

Website for Technical Advisory Panel – Product Registration – New locations shown in Blue

2008 Meeting Calendar

- **Nov 20, 2008 (Thur) 10:00-3:30 Veterans Service Bldg; 5th Floor Conference Room; 20 West 12th Street, St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **Dec 12, 2008 (Friday) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes

2009 Meeting Calendar

- **Jan 22, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **Feb 19, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **Mar 19, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **Apr 16, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **May 21, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes
- **June 18, 2009 (Thur) 10:00-3:30 Minnesota Pollution Control; Board Room West; 520 Lafayette St., St. Paul**
 - Agenda
 - Handouts
 - Meeting Notes



Minnesota Pollution Control Agency

Subsurface Sewage Treatment Systems

How to Use the List of Registered Treatment and Distribution Products

October 2008

The new process for listing Registered Treatment and Distribution Products for Subsurface Sewage Treatment Systems (SSTS) was established in October 2008. The Lists of Registered Products, and accompanying information, provides additional guidance on the registered uses of treatment and distribution products; how and where these products are appropriately used, along with proper design, installation, operation, and maintenance requirements.

The products on the 'Lists' are registered for use in Minnesota. What this means is that listed products have demonstrated they meet minimum requirements contained in the current rules ([link to 7083.4000](#)). Manufacturers of proprietary products have provided documentation to the Minnesota Pollution Control Agency (MPCA), as specified in the rules, including an application and supporting technical information. Independent, third-party testing data are required as part of the submittal process. Manuals specific to Minnesota's requirements are prepared by manufacturers, and include design, installation, and operation and maintenance requirements.

A Technical Advisory Panel (TAP), composed of practitioners in the SSTS industry, is part of the product review process ([link to TAP webpage](#)). The TAP plays an important role in reviewing applications, providing recommendations to the MPCA, and helping to ensure product information is readily accessible and user-friendly.

Treatment Products

For treatment products, the List of Registered SSTS Treatment Products provides the name of the company, along with a link to the company website and contact information. The product name and model are listed, along with its rated capacity (design flow) for each model. Other information related to each model is listed. For example, if the product needs to be operated in a certain way (i.e.: in Mode 1 operation) or if Ultraviolet (UV) light disinfection is required as part of the treatment process, this is specified in the listing. A brief description of the treatment process is also provided in the listing. For registered distribution media, company and contact information is provided, along with information on how the product is to be used in Minnesota.

Treatment products are registered in Minnesota as products that either: 1) treat residential strength sewage or 2) treat commercial or high-strength sewage as follows:

- Category A – treatment products for residential strength sewage
- Category B – treatment products for commercial or high-strength sewage

Category A Products and Treatment Levels

Within Category A, proprietary treatment products are listed by their ability to treat residential sewage to a specific treatment level. There are five 'Treatment Levels' at which treatment products can be registered (Table 1). Products that meet the requirements of *Treatment Level A*

meet the highest treatment standard in removing organic matter (15 mg/L CBOD₅), total suspended solids (15 mg/L TSS), and pathogenic indicator organisms (1,000 cfu/100 ml fecal coliform bacteria).

Table 1. The five Treatment Levels for proprietary treatment products in Minnesota.

Treatment Level	CBOD ₅ (mg/L)	TSS (mg/L)	Fecal Coliform (#/100ml)	Nutrient (mg/L)
A	15	15	1,000	-
B	25	30	10,000	-
C	125	80	-	-
Total Nitrogen	-	-	-	20
Total Phosphorus	-	-	-	2

Products that meet *Treatment Level B* standards have been tested to reduce organic matter to 25 mg/L CBOD₅, total suspended solids to 30 mg/L TSS, and fecal coliform bacteria to 10,000 cfu/100 ml. Higher quality effluents using products that meet Treatment Levels A and B can be dispersed into suitable soils with reduced vertical separation and increased hydraulic loading rates, depending upon soil characteristics. Soil dispersal requirements using treatment products that meet Treatment Levels A and B are specified in Minnesota Rules Chapter 7080.2350. For a residential treatment product (Category A) listed under Treatment Level A, the product would also meet the ‘lower’ treatment standards for Treatment Level B and Treatment Level C.

Category B Products and Treatment Levels

Within Category B, products can be registered for treating high strength or commercial wastewater (i.e. restaurants, grocery stores). These products have been tested to specifically reduce wastewater from high strength to typical residential strength wastewater. These products would be listed as *Treatment Level C* products, or products tested to reduce wastewater to ‘typical’ residential strength (125 mg/L CBOD₅, 80 mg/L TSS, and 20 mg/L oil and grease).

Nutrient Listing

The List also identifies products registered for use in Minnesota that have been tested to reduce nitrogen and/or phosphorus. In order to be listed for nitrogen and phosphorus removal, independent third party testing has been completed and shown to meet a total nitrogen of 20 mg/L and total phosphorus of 2 mg/L, respectively.

Distribution Media Products

For distribution media products, the List of Registered SSTS Distribution Media Products provides the name of the company, along with a link to the company website and contact information. The product name and model are listed, along with information on how the product is to be used in Minnesota.

Distribution media are required to meet the following standards:

- be non-decaying and non-deteriorating and does not leach unacceptable chemicals when exposed to sewage and soil
- provides adequate void space (for the passage and temporary storage of effluent) while maintaining a stable density throughout the life of the system

- supports the distribution pipe, provides for suitable effluent distribution, and presents an interface with the infiltrative surface—trench bottom and side-wall soil—for absorption of the wastewater
- maintains integrity of the excavation, supports soil backfill and cover material, and weight of equipment used in backfilling

More regarding sizing systems (placeholder)

Product Information

Manufacturers provide information to the MPCA as part of the registration process. The items listed under the section ‘Product Information’ can be useful to system owners, designers, installers, service providers, and regulators on product application in Minnesota. The following provides a brief overview of the information under this section of the product listing:

- **Notice of Product Listing** – official notification letter from the MPCA to the manufacturer that the product is registered for use in Minnesota; describes its rated capacity, Treatment Level, and conditions for product use
- **Submitted Drawings** – drawings that show the layout of treatment or distribution product(s) that were submitted with the initial application for product registration
- **Known Limitations** – manufacturer specified known limitations of their treatment or distribution product
- **Service Contract** – service contract prepared by the manufacturer to ensure the product is properly serviced
- **Installation Manual** – manufacturer prepared installation manual showing how the product is properly installed
- **Operation and Maintenance Standards** – manufacturer explains how the product needs to be properly operated and maintained
- **Owners Manual** – manual prepared by the manufacturer that explains the product in detail, similar to a car owner’s manual
- **Regulators Checklist** – various checklists and inspection forms developed by the manufacturer for local inspectors (i.e.: what to inspect at the time of system installation)
- **Operating Permit** – operating permit template with suggested permit language and monitoring and maintenance requirements

Product Performance and Renewal

Proprietary treatment and distribution products are registered in Minnesota for up to three years, unless a product is recalled, found to be defective, or is no longer available. The product renewal process will include a feedback loop on product performance. Field assessments from local units of governments will be requested as part of product renewal. An independent, third-party audit of system performance may be needed to fully evaluate product performance as the registration process is fully implemented.

