Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

PILOTING APPROVAL - REVISED
Pursuant to Title 5, 310 CMR 15.000

Name and Address of Applicant:

Bio-Microbics, Inc.
8450 Cole Parkway
Shawnee, KS 66227

Trade name of technology and model: BioBarrier MBR Wastewater Treatment System, model 0.5, (hereinafter the "System"). Schematic drawings of a typical unit and a technology inspection checklist are attached and are part of this Approval

Transmittal Number:	W066696
Date of Issuance:	April 30, 2007, revised June 8, 2011
Date of Expiration:	April 30, 2012

Authority for Issuance

Pursuant to Title 5 of the State Environmental Code, 310 CMR 15.000, the Department of Environmental Protection hereby issues this Approval to: Bio-Microbics, Inc., 8450 Cole Parkway, Shawnee, KS 66227 (hereinafter "the Company"), to Pilot in the Commonwealth of Massachusetts the System described herein. Sale and use of the System are conditioned on and subject to compliance by the Company and the System owner with the terms and conditions set forth below. Any noncompliance with the terms or conditions of this Approval constitutes a violation of 310 CMR 15.000.

David Ferris, Director
Wastewater Management Program
Bureau of Resource Protection

June 8, 2011
Date

I. Purpose

1. The purpose of this Approval is to provide field testing and technical demonstration of the System in Massachusetts, on a Piloting Approval basis, so as to evaluate whether the System can function effectively.

2. With the necessary permits and approvals required by 310 CMR 15.000, this Piloting Approval authorizes the use and installation of the System in Massachusetts at one or more pilot facilities, and requires testing so that the Department can determine if the System can or cannot consistently function to effectively reduce total nitrogen (TN) to less than or equal to 19 mg/L and also to 10 mg/L.

3. The System may only be installed on facilities that meet the criteria of 310 CMR 15.285(2).

4. Department Piloting Approval authorizes the use of the System, with the approval of the local approving authority, for upgrades of existing failed, failing or substandard systems and for new construction of systems with design flows less than 2,000 gallons per day, subject to the limitations of this approval.

II. Design Standards

1. The Bio-Barrier® System is a membrane bioreactor (MBR System), providing primary settling, BOD, TSS and nitrogen removal via the nitrification and denitrification processes; using aeration and anoxic zones, and membrane filtration.The tank(s) containing the BioBarrier® is installed between the building sewer and the soil absorption system (SAS) designed and constructed in accordance with 310 CMR 15.100 - 15.279. The System is in a three compartment tank or two tanks with a total of 3 compartments with the membrane module always in the last compartment in the system and the anoxic zone must be connected to the aeration zone via a baffle wall. The sanitary sewage from a facility enters the system in the first compartment or tank, the settling zone, for primary sedimentation and floatables retention. On the outlet side in this first compartment is a SaniTEE® screen, to provide the screening. The second compartment serves as the anoxic zone and contains a mixing pump and the third compartment is the aeration zone. The aeration zone contains the membrane module, a permeate pump and an air supply from the System's remote installed blower unit. The membrane module consists of flat sheet membranes arranged in a cartridge. A high mixed liquor suspended solids concentration in the aeration zone provides biological treatment and nitrification. A portion of the nitrified wastewater is returned to the anoxic chamber for denitrification by the mixing pump action via patent pending ports in the baffle wall separating the two zones. The final effluent or permeate is pulled out by the permeate pump through the MBR membranes leaving behind large organic and inorganic particles for further digestion or wasting.

   The System may be equipped with chemical feed to provide a carbon source for anoxic denitrification when required by the wastewater constituents. The aeration system runs when the permeate pump is activated by a float system. The aeration system provides scouring for the membranes and oxygen to the biological

process. When the permeate pump is not running the aeration system runs on a timer that activates the blower for 30 minutes and turns it off for 90 minutes. The off time provides a resting period for the MBR unit. The rest periods allow the membranes to relax which helps in membrane filtration capability. When the aeration operates the solids are broken up by turbulence. All pumps, timers and aeration equipment shall be controlled at the control panel. Final effluent disposal shall be either by pressure distribution or by gravity to soil absorption.

2. The System shall be installed in series between the building sewer and the soil absorption system (SAS) of a standard Title 5 system constructed in accordance with 310 CMR 15.100 - 15.279, subject to the provisions of this Approval. The use of a septic tank, in addition to the above described System treatment tank, is not required.

3. All access ports and manhole covers shall be installed and maintained at grade to allow for access and maintenance of the System.

