

Ohio Department of Health
Special Device Approval per OAC 3701-29-20(C)
Leaching Trench Products Utilizing a Non-gravel, Fines-Free Distribution System

In accordance with Am. Sub. HB 119 (127th General Assembly), effective July 2, 2007, the Ohio Department of Health (ODH) adopted Statewide Interim Sewage Rules that reflect the language in the 1977 version of Ohio Administrative Code (OAC) Chapter 3701-29. The Ohio Department of Health (ODH) approved the use of several types of chamber and gravelless products for onsite sewage treatment systems provided these complied with the same soil absorption sizing requirements used for traditional gravel leaching trenches. In May of 2007, the Sewage Treatment Systems Technical Advisory Committee, as authorized by Ohio Revised Code Chapter 3718, recommended continued use of chamber and gravelless products-as approved by ODH. The approval for use of these products continues under the Statewide Interim Sewage Rules (Ohio Administrative Code Chapter 3701 -29) that became effective on July 2, 2007.

Manufacturers continue to develop new configurations and specifications for many of these products. At the request of several of these manufactures, the Sewage Treatment Systems Technical Advisory Committee (TAC) reviewed the existing literature and state-of-the-art on the design and sizing of leaching trench systems utilizing chamber and bundled EPS distribution media products. With consideration of TAC recommendations, ODH grants special device approval for alternative leaching trench bottom area sizing for leaching trench systems utilizing approved chamber and bundled EPS distribution media products in accordance with the conditions, specifications, and other provisions set forth in this document. Other products utilizing a non-gravel, fines-free distribution system may be approved by the Director of ODH under this SDA after review and recommendation by the TAC. **This special device approval (SDA) is intended as a supplement to OAC Rule 3701-29-11 and grants local boards of health the authority to use alternative leaching trench bottom area sizing methods for sizing leaching trench systems utilizing chamber and bundled EPS distribution media products or other products approved by the Director of ODH as described within this document.**

I. DEFINITIONS

- 1. Approved Leaching Trench Products Utilizing a Non-gravel Fines-Free Distribution System:** Products which have received the approval of the Director of ODH through one of the two processes described in Section II herein.
- 2. Parallel Distribution:** pressure or gravity distribution of effluent that proportionally and simultaneously loads multiple sections of a final treatment and dispersal component.
- 3. Sequential Distribution:** distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief line or device to the succeeding trench; the effluent does not pass through the distribution media before it enters succeeding trenches
- 4. Serial Distribution:** distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief line or device to the succeeding trench; effluent passes through the distribution media before entering succeeding trenches which may be connected to provide a single uninterrupted flow path

II. PROCESS TO BECOME AN “APPROVED” PRODUCT

1. Approval After Administrative Review: For the two product types meeting the description provide in section A and B below, approval may be granted by the Director of ODH after Administrative review. Those chamber and bundled expanded polystyrene (EPS) distribution media products that meet the specifications below may submit technical, design, performance, installation, and O&M information to support all manufacturer claims as requested by ODH for administrative review. Installation information shall include a product-specific installation checklist for use by contractors and inspectors. The checklist shall provide enough information to guide installations and inspections. A generic example of such a checklist is provided in Appendix A. Only after Administrative review and approval may such Chamber or EPS systems be deemed “approved.” If the Director deems the system does not meet the necessary criteria, the manufacturer may seek approval through TAC as detailed in Section 2 below.

A. Chamber Distribution Products eligible for Administrative approval shall

- i. eliminate the need for gravel in leaching trenches and replace it with an open bottom, plastic chamber;
- ii. provide adequate void space for the passage and temporary storage of effluent (adequate void space shall be considered the volume of void space provided by the equivalent area of an alternative leaching trench as described in this Special Device Approval);
- iii. provide for suitable effluent distribution, and present an interface with the infiltrative surface- trench bottom and side-wall soil - for absorption of the wastewater; and
- iv. be certified by the International Association of Plumbing and Mechanical Officials (IAPMO) to meet IAPMO Property Standard PS 63-2005 *et seq.*