September 29, 2008

Minnesota Pollution Control Agency
525 South Lake Avenue, Suite 400
Duluth, MN 55802

VIA EMAIL

Attention: Barbara McCarthy

Reference: Approval of Orenco Systems Inc. AX-20 Unit by State of Minnesota

Dear Madam:

NovaTec Consultants Inc. operates an NSF-accredited test site in British Columbia, Canada. In 2000 and 2001 both the AX-10 and AX-20 Orenco treatment systems were tested in accordance with NSF Standard 40 protocol at our Mamquam test site in Squamish, British Columbia, Canada. Testing of the AX-10 unit lasted for over 13 months while that of the AX-20 unit lasted for 6 months. Each unit consisted of a two-compartment 1500 gal tank, the first compartment (1000 gal) being a primary tank and the second compartment (500 gal) being a recirculation tank that intermittently pumps its contents through textile filter media housed in a pod. The size of the textile filter media for the AX-20 was double that of the AX-10.

We have been requested by Orenco Systems, based on the results of the above noted testing, to provide an opinion on the ability of the AX-20 unit to meet the State of Minnesota 30-day average limit of 15 mg/L for each of cBOD₅ and TSS for a flow of 600 gpd generated from a 4-bedroom home.

Orenco has been advised by the State of Minnesota that the 600 gpd value represents a peak flow and that the average daily flow would be about 70% of the peak flow (ie, around 420 gpd).

AX-20 Testing Results

The unit was fed at an average daily flow of 500 gpd. Based on the above interpretation of average flow for Minnesota, we conclude that the unit was tested at an average flow which exceeds the Minnesota average daily flow of 420 gpd by about 20%.

A summary of the pertinent NSF test results is presented in Table 1 and Figures 1 and 2. More detailed information and results can be provided, if desired. During the six months of testing the unit achieved an overall average effluent cBOD₅ of 5 mg/L and an average effluent TSS of 4 mg/L.

Table 1: Comparison of AX-20 NSF Test Results With State of Minnesota Limits

Parameter	Unit	State of Minnesota Limit	AX-20 NSF Test Results
Peak day flow (1)	gpd	600	568
Average day flow (2)	gpd	420	500
Maximum 30-day average cBOD ₅ during 6 month test period (3)	mg/L	15	8
Maximum 30-day average TSS during 6 month test period	mg/L	15	11
CBOD ₅ measured during maximum day flow	mg/L		13
TSS measured during maximum day flow	mg/L		4

Notes:

- (1) Occurred during the first month of testing and lasted three days
- (2) Average day flow for Minnesota based on assumption that it equals 70% of peak day flow
- (3) The maximum 30-day average cBOD₅ concentration was measured during the first 30-day period of testing

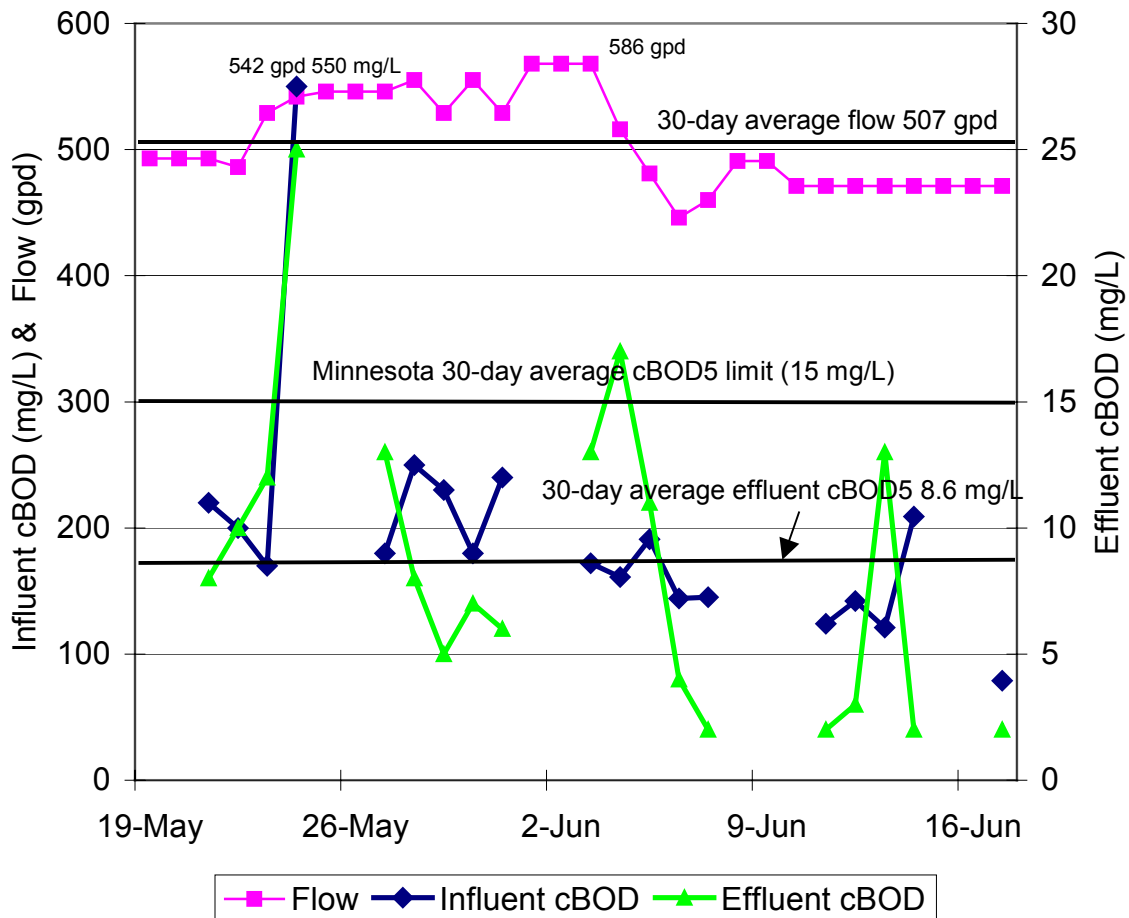
With regards to peak flow loading, the NSF testing protocol is based on feeding the test unit at a predetermined sustained daily flow that is not intended to change¹. In reality it is virtually impossible to maintain a constant flow rate during the entire six month test period and the testing protocol allows for $\pm 10\%$ variability of flow within any thirty-day test period.

