



Department of Energy
Office of Legacy Management

7116

September 29, 2008

Mr. Timothy Fischer
U.S. Environmental Protection Agency
Region V-SRF-6J
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Fischer and Mr. Schneider:

**Subject: Transmittal of the Response to Comments on the Fernald Preserve Visitors Center
Operation and Maintenance Plan Wastewater Bio-Treatment Wetland**

This letter transmits from the U.S. Department of Energy the response to comments on the Fernald Preserve Visitors Center Operation and Maintenance Plan for the Wastewater Bio-Treatment Wetland. The revised document is attached as well.

If you have any questions or require additional information, please call me at (513) 648-3148.

Sincerely,

Jane Powell
Fernald Preserve Manager
DOE-LM-20.1

Enclosure

Mr. Timothy Fischer
Mr. Thomas Schneider
Page 2

cc w/enclosure:

M. Cullerton, Tetra Tech.
S. Helmer, ODH
M. Murphy, USEPA-V, A-18J
T. Pauling, DOE (electronic)
T. Schneider, OEPA (three copies of enclosure)
M. Shupe, HSI GeoTrans
Project Record File (thru W. Sumner)
Administrative Records (thru W. Sumner)

cc w/o enclosure:

J. Homer, Stoller
F. Johnston, Stoller
M. Sizemore, Stoller

**Response to Comments
on the
Bio-Treatment Wetland Operation and Maintenance Plan**

1. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Health and Safety Pg #: 1 Line #: na Code: C
Comment: *Prevent children and domestic animals from playing in the area to avoid contact with potentially infectious microorganisms.* As there will not be personnel present at the treatment wetland at all times, how will the public be kept out?

Response: Two additional "Danger – Unsafe Water" signs have been installed in front of the SSF wetland basin. Therefore, sufficient signage is in place to warn of the unsafe conditions present. In addition, site visitors are instructed to stay on trails at all times. From a maintenance and aesthetics perspective, no additional restrictions (i.e., fencing) are needed.

Action: None required.

2. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Septic Tanks Pg #: 6 Line #: B-1 Code: C
Comment: No signage currently exists to inform people not to dispose of personal hygiene products into the septic system. Ohio EPA recommends installation of such signage in the visitor center restrooms.

Response: Agree. The requested signage has been installed.

Action: None required.

3. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Subsurface Flow Wetland Pg #: 8 Line #: A-3 Code: C
Comment: *The water level in the SSF wetland should be at or slightly above the top of the mulch layer until the plants have about 1-2 feet of new growth.* During a site visit on August 11, 2008, it was observed that the water level was below the mulch layer (mulch layer appeared mostly dry), although the plants clearly do not have 1-2 feet of new growth yet. Also, yellowing of the plants was observed which corresponds to stressed vegetation.

Response: The acceptable range for SSF wetland water levels is within the three-inch mulch layer and not above it. Water levels in the SSF wetland are checked at least weekly and water added as needed. In the initial weeks of operation, some fluctuation in SSF wetland water levels has occurred as operations personnel have become familiar with the amount of transpiration that is taking place on a day-to-day basis. In general, vegetation has responded well and is becoming sufficiently established across the SSF wetland.

Action: Revise the O&M Plan and associated operating procedures to make clear that optimal water levels are within the three-inch mulch layer and not above it.

4. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Subsurface Flow Wetland Pg #: 8 Line #: A-6 Code: C
Comment: As mentioned in Comment #3, stressed vegetation was observed in the SSF on August 11, 2008. It is likely, though, that the stressed vegetation is a result of a lower water level and not due to high levels of effluent, as the Visitors Center is not open yet.

Response: See Response to Comment No. 3.

Action: See Action to Comment No. 3.

5. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Subsurface Flow Wetland Pg #: 14 Line #: H-3 Code: C
Comment: This section states that the perimeter of the planted basin will be lined with welded wire fencing, and then strung with monofilament fishing line. On August 11, 2008, the monofilament fishing line was observed, but no welded wire fencing had been installed.

Response: Both monofilament fishing line and welded wire fencing have been used in the past as goose deterrents. From a maintenance and aesthetics perspective, it was determined to use monofilament fishing line instead of welded wire fencing.

Action: Revise the O&M Plan to state that monofilament fishing line is used instead of welded wire fencing.

6. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Pumps Pg #: 16 Line #: A-3 Code: C
Comment: Please list the pump electrical service breaker numbers that have been omitted.

Response: Agree. The breaker numbers were not available at the time of the original O&M Plan submittal.

Action: Revise O&M Plan to state that the electrical service breaker numbers are Breakers 2 & 4 in Panel LPA.

OPERATIONS AND MAINTENANCE PLAN

FERNALD PRESERVE VISITOR CENTER WASTEWATER BIO-TREATMENT WETLAND

Prepared for

Stoller

Stoller
10995 Hamilton-Cleves Highway
Harrison, OH 45030

and



Department of Energy

August 1, 2008
Revised September 24, 2008

URS

1375 Euclid Avenue, Suite 600
Cleveland, Ohio 44115-1808
216-622-2400

Project No. 41785943.10000

Operation and Maintenance Manual

Bio-Treatment Wetland

Fernald Preserve Visitors Center

Purpose

The following Operations and Maintenance (O&M) plan has been developed to provide for the proper care of the Fernald Preserve Visitor Center Wastewater Bio-Treatment Wetland. The O&M plan provides operational and maintenance guidelines for the staff in charge of supervising wastewater treatment activities at the facility. The plan sets forth how the septic tanks, pumps, and wetlands will be safely cared for with continued use and various contingencies.

Day to day maintenance activities include flow and water level adjustments and water quality monitoring. Other less frequent operation and maintenance activities include maintenance and repair of mechanical equipment and other structures, berm repair, vegetation management, pest and wildlife management, and removal of accumulated solids.

A. *Training*

Training should be provided for all personnel designated to operate and maintain wastewater treatment operations at the site. This will include training on the operation of the equipment and should include the following:

1. A start-up walkthrough of the treatment system, from pretreatment to final discharge.
2. Operation of equipment in accordance with the manufacturer's operation manual.
3. Responsibilities and duties.

Health and Safety

Visitors and other non-authorized personnel should be prevented from contact with the wetland treatment system, including auxiliary components to eliminate exposure to potential pathogens. Prevent children and domestic animals from playing in the area to avoid contact with potentially infectious microorganisms. Be sure that the lids on each structure are tight fitting and securely locked.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Limitations

This O&M manual has been prepared to provide general guidance and should be supplemented by other resources as needed to ensure the safe and effective operation of the Fernald Preserve Visitor Center wastewater treatment bio-wetland.

Monitoring

Suggested monitoring and frequency of the bio-wetland treatment system is provided in the table below. The frequency of monitoring can be adjusted based on site conditions and system usage. A maintenance checklist is attached at the end of this manual for use during inspections.