B. Bundled Expanded Polystyrene (EPS) Distribution Media Products eligible for Administrative approval shall:

- i. eliminate the need for traditional gravel, and replace it with a perforated pipe surrounded by tightly packed EPS aggregate and enclosed in polyolefin netting. When used in combination with EPS bundles containing a perforated pipe, additional bundles may not contain a perforated pipe.
- ii. provide adequate void space for the passage and temporary storage of effluent, while maintaining a stable density throughout the life of the system (adequate void space shall be considered the volume of void space provided by the equivalent area of an alternative leaching trench as described in this Special Device Approval);
- iii. support the distribution pipe (where required), provide for suitable effluent distribution, and present an interface with the infiltrative surface - trench bottom and side-wall soil - for absorption of the wastewater;
- iv. maintain the integrity of the excavation, support soil backfill and cover material, and weight of equipment used in backfilling; and
- v. be fabricated from non-decaying and non-deteriorating materials, meeting applicable industry standards that do not leach unacceptable chemicals when exposed to sewage and the soil environment.

2. Approval After TAC Review: Other products utilizing a non-gravel, fines-free distribution system can be considered for approval under this SDA upon application to the ODH and review by the TAC, as authorized by Ohio Revised Code Chapter 3718. Those manufacturers who

believe their products meet the specifications below may submit an application to the TAC to become a “Leaching Trench Product Utilizing Non-gravel Fines-Free Distribution Systems” under this SDA. The application must include technical, design, performance, installation, and O&M information to support all manufacturer claims as requested by ODH and the TAC for review. Installation information shall include a product-specific installation checklist for use by contractors and inspectors. The checklist shall provide enough information to guide installations and inspections. A generic example of such a checklist is provided in Appendix A.

- A. eliminate the need for traditional gravel and pipe, and replace it with a non-gravel, fines-free system.
- B. provide adequate void space (for the passage and temporary storage of effluent) while maintaining a stable density throughout the life of the system;
- C. support the distribution pipe (where required), provide for suitable effluent distribution, and present an interface with the infiltrative surface - trench bottom and side-wall soil - for absorption of the wastewater;
- D. maintain the integrity of the excavation, support soil backfill and cover material, and weight of equipment used in backfilling;
- E. be fabricated from non-decaying and non-deteriorating materials that do not leach unacceptable chemicals when exposed to sewage and the soil environment; and
- F. be supported by such technical information, published scientific studies and field performance data to demonstrate the appropriateness of the leaching trench bottom area sizing allowed under Section IV herein.

III. CONDITIONS

The following conditions, as applicable, shall be met to comply with this approval:

1. The minimum leaching trench bottom area permitted for approved leaching trench products **utilizing a non-gravel, fines-free distribution system** is that calculated using the design requirements and specifications herein. Absorption area size reductions allowed in other approvals shall not be combined to produce a required leaching trench bottom area less than the minimum area produced using the design requirements and specifications herein.
2. The vertical separation distance (VSD) from the infiltrative surface of the leach trench to limiting condition, when applying septic tank effluent, may be 3 feet to rock strata and shall comply with VSD established locally for water tables and other limiting conditions.
3. Maintain at least one foot of in situ soil above any limiting condition except where permitted locally to be less than one foot to a perched seasonal high water table.
4. Soil depth credits may be used as specified for approved pretreatment components and other special device approvals posted on the ODH web site.

IV. SPECIFICATIONS

1. **Site Limitations and Modifications** - Siting limitations and site modification include but are not limited to the following:
 - A. Trenches shall be oriented parallel to natural surface contours and shall be sited to avoid natural drainage features and depressions that may hold surface water. A variation of plus or

minus 3 inches along the surface contour may be permissible to accommodate trench installation along the contour.

