2.2.2

Darling Hill Project
Lyndonville, Vermont
Project No. 89-4050

WATER TREATMENT SYSTEM OPERATION AND MAINTENANCE PLAN

Prepared on Behalf of:

Village of Lyndonville
Vermont American Corporation, and
Vermont Tap and Die Company, Inc.

Prepared By:

Environmental Science &
Engineering, Inc. (ESE)
Amherst, New Hampshire

Submitted To:

U.S. EPA Region 1
Boston, Massachusetts

September 17, 1990

ESE

Environmental
Science &
Engineering, Inc.
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September 17, 1990

Mr. Edward Hathaway, RPM
U.S. Environmental Protection Agency
ME & VT Superfund Section
JFK Federal Building HPS-1
Boston, MA 02203-2211

RE: Revised Operation and Maintenance Plan
Municipal Treatment System - Lyndonville, VT

Dear Mr. Hathaway:

Enclosed are fifteen copies, and an original, of the revised Operation & Maintenance Plan (O&M Plan) and of Environmental Science & Engineering's (ESE) responses to EPA comments on the original O&M Plan. These documents are being submitted to EPA pursuant to your August 14, 1990 letter disapproving the original O&M Plan, with modifications required.

Responses and revisions are based upon discussions between EPA and ESE at the August 22, 1990 meeting and, therefore, should satisfy EPA's concerns and supply the modifications necessary for approval. If you have any questions concerning the responses to comments or the revised O&M Plan, please contact either of the undersigned.

Thank you.

Respectfully submitted,

W. Gary Wilson
QA/QC Officer

David E. Andrews
Sr. Vice President/
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cc.: Tom Moye (VT DEC)
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Formerly known as Hunter/bca.

DISCLAIMER

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OPERATION AND MAINTENANCE PLAN

MUNICIPAL WELLFIELD TREATMENT SYSTEM
LYNDONVILLE, VERMONT

APPROVALS:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

PROJECT COORDINATOR _____ DATE _____

PROJECT MANAGER _____ DATE _____

QA/QC OFFICER _____ DATE _____

ENVIRONMENTAL PROTECTION AGENCY, REGION I

REGIONAL PROJECT MANAGER _____ DATE _____

QA/QC OFFICER _____ DATE _____

ESE
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

A - NPDES Permit

B - Material Safety Data Sheets

C - Forms

D - Calgon Maintenance Procedures and Spare Parts List

E - O&M Costs Backup

F - Calgon Spent Carbon Pre-acceptance Forms

G - VT Department of Health Operating Permit

LIST OF DRAWINGS

Legends and Symbols

Engineering Flow Diagram
Liquid Phase Carbon
Treatment System

1.0 INTRODUCTION

This Operations and Maintenance Plan for the Village of Lyndonville Municipal drinking Water System (System) is being submitted by Environmental Science & Engineering, Inc. (ESE), formerly Hunter/BCA, to EPA Region I pursuant to an Administrative Consent Order, Docket No. I-89-1090, effective September 29,1989. The Plan contains eleven sections which respond to the deliverables required by Section 49 of the Order.

2.0 PLANT OPERATING PROCEDURES

The following section describes the operating procedures that are necessary to operate the System. Also included in this section is a schedule of when operating procedures are to be performed.

2.1 PLANT DESCRIPTION

The System consists of two fixed bed carbon adsorbers, a sodium hypochlorite disinfection system, and a clear well pumping station to transfer treated water to the distribution system. The treatment system is enclosed in a heated building for freeze protection and aesthetic considerations.

Drawing 1 provides an engineering flow diagram of the treatment system. Groundwater will be pumped from wells PW-1, PW-2, and PW-3 in the municipal wellfield and treated in the carbon bed adsorbers to remove volatile organic compounds.

The design flowrate of water to be treated is 700 gallons per minute (gpm). This peak usage occurs during Village emergencies (i.e., fire or when the village reservoirs require replenishing). Water is simultaneously pumped from two wells.

During normal operations, water is pumped from one well only. The normal peak water usage rate is 375 gpm. This peak usage rate occurs between 7 a.m. and 6 p.m. Water is pumped exclusively from well PW-1. The flow rate of water pumped

during non-peak hours is 350 gpm. During this time, water is pumped from either well PW-2 or PW-3.

Each carbon bed adsorber is an ASME coded vessel with a design pressure of 75 psig at 150° F. Each vessel is lined with a vinyl ester resin suitable for potable water use, and is charged with 20,000 pounds of virgin granular activated carbon (GAC). The GAC is supported in each vessel by an underdrain collection system consisting of slots of predetermined width. The slots retain the GAC and allow free passage of treated water with a minimum of pressure drop. Treated water then passes through the second adsorber which acts as a guard bed in case of organic compound breakthrough from the first bed.

When breakthrough is detected downstream of the first carbon bed in the treatment system, the first carbon bed is isolated from the treatment system by valving. Water is then treated by the second or polishing bed only, while the spent carbon in the first bed is replaced with virgin carbon.

Backwash water and neutralized disinfection solution water are discharged to the Passumpsic River through an underground discharge line. An NPDES permit issued pursuant to the Clean Water Act regulates the quality of this discharge and sets contaminant limits. A copy of the NPDES permit requirements is included in Appendix A.

GAC replacement in the lead adsorber is accomplished hydraulically in slurry form in a closed-loop piping system between the adsorber vessel and the GAC transport truck. The spent GAC is transferred by pressurizing the adsorber and pneumatically displacing the slurry to the transport truck. Virgin GAC is then charged to the empty adsorber. After GAC replacement, the unit with virgin carbon is put back in service and becomes the second treatment bed, or guard bed, in the treatment series.

Effluent from the carbon bed treatment system is disinfected with a sodium hypochlorite chlorination system. The sodium hypochlorite chlorination system is installed downstream of the activated carbon adsorbers. This system insures that the water distribution system will not be contaminated by bacterial action, if any, from the carbon bed absorption system.

The chlorination system is designed to produce a 5 ppmv free chlorine level in a 700 gpm water stream. Based on experience with carbon adsorption systems, a 3 to 5 ppmv free chlorine concentration is adequate to provide disinfection of water after passing through the wet phase carbon absorption system. This range also insures a 0.5 ppmv to 1 ppmv residual chlorine level in the distribution system.

The sodium hypochlorite chlorination system consists of a variable speed metering pump, day tank, storage tank and sodium hypochlorite injection system. The chlorination system operates using commercially available sodium hypochlorite solution (15% by volume solution). The 1500 gallon storage tank is adequate for about 1 month of treating well water pumped at 700 gpm.

Effluent from the treatment and chlorination systems is piped to a pumping station located below grade. The pumping station and collection reservoir is equipped with two vertical turbine pumps. Pump P-1 is a new vertical turbine pump rated for 450 gpm and 400 ft. TDH. Pump P-2 is a 700 gpm pump relocated from the existing pump house. Pump P-1 will be on-line continuously and the second pump will operate during peak emergency water usage times only.

2.2 PLANT OPERATING SUMMARY

All equipment installed at the drinking water treatment plant, which is operated on a routine basis, including valves, instrumentation, and mechanical equipment will be assigned a number for ease in identification. This number will appear on a tag which will be attached to the particular piece of equipment.

The operating procedures which follow provide detailed instructions for performing the indicated tasks. Valves and instruments that are referenced by number in the operating procedures are shown on:

- the block flow diagram for each procedure (for descriptive purposes);
- the plant valve location plan; and
- the master valve list (Table 1).

The engineering flow diagram (Drawing 1) shows all piping and instrumentation for the Treatment System.

TABLE 1
MASTER VALVE LIST

Municipal Well Field Treatment System
Lyndonville, VT

Valve Number	Description
V1	Adsorber C-1, Water Inlet (Adsorber in lead position)
V2	Adsorber C-1, Water Inlet (Adsorber in lag position)
V3	Adsorber C-1, Backwash Inlet
V4	Adsorber C-1, Treated Water to Clearwell
V5	Adsorber C-2, Water Inlet (Adsorber in lag position)
V6	Adsorber C-2, Water Inlet (Adsorber in lead position)
V7	Adsorber C-2, Backwash Inlet
V8	Adsorber C-2, Treated Water to Clearwell
V9	Adsorber C-1, Backwash Water Drain
V10	Adsorber C-2, Backwash Water Drain
V11	Backwash Water Isolation Valve
V12	Potable Water to Truck
V13	PIV Valve

TABLE 1 (cont.)
MASTER VALVE LIST

Municipal Well Field Treatment System
Lyndonville, VT

Valve Number	Description
V14	Backwash Water Isolation Valve
V15	Sodium Hypochlorite Fill Valve
V16	Clearwell Isolation Valve
V17	Drain/Backwash Water Offsite
V18	Control Valve Isolation Valve
V19	Control Valve Isolation Valve
V20	Control Station Bypass Valve
V21	Clearwell Isolation Valve
V22	Treated Water to Waste
V24	Adsorber C-1, Carbon Slurry In
V26	Adsorber C-1, Carbon Slurry Out
V27	Adsorber C-2, Carbon Slurry In
V28	Adsorber C-2, carbon Slurry Out
V31	Day Tank Outlet Isolation Valve
V32	Storage Tank Outlet Line Isolation Valve

TABLE 1 (cont.)
MASTER VALVE LIST

Municipal Well Field Treatment System
Lyndonville, VT

Valve Number	Description
V33	Transfer Pump Recycle Line Isolation Valve
V34	Day Tank Hypochlorite Line Isolation Valve
V35	Treated Water Main Isolation Valve
V36	Transfer Pump Isolation Valve
V37	Storage Tank Water Fill Line Isolation Valve
V38	Day Tank Water Fill Valve
V40	Pump P-1 Isolation Valve
V41	Pump P-2 Isolation Valve
V42	Pump P-1 Air Release Isolation Valve
V43	Pump P-2 Air Release Isolation Valve
V44	Potable Header Isolation Valve

GENERAL
OPERATION OF WATER TREATMENT EQUIPMENT AND PUMP STATION

Summary

Well water is pumped from the municipal wellfield and treated in carbon bed adsorbers to remove contaminants. After treatment, the well water is chlorinated with sodium hypochlorite and pumped from a clearwell to the municipal distribution system. Block flow diagram F-1 summarizes the normal treatment process.

Carbon Bed Skid Operation

Well water is treated in two carbon bed adsorbers that are skid mounted and operated in series. The first carbon bed adsorber that comes into contact with untreated water is the "lead" adsorber. The lead adsorber removes VOC contaminants. The second adsorber in the treatment series, or "lag" adsorber is the guard bed.

Either carbon bed adsorber C-1 or C-2 can be designated the lead adsorber. Table T-1 shows the required valve positions when adsorber C-1 is designated the lead adsorber and adsorber C-2 is the lag or guard bed. Table T-2 shows the required valve positions when adsorber C-2 is designated the lead adsorber and adsorber C-1 is the lag or guard bed. Figure F-2 details the location of all valves in the water treatment plant.

Table T-1

Valve Position: Adsorber C-1 Lead, Adsorber C-2 Lag

Valve No.	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V21	V22
Position	O	C	O	C	C	O	C	O	C	C	C	O	C

C = Closed
O = Open

FIGURE F-1

WATER TREATMENT BUILDING & PUMP STATION
BLOCK FLOW DIAGRAM

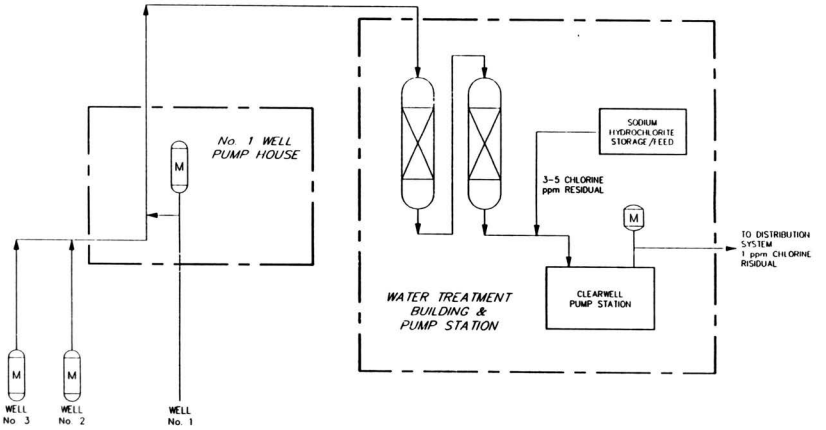

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FIGURE F-2
WATER TREATMENT BUILDING & PUMP STATION
VALVE & INSTRUMENT LOCATION

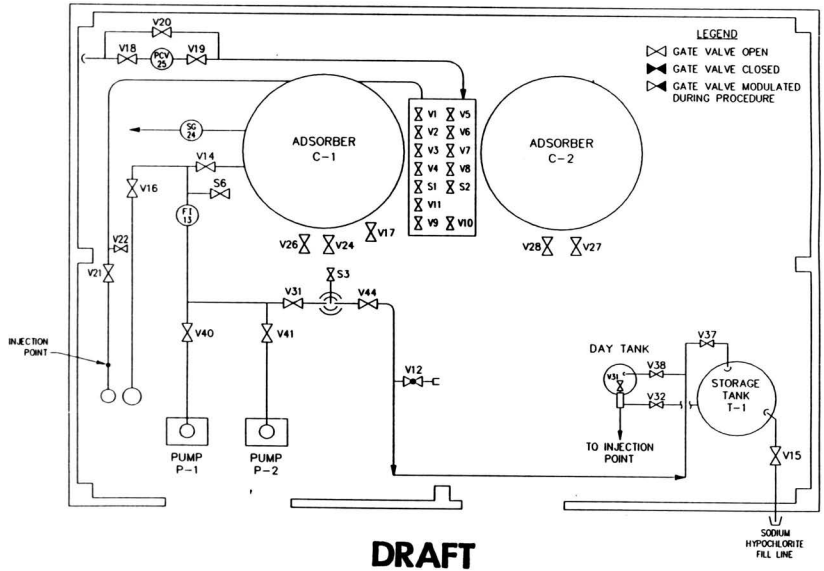

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Table T-2

Valve Position: Adsorber C-2 Lead, Adsorber C-1 Lag

Valve No.	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V21	V22
Position	C	O	C	O	O	C	O	C	C	C	C	O	C

C = Closed
O = Open

Water is normally sampled downstream of the lead carbon bed adsorber at sample valve S2. When VOC contaminants are detected downstream of the lead adsorber, the adsorber is taken off-line and the spent carbon is replaced with virgin carbon. The carbon transfer is detailed in procedure **Virgin Carbon Transfer.** After carbon replacement, the adsorber is placed back on-line as the lag or guard bed in the treatment series.