Suggested Monitoring and Frequency		
Monitoring Requirement	Frequency of Monitoring	Location of Monitoring
Water Depth	Weekly	Each Cell
Flow Rate	Weekly	Flow Meter (Water Usage)
Water Quality, CBOD	Weekly	Inlet of recirculation manhole
Vegetation coverage/distribution	Monthly (during season)	Each Cell
Wildlife	Monthly (during season)	Each Cell
Berm and Liner	Weekly	All Berms
Inlet/Outlet Condition	Weekly	All inlet/outlet structures
Access Way Condition	Weekly	All access points
Mulch Layer	Monthly (during season)	Each Cell (SSF Wetland)
Septic Tanks	Monthly	Inlets/Outlets, Baffles, Filter
Conveyance System	Monthly	All Valves, Gates, Structures

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Conveyance System

A. *Conveyance System Wastewater Flows*

1. In order to allow maintenance activities, wastewater flow through the system can be isolated at each structure involved in conveyance through the use of pumps, valves and in-line water control structures. The locations of these structures and the corresponding isolation mechanisms are provided on the attached Figure 1.
2. The following table provides the isolation mechanism for each component of the wastewater conveyance system:

Conveyance Structure	Isolation Mechanisms (Location)	Normal Operation	Maintenance Operation
Septic Tanks	Restrict use of building facilities	No restrictions on normal use	Perform work when facility closed or at minimum occupancy
Septic Tank Effluent Filter	Restrict use of building facilities	No restrictions on normal use	Perform work when facility closed or at minimum occupancy
Flow Equalization Manhole	WW-Pump 1/WW-Pump 2/WW-Valve 7	WW-Valve 7 Open, WW-Pump 1/WW-Pump 2 Operational	WW-Valve 7 Closed, WW-Pump 1/WW-Pump 2 Non-Operational
Flow Distribution Manhole	WW-Gate 1/WW-Gate 2/WW-Valve 1	WW-Valve 1 Open, WW-Gate 1/WW-Gate 2 Open (Equal Flow Distribution)	WW-Valve 1 Closed, WW-Gate 1/WW-Gate 2 Closed
Subsurface Flow Wetland	WW-Gate 1/WW-Gate 2 (<i>Flow Distribution Manhole</i>) WW-Pump 1/WW-Pump 2 (<i>Flow Distribution Manhole</i>) WW-Pump 3 (<i>Recirculation Manhole</i>)	WW-Gate 1/WW-Gate 2 Open (Equal Flow Distribution) WW-Pump 1/WW-Pump 2 Operational WW-Pump 3 Operational	WW-Gate 1 Closed (Cell 1) or WW-Gate 2 Closed (Cell 2) WW-Pump 1/WW-Pump 2 Non-Operational (No Flow to Either Cell) WW-Pump 3 Non-Operational

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Conveyance Structure	Isolation Mechanisms (Location)	Normal Operation	Maintenance Operation
Recirculation Manhole	WW-Valve 2/WW-Valve 3	WW-Valve 2/WW-Valve 3 Open	WW-Valve 2/WW-Valve 3 Closed
In-Line Water Level Control Structure/	WW-Pump 3 WW-Valve 2/WW-Valve 3 (<i>SSF Wetland Effluent Lines</i>)	WW-Pump 3 Operational/WW-Valve 2/WW-Valve 3 Open	WW-Valve 2/WW-Valve 3 Closed /WW-Pump 3 Non-Operational
Surface Flow Wetland	WW-Valve 4/WW-Valve 5 (<i>SF Wetland Influent Line</i>)/WW-Valve 6 /WW-WLC 2 (<i>SF Wetland Effluent Line</i>)	WW-Valve 4 Open/ WW-Valve 5 Closed WW-Valve 6 Open/ WW-WLC 2 at Design Elevation(<i>SF Wetland Effluent Line</i>)	WW-Valve 4 Closed/ WW-Valve 5 Closed WW-Valve 6 Open/ WW-WLC 2 at Lowest Elevation to Drain SSF Wetland
Water Level Control Structure (WLC 2)	WW-Valve 6 (<i>SF Wetland Effluent Line</i>)	WW-Valve 6 Open	WW-Valve 6 Closed

3. The above isolation mechanisms can be used in different combinations to direct or restrict flow as needed for both normal operation and maintenance activities. For example, to drain the SF wetland, WW-Valve 5 and WW-Valve 6 must be closed, WW-Valve 7 open, and the SF wetland water level control structure plates raised. Depending on the flow through the system, it may be desirable to restrict input from the building in order to do this to avoid an overflow condition at the water level control manhole.
4. For normal operation, the outlets from the flow distribution manhole will be open and the slide gates will be stored in the maintenance shed. Slide gates will be used to restrict flow to the individual SSF wetland cells as needed for maintenance purposes. WW-Valve 1 can also be used to isolate flow to both of the SSF wetland cells.
5. To perform maintenance on the pumps, the pumps should be switched off, and the power locked out. (See section pertaining to pump operation and maintenance for lock-out/tag-out information).

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

B. General Maintenance Procedures

1. All structures involved in conveyance of water through this treatment system will be inspected monthly for clogging (i.e. water should be free flowing without signs of obstruction) during system start-up and semi-annually thereafter. Any materials causing clogging will be removed immediately. Any necessary repairs will be completed. If evidence of clogging within a sewer line is discovered, the sewer will be serviced and cleaned immediately.

2. Check all conveyance system structures monthly for leaks from joints; water dripping or pools formed where no water should be. Repair as soon as practical to stop any leaks. If necessary, isolate the system components as needed in order to safely complete repairs. Resume normal operations as soon as repairs are complete.

C. Operation

1. All equipment used in the care of the wastewater treatment facility will be operated in strict conformance with manufacturer's operating manuals, best management practices, safety requirements, and the requirements of this plan.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Septic Tanks

A. Start Up

1. The septic tanks will be filled with clean water to ensure that they do not inadvertently float. For two weeks, no wastewater will be allowed to enter the system. After the two-week clean water period, wastewater will be allowed to enter the system. If signs of stressed vegetation in the wetlands appear, the volume of septic tank effluent will be reduced [by trucking a portion of the wastewater to a Publicly Owned Treatment Works (POTW)] and diluting with clean water until the system can acclimate.

B. Undesirable Materials

1. Materials that degrade slowly or do not settle well should not be put into the septic tank. Coffee grounds, cooking fats, bones and other ground garbage, cigarette butts, personal hygiene products, etc. will not be disposed in the septic system.

C. Inspection

1. The following should be inspected or monitored monthly:
 - a. Sludge and scum accumulation (Open tank risers and visually inspect for accumulation).
 - b. Septic tank effluent filter (Open tank riser at outlet of second septic tank).
 - c. Inlet and outlet baffles (Open tank risers and visually inspect baffles).

D. Cleaning

1. The tanks will be cleaned annually by pumping with a vacuum truck. A licensed septic service contractor will perform this work. All solids will be removed, but the tank should not be washed or disinfected. The inlets, outlets, and manholes should be inspected at this time. If repairs are required, they should be made immediately. The septic tank effluent filter should be cleaned or replaced at this time.
2. Emptying of the tanks for cleaning should be performed during dry weather conditions. Immediately after tanks are cleaned, they should be filled with clean water.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

3. No one should ever enter a tank without a continuous supply of fresh air. Anyone entering the tank should be OSHA trained in confined space entry.
4. The septic tank effluent filter should be replaced more than one time per year to prevent solids loading and maintenance problems at the influent end of the wetland.

E. Additives

1. Septic tank additives have not been shown to be beneficial to the functioning of the septic tank and should not be used.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

Subsurface Flow Wetland

A. Start-Up and Replanting

1. Prior to planting, add clean water¹ to the system to maintain the water level and promote plant growth. Maintain water level during the establishment period to allow establishment of emergent vegetation.
2. To control the water level, adjust the stacking plates on the In-Line Water Level Control Structure (Figure 1, WLC-1).
3. The water level in the Subsurface Flow (SSF) wetland should be kept within the 3-in. mulch layer until the plants have about 1-2 feet of new growth. Do not submerge the leaves of the plants. When the vegetation has been properly established, the water level can be lowered, to the final design level, which corresponds to the top of the gravel layer.
4. Do not mow the wetland.
5. Check the water levels against the water level indicator at least once per week. If necessary, adjust the stacking plates or add clean water. See the section on water level controls for more information on monitoring and controlling the water level in the wetland.
6. If signs of stressed vegetation appear, such as yellowing leaves or more than 30% dieback, the concentration of septic tank effluent can be reduced by trucking a portion of the wastewater to a Publicly Owned Treatment Works (POTW) and adding clean water to dilute the septic tank effluent, which will allow the plants to acclimate. Trucking of wastewater will be completed on an as-needed basis until the SSF wetland is accepting 100% of the wastewater from the septic tanks.