4. The alarms and controls shall be housed within an enclosure mounted in a location readily accessible to the operator.

5. New Construction: When the System is used in areas subject to the nitrogen loading limitations of 310 CMR 15.214, an increase in calculated allowable nitrogen loading per acre is allowed for facilities *with a design flow of less than 2,000 gallons per day (gpd)* as provided in 310 CMR 15.217(2). When used in such areas:

   i. for residential facilities, the design flow shall not exceed 660 gallons per day per acre (gpda), and the System shall not exceed 19 mg/L total nitrogen (TN) concentration in the effluent measured as the sum of the total TKN (total Kjeldhal Nitrogen), NO_3-N (Nitrate nitrogen) and NO_2-N (Nitrite nitrogen).

   ii. for non-residential facilities, the design flow shall not exceed 550 gpda, and the System shall not exceed 25 mg/L TN concentration in the effluent

III. **General Conditions**

1. No more than 15 Systems may be installed under this Approval. A representative of the Company shall be on-site to inspect and approve each system installation.

2. All provisions of 310 CMR 15.000 are applicable to the use of this System, the System owner and the Company, except those that specifically have been varied by the terms of this Approval.

3. Any required operation and maintenance, monitoring and testing shall be performed in accordance with a Department approved plan. Any required sample analysis shall be conducted by an independent U.S. EPA or DEP approved testing laboratory, or a DEP approved independent university laboratory, unless otherwise is provided in the Department's written Approval. It shall be a violation

of this Approval to falsify any data collected pursuant to an approved testing plan, to omit any required data or to fail to submit any report required by such plan.

4. The facility served by the System and the System itself shall be open to inspection and sampling by the Department and the local approving authority at all reasonable times.

5. In accordance with applicable law, the Department and/or the local approving authority may require the System owner to cease operation of the system and/or to take any other action as it deems necessary to protect public health, safety, welfare and the environment.

6. The Department has not determined that the performance of the System will provide a level of protection to public health and safety and the environment that is at least equivalent to that of a sewer system. Accordingly, no System shall be upgraded or expanded, if it is feasible to connect the facility to a sanitary sewer, unless as allowed by 310 CMR 15.004.

7. Design and installation of the System shall be in strict conformance with the Company's DEP approved plans and specifications, 310 CMR 15.000 and this Approval.

8. The following table lists the monitoring requirements for Systems installed under this Approval. The following parameters shall be monitored and reported at each inspection: pH, influent biochemical oxygen demand (BOD_5), effluent carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), alkalinity, total nitrogen (TN). The BioBarrier unit's transmembrane pressure shall be monitored by reporting at each inspection the parameters: instantaneous flow rate, high water level and low water level. Also, the system aeration and anoxic zones shall be monitored for temperature and dissolved oxygen levels at each inspection. The inspector shall also conduct a visual and odor evaluation of the aeration compartment. Each time the System is monitored, the water meter, if a water meter is installed, shall be read and the water use recorded. All monitoring data shall be submitted to the Department and local approving authority within 45 days of the sampling date.

Facility Type	Design Flow (gpd)	Stream	Frequency	Sample Type
Residential	< 2,000	Effluent & Process Locations	Monthly for at least the first six months, quarterly thereafter for a total of 18 months	Grab
Non-residential	< 2,000	Influent, Effluent & Process Locations	Monthly for at least the first 18 months	Composite*

*Unless otherwise specified by the Department, composite shall be determined based on facility operation.

IV. **Conditions Applicable to the System Owner**

1. The System is approved in connection with the discharge of sanitary wastewater only. Any non-sanitary wastewater generated or used at the facility served by the System shall not be introduced into the System and shall be lawfully disposed of.

2. All effluent samples shall be taken at a flowing discharge point, i.e.- distribution box, pipe entering a pump chamber or other Department approved location from the treatment unit. Any required influent or process samples shall be taken at a point that will provide a representative sample of the required parameter. Sampling locations for collecting influent shall be determined by the system designer subject to written approval by the Department.

3. Operation and Maintenance agreement:

    i. Throughout its life, the System shall be under an operation and maintenance (O&M) agreement. The initial O&M agreement shall be for at least 18 months as described in Section V, items 7 through 9, with the Company or its licensed agents. Each subsequent O&M agreement shall be for at least one year.

    ii. No System shall begin operation until an O&M agreement is submitted to the Department and the local approving authority which:

        a. Provides for the contracting of a person or firm competent in providing services consistent with the System's specifications and the operation and maintenance requirements specified by the designer and any specified by the Department;

        b. Contains routine O&M activities specified by the Company necessary for proper operation of the System;

        c. Contains procedures for notification to the Department and the local approving authority within five days of a System failure or alarm event and for corrective measures to be taken immediately;

        d. Provides the name of a certified minimum Grade Level 4 (four) operator by the Board of Registration of Operators of Wastewater Treatment Facilities in accordance with Massachusetts regulations 257 CMR 2.00, that will operate, monitor and maintain the System at the frequency specified in Section III item 8 and anytime there is an alarm event.