Note to New operators:
When the treatment skid has been operating for a period of time, the lead adsorber can be determined in the following ways:

- If valve V1 is open and valve V5 is closed, adsorber C-1 is the lead adsorber and adsorber C-2 is the lag bed.
- If valve V5 is open and valve V1 is closed, adsorber C-2 is the lead adsorber and adsorber C-1 is the lag bed.

Well Pump Selection and Start-up

Well water can be pumped from anyone of the following wells: PW-1, PW-2, or PW-3. During emergency conditions, well water can be pumped from a maximum of two wells simultaneously. Start/Stop switches for the pumps in the well field are located on control panel DP in the existing pump house.

1. Before starting well field pumps, verify valve positions associated with the carbon bed treatment system. If carbon bed adsorber C-1 is the designated "lead" adsorber, see Table T-1. If carbon bed adsorber C-2 is designated the "lead" adsorber, see Table T-2.

2. Verify HOA-09 is in the "auto" position. HOA-09 controls clearwell pumps P-1 and P-2 and surge control valves.

3. Verify valve V32 is open and valve V31 is closed at the sodium hypochlorite storage tank.

4. Start sodium hypochlorite metering pump at panel LA in the existing pumphouse.

5. Start selected well field pump(s) at panel DP in the existing pump house.

6. Verify back pressure control valve PCV-25 is operating at 40 psig with valve V20 in the closed position and valves V18 and V19 in the open position. If back pressure valve is not operating at 40 psig, reset per manufacturers instructions.

Sodium Hypochlorite Storage Tank
Clean and Flush

Purpose

The Sodium Hypochlorite Storage Tank, T-1, must be cleaned and flushed with water once a year to remove trace metals which may enter the tank as normal contaminants of the sodium hypochlorite. Trace metals can cause brittleness and cracking of the polyethylene tanks. Block flow diagram Figure F-3 summarizes the clean and flush operation.

Health and Safety Concerns

Exposure to sodium hypochlorite solutions and sodium bisulfite can be irritating to skin and eyes. Splash-proof goggles, rubber gloves, and a rubber apron should be worn at all times while handling/dispensing sodium hypochlorite solutions.

A portable eye wash/body spray station is available in the sodium hypochlorite storage area for flushing affected areas of skin, in case of an accidental exposure. Affected areas should be washed with copious amounts of water.

See the Material Safety Data Sheet (MSDS) in Appendix B for further information.

Procedure

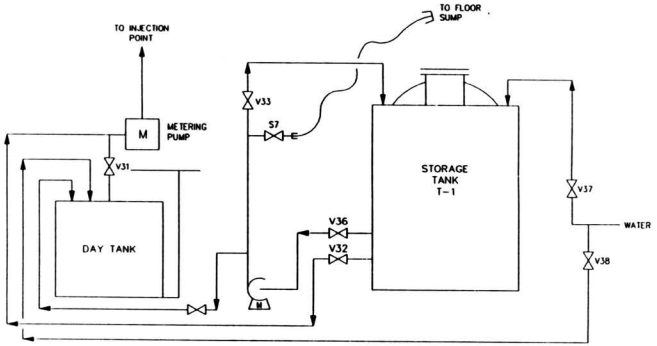
1. Postpone regular scheduled delivery of sodium hypochlorite and allow T-1 tank level to drop below fifty (50) gallon mark (4 inch level on side of tank).

2. Transfer remainder of sodium hypochlorite solution in T-1 to the day tank. Start Recycle Pump, P-3. Close valve V33 and open valve V34. At end of transfer stop pump. Close valve V34 and reopen valve V33.

3. Open valve V-31 and close valve V-32. Sodium hypochlorite injection pump now meters sodium hypochlorite from the day tank instead of the storage tank.

FIGURE F-3

SODIUM HYPOCHLORITE STORAGE
TANK CLEAN & FLUSH
BLOCK FLOW DIAGRAM



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4. Fill tank T-1 with water to 1500 gallon mark by opening valve V37.

5. Restart Recycle Pump P-3. Operate pump in recycle mode for 30 minutes. Sample the recycle station at S7 for chlorine residual. If chlorine residual is greater than 0.1 ppm, add sodium bisulfite at tank manway. Sample and reanalyze the recycle stream and continue to add sodium bisulfite until the chlorine residual is less than 0.1 ppm.

6. At end of wash period, attach hose to pump discharge. Drain tank slowly to floor sump located outside of containment area by opening valve S7 and closing valve V33. Drain water will be discharged through the NPDES discharge line. Add dilution water at the sump to assure that the pH is reduced to below 10, as measured on litmus paper.

7. After tank T-1 is empty, stop Recycle Pump P-3 and close valve S7. Disconnect and store transfer hose.

8. Fill Sodium Hypochlorite Storage Tank as soon as possible with new delivery of sodium hypochlorite. Sample new sodium hypochlorite solution. (See procedure for Chlorination System Operation).

9. When the day tank is empty, open V32 and close V31. Readjust the metering pump stroke, based on the analysis of samples taken in Step 8.

Carbon Filter Backwash

Purpose

A carbon filter will require backwashing when:

- Spent carbon is replaced with virgin granular activated carbon (GAC)
- Head loss across a carbon filter exceeds 15 psi during normal treatment operations

During a backwash operation, water flow through a carbon bed adsorber is reversed in order to expand the bed. Figure F-4 is a block flow diagram of the backwash operation.

Backwashing after carbon replacement removes carbon fines that are generated during carbon manufacturing and transport processes. Backwashing to reduce head loss across a filter removes insoluble particulate that may accumulate in a carbon bed filter.

Backwash water will be discharged through the NPDES discharge line to the East Branch Passumpsic River.

Health and Safety Considerations

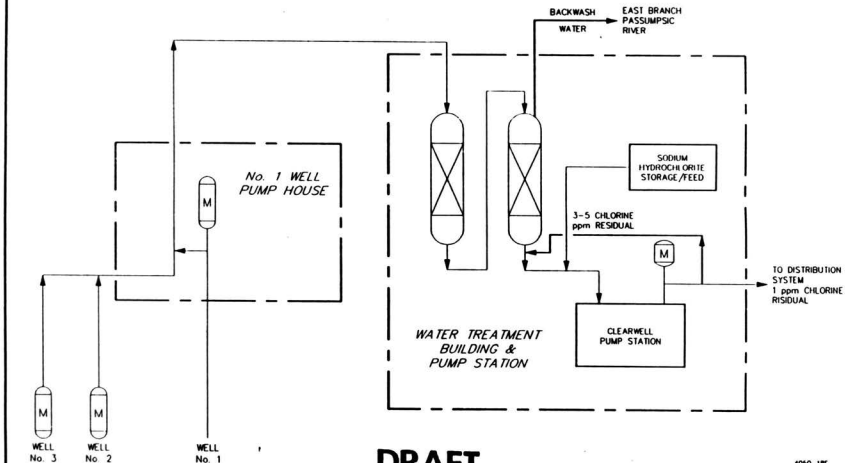
The NPDES discharge line is hard piped (no hose connects) inside the treatment building. Backwashing a carbon filter poses no health or safety concerns to water plant operators. No spill control measures are required during a backwash operation.

Procedure

1. Verify valves V17, V16, and V14 are closed.
2. Isolate the carbon bed for backwashing. To backwash adsorber C-1, close valves V1 and V6. To backwash adsorber C-2, close valves V2 and V5. Well water will be directed to the alternate carbon bed only.

FIGURE F-4

CARBON FILTER BACKWASH
BLOCK FLOW DIAGRAM



3. Open valve V11.

Note:
Final valve positions before commencing the Adsorber C-1 backwash operation are shown on Figure F-5. Verify all valve positions shown on the figure before proceeding to Step 4 of this procedure.

Final valve positions before commencing the Adsorber C-2 backwash operation are shown on Figure F-6. Verify all valve positions shown on the drawing before proceeding to Step 4 of this procedure.

4. Operate wellfield pump No.1 or wellfield pumps No.2,3 in parallel.

5. Open valve V14 slowly and monitor the backwash water flowrate with flow meter FI-13. The backwash water flow rate should be between 100 and 200 GPM for the first 5 minutes of the backwash period.

6. After 5 minutes of backwashing at the reduced water flowrate, increase the flowrate slowly to 700 gpm with throttle valve V14. Note if only one or two wellfield pumps are operating, the 700 gpm backwash flowrate will be achieved with some back flow in the treated water main.

7. After the backwash water flowrate is at 700 gpm for 5 minutes, open throttle valve V14 to increase backwash rate to 1000 gpm. If the required 1000 gpm flowrate cannot be achieved, start third wellfield pump.

8. Backwash carbon filter for 5 minutes at 1000 gpm or until effluent is clear as indicated in flow glass FG-24.

9. At end of backwash period, slowly close valve V14. Close backwash valves V14 and V11.

10. Re-establish series treatment flow regime. If adsorber C-1 was being backwashed, re-open valves V1 and V6. If adsorber C-2 was being backwashed, re-open valves V2 and V5.

FIGURE F-5
ADSORBER C-1 BACKWASH
VALVE POSITION AND LOCATION

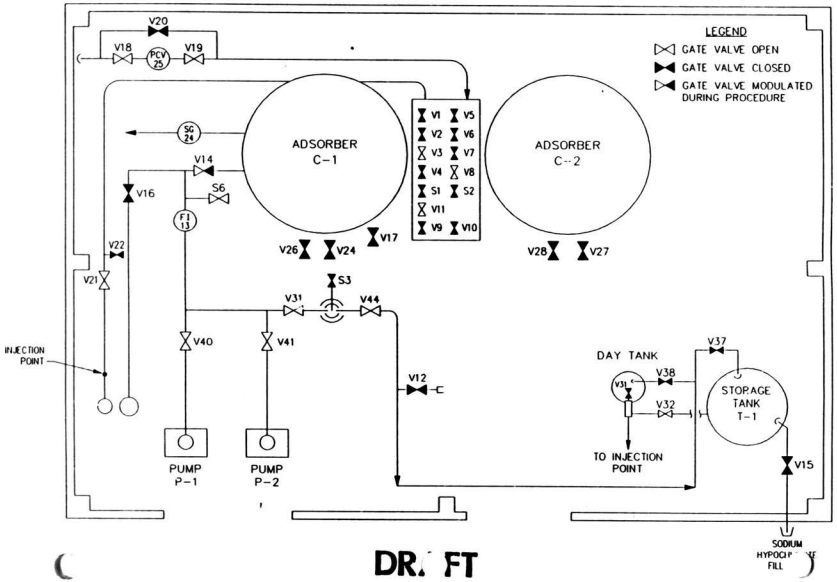


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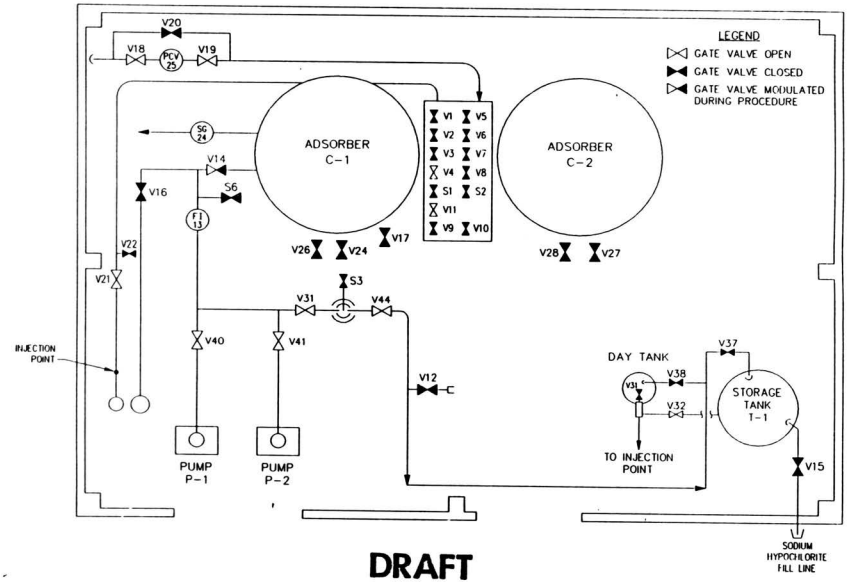
FIGURE F-6
ADSORBER C-2 BACKWASH
VALVE POSITION AND LOCATION



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11. Operate required number of well field pumps to meet municipal water demand.