¹ Pond water can be used in place of potable water to irrigate the wetlands, if desired.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

7. Upon startup of the system, the discharge valves from the recirculation manhole (WW-Valve-4 and WW-Valve-5) will be locked shut. During the first growing season, water entering the recirculation manhole from the SSF wetland will be tested weekly for Carbonaceous BOD (CBOD). If the effluent exceeds 15 mg/l CBOD, the water will not be permitted to discharge to the surface flow wetland. When testing demonstrates that a concentration of 15mg/l or less is achieved, the lock on the recirculation manhole will be removed and the valve will be opened to allow the wastewater to discharge to the SF wetland. Further manipulation of the SSF wetland effluent may be needed in order to ensure the vegetation gets established in the SF wetland.

B. Water Level

1. The water level in the SSF wetland may be adjusted for multiple purposes, including increasing the water depth so that water is in contact with the rootstock during establishment, to fluctuate the water depth to promote greater root penetration into the bed gravel substrate, and to increase the available hydraulic gradient.
2. The water level should not be lowered by more than 0.75 inches per week to avoid drought stress.
3. Normal Operation - Maintain water level in the SSF wetland at the design elevation at the top of the gravel substrate surface at the inlet end. Adjust the water level using the in-line water level control structure by adjustment of the stacking plate system. Water Level Indicators are provided in each treatment wetland cell for water level determination.
4. Maintain water level in bed by utilization of the recirculation pump or adding clean water. Without flow, water in the bed will evaporate in the summer months and freeze during severe cold months. Both extremes will damage roots and tubers over a prolonged period. Recirculation of the wetland effluent should occur continuously.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

5. Recirculation Pump - Adjust pumping rate, float valves and water level on the recirculation pump so that recirculation pumping does not result in wastewater surging above the mulch layer. Consult the manufacturer's operations manual for the pump for specific operation and maintenance procedures.

6. Surface Ponding – Complete the following items as required to eliminate surface ponding:
 - a. Lower the level of the outlet control structure. If no noticeable change takes place at the influent end, the bed is likely clogged.

 - b. Ensure the outlet septic tank baffle is in place. Ensure that excess solids have not accumulated in the septic tanks.

 - c. Check surge capacity of tank baffles to ensure scum is not escaping from the tank. Install or replace as needed.

 - d. Determine if solids are accumulating in inlet distribution system. If solids have accumulated, flush with fresh water.

 - e. Determine if solids are accumulating in the effluent discharge system. If solids have accumulated, flush with fresh water.

 - f. Identify and implement actions to prevent the problem from reoccurring, such as pumping the solids from the septic tank more frequently, installation/replacement of a septic effluent filter, or installation of an additional septic tank in series, and elimination of any chemicals (chlorine bleach, drain cleaners, etc) that have the potential to upset the septic tank.

 - g. If cleaning the inlet distributor reveals little or no solids build up in the pipe, reduce the flow through the cell by reducing the gallons per minute pumped by the recirculation pump.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

- h. Water levels may temporarily increase due to flow surges. Do not make major corrections unless water levels remain above the mulch layer for more than a couple days.
- i. Should the bed in the SSF wetland prove to be clogged, the gravel substrate may need to be removed, cleaned and replaced and the vegetation replanted. In extreme cases, replacement with coarser gravel substrate may be helpful.

C. Inlet Structure

- 1. Check inlet structure to ensure it is not totally or partially blocked by solids, algae, or other items. Flush solids out with fresh water. Remove any articles that may block the inlet structure.
- 2. If inlet structure tends to freeze during the winter months, cover with an additional protective layer of mulch.

D. Outlet Structure

- 1. Check the outlet structure to ensure that it is not totally or partially blocked by solids, algae, or other items. Flush solids out if needed. Remove any articles that may block the effluent.
- 2. If outlet tends to freeze during the winter months, cover with a protective layer of mulch or straw bales.

E. Liner

- 1. Check to ensure that the geomembrane liner is covered by either the gravel of the treatment wetland bed, or soil cover.
- 2. Periodically check the liner for leaks around inlet structures. If necessary, drain cell, remove gravel in suspected leak area, and patch liner following manufacturer's directions.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

F. Vegetation Management

1. Check the vegetation for signs of disease or other stress (yellowing or browning, withering, spots, etc.). Some of these symptoms may occur naturally as the plants mature, especially after seeds have matured. If the water level in the treatment wetland cell is satisfactory, obtain guidance from a local nursery or agricultural center.
2. Do not remove mature wetland vegetation in the fall after plants have browned. This vegetation forms an insulating blanket for the wetland during the winter months. Do not mow the wetland.
3. A mulch layer of approximately 3-inch thickness (including decaying plant litter) should be maintained to protect the SSF wetland over the winter months, when the temperature is frequently below freezing. Additional well composted weed-free mulch may be added if needed. This insulation must be checked for degradation and maintained on an annual basis. Effluent quality should also be checked as an indicator of insulation layer degradation.
4. If insects are causing significant damage to the plants, obtain guidance from a local nursery or agricultural center. Avoid the use of chemical pesticides whenever possible.
5. If vegetation does not seem healthy and water levels are correctly maintained, consult with a local nursery to determine possible causes and courses of action.
6. Replace dead plants as necessary to fill voids. The extent of vegetative cover in the SSF wetland following one growing season will be evaluated. Additional plugging and planting of root stock may be conducted in the spring of 2009. Proposed species are provided in the following table.

Common Name	Plant Species
Blue Flag Iris	<i>Iris versicolor</i>
Green Bulrush	<i>Scirpus atrovirens</i>
Duck Potato	<i>Saaitaria latifolia</i>
River Bulrush	<i>Scirpus fluviatilis</i>
Prairie Cordgrass	<i>Spartina pectinata</i>

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

7. Use at least three different species of rootstock when planting SSF wetland. At least 60% of rootstock should be *Scirpus atrovirens* (Green Bulrush). Plants should be spaced 2-feet by 2-feet (4 square feet per plant) maximum. Rootstock in the form of tubers should be at least 5/8-inch in diameter. Rootstock in the form of rhizomes should be at least 2 inches long. Duck Potato rootstock will be in the form of tubers at least 5/8-inch in diameter. Blue Flag Iris rootstock in the form of rhizomes should be at least 2 inches long. Green Bulrush, River Bulrush, and Prairie Cordgrass should be in the form of root wads. Bodies and shoots associated with rootstock should be rigid to the touch. Bodies and shoots that are soft, mushy and appear rotten or decomposed should not be utilized. Established root stock should contain roots that are rigid to the touch. Tubers and rhizomes should be white in appearance. To plant stock, hand-dig through the mulch layer and SSF wetland gravel substrate. Stock should be planted directly into gravel substrate.
8. Pull up volunteer weeds, trees, and shrubs from the wetland. These species will shade and crowd the desirable wetland species. Use spot application of appropriate herbicide if necessary. Consult with a local nursery to determine appropriate chemical use, considering water quality objective of the treatment system.
9. Prevent excessive shading of the wetland vegetation by controlling the growth of trees or high shrubs near the treatment wetland cells. Most wetland species need a minimum of six hours of sunlight per day.
10. Deep Root Growth (to be completed in the fall whenever new plantings have occurred):
 - a. Encourage deep root growth by lowering the water level over several weeks during a dormant period. Drop water levels gradually in order to encourage plant growth.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

- b. After frost has killed the top of the plants, drop the water level below the surface 1/3 of the gravel depth (6 inches for 18-inch bed) for one week. Raise the level back to 1 inch below the surface for one week. Drop the level 2/3 of the gravel depth (12 inches for an 18-inch bed) for one week. Again, raise the level to one inch below the surface for one week. Drop the level to 1 inch above cell bottom (17 inches for 18-inch bed) for one week. Raise the level to 1 inch below the surface of the gravel for one week. Repeat this cycle one time.

G. Odor Control

1. Standing water on the gravel substrate surface is often the cause of objectionable odor. Level any low or high spots on the gravel substrate surface which create small standing pools by raking and/or filling with additional gravel substrate. If a too high water level is causing standing water over most of the treatment wetland cell, lower the water level in the system using the water level control device so that it is one inch below the gravel substrate surface. Refer to the section on water levels for additional operation and maintenance information for regulating water levels in the treatment wetland cells.
2. Odors will also occur from water standing or flowing within the conveyance structures (manholes, flow splitters, water level control box). Ensure that these structures are tightly covered to prevent odors from escaping.