- B. Plans shall address surface water diversion as needed. An interceptor drain may be used upslope of the leaching trench soil absorption component to intercept the horizontal flow of subsurface water to reduce its impact on the down gradient leaching trenches.
- C. Special safety considerations and installation criteria as needed are required for installing trenches on a slope greater than 15%. Manufacturer prohibitions and instructions shall be followed. When the depth to a limiting condition requires the approved product to be installed to within six inches of or above natural grade, and fill material is placed between and/ or over trenches for the purpose of creating trench sidewall, soil cover installation on slopes greater than 15% may not be feasible due to the risk of material slippage and maintenance of appropriate trench depths.
- D. Site modification involving fill material shall follow manufacturer's specifications and shall comply with the following:
 - i. When the specified trench depth results in the distribution product extending above natural grade of the in situ soil, fill material between the trenches shall be of sand, loamy sand or sandy loam texture. Fill material shall be applied in a manner that protects and creates an interface with the underlying in situ soil and prevents compaction of material between trenches.
 - ii. Fill material applied to the natural ground surface prior to the excavation of leaching trenches for the purpose of creating trench sidewall shall be sand, loamy sand, or sandy loam texture soil capable of maintaining trench sidewall stability during installation and shall be applied in a manner that both protects and creates an interface with the underlying in situ soil.
 - iii. Unless evaluated as suitable, no fill material shall be present in the vertical separation distance below the infiltrative surface of the leaching trenches. Careful consideration shall be given prior to siting leach trenches in settled non-compacted fill material to determine its suitability for soil absorption. Over time, fill material *may* develop the characteristics of soil; however, it shall be thoroughly evaluated for such characteristics, in addition to treatment and dispersal capacities.

2. **Site and Soil Information** - A site and soil evaluation is required to identify depth to limiting conditions including but not limited to seasonal saturation and the average depth to the water table and rock strata, a description of soils including texture, consistence, structure (both shape and grade), and identification of replacement area.

3. **Design Criteria**

- A. **Sizing and configuration**: Systems shall be sized based on a daily design flow of at least 120 gallons per day per bedroom, or as otherwise justified for daily peak flow variations. Small Flow Onsite Sewage Treatment Systems as defined in Ohio Administrative Code (OAC) 3701-29-21 shall be sized in accordance with OAC Rule 3701-29-21.
 - i. The leaching trench bottom **area** shall be of adequate size and configuration to disperse the effluent and prevent surface seepage and shall comply with the sizing requirements within this document.

The design leaching trench bottom area of an approved leaching trench product utilizing a **non-gravel, fines-free distribution system** shall be calculated using the soil loading rate from the Tyler Table (table available in papers referenced herein) and the daily design

flow. The required minimum leaching trench bottom **area** of a product approved under this SDA shall be no less than 75% of the design leaching trench bottom area when the design leaching trench bottom area is calculated using the soil loading rate for leaching trenches accepting typical septic tank effluent (BOD₅/ TSS >30 mg/L). This SDA does not authorize reductions in the leaching trench bottom area for systems utilizing the soil loading rate for low organic effluent (BOD₅/ TSS <30 mg/L).

Additional leaching trench bottom **area**, for the purposes of resting portions of the leach field, shall be added to the calculated soil absorption component area in all leaching systems. This additional area shall be equivalent to 25% of the required minimum area under this SDA.

An example calculation of the minimum leaching trench bottom area required under this SDA is provided in Appendix B of this document.

- ii. The daily design flow and linear loading rate will establish the minimum **length** of the trenches along each contour. **Partial trenches, that do not provide the required length along contour, are not permitted.** Leach trench lengths exceeding 150 feet, as a result of linear loading rate calculations, are permissible. Placing the manifold in center of longer trenches or use of low pressure distribution systems may be considered.
- iii. Leaching trenches for new sewage treatment system installations shall have a maximum **width** of two feet. A leaching trench width of up to three feet may be permissible for system alterations or replacements when the two-foot trench width requirement will cause an unusual hardship, including the installation of a soil absorption component other than leaching trenches when leaching trenches would otherwise be authorized, or the installation of a leaching trench configuration that is disadvantageous for the proper dispersal and treatment of the effluent. The minimum length as determined in accordance with the Tyler Table and the specified trench width shall be used to determine the number of leaching trenches needed to accommodate the daily design flow.

Products approved under this SDA shall have a minimum projected product width that substantially fills (within 2 inches) the trench width (i.e. a maximum trench width of eighteen inches is required for approved products with a product width of sixteen inches.)

