NORTH CAROLINA DEPARTMENTOF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WATER PROTECTION SECTION

EXPERIMENTAL WASTEWATER SYSTEM APPROVAL

EXPERIMENTAL WASTEWATER SYSTEM NO: EWWS-06-1R

ISSUED TO:

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FOR: EZflow 1201GEO Subsurface Wastewater System

APPROVAL DATES: July 14, 2006
January 16, 2007

In accordance with North Carolina General Statute 130A-343 as amended by Session Law 2001-505 (House Bill 1019), an application by Ring Industrial Group, EZ*flow*, has been submitted and been found to meet standards for approval as an Experimental subsurface wastewater system utilizing the EZflow 1201GEO EPS system at a sizing of 2.5 Sf/Lf, installed in a 12 to 24 inch wide trench, with a trench to trench spacing of 7.5' On Center.

A. GENERAL. Scope of this Experimental Approval:

1. A field assessment of the performance specifically of the EZflow 1201GEO system under various soil conditions in North Carolina as a follow up to previous research by Bob Rubin, PhD in Sampson County, North Carolina. Monitoring to date at this site has demonstrated the significance of the wastewater throughput at different surface areas of the trench. The study shows correlation between long-term performance and available sidewall infiltration area.

2. Use, design and construction requirements for the specified model of the EZ*flow* Drainage system.

3. Sizing and siting specifications for the specified EZ*flow* Drainage subsurface wastewater systems to meet the specified sizing and spacing criteria.

4. Operation, maintenance and monitoring of the EZflow 1201GEO and conventional gravel and pipe subsurface wastewater systems to collect and compare data on liquid ponding in the trenches, infiltration rates and relative moisture comparisons between trenches.

5. Proposal for evaluation of this Experimental system. These Experimental EZflow 1201GEO systems are applicable to subsurface wastewater systems that treat domestic wastewater (from single and multiple dwelling units and other facilities generating similar domestic wastewater).

6. This Experimental approval is proposed for up to fifty (50) EZflow 1201GEO subsurface wastewater systems with design flows of up to 1500 gallons per day.

7. All EZflow 1201GEO systems shall have monitoring ports installed to grade in each trench, approximately at a point representing 60% of the trench length.

8. A minimum of twenty (20) sites shall be constructed to consist of both gravel trenches and the Ezflow 1201GEO. These drainfields will be designed in two parts and will receive equal volumes of wastewater. The gravel trenches shall be 36" wide and sized at 3.0 Sf/Ft. Both the Gravel and EZflow 1201GEO trenches shall be instrumented with pressure transducers and data loggers to incrementally measure ponding data for infiltration rate determination and comparison. Watermark Indicators may be installed between gravel trenches and between EZflow trenches and in control zones to monitor moisture levels between trenches. The remaining installations (not to exceed 30) may be designed and installed with EZflow 1201GEO only. These sites are intended to provide a broad range of equilibrium ponding data at typical loading conditions. Ponding information will be gathered on no less than a quarterly basis. More frequent inspections shall be made if found necessary based upon the quarterly inspection findings.

B. SITING CRITERIA

1. Approved Experimental Systems may be installed on sites that are suitable for a conventional wastewater system and that have a repair area of sufficient size to allow installation of a conventional wastewater system, an approved innovative wastewater system, or an accepted wastewater system if the Experimental wastewater system fails to perform properly.

2. Sites which are classified Suitable or Provisionally Suitable for a conventional nitrification field system in accordance with 15A NCAC 18A .1948(a) and (b).

3. Sites which have been reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(2), (4), (5), and (6).

4. Sites which may be reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(1).

5. Minimum horizontal setbacks shall be as specified in Rule .1950.

6. The required vertical separation shall be measured from the trench bottom.

7. Sites are to reserve an area adjacent to the primary drainfield of the size needed for a conventional gravel system.

C. SIZING CRITERIA

1. The system sizing criteria shall normally be based upon the Long Term Acceptance Rate (LTAR) specified in the appropriate portion of the Rules as follows:

Table 1

<table>
<tr><th colspan="2" rowspan="2">Textural Group</th><th colspan="2">LTAR (GPD/ft^2)</th></tr>
<tr><th>Natural</th><th>Saprolite</th></tr>
<tr><td rowspan="2">Soil/Group I (Sands)</td><td>Sand</td><td rowspan="2">0.8 - 1.0</td><td>0.6-0.8</td></tr>
<tr><td>Loamy Sand</td><td>0.5-0.7</td></tr>
<tr><td rowspan="3">Soil Group II (Coarse Loams)</td><td>Sandy Loam</td><td rowspan="3">0.6 - 0.8</td><td>0.4 - 0.6</td></tr>
<tr><td rowspan="2">Loam</td><td></td></tr>
<tr><td>0.2-0.4</td></tr>
<tr><td rowspan="3">Soil Group III (Fine Loams)</td><td>Silt Loam</td><td rowspan="3">0.3 - 0.6</td><td>0.1-0.3</td></tr>
<tr><td rowspan="2">Other Fine Loams</td><td></td></tr>
<tr><td>N.A.</td></tr>
<tr><td>Soil Group IV</td><td>Clays</td><td>0.1 - 0.4</td><td>N.A.</td></tr>
</table>

2. The LTAR shall be based on the most hydraulically limiting naturally occurring soil horizon within three feet of the ground surface or to a depth of one foot below the trench bottom whichever is deeper.