H. Animal Management

1. Inspection for nuisance animals should be conducted on a monthly basis.
2. If needed, assistance with animal management is available from the Ohio Department of Natural Resources.
3. For Canada goose control, line the perimeter of the planted basin with welded wire fencing or monofilament fishing line, then string monofilament fishing line in a criss-cross pattern over the water/planted areas and tie ribbons to it. This acts as a deterrent to geese flying into the area.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

I. Miscellaneous

1. Leaky or Faulty Plumbing Fixtures –Leaky or faulty plumbing should be repaired as soon as it is noticed. Leaky or stuck commode flaps can reduce treatment effectiveness due to the large amount of water that can be introduced to the system in a short period of time.
2. Chemicals – Do not introduce strong chemicals (floor cleaners, drain cleaners, bleach, etc.) into the sanitary system. Chemicals can cause upset to the septic tanks causing excessive solids to wash out and possibly plug the gravel substrate. Also, chemicals can damage and kill the vegetation.
3. Herbicides/Pesticides – Do not apply herbicides and pesticides that can damage vegetation either on or near the system.
4. Mulch Layer– Maintain a minimum 3-inch mulch/leaf litter cover on top of the gravel substrate, either with plant litter from the wetland vegetation, well degraded pine straw or bark, or other suitable material.
5. Animals – Prevent animals from digging in the wetland, destroying vegetation, and making holes in the gravel substrate or mulch.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Pumps

A. *Maintenance*

1. Maintain the flow equalization force main and recirculation pump according to the manufacturer's specifications.
2. Check periodically to ensure that the alarm and float valves of the pumping system are working properly, according to manufacturer's specifications.
3. Prior to completing any maintenance activities on the pump, power to the pumps must be disconnected using lock-out/tag-out procedures. The breakers for the pumps are located in the visitor center panel. The pump electrical service breaker numbers that must be locked-out are breakers 2 and 4 in panel LPA.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

Surface Flow Wetland

B. Start-Up

1. Immediately before seeding, the soil should be fully or partially saturated; and should not be allowed to dry after planting. Seed should be distributed evenly over footprint of surface flow wetland. Seeding should be completed by broadcasting using rotary seeders, or by hand, and then lightly raking into the soil. Seed mix and rate will be provided by owner. Soil should be kept moist while plants are germinating.
2. Gradually increase water depth (less than 0.75 in/day) as emergent plants become established. Do not submerge the leaves of the vegetation.
3. Do not mow the wetland.

C. Water Level

1. Normal Operation – Maintain water at design level.
2. Supplemental Water – Check water level in SF wetland weekly. If necessary, provide supplemental water to ensure saturated conditions.

D. Inlet Piping

1. Inspect the inlet pipe to ensure that water is moving freely through the pipe into the SF wetland. Use fresh water to flush if necessary.

E. Vegetation

1. Check the vegetation for signs of disease or other stress (yellowing or browning, withering, spots, etc.). Some of these symptoms may occur naturally as the plants mature, especially after seeds have matured. If vegetation does not seem healthy and water levels are correctly maintained, consult with a local nursery to determine possible causes and courses of action.
2. If insects are causing significant damage to the plants, obtain guidance from a local nursery or agricultural center. Avoid the use of chemical pesticides whenever possible.

Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center

3. Replanting of the SF wetland may be desirable if large algal blooms appear on the water surface. In this case, the water should be lowered to expose the root media and to allow the algae mats to decay prior to replanting.
4. Invasive plant species may appear in the wetland if there is excess plant detritus on the surface of the wetland. These species should be removed by hand weeding and spot application of appropriate herbicides.
5. Controlled burning can also be used as an invasive species management tool. The burning should be limited to every 5 years in late fall or early winter, and the burn area should be isolated with fire breaks such as: areas of no vegetation, gravel, or water filled ditches and not be used for a month after burning; with influent directed to other areas during this time. Notification and coordination with the local fire department will likely be required.
6. Do not remove mature wetland vegetation in the fall after plants have browned. This vegetation forms an insulating blanket for the wetland during the winter months. Do not mow the wetland.
7. Black willow cuttings will be planted around the SF wetland. Inspection of black willow saplings and trees will continue on a monthly basis with replanting as necessary. Black willow saplings can be protected from the threat posed by beavers by using a heavy wire mesh and heavy gauge hardware cloth of tar paper wrapped to 3ft high.

F. Animal Management

1. Inspection for nuisance animals should be conducted on a monthly basis.
2. Assistance with animal management is available from the Ohio Department of Natural Resources.
3. For Canada goose control, line the perimeter of the planted basin with welded wire fencing, then string monofilament fishing line in a criss-cross pattern over the water/planted areas and tie ribbons to it. This acts as a deterrent to geese flying into the area.

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Berms/Ditches

A. Maintenance

1. Repair any earthen berm erosion as soon as it is noted.
2. Repair leaks around the berms as soon as they are noted by plugging or sealing, etc.

B. Vegetation Management

1. Trim/remove vegetation as required to ensure access to the wetland, integrity of the berm, and aesthetics of the area.
2. Seeded ditches and berms should be inspected between 6 to 12 months after seeding to ensure at least 70% coverage of the area. If any area is not at least 70% covered with established vegetation, that area should be reseeded, and checked again within 6 to 12 months.
3. Inspection of the ditches and berms is necessary on a monthly basis during the growing season after the period of initial planting. Normally eroded or other damaged areas should be reseeded as discussed above, and in accordance with ODOT item 659.23 using the seed mix provided below.
4. Berms should be seeded with a tallgrass prairie seed mix emphasizing natural species. Prairie seed mix should be applied at a rate of 1.0 pound per 1,000 square feet using a seed drill, such as a Truax drill, or equivalent. After planting berms with native grass, plant area with a cover crop of oats or barley at a rate of 3.0 pounds per 1,000 square feet.
5. Suggested species are provided on the following table:

Common Name	Plant Species
Prairie Cordgrass	<i>Spartina pectinata</i>
Big Bluestem	<i>Andropogon gerardii</i>
Blue Joint Grass	<i>Calamagrostis canadensis</i>
Switch Grass	<i>Panicum virgatum</i>
Woolgrass	<i>Scirpus cyperinus</i>

**Operation and Maintenance Manual
Bio-Treatment Wetland
Fernald Preserve Visitors Center**

Emergency Spillway/SF Wetland Effluent Monitoring

1. The emergency spillway/SF wetland effluent monitoring will be covered under the general site NPDES permit for the Fernald Preserve Visitor's Center. The modification to the permit will include monitoring limits for the spillway and schedule of testing, and will be included in this plan at a later date.

FORMS

Wetland Maintenance Checklist

Date: _____ Initials: _____

Note: If corrective action is required, consult the O&M manual for guidance.

Yes No Septic Tanks

<input type="checkbox"/>	<input type="checkbox"/>	1. Evidence of clogging, i.e. sludge and scum?
<input type="checkbox"/>	<input type="checkbox"/>	2. Signs of leakage, improper operation?
<input type="checkbox"/>	<input type="checkbox"/>	3. Baffles in place, and surge capacity adequate?
<input type="checkbox"/>	<input type="checkbox"/>	4. Clogged Filter?

Comments:

Yes No Flow Equalization Manhole

<input type="checkbox"/>	<input type="checkbox"/>	1. Signs of Leakage, improper operation?
<input type="checkbox"/>	<input type="checkbox"/>	2. Normal Operation Setup, i.e. Valve 1 open?
<input type="checkbox"/>	<input type="checkbox"/>	3. Inlet/Outlet clogging?

Comments:

Yes No Flow Distribution Manhole

<input type="checkbox"/>	<input type="checkbox"/>	1. Signs of Leakage?
<input type="checkbox"/>	<input type="checkbox"/>	2. Normal operation setup, i.e. Valve 2 open, Pump 1 and Pump2 Operational?
<input type="checkbox"/>	<input type="checkbox"/>	3. Inlet/Outlet clogging?

