

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**Bureau of Clean Water**

**DOCUMENT NUMBER:** 385-2208-003

**TITLE:** Onlot Wastewater Technology Verification Protocol (TVP)

**EFFECTIVE DATE:** Upon publication of notice as final in the *Pennsylvania Bulletin*

**AUTHORITY:** The Pennsylvania Sewage Facilities Act (as amended), 35 P.S. §§ 750.1-750.20a, 25 Pa. Code Chapter 73

**POLICY:** The Department of Environmental Protection (DEP) will evaluate new concepts, or technologies that are applicable to onlot wastewater disposal, and components that have been classified as onlot alternate technologies for use in Pennsylvania. It is necessary that such evaluations be consistently applied and impartially conducted by a DEP-approved qualified independent third party evaluator.

**PURPOSE:** The purpose of this guidance is to provide scientific, technical, and field testing standards as directed by Act 26 of 2017, upon which evaluation of each onlot sewage system or component that has been classified as an alternate system and newly proposed on-lot sewage system or component technologies for which approval as an alternate system or component in the Commonwealth of Pennsylvania is being sought. Specifically, the guidance provides a consistent approach to the submission, review and approval/disapproval of existing and newly proposed alternate treatment technologies.

**APPLICABILITY:** This policy applies to persons and manufacturers seeking approval of new or previously classified, onlot wastewater technologies for use as alternate onlot sewage disposal facilities.

**DISCLAIMER:** The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures will affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of the Department to give these rules that weight or deference. This document establishes the framework, within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

**PAGE LENGTH:** 42 pages

**DEFINITIONS:** See 25 Pa. Code Chapters 71, 72 and 73

## I. Introduction

The Pennsylvania Sewage Facilities Act (35 P.S. §§ 750.1-750.20a), commonly known as “Act 537”, establishes the framework for the development and implementation of plans for the sanitary disposal of sewage waste. Effective treatment and disposal of sewage waste are essential to maintaining the quality of waters of the Commonwealth and the economic value of residential and other properties.<sup>1</sup> Section 5 of Act 537 requires each municipality to submit to the Department of Environmental Protection (DEP) an officially adopted plan for sewage services for areas within its jurisdiction and establishes the framework for review and approval of these official plans by both the municipality and DEP. On July 20, 2017, amendments to Act 537 were enacted (Act 26 of 2017) to revise the sewage planning process to allow for the consideration of alternate onlot sewage systems during the planning process. These amendments became effective on September 18, 2017.

Act 26 requires the Department to “develop scientific, technical and field-testing standards upon which an evaluation of each onlot sewage system that has been classified as an alternate system in accordance with 25 Pa. Code § 73.72 (relating to alternate sewage systems) shall be based.” These standards are to be developed in consultation with the Sewage Advisory Committee (SAC).

While the existing regulations do not provide for consideration of alternate onlot sewage systems and related technologies or components during the planning process, the regulations do establish criteria for evaluation of alternate systems on a case-by-case basis. 25 Pa. Code § 73.72. The regulations were developed primarily to address malfunctioning onlot sewage systems on lots that have specific site suitability deficiencies or engineering problems. A local agency can issue a permit for an alternate system under the current regulations in certain circumstances even though the alternate system is not consistent with the method of sewage disposal contained in the municipality’s approved official plan, special study or update revision. 25 Pa. Code § 72.23(d). The regulations require a person desiring to install an alternate system to submit complete preliminary design plans and specifications to the Sewage Enforcement Officer (SEO) and DEP for review and comment prior to applying to the local agency for a permit for the installation of an alternate onlot sewage system or component. 25 Pa. Code § 73.72(b).

