NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION
ON-SITE WATER PROTECTION BRANCH

INNOVATIVE WASTEWATER SYSTEM APPROVAL

INNOVATIVE WASTEWATER SYSTEM NO: IWWS-1993-1-R7A

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For: American Perc-Rite® Subsurface Drip System, Anaerobic

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February 9, 1996
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February 4, 2010
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In accordance with General Statute 130A-343 and 15A NCAC 18A .1969, an application by American Manufacturing Company, Inc. of Elkwood, VA, for modification to their anaerobic subsurface drip system approval has been reviewed, and the system has been found to meet the standards of an innovative system when the following conditions are met:

I. General

A. Scope of this Innovative Approval
1. Use, design, and installation requirements for the American Manufacturing anaerobic subsurface drip system.
2. Operation, maintenance and monitoring requirements for the American Manufacturing anaerobic subsurface drip system.

B. This Innovative System Approval is applicable to anaerobic (septic tank effluent) subsurface wastewater drip irrigation systems.

II. System Description

A. Collection system — Conventional gravity, pressure sewer fed by grinder pumps or individual septic tank effluent pumping units.

B. Pretreatment — DEH approved septic tank, or approved equal.

C. Filtration — Automatic, self-cleaning filter(s) (appropriately sized Arkal disc filters, or approved

equal) capable of screening particles larger than or equal to 115 microns.

D.	Manifold	Common line (Schedule 40 PVC) to connect all the dripline in a single field or zone at the start of the field or zone (supply end) and the distal ends of the dripline (flush end).
E.	Air vent	Air vacuum breaker(s) installed at the high point(s) of each drip field to allow air to be rapidly evacuated from the tubing during pressurization and to keep soil from being aspirated into the drip emitters due to back siphoning or back pressure after the pumps shut off.
F.	Dripline	NETAFIM PC dripline with pressure-compensating emitters spaced uniformly in the tubing (12, 18, or 24 inch centers). The dripline contains interior emitters and the outside layer is purple colored for easy identification. The emitters are impregnated with a biocide to inhibit slime accumulations.
G.	Drip lateral	Entire length of dripline, from the connection to the supply manifold to the connection to the return manifold.
H.	Drip run	Single section, on contour, of a drip lateral between manifolds, a manifold and a loop, or between two loops. Multiple parallel drip runs may be used within a single drip lateral.
I.	Field flushing valve	An automatic valve used to enable accumulated debris and sediment to be flushed from the dripline back to the pretreatment unit.
J.	System Controls	Control/software package controlling all functions, including filter flushing, system dosing and flushing, and audible/visible alarms. Telemetry must be included for systems with a design daily flow greater than 600 gallons per day (gpd). Flow monitoring and self-diagnostics capabilities must be included for systems with a design daily flow greater than 3,000 gpd.
K.	Documentation	Current schematics, drawings and manuals must be filed with NCDHHS for all major components utilized under this approval for posting on the On-Site Water Protection Branch Webpage.

III. Siting Criteria

The American Perc-Rite® anaerobic subsurface drip system may be utilized when one or more of the conditions set forth in Sections III.A through E of this approval are met, as applicable. Summary tables of siting criteria, including when a special site evaluation (Section V) is required, are included in Appendix A.

A. An anaerobic drip system may be utilized on sites that meet one of the following criteria:
   1. Sites classified suitable or provisionally suitable in accordance with Rules .1939-.1948;
   2. Sites reclassified to be provisionally suitable in accordance with Rules .1956(1), (2), (4), (5) or (6a); or
   3. Sites meeting the criteria for low pressure pipe (LPP) systems in accordance with Rule .1957(a)(2).
   4. A special site evaluation pursuant to Section V shall only be required if needed to justify the proposed long term acceptance rate (LTAR), as set forth in Section IV.

B. A drip system receiving anaerobic septic tank effluent may be utilized on sites where there is at least 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon or rock, and at least 13 inches of usable naturally occurring soil above an UNSUITABLE soil wetness condition.
   1. The dripline shall be installed within the naturally occurring soil.
   2. The minimum vertical separation distance between the installed trench bottom or point of application and any UNSUITABLE horizon, rock, or soil wetness condition shall be 12 inches.

3. A minimum of 6 inches of cover over the dripline shall be maintained.
4. Minimum required soil cover shall be uniform over the entire drip dispersal field.
5. The requirement for at least 6 inches of cover may be met by the addition of up to 6 inches, after settling, of suitable Group II or III soil material over the drip field.
6. If cover material is required and the slope is greater than 30%, a slope stabilization plan must be provided by an appropriately licensed individual.
7. A special site evaluation, pursuant to Section V of this approval, shall be required whenever Group IV soils are encountered within 18 inches of the naturally occurring soil surface or within 12 inches of the trench bottom or point of application, whichever is deeper, and the LTAR is proposed to exceed 0.1 gpd/ft^2.
8. A special site evaluation, pursuant to Section V of this Approval, shall also be required whenever there is less than 24 inches of naturally occurring soil to any UNSUITABLE soil horizon, rock, or soil wetness condition, and Group IV soils are encountered within 18 inches of the naturally occurring soil surface.