Comments:

Yes No Sub Surface Flow Wetland

<input type="checkbox"/>	<input type="checkbox"/>	1. Ponding water evident?
<input type="checkbox"/>	<input type="checkbox"/>	2. Signs of brown or yellowing vegetation?
<input type="checkbox"/>	<input type="checkbox"/>	3. Inlet structure free of solids?
<input type="checkbox"/>	<input type="checkbox"/>	4. Liner exposed?
<input type="checkbox"/>	<input type="checkbox"/>	5. Areas where vegetation needs replanting?
<input type="checkbox"/>	<input type="checkbox"/>	6. Invasive species present?
<input type="checkbox"/>	<input type="checkbox"/>	7. Water at design level?
<input type="checkbox"/>	<input type="checkbox"/>	8. Mulch layer maintained?
<input type="checkbox"/>	<input type="checkbox"/>	9. Signs of animal interference?
<input type="checkbox"/>	<input type="checkbox"/>	10. Normal Operation setup, ie. Gate 1&2 open, Pump 1,2, &3 operational?

Comments:

Wetland Maintenance Checklist

Date: _____ Initials: _____

Note: If corrective action is required, consult the O&M manual for guidance.

Yes No In-Line Water Control Structure 1

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Signs of Leakage, improper operation? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Normal operation setup, i.e. Valves 3&4 open? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Inlet/Outlet clogging? |

Comments:

Yes No Pumps

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Flow equalization force main maintained according to manufacuter's instructions? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Recirculation pump maintained according to manufacuter's instructions? |

Comments:

Yes No Recirculation Manhole

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Signs of Leakage, improper operation? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Normal operation setup, i.e. Valves 3&4 open? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Inlet/Outlet clogging? |

Comments:

Yes No Surface Flow Wetland

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Water level at design level? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Vegetation showing signs of disease? |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Voids in vegetation that require replanting? |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Inlet pipe clear of clogging? |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Algal blooms on water surface? |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Invasive species present? |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Signs of animal interference? |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. Normal operation setup, i.e. Valve 5 open, Valve 6 closed? |

Comments:

Wetland Maintenance Checklist

Date: _____ Initials: _____

Note: If corrective action is required, consult the O&M manual for guidance.

Yes No Berms/Ditches

<input type="checkbox"/>	<input type="checkbox"/>	1. Mowing necessary?
<input type="checkbox"/>	<input type="checkbox"/>	2. Evidence of burrowing animals?
<input type="checkbox"/>	<input type="checkbox"/>	3. At least 70% vegetation coverage maintained?
<input type="checkbox"/>	<input type="checkbox"/>	4. Evidence of erosion?
<input type="checkbox"/>	<input type="checkbox"/>	5. Evidence of leaks around berms?

Comments:

Yes No In-Line Water Level Control Structure 2

<input type="checkbox"/>	<input type="checkbox"/>	1. Signs of Leakage?
<input type="checkbox"/>	<input type="checkbox"/>	2. Normal operation setup, i.e. Valve 7 closed?
<input type="checkbox"/>	<input type="checkbox"/>	3. Inlet/Outlet clogging?

Comments:

Water Level Measurements

SSF Cell 1 _____
 SSF Cell 2 _____
 SF Wetland _____

Flow Rate (gpm) _____

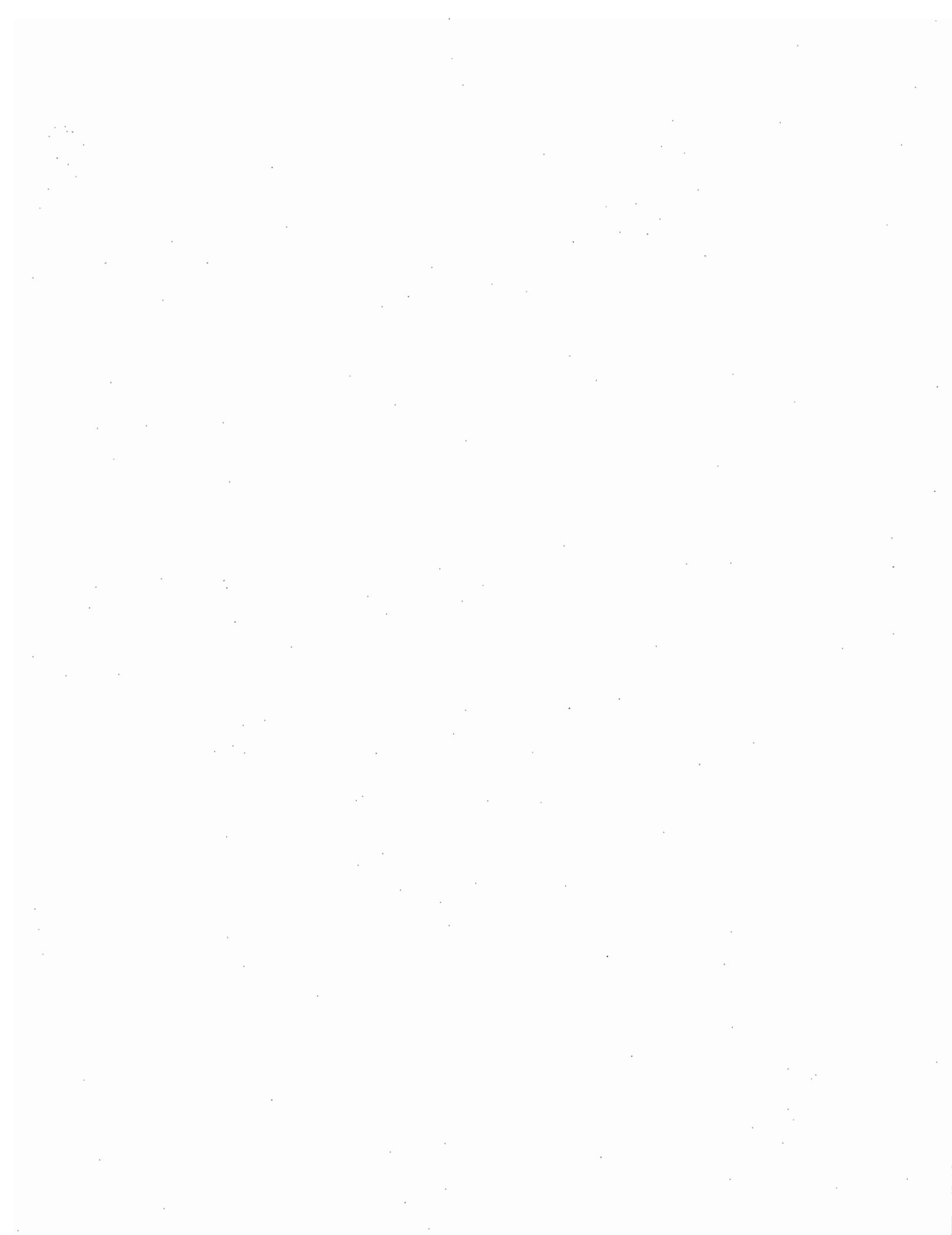
Sampling

Yes No

<input type="checkbox"/>	<input type="checkbox"/>	Samples Collected?
		Location: _____
		Analysis: _____