When DEP initially evaluates an alternate technology based on the criteria in 25 Pa. Code § 73.72(c), DEP typically develops general requirements that must be considered by an SEO before issuing a permit for the use of the alternate technology in a proposed onlot system. The local agency is responsible for issuing the permit for the system based on consideration of DEP comments. DEP makes its general requirements for evaluated onlot alternate technologies available for use by SEOs through listing on its website.<sup>2</sup> DEP does not require persons seeking to use these listed alternate technologies to submit their proposals to DEP for further review, and SEOs can issue permits for these listed alternate technologies when the general requirements of the listing are satisfied. If a person proposes to install an alternate technology that DEP has not previously evaluated or has not developed general requirements through its listing process, the

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<sup>1</sup> 35 P.S. § 750.3 (Declaration of policy) (“It is hereby declared to be the policy of the Commonwealth of Pennsylvania through this act: (1) To protect the public health, safety and welfare of its citizens through the development and implementation of plans for the sanitary disposal of sewage waste. ...”)

<sup>2</sup> These onlot alternate technology listings are available on DEP’s website at <http://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Act537/OnlotDisposal/Pages/OnlotAlternateTechnologyListings.aspx>.

person would need to submit the proposed alternate technology to both DEP and the SEO for review.

In addition to establishing criteria for evaluating the use of alternate systems on a case-by-case basis, the existing regulations allow for the use of experimental systems. 25 Pa. Code § 73.71. DEP has developed guidance for the review of experimental systems, *Experimental Onlot Wastewater Technology Verification Program*, DEP Doc ID 381-2208-001 (TVP Guidance). This guidance has replaced the previous TVP Guidance. That guidance outlined a process for testing and verifying the performance of experimental technologies that was applicable to onlot sewage collection, treatment and disposal to satisfy the criteria in § 73.71(c) for the successful design and use of experimental systems.

Prior to issuance of the TVP Guidance, monitoring, observation and testing requirements for experimental technologies were established on a case-by-case basis and resulted in inconsistencies, inappropriate use of experimental technologies and a delay in making promising technologies available for general use.

The process that DEP has used to approve alternate systems/components has also gone this same route. This Onlot Wastewater Technology Verification Protocol will not only provide compliance with the requirements of Act 26, but it will appropriately formalize the alternate system approval process. Given the advancements in onlot treatment technologies and the passing of Act 26, the processes used to approve, site, and maintain alternate pretreatment system components must be established. The development of the scientific, technical and field-testing standards as required by Act 26 of 2017 provides a more robust process for alternate system advanced pretreatment component review and approval. In accordance with the Act, the process confirms that onlot technologies approved by DEP will continue to operate successfully over the long term, ensuring the Best Management Practices being employed for treatment and disposal of sewage on the most challenging sites will be protective of the Waters of the Commonwealth, water supplies, and property values.

This Guidance outlines the process that the manufacturer of each existing and new alternate pretreatment component and experimental system follows in order for the system or component to be approved for use in the Commonwealth of Pennsylvania. Given that it is difficult for the existing alternate systems to meet requirements that have not been established, DEP has provided some flexibility in the process for the existing alternate pretreatment system components without compromising the integrity of the review process.

This Guidance includes three elements, (1) certification by an approved certification organization, (2) in-situ performance of the technology through field testing, and (3) ongoing performance monitoring of the technology through annual audits. The certification provides a basis for establishing whether a proprietary pretreatment system can meet the performance standards under a controlled setting. The certification data can be used to determine if the pretreatment system meets the performance criteria for the various parameters in the treatment standards. An additional statistical analysis of the certification data provides evidence that the pretreatment system meets the standards.

Successful field testing provides the assurance that the technology performs under field conditions and variable wastewater loading. This is important since the certification testing is conducted in a controlled setting, while field testing shows how the system reacts under “typical”

use. Field data will also help to establish the level of operation and maintenance required to ensure the system operates in a manner that maintains compliance with the effluent performance standards.

Once it is established that a technology meets the performance standard and the approval process is completed, the technology is approved for use in the Commonwealth of Pennsylvania. The technology then enters the last element of the technology verification process, the annual performance audit. The annual audits, through random selection of installed systems, provide assurance the technology continues to meet the approved performance standard for the technology. The process is a cost-effective way to ensure that systems not only continue to meet the performance standards but also ensures systems are being operated and maintained appropriately.