C. An anaerobic drip system may be utilized when a groundwater lowering system (existing or proposed) is used to meet the vertical separation requirements to a soil wetness condition, only when Group I or Group II soils with suitable structure and clay mineralogy are present within 36 inches of the naturally occurring soil surface. A special site evaluation shall be required when the local health department or regional soil scientist require such an evaluation to determine the projected effectiveness of the groundwater lowering system.

Note: Aerobic treatment is required when a groundwater lowering system is used to meet soil depth and vertical separation requirements to a soil wetness condition and there are Group III soils present, or when used in conjunction with a fill system. No drainage of Group IV soils is allowed, regardless of treatment level. See American aerobic drip system approval (IWWS-1993-1-R6A) for details.

D. An anaerobic drip system may be utilized on new fill sites [Rule .1957(b)(1)], when all or part of the dripline is to be installed in approved fill material, when there is at least 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon or rock and at least 12 inches above a soil wetness condition, and the following requirements are met:
1. The minimum vertical separation distance between the trench bottom or point of application and any UNSUITABLE soil horizon or rock shall be 18 inches and any soil wetness condition shall be 12 inches.
2. A special site evaluation, pursuant to Section V of this approval, shall be required whenever Group IV soils are present within 18 inches of the naturally occurring soil surface.
3. Except as provided for herein, all requirements for new fill sites and systems of Rule 1957(b)(1) are applicable to drip systems in fill.

E. An anaerobic drip system may be utilized on sites meeting the criteria for existing fill, in accordance with Rule .1957(b)(2), when all or part of the dripline is to be installed in approved fill material.
1. For an anaerobic drip system, the minimum vertical separation distance between the trench bottom or point of application and any UNSUITABLE soil horizon, rock, or a soil wetness condition shall be 24 inches.
2. Except as provided for herein, all requirements for existing fill sites and systems of Rule 1957(b)(2) are applicable to all drip systems in existing fill.

F. Required vertical separation requirements shall be measured from the installed trench bottom or point of application, whichever is deeper.

G. For anaerobic drip in existing or new fill, the initial condition and the vertical separation requirements to a soil wetness condition shall not be met with the use of a groundwater lowering system.

H. The minimum horizontal setback requirements of Rule 1950(a) and .1951 shall be met for drip systems receiving anaerobic effluent.

I. A special site evaluation including a hydraulic assessment shall be provided to the local health department on behalf of the owner, when required pursuant to Section V of this Approval.

IV. System Sizing

A. The LTAR shall be based on the most hydraulically limiting, naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or to a depth of 12 inches below the trench bottom or point of application, whichever is deeper.

B. The following table shall be used in determining the LTAR for the American Perc-Rite® anaerobic subsurface drip system.

Soil Group	LTAR (area basis) (gpd/ft^2)
I.	0.6-0.4
II.	0.4-0.3
III.	0.3-0.15
IV.	0.15-0.05

C. For anaerobic drip systems in new fill [Rule .1957(b)(1)], the LTAR shall not exceed 0.5 gpd/ft^2 for Group I, 0.3 for gpd/ft^2 Group II, 0.15 gpd/ft^2 for Group III or 0.05 gpd/ft^2 for Group IV soils, respectively. Soil group is based on the most hydraulically limiting, naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or 12 inches below the trench bottom or point of application, whichever is deeper.

D. The following table shall be used in determining the LTAR for American Perc-Rite® anaerobic subsurface drip systems installed in saprolite pursuant to Rule .1956(6). The LTAR shall be based on the most hydraulically limiting, naturally occurring saprolite to a depth of 24 inches below the trench bottom or point of application, whichever is deeper.

Saprolite Group	Texture	LTAR (area basis) (gpd/ft^2)
I.	Sand	0.4-0.3
	Loamy sand	0.35-0.25
II	Sandy loam	0.3-0.2
	Loam	0.2-0.1
	Silt loam	0.1-0.05
III.	Sandy clay loam	0.1-0.05

E. In calculating the minimum number of square feet for the drainfield, the daily design flow shall be divided by the LTAR determined from the appropriate table above.

F. In calculating the minimum length of dripline to be used, the total square footage of drainfield, as derived in Section IV.E, shall be divided by 2 feet, unless additional linear footage is determined to be needed at the recommendation of the designer as soil and site conditions allow.

G. Sections of tubing without emitters (blank tubing) required to meet site specific conditions shall not count towards the minimum length of dripline needed when laying out the system or when calculating the linear footage of dripline needed (see Section VI.G).

V. Special Site Evaluation

A special site evaluation for an anaerobic drip system shall be provided to the local health department on behalf of the owner when any of the following conditions exist.

A. The soil depth from the naturally occurring soil surface to any UNSUITABLE soil horizon, rock, or soil wetness condition is greater than or equal to 18 inches and the LTAR is proposed to exceed 0.5 gpd/ft^2 for Group I, 0.35 gpd/ft^2 for Group II, or 0.2 gpd/ft^2 for Group III soils.