Water Plant Disinfection Procedure

Purpose

The System must be disinfected with a sodium hypochlorite solution before the System is put into service. Also, all treatment facilities/equipment taken out of service for inspection, repairing, cleaning or other activity that may lead to contamination of water must be disinfected before they are returned to service. Units that are downstream from the first point of application of disinfectant (i.e., pump suction wells and associated piping and appurtenances) must also be disinfected. Activated carbon is difficult to effectively disinfect. This procedure is for disinfection of the empty vessel and is not for use on activated carbon.

Health and Safety Concerns

Exposure to sodium hypochlorite solutions can be irritating to skin and eyes. Splash-proof goggles, rubber gloves, and a rubber apron should be worn at all times while handling/dispensing sodium hypochlorite solutions.

A portable eye wash/body spray station is available in the sodium hypochlorite storage area for flushing affected areas of skin, in case of an accidental exposure. Affected areas should be washed with copious amounts of water.

See the Material Safety Data Sheet (MSDS) in Appendix B for further information.

Procedure

The following American Water Works Association (AWWA) Standards will be followed while the System is constructed and before the System is put into service:

Standard	Description
AWWA C651	Standard for Disinfecting Water Mains
AWWA C652	Standard for Disinfection of Water-Storage Facilities

The following procedure details the disinfection process for an adsorber vessel without carbon. An adsorber vessel should be disinfected whenever the adsorber is entered for periodic inspection and/or repair.

An adsorber vessel is disinfected with a sodium hypochlorite solution. A sodium hypochlorite solution with a 30 ppm free chlorine residual is first prepared in the pump clearwell. The solution is then pumped to the empty adsorber vessel through the vessel backwash line. The chlorinated solution is allowed to stand in the vessel for at least 12 hours. At the end of the 12 hour contact time, the chlorinated water is tested to determine the free chlorine residual. If the residual is less than 15 ppm, the disinfection process is repeated after the 15 ppm solution is neutralized and disposed of. Figure F-7 is a block flow diagram of the adsorber vessel disinfection identifying all valves that are operated during the operation.

1. Stop all well field pumps in operation. Place collection reservoir level control system into manual mode at control switch (HOA-09).

2. Close water main valve V31 and open recycle valve V16. Collection reservoir water will now be recycled from the P-1 pump discharge to the clearwell.

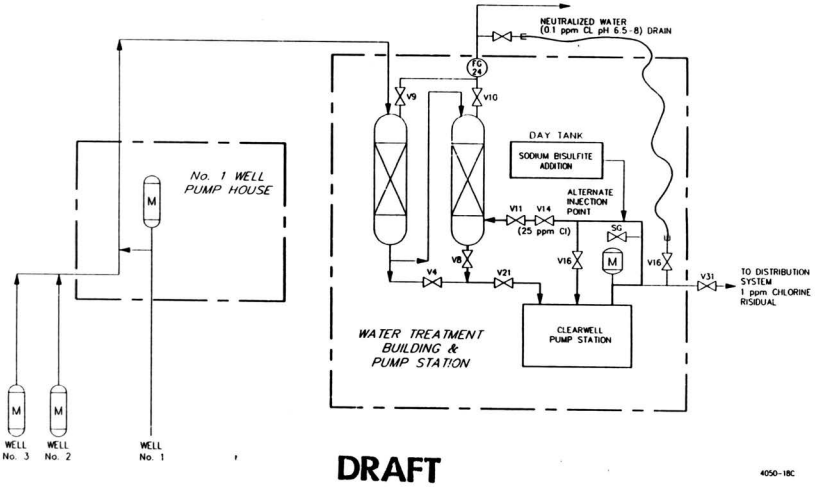
3. Relocate chlorinator injection/check valve to the clearwell recycle line. Place sodium hypochlorite feed pump into manual mode.

4. Start well pump PW-2 and collection reservoir pump P-1. Pump P-1 will recycle water and the collection reservoir will fill with water until high level switch LS-08 stops well field pump.

5. Start sodium hypochlorite feed pump and continue to recycle water. Sample water at sample valve S6. Stop sodium hypochlorite feed pump when free chlorine residual of recycle water reaches 30 ppmv as measured by a portable digital titrator.

FIGURE F-7

WATER PLANT DISINFECTION
BLOCK FLOW DIAGRAM



6. Prepare adsorber vessel to receive chlorinated solution through backwash water piping and valving. Open backwash valve V11. If adsorber C-1 is being disinfected, verify that valve positions around the treatment adsorbers are those shown on Figure F-5. (Exception: Water main header valve V31 is to remain closed until the disinfection procedure is complete.)

   If adsorber C-2 is being disinfected, verify that valve positions around the treatment adsorbers are those shown on Figure F-6. (Exception: Water main header valve V31 is to remain closed until the disinfection procedure is complete).

7. Transfer the 30 ppm chlorinated solution to the adsorber vessel by opening valves V14 and closing valve V16.

8. At end of transfer to the adsorber, repeat steps 1 through 5 to prepare a second chlorinated solution with a free chlorine residual of 30 ppm.

9. Transfer solution to the adsorber slowly until flow is detected in flow glass FG-24. Remaining solution in the collection reservoir will be used to disinfect the clearwell.

10. Open valve V16 and close valve V14. Stop pump P-1.

11. Allow chlorinated water to stand in adsorber and reservoir for 12 hours. At the end of the 12 hour contact time, test the chlorinated water in the adsorber and the clearwell for free chlorine residual.

12. If the free chlorine residual in the adsorber and clearwell is greater than 15 ppmv, the chlorine solutions can be neutralized with sodium bisulfite. Following neutralization to less than 0.1 ppmv free chlorine residual, the water may be discharged to the Passumpsic River pursuant to the NPDES permit.

13. To neutralize disinfectant solutions, prepare a sodium bisulfite solution in the sodium hypochlorite day tank. The following pounds of sodium bisulfite are required to neutralize residual chlorine concentrations:

Residual Chlorine (mg/L)	Sodium Bisulfite (lbs)
15	19
20	25
25	31
30	38

14. To neutralize chlorinated water in the collection reservoir, start reservoir pump P-1 and meter the solution into the water recycle line. Sample recycle water at sample valve S6. Stop metering pump when free chlorine residual in water is less than 0.1 ppmv.

15. Measure pH of clearwell water and verify pH is greater than 6.5 and less than 8.0. If pH is less than 6.5, overdosing with sodium bisulfite most likely occurred during the neutralization step. Add one gallon potable water to the day tank. Operate metering pump until day tank is empty to flush metering pump and injection lines. Close valve V31 and open V32. Meter sodium hypochlorite solution from storage tank until pH is above 6.5 and free chlorine residual is still less than 0.1 ppm.

16. The neutralized water can then be discharged from the reservoir to the Passumpsic River by:

    - Connecting a 4 inch flexible hose between valve coupling V17 and valve coupling V12; and
    - Operating reservoir pump P-1 until the collection reservoir is dry.

17. The chlorinated water in an adsorber can be treated before disposal by slowly discharging the water to the clearwell and neutralizing the chlorine with sodium bisulfite as in procedural Step 14. Open valve V4 to drain the water from adsorber C-1. Open valve V8 to drain the water

from C-2. Follow procedural Step 16 for discharge of the neutralized water to the Passumpsic River.

18. If the free chlorine residuals measured in step 12 is less than 15 ppmv, the chlorinated solutions must be neutralized and discharged. The chlorination process must then be repeated until a free chlorine residual of at least 15 ppmv is recorded after a 12 hour contact time.

Virgin Carbon Transfer From Trailer

Purpose

The carbon bed adsorbers must be charged with virgin granular activated carbon before the System is started up. Also, the carbon bed adsorber must be filled with virgin carbon after spent carbon is removed from the adsorber for regeneration at a RCRA approved facility.

Health/Safety Considerations

A slurry mixture of virgin granular activated carbon in water represents no health threat to plant operators who may inadvertently come into contact with the mixture. Care must be exercised at all times when handling compressed air lines. Vent air from compressed air lines before disconnecting flexible hose.

Procedure

Virgin granular activated carbon is transferred to an empty adsorber as a water slurry using compressed air. The carbon trailer must be filled with potable water to slurry the carbon. Since the pores of the carbon are filled with air, it is essential that the carbon be pre-wetted, as long as feasible in the hopper trailer. Therefore, the trailer should be filled with water as soon as it arrives on site.

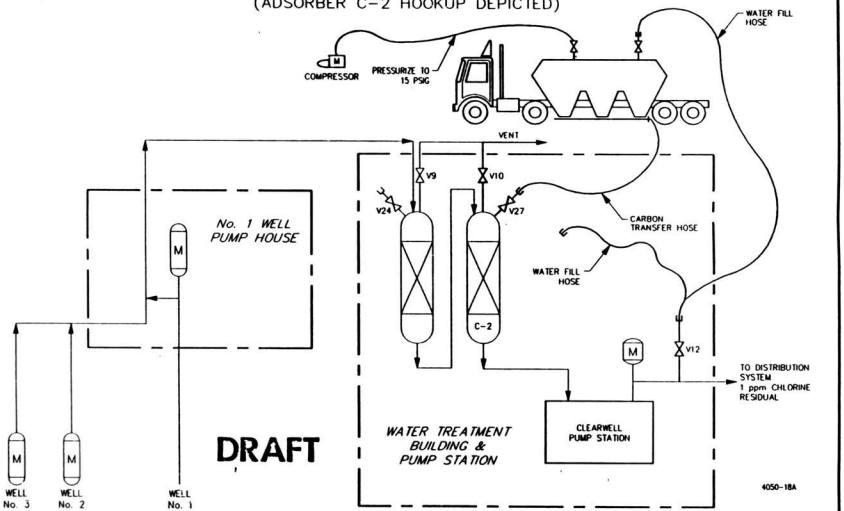
Also, before the carbon transfer begins, it is necessary to pump approximately 1000 gallons of water into an adsorber to cushion the initial flow of carbon slurry into the vessel.

Figure F-8 is a block flow diagram summarizing the carbon fill operations. The following procedural steps will normally be performed by the operator of the carbon transport truck.

1. Spot the trailer in a convenient location close to the water treatment building. The ground must be level from side to side, and if possible, from front to back.

FIGURE F-8

VIRGIN CARBON TRANSFER
BLOCK FLOW DIAGRAM
(ADSORBER C-2 HOOKUP DEPICTED)



2. Connect a 4 inch hose to the 4 inch connection on the plant potable water line. Connect the other end of the hose to the carbon fill line of the trailer.

3. Open valve on the trailer vent line.

4. Open the valve in the carbon fill line and valve V12 on the plant potable water line.

5. Open valve V12 on the plant potable water line and fill the trailer with water until full as indicated by water overflow from the trailer vent line. Close valve V12.

6. Close the valve on the trailer carbon fill line. Allow the carbon in the trailer to soak for 1 to 2 hours.

7. Close the valve in the trailer vent line.

8. Connect transfer hose between trailer carbon unloading line and hose connect that is adjacent to the adsorber slurry fill valve. Use coupling that is adjacent to valve V24 for adsorber C-1. Use coupling that is adjacent to valve V27 for adsorber C-2.

9. Prepare adsorber to receive virgin carbon transfer from carbon trailer. If adsorber C-1 is to receive the virgin carbon transfer, verify and position valving according to Figure F-9. If adsorber C-2 is to receive the virgin carbon transfer, verify and position valving according to Figure F-10.

   Valve arrangements allow wellwater to be treated in the carbon adsorber that is adjacent to the adsorber that is being filled with virgin carbon.

10. Locate a portable air compressor near the truck and pressurize the trailer truck to 15 psig. The portable air compressor will be provided by treatment plant personnel.