Pretreatment systems approved via the TVP that meet the required treatment standards may also be systems that will be eligible for coverage under PAG-04 - National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Small Flow Treatment Facilities (SFTFs). Systems authorized under this permit are typically for residential sewage flows of 2,000 gpd or less. The treatment standard the system must meet to be considered an SFTF under the general permit is advanced treatment and Treatment Level D-3 for Fecal Coliform (See Page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards* for a list of Performance Standards).

Proprietary pretreatment systems are the focus of Act 26 and its implementation. The Act does not specifically distinguish between proprietary pretreatment system components and other approved technologies. Issues surrounding alternate systems and new land development planning primarily focus on the development of sites with shallow soils. The approval of alternate pretreatment systems is the focus of the TVP. There are, however, “other” types of technologies currently approved. *Appendix B: Alternate Onlot Listings – Proprietary Non-pretreatment and Nonproprietary Pretreatment*, on page 16, includes the current list of “other” types of alternate technologies that have been approved by DEP. Except for one of the technologies, the modified subsurface sand filter, the technologies are not pretreatment technologies. The standard for non-proprietary technologies will be the approved listing. These listings or approvals will be reviewed and updated during the alternate system evaluation process. In general, applicable NSF standards will be incorporated into the approval as a testing requirement. Future proposals for non-proprietary pretreatment technologies will be considered on a case-by-case basis. The consideration for approval of non-proprietary pretreatment technologies will be discussed in greater detail within the TVP process portion of this document (see page 5). A number of the “other” alternates are for distribution system components. The recommended standard for alternate technologies that provide for the distribution of effluent is the following – Alternate System Components that provide distribution of effluent are required to equally distribute effluent over the absorption area with the goal of maximizing the renovative and dispersal capability of the infiltrative surface. Evidence of equal distribution must be demonstrated to the satisfaction of the Department for alternate component approval.

## **II. Scope**

This policy is intended to provide guidelines for testing and verifying the performance of experimental onlot technologies and alternate onlot technologies, that are applicable to onlot treatment and disposal. The prior practice of classifying systems on a case-by-case basis resulted

in inconsistencies in classifications, inappropriate use of alternate and experimental systems and components, and a delay in making proven alternate and experimental systems available for general use.

This policy extends to all commercially ready proprietary and non-proprietary pretreatment systems/components of an experimental or alternate onlot sewage system that are reproducible from one location to another. This includes systems/components applicable to individual and community onlot systems designed to treat no more than 10,000 gallons per day of wastewater from residential, commercial or institutional establishments as listed in 25 Pa. Code § 73.17, but excluding industrial waste.

This policy will not affect any system/component testing or approval as currently described in 25 Pa. Code Chapter 73. Treatment systems and the system components not described in Chapter 73 are the targets of this policy. The technology performance verification information gathered under this policy will also be appropriate for use in making small flow treatment facility design, permit, and operation decisions.

### **III. Roles and Responsibilities**

- A. Certification Organization - One or more certification organizations acceptable to DEP will be selected by the technology manufacturer to oversee the technology verification process through test center verification. To be acceptable to DEP, an organization must be accredited by either the American National Standards Institute (ANSI) or the Standards Council of Canada (SCC) as an independent third party organization, and demonstrate to the satisfaction of DEP, that it can implement this guidance. Examples of acceptable certification organizations are the National Sanitation Foundation International (NSF) and the Bureau de normalisation du Québec (BNQ).
- B. Testing Organization - An entity that implements the technology-specific field test plan and/or performance audit, including documentation and sample reporting to DEP. The testing organization should be an independent third party; a person or body that is recognized as being independent of the person or organization that sells the treatment unit, as well as independent from the manufacturer and user of the treatment unit. They are independent because they are not affiliated with the producer, the seller, or the end user of the item being tested (i.e., no commercial bias is present). An individual, such as a professional engineer, geologist, university professor, or other qualified professional, can also act as a testing organization. The qualifications of the testing organization should be provided and will be subject to review and approval by DEP as part of the field test verification application review.
- C. Technology Manufacturer - A Natural person or legal entity that manufactures onlot wastewater treatment systems, or, as required by the applicant, components of such systems, and that is seeking to obtain product certification by DEP. When the onlot wastewater treatment system is constituted of components made by other manufacturers, the applicant should designate a main manufacturer. All the other manufacturers will be deemed subcontractors of the main manufacturer, referred to as the manufacturer, who is responsible for the component quality follow-up. Manufacturers should submit complete application forms to a certification organization for technology performance verification,