B. The soil depth from the naturally occurring soil surface to a soil wetness condition is less than 18 inches and the LTAR is proposed to exceed 0.5 gpd/ft^2 for Group I, 0.3 gpd/ft^2 for Group II, or 0.15 gpd/ft^2 for Group III soils.

C. Group IV soils are encountered within 18 inches of the naturally occurring soil surface or within 12 inches of the trench bottom or point of application, whichever is deeper, and the LTAR is proposed to exceed 0.05 gpd/ft^2.

D. There is less than 24 inches of naturally occurring soil to any UNSUITABLE soil horizon, rock, or soil wetness condition, and Group IV soils are encountered within 18 inches of the naturally occurring soil surface.

E. Driplines are to be installed in new fill material and Group IV soils are encountered within 18 inches of the naturally occurring soil surface.

F. A groundwater lowering system (existing or proposed) is used to meet soil depth and vertical separation requirements to a soil wetness condition, and the local health department or regional soil scientist requires such an evaluation to determine the effectiveness of the groundwater lowering system. The evaluation shall include site-specific determination of saturated hydraulic conductivities and other critical site factors, and the proper application of appropriate drainage models and assessment tools.

G. To verify a proposed LTAR that exceeds the LTAR assigned by the EHS/LHD, pursuant to Section IV.B or Section IV.D of this Approval.

H. The daily design flow exceeds 1,500 gallons per day (gpd).

I. The local health department or regional soil scientist determines that the combination of soil conditions, site topography and landscape position, daily design flow, system layout and/or proposed stormwater appurtenances creates the potential for hydraulic overloading of a site. The hydraulic assessment may be required to include one or more of the following, as applicable: a lateral flow, linear loading, groundwater mounding, or water balance analysis.

The evaluation shall contain applicable information required by Rule .1970(p)(2), including a hydraulic assessment, to justify use at the proposed LTAR and system layout. In conjunction with the information required to be included by Rule .1970(p)(2), the report is to communicate to the designer site-specific details of the delineated area and include a preliminary system layout and design that complies with the requirements of this approval. The report shall identify, comment on, and offer recommendations to address, as necessary, site specific conditions such as soil quality, slope and stabilization, stoniness, vegetation, surface or subsurface drainage, site preparation, depth of installation, landscaping, etc. that may, in the judgment of the evaluator, affect the design and/or field installation.

VI. Design Criteria

A. Pretreatment

The drip system drainfield shall be preceded by a pretreatment process designed to reduce the wastewater biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations to a maximum of 350 and 200 milligrams per liter (mg/l), respectively. This level of pretreatment may be achieved by septic

tanks approved in accordance with Rules .1952 through .1954, or project-specific approved equal.

B. Dosing Tank
   1. The dosing system shall meet the design and construction criteria of Rules .1952-.1954.
   2. The dosing tank shall be a separate approved pump tank with a minimum liquid capacity not less than the total liquid capacity of the septic tank that would be required for this system in accordance with Rule .1952.
   3. Level control floats in the dosing tank shall be adjustable and replaceable from the ground surface without requiring entrance into the tank.
   4. The Rule requirement for a separate high-water alarm that is audible and visible by system users shall be met, in conjunction with any required self-monitoring features of the American Perc-Rite® system.

C. Pumps
   Pumps to be used shall include effluent rated turbine pumps with cooling flow collars, effluent rated suction lift self-priming centrifugal pump(s), or high head submersible effluent pump(s) in accordance with Rule .1952(c)(2), and as approved by American. For a suction lift pump, the intake pipe shall contain a screen and foot valve as specified by American. Pump, controls, intake pipe and screen, as applicable, shall be easily accessible, adjustable and replaceable from the ground surface without requiring entrance into the tank by the Operator in Responsible Charge (ORC) for routine operation, maintenance, monitoring and servicing.

D. Filters
   1. Self-cleaning disc filter(s) capable of screening particles larger than or equal to 115 microns shall be used. The self-cleaning process shall be automatic. American Perc-Rite® Filters, or an American approved equal, shall be used.
   2. Filter flushing residuals shall be pumped into the upstream end of the pretreatment system with provisions made to minimize disturbance of any solids in the septic tank.
   3. The number and size of filter(s) shall be at least adequate to operate at a flow rate, during both irrigation and flushing conditions, within the filter manufacturer's specified acceptable operating range.

E. Headworks
   The headworks assembly typically includes the filters and associated filter backwash valves, field flush valve, and flow meter, and may also include zone dosing and isolation valves. Headworks components shall be in a separate enclosure that is freeze protected, UV and corrosion resistant, and easily accessible for routine operation, maintenance, monitoring and servicing. Design shall facilitate reasonable access to all internal components.

   The investigation of the site for the headworks assembly shall include evaluation for the presence of soil wetness conditions in accordance with Rule 15A NCAC 18A .1942. The headworks assembly shall be installed at a high enough elevation so that its bottom shall remain above any seasonal high water table/wetness condition. Sites located on linear side- and foot-slopes subject to lateral water movement shall incorporate surface and/or sub-surface water drainage diversions (i.e., interceptor drain, curtain drain, etc.) to prevent water migration into the assembly. Provisions should also be made to prevent the entrance or accumulation of rainwater inside the headworks assembly.

