 Limitations

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. HNO3 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

LIST OF FIGURES

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.

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.l.2.4 Maintenance

l. 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.l.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:

l. 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.

5.5.2 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.l 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.

l. 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.

l. 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

l. 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:

l. Close the adsorber vents on Vl 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.

l. 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 l-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 l0,000 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, l5 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.

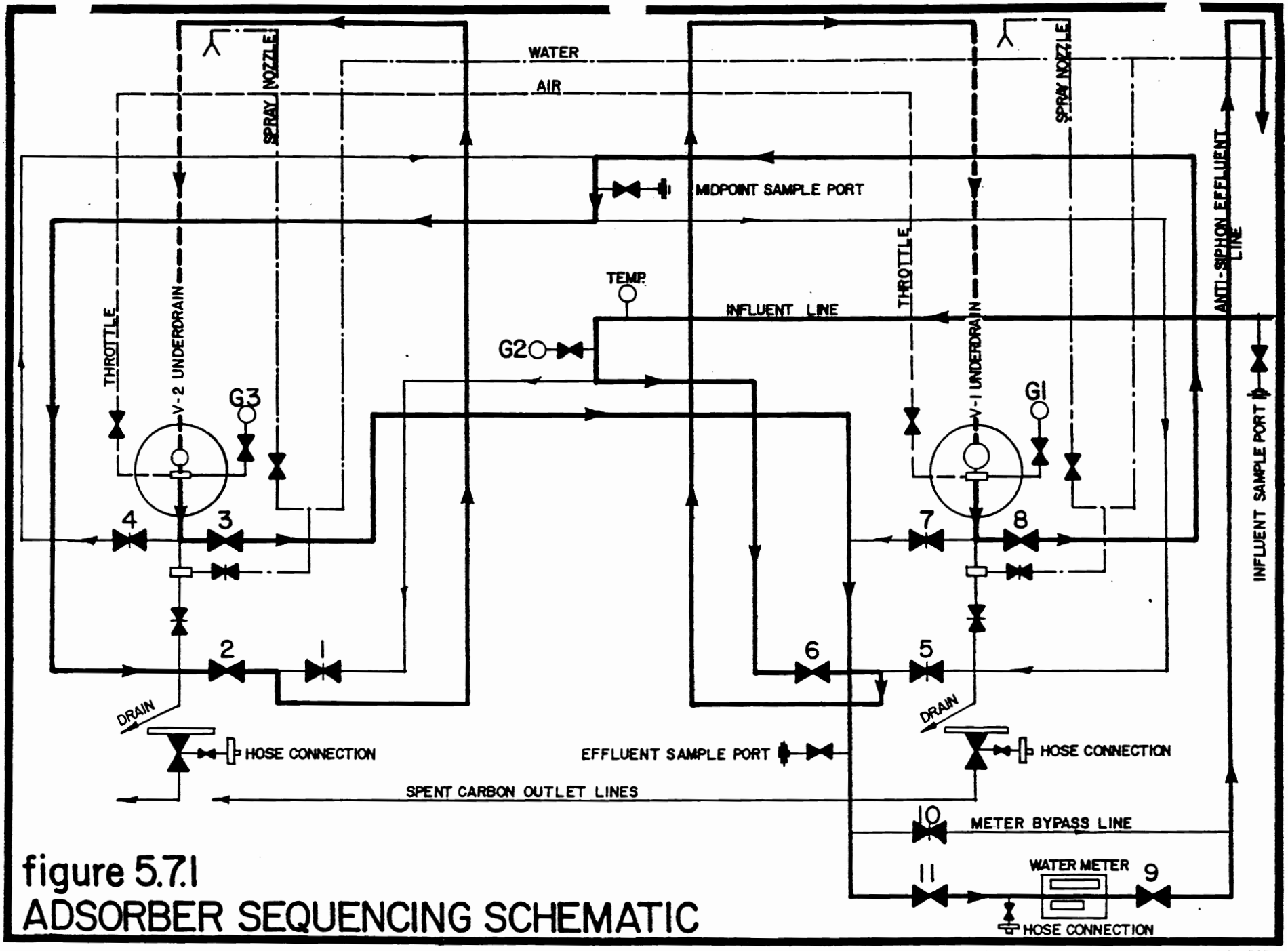

figure 5.7.1
ADSORBER SEQUENCING SCHEMATIC

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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

TABLE OF CONTENTS

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 l600 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 l5 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.