4. After the first 18 months of System operation, if the System is approved as acceptable by the Department in accordance with section V item 11, the System owner shall maintain additional O & M and sampling agreements for a period of least one year with a Massachusetts certified operator of the appropriate grade. After the first 18 months of System operation, at the written request of the System owner, the Department may reduce System monitoring requirements.

5. Effluent discharge concentrations from the System shall meet or exceed secondary treatment standards of 30 mg/L $CBOD_5$ and 30 mg/L TSS. The effluent pH shall not be less than 6.0 or more than 9.0 standard units. The TN concentration in the effluent discharged from the System shall not exceed 19 mg/L for single family residential facilities or 25 mg/L for non-residential facilities.

6. During the first 18 months of System operation excluding the first six months of startup operations, if on two consecutive sampling events the effluent exceeds the TN limit of 19 mg/L or 25 mg/L, or the applicable $CBOD_5$ or TSS limitations, then the System owner shall in cooperation with the Company have the person or firm contracted to operate and maintain the System shall initiate monthly sampling and within 60 days submit a report to the Department explaining the reasons for the exceedances with recommendations for operational or design changes to prevent future violations. Quarterly sampling can be restarted once the system has met its effluent limits for two consecutive monthly samples.

7. During the first 18 months of System operation, the System owner in cooperation with the Company shall submit monitoring data and O & M inspection results to the Department and the Board of Health within 45 days of each sampling date and each inspection date. The inspection results must be recorded on a DEP approved inspection form and the System technology checklist, copies of which are attached to this Approval. Forms shall be completed by the System operator.

8. Anytime the operator is changed, within seven days of such change, the System owner shall notify the Department and the local approving authority in writing and submit a copy of the new agreement to operate and monitor the System.

9. The System owner shall at all times have the System properly operated and maintained in accordance with the Company's and the designer's operation and maintenance requirements and this Approval.

10. The System owner shall furnish the Department any information, which the Department may request regarding the System, within 21 days of the date of receipt of that request.

11. The System owner shall provide a copy of this Approval, prior to the signing of a purchase and sale agreement for the facility served by the System or any portion thereof, to the proposed new owner.

12. Prior to installation of the System, the proposed owner shall submit to the Department the written approval of the local approving authority, together with a copy of the complete application submitted to the local approving authority, and a complete BRP WP 64b application in order to obtain DEP written approval.

13. Prior to the issuance of a Certificate of Compliance for the System, the System owner shall record and/or register in the appropriate Registry of Deeds and/or Land Registration Office, a Notice disclosing both the existence of the alternative

septic system subject to this Approval on the property, and the Department's approval of the System. If the property subject to the Notice is unregistered land, the Notice shall be marginally referenced on the owner's deed to the property. Within 30 days of recording and/or registering the Notice, the System owner shall submit the following to the Department and the local approving authority: (i) a certified Registry copy of the Notice bearing the book and page/instrument number and/or document number; and (ii) if the property is unregistered land, a Registry copy of the owner's deed to the property, bearing the marginal reference.

14. Within fourteen days of the local approving authority's issuance of the Certificate of Compliance, the System owner shall submit a copy of the Certificate of Compliance to the Department.

V. Conditions Applicable to the Company

1. By January 31 of each year, the Company shall submit to the Department a report, signed by a corporate officer, general partner or Company owner, that contains information on the System for the previous calendar year. The report shall state: the number of units of the System sold for use in Massachusetts during the previous calendar year; the address of each installed System, the owner's name and address, the type of use (e.g. residential, commercial, school, institutional) and the design flow; and for all Systems installed since the date of issuance of this Approval, all known failures, malfunctions, and corrective actions taken and the address of each such event.

2. The Company shall notify the Director of the Wastewater Management Program at least 30 days in advance of the proposed transfer of ownership of the technology for which this Approval is issued. Said notification shall include the name and address of the proposed new owner and a written agreement between the existing and proposed new owner containing a specific date for transfer of ownership, responsibility, coverage and liability between them. All provisions of this Approval applicable to the Company shall be applicable to successors and assigns of the Company, unless the Department determines otherwise.