provide field-ready versions of the technology, assist with installation at a qualified test center, and provide necessary funding for test center and field verification testing.

- D. Service Provider - An individual, company or other entity who is certified by the manufacturer to provide operation and maintenance (O/M) to a manufacturer specific component, components, or system. By being affiliated with the manufacturer, service providers will not be authorized to act as a testing organization.
- E. DEP - Develops and maintains the onlot wastewater technology performance standards, technology verification application process, and review methodology. Reviews the technology verification applications to verify the onlot wastewater technology performance and approves or disapproves onlot technologies and previously classified alternate technologies for use in Pennsylvania.

#### **IV. Technology Application Review Process**

- A. All applications for onlot technology verification must be submitted to DEP. Applications should include all necessary information to confirm that the technology performs at the treatment level specified in the application. DEP will review the application to determine if it is administratively and technically complete. The applicant will submit two (2) hard copies and one (1) electronic copy of the application to DEP; all calculations and testing data will be provided in an excel workbook in the electronic submission. See page 17 *Appendix C: Application Administrative Requirements* for the administrative completeness items. Any existing performance verification data that the manufacturer wishes to be considered to supplement or supplant required testing must be submitted along with the verification application in a format acceptable to DEP.
  - 1. All proprietary pretreatment technologies must have the appropriate certification, unless the proprietary pretreatment technology is technologically incapable of being tested by a certification organization. See *Appendix D: Acceptable Certifications* on page 18 for currently acceptable certifications. The appropriate certification must be provided with the application to be considered administratively complete. If a technology is incapable of being certified, a statement provided by a qualified certification organization stating that the technology cannot be tested using the approved certification protocol must be provided with the application.
  - 2. An exception to the certification requirement may be granted for currently classified pretreatment alternate systems/components that were on the Alternate Systems Listing prior to September 18, 2017, and for which certification testing has not been performed. Manufacturers of these alternate systems/components may submit field testing data in lieu of certification data. The field testing data should meet the standards set forth in the field testing verification protocol referenced in this guidance.
  - 3. Non-proprietary pretreatment systems/components are not required to have a certification. These technologies will be limited to commonly accepted standard designs that have been proven to provide the treatment necessary to meet the performance standard for the site the technology is being designed to meet or

non-proprietary pretreatment systems/components being proposed as experimental.

4. Any experimental pretreatment system or component that successfully completes the technology verification protocol, but then is marketed as a proprietary system will be removed from the approved systems list and be required to complete certification.
  5. DEP may require additional information, when applicable, to determine the performance of a technology.
- D. Once the application is considered administratively complete, a technical review will begin. The technical review will be completed in five (5) steps.

Step One - DEP will review the certification data to determine if the technology meets the minimum performance standards as an alternate pretreatment treatment technology requested in the application. Pretreatment technology performance will be categorized based upon the level of treatment achieved. The levels of performance are shown in *Appendix A: Onlot Pretreatment Technology Performance Standards* on page 15.

1. Proprietary technologies that are incapable of being certified and non-proprietary technologies will proceed to step two of the technical review, Field Testing Verification.
2. Proprietary technologies with certification (NSF or BNQ) data will be statistically evaluated to determine if they meet the performance standard(s) for the approval being requested.