   Notice: Elevating the headworks and associated plumbing connections above the frost line (also called the freezing depth or ground freezing depth) may require special design considerations to protect the wastewater system components from freezing. Consult the local building inspections code enforcement department for information on the frost line at the site.

F. American Perc-Rite® processing and control unit
   1. Controls shall:
      a. Provide for delivery of designer specified preprogrammed volumes of effluent to each field zone

(adjustable and variable between zones) at designer specified time intervals (24 hour flow equalization);

b. Provide for automatic flushing of integral unit filters (filter flushing), initiated by a timer (adjustable duration);
c. Provide for automatic flushing (at least weekly) of the drip laterals (field flushing) with filtered effluent at designer specified duration; and
d. Monitor pump cycles and run times (for each pump and field zone) and flow (with totalizing flow meter, or equal).

2. A telemetry system shall be provided for systems with a daily design flow greater than 600 gpd. The ORC shall be immediately notified of alarm conditions (high water and power outage).
3. For systems with a daily design flow greater than 3,000 gpd, controls shall also monitor flow volume to each zone and flow variance indication when flow is + or - 20% of design. Telemetry system and alarm shall include an automatically rechargeable battery backup power supply.
4. Any special equipment to monitor system performance shall either be provided with the system, or determined to be in the possession of the manufacturer authorized ORC prior to system approval.
5. Controls and float levels shall be synchronized to assure the minimum dose is available prior to initiating a dosing cycle to a zone or subfield.
6. Minimum dose volume per zone shall be set as needed so that at least 80 percent of each dose is delivered when the minimum pressure in the field network pressure is at least 10 pounds per square inch (psi). This shall be approximated by using five times the liquid capacity of the drip laterals plus the liquid capacity of the supply and return manifold lines (only the portions that drain between doses), unless a smaller volume is field determined to meet this performance criteria. For example, the minimum dose time can be field determined as follows:
   a. When zone is dry, measure the time from pump start until the top of return pressure is greater than 10 psi. This time shall be designated T_i. Also measure the total gallons it takes to reach 10 psi. This fill volume is designated G_i
   b. Determine minimum additional dose time as $(4 \times G_i)/(\text{irrigation flow rate}) = T_f$.
   c. Total adjusted minimum dose time can be reduced to T_i plus T_f, and adjusted dose volume is $5 \times G_i$.
7. Minimum automatic field flushing volume per zone shall be two times the liquid capacity of the drip laterals plus the liquid capacity of supply and return and manifold lines that drain between doses.
8. A duplex pump dosing system shall be provided whenever the design daily flow exceeds 3,000 gpd or when the total length of driplines exceeds 5,000 feet.
9. Floats and controls shall be set up as follows:
   a. The off (redundant off) float is set to provide at least the minimum level of effluent required to keep the pump submerged based on recommendations by the pump manufacturer and American. The purpose of the off float is to help ensure that the pump shuts off prior to the system being pumped dry.
   b. The timer enable (on) float is set to initiate the pump cycle which will last until the preset on cycle times out (set to deliver desired dose volume). The float shall be set sufficiently above the redundant off level so that one dose volume to the largest drip dispersal zone is available, and the effluent level in the tank remains above the deactivation (off) float level at the end of each pump cycle. The cycle off time begins to time out at the start of each dose event. The purpose of the timer enable float is to deliver up to 60 percent of the daily design flow to the drainfield.
   c. The peak enable float is set to initiate an accelerated (more frequent) pump cycle by reducing the off time period. This float shall be set one-half the distance between the high water alarm float and the timer enable float. The purpose of the peak enable float is to deliver up to 100 percent of the daily design flow to the drainfield.
   d. The high water alarm float is set to provide the minimum required emergency storage capacity for the system, which shall be at least 24 hours or as otherwise approved pursuant to Rule .1952(c)(1)(D). The purpose of the high water alarm float is to maximize storage capacity to help ensure that effluent does not exceed the pump tank/collection system capacity and discharge to the surface or back up into the facility.

Alternative setups for floats and controls may be proposed by the system designer on a project specific basis. Such alternative proposals must receive the concurrence of American and the local health

department or the State.

10. Floats, pump and control circuits, and the control panel shall meet the requirements of Rule .1952(c). Panel and control equipment shall include lightning protection, be protected from unauthorized access, and remain accessible at all times to the ORC. The bottom of the panel shall be at least 36 inches above the ground surface.
11. The drip system control panel shall be manufactured by American Manufacturing. Documentation shall be provided to the State for inclusion on the On-Site Water Protection Branch's Homepage.