When the AX-20 unit was tested, there were occasional high flows and the highest recorded peak flow occurred during the first month of testing between June 2 and 4 with flows averaging 568 gpd for three consecutive days. This flow was 14% higher than the test objective of 500 gpd and is only 5% lower than the State of Minnesota peak flow of 600 gpd. A composite sample collected on June 4 on the third day of loading at this high flowrate had a cBOD₅ and TSS concentration of 13 and 4 mg/L, respectively.

We note that during that same 30-day period the test unit received an average flow of 507 gpd which exceeded the Minnesota “average” by over 20%. The treated effluent quality with respect to cBOD₅ during that first 30-day of testing was the highest of the entire 6 month testing period and averaged 8.6 mg/L which is just under 60% of the Minnesota limit.

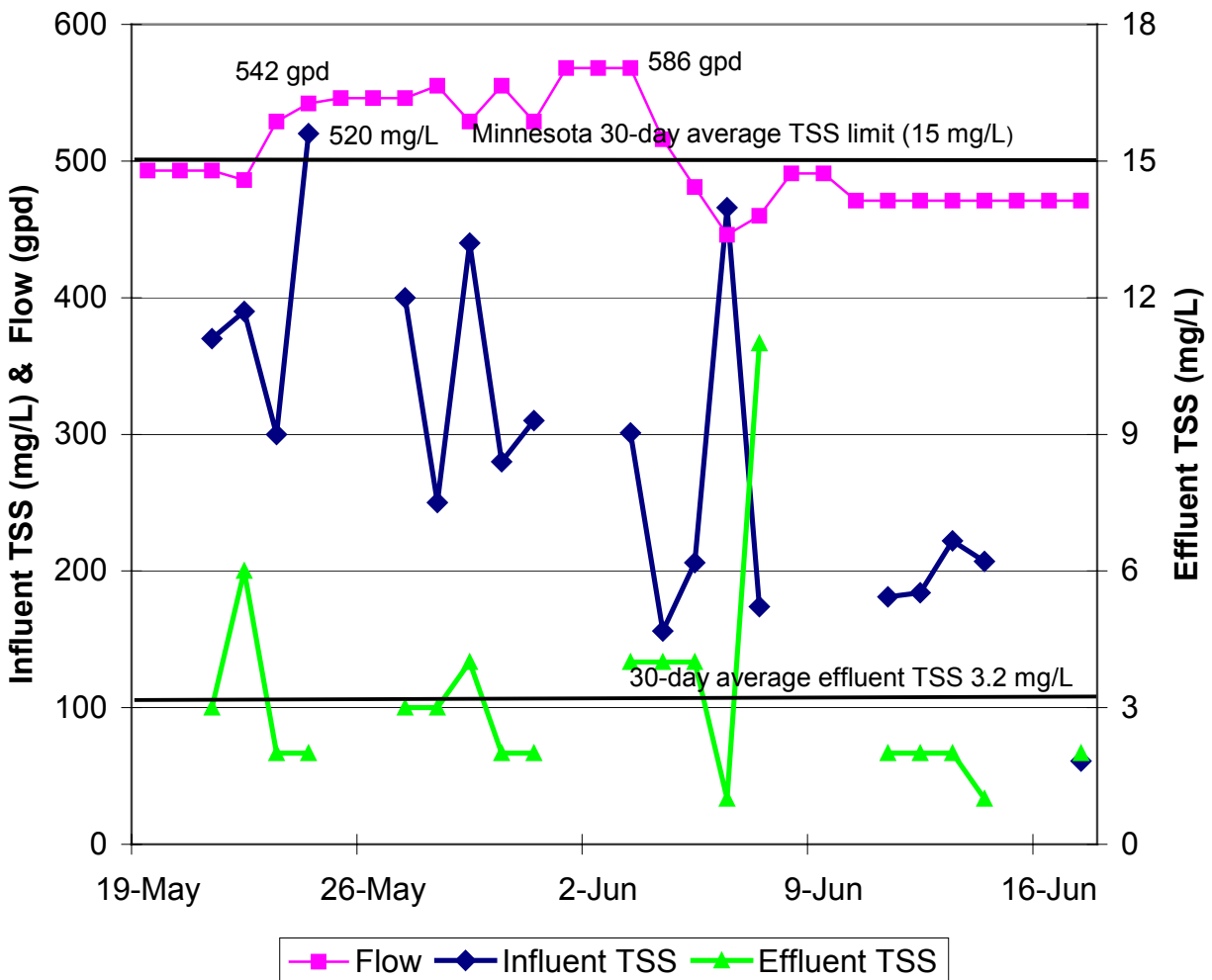
¹ The exceptions being during the stress test periods when the flow rate is reduced or shut off on specific days.

Figure 1: Flow and cBOD₅ During First 30 Days of Testing



Orenco opted to forego the typical 3 week start up period in favour of a one week start up period in order to demonstrate early cBOD₅ removal gained by their textile filter media filtration characteristics. System start up was on May 14 and on May 25 the unit was subjected to a flow of 542 gpd containing a cBOD₅ and TSS concentration of 550 mg/L and 520 mg/L, respectively. Both of these concentrations were considerably above the maximum 30-day average NSF Standard 40 limit (300 mg/L for cBOD₅ and 350 mg/L for TSS) and the combined effect of high flow and high cBOD₅ and TSS represented an equivalent per capita loading of 14 persons for cBOD₅ and 12 persons for TSS. Treated effluent quality on May 25 was 25 mg/L for cBOD₅ and 2 mg/L for TSS.