Corrective Action Needed/Taken

FIGURES

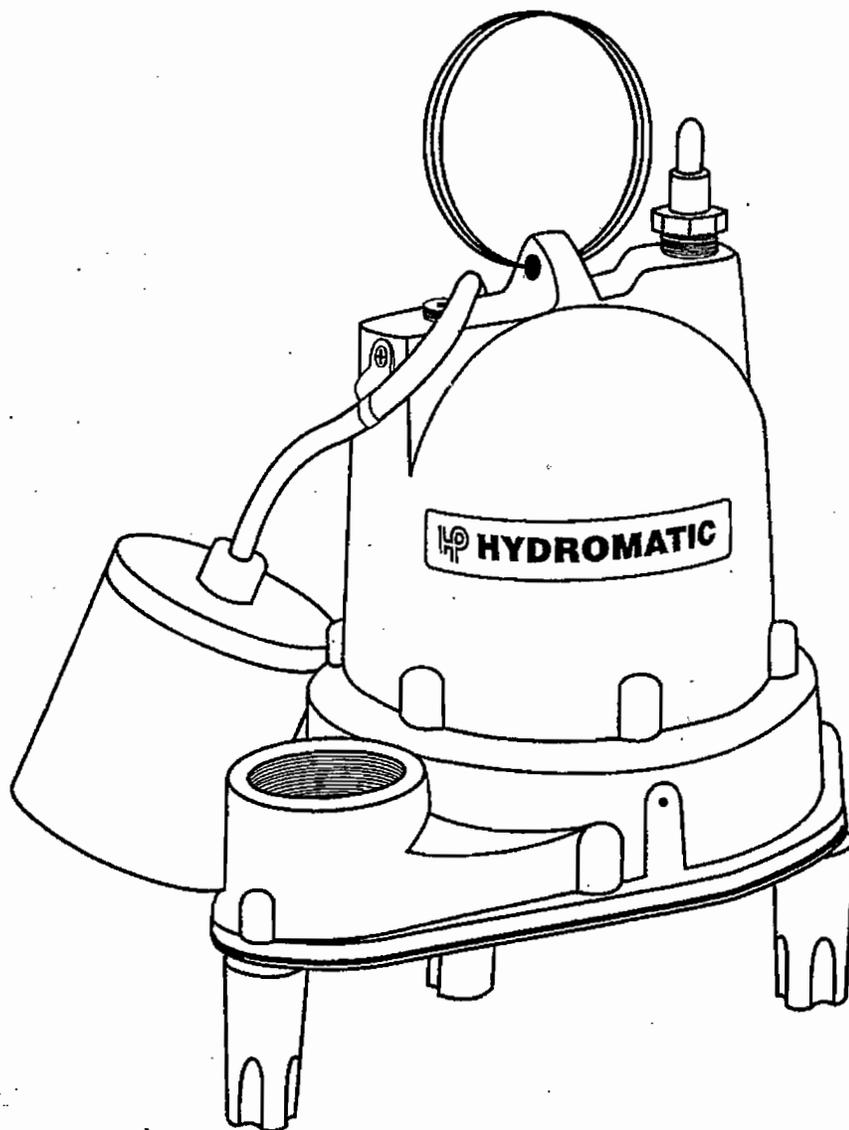




HYDROMATIC®

SHEF30

Submersible Pump/Effluent Pump



NOTE! To the installer: Please make sure you provide this manual to the owner of the pumping equipment or to the responsible party who maintains the system.



Pentair
Pump Group

General Information

Thank you for purchasing your HYDROMATIC pump. To help ensure years of trouble-free operation, please read the following manual carefully.

Before Operation:

Read the following instructions carefully. Reasonable care and safe methods should be practiced. Check local codes and requirements before installation.

Attention:

This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. **DO NOT THROW AWAY OR LOSE THIS MANUAL.** Keep it in a safe place so that you may refer to it often.

WARNING: Before handling these pumps and controls, always disconnect the power first. Do not smoke or use sparkable electrical devices or flames in a septic (gaseous) or possible septic sump.

Pump Warning

To reduce risk of electrical shock:

1. **Risk of Electrical Shock:** This pump has not been investigated for use in swimming pool areas.

2. **Risk of Electrical Shock:** Connect only to a properly grounded receptacle.

Septic tank is to be vented in accordance with local plumbing codes.

Do not smoke or use sparkable electrical devices or flame in a septic (gaseous) or possible septic sump.

If a septic sump condition may exist and if entry into sump is necessary, then (1) provide proper safety precautions per OSHA requirements and (2) do not enter sump until these precautions are strictly adhered to.

Do not install pump in location classified as hazardous per N.E.C., ANSI/NFPA 70 - 1999.

Failure to heed above cautions could result in injury or death.

Installation Instructions

These important instructions must be followed for satisfactory performance of your pump. Before installation, check your local electrical and plumbing codes.

1. Provide proper sump

Minimum Sump Diameter

SHEF30 18"

Approx. Turn-On & -Off Level

SHEF30 On 9-1/2"

Off 3-1/2"

2. Make sure float (automatic models) hangs free. It should not come into contact with side or bottom of sump pit.
3. Make sure sump is free of string, cloth, nails, gravel, etc. before installing pump.
4. Do not set pump directly on

the bottom of sump if it is not solid. Raise the pump by placing bricks or concrete blocks underneath it.

5. Use steel or plastic pipe for all connecting lines between pump and sewer outlet.

NOTE: Some city regulations do not allow installing a pump with plastic pipe. Check local regulations.

6. HYDROMATIC check valve should be installed in discharge pipe, at least twelve inches above the discharge outlet of the pump. Install check valve with arrow pointing in the direction of flow.
7. A shutoff valve should also be used.
8. Connect to power source using 3-prong grounded 115 volt AC receptacle. Do not remove ground pin from electrical plug. Do not use an extension cord.
9. For proper automatic operation make sure the pump power cord is plugged into the back of the "piggyback" receptacle on the switch cord. Also ensure that the piggyback plug is securely plugged into the 115 volt grounded receptacle.
10. If shutoff valve is used in the discharge line, ensure that the valve is open.
11. To ensure that the pump is properly installed, fill basin with enough water to activate pump (see #1 - Turn-on and -off levels). Allow pump to go through several on-off cycles to assure satisfactory operation.
12. Use pump submerged for pumping waterlike liquids (temperature to 120°F).

CAUTION: Do not pump flammable liquids, strong chemicals or salt water.

13. In applications where the pump may sit idle for months at a time, it is recommended that the pump(s) be cycled every few months to ensure the pumping system is working properly when needed.

14. An audible alarm, such as the Hydromatic Q-Alert for high water conditions, should be installed for additional protection against high water conditions.

NOTE: The Q-Alert alarm panel is for indoor use only. For applications and product information, contact your HYDROMATIC distributor.

Your pump warranty is void...

If... power cord has been cut.

If... pump has been used to pump mud, cement, tar, abrasives or chemicals.

If... pump has been used for pumping of hot water (above 120°F).

If... pump has been dismantled by other than authorized HYDROMATIC service center or distributor.

Pump Troubleshooting

Servicing should be performed only by an authorized HYDROMATIC service center.

WARNING: Always disconnect the pump from power source before handling or making any adjustments. Always wear rubber boots when there is water on the floor and you must unplug the pump or make any adjustments.

NOTE: Automatic thermal overload protects the sealed-in-oil motor. Running dry may overheat the motor and activate the overload protector until the unit cools.

Pump does not run or just hums.

1. Line circuit breaker may be off, or fuse may be blown or loose.
2. Water level in sump may be too low to activate automatic switch. See installation for proper on/off levels.
3. Pump and/or switch cord plug may not be making contact in receptacle.
4. If pump is using the series (piggyback) cord plug, the two plugs may not be plugged together tightly.
5. Float may be stuck. Be sure float operates freely in basin.
6. If the unit is being operated by the optional float control switch, unplug the pump from the piggyback receptacle and plug the pump directly into the power source. If the pump starts each time it is plugged directly into the receptacle and does not start each time when plugged into the piggyback switch with the float raised up to a start position, replace the complete piggyback switch assembly and retest with new assembly.
7. If all symptoms check OK, motor winding may be open;

take to authorized service center for check.

Pump runs but does not deliver water.

1. Check valve may be installed backward. Arrow on valve points in direction of flow.
2. Discharge shutoff valve, if used, may be closed.
3. Pump may be air locked. Start and stop several times by plugging and unplugging cord. HYDROMATIC pumps have a small air vent hole in the impeller cavity to let out trapped air. If this hole becomes plugged, pump may air lock. To break the air lock, use a small screwdriver to clear hole in the impeller cavity.