- iv. Trench **depth** shall be determined by the limiting condition and have a minimum depth of two inches into the in situ soil. A leaching trench bottom shall be as level as practicable along its length and shall be installed in accordance with the guidelines set forth in Section V – Installation, herein.
- b. **Trench material:** Approved chamber and bundled EPS distribution media products shall provide a minimum 8-inch height and shall be used in accordance with manufacturer specifications for installation.
 - c. **Cover:** The soil cover shall have a depth of at least six inches after settling or as specified for a proprietary product and shall be of a quality to allow for oxygen transfer and growth of vegetation.
 - d. **Distribution options:** This special device approval allows for alternative dosing and distribution methods when gravity flow is not possible or preferred. Serial Distribution Systems as defined herein are expressly prohibited under this Special Device Approval. Plans shall specify the means of distribution and management requirements including but not limited to the following:

- i. Specification of either parallel or sequential distribution using components with access to grade and a mechanism for flow diversion for the sequential resting of each trench in the soil adsorption system.
- ii. Distribution component connections between the tank or another distribution component, and to a leaching trench, shall be watertight and shall include properly supported rigid solid wall pipe to prevent settling and damage under normal loads and operating conditions.
- iii. A means for determining the liquid level or capacity of each leaching trench shall be provided. If an inspection port is used or required by the local Board of Health, the port shall be anchored and accessible with at least a two-inch opening and a removable watertight cap.
- iv. References or specifications for dosing or distribution methods such as lift tanks, flood dosing, surge capacity for timed dosing, or low pressure pipe (LPP) distribution.

V. INSTALLATION

1. Products approved under this SDA shall be installed in accordance with the manufacturer's product-specific design and installation manual, product-specific checklist, accepted standards of practice; and all state and local code requirements.
2. If any disturbance or damage has occurred to the soil absorption area, installation shall not proceed and the registered installer shall contact the owner and the local Board of Health. Soil moisture conditions shall be evaluated and trench excavation postponed when there is risk of compaction or smearing sidewalls. Approved **leaching trench products utilizing a non-gravel, fines-free distribution system** shall be placed in a manner that prevents compaction of the infiltrative surface. Open trenches shall be avoided for any length of time to prevent impacts from sediments in runoff and windblown silt. Suitable backfill and cover material as required in this document, or if the approved product has a proprietary component as required by the product specifications, shall be used. Such material shall not be compacted and shall allow for settling unless otherwise specified by the proprietary product installation instructions. The area over the leaching trenches shall be protected from erosion with provision of suitable vegetative cover, mulching, or other specified means of protection.

VI. OPERATION & MAINTENANCE (O&M)

Sewage treatment systems with approved **leaching trench products utilizing a non-gravel, fines-free distribution system** shall be operated, maintained, and monitored as required by the operation permit issued by the local Board of Health. In sewage treatment systems where a pretreatment component precedes an approved **leaching trench product utilizing a non-gravel, fines-free distribution system**, any service agreement for the pretreatment component shall include the maintenance and monitoring of **all system components**. In conjunction with any operation permit conditions or O&M provisions required by the aforementioned Board of Health, the O&M of a sewage treatment system with an approved **leaching trench product utilizing a non-gravel, fines-free distribution system** may also include but is not limited to:

1. Monitoring the liquid level or capacity of the leaching trench soil absorption component.
2. Management of flow diversion mechanisms for the purpose of resting portions of the soil absorption area.

3. Checking for surface water infiltration or clear water flows from the dwelling or structures into the system or onto the soil absorption area.
4. Monitoring for proper operation of mechanical components and/or distribution methods as applicable.
5. Any other O&M requirements specified by the manufacturer of the system.

VII. REFERENCES / RESOURCES

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Appendix A

Example Installation Checklist for Contractors and Inspectors for an Approved Non-Gravel, Fines-Free Distribution System*

Before Installation Begins:

- Is the proprietary system to be installed approved in accordance with all state and local regulations?
- Has a sewage treatment system construction permit been issued by the local board of health for the installation?

Pre-Installation Steps:

- Has the soil moisture content been checked to three inches (0.25 foot) below the planned trench bottom? (See product manufacturer's installation instructions).
- Where required by local regulations, have erosion control measures been installed as necessary to protect the sewage treatment system area and/or any adjacent sensitive areas?

Chamber Installation:

- Are the elevations of the chamber trench bottom properly set?
- Are the excavated trench bottoms level?
- Has any smearing occurred in the first foot of excavation during installation? If so, see product manufacturer's installation instructions.
- Has all debris and have all rocks been removed from the trench excavation?
- If present, have all footprints on the trench bottom been raked or scarified?
- Has the appropriate knockout been prepared in inlet end cap to achieve correct inlet height?
- Are installed chambers fully engaged? (See product manufacturer's installation instructions).