Figure 2: Flow and TSS During First 30 Days of Testing



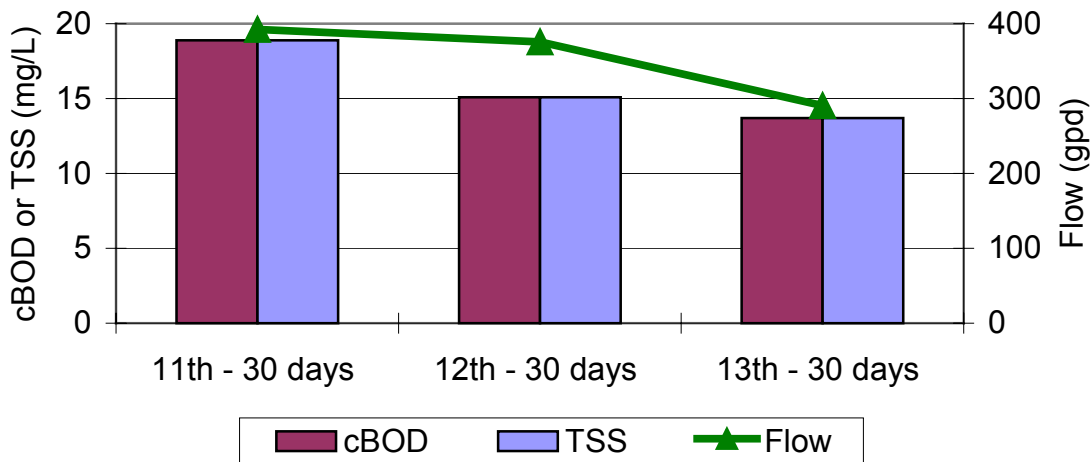
AX-10 Testing Results

An AX-10 unit was operated for 13 months at our test site under various configurations and hydraulic loading regimes. In the last three months of testing the average hydraulic loading was reduced from the 500 gpd flow at which it operated during the first 10 months of testing to 400 and then to 300 gpd. Thirty day average data for those last three months of testing is presented in Figure 3.

The AX-10 was just able to meet the 30-day 15 mg/L limit for both cBOD₅ and TSS at an average flow of 375 gpd and was below those limits at an average flow of 290 gpd.

Keeping in mind that the scale up factor between the AX-10 and AX-20 units applies mostly to the textile media (which is responsible for BOD reduction), the AX-10 data with respect to cBOD₅ performance would be the equivalent of an AX-20 unit loaded at double the flow rate of the AX-10 unit (ie, at least 580 gpd average flow) which is about 38% higher than the State of Minnesota average flow rate of 420 gpd and almost equal to the State of Minnesota peak flow rate of 600 gpd.

**Figure 3: AX-10 Performance At 300 to 400 GPD
Average Flow Rate**



Conclusion

Based on the above test results and discussion, we conclude that the AX-20 unit should be able to meet the State of Minnesota 30-day average limits for cBOD₅ and TSS at a peak flow of 600 gpd.

Yours truly,
NOVATEC CONSULTANTS INC.

O. (Sam) Turk, Ph.D., P.Eng.
Senior Environmental Engineer
Managing Director

cc: Sam Carter, Orenco Systems Inc.



Checklist for Product Registration

Submittal Requirements for Proprietary Treatment Products

Name of Manufacturer: Bio-Microbics, Inc.
Identification Number: 2008-006

Proprietary Treatment Product Checklist	
Application: New Submittal Date 09/03/08; Test Reports 10/20/08	
Application Status: <ul style="list-style-type: none"> Incomplete: If incomplete, return application (<i>Return letter with comments, Action Date Returned</i>). Complete: If complete, review process done within 60 days and Complete Listing of the Product (<i>Approval letter, Listing of Product, Action Date Approval</i>) 	Some issues to discuss
Submittal Requirements to List Treatment Products as a Registered Product:	
Applicant Information:	
Manufacture's name, mailing address, street address, telephone number	X
Contact individual name (vested with authority to act as agent), address, telephone number	X
Product Information:	
Name of product, including brand and model: RetroFAST, MicroFAST, High Strength FAST – 22 'models' (ranging from 150 gpd to 9000 gpd). Includes both Category A (residential) and Category B (high-strength) treatment devices	X
Description of the function of the product(s) – yes	X
Description of any known limitations on the use of the product – 1) Service Manual and 2) Field Inspection and Service Report	X
Product description and technical information to include:	X
<ul style="list-style-type: none"> Process flow diagrams and schematics - yes 	
<ul style="list-style-type: none"> Materials and characteristics -yes 	
<ul style="list-style-type: none"> Component design specifications -yes 	
<ul style="list-style-type: none"> Design capacity –yes 	
<ul style="list-style-type: none"> Volumes and flow assumptions and calculations 	

• Components – yes	
• Dimensioned drawings - yes	
• Photos - yes	
For treatment systems in Category B, daily capacity of the model or models in lb/day CBOD – 5 Models - 1.0, 1.5, 3.0, 4.5 and 9.0 with lbs BOD/day	
Siting and installation requirements – yes All installer should be approved by Bio-Microbics.	X
Detailed description, procedure, and schedule of routine service, system maintenance events – yes – Owners Manual, Service Manual, O & M Manual	X
Estimated operation costs for the 1 st 5 years of the treatment components life (both estimated annual electricity costs and routine maintenance costs, including replacement of parts). – yes Item I in Application.	X
Identification of information subject to be protected from disclosure of trade secrets or confidential business information – None	X
Copies of product brochures and manuals:	X
• Sales and promotional -yes	
• Design – no ‘design manual’ but include schematics, design flow	
• Installation - yes	
• Operation and Maintenance - yes	
• Homeowner Instructions -yes	
Testing Results:	
The most recently available product test protocol and results report: 5 Reports were submitted directly by NSF (4 NSF, 1 ETV)	X
All available product testing results, including a listing of state approvals and denials - yes Section M of Application.	
Certification Statement:	
Signed and dated certification statement by authorized senior executive or authorized agent, with the following statement: “I certify that I represent (MANUFACTURING COMPANY NAME) and I am authorized to prepare or direct the preparation of this application for registration. I attest, under penalty of law, that this document and all attachments are true, accurate, and complete. I understand and accept that the product testing results reported in this application for registration are the parameters and values to be used for determining conformance with treatment system performance testing levels established in Minnesota Rules, part 7083.4030.”	X Dated Aug 1, 2008
Signed and dated certification statement from the testing entity including the statement: “ I certify that I represent (INSERT TESTING ENTITY NME) and that I am authorized to report the testing results for this proprietary product. I attest, under penalty of law, that the report about the test protocol and results is true, accurate, and complete.”	Report directly sent by NSF.