FIGURE F-9
VIRGIN CARBON TRANSFER TO ADSORBER C-1
VALVE POSITION AND LOCATION

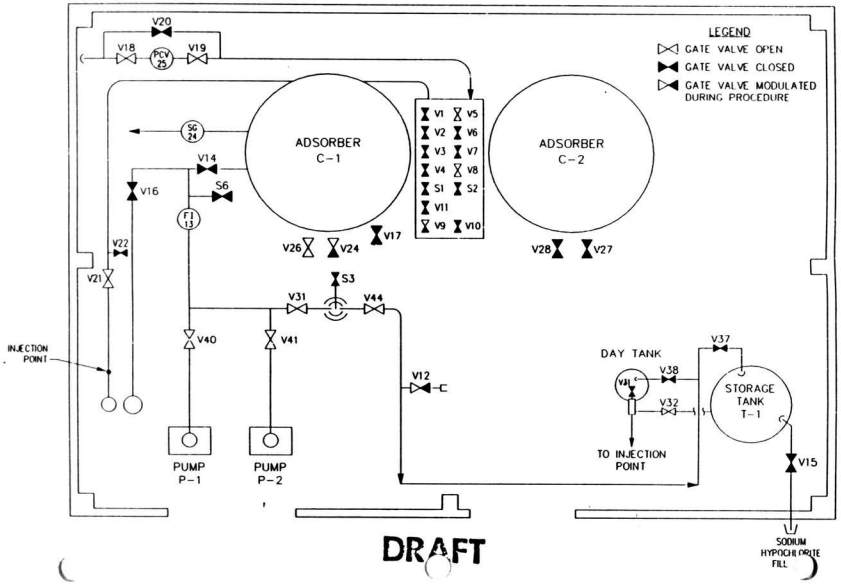
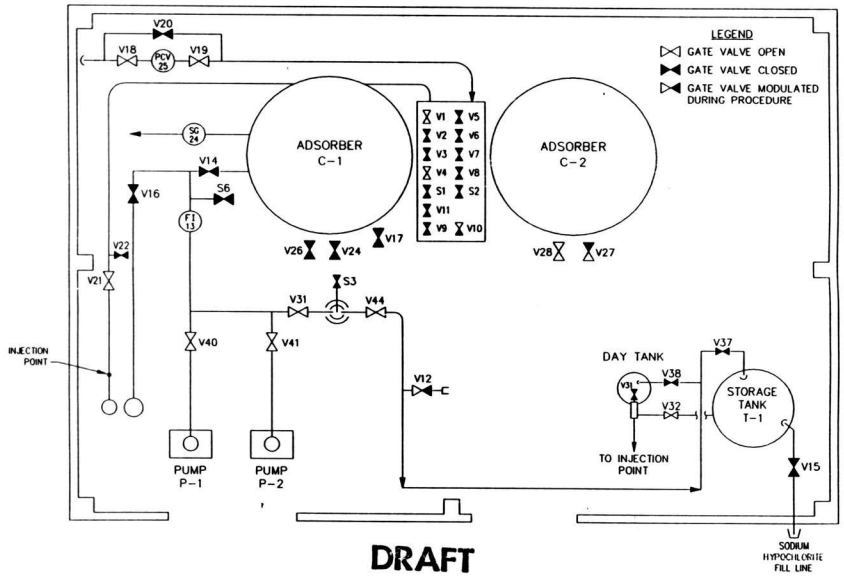


FIGURE F-10
VIRGIN CARBON TRANSFER TO ADSORBER C-2
VALVE POSITION AND LOCATION



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11. Open the adsorber vent line. If adsorber C-1 is being filled, open vent valve V9. If adsorber C-2 is being filled, open vent valve V10.

12. Open valve carbon adsorber fill line. If adsorber C-1 is being filled, open valve V24. If adsorber C-2 is being filled, open valve V27.

13. Open the valve in the carbon unloading line to initiate carbon flow. Each hopper section of the trailer is emptied by opening the valve for the specific hopper section. The hopper sections should be emptied partially one at a time. This procedure should be repeated until all of the carbon has been transferred from the trailer. More water should be added as necessary to accomplish the transfer.

14. When the carbon transfer is complete, close air compressor discharge line valve. Allow the pressure in the trailer to vent through the carbon unloading line into the adsorber.

15. When the trailer is vented, close the valve on the trailer unloading line and the adsorber fill valve. Close valve V24 if adsorber C-1 was being filled. Close valve V27 if adsorber C-2 was being filled. Open the valve on the trailer vent line.

16. Bleed and disconnect the air, water, and carbon transfer hoses.

17. Close vent valve on the adsorber that was filled. The trailer is now empty and the adsorber is filled with virgin carbon.

Spent Carbon Transfer From Adsorber To Trailer

Purpose

Spent carbon must be removed from the lead adsorber in the treatment series when quarterly sampling results indicate that the performance criteria are not being met after the lead adsorber.

Health and Safety Considerations

A slurry mixture of spent granular activated carbon in water will contain trace amounts of volatile organic contaminants. All spills should be cleaned up immediately by plant personnel equipped with rubber gloves. Spilled carbon should be added directly to the trailer after the initial transfer of spent carbon is complete.

Procedure

The adsorber with spent carbon is taken "off-line" by closing the appropriate valves and water from the wellfield is directed only to the remaining carbon adsorber for treatment and distribution. The appropriate arrangements are then made with a carbon supplier to:

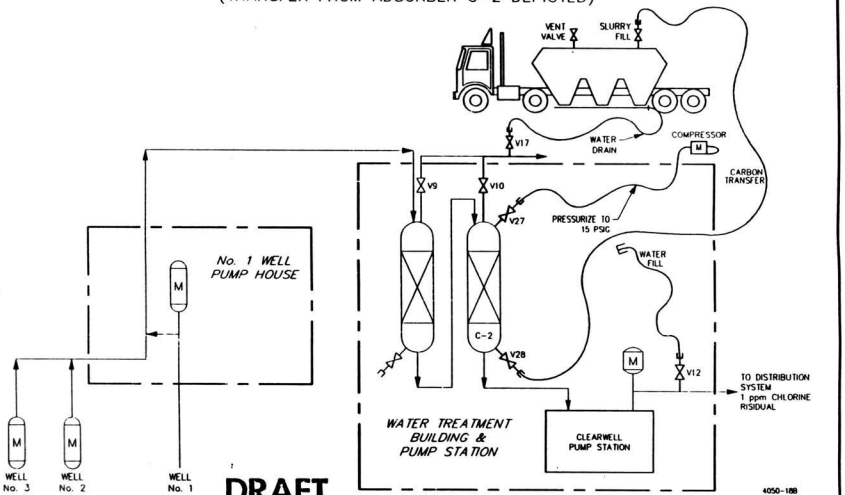
- Remove the spent carbon from the adsorber. Regeneration of the carbon must be at a RCRA approved facility.
- Deliver virgin granular activated carbon to the site.

Spent carbon is transferred to an empty trailer truck as a water slurry using compressed air. The specific steps required to make the carbon transfer from an adsorber are detailed below. Figure F-11 is a block diagram summarizing the spent carbon transfer operation.

The following procedural steps will be performed by the operator of the carbon transport truck.

FIGURE F-11

SPENT CARBON TRANSFER FROM ADSORBER TO TRAILER
BLOCK FLOW DIAGRAM
(TRANSFER FROM ADSORBER C-2 DEPICTED)



1. Isolate the lead adsorber from the treatment system. If adsorber C-1 is the lead adsorber, open V5 and close V1, V3, and V6. If adsorber C-2 is the lead adsorber, open V1 and close V2, V5, and V7. After isolating the lead adsorber, water will be directed to the guard adsorber only. Arrange for removal of spent carbon and delivery of virgin carbon.

2. When the trailer for removal of spent carbon arrives, spot the trailer in a convenient location close to the water treatment building. The ground must be level from side to side, and if possible, from front to back.

3. Connect a 4-inch hose to the 4-inch hose connect that is adjacent to potable water valve V12. Connect the other end of the hose to the adsorber "carbon slurry in" valve. If adsorber C-1 is being emptied, connect hose to V24. If adsorber C-2 is being emptied, connect hose to V27. This connection is necessary to initially fill the adsorber with water before beginning the transfer. More water can also be added during the transfer as needed to wash down carbon that might remain on the sides of the adsorber vessel.

4. Open the adsorber vent valve. If adsorber C-1 is being emptied, open V9. If adsorber C-2 is being emptied, open V10.

5. Open potable water valve V12. When the adsorber is full of water, close V12 and the adsorber vent valve opened in Step 4.

6. Connect transfer hose between the trailer carbon slurry loading line and the hose connect that is adjacent to the adsorber "carbon slurry out valve". If adsorber C-1 is being emptied, connect hose to V26. If adsorber C-2 is being emptied, connect hose to V28. Open trailer vent valve.

7. Locate a portable air compressor near the adsorber being emptied and attach compressor hose to adsorber air connect valve. If adsorber C-1 is being emptied, verify and position remaining valves according to Figure F-12. If adsorber C-2 is being emptied, verify and position valves according to Figure F-13.

FIGURE F-12
SPENT CARBON FROM TRANSFER ADSORBER C-1
VALVE POSITION AND LOCATION

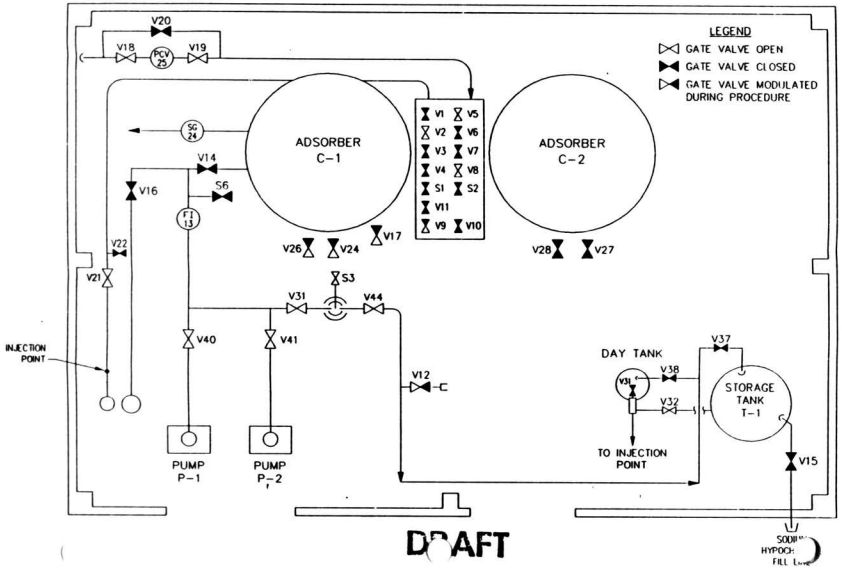
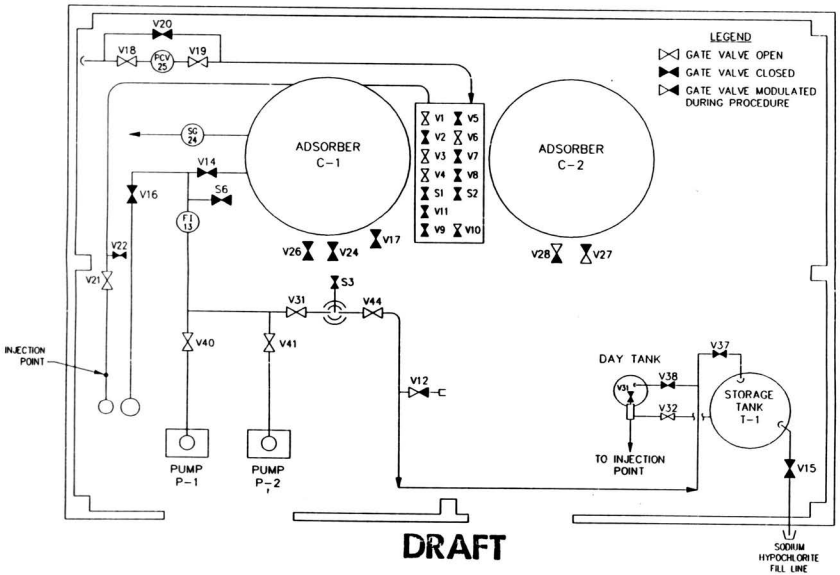


FIGURE F-13
SPENT CARBON FROM TRANSFER ADSORBER C-2
VALVE POSITION AND LOCATION



8. Pressurize the adsorber to 15 psig. The portable air compressor will be provided by plant personnel.

9. Open carbon "slurry outlet valve" on the adsorber discharge line. If adsorber C-1 is being emptied, open V26. If adsorber C-2 is being emptied, open V28.

10. Open the valve in the carbon trailer loading line to initiate carbon flow.

11. When the carbon transfer is complete, close the "carbon slurry outlet valve" that was opened as part of Step 9 and the discharge valve on the air compressor line. Allow the pressure in the adsorber to vent by opening the adsorber vent valve.

12. Close the valve on the carbon loading line.

13. Bleed and disconnect the air, water, and carbon transfer hoses.

14. Upon completion of the spent carbon transfer, the hopper trailer must be completely drained of water. Reconnect the 4 inch hose between the trailer truck carbon loading line and the hose connect adjacent to valve V17, which allows the excess water to gravity drain from the trailer into the NPDES discharge line.

The trailer is now full of spent carbon and the adsorber is ready, after inspection, for a virgin carbon transfer.

Chlorination System Operation

Purpose

The installation of water treatment equipment in the municipal wellfield requires that the treated water be disinfected before the water is distributed to the municipality. A liquid sodium hypochlorite solution will be metered into the water main to provide a 0.5 to 1.0 ppmv free chlorine residual in the distribution system. Only sodium hypochlorite solutions that conform to the American Water Works Association (AWWA) Standard for Hypochlorites (AWWA B300-87) will used in the drinking water treatment plant.

The sodium hypochlorite solution metering pump will be a positive displacement pump with variable frequency drive for controlling stroke frequency. A manual control will be provided to adjust stroke length.

Sodium hypochlorite addition will be a function of the flowrate of water treated and the concentration of available chlorine in the sodium hypochlorite solution. The stroke frequency of the metering pump controlled by the variable speed drive will be proportional to the flowrate of water to be treated, as measured by a flowmeter in the existing pump house. Metering pump stroke length will be adjusted by the System operator. Adjustments will be based on the free chlorine residual measured in the distribution system and the strength of the sodium hypochlorite feed solution.