Observation Port

- Has a mechanism for monitoring the liquid level been installed (observation port at chamber or drop box)?

Backfilling:

- Is sidewall backfill appropriately compacted? (See product manufacturer's installation instructions).

Inspection:

- Where required, has an "as-built" plan been prepared for the inspector?
- Has installed approved chamber system been inspected by local board of health prior to installation of final cover?

Final Cover:

- Is final cover installed to height as per the system design and as described in the authorized sewage system construction permit?
- Have vehicles been introduced to the area over the system? (See product manufacturer's installation instructions for details/restrictions).

Remember:

- Are approved chambers installed in accordance with all state and local regulations?
- Are approved chambers installed in accordance with an authorized sewage treatment system construction permit as issued by the local board of health?

*Note: Manufacturers of approved products shall provide an "Installation Checklist" specific to their product, as well as "Installation Instructions" specific to Ohio, in accordance with this Special Device Approval, for your reference.

Appendix B

Example Calculation of the Minimum Leaching Trench Bottom Area and Trench Length Required for an Approved Non-Gravel, Fines-Free Distribution System

Design Parameters:

Home: Four Bedrooms
Soil Type: A fine sandy loam (FSL) with moderate (2) blocky (BK) structure
Slope: 3%
Infiltration Distance: 18 inches - distance from trench bottom to soil limitation or restrictive layer

Step 1: Calculate the Daily Design Flow

4 bedroom System at 120 gallon per day per bedroom: $(120 \text{ gpd} \times 4) = 480 \text{ gal/day (gpd)}$

Step 2: Determine Infiltration (Soil) Loading Rate from the Tyler Table

Go to the Tyler Table. Referencing the septic tank effluent with $\text{BOD}_5/\text{TSS} > 30 \text{ mg/L}$ column, the soil type listed has a design infiltration rate of 0.4 gallons/day/square foot (gpd/ft^2)

Step 3: Calculate the Required Minimum Trench Bottom Area allowed Under the SDA

The absorption area for a gravel system (leach trench bottom area) is calculated by dividing the daily design flow (gpd) by the infiltration loading rate. Under this SDA, the bottom area is reduced by 25%, only when utilizing typical septic tank effluent ($\text{BOD}/\text{TSS} > 30 \text{ mg/l}$) loading rates from the Tyler Table. To calculate this, the gravel absorption area (daily design flow/infiltration loading rate) is multiplied by 0.75 (75%). Therefore:

$$\text{Required minimum leaching trench bottom area: } \frac{0.75 \times 480 \text{ gpd}}{0.4 \text{ gpd/ft}^2} = 900 \text{ ft}^2$$

Step 4: Determine the Hydraulic Linear Loading Rate (HLLR)

Return to the Tyler Table. Referencing the soil loading rate of 0.4 gpd/ft^2 (0-4%) and the infiltration distance of 18 inches (12-24), the HLLR is **3.8 gpd/linear foot (lf)**.

Step 5: Calculate the Minimum Required Length of the Trenches Along the Contour

Note: This SDA does **not** provide a reduction in system length along the contour, only a reduction in square footage resulting in fewer trenches and/or reduced width of trenches. To calculate the minimum required system length, divide the daily design flow by the HLLR: Therefore, the minimum required system length is:

$$\frac{480 \text{ gpd}}{3.8 \text{ gpd/lf}} = 126 \text{ lf}$$

Step 6: Calculate the Resting Leaching Trench Bottom Area

The resting area must be equal to 25% of the required minimum leaching trench bottom area or the area utilized by one leaching trench, whichever is greater.

- Calculate 25% of the required minimum leaching trench bottom area $900 \text{ ft}^2 \times 0.25 = 225 \text{ ft}^2$

Step 7: Calculate the Total Leach Trench Bottom Area

- Determine the total leaching trench bottom area by adding the required minimum leaching trench bottom area and the resting leaching trench bottom area

$$900 \text{ ft}^2 + 225 \text{ ft}^2 = 1125 \text{ ft}^2$$

Step 8: Calculate the component width

Determine infiltration component width (sum of trench widths) by dividing total leaching trench bottom area by HLLR trench length:

$$1125 \text{ ft}^2 / 126 \text{ ft} = 8.93 \text{ feet wide}$$

Step 9: Calculate the number of trenches

Determine the number of trenches by dividing the component width by the trench width. *Note:* Three examples are provided in the chart below utilizing 12”, 18”, and 24” wide trenches