Test Data:

See Listing for general discussion – 5 Reports and 22 Products.	
Final Review Sign-off:	
Application meets all specified requirements for Proprietary Treatment Product Registration	
Date of Application Approval	
Reviewer Name Barb McCarthy	

Discussion Points for TAP meeting – Identified by Reviewer:

1. More time needed to review application and all Reports; engineer review to be done.
2. Review NSF, ETV State of Washington listings
3. Review Draft Listing (for discussion purposes only) – Discuss issues (i.e.: flow >1500 gpd), High-strength waste, Disinfection for various models (ie:0.75)
4. Design manual needed or drawings enough for designer
5. Service Contract
6. Septic tank per local requirements.
7. List of manufacturer-certified practitioners

Listing of Registered Treatment and Distribution Products for Subsurface Sewage Treatment Systems (SSTS)

Manufacturers of Registered Category A (Residential) Proprietary Treatment Products				
<p>Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227</p> <p>Phone: 800-753-3278 Phone: 913-422-0707 Fax: 913-422-0808 Email: jbell@biomicrobics.com Web: http://www.biomicrobics.com</p>				
Product Name Model	Design Flow	Treatment Process	Treatment Level(s)	Product Information
FAST Wastewater Treatment System RetroFAST Model 0.375 <i>(Model 0.15, Model 0.25)</i>	375	Attached and Suspended Growth	C and TN	<ul style="list-style-type: none"> • Notice of Product Listing • Submitted Drawings • Known Limitations • Service Contract • Installation Manual • Operation and Maintenance Standards • Owners Manual • Regulators Checklist • Operating Permit
FAST Wastewater Treatment System MicroFAST Model 0.5 MicroFAST Model 0.75 MicroFAST Model 0.9 MicroFAST Model 1.5 <i>MicroFAST Model 3000</i> <i>MicroFAST Model 4500</i> <i>MicroFAST Model 9000</i>	500 750 900 1500	Attached and Suspended Growth	C and TN	
FAST Wastewater Treatment System MicroFAST Model 0.5 w/Salcor UV unit <i>Model 0.75 w/Salcor UV unit</i> <i>Model 0.9 w/ Salcor UV unit</i> <i>Model 1.5 w/Salcor UV unit</i>	500	Attached and Suspended Growth and Ultraviolet (UV) Light Disinfection	A and B and TN	

Blue indicates link to an email address, the manufacturer's webpage, and documents on the MPCA website

Listing of Registered Treatment and Distribution Products for Subsurface Sewage Treatment Systems (SSTS)

Manufacturers of Registered Category B (High-Strength) Proprietary Treatment Products				
<p>Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227</p> <p>Phone: 800-753-3278 Phone: 913-422-0707 Fax: 913-422-0808 Email: jbell@biomicrobics.com Web: http://www.biomicrobics.com</p>				
Product Name Model	Design Flow	Treatment Process	Treatment Level(s)	Product Information
<p>FAST Wastewater Treatment System</p> <p>HighStrengthFAST</p> <p><i>Model 1.0 ≤ 2.0 Lbs BOD/Day</i> <i>Model 1.5 ≤ 3.25 Lbs BOD/Day</i> <i>Model 3.0 ≤ 6.5 Lbs BOD/Day</i> <i>Model 4.5 ≤ 9.5 Lbs BOD/Day</i> <i>Model 9.0 ≤ 17.0 Lbs BOD/Day</i></p> <p>Any system designed for high-strength waste needs to be evaluated and approved by Bio-Microbics.</p>		Attached and Suspended Growth	C	<ul style="list-style-type: none"> • Notice of Product Listing • Submitted Drawings • Known Limitations • Service Contract • Installation Manual • Operation and Maintenance Standards • Owners Manual • Regulators Checklist • Operating Permit

Blue indicates link to an email address, the manufacturer's webpage, and documents on the MPCA website



Checklist for Product Registration

Submittal Requirements for Proprietary Treatment Products

Name of Manufacturer: Premier Tech Environment
Identification Number: 2008-005

Proprietary Treatment Product Checklist	
Application: New Submittal Date 09/02/08	
Application Status: <ul style="list-style-type: none"> Incomplete: If incomplete, return application (<i>Return letter with comments, Action Date Returned</i>). Complete: If complete, review process done within 60 days and Complete Listing of the Product (<i>Approval letter, Listing of Product, Action Date Approval</i>) 	Some issues to discuss
Submittal Requirements to List Treatment Products as a Registered Product:	
Applicant Information:	
Manufacture's name, mailing address, street address, telephone number	X
Contact individual name (vested with authority to act as agent), address, telephone number	X
Product Information:	
Name of product, including brand and model: Ecoflo Peat Filter – 7 models proposed (600 and 420 gpd; open bottom and closed bottom; fiberglass and concrete shell). ST=Open Bottom (drains out bottom), STB = Closed Bottom	X
Description of the function of the product(s) – yes, several locations	X
Description of any known limitations on the use of the product – description provided in Owners Manual	X
Product description and technical information to include:	X
<ul style="list-style-type: none"> Process flow diagrams and schematics - yes 	
<ul style="list-style-type: none"> Materials and characteristics -yes 	
<ul style="list-style-type: none"> Component design specifications -yes 	
<ul style="list-style-type: none"> Design capacity –yes 	
<ul style="list-style-type: none"> Volumes and flow assumptions and calculations 	

• Components – yes	
• Dimensioned drawings - yes	
• Photos - yes	
For treatment systems in Category B, daily capacity of the model or models in lb/day CBOD - NA	
Siting and installation requirements - yes	X
Detailed description, procedure, and schedule of routine service, system maintenance events – yes	X
Estimated operation costs for the 1 st 5 years of the treatment components life (both estimated annual electricity costs and routine maintenance costs, including replacement of parts). – yes ~\$1,700 for 5 years.	X
Identification of information subject to be protected from disclosure of trade secrets or confidential business information – None	X
Copies of product brochures and manuals:	X
• Sales and promotional -yes	
• Design – no ‘design manual’ but include schematics, design flow	
• Installation - yes	
• Operation and Maintenance - yes	
• Homeowner Instructions -yes	
Testing Results:	
The most recently available product test protocol and results report: NSF Standard 40 Report dated November 2005	1 NSF Report provided
All available product testing results, including a listing of state approvals and denials Listing of state approval submitted	X
Certification Statement:	
Signed and dated certification statement by authorized senior executive or authorized agent, with the following statement: “I certify that I represent (MANUFACTURING COMPANY NAME) and I am authorized to prepare or direct the preparation of this application for registration. I attest, under penalty of law, that this document and all attachments are true, accurate, and complete. I understand and accept that the product testing results reported in this application for registration are the parameters and values to be used for determining conformance with treatment system performance testing levels established in Minnesota Rules, part 7083.4030.”	X Dated Aug 5, 2008
Signed and dated certification statement from the testing entity including the statement: “ I certify that I represent (INSERT TESTING ENTITY NME) and that I am authorized to report the testing results for this proprietary product. I attest, under penalty of law, that the report about the test protocol and results is true, accurate, and complete.”	Need Report(s) directly from NSF