3. To determine the minimum total trench bottom area (ft^2) required, divide the design daily sewage flow by the applicable LTAR shown in Table 1 above.

4. For the twenty (20) instrumented sites, at least 1/3 and no more than 1/2 of the total trench bottom area (ft^2) will consist of the equal square footage of EZflow 1201GEO and 3' x 1' conventional gravel trench at the designated sizing in Table 2. This portion of the system shall be dosed at the design daily flow. The minimum trench length for both gravel and EZflow 1201GEO is 25 feet. The remaining 2/3 or 1/2 of the required trench bottom area shall consist of an approved innovative, accepted or conventional system.

5. The remaining installations containing Ezflow 1201GEO only shall be sized by dividing the minimum required trench bottom area by the designated sizing factor found in Table 2.

6. Trench spacing of EZflow 1201GEO shall be no less than 7.5 feet measured from the center of each drain line. Trench spacing for 3' x 1' gravel trenches shall be 9.0 feet measured from the center of each drain line.

Table 2

EZflow Product Configuration	Excavated Trench Width	Sizing Factor (SF/LF)
EZflow 1201GEO	12-24-inches	2.5
3'W x 1'D Gravel Trench	36-inches	3.0

Example for instrumented EZflow 1201GEO Site:

Assume: Three bedroom residence with a design daily sewage flow of 360 gallons on a Group III sandy clay loam soil:

Then: Total computed trench bottom area is:
360 GPD (3x120 GPD/BR)/0.5 LTAR (GPD/SF) = 720 ft^2

Total square footage of Test Comparison shall be a minimum of 240 SF or a maximum of 360 SF.

Assume 360 Square Feet for Test Comparison

EZflow 1201GEO LF = 180 SF / 2.5 SF/FT (sizing factor) = 72 LF (EZflow 1201GEO)

3' x 1' Gravel LF = 180 SF / 3.0 SF/FT (sizing factor) = 60 LF

Remaining 360 SF shall consist of approved innovative, accepted or conventional system.

D. INSTALLATION AND TESTING PROCEDURES

1. Twenty (20) instrumented test sites shall consist of a split design containing both 36 inch wide gravel trenches and the EZflow 1201 trenches of which each type shall receive equal volumes of wastewater. Installation procedures for the EZflow 1201 system and conventional gravel are shown in *Manufacturer's Installation Manual for EZflow 1201GEO as Experimental Systems in North Carolina,* attached as Appendix B. Additionally, each of these installations shall be in accordance with the following requirements and conditions:

    a. The EZflow 1201 system and gravel system shall be installed in a manner that assures each product receives equal volumes of wastewater for the duration of the test. Measures shall be taken to verify equal volumes.

    b. Both EZflow 1201 system and Gravel system shall be installed on same contour or topography when possible.

    c. At lease one (1) pressure transducer shall be installed in each trench at approximately 60 percent of the trench length or (2) pressure transducers shall be installed in a center trench for each product type at approximately 30 percent and 60 percent of the trench length.

    d. Pressure transducers shall continuously log ponding depths over the duration of the test.

    e. Watermark indicators may be placed at outer base of trenches and one foot below the trench bottom, centered between trenches. A control watermark indicator may be installed outside of the dispersal zone on the same contour and topography as the drainfield.

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2. Up to thirty (30) test sites shall consist of EZflow 1201GEO only. Each trench at these sites shall be installed with inspection ports for the purpose of periodically monitoring ponding data over the duration of the test.

3. Monitoring and testing, including the location and placement of monitoring inspection pipes, pressure transducers, watermark indicators, etc., shall be supervised by an independent 3rd-Party wastewater professional engaged under contract by the manufacturer.

E. Reporting

1. The manufacturer shall maintain a contract for evaluation of the performance of the Experimental wastewater system with an independent consultant, or other entity that has expertise in the evaluation of wastewater systems and that is approved by the Department. Annual Reports shall be submitted by the performance evaluator, summarizing all data for the sites. This report is due by April 30, and shall include all data gathered through March 31.

2. These reports shall provide information to the Department based upon the monitoring data and observations made from the Experimental systems installed pursuant to this Approval. This should include an assessment of system performance in relation to the established treatment performance standards; an assessment of physical and chemical properties of the materials used to construct the system, in terms of strength, durability, and chemical resistance to loads and conditions experienced; recommended areas of applicability for the system; and any conditions and limitations related to the use of the system.

3. This report shall be in electronic format and may be published on the On-Site Water Protection Section's website with the approval from Ring Industrial Group, EZ*flow*. The contents of this report shall not be altered from the original document without approval from Ring Industrial Group, EZ*flow.*

4. Any failure observed during or after the duration of this experiment shall be reported to the local health department and DENR within 48 hours of discovery.