As a secondary precaution in installations of this type — 1/16" hole should be drilled in the discharge pipe below the check valve. The check valve should be 12 to 18 inches above pump discharge. Do not put check valve directly into pump discharge opening.

NOTE: In sumps where the pump is operating daily, air locking rarely occurs.

4. Pump head may be too high. Pump cannot deliver water over 24' vertical lift. Horizontal distance does not affect pumping, except for friction loss through the pipe.
5. Inlet in pump base may be clogged. Remove pump and clean out openings.
6. Impeller or volute openings may be plugged or partially plugged. Remove pump and clean out.

Pump runs and pumps out sump but does not stop.

1. Float is stuck in up position. Be sure float is not hung up and operates freely in basin.
2. Switch contacts may be stuck; replace switch.

Pump runs but delivers only small amount of water.

1. Pump may be air locked. Start and stop several times by plugging and unplugging cord. Check vent hole in pump case for plugging.
2. Pump head may be too high. Pump cannot deliver water over 24' vertical lift. Horizontal distance does not affect pumping, except loss due to friction through discharge pipe.
3. Inlet in pump base may be clogged. Remove pump and clean out openings.
4. Impeller or volute openings may be plugged or partially plugged. Remove pump and clean out.
5. Pump impeller may be partially clogged causing motor to run slow, resulting in motor overload. Clear impeller.

Fuse blows or circuit breaker trips when pump starts.

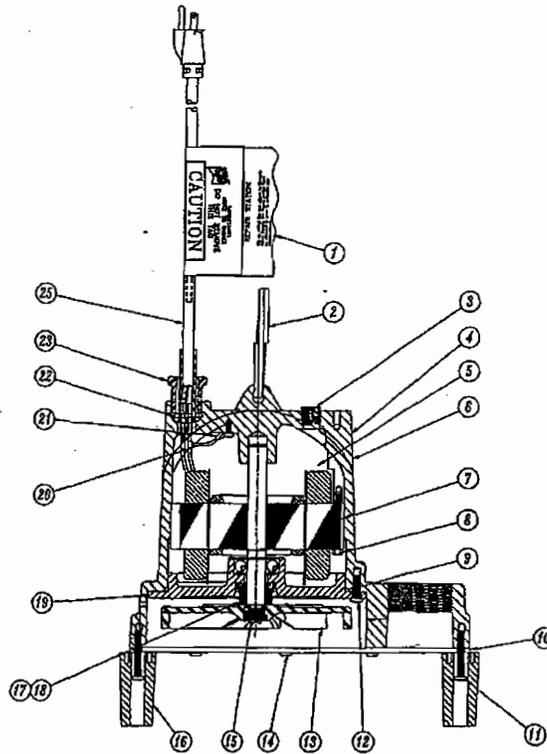
1. Inlet in pump base may be clogged. Remove pump and clean out openings.
2. Impeller or volute openings may be plugged or partially plugged. Remove pump and clean out.
3. Pump impeller may be partially clogged causing motor to run slow, resulting in motor overload. Clear impeller.
4. Fuse size or circuit breaker is too small.

5. Defective motor stator; return to authorized HYDROMATIC service center for verification.

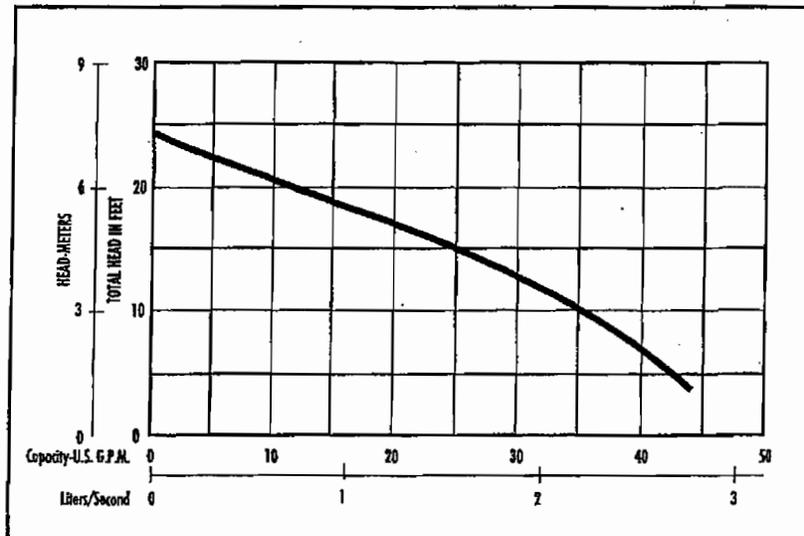
Motor runs for short time then stops. Then after short period starts again. Indicates tripping overload caused by symptom shown.

1. Inlet in pump base may be clogged. Remove pump and clean out openings.

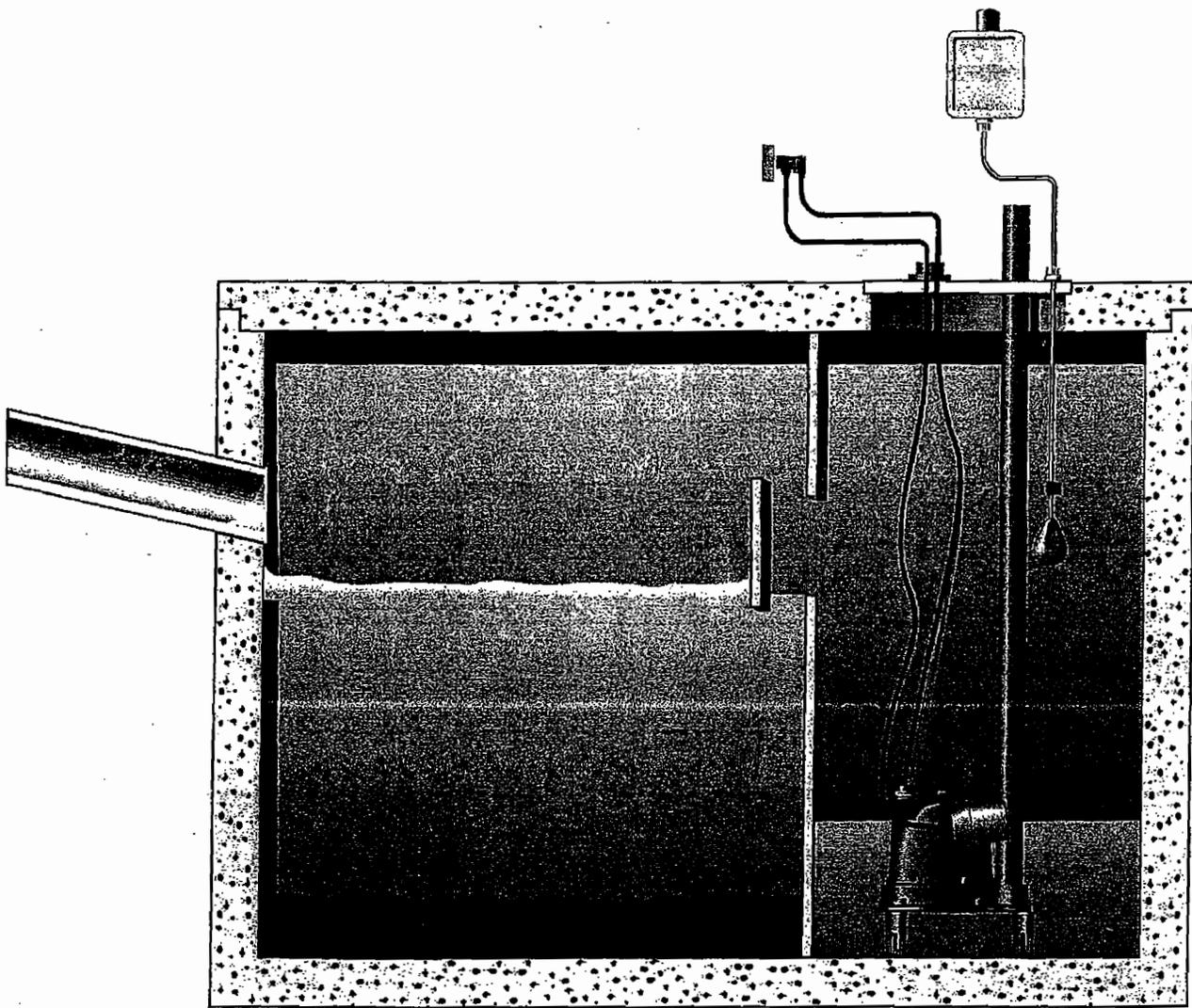
2. Impeller or volute openings may be plugged or partially plugged. Remove pump and clean out.
3. Pump impeller may be partially clogged causing motor to run slow, resulting in motor overload. Clear impeller.
4. Defective motor stator: return to authorized HYDROMATIC service center.