G. American Perc-Rite® Subsurface Drip System Field Design (See Section XI for designer responsibilities)

1. The field network shall utilize 1/2-inch (0.67 inch O.D., 0.57 inch I.D.) nominal size NETAFIM PC polyethylene dripline.
2. Pressure compensating emitters, containing a biocide, are spaced uniformly along the dripline on a maximum of 2 foot centers and designed to deliver 0.61 to 0.65 gallons per hour per emitter (+ or - 5%) at internal pressures of 7 to 60 psi.
3. The field shall consist of multiple separately and automatically dosed and valved zones whenever needed to meet irrigation and/or flushing requirements, and in adherence with manufacturer's recommendations.
4. All anaerobic drip systems on sites with Group III and IV soils within 18 inches of the naturally occurring soil surface shall include at least two zones each sized to receive 40-60 percent of the daily design flow.
5. The minimum zone size and linear feet of dripline in each zone shall adhere to the manufacturer's recommendations. The linear feet of dripline may be increased utilizing reduced dripline spacing as the site and this innovative approval allow, without requiring an increase in the total area requirement as calculated in Section V.E. Also refer to subparagraphs pertaining to Blanking, below for further guidance on options and constraints associated with system size and layout in the field.
6. Driplines and drip runs shall be designed and installed level, following the naturally occurring ground contour. A maximum variance of + or - 2 inches off dead level may be allowed within any drip run or any contiguous section of dripline containing drip emitters between fittings.
7. Individual driplines and drip runs are designed and installed on contour and on at least 2 foot centers, unless approved to be spaced uniformly on less than 2 foot centers as described in Section VI.G.5 above to address site-specific situations or for short sections as needed to avoid field obstructions, without reducing total area requirements.
    a. In no case shall dripline spacing be less than 12 inches on center.
    b. In order to keep on contour, driplines or portions of driplines may be installed on greater than two foot centers, requiring additional total application area.
    c. Short sections, installed on less than 2 foot centers, as needed to avoid field obstructions shall account for less than 5 percent of the total linear feet of dripline within any zone.
8. Solvent welded heavy duty non-perforated flexible PVC pipe shall be used to connect the supply and return manifolds with the driplines, or to connect common driplines installed at varying depths or locations (e.g.: in stepdowns or to connect looped drip runs). The connection lines shall be made to the driplines by solvent welded American Perc-Rite® compression or insert adapters or fittings, or approved equal.
9. Connection lines shall be conveyed over compacted earthen dams constructed at least 2 inches higher than the maximum elevation of each dripline served. These dams are to retain effluent in the driplines at the end of each dose cycle. If the TopFeed™ system is used, the manifold feed lines shall be on a continuous positive grade from the supply/return manifolds to each drip lateral, through an earthen dam, without passing over a 2 inch rise. The loops between runs must be elevated so that they drain freely into the run lines. Connection lines and loops shall be Schedule 40 PVC or solvent-welded, non-perforated flexible PVC.
10. Blanking describes interior watertight sections of tubing without any drip emitters, which may be installed where unfavorable site conditions are encountered along a drip lateral, such as rock, shell fragments (> 35%), trees, large roots, large tree stumps as identified by the system designer, soil scientist, installer or local health department.
11. Short sections of blanking tubing may also be used where minimum horizontal separation requirements between adjacent driplines as specified in Section VI.G.7. of this Approval cannot be met.

12. Sections of blank tubing shall not be included in meeting the minimum linear footage of dripline calculated for the zone containing the blanking section.
13. No more than 20 percent of the total drip lateral length in a zone shall be compromised of blanking sections.
14. Blanking tubing shall be either
    a. Black or otherwise differently colored HDPE tubing of the same material, specifications and inside diameter as the connecting dripline; or
    b. Non-perforated flexible PVC.
15. Non-perforated flexible PVC shall be used whenever the blanking section passes through an area having excessive abrasion hazards due to number or condition of rocks or an area where uniform bedding cannot be effectively insured.
16. Blanking sections shall also meet the following conditions:
    a. Connection lines shall be made to the driplines (with emitters) by solvent welded American Perc-Rite® compression or insert adapters or fittings, or American approved equal.
    b. Blanking sections and connections shall be provided by the drip system manufacturer.
    c. Blanking sections shall be installed in hand shaped trenches with a minimum of 2 inches of clean acceptable soil on all sides, free of organic material, to protect the entire length of the blanking section from abrasion or damage from contact with rocks, roots, voids or other obstructions.
    d. All direction changes shall be gentle, sweeping bends which eliminate any danger of kinking, pinching or collapse of the tubing.
    e. Where possible, blanking sections shall be installed level and at the same elevation as the dripline being blanked. Where the blanking tubing trench floor elevation must vary from the dripline elevation due to specific obstructions, the blanking section shall go upslope in elevation around the obstruction, rather than downslope, with a single, sweeping high point in a manner which will not retain water in the blanking section.
    f. The dripline at both ends of any given section of blanking shall be maintained at the same elevation or the blanked section be constructed as a contour dam, preventing flow at pump cut off from the upper portion to the lower portion.
    g. A minimum of 6 inches of soil cover shall be maintained over blanking sections with care taken to provide proper surface drainage without creating areas of concentrated runoff or ponding. Less cover (a minimum of 3 inches is required) may be considered when utilizing flexible PVC if necessary to allow the dripline to be installed at the specified depth.
    h. At least a single blanking section is to be used whenever a drip lateral must be installed where the horizontal separation between adjacent sections of dripline is less than the minimum spacing as set forth in Section VI.G.7, above. This portion of the blank section shall be backfilled with well compacted, low permeability, clay.
    i. When driplines must be installed closer than 12 inches apart, both shall be blanking sections and those sections shall be backfilled with hand compacted clayey material.
    j. Locations and lengths of blanking sections shall be noted on the as-built drawings for the project.
17. The hydraulic design shall be based on achieving the following conditions:
    a. No more than a 10 percent variation in flow between any individual emitters anywhere within a separately dosed zone, including any effluent redistribution due to drain back.
    b. On sites with a discernable slope (typically greater than 4 percent), Top Feed™ manifolds will be utilized to minimize disproportionate amount of drainage into the lowest area of the zone.
    c. Maintenance of velocities of at least 1.2 feet per second in the supply line from the dosing tank to the beginning of the drip field during normal dosing cycles.
    d. Maintenance of velocities of at least 1.2 feet per second in each supply manifold segment during field flushing.
    e. Minimum pressure of 10 psi during flushing flows and a maximum of 60 psi during normal dosing flows.
    f. Maintenance of field network velocities of at least 2 feet per second at the distal end of each drip lateral line during automatic field flushing.
18. The hydraulic design shall include documentation that minimum scour velocities and maximum pressure restrictions will be maintained, including project specific calculations, computer simulations as necessary, or verification of adherence to pre-approved design criteria. Hydraulic calculations are to