Test Data:

Product tested according to product and testing protocol – NSF Standard 40 Nov 2005. cBOD = 2 mg/L TSS = 2 mg/L	
Tested Model STB-500 – with a rated capacity (design flow) of 420 gpd.	
No test data provided for Model STB-650 for the rated capacity of 600 gpd?	
Product tested for fecal coliform reduction by NSF. Need NSF summary of the fecal coliform data meeting requirements of bacterial reduction protocol, MR Chapter 7083.4060?	
Treatment Level A – need data as per rules for Treatment Level A designation (7083.4060)	
Final Review Sign-off:	
Application meets all specified requirements for Proprietary Treatment Product Registration	
Date of Application Approval	
Reviewer Name Barb McCarthy	

Discussion Points for TAP meeting – Identified by Reviewer:

1. The ST-650 (600 gpd) model. The ST-500 was tested by NSF at 420 gpd.
2. Testing for bacteria reductions as per 7083.4060. The raw data is listed in the NSF Report dated November 2005 (30 day averages). This is registered in Washington State at the following: 15 mg/L cBOD, 15 mg/L TSS, 1,000 cfu/100ml.
3. Open bottom peat filters. For Type IV systems (prescriptive), require soil loading as per 7083.2350, Table XI (minimum vertical separation, pressure distribution, timed dosing) and Table XII (maximum loading rates). The Installation Guide indicates that 12-24 inches of permeable soil is needed for bottom drain peat filters.
4. No surface discharge without state NPDES permit. This is shown in several places (ie as a Type 6 configuration on page 14/14).
5. There is an Installation Guide but no Design Guide. Should a separate Design guide be developed, or incorporate with the Installation Guide?
6. Drawing needed for each of the 7 models seeking registration (and when 2 and 3 modules are used, their configuration).
7. Any issues with pump vault at bottom in concrete tank?
8. Under limitations – never use a garbage disposal or sewage pump upstream of the septic tank. What is required, if present?

9. In Owners Manual, page 3/7, wiring diagram is in French.
10. Requirement for disposal of spent peat (~4 tons of used filter material) – indicated a landfill or waste reclamation site. It would be required to be a MPCA approved landfill (used mainly for daily cover) or landspread per 7080.2500 Subpart 3.
11. No “Regulators” checklist provided for construction inspection.
12. No “Service Contract”.
13. Need to get the NSF Report directly from NSF before registration.
14. Septic tank per local requirements – also in registration letter.
15. Annual maintenance is required – this will be stated in the registration letter as a condition of use in Minnesota (part of operating permit).
16. Effluent screen required – in registration letter and condition of use in Minnesota.
17. List of manufacturer-certified service providers (and designers and installers)?

Listing of Registered Treatment and Distribution Products for Subsurface Sewage Treatment Systems (SSTS)

Manufacturers of Registered Category A (Residential) Proprietary Treatment Products				
Premier Tech Environment 1 Avenue Premier Riviere-du-Loup Quebec, Canada G5R 6C1 Phone: 450-978-5034 Fax: 418-862-6642 Email: belm2@premiertech.com Web: http://www.premiertechenv.com				
Product Name Model	Design Flow	Treatment Process	Treatment Level	Product Information
Ecoflo Peat Filter – Closed bottom models; Fiberglass Shell STB-500 (gravity discharge) STB-500-2 STB-650 (gravity discharge) STB-650-2 STB-650-3	 420 840 600 1200 1500	 Attached Growth Single-pass Packed Bed Filter	 A, B and C	<ul style="list-style-type: none"> • Notice of Product Listing • Submitted Drawings • Known Limitations • Service Contract • Installation Manual • Operation and Maintenance Standards • Owners Manual • Regulators Checklist • Operating Permit
Ecoflo Peat Filter – Closed bottom models; Concrete Shell STB-650B (gravity discharge) STB-650B-2 STB-650B-3 STB-650BR (pump discharge) STB-650BR-2 STB-650BR-3	 600 1200 1500 600 1200 1500	 Attached Growth Single-pass Packed Bed Filter	 A, B and C	

Blue indicates link to an email address, the manufacturer's webpage, and documents on the MPCA website

Recommended Standards and Guidance for Performance, Application, Design, and Operation & Maintenance

Public Domain Distribution Technologies for Subsurface Sewage Treatment Systems

Drain Rock Distribution Media For Trenches, Seepage Beds, At-grades and Mounds

October 23, 2008 Draft



For information or additional copies of this document contact:
Minnesota Pollution Control Agency – Municipal Division
Mailing address: xx

Tel: xx
FAX: xx
Webpage: <http://www.>

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MPCA Publication #

How this document is organized:

Standards Section	Explanation
Introduction	Purpose of the document, general background information
Performance Standards	How this technology is expected to perform
Application Standards	How this technology is to be applied. This section includes conditions that must be met prior to proceeding with design. Topics in this section describe the “registered” status of the technology, listing requirements, permitting, installation, testing, inspection requirements, etc.
Design and Installation	How this technology is to be designed and constructed (includes minimum standards that must be met).
Operation and Maintenance	How this technology is to be operated and maintained (includes responsibilities of various parties, recommended maintenance tasks and frequency, assurance measures, etc)
References	List of references cited in the document

Introduction

Public domain drainfield rock distribution media is the material addressed in these standards. The Recommended Standards and Guidance contained in this document were developed for statewide application. The document was written to provide technical information regarding the quality and use of what is commonly called ‘drainfield rock’ in the Subsurface Sewage Treatment System (SSTS) industry. Drainfield rock is a type of distribution media used in soil treatment systems, including trenches, beds, at-grades, mounds, sand filters and other treatment systems. Synthetic distribution media, made from various recycled or synthetic materials, are also widely available for use as a distribution media in soil treatment and dispersal systems.

Public domain distribution technologies are products developed without a patent. Drainfield rock is a public domain distribution technology (Minnesota Rules Chapter 7080.4000 Subp. 1.B.3.); there is no patent on this product. Another example of a public domain material is the sand used in a mound or sand filter. The purpose of drainfield rock is to temporarily store and convey wastewater to the soil’s infiltrative surface (absorption area) in all soil treatment systems. The infiltrative surface is the interface where effluent moves from the distribution media and into the treatment media or soil (Decentralized Wastewater Glossary, 2007).