Procedure

The available chlorine in the sodium hypochlorite feed solution will be sampled and analyzed once every three calendar days. The sodium hypochlorite solution will be stored in Tank T-1. The solution can be sampled at Valve S7 by operating pump P-3. The free chlorine residual in the treated water at the System will be measured at least once a day. The System operator will adjust the stroke length of the metering pump based on the results of the above sample analyses. A chart detailing the required adjustments based on sodium hypochlorite strength and chlorine residual will be prepared when the manufacturer of the metering pump is selected. The metering pump will be calibrated, per manufacturer's instructions, on a monthly basis.

2.3 SCHEDULE FOR PERFORMING PLANT OPERATING PROCEDURES

Table 2 details when the procedures described in Section 2.2 will be performed. Whenever one of the plant operating procedures is carried out by an operator, Form-1, Plant Operating Procedure Reporting Form, will be filled out by the operator. The data sheet will then become part of the operating log for the System. The operating log will be available at the treatment facility for review by the State of Vermont and EPA. Form-1 is provided in Appendix C.

3.0 WATER QUALITY SAMPLING

3.1 START-UP WATER QUALITY TESTING

Start-up water quality testing is discussed in detail in the Treatment System Design Report. In summary, the supplier will be required to provide to the Village the results of analytical laboratory testing which demonstrates compliance with the concentration-based performance criteria. To do so, the supplier must collect at a minimum duplicate water samples for analysis for volatile organic compounds from each of the following sources:

- Influent to the Adsorption System;
- Effluent from the first (lead) adsorber; and
- Effluent from the entire Adsorption System.

The supplier will be required to collect these six samples and one field blank, at least at 24 hours after start-up and again 72 hours after start-up. Samples must be submitted to a laboratory certified for drinking water analysis by the State of Vermont, for analysis by EPA Method 524.2. Acceptance by the Village will not be given prior to receipt of analytical data demonstrating that the performance criteria have been met.

TABLE 2
SCHEDULE FOR PERFORMING NORMAL PLANT OPERATING PROCEDURES

Municipal Well Field Treatment System
Lyndonville, VT.

Procedure	Initiating Event	Anticipate Frequency
Adsorber Disinfect	Completion of construction	Prior to plant start up
	Inspection of internals	After fifth carbon changeout
Reservoir Disinfect	Completion of construction	Prior to plant start up
	Inspection of internals and/or pump maintenance	Once every 5 years
Adsorber Backwash	Headloss in excess of 10 psi per adsorber	Annual
	Adsorber filled with Virgin GAC	Annual
Spent Carbon Removal from Adsorber	Breakthrough in VOC above criteria	Annual
	Headloss greater than 10 psi per adsorber after backwash	As required
Storage Tank Clean/Flush	None	Annual
Calibrate Chlorine Metering Pump	None	Monthly

3.2 QUARTERLY SAMPLING PROGRAM

Quarterly samples of untreated and treated water will be collected, by a contractor experienced in the collection of drinking water samples, to verify continued compliance with the performance criteria established for the System, as detailed in the Treatment System Design Report. Samples will be collected on the same day and in duplicate from the following points within the System:

Sample Type	Sampling Location
Untreated water	Prior to adsorbers - S1
Water after first adsorber	After first adsorber - S2
Treated water	After System - S3

The six samples, one trip blank, and one field blank will be submitted to a laboratory certified for drinking water analyses by the State of Vermont, for analysis for volatile organic compounds using EPA Method 524.2, Revision 3. A Quality Assurance Project Plan (QAPjP) has been prepared as part of the Treatment System Design Report. The water quality sampling described herein will be conducted in accordance with the requirements of that QAPjP. Table 3 shows the compounds to be analyzed and their quantitation limits.

As described in the Treatment System Design Report, the start-up water quality testing will receive full data validation (Level 4) according to EPA Region I data validation criteria. Data generated as part of the routine quarterly sampling will be Level 3 and not undergo Level 4 data validation. Data reports received from the analytical laboratory will be reviewed for compliance with the requirements of the QAPjP. This will include a review of surrogate recoveries, spike recoveries, duplicates comparison, and blank analyses. Analytical results of positive values will be entered into a computerized data base to allow for comparison with previous reported concentrations and for analyzing trends, as necessary. Laboratory data reports will be submitted to EPA and the State of Vermont and will become a for permanent part of the operating log maintained at the Village of Lyndonville's Town Clerk's Office.

TABLE 3
EPA METHOD 524.2 COMPOUND LIST
Municipal Well Field Treatment System
Lyndonville, VT

COMPOUNDS	MDL,ppb
benzene	0.5
bromobenzene	0.5
bromochloromethane	0.5
bromodichloromethane	0.5
bromoform	0.5
bromomethane	0.5
n-butylbenzene	0.5
sec-butylbenzene	0.5
tert-butylbenzene	0.5
carbon tetrachloride	0.5
chlorobenzene	0.5
chloroethane	0.5
chloroform	0.5
chloromethane	0.5
2-chlorotoluene	0.5
4-chlorotoluene	0.5
dibromochloromethane	0.5
1,2-dibromo-3-chloropropane	0.5
1,2-dibromoethane	0.5
dibromomethane	0.5
1,2-dichlorobenzene	0.5
1,3-dichlorobenzene	0.5
1,4-dichlorobenzene	0.5
dichlorodifluoromethane	0.5
1,1-dichloroethane	0.5
1,2-dichloroethane	0.5
1,1-dichloroethene	0.5
cis-1,2-dichloroethene	0.5
trans-1,2-dichloroethene	0.5
1,2-dichloropropane	0.5

TABLE 3 (con't)
EPA METHOD 524.2 COMPOUND LIST
Municipal Well Field Treatment System
Lyndonville, VT

COMPOUNDS	MDL/ppb
1,3-dichloropropane	0.5
2,2-dichloropropane	0.5
1,1-dichloropropene	0.5
cis-1,3-dichloropropene	0.5
trans-1,3-dichloropropene	0.5
ethylbenzene	0.5
hexachlorobutadiene	0.5
isopropylbenzene	0.5
p-isopropyltoluene	0.5
methylene chloride	0.5
naphthalene	0.5
n-propylbenzene	0.5
styrene	0.5
1,1,1,2-tetrachloroethane	0.5
1,1,2,2-tetrachloroethane	0.5
tetrachloroethene	0.5
toluene	0.5
1,2,3-trichlorobenzene	0.5
1,2,4-trichlorobenzene	0.5
1,1,1-trichloroethane	0.5
1,1,2-trichloroethane	0.5
trichloroethene	0.5
trichlorofluoromethane	0.5
1,2,3-trichloropropane	0.5
1,2,4-trimethylbenzene	0.5
1,3,5-trimethylbenzene	0.5
vinyl chloride	0.5
m & p xylenes	0.5
o-xylene	0.5

3.3 SAMPLING SCHEDULE

The first round of quarterly samples will be collected three months after acceptance of the System by EPA. Samples will be collected and analyzed at three month intervals thereafter.

4.0 DAILY INSPECTION REQUIREMENTS

Table 4 provides a list of the items that will be inspected on a periodic basis by the System operator. Upon completion of the inspection requirements, the operator will complete a line entry on Form-2, Plant Inspection Log. Form-2 will be part of the operating log for the drinking water treatment plant and will be available at the treatment facility for review by the State of Vermont and EPA. Form-2 is provided in Appendix C.

5.0 ROUTINE AND PREVENTATIVE MAINTENANCE PROCEDURES

5.1 PREVENTATIVE MAINTENANCE

Table 5 provides a list of the mechanical equipment/instrumentation that should be taken "off-line" and maintained on a periodic basis. Upon completion of the preventative maintenance requirements, the operator will complete Form-3, Maintenance Detail Sheet. Form-3 will become part of the operating log and will be available at the System for review by the State of Vermont and EPA. Form-3 is provided in Appendix C.

5.2 MANUFACTURER'S MAINTENANCE INFORMATION

Operating instructions, maintenance manuals, spare parts lists, and detailed information on recommended maintenance procedures for each piece of equipment, as supplied by Calgon, are included as Appendix D.

TABLE 4
SYSTEM INSPECTION CHECKLIST

Municipal Well Field Treatment System
Lyndonville, VT.

Equipment	Inspection/Problem	Inspection Frequency
Pressure Guages	- check operability	Daily
	- check for excessive headloss across adsorbers	Daily
Chlorination Equipment	- check operability of pump	Daily
	- check available free chlorine residual in treated water	Daily
	- check free chlorine in sodium hypochlorite solution in storage tank	Once every 3 days
	- check level in hypochlorite storage tank	Daily
	- check piping and tank for leakage/wet spots	Daily
Reservoir Pump Spare, P-2	- start motor and rotate shaft	Weekly
Carbon Bed Adsorber	- inspect interior and underdrain collection system for corrosion/erosion damage	Once every 5 carbon changeouts
	- inspect exterior for cracking, leaks, discoloration and obvious deformation	Daily
Water Piping and Appurtenances	- check valves, piping and flanges for leakage	Daily
	- check control valve operability	Daily
Reservoir Pump P-1	- check for proper pump operation	Daily
	- check for excessive vibration	
Flowmeter	- check recording chart and operability of recording pens	Daily
Carbon Transfer Hose	- check for cracks and malfunctioning couplings	Prior to Use
Adsorber Hydraulic Relief Valves	- check for leakage and operability	Annual

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TABLE 5
PREVENTATIVE MAINTENANCE CHECKLIST/SCHEDULE

Municipal Well Field Treatment System
Lyndonville, VT.

Equipment Component	Required Service	Frequency
Magmeter	- Calibrate - measure transmitter output	- Bi-annual
Flowmeter Recorder	- replace recording chart/pens	- As required
Reservoir Pumps P-1, P-2	- change thrust bearing motor oil	- Annual
	- check/record pump shut-off pressure	- Annual
	- inspect/service bowl assembly and impellers	- Once every 10 years
Metering Pump	- return to factory for service/recondition of internal parts	- per manufacturers recommendation
Level Probes/ Switches	-remove and inspect for corrosion	- Annual
Chlorine Injection and Anti-syphon Valve	- disassemble and clean	- Annual
Reservoir Level and Surge Control Valves	- rebuild hydraulic cylinder	- Once every 5 years
	- inspect solenoid valves, speed controls and hydraulic parts for leakage	- Annual
Adsorber Vessels and Associated Water Piping	- paint exterior surfaces	- As required

6.0 ANNUAL OPERATION AND MAINTENANCE COSTS

An estimate of annual operation and maintenance (O & M) costs for the System is summarized below. The backup calculations and assumptions used to arrive at each number are provided in Appendix E.

Actual O & M costs will be computed by the plant operator on an annual basis and recorded on Form-4. Form-4 will become part of the operating log and will be available at all times at the treatment facility for review by the State of Vermont and EPA. Form-4 is provided in Appendix C.

Summary of Anticipated Annual Operating and Maintenance Costs

Operating Costs	
Electricity[1]	$ 3,331
Virgin Carbon[2]	$33,472
Sodium Hypochlorite	$ 8,760
Inspection	$12,775
Documentation	$ 1,820
Quarterly Water Quality Testing	
Sampling	$ 3,224
Analyses	$10,000
Maintenance	
Labor	$ 700
Parts/ Equipment	$ 1,800

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1 Additional to present pump station electrical costs.

2 Cost based on present pumping rate and 20ppb TCE and DCE.

7.0 INDEPENDENT AUDITS

To insure that the proper Operation and Maintenance procedures are being performed, an annual audit of the operating log will be conducted by an independent consultant. The audit will consider timeliness of performance of tasks, recordkeeping, documentation, analytical testing results, and problems, if any, encountered and method of resolution of each problem. An audit report will be submitted to the Village and included in the operating log.

A copy of the operating log will also be maintained at the:

Town Clerks Office
Village of Lyndonville
Lyndonville, VT., 05851

The copy of the operating log that is maintained at the Town Clerks Office will include the results of laboratory analyses conducted in accordance with the approved sampling plan. The operating log and associated records will be retained for a minimum of six years from the acceptance of the System by EPA.

8.0 CONTINGENCY PLAN

This section discusses contingencies to be implemented in the event of failure of the System or components within the System. Two types of contingency planning have been utilized. First, corrective action procedures have been developed to prevent interruption of treatment in case of isolated equipment failure or malfunction. Second, design and construction techniques have been developed to avoid or mitigate potential natural disasters which could impact System operation.

Equipment Failure

Spares of critical equipment components will be available at the System, so that in the event a component fails, the System can be restarted with a minimum of down time. With the reservoir capacity of 2.5 million gallons, the maximum allowable

down time, before the municipality is without water, is four (4) days. Consideration has been given to the following equipment problems, and the appropriate corrective actions to restart the equipment and/or treatment system:

Equipment Failure	Corrective Action
Chlorinator Feed Pump	Install warehouse spare and restart pumping to treatment system.
Reservoir Pump (P-1)	Operate installed spare reservoir pump (P-2)
Carbon Bed Adsorber	Isolate adsorber with valving that is provided.
	Treat well water with single bed adsorber and use in-bed sample port to monitor for organic break through.
	Contact manufacturer and arrange for repair and carbon removal.
Sodium Hypochlorite Storage Tank	Pump out containment dike.
	Arrange for delivery of sodium hypochlorite in 55 gal drums.
	Fill chlorinator day tank from 55 gal. drum and restart treatment system.
	Contact tank manufacturer and arrange for tank repair/replacement.