3. The Company shall make available to owners, operators, and installers of the System, in printed and electronic format: minimum installation requirements; an operating manual, including information on substances that should not be discharged to the System; a protocol for collecting samples; a maintenance checklist; and a recommended schedule for maintenance of the System. The Company shall develop and submit to the Department within 60 days of the effective date of this Approval a standard protocol essential for consistent and accurate measurement of performance of installed Systems, including procedures for sample collection and analysis of the System. The protocol shall be in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater.

4. The Company shall institute and maintain a program of operator training and continuing education. The Company shall maintain and annually update, and make the list of qualified System operators available by March 1st of each year. The Company shall also make the list known to the local approving authorities, the Department and users of the technology.

5. Prior to its sale of the System, the Company shall provide the purchaser with a copy of this Approval. In any contract for distribution or sale of the System, the Company shall require the distributor or seller to provide the purchaser of the System, prior to any sale of the System, with a copy of this Approval.

6. The Company shall furnish the Department any information that the Department requests regarding the System, within 21 days of the date of receipt of that request.

7. For at least the first 18 months of operation, the Company shall be responsible for operating, maintaining and monitoring the Systems in accordance with Section III, item 8 of this Approval. The Company shall submit monitoring data and O&M inspection results to the Department and the local approving authority within 45 days of each sampling date and each inspection date. The inspection results must be recorded on a DEP approved inspection form and a technology checklist. Accurate completion of the forms shall be the responsibility of the Company.

8. For nitrogen reducing Systems the effluent discharge concentrations shall meet or exceed secondary treatment standards of 30 mg/L $CBOD_5$ and 30 mg/L TSS. The effluent pH shall not be less than 6.0 or more than 9.0 standard units. The TN concentration in the effluent discharged from the System shall not exceed 19 mg/L or 25 mg/L.

9. During the first 18 months of operation, excluding the first six months of startup, should the effluent concentration from the System exceed the applicable TN limit on two consecutive sampling events, the Company shall initiate monthly sampling and within 60 days submit a report to the Department explaining the reasons for the exceedances with recommendations for operational or design changes to prevent future violations. Quarterly sampling can be restarted once the system has met its effluent limits for two consecutive monthly samples.

10. Within 30 days of the end of the first 18 months of operation the Company shall submit a summary report on each system describing the operations of the system, any changes in operation or design that were made during the Piloting period, the final results of the Piloting program for that system and whether the system met the effluent limits for the previous 12 months of operation. That report shall also include either recommendations for approving and ending the Piloting program for that system or recommendations for continuing Piloting for any system that has not performed as planned.

11. The Department will review the report(s) in item 10 above and determine if additional Piloting of the system is required. The Company shall either continue the Piloting program for that system as required by the Department or remove the system and replace it with a fully complying Title 5 system. If the Department determines that the system has performed at the relevant level for at least the final 12 months of the Piloting program, the Company can turn the responsibility for operation and monitoring of the system over to the system owner in accordance with Section IV, item 4 of this Approval.

12. If the Company wishes to continue this Piloting Use Approval after its expiration date; the Company shall apply for and obtain a renewal of this Approval. The Company shall submit a renewal application at least 180 days before the expiration date of this Approval, unless permission for a later date has been granted in writing by the Department.

VI. Reporting

1. All notices and documents required to be submitted to the Department by this Approval shall be submitted to:

Director
Wastewater Management Program
Department of Environmental Protection
One Winter Street - 5th floor
Boston, Massachusetts 02108

VII. Rights of the Department

1. The Department may suspend, modify or revoke this Approval for cause, including, but not limited to, non-compliance with the terms of this Approval, non-payment of the annual compliance assurance fee, for obtaining the Approval by misrepresentation or failure to disclose fully all relevant facts or any change in or discovery of conditions that would constitute grounds for discontinuance of the Approval, or as necessary for the protection of public health, safety, welfare or the environment, and as authorized by applicable law. The Department reserves its rights to take any enforcement action authorized by law with respect to this Approval and/or the System against the owner, or operator of the System and/or the Company.

VIII. Expiration date

1. Notwithstanding the expiration date of this Approval, any System sold and installed prior to the expiration date of this Approval, and approved, installed and maintained in compliance with this Approval (as it may be modified) and 310 CMR 15.000, may remain in use unless the Department, the local approving authority, or a court requires the System to be modified or removed, or requires discharges to the System to cease.