

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
ONE CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO: **MA0110281**

NAME AND ADDRESS OF APPLICANT:

**Bioshelters, Inc.
500 Sunderland Road
Amherst, MA 01002**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Bioshelters, Inc.
Route 116
500 Sunderland Road
Amherst, MA 01002**

RECEIVING WATERS: **Great Swamp to Unnamed Tributary of the Mill River**
(Connecticut River Watershed - MA-34)

CLASSIFICATION: **Class B - Warm Water**

I. PROPOSED ACTION

The above named applicant has applied to the U.S. Environmental Protection Agency for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The current permit was issued February 23, 1994 and became effective on the date of signature. It expired February 29, 1999 and a timely application was received.

II. TYPE OF FACILITY AND DISCHARGE LOCATION

The facility is engaged in the culture of Tilapia, a non-native fish. It is regulated as a Concentrated Aquatic Animal Production Facility, as defined at 40 CFR 122.24. The discharge is culture water.

The facility's discharge outfall is listed below:

| <u>Outfall</u> | <u>Description of Discharge</u> | <u>Outfall Location</u> |
|----------------|---------------------------------|--|
| 001 | Fish Culture Effluent | Great Swamp to Unnamed Tributary to the Mill River |

III. DESCRIPTION OF DISCHARGE

A quantitative description of the discharge in terms of significant effluent parameters based on recent discharge monitoring reports (DMRs), June 1999 through July 2001, is shown on Attachment A of this fact sheet.

IV. LIMITATIONS AND CONDITIONS

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

V. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

A. PROCESS DESCRIPTION

Bioshelters, Inc. is located in Amherst, MA (Figure 1) and has the capacity to produce 600,000 pounds of tilapia annually. In 2001, Bioshelters produced 200,000-300,000 pounds of tilapia. The Bioshelters facility raises fish and hydroponic produce in a recirculating aquaculture and hydroponic system. The waste water from the fish is used to grow plants, and plants are used to clean the water for the fish. Fresh fish and produce are sold to local markets.

The facility is greenhouse structure which houses ten (10) aquaculture tanks and related operations on the first level and the hydroponic produce operation is located on the upper level. An additional portion of the of the lower level is used for the packaging of the hydroponic produce. Water is supplied to the facility by an on-site groundwater well.

The rear section of the lower level of the facility is the hatchery area. Tilapia are mouth-brooders and the facility has become self-supplying.

Recirculating System

The production tanks are 100% recirculated. The only water coming into the facility is well water at a rate of 19 gpm to rinse the drum filters. Water leaves the fish tanks and runs through a 90 micron drum filter, where most of the solids are removed. After the solids removal, the water is stripped of carbon dioxide. The stripped carbon dioxide is blown by a fan into the plant growing area to increase growth rates of the hydroponic crops. After the carbon dioxide is stripped, the water is run through biological filters where ammonium nitrogen is oxidized into nitrate nitrogen. Water is then cycled through the hydroponic plants. The water is then oxygenated and returned to the fish tanks.

Wastewater Treatment System

The solids are removed from the drum filter and held in a storage tank for dewatering. The sludge is used on the local farm area.

The filtrate is sent to a constructed wetland. The outflow from the wetland is aerated with a small aquarium airstone and then discharged to a very small brook which flows into the Great Swamp. The effluent is not ozonated as required by the existing permit

Cleaning

Since going into production, the tanks have never been cleaned. They have a slight conical bottom which allows solids to settle out, which are then treated by the drum filter. Periodic tank inspections by diver show little, if any, solids build up. Tilapia are known for their tolerance of turbid, low oxygen waters. Therefore, the very clean waters required of most fish farming is not required for this species.

The hatchery tanks are occasionally drained for harvesting. The tanks are drained to another set of tanks which is located in the floor below the hatchery tanks. Once the harvesting is complete, the water is pumped back into the hatchery tanks.

Medications

The only therapeutic ever used on the fish at the Bioshelters facility is salt. It is used at 1.5 part per 1000 to soothe any skin maladies. When salt has been used, it has been in the hatchery tank and the treatment water is discharged to the wetland system.

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Overview of Federal and State Regulations

EPA is required to consider technology and water quality requirements when developing permit effluent limits. Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 402 and 301(b) of the Act (see 40 CFR 125 Subpart A) to meet Best Practicable Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT) for conventional pollutants and Best Available Technology Economically Achievable (BAT) for toxic pollutants.