Flow meter	Manually set chlorinator for required feed rate.
	Contact manufacturer for repair/replacement.
Treatment Skid Failure (Both Adsorbers Down)	Contact manufacturer.
	Arrange for delivery of emergency treatment skid.
	Ration water and provide instructions for use.
	Reservoir capacity to be used for emergency purposes only.

Power Outage

Provision has been incorporated into the System design to allow it to operate during a power outage. During a power outage, one collection reservoir pump in the new treatment building will be operated with the direct drive Chrysler engine. A portable generator will be used to power one well pump and the chlorinator feed pump.

Natural Events

The design and construction of the System has considered the potential for the following major natural disasters which could potentially impact the continued operation of the System:

- Floods

  Though the municipal wellfield lies in the 100 year flood plain, the treatment building will be placed on structural fill to elevate the building above the 100 year flood plain elevation.

- Earthquakes

  The treatment building is not located in an earthquake jurisdiction, as listed in 40 CFR 264 Appendix VI.

- Hurricanes

  The System building is designed to withstand hurricane force winds.

9.0 SYSTEM DECOMMISSION PLAN

The System may be decommissioned when the Village receives notice from EPA that treatment is no longer necessary or upon the Administrative Order being superseded by a future Order or Judicial Decree. This section discusses procedures to be followed during System decommissioning.

1. The sodium hypochlorite day tank and metering system will be relocated to the chlorination room of the existing pump house at the municipal wellfield. The 1500 gallon sodium hypochlorite storage tank will be relocated to an area adjacent to the pump house.

2. The drinking water treatment plant will be by-passed by installing the appropriate piping/valving.

3. The remaining carbon in the adsorber vessels will be removed and regenerated of at a RCRA approved facility.

4. The two (2) adsorber vessels will be opened and cleaned to decontaminate the interior of the vessels. If properly decontaminated, the treatment skid will not have to be removed and disposed of as a potential hazardous waste by a third party. Also, decontaminating the adsorbers may permit resale and reuse of the treatment skid.

5. The interior of the vessel will first be cleaned with high pressure steam. The interior of the vessel will then be rinsed with a volume of water equivalent to 10% of the vessel volume. Rinsates will be disposed of by a licensed waste hauler. The final rinse will be sampled for the presence of TCE and cis/trans DCE to verify that the adsorbers are decontaminated.

6. All employees involved with the adsorber cleaning operation will use the following safety equipment:

   - Hard hats
   - Face shields or goggles
   - Impenetrable boots, steel-toed
   - Impervious coveralls and impenetrable gloves
   - Positive-pressure self-contained breathing apparatus with full face gas mask.

   API 2015 tank entry procedures will be followed as appropriate. Personnel decontamination facilities will be provided. At a minimum, a two-man crew will be required, with one worker outside the vessel to maintain constant visual surveillance and assist in the event of an emergency.

7. The treatment building will either be left in place or dismantled depending upon the Village's future needs for the building. If the treatment facility is dismantled, additional decontamination, beyond that discussed above, will not be required.

10.0 SPENT CARBON PRE-ACCEPTANCE PROCEDURES

To insure that spent carbon can be legally and safely reactivated at a reactivation facility owned and operated by Calgon Carbon Corporation, a sample of spent carbon and the following information concerning the spent carbon will be provided by the Village of Lyndonville at the time of the first scheduled carbon changeout.

Exhibit No.	Document
1	Waste Profile Document
2	Certification Statement (regarding "Exemption Compounds")
3	Certification Statement (Regarding RCRA Classification)
4	Carbon Acceptance Request

Exhibits 1 through 4 are included in Appendix F.

11.0 REPORTING & NOTIFICATION

11.1 REPORTING

The operation of the treatment system will result in additional reporting beyond the current reporting required of the Village because it operates a drinking water system. Prior to startup of the treatment system, the Village will obtain an operating permit from the Vermont Department of Health. This permit lists minimum reporting requirements. A copy of these permit requirements are included in Appendix G.

The discharge of backwash water and neutralized disinfection solution requires the issuance of an NPDES permit from the State. This permit contains reporting requirements and is included in Appendix A.

11.2 NOTIFICATION

The State of Vermont Department of Health shall be notified whenever a plant shutdown has occurred which will likely be of a duration longer than 48 hours. Notification shall be made as set forth in the Operating Permit issued by that Department.

Accidents, fires, etc. shall be reported to the appropriate authorities:

EMERGENCY RESPONSE RESOURCES

FIRE DEPARTMENT:	Grove Street Lyndonville, Vermont (802) 626-3211 - emergency (802) 626-3315 - business
POLICE DEPARTMENT:	Main Street Lyndonville, Vermont (802) 626-5559
AMBULANCE SERVICE:	Rescue Unit Services Lyndon State College (802) 626-5053
NEAREST HOSPITAL FACILITY:	Northeastern Vermont Regional Hospital Hospital Drive St. Johnsbury, Vermont (802) 748-8141

POISON CENTER:	Vermont Poison Center Medical Center Hospital Burlington, Vermont (802) 658-3456
CHEMTREC:	CHEMTREC (Chemical Transportation
CALGON CARBON CORP.	500 Calgon Carbon Drive Robinson Township, PA 15205 (800) 274-2726
ESE, CORP.	One Overlook Drive Unit 16 Amherst, NH 03031 (603) 672-2511

APPENDIX A

NPDES PERMIT

THE NPDES PERMIT WILL BE INSERTED IN THIS APPENDIX WHEN ISSUED BY THE STATE OF VERMONT.

APPENDIX B

MATERIAL SAFETY DATA SHEETS

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: SODIUM HYPOCHLORITE SOLN DATE: 11/17/89 PAGE 01
PRODUCT CODE: 26-18130-03

CAS # 007681-52-9

FORMULA: NaOCl

CHEMICAL FAMILY: Hypochlorite

CHEMICAL NAME AND SYNONYMS: Sodium Hypochlorite Solution; Javel Water Bleach; Soda Water Bleach; Hypo; Chlorine Bleach; Vertex Concentrate; Sunny Sol; Super Shock; Dixichlor

SUPPLIERS NAME: Harcros Chemicals Inc
5200 Speaker Rd
Kansas City Ks 66106
SUPPLIERS PHONE NUMBER: 913-321-3131
TRANSPROTATION EMERGENCY PHONE NUMBER: 1-800-424-9300

S.A.R.A. INFORMATION

HAZARDS: Fire: Pressure: Reactivity:Yes Acute: Yes Chronic:
PHYSICAL DATA: Mixture:Yes Pure: Solid: Liquid:Yes Gas:

SECTION I Hazardous Ingredients

Ingredient	Percent	TLV
Sodium Hypochlorite (CAS # 7681-52-9)	10.5%	N/E *
Sodium Hydroxide (CAS # 1310-73-2)<>	0.8 to 2.4	PEL/TLV 2 mg/m(3) OSHA/ACGIH
* Chlorine (Available)	Approx 10.0%	PEL/TLV 0.5 ppm STEL 1 ppm OSHA/ACGIH

<>-This chemical is subject to S.A.R.A. Title III section 313 part 372 reporting.

SECTION II Health Hazards

Threshold Limit Value: As indicated in Section I.

Potential Effects of Exposure:

Acute - Irritating effects increase with strength of solution and time of exposure.

Chronic - Constant irritant to eyes, throat.

Eyes: Causes severe eye irritation.

Skin: Irritation, reddening, damage with long or repeated exposure.

Inhalation: Fumes from exposed solution very irritating to mucous membranes, may cause sneezing. Grossly excessive exposure can cause bronchitis, and pneumonia, and corrosion of the respiratory tract in severe cases.

Ingestion: Causes irritation of membranes of the mouth and throat, stomach pain and possible ulceration.
In severe cases can produce circulatory collapse, lethargy,

CONTINUED ON PAGE 02

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: SODIUM HYPOCHLORITE SOLN DATE: 11/17/89 PAGE 02
PRODUCT CODE: 26-18130-03

SECTION II Health Hazards CONTINUED

delidium, convulsions, and coma. Ingestion of small quantities (a few tablespoons) can be fatal to children.
Oral LD(50) (Rat): 13 g/kg with 5.25% NaOCl and 5 g/kg with 12. NaOCl (Sodium Hypochlorite).

First aid:

Eyes: Flush with water for 15 minutes while holding eyelids open. Get medical attention as soon as possible.

Skin: Flush with water while removing contaminated clothing and shoes. Follow by washing with soap and water. DO NOT reuse clothing or shoes until cleaned. If irritation persists, get medical attention.

Inhalation: Remove person to fresh air. If distress persists call a physician immediately.

Ingestion: If accidentally swallowed, drink water or milk and obtain medical attention promptly. DO NOT induce vomiting, or administer baking soda or acidic antidotes. If vomiting occurs spontaneously, keep head lower than hips to prevent aspiration into lungs.

Other Information: Not listed as carcinogen or potential carcinogen by NTP, IARC or OSHA.

ADVICE TO PHYSICIAN: Antidote - give Sodium Thiosulfate orally.

SECTION III Special Protection Information

Respiratory Protection: When fumes present use NIOSH-approved respirator with a chlorine canister or supplied air respirator, consult your equipment supplier.

Ventilation Required: No special ventilation is needed unless the product is exposed to decomposition conditions; i.e. in a spill or in an acid condition.

Protective Clothing:

Eyes: Splash-proof goggles should be used when dispensing sodium hypochlorite in this concentration.

Skin: Rubber gloves for handling, rubber apron and boots if splashing may occur, and in emergency spill situations.

Additional Protective Measures: Safety shower, eye bath and washing facilities should be available.

SECTION IV Fire & Explosion Hazard Data

Flash Point (Method): Non-flammable

Flammable Limits (% Volume in Air):

Upper: N/A

CONTINUED ON PAGE 03

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: SODIUM HYPOCHLORITE SOLN DATE: 11/17/89 PAGE 03
PRODUCT CODE: 26-18130-03

SECTION IV Fire & Explosion Hazard Data CONTINUED

Lower: N/A

Extinguishing Media: Use water to cool containers, knock down fumes if released.

Special Fire Fighting Procedures: Avoid fumes from spilled or exposed liquid, dilute copiously, ventilate, and be prepared to use respiratory protection if needed. Acid contamination will produce very irritating fumes similar to chlorine gas.

Unusual Fire and Explosion Hazards: Product decomposes when heated; decomposition products may cause containers to rupture or explode. Vigorous reaction possible with organic materials or oxidizing agents; may result in a fire.

SECTION V Physical Data

Boiling Point: Decomposes

Specific Gravity (H(2)O=1): Approx. 1.14

Vapor Pressure (MM HG.): V.P. of water & V.P. of decomposition products

Vapor Density (AIR=1): N/A

Evaporation Rate (_____=1): N/A

Solubility in Water: Complete

Percent Volatile by Volume: Variable - water vapor and products of decomposition.

pH: Approx. 12 - 13

Appearance and Odor: Light yellowish green liquid with-chlorine odor.

SECTION VI Reactivity Data

Stability: Solutions of sodium hypochlorite are fairly stable in concentrations below 15%. Stability decreases with concentration, heat, light exposure, decrease in pH, and contamination with heavy metals, such as nickel, cobalt, copper and iron.

Incompatibility: Avoid contamination with heavy metals (act as catalysts), reducing agents, organics, ether, amines, ammonium acetate, cellulose, ammonia, acids, or acid pH.

Hazardous Decomposition Products: Hypochlorous acid (HOCL), chlorine, hydrochloric acid. Composition depends upon temperature and decrease in pH. Additional decomposition products, which depend upon pH, temperature and time, are sodium chloride, sodium chlorate and oxygen.

Hazardous Polymerization: Will not occur

CONTINUED ON PAGE 04

SECTION VII Spill and Leak Procedures

Steps to be taken if material is released or spilled:

Dike to contain spill. DO NOT allow to enter sewers or streams. Flush with water to dilute as much as possible, avoid heat and contamination with acid materials. If using absorbent to soak up a small spill avoid sawdust and other combustibles.

Waste Disposal Method:

Reduce by adding reducing agents such as bisulfites or ferrous salt solutions. Some heat will be produced. May neutralize with reducing agents. Keep on alkaline side and dilute with copious quantities of water. Principal end product is salt water (NaCl). Dispose in conformance with applicable local, state, and federal regulations.

EPA - Resource Conservation and Recovery Act (RCRA) Regulations As produced, this material is a product and not a waste. If discarded or intended to be discarded as is, it is a corrosive hazardous waste as defined in RCRA (40 CFR 261.22). The EPA hazardous waste number is D002.

SECTION VIII D.O.T. Shipping Information

Proper Shipping Name:	HYPOCHLORITE SOLUTION MORE THAN 7% AVAILABLE CHLORINE BY WEIGHT
Hazard Class:	CORROSIVE MATERIAL
ID Number:	UN1791
Label Requirements:	CORROSIVE
Reportable Quantity:	SHIPMENTS OF 00010 GAL OR MORE ARE REPOR TABLE

Other Information:

SECTION IX Additional Information

This information may be of importance to you:

Sodium Hypochlorite is manufactured only in solution form. "Household bleach" contains not more than 7% Sodium Hypochlorite (=6.67 wt. % available chlorine) with about .6-1.75% excess Sodium Hydroxide for stability control. Industrial bleach contains from 7% to 15% Sodium Hypochlorite (6.67-13.06 weight % available chlorine) with 1-3% excess Sodium Hydroxide for stability control. Household Bleach is much less hazardous, the less stringent safety measures given on the household bleach container should be observed.