Drainfield rock is a material obtained from gravel pits in Minnesota and neighboring states. The rock is produced by screening, grading, and washing to meet the desired specifications. In some regions of Minnesota, sand and gravel deposits are common; other areas lack significant suitable geologic deposits.

Distribution media also include proprietary distribution products typically produced from recycled or synthetic materials. Proprietary distribution products are developed by companies and obtain a patent to protect a product from being manufactured by others. Both proprietary and public distribution media provide similar functions; each type of distribution media temporarily stores and conveys wastewater to the soils infiltrative surface. There are pros and cons for using different types of distribution media. A companion document for proprietary distribution media is found on the MPCA website at <http://www.xx>.

The purpose of this Recommended Standards and Guidance document is to identify requirements for drainfield rock distribution media to ensure it is suitable for use in soil treatment systems. Furthermore, this document identifies quality control measures and Best Management Practices that can be used to ensure drainfield rock stays ‘clean’ when stored, transported, and handled prior to system construction.

Performance Standards

Listing

Drainfield rock distribution media (also called drainfield rock) is a material mined from quarries and gravel pits. Drainfield rock must meet minimum specifications when used in soil treatment and dispersal systems. The MPCA does not require that each gravel pit owner ‘register’ drainfield rock (or mound sand) when used in soil treatment and dispersal systems. However, drainfield rock must meet minimum requirements. In the end, the Installer is responsible to ensure that the right materials are used in the construction of treatment and dispersal systems.

This document provides the standards for drainfield rock distribution media and the recommended quality control assurance that designers, installers, and local governmental units (LGU’s) use when drainfield rock is the selected distribution media in trenches, beds, at-grades, and mounds.

In general, drainfield rock shall be clean, sound, and durable. Rock needs to be washed (double to triple washed) in order to remove the small particles that contribute to soil clogging. Dirty rock contains too many fines; the fines are small silt and clay particles. Uniform rock size is preferred to obtain the maximum void space for the temporary storage of effluent. The hardness of the rock is also important; limestone has been an issue in some parts of southern Minnesota. Drainfield rock must not break down during transport or when used in the sewage system.

Ultimately, the MPCA licensed Installer is responsible to ensure that all products, including suitable drainfield rock, are used in the construction of soil treatment and dispersal systems (Chapter 7083.0760.Subpart 2. D and G).

Performance Criteria

All distribution media used in sewage systems shall meet four basic criteria (Chapter 7080.4070):

- be non-decaying and non-deteriorating and does not leach unacceptable chemicals when exposed to sewage and soil;
- provides adequate void space (for the passage and temporary storage of effluent) while maintaining a stable density throughout the life of the system;
- supports the distribution pipe, provides for suitable effluent distribution, and presents an interface with the infiltrative surface—trench bottom and side-wall soil—for absorption of the wastewater; and,
- maintains the integrity of the excavation, supports soil backfill and cover material, and weight of equipment used in backfilling.

Application Standards

Permitting

Permitting and installation of systems using drainfield rock distribution media are subject to state and local requirements.

The local governmental unit construction permit must specify, among other items normally required within the specific local governmental unit jurisdiction, the following items:

- Name, mailing address, telephone number and email address.
- Property Identification Number and address or other description of property location.
- Site Evaluation Report as described in Chapter 7080.1730.
- Design Report as described in Chapter 7080.2430.
- Management Plan as described in Chapter 7082.0600.

General Conditions

Drainfield rock distribution media may be used in trenches, beds, at-grades, and mounds and in all systems types (Type I through Type V). Drainfield rock distribution media may incorporate any combination of the following design elements:

- gravity flow distribution
- pressurized distribution
- timed dosing
- zoned or alternating subsurface sewage treatment systems

Influent Wastewater Characteristics

Wastewater from residential sources must receive pre-treatment at least equal to that provided in a septic tank before discharge to the drainfield rock distribution media and into the soil or mound sand media as described in Chapter 7080.xxxx and Chapter 7081.xxxx.

Wastewater from non-residential sources, or high-strength wastewater from residential sources must receive pre-treatment sufficient to lower the waste-strength to the level of that commonly found in domestic residential septic tank effluent before discharge to a drain rock distribution media as described in Chapter 7080.xxxx and Chapter 7081.xxxx.

Specifications for Drainfield Rock Distribution Media *this section, modified – ‘list’ on web*

Drainfield rock must be clean, durable, broken or crushed stones, or screened gravel, meeting the size gradation shown in Table 1 using the wet sieve test. Drainfield rock shall be free of silt, lumps of clay, mud, dirt, organic material, or other deleterious substances. Drainfield rock shall not contain more than 1 percent fines (#200 sieve) using the wet sieve test.

Limestone and other potentially soft rocks shall be tested for both loss of abrasion and loss of soundness. The rock shall: 1) have a loss of abrasion of ~~not more than 40 percent~~ less than 35 percent using ASTM C 535 (smaller than 3 inch) ~~or AASHTO Method T 96 (smaller than 1-½ inch)~~, and 2) not have a loss of soundness (magnesium sulfate) of more than 15 percent at the end of 5 cycles using AASHTO Method T 104.

An adequate amount of testing shall be performed by gravel pit and quarry owners to ensure drainfield rock meets the required specifications. *Check MNDOT sampling and testing frequencies - see if it applies here.*

Table 1. Drainfield rock size specifications

SIEVE SIZE	PERCENT PASSING (by weight)
2.5-inch	100
1.5-inch	90 – 100
1-inch	20 - 55
¾-inch	0 – 15 (15% seems high)
3/8-inch	0 – 5
#40	0 – 3
#200	0 – 1

Design and Installation

When drain rock distribution media is used in the construction of trenches, beds, at-grades and mounds, the following practices apply:

- For trenches, the bottom absorption area (infiltrative surface) in a one-foot long by three-foot wide trench filled with six-inches of drainfield rock below the gravity distribution pipe is three (3) square feet.
- For trenches using gravity distribution, the bottom absorption area may be reduced by the following percentages:
 - 20 percent for loading 12 to 17 inches of sidewall absorption below the gravity distribution pipe
 - 34 percent for loading 18 to 23 inches of sidewall absorption below the gravity distribution pipe