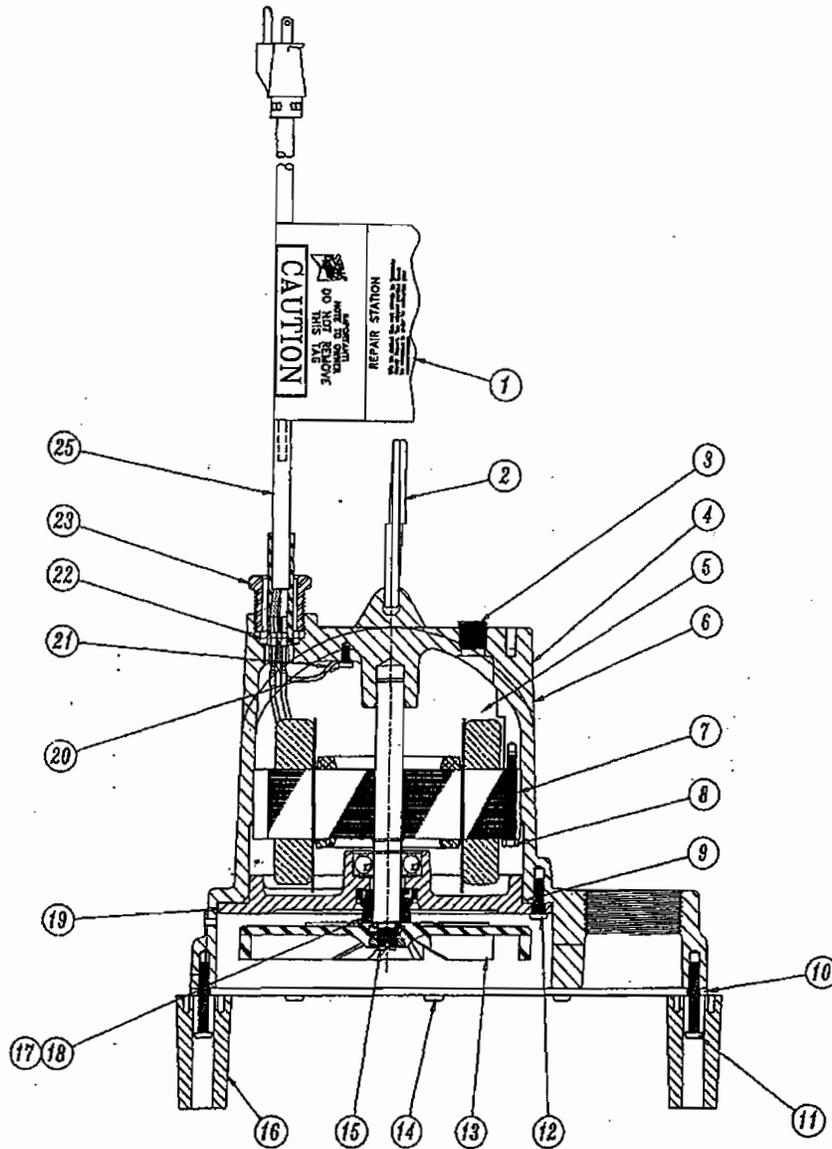
SHEF30 Performance Curve



**SHEF30
Typical Installation**



SHEF30 Parts List



Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	10193-019-1	Tag-Warranty	1	17	5484-001-1	Seal-Stationary	1
2	8522-010-1	Ring-Handle	1	18	5484-003-1	Seal-Rotating	1
3	14981-001-1	Plug-Pipe	1	19	14076-000-2	Plate-Seal	1
4	13424-013-1	Label-Hydromatic	1	20	14770-001-1	Screw-Quadrex #8-32 x 5/16	1
5	5617-001-1	Oil	1	21	6000-053-1	Wire W/Terminal	1
6	8507-202-1	Volute/Motor Housing	1	22	139-014-1	Ring-Seal	1
7	14581-001-1	Stator .3HP, 115 Volt, 60Hz, 1 Phase	1	23	75-005-1	Nut-Cord	1
8	145-001-1	Screw-Mach (Hex Head)	2	24	13425-064-1	Nameplate	1
9	834-030-1	O-Ring	1	25	14623-010-1	Cord-Power 20'	1
10	8521-001-1	Plate-Bottom	1	25	14623-020-1	Cord-Power 30'	1
11	14770-002-1	Screw-Quadrex #10-24 x 1.25	3			FOR AUTOMATIC OPERATION	
12	14770-005-1	Screw-Quadrex #10-24 x .63	6			Screw-Mach. (Pan Head)	1
13	8498-003-1	Impeller	1	NOT SHOWN	5583-001-1	Tie-Wire	1
14	14770-006-1	Screw-Quadrex #10-24 x .38	2	NOT SHOWN	1055-000-1	Switch-Mech. Wide Angle 20'	1
15	14581-210-1	Rotor/Shaft/Bearing Assembly	1	NOT SHOWN	13967-020-1	Switch-Mech. Wide Angle 30'	1
16	13507-001-1	Leg	3			Switch-Mech. Wide Angle 30'	1

WARRANTY

Hydromatic Pumps warrants to the original purchaser of each Hydromatic Pump product(s) that any part thereof which proves to be defective in material or workmanship within one year from date of installation or 18 months from manufacture date, whichever comes first, will be replaced at no charge with a new or remanufactured part, F.O.B. factory. Purchaser shall assume all responsibility and expense for removal, reinstallation and freight. Any item(s) designated as manufactured by others shall be covered only by the express warranty of the manufacturer thereof. This warranty does not apply to damage resulting from accident, alteration, design misuse or abuse.

If the material furnished to the Buyer shall fail to conform to this contract or to any of the terms of this written warranty, Hydromatic Pump shall replace such nonconforming material at the original point of delivery and shall furnish instruction for its disposition. Any transportation charges involved in such disposition shall be for the Buyer's account. The Buyer's exclusive and sole remedy on account or in respect of the furnishing of material that does not conform to this contract, or to this written warranty, shall be to secure replacement thereof as aforesaid. Hydromatic Pump shall not in any event be liable for the cost of any labor expended on any such material or for any incidental or consequential damages to anyone by reason of the fact that such material does not conform to this contract or to this written warranty.

ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE SAME EXTENT AS THE EXPRESS WARRANTY CONTAINED HEREIN. Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

MANUFACTURER EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ARISING IN CONNECTION WITH THIS PRODUCT INCLUDING WITHOUT LIMITATION, WHETHER IN TORT, NEGLIGENCE, STRICT LIABILITY CONTRACT OR OTHERWISE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

PUMP MUST BE REPAIRED BY AUTHORIZED HYDROMATIC REPAIR CENTER OR WARRANTY WILL BE VOID. IF REPAIR CENTER IS NOT AVAILABLE, RETURN PUMP TO PLACE OF PURCHASE.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

 HYDROMATIC® Pentair Pump Group	- Your Authorized Local Distributor -
USA 1840 Baney Road Ashland, Ohio 44805 Tel: 419-289-3042 Fax: 419-281-4087	CANADA 269 Trillium Drive Kitchener, Ontario, Canada N2G 4W5 Tel: 519-896-2163 Fax: 519-896-6337
www.hydromatic.com	