Sodium Hypochlorite does not exist as such in the vapor phase, unless as a component of a mist or fumes. This product is

CONTINUED ON PAGE 05

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: SODIUM HYPOCHLORITE SOLN DATE: 11/17/89 PAGE 05
PRODUCT CODE: 26-18130-03

SECTION IX Additional Information CONTINUED

listed in the Toxic Substances Control Act (TSCA) inventory of chemical substances.

Store in vented, closed clean, non-corrodable containers in a cool, dry location, away from direct sunlight and not adjacent to chemicals which may react with the product if spillage occurs. If closed containers become heated, they should be vented to release decomposition products (mainly oxygen under normal decomposition). DO NOT mix or contaminate with ammonia, hydrocarbon acids, alcohols, ethers.

Long storage periods should be avoided as product degrades with age.

Minimize skin contact. Wash with soap and water before eating, drinking, smoking or using toilet facilities.

Containers of this material may be hazardous when emptied. "Empty" containers retain product residues. Observe all hazard precautions outlined in this sheet.

NPCA HMIS 102C

********* E N D O F R E P O R T *********

NAME: GENE TURNER DATE ISSUED: 11/04/1987
DATE REVISED: 10/25/1989

< = LESS THAN N/A = NOT APPLICABLE UNK = UNKNOWN
> = MORE THAN N/D = NOT DETERMINED
N/E = NOT ESTABLISHED

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc knows of no medical condition, other than those noted on this material safety data sheet, which aregenerally recognized as being aggravated by exposure to this product.

J. T. Baker Chemical Co.
222 Red School Lane Phillipsburg, N.J. 08865
24-Hour Emergency Telephone - (201) 859-2151
Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

S3074 -02 Sodium Bisulfite Page: 1
Effective: 08/18/86 Issued: 08/18/86

SECTION I - PRODUCT IDENTIFICATION

Product Name: Sodium Bisulfite
Formula: $NaHSO_3$

Formula Wt: 104.06
CAS No.: 7631-90-5
NIOSH/RTECS No.: VZ2000000
Common Synonyms: Hydrogen Sulfite Sodium; Sodium Acid Sulfite; Sodium Hydrogen Sulfite
Product Codes: 3556,3557

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System

Laboratory Protective Equipment

Precautionary Label Statements

WARNING!
HARMFUL IF SWALLOWED OR INHALED
Avoid contact with eyes, skin, clothing.
Avoid breathing dust. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Sodium Bisulfite	90-100	7631-90-5

SECTION III - PHYSICAL DATA

Boiling Point: N/A
Melting Point: N/A
Vapor Pressure(mmHg): N/A
Vapor Density(air=1): N/A

Continued on Page: 2

SECTION III - PHYSICAL DATA (Continued)

Specific Gravity: 1.48 (H_2O=1)

Evaporation Rate: N/A (Butyl Acetate=1)

Solubility(H_2O): Appreciable (more than 10 %)

% Volatiles by Volume: 0

Appearance & Odor: White powder with SO_2 odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Flammable Limits: Upper - N/A % Lower - N/A %

Fire Extinguishing Media
Use water spray.

Special Fire-Fighting Procedures
Firefighters should wear proper protective equipment and self-contained (positive pressure if available) breathing apparatus with full facepiece. Move exposed containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire & Explosion Hazards
Closed containers exposed to heat may explode.

Toxic Gases Produced
sulfur dioxide

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 5 mg/m^3 (ppm)

Toxicity: LD_{50} (oral-rat)(mg/kg) - 2000
LD_{50} (ipr-rat)(mg/kg) - 650
LD_{50} (iv-rat) (mg/kg) - 115

Carcinogenicity: NTP: No IARC: No Z List: No OSHA reg: No

Effects of Overexposure
Contact with skin or eyes may cause severe irritation or burns. Sulfites reportedly cause possible allergenic effects including hives, diarrhea, shortness of breath, shock and brain damage caused by constriction of the lung's air passages. Severe anaphylactic allergic

Continued on Page: 3

SECTION V - HEALTH HAZARD DATA (Continued)

reactions allegedly cause death.

Medical Conditions Generally Aggravated By Exposure
asthma

Routes Of Entry
inhalation, skin contact

Emergency and First Aid Procedures
CALL A PHYSICIAN.
If swallowed, if conscious, immediately induce vomiting.
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Flush skin with water.

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: none documented

Incompatibles: strong acids, strong oxidizing agents

Decomposition Products: oxides of sulfur, oxides

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge
Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Disposal Procedure
Dispose in accordance with all applicable federal, state, and local environmental regulations.

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use general or local exhaust ventilation to meet TLV requirements.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentration is high, a dust/mist respirator is recommended. If concentration exceeds capacity of respirator, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety glasses with sideshields, proper gloves are

Continued on Page: 4

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT (Continued)

recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA™ Storage Color Code: Orange

Special Precautions

Keep container tightly closed. Suitable for any general chemical storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name Chemicals, n.o.s. (Non-regulated)

INTERNATIONAL (I.M.O.)

Proper Shipping Name Chemicals, n.o.s. (Non-regulated)

N/A = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

-- LAST PAGE --

APPENDIX C

FORMS

Municipal Water Treatment System
Lyndonville, VT

FORM - 1

PLANT OPERATING PROCEDURE
REPORTING FORM

Date of Procedure: _____

Operator's Name: _____

Equipment Item No./Description: _____

Procedure Peformed (check appropriate procedure):

Sodium Hypo. Tank Clean/Flush _____ Carbon Filter Back Wash _____
System Disinfection _____ Virgin Carbon Transfer _____
Spent Carbon Transfer _____ Chlorination System Oper. _____

Initiating Event _____ Date: _____

Total Water Treated Since Last Maintenance: _____
Previous Meter Reading (this procedure): _____
Current Meter Reading: _____

Treatment Series (circle appropriate series):

Before this procedure: C1 to C2 C2 to C1

After this procedure: C1 to C2 C2 to C1

Disposition of Water (check one):

Tank truck ____
NPDES ____
Floor Drain ____
None____

Estimated Quantity of Water: _____

Comments:

Signature _____
(operator)

Municipal Well Field Treatment System
Lyndonville, VT

SHEET ____

FORM - 2
PLANT INSPECTION LOG

DATE	WATER PUMPING DATA			CHLORINE RESIDUAL (ppm)	CHLORINE TK LEVEL (gallons)	INSPECTION COMMENTS	INITIALS
	GALLONS (total)	GPM (max)	WELLS UTILIZED				
			a.m.				
			p.m.				

Municipal Water Treatment System
Lyndonville, VT

FORM - 3

MAINTENANCE DETAIL SHEET

EQUIPMENT SERVICED	DATE	DESCRIPTION OF SERVICE PERFORMED	SIGNATURE

Municipal Water Treatment System
Lyndonville, VT

FORM - 4

ANNUAL REPORT
ANNUAL OPERATION AND MAINTENANCE
COST SUMMARY

OPERATING DATA $_____

Connected Population _____
Average Flow (MGD) _____

OPERATING EXPENSE $_____

Chlorine
Total Metered (lbs) _____
Contract Cost ($/lb) _____

Activated Carbon
Total Spent Carbon (lbs) _____
Contract Cost ($/lb) _____

Labor
Inspection _____
Administration _____

Water Quality Testing
Sampling _____
Analyses _____
Documentation _____

Electricity (KWH) _____

MAINTENANCE EXPENSE $_____

Materials/Equipment _____
_____ _____
_____ _____
_____ _____

TOTAL $_____

APPENDIX D

CALGON MAINTENANCE PROCEDURES AND SPARE PARTS LIST

THE CALGON MAINTENANCE PROCEDURES AND SPARE PARTS LIST WILL BE INSERTED INTO THIS APPENDIX WHEN RECEIVED FROM CALGON.

APPENDIX E

O&M COSTS BACKUP

OPERATION & MAINTENANCE COSTS
BACKUP

ELECTRICAL

- Increased pressure drop (psi) of plant:

  15 psi (lead adsorber) + 3 psi (guard adsorber) = 18 psi

  $$\text{Break Horsepower (BHP)} = \frac{\text{psi (gpm)}}{1715 \text{ (efficiency)}}$$

  efficiency = 75%
  ave. gpm = 363

  $$\text{BHP} = \frac{18\ (363)}{1715\ (0.75)} = 5.1$$

  Cost = 10c per kilowatt hour (KWHR)

Electrical Cost (annual) = 5.1 (0.10) (8760 hrs/yr) (.7457)
= **$3,331**

[.7457 is the conversion factor for horsepower hours to kilowatt hours]

VIRGIN CARBON

- From Design Report, @ 20 ppb DCE & TCE, exhaustion time is 229 days. The vessel holds 20,000 lbs of virgin carbon.

  $$\text{Total lbs/yr} = \frac{20{,}000 \text{ lbs C}}{229 \text{ days}} (365 \text{ days/yr}) = 31{,}877.7$$

  Cost = $1.05 per lb

TOTAL VIRGIN CARBON COSTS (annual) = 31,877.7 ($1.05) = **$33472**

SODIUM HYPOCHLORITE

- @ 350 gpm a dosing of 3-5 ppm to achieve 1 ppm residual chlorine requires 0.6-1.05 gph of a 10% sodium hypochlorite solution.
- Assume an average flowrate of 363 gpm and use an average dosing rate of 0.8 gph sodium hypochlorite.

  Annual Usage = 0.8 gph (8760 hr/yr) = 7008 gallons

  Cost = $1.25 per gallon

TOTAL SODIUM HYPOCHLORITE COSTS (annual) = 7008 ($1.25)
= $8760

WATER QUALITY TESTING

- Assumes sampling to be completed by a qualified subcontractor and analysis at a certified laboratory.

  8 samples per quarter X 4 X $275 per sample = $8800
  Subcontractor review & report @ $300 X 4 = $1200

  Sampling/travel, 13 hrs @ $62/hr X 4 = $3224

TOTAL WATER QUALITY TESTING COSTS (annual) = $13224

PARTS/EQUIPMENT

- Based upon the Design Report, annual parts and equipment costs are estimated by Calgon to be 1% of the cost of the carbon unit.

TOTAL PARTS/EQUIPMENT (annual) = 0.01 ($180,000) = $1800

LABOR TASKS

- All the following tasks assume performance by a trained technician @ $50/hr or a labor mechanic @ $35/hr.

Inspection Costs (annual)

(365 days/yr) (1 hr/day) ($35/hr) = $12,775

Documentation Costs (annual)

(52 wks/yr) (1 hr/wk) = $1820

Maintenance Labor Costs (annual)

Based upon the tasks set forth in the O&M Plan:

Equipment Component	Required Service	Frequency	Labor Cost
Magmeter	- Calibrate - measure transmitter output	- Bi-annual	2 hr X $50/hr = $100/yr
Flowmeter Recorder	- replace recording chart/pens	- As required	1 hr X $35/hr = $35/yr
Reservoir Pumps P-1, P-2	- change thrust bearing motor oil	- Annual	1 hr X $35/hr = $35/yr
	- check/record pump shut-off pressure	- Annual	1 hr X $35/hr = $35/yr
	- inspect/service bowl assembly and impellers	- Once every 10 years	$1000/10 yrs = $100/yr
Metering Pump	- return to factory for service/recondition of internal parts	- per manufacturers recommendation	$90/yr

Level Probes/ Switches	-remove and inspect for corrosion	- Annual	1 hr X $35 = $35/yr
Chlorine Injection and Anti-syphon Valve	- disassemble and clean	- Annual	1 hr X $35/hr = $35/yr
Reservoir Level and Surge Control Valves	- rebuild hydraulic cylinder	- Once every 5 years	(5hr @ $50/hr)/5 = $50/yr
	- inspect solenoid valves, speed controls and hydraulic parts for leakage	- Annual	3 hr X $50/hr = $150/yr
Sodium Hypochlorite Tank, Clean/Flush		- annual	1 hr X $35/hr = $35/yr

TOTAL ANNUAL COST = $700

APPENDIX F

CALGON SPENT CARBON PRE-ACCEPTANCE FORMS

EXHIBIT 1

CALGON

2017 3/84

Return Form To:

CALGON CARBON CORPORATION
Reactivation Operations
P. O. Box 1346
Pittsburgh, PA 15230

DATE _____ NO. _____

WASTE PROFILE DOCUMENT

1. GENERAL INFORMATION

CUSTOMER _____

MAILING ADDRESS _____

_____

FACILITY ADDRESS _____ EPA ID NO. _____

_____ STATE ID NO. _____

NAME OF CONTACT _____ POSITION _____ TELEPHONE _____

2. STREAM PROFILE

A. PRINCIPAL CHEMICAL PRESENT AND AND ESTIMATED AMOUNT:

1) _____ 6) _____

2) _____ 7) _____

3) _____ 8) _____

4) _____ 9) _____

5) _____ 10) _____

B. TYPE OF STREAM

- ☐ INDUSTRIAL WASTEWATER
- ☐ GROUNDWATER
- ☐ SPILL/EMERGENCY
- ☐ INDUSTRIAL PROCESS
- ☐ FOOD PROCESS
- ☐ POTABLE WATER (surface/other)
- ☐ OTHER _____

3. REGULATORY PROFILE

A. IS THIS STREAM A HAZARDOUS WASTE AS DEFINED BY PART 261 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? ☐ YES ☐ NO

IF YES, DESCRIBE AND SPECIFY BY EPA WASTE CODE NUMBER(S): _____

B. IS THE STREAM A HAZARDOUS WASTE IN THE FACILITY'S STATE? ☐ YES ☐ NO

IF YES, DESCRIBE AND SPECIFY BY STATE WASTE CODE NUMBER(S): _____

C. DOES THE STREAM CONTAIN POLYCHLORINATED BIPHENYL (PCB) OR DIOXIN? ☐ YES ☐ NO

D. HAS THE STREAM BEEN ANALYZED TO COMPLY WITH NPDES PERMITTING REQUIREMENTS?

☐ YES ☐ NO

2017 3/84 Page 2

CUSTOMER _____ / _____ NO. _____

4. SAFETY PROFILE

A. ARE ANY OF THE FOLLOWING TYPES OF COMPOUNDS, MATERIALS, OR CONDITIONS PRESENT IN THE STREAM? IF YES, IDENTIFY AND ESTIMATE AMOUNT OR CONDITION.