take into account sections of top-feed lateral feed/return lines and blanking, where applicable.

19. Field appurtenances include an air/vacuum relief valve at the high point(s)/outlet of each zone; an isolation valve and check valve at the high point/outlet of each zone (when there are more than one zone); pressure sustaining valves where needed; solenoid valve with separate isolation valves on each side at the inlet to each zone or in the headworks assembly (or by an appropriate alternate method which enables all valves to be isolated and serviced without effluent discharge from supply/return lines); cleanout at each end of the supply and return manifolds; a separate cleanout at the distal end of the supply line to each zone; and pressure monitoring fittings at the field inlet and outlet points, and at the headworks for measuring deadhead and operating pressures.
20. The ORC must be able to access all solenoid valves, air vents, pressure monitoring points and isolation valves at all times for inspection, testing and maintenance. Valves, pressure monitoring fittings, vents and cleanouts shall be provided with protective vaults or boxes that are decay resistant, ultraviolet rated, and that extend at least to finished grade. Routine maintenance and monitoring shall be possible without effluent discharging from the network in preparation for or during these procedures.

H. Return Line
The return line shall be directed into the upstream end of the septic tank, with provisions made to minimize disturbance of any solids in the tank. For fields remotely located in relation to the septic tank and field dosing tank, an intermediate settling tank and pump tank may be used to receive the field flush effluent prior to its direct conveyance back to the field dosing tank, or a separate settling tank provided to receive the field flush effluent prior to its conveyance back to the drip dosing tank.

VII. Installation and Testing Procedures

A. A preconstruction conference shall be required prior to beginning any site modifications or construction of the American subsurface drip system. The conference shall be attended by the American authorized system designer, American authorized installer, and the local health department. The licensed soil scientist and registered professional engineer shall also be present, as applicable.

B. It shall be the responsibility of the system designer to specify equipment to be used, and site specific procedures to be followed, including blanking provisions.

C. The septic tank(s) and dosing tank(s) shall be demonstrated to be watertight by vacuum test or 24 hour leakage test conducted at the installation site. Test shall be run after tank installation with risers/and inlet/outlet pipes in place, but before the tanks are covered (backfilled). A water level change of ½ inch or more, within a 24 inch riser, over 24 hours, or visual observation of leakage shall be cause for failure of a leakage test. Initial water level shall be 2 inches above the riser/adapter seam in the tanks.

D. The preservation of the original structure of the soil in the drainfield and repair areas is essential to maintaining the absorptive capacity of the soil. No activity other than the construction of the system is permitted within these areas before, during and after installation of the system.

E. Drainfield area shall be prepared in a manner that minimizes site disturbance.
1. No equipment shall cross the field areas during rainfall events, or when the soil moisture content of the fields is above field capacity (too wet to plow).
2. Only equipment light enough to not compact the soil shall be used to remove trees, roots, and rocks, with hand incorporation of select fill material used to eliminate weak spots where roots or boulders must be removed.
3. Fill material and final cover shall be in accordance with Rule .1957(b)(1)(F). In some instances, final cover material may be approved to be added after dripline installation.
4. The field shall be prepared as needed to enable the final cover to be established and maintained prior to dripline installation.
5. Sequencing and fill/cover incorporation procedures must be carefully reviewed and concurred with by the system designer, soil evaluator, and local health department prior to and during installation.

F. Drip laterals shall be staked out by use of an engineer's or laser level and taped prior to permitting. At least every fourth drip run or parallel adjacent dripline shall be field staked. However, staking shall be more frequently if needed, as determined by the system designer or local health department, to assure conformation with natural contours and design requirements for sizing, location and separations. Maximum dripline depth shall be in accordance with permit conditions.