Utilizing a	Calculate the number of trenches	Round up* to nearest number of whole trenches
12” wide trench:	8.93 feet divided by 1.0 foot = 8.93 trenches	Round up to: 9 trenches
18” wide trench:	8.93 feet divided by 1.5 feet = 5.9 trenches	Round up to: 6 trenches
24” wide trench:	8.93 feet divided by 2.0 feet = 4.46 trenches	Round up to: 5 trenches <i>(Note: This design requires that 2 trenches be available for resting)</i>

* The number of trenches calculated in Step 9 is the minimum number of trenches to be installed for the trench length given in this example. **Partial trenches, that do not provide the required length along contour, are not permitted.** If rounding the number of trenches up requires the installation of more square footage of leaching trench than is desirable, the designer may wish to consider changing the trench width or length to determine a more desirable configuration. **However, under no circumstances can the trench length be less than the minimum required length based on the Hydraulic Linear Loading Rate (HLLR).**

NOTES:

1. Leaching trenches for new sewage treatment system installations shall have a maximum width of two feet. A leaching trench width of up to three feet may be permissible for system alterations or replacements when the two-foot trench width requirement will cause an unusual hardship as described in the SDA.
2. In accordance with the SDA, “the design leaching trench bottom area is calculated using the soil loading rate for leaching trenches accepting typical septic tank effluent (BOD5/ TSS >30 mg/L).” The SDA does not authorized reductions in the leaching trench bottom area for systems utilizing the soil loading rate for low organic effluent (BOD5/ TSS <30 mg/L).
3. Design options shown above are possible options. Other options that meet the required minimum leaching trench bottom area are acceptable.
4. Products approved under this SDA shall have minimum projected width that substantially fills (within two inches) the trench width (e.g. the approved product used in design option 2 above must have a projected width of at least 16” inches).
5. The system design must include operation instructions and designate the number of trenches to be rested at one time. It is recommended that flow be diverted from 25% of the leaching trenches at one time.



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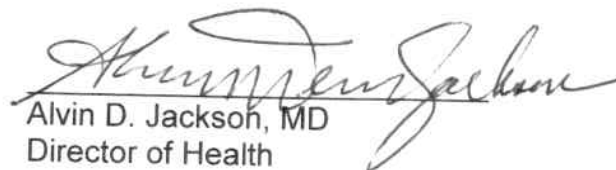
DIRECTOR'S JOURNAL ENTRY

APPROVAL OF LEACHING TRENCH PRODUCTS UTILIZING A NON-GRAVEL, FINES-FREE DISTRIBUTION SYSTEM AS A SPECIAL DEVICE FOR SEWAGE TREATMENT SYSTEMS

Recently adopted revisions to Chapter 3701-29 of the Administrative Code set forth specifications for traditional sewage disposal systems. The rules do not authorize alternative methods of soil absorption and distribution, such as use of products that provide alternatives to approved leaching trench materials that improve sewage effluent loading to the soil. The Ohio Department of Health worked with a subcommittee of the Sewage Treatment Systems Technical Advisory Council to evaluate the scientific research and other state rules and experience regarding the use of these products to allow for soil absorption area sizing reductions.


Under the authority of rule 3701-29-20(C) of the Administrative Code, the Director of Health may approve special devices or systems that differ in design or principle of operation from those set forth in the rules. The standards and criteria for the use of leaching trench products utilizing a non-gravel, fines-free distribution system attached to this entry have been reviewed and recommended for approval by the Sewage Treatment Systems Technical Advisory Committee for use as a sewage treatment system in Ohio at their meeting on April 14, 2009. Therefore, the use of leaching trench products utilizing a non-gravel, fines-free distribution system as described in the attachment, and designed, installed and maintained in accordance with the conditions as specified, are now approved as a sewage treatment system special device for use in Ohio.

7-27-2009
Date


Alvin D. Jackson, MD
Director of Health

I hereby certify this to be a true and correct copy of the Order to journal entry for the Ohio Director of Health.

7-28-2009
Date


Brenda M. Adams
Custodian of the Director's Journals
Ohio Department of Health