	YES	NO	IF YES, ESTIMATE AMOUNT/IDENTIFY
1) POLYCHLORINATED BIPHENYLS (PCB)			
2) DIOXINS			
3) OSHA REGULATED CARCINOGENS			
4) HALOGENATED ORGANICS			
5) SULFUR-CONTAINING ORGANICS			
6) PESTICIDES			
7) HIGHLY TOXIC ORGANICS			
8) RADIOACTIVE MATERIAL			
9) EXPLOSIVE (PYROPHORIC/SHOCK) MATERIAL			
10) BIOLOGICAL PATHOGENIC OR ETIOLOGIC AGENTS			
11) HEAVY METALS			
12) FLASH POINT $\leq$ 200° F (CLOSED CUP)			
13) pH $\leq$ 4 OR $\geq$ 10			
14) CORROSIVE			

B. LIST ANY ACUTE OR CHRONIC HAZARDS ASSOCIATED WITH OR ALLEGED TO BE ASSOCIATED WITH HUMAN CONTACT WITH OR EXPOSURE TO THE WASTE:

_____

_____

_____

_____

_____

_____

_____

PLEASE ATTACH ANY ANALYSES, TOXICOLOGY STUDIES, SAFETY DATA, ETC. THAT IS RELEVANT

5. CERTIFICATION

To the best of my knowledge and ability the information provided is complete, accurate and true.

NAME _____

SIGNATURE _____

TITLE _____

DATE _____

6. CONFIDENTIALTY

Calgon Carbon Corporation as consideration o the customer's release of the above information, and an subsequent data provided, agrees to treat such informa tion as confidential property and will not disclos such information to others except as is required by la and facility operating permits.

NAME: _____

TITLE: _____

EXHIBIT 2

EXHIBIT F-4

CERTIFICATION STATEMENT

I, the undersigned, hereby certify that to the best of our knowledge and observation, the groundwater being treated at the "location" under the Calgon Carbon Service for the "location" facility operated by "company" contains no polychlorinated byphenyls, chlorinated dibenzo-p-dioxins, or 1, 2, dibromo 3 chloropropane and I further certify that if groundwater is subsequently determined to contain any of these substances, "company" will notify Calgon Carbon Corporation of these findings.

"Company"
"Location"

Signature _____

Name _____

Title _____

Date _____

EXHIBIT 3

:617 3/83

"CONFIDENTIAL"

CARBON ACCEPTANCE REQUEST

SUBMITTED BY ENGINEERING / SALES	DATE ACTION REQUIRED BY

I. PROJECT IDENTIFICATION

CUSTOMER

CITY/STATE

DESCRIPTION OF TREATMENT (CARBON TYPE, PRINCIPAL ADSORBATES, INFLUENT IDENTIFICATION, ETC.)

PROJECT CLASSIFICATION

- INDUSTRIAL WASTE WATER
- POTABLE WATER
- SPILL/EMERGENCY CLEAN-UP
- INDUSTRIAL PROCESS
- FOOD-GRADE PROCESS
- BUYBACK/EXCHANGE
- CUSTOM REACTIVATION
- OTHER

II. BUSINESS INFORMATION

A. VOLUME (M LBS)

TOTAL VOLUME OVER LIFE OF CONTRACT _____ ; ANNUAL DEMAND _____

B. TRANSPORTATION

DATE OF INITIAL FILL _____ DATE OF FIRST RETURN _____

FREQUENCY _____ (_____ M LB) TRUCKLOADS PER ☐ WEEK ☐ MONTH ☐ YEAR

METHOD OF SPENT CARBON RETURN _____ VIRGIN REPLACEMENT REQUIRED? _____

PREFERRED REACT SITE _____ ALTERNATE _____

COMMENTS _____

C. BUSINESS FACTORS (CUSTOMER RELATIONS, CONTRACT STATUS, ETC.)

III. REACTIVATION INFORMATION (attach lab results)

A. CARBON EVALUATED

TYPE _____ MESH SIZE _____ ESTIMATED LOADING (≥ AD) _____

SOURCE _____

B. REACT PRODUCT QUALITY

REACT A. D. _____ I_2NO. ACTIVITY _____ % VOL. YIELD _____

REACTIVATABILITY _____ < 15 MIN EASY _____ 15 TO 40 MIN MODERATE _____ > 40 MIN DIFFICULT

C. POTENTIAL PLANT HANDLING PROBLEMS

ASH FUSION (°F) _____ COUPON CORROSION _____

FLAMMABILITY _____ pH _____

NATURE OF CARBON (LUMPS, EXTRANEOUS MATERIAL, HIGH FINES, ETC) _____

OBSERVATIONS DURING REACTIVATION (SMOKE, FLAMES, ODOR, ETC) _____

D. ESTIMATED AIR POLLUTION POTENTIAL

VOLATILE CHLORIDE _____ VOLATILE FLUORIDE _____ VOLATILE BROMIDE _____

VOLATILE SULFUR _____ OTHER _____

IV. ADSORBATE CHARACTERIZATION (attach lab results)

A. SOURCE

GC-MS ANALYSIS BY ☐ CALGON LABS ☐ CUSTOMER ☐ NOT AVAILABLE

ANALYSIS PERFORMED ON ☐ INFLUENT ☐ SPENT CARBON

ESTIMATED % LOADING _____ BY AD DIFFERENCE ☐ OR LAB EXTRAPOLATION ☐

B. LOADING AND TOXICITY PROFILE

ADSORBATE	CONCENTRATION IN INFLUENT	ESTIMATED CONC. ON CARBON	TOXICITY*		
			TWA	ORAL LD_{50} (rat)	CI

*TOXICITY INFORMATION OBTAINED FROM ☐ SAX HANDBOOK ☐ CUSTOMER (ATTACHED) ☐ OTHER _____

C. SAFETY/REGULATORY POTENTIAL

1. POTENTIALLY HAZARDOUS ADSORBATES

2. REGULATED OSHA ADSORBATES

3. RCRA LETTER FROM CUSTOMER ATTACHED YES ☐ NO ☐

STATUS

4. PCB LETTER FROM CUSTOMER ATTACHED YES ☐ NO ☐

STATUS

V. PROCESS INFORMATION

A. SYSTEM TYPE

☐ CUSTOMER DESIGN ☐ CALGON DESIGN, IF MODULE ADSORBER-TYPE

DESCRIBE SYSTEM (INCLUDE PRE- AND POST-TREATMENT IF ANY)

B. TREATMENT CRITERIA

POUNDS AND TYPE OF CARBON USED TO TREAT INFLUENT

ESTIMATED GALLONS OR SCF OF INFLUENT TREATED AT BREAKTHROUGH

TREATMENT OBJECTIVE

DESCRIBE NECESSARY TREATMENT TO CARBON PRIOR TO SHIPMENT TO REACTIVATION SITE

C. COMMENTS

EXHIBIT 4

1214 3/82

CALGC.. ANALYTICAL LABORATORY
CARBON RE ACTIVATION REQUEST

CUSTOMER	
LOCATION	
ENGINEER	
SALESPERSON	
PJC # / TSR #	
ENGINEERING CODE	

COPY LIST

SPENT CARBON TYPE _____

APPLICATION ☐ Potable Water ☐ Process ☐ Water ☐ V

ADSORBATE _____

OBJECTIVE _____

ACCEPTANCE TESTING ☐ (includes necessary tests)

WATER WASH SPENT CARBON WITH _____ NUMBER OF BED VOLUMES PRIOR TO REACT

AND MONITOR FOR _____ SAVE WASH WATER ☐

OTHER TREATMENT _____

PROCESS REACTIVATIONS

☐ THERMAL ☐ STEAM AT _____ °F ☐ CHEMICAL USING _____

REACT TO, O. AD

TESTS FOR ACCEPTANCE			PROCESS REACTIVATIONS		
SAMPLE IDENT					
INTERNAL LOG					
AD g/cc Air / Oven			Please Check (✓)	BEFORE REACT	AFTER REA (✓)
Coupon Corrosion %			AD g/cc Air / Oven		
Contact pH			% Ash		
Flammability, °F			Iodine Number		
Spent % Ash			Molasses Number		
Ash Fusion Temp, °F			CCL,		
Dean-Stark Moisture			Butane No., c/gg		
% Volatile Sulfur			Butane Ret., cc/g		
Estimated % Halide			Butane W/C., g/cc		
Fluoride			React Time		
Chloride					
Bromide					
React AD					
Iodine Number					
CCL,					
% Ash					
React Time					
% wt. Loss (oven dried)					

NATURE OF SPENT CARBON

OBSERVATION DURING REACTIVATION

DATE RECEIVED

APPROVED BY

DATE

1 REACT LAB

LABORATORY CALCULATIONS – R) TIVATION DATA

TEST	TEST	TEST
DATE / / BY	DATE / / BY	DATE / / BY
TEST	TEST	TEST
DATE / / BY	DATE / / BY	DATE / / BY
TEST	TEST	TEST
DATE / / BY	DATE / / BY	DATE / / BY
TEST	TEST	TEST
DATE / / BY	DATE / / BY	DATE / / BY

Spent AD _____
Volume to React _____
Spent wt. _____

Target AD _____
at _____ cc (v
Target wt. _____

Spent
– Targ
= Amt.
10%
+ to lo
= Tota
to lo

Spent wt
Total amt to lose

FINAL REACT WT

WEIGHT LOSS DATA
WT VS TIM

APPENDIX G

VERMONT DEPARTMENT OF HEALTH
OPERATING PERMIT

THE OPERATING PERMIT WILL BE INSERTED INTO THIS APPENDIX WHEN IT IS RECEIVED FROM THE VERMONT DEPARTMENT OF HEALTH.

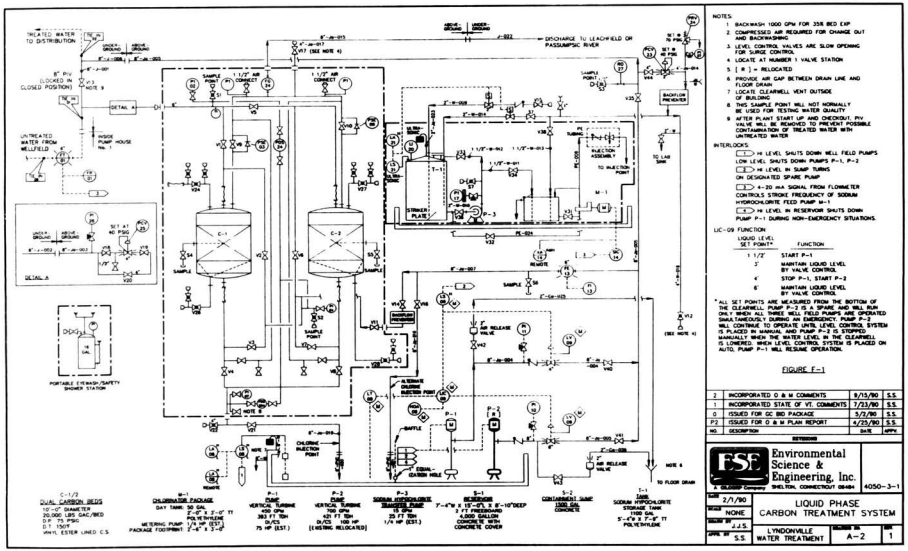

FIGURE F-1

NO	DESCRIPTION	DATE	APPR.
2	INCORPORATED O & M COMMENTS	9/13/90	S.S.
1	INCORPORATED STATE OF VT. COMMENTS	7/23/90	S.S.
0	ISSUED FOR GC BID PACKAGE	3/2/90	S.S.
P2	ISSUED FOR O & M PLAN REPORT	4/25/90	S.S.

RETROFIT

Environmental Science & Engineering, Inc.
A GILBERT Company
SHELTON, CONNECTICUT 06484

4050-3-1

DATE	2/1/90
SCALE	NONE
DRAWN BY	J.J.S.
APPR. BY	S.S.

LIQUID PHASE CARBON TREATMENT SYSTEM

LYNDONVILLE WATER TREATMENT

DRAWING NO. A-2

REV. 1