G. Dripline shall be installed in accordance with the designer's and manufacturer's recommendations for each site. A vibratory plow, static plow, trencher, or rock saw is most typically used, or the system is installed by hand. Soil moisture must be dry enough so that soil compaction or smearing will not occur. The system shall not be constructed during periods of wet weather when the soil is sufficiently wet at the depth of installation to exceed its plastic limit. The plastic limit is exceeded when the soil can be rolled between the palms of the hands to produce a roll (wire) 1/8 inch in diameter (>1.5 inches in length) without breaking and crumbling. Questions about site workability shall be reviewed with the system designer, soil evaluator, and local health department prior to proceeding.

H. Leaf litter and debris shall be removed prior to the installation of dripline, where applicable. When a trencher is used or trenches are hand dug, the trench bottoms shall be hand cleaned of roots, debris and litter, and the dripline shall be secured to the center of the trench bottom prior to backfilling.

I. Minimum soil cover over dripline shall be 6 inches to finished grade. Cover material shall be free of rocks, debris, construction and demolition (C+D) waste, hazardous or contaminated waste, or material with concentrations or layers containing more than 35 percent by volume of shell fragments or more than 10 percent by volume of fibrous organics.

J. Minimum depth of valves in protective vaults or boxes shall be at least 12-18 inches below finished grade (as needed to be below normal frost depth).

K. Air vents shall be installed in a valve box so that the entire vent is below finished grade. The outlet of the vent must be above the installation depth of the dripline.

L. Extreme care must be taken during and after system installation to assure no extraneous debris enters the tankage, supply lines, and dripline network. Supply lines and manifolds shall be flushed out prior to system startup.

M. Designer's and manufacturer's recommendations shall be followed for system startup. All leaks in pipe network or from emitters exhibiting excessive emission rates, as evidenced by wet spots during dosing cycles comparable to normal operating conditions, shall be repaired.

N. Dosing and flushing flow rates must be measured. Dosing pressure must be measured at the lowest point in the supply manifold to verify need for a pressure sustaining valve and its effectiveness, if valve is present. Flushing pressures at the ends of each zone supply and return manifold shall be measured and determined to be in accordance with design criteria.

O. Fields shall be finished and graded to shed surface water and in a manner which facilitates system inspection, operation, maintenance, and repair as well as turf management with standard mowing equipment (if applicable). Provisions shall be made to establish and maintain a vegetative cover (e.g. grass) to prevent erosion and allow mowing with standard equipment and to allow for effective system inspection.

P. Other methods of site stabilization may be proposed, such as in woodland sites. Equivalent provisions for finished grading to shed surface water and as needed to facilitate inspection, operation, maintenance, and repair apply. Establishment of a permanent vegetative cover on a wooded site is not necessary if the site is otherwise effectively stabilized from erosion after construction until a protective litter cover is naturally reestablished. Site-specific procedures shall be reviewed by the system designer, soil evaluator and local health department. To facilitate inspection and maintenance, new woody vegetation must be prevented from becoming established over driplines and appurtenances.

Q. All mechanical components, pumps, pump cycling, filters, valves, vents, flushing, high water alarm and telemetry systems, as applicable, must be demonstrated to be fully operable in accordance with their design.

VIII. Operation, Maintenance, Monitoring and Reporting

A. System management entity, inspection/maintenance and reporting frequency requirements shall be comparable to at least Type V(a) systems in Rule .1961(b), Table V(b), except that the maximum inspection interval for systems up to 1,500 gpd shall be quarterly for the first year of operation.

B. During the first operational inspection after system start-up, an American Manufacturing representative will meet with the ORC and the property owner to explain the system and answer any questions.

C. In the event any system is found to be out of compliance, American Manufacturing will assist in the development of an action plan to bring the system back into compliance.

D. The maximum inspection/maintenance/inspection frequency shall revert to quarterly for a period of one year after a system found to be out of compliance is repaired.

E. The ORC shall provide monitoring reports to the health department, which include a log of all malfunction incidences/notifications, maintenance activities and wastewater volume delivered to each zone between each required monitoring period.

F. Minimum activities during each required inspection shall include visual observation of the dripfield(s), checking/cleaning filter(s), measured dosing flow rate to each zone, and recording of flow meter reading, pump run times and cycle counts.

G. Flushing flow rates and pressure head measurements during flushing at the inlet and outlet of each field zone shall be taken at least once per year.

H. The ORC shall report inspection findings and measurements on the report form and spread sheet provided by American and Appended to this Innovative Approval.

I. For systems with a daily design flow of greater than 600 gpd, the ORC shall be telemetrically notified of high water and power outage. For systems with a daily design flow of greater than 3,000 gpd, the ORC shall also be telemetrically notified of flow variance (+ or – 20%) and catastrophic failure (+ or – 50%) conditions.

J. The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by American.

IX. Responsibilities and Permitting

A. Prior to the installation of an American subsurface drip system at a site, or modification to a site for an American subsurface drip system, the owner or owner's legal representative shall notify the local health department of their proposed use of such a system. 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 the proposed Innovative System upon a finding that all provisions of this approval and all other applicable rules shall be met.

B. Use of the proposed Innovative System and any conditions shall be described in the 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.