EPA regulations require NPDES permits to contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to maintain or achieve federal or state water quality standards.

Under Section 301(b)(1)(C) of the Clean Water Act (CWA), discharges are subject to effluent limitations based on Water Quality Standards. The Massachusetts Surface Water Quality Standards include the requirements for the regulation and control of toxic constituents and also require that EPA criteria established pursuant to Section 304(a) of the CWA shall be used unless site specific criteria are established. The State will limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained.

In the absence of technology-based guidelines, EPA is authorized to use Best Professional Judgement (BPJ) to establish effluent limitations, in accordance with Section 402 (a)(1) of the CWA and 40 CFR Section 125.3.

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that caused, has reasonable potential to cause, or contributes to an excursion above any water quality criteria. An excursion occurs if the projected or actual instream concentrations exceed the applicable criteria. In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and, where appropriate, the dilution of the effluent in the receiving water.

A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirement of the CWA. EPA's anti-backsliding provisions found in 40 CFR 122.44(l) restrict the relaxation of permits, standards, and conditions. Therefore, the technology-based effluent limits in the reissued permit must be at least as stringent as those of the previous permit. Relaxation of these limits is only allowed when cause for permit modification is met (see 40 CFR 122.62). Effluent limits based on BPJ, water quality, and state certification requirements must also meet the anti-backsliding

provisions found under Section 402(o) and 303(d)(4) of the CWA, as described in 40 CFR 122.44(1).

2. Water Quality Standards; Designated Use; Outfall 001

The Mill River is classified as a Class B water, warm water fishery in the Massachusetts Surface Water Quality Standards (314 CMR 4.00). Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. The waters should have consistently good aesthetic value.

A warm water fishery is defined in the Massachusetts Surface Water Quality Standards (314 CMR 4.02) as waters in which the maximum mean monthly temperature generally exceeds 20° Celsius during the summer months and are not capable of supporting a year-round population of cold water stenothermal aquatic life.

Available Dilution

Water quality based limitations are established with the use of a calculated available dilution. Title 314 CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10-year recurrence interval. Additionally, the facility design flow is used to calculate available effluent dilution.

A site visit was conducted to tour the facility and observe the effluent discharge outfall. It was found that the discharge was into a very small brook. Flow in the brook was minimal. The receiving water flow used to calculate effluent limits is therefore zero, resulting in a dilution factor of one.

OUTFALL 001 - CONVENTIONAL POLLUTANTS

Biochemical Oxygen Demand (BOD₅) - The Environmental Protection Agency has not developed effluent guidelines for this type of facility as provided for in the Clean Water Act (CWA). The draft permit includes proposed average monthly and maximum daily BOD limitations which are based on Best Professional Judgement (BPJ). The BOD limits were derived from a review of effluent data from concentrated aquatic animal production facilities located in Massachusetts and New Hampshire, as well as review of general NPDES permits developed for similar facilities in Idaho, Oregon and South Carolina. The limits are 5 mg/l average monthly and 10 mg/l for maximum daily. The maximum daily limit of 10 mg/l is a new limitation. The draft permit carries forward monthly monitoring frequency from the previous permit.

Total Suspended Solids (TSS) - EPA has not developed effluent guidelines for this type of facility as provided for in the CWA. The draft permit includes a proposed average monthly and maximum daily TSS limitations which are based on Best Professional Judgement (BPJ). The TSS limits were derived from a review of effluent data from concentrated aquatic animal production facilities located in Massachusetts and New Hampshire, as well as review of general NPDES permits developed for similar facilities in Idaho, Oregon and South Carolina. The limit is 5 mg/l average monthly and 10 mg/l for maximum daily.

However, due to anti-backsliding, EPA has determined that the average monthly limit of 3 mg/l and the maximum daily limit of 6 mg/l should be retained. The draft permit carries forward monthly monitoring frequency from the previous permit.