5. The monitoring, testing and reporting outlined in Sections D3 and E1 through 4, above, shall be carried out by or under the direct supervision of Dr. Robert Rubin, or another prior-approved Third Party investigator.

F. RESPONSIBILITIES AND PERMITTING PROCEDURES

1. Prior to the installation of an EZflow 1201GEO System at a site, the owner or owner's agent shall notify the local health department of their proposed use of such a system. Site-specific design details shall be provided by the manufacturer or the manufacturer's authorized agent, including special provisions for monitoring the site, in accordance with the Experimental Approval. The local health department shall issue an Improvement Permit

or Authorization to Construct or amend a previously issued Improvement Permit or Authorization to Construct allowing for the use of up to fifty (50) of the proposed Experimental Systems upon a finding that all provisions of this Approval and all other applicable rules shall be met. Use of the proposed Experimental System and any conditions shall be described in the Improvement Permit and Authorization to Construct or amended Improvement Permit and Authorization to Construct, as well as described on the Operation Permit to be issued upon the acceptable completion of the system installation. **Notification of the issuance of all permits/Authorizations by the local health department pursuant to this Experimental Approval shall be submitted to the On-Site Water Protection Section.**

2. Prior to the issuance of the Improvement Permit for each of the twenty (20) instrumented sites, the site shall be evaluated by a Licensed Soil Scientist. The Licensed Soil Scientist shall conduct a detailed assessment of the site conditions and provide to the local health department a written, sealed report that includes:

    a. Detailed descriptions of landscape position and soil morphological conditions to a depth of at least three feet below the trench bottom in the drainfield and repair area,

    b. Field estimates of the depth and thickness of the least permeable horizons,

    c. Recommended depth for placement of the trench bottoms and the recommended LTAR,

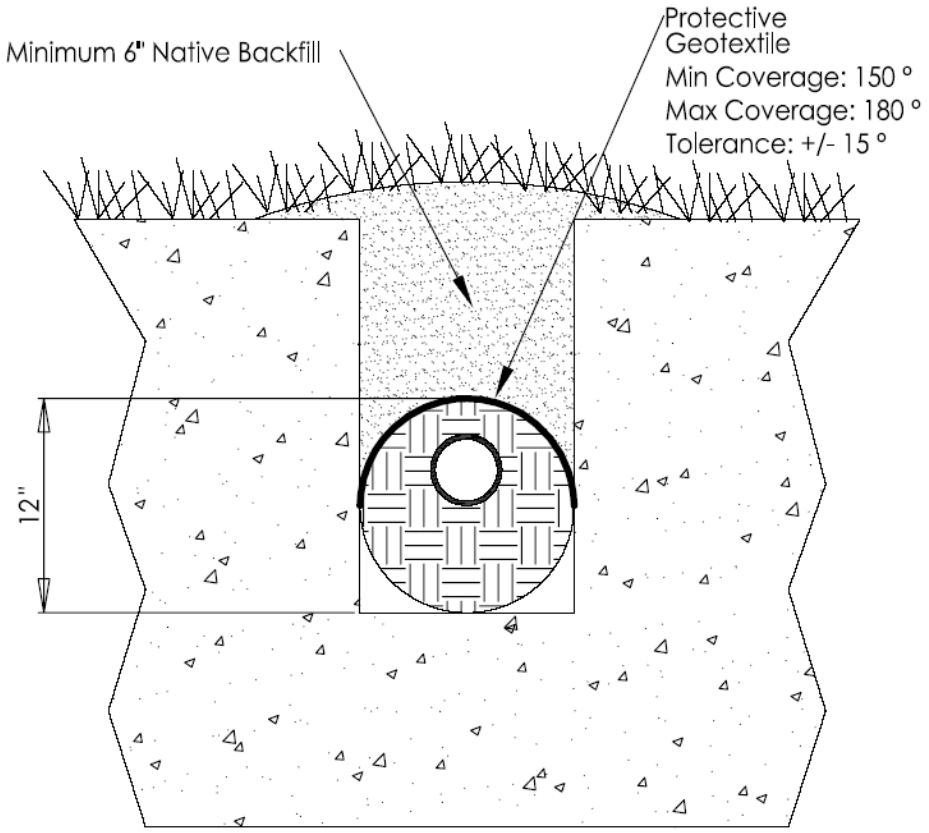
    d. Other site-specific requirements for system design, installation, site preparation, modifications and final landscaping.

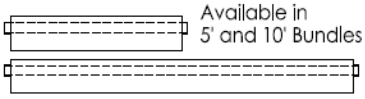
3. The EZ*flow* authorized installer must certify in writing that the system was installed in accordance with the approved design prior to Operation Permit issuance. A professional engineer must certify in writing that a system required to be designed by an engineer was installed in accordance with the approved plans and specifications prior to Operation Permit issuance.

4. Any malfunctioning EZflow 1201GEO System will be replaced by a standard conventional or other approved system, as determined by the Principal Investigator, at no cost to the homeowner for the period of the Warranty issued by Ring Industrial Group, EZ*flow*.

Approved By: _____ Date:_____

APPENDIX A





EPS Aggregate Drainage System

UNITS: INCHES

Last Edited: 07/31/2006

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EZflow™

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