C. All systems shall be designed by a professional engineer or by individuals authorized in writing by the manufacturer. The system shall be designed by a professional engineer when:
   1. Pretreatment components have not received prior State approval, or pretreatment system component approval requires the system to be designed by a professional engineer,
   2. The system daily design flow exceeds 600 gpd,
   3. Drip lateral lengths in a single field zone vary by more than 25 percent,
   4. Duplex pumps are required in accordance with Section VI.F.8, above, or
   5. The complexity of the site or system dictates non-standard design as determined by the local health department or the manufacturer.

D. When required, plans and specifications shall be prepared, reviewed and approved in accordance with Rules .1938(e) and (f). Systems designed by an authorized designer shall include a review letter from the manufacturer along with a submittal checklist signed by the manufacturer for each system.

E. The system shall be installed by a NCOWCICB certified Level IV Installer that is authorized in writing by the manufacturer. The Installer shall coordinate the installation with the system designer and manufacturer's field representative.

F. Prior to issuance of an Operation Permit a contract for operation and maintenance shall be executed between the system owner and an ORC as required in accordance with Rule .1961(b). The ORC shall have been trained and certified in writing by American to operate and maintain American Perc-Rite® subsurface drip dispersal systems. American shall provide, as needed, classroom and field training for licensed operators.

G. A condition of the Operation Permit shall be that a contract for operation and maintenance with an American certified ORC shall remain in effect for as long as the system is to remain in use.

H. A professional engineer or American authorized designer as applicable, must certify in writing that the system was installed in accordance with the approved plans and specifications prior to Operation Permit issuance. The manufacturer or the manufacturer's authorized field representative and authorized designer shall provide written confirmation of their acceptance of the system installation prior to Operation Permit issuance.

I. For sites required to be evaluated by a Licensed Soil Scientist or Professional Geologist, the local health department shall specify as a condition on the Improvement Permit and Authorization to Construct that a Licensed Soil Scientist or Professional Geologist oversee critical phases of the ground absorption system installation and certify in writing that the installation was in accordance with their specified site/installation requirements prior to the Operation Permit issuance.

J. American Manufacturing Company, Inc. shall provide lists of manufacturer's authorized designers, installers and operators to the State and applicable local health departments. The Manufacturer shall also provide notice of all scheduled manufacturer authorized training programs for individuals seeking authorization, or ongoing training.

X. Repair of System

The provisions of 15A NCAC 18A .1961(c) shall govern the use of the American Perc-Rite® subsurface drip system for repairs to existing malfunctioning wastewater systems.

Approved by:_____Date:_____

Appendix A

Note: In Tables A-1, A-2, and A-3 "SWC" means "Soil Wetness Condition" and "USC" means an "UNSUITABLE Soil Condition," other than a SWC.

Table A-1
Siting criteria for anaerobic drip systems where dripline is installed below the elevation of the naturally occurring soil surface (NOSS)

Criteria or requirement	
Minimum useable soil depth below NOSS to USC or SWC	18 inches to USC 13 inches to SWC
Minimum vertical separation between the trench bottom or point of application and USC or SWC	12 inches
Allowance to meet 6 inches cover requirement	Addition of up to 6 inches of suitable Group II or III soil material, after settlement
Special site evaluation not required, unless specifically required below	24 inches or more of useable soil
	18 inches or more of useable soil and no Group IV soil within 18 inches of NOSS
Special site evaluation required (Section V)	Group IV soil within 18 inches of NOSS and LTAR >0.05
	<24 inches of useable soil and Group IV soil within 18 inches of NOSS
	Proposed LTAR exceeds LTAR assigned by EHS/LHD per Section III(b)
	Groundwater lowering system used and LHD or RSS determines evaluation needed
	Design daily flow exceeds 1,500 gpd
	When total soil depth from NOSS to USC or SWC is ≥ 18 inches and LTAR: >0.5 (Group I); >0.35 (Group II); >0.2 (Group III); 0.1 (Group IV) When total soil depth from NOSS to SWC is < 18 inches and LTAR: >0.5 (Group I); > 0.3 (Group II); > 0.15 (Group III)
	LHD or RSS determines evaluation needed based on soil/site conditions, daily design flow, layout and/or stormwater appurtenances

Table A-2
Siting criteria for anaerobic drip systems on new fill sites, when all or part of the dripline is to be installed in approved fill material

Criteria or requirement	
Minimum useable soil depth below NOSS to USC or SWC	18 inches to USC 12 inches to SWC
Minimum vertical separation between the trench bottom or point of application and USC or SWC	18 inches to USC 12 inches to SWC
Special site evaluation not required, unless specifically required below	18 inches or more of useable soil and no Group IV soil within 18 inches of NOSS
Special site evaluation required (Section V)	Group IV soil within 18 inches of NOSS
	Design daily flow exceeds 1,500 gpd

Table A-3
Siting criteria for anaerobic drip systems on existing fill sites, when all or part of the dripline is to be installed in approved fill material.

Criteria or requirement	
Minimum depth Group I fill/soil below existing fill surface to USC or SWC	24 inches
Minimum vertical separation between the trench bottom or point of application and USC or SWC	18 inches