- 40 percent for 24 inches of sidewall absorption below the gravity distribution pipe.
- For seepage beds, the bottom absorption area (infiltrative surface) is one (1) square foot per square foot of rockbed.
- For trenches and seepage beds, there needs to be a layer of at least six inches of drainfield rock distribution media below the distribution pipe (Chapter 7080.xx). For trenches and seepage beds, a 4-inch vertical inspection pipe must be installed in the distribution rock at the end of each trench and seepage bed (Chapter 7080.2210 Subpart 3 B).
- For at-grades, the bottom absorption area (infiltrative surface) is one (1) square foot per square foot of rockbed. A 4-inch vertical inspection pipe must be installed at the drainfield rock and soil interface along the downslope bed (Chapter 7080.2230 Subpart 3 G).
- For mounds, the bottom absorption area (infiltrative surface) is one (1) square foot per square foot of rockbed. A 4-inch vertical inspection pipe must be installed at the drainfield rock and sand interface (Chapter 7080.2220 Subpart 3 O).
- For all systems a durable, non-woven geotextile fabric must be used to cover the drainfield rock distribution media. The fabric must be of sufficient strength to undergo installation without rupture. The fabric must permit the passage of water without passage of overlying soil material into the drainfield rock medium (Chapter 7080.2150. Subpart 3.F).
- For all systems, the top and bottom of the drainfield rock distribution media must be level along the contour. Sidewalls must be as vertical as practical and not intentionally sloped (Chapter 7080.2210 Subpart 4 C).
- For all systems, the minimum depth of soil cover, including topsoil borrow over the drainfield rock distribution media, is 12 inches (Chapter 7080.2210 Subpart 4 D).

Installation and Quality Control Considerations

When placing drain rock into an excavation, the Installer shall ensure that drainfield rock is of suitable quality and placed into the excavation in a fashion that maintains the infiltrative surface of the soil. The Installer shall verify the quality of drainfield rock at the pit and/or when delivered to the site to ensure it meets the required specifications.

If the quality of the gravel washing process is poor, the silt particles remaining on the surface of the drain rock will likely be washed when the system is loaded with effluent. This can result in a layer of fines (clay and silt) that accumulate along the surface, thereby reducing infiltrative capacity. Furthermore, if drainfield rock is 'mishandled' on site, it can become contaminated with grass, soil and other materials and debris when drainfield rock is moved around with heavy equipment.

The pit operator and Installer can follow some simple Best Management Practices (BMPs) when loading and moving drainfield rock around so it remains clean and will not become contaminated with fines, silt and clay clods, and other undesirable materials.

The following techniques can be used as tools to help determine the suitability of drainfield rock:

- Test Results for the Facility. This would include the wet sieve analyses, soundness test, and abrasion test, along with a statement the material meets MPCA drainfield rock specifications.
- Collect Independent Samples. Properly collect drainfield rock samples and have tested at materials testing laboratory.
- Use Field Screening Techniques. Screening tools do not replace the testing performed by qualified laboratories. However, screening tools can help both the Installer and Inspector determine the general suitability of drainfield rock, including fines and hardness.

Screening Tool for Fines

Use a quart size mason jar. Fill the jar with rock. Add water and shake for 1 minute. Wait for 30 minutes. Check to see if a film forms on the surface or if fines collect. There should be NO measurable amount of fine material in the jar. If the fines can be measured, a sieve analysis should be performed or reject the drainfield rock (Installation of Wastewater Treatment Systems, Consortium of Institutes for Decentralized Wastewater Treatment, Draft 2008).

Screening Tool for Hardness

Get the procedure - how to use the “hardness kit” to determine rock hardness (3 or 4 Mhos or greater).

Other techniques may be useful as an observant Installer and Inspector. Look for fines on rock surfaces. Pick up a handful of drainfield rock and observe ‘fines’ on your fingertips. Check for dustiness when the drainfield rock is loaded or unloaded; dust would indicate the rock is too dirty and should be rejected.

Best Management Practices (BMPs)

A few simple (BMP’s) can be used to minimize contamination of drainfield rock with fines, dust, clods of silt and clay, and other undesirable materials. The BMP’s can be used by operators loading drainfield rock at the pit and by Installers moving rock around on the construction project.

- Best Management Practices at the Gravel Pit or Quarry:

- Leave a bottom layer of rock at the pit when loading the truck. Do not scoop up all the rock because it will mix with the underlying soil and the load will become contaminated with soil and/or fines
 - Don't let the rock get dusty (it may need to be washed again)
- Best Management Practices at the Construction Site:
 - Take directly from the truck to soil treatment system
 - Don't store or stockpile drainfield rock, install it immediately
 - Use a clean, undisturbed area for temporary storage of drainfield rock
 - If stockpiled, consider covering it to keep it clean
 - If stored, make sure different materials are kept separate (i.e. clean sand, pea rock, and drainfield rock)
 - Take care not to mix any soil in with the drainfield rock when scooping the material up; the bottom part of the piled material will not be useable
 - Carefully place drainfield rock into the excavation, make sure soil is at proper moisture content (not too wet). Make sure the bottom is not smeared; minimize walking in the excavation. Carefully place drainfield rock into the excavation by minimizing the drop distance into the excavation

Operation and Maintenance

General

The owner of the residence or facility served by the soil treatment system is responsible for assuring proper operation and providing timely maintenance for all components of the on-site wastewater treatment and dispersal system. The on-site wastewater system Designer or Installer should instruct, or assure that instruction is provided to, the owner of the residence or facility regarding proper operation of the entire on-site wastewater system.

Operation and Maintenance Activities

Assure that no surface water collects on the soil treatment system or its components (i.e.: sewage tanks). Fix leaks in the home to prevent hydraulic failure of the system.

Use the system according to the Management Plan or according to conditions of the Operating Permit (if issued by local government).

Prohibit any type of vehicular or livestock traffic over the drainfield area. No wildlife feeding near the system.

Maintain a suitable, non-invasive shallow-rooted vegetative cover over the soil treatment system.

Observe the entire treatment system at a frequency appropriate for the site conditions and sewage system. This can be done by the homeowner or service provider.

When observation reveals either of the following listed conditions, the owner of the system must take appropriate action to alleviate the situation according to the direction and satisfaction of the local governmental unit.

- Hydraulic failure; or,
- A history of long-term, continuous and increasing ponding of wastewater within soil treatment systems of such magnitude that, if left unresolved, will probably result in drainfield failure.

Appropriate action may include:

- Repair or modification of the soil treatment system.
- Expansion of the soil treatment system.
- Modifications or changes within the structure relative to wastewater strength or hydraulic flow.

References

Decentralized Wastewater Glossary. 2007. The Consortium of Institutes for Decentralized Wastewater Treatment. Available online at: <http://onsiteconsortium.org/files/Glossary.pdf>

Installation of Wastewater Treatment Systems. Draft 2008. Consortium of Institutes for Decentralized Wastewater Treatment.

Minnesota Rules Chapter 7080 - 7083