Dissolved Oxygen (DO) - The draft permit includes a limit for DO of 5.0 mg/l based on state water quality standards. The previous permit had a limit of 6.0 mg/l. However, Bioshelters discharges to Class B waters, warm water fishery, as classified by the Massachusetts Surface Water Quality Standards, and as such it shall have DO levels not less than 5.0 mg/l. The monthly monitoring frequency is carried forward from the previous permit.

pH - The draft permit includes proposed pH limitations which are required by state water quality standards, and are at least as stringent as pH limitations set forth at 40 CFR 133.102(c). The pH level shall be in a range of 6.5 through 8.3 standard units. There shall be no change from background conditions that would impair any use assigned to this class. The monthly monitoring frequency is carried forward from the pervious permit.

Fecal Coliform Bacteria - The previous limits for fecal coliform bacteria has been removed from the draft permit as coliform bacteria are only present in the intestinal tracts of humans and warm-blooded animals.

OUTFALL 001 - NONCONVENTIONAL AND TOXIC POLLUTANTS

Total Ammonia, as N - Ammonia is a nutrient which is toxic at elevated concentrations. Concentrated aquatic animal facilities as defined in 40 CFR 122.24 are known contributors of ammonia. The previous permit had “report only” requirement for ammonia.

As part of the application process, under the provisions of Section 308 of the Clean Water Act, additional information was requested for ammonia. Based on three rounds of sampling, the level of total ammonia ranged from 2.25 mg/l to 14 mg/l, with an average of 6.46 mg/l.

Current EPA water quality criteria for ammonia in freshwater systems are defined in the 1999 Update of Water Quality Criteria for Ammonia. At a pH of 7.0 and temperature of 20° Celsius, the acute criteria is 24.1 mg/l and the chronic criteria is 4.15 mg/l. Given a dilution factor of 1, the total ammonia limitations are 24.1 mg/l daily maximum and 4.15 monthly average. Monitoring shall continue to be conducted monthly.

Total Ammonia, as N Limitations

Acute (Daily Maximum)

24.1 mg/l (At pH 7.0 and temperature of 20° Celsius)

(acute criteria * dilution factor) = Acute (Daily Maximum)

(24.1 mg/l * 1) = 24.1 mg/l

Chronic (Monthly Average)

4.15 mg/l (At pH 7.0 and temperature of 20° Celsius)

(chronic criteria * dilution factor) = Chronic (Monthly Average)

(4.15 mg/l * 1) = 4.15 mg/l

Total Phosphorus - The previous permit had a quarterly reporting requirement for phosphorus. However, the facility has been reporting total phosphate levels as determined in-house. As part of the application process under the provisions of Section 308 of the Clean Water Act, EPA requested additional data. The facility split samples between their in-house facility and a contract lab. The values ranged between 1.8 mg/l and 9.8 mg/l with an average of 6.46. This recent data clearly indicates that reasonable potential exists for total phosphorus, as such a limit will be included in the draft permit. During a November 2001 site visit, significant growth weed and algae growth was observed in the receiving water at and downstream of the point of discharge.

National guidance sets forth a desired instream goal of 0.025 mg/l total phosphorus for within a lake or reservoir to prevent plant nuisances. The Massachusetts Surface Water Quality Standards, 314 CMR 4.04 (5), states that "Any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such nutrients." As such, the draft limit of 0.2 mg/l daily maximum is set in the draft permit. The frequency of monitoring has been increased to monthly and during cleaning activities which represent the worst case scenario.

Nitrogen - The Long Island Sound Study has determined that excessive nitrogen loadings are causing significant water quality problems in Long Island Sound, including low dissolved oxygen. The State of Connecticut has begun to impose nitrogen limitations on Connecticut River discharges to Long Island Sound and its tributaries. There is a need to determine the loadings of nitrogen from sources in Massachusetts which are tributary to Long Island Sound, to determine whether these loadings are impacting the water quality in Long Island Sound, and to help determine what limits, if any, should ultimately be imposed on discharges in Massachusetts. Therefore, EPA has included report requirements for Total Ammonia, Total Kjeldahl Nitrogen and Nitrate + Nitrite based on provisions of Section 308 of the Clean Water Act. The information submitted by the permittee will help to establish a database of nitrogen loadings, which can be used to quantitatively assess the impact of loading and transport of nitrogen to Long Island Sound. The data will provide a more sound basis for future decisions relating to nitrogen loadings to the Sound. The results of this monitoring will be reviewed to determine if further steps are needed to reduce, and control nitrogen inputs impacting coastal waters in Connecticut from the facility. No numerical limitations for these pollutants are established in the draft permit. Monitoring shall be conducted quarterly.

Ozone - The previous permit included a minimum limit for ozone of 0.35 mg/l to ensure proper disinfection of the effluent. The limit was based on a recommendation from Gary A. Wedemeyer, Ph.D. formerly of the U.S. Department of the Interior, National Biological Service. In a letter dated January 3, 1997 regarding a similar facility, Dr. Wedemeyer indicated that the background information available to him at the time was probably inadequate to make an appropriate recommendation. The 0.35 mg/l has been used as a standard for disease containment

at biohazard facilities but is probably overzealous for general disinfection of effluent from a fish culture facility that is not a source of exotic pathogens. Based on current information, it is Dr. Wedemeyer's opinion that the facility should be able to achieve the same level of treatment with an ozone residual of >0.02 mg/l after a 60 second retention time. Given this information and recent conversations with Dr. Wedemeyer, the minimum ozone limit shall be changed to 0.02 mg/l after a 60 second retention time.

VI. ANTI-DEGRADATION

The Massachusetts Anti-degradation Policy is found at Title 314 CMR 4.04. All existing uses of the unnamed tributary and the Mill River must be protected. This draft permit is being reissued with allowable discharge limits as or more stringent than the current permit (except as noted above) with the same parameter coverage and no change in outfall location.

VII. STATE PERMIT CONDITIONS

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the MA DEP Commissioner.

VIII. STATE CERTIFICATION REQUIREMENTS

The staff of the Massachusetts Department of Environmental Protection ("MADEP") has reviewed the draft permit. EPA has requested permit certification by the State pursuant to 40 CFR § 124.53 and expects that the draft permit will be certified.

IX. PUBLIC COMMENT PERIOD AND PROCEDURES FOR FINAL DECISION

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection, MA Unit, One Congress Street, Suite-1100, Boston, Massachusetts 02114. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. Public hearings may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates a significant public interest. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and after a public hearing, if such a hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

X. EPA CONTACT

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

Michele Cobban Barden
Office of Ecosystem Protection
U.S. Environmental Protection Agency
One Congress Street, Suite-1100 (CPE)
Boston, MA 02114-2023
Telephone: (617) 918-1539
Barden.Michele@epa.gov

DATED

Linda M. Murphy, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Attachment A- DMR summary

Discharge Monitoring Report Summary - August 1999 through July 2001

| Parameter | Limit | | Average Monthly | | Maximum Daily | | Violations | |
|-----------------------------|-----------------|---------------|-----------------|--------------|--------------------|--------------------|-----------------|---------------|
| | Average Monthly | Maximum Daily | Minimum | Maximum | Minimum | Maximum | Average Monthly | Maximum Daily |
| Flow (gpd) | *** | 86400 | *** | *** | 18437 | 34704 | *** | 0 |
| BOD ₅ (mg/l) | 5.0 | *** | 5.5 | 34.0 | *** | *** | 24/24 | *** |
| Dissolved Oxygen (mg/l) | 6.0 | *** | 2.0 | 31 | *** | *** | 21/24 | *** |
| Temperature (Fahrenheit) | *** | 83 | *** | *** | 37.4 | 71.2 | 0/24 | *** |
| Ozone* (mg/l) | >0.35 | *** | Not Reported | Not Reported | *** | *** | 24/24 | *** |
| TSS (mg/l) | 3.0 | 6.0 | 0 | 10 | Not Reported | Not Reported | 1/24 | 24/24 |
| Ammonia (mg/l) | *** | Report | *** | *** | Reported Ammonium | Reported Ammonium | *** | *** |
| Nitrate, Nitrogen (mg/l) | *** | Report | *** | *** | 0 | 30 | *** | *** |
| Total Phosphorus (mg/l) | *** | Report | *** | *** | Reported Phosphate | Reported Phosphate | *** | *** |
| pH | 6.5 | 8.3 | 7.27 | 9.30 | Not Reported | Not Reported | *** | *** |
| Fecal Coliform (cfu/100 ml) | 200 | 400 | 0 | 2 | Not Reported | Not Reported | 0 | *** |

* Required ozonation disinfection never implemented. Permittee has been out of compliance since commencement of discharge. Permittee has no intention of installing the required treatment until EPA and MA DEP can specifically define the parasites, bacteria, and other biological pollution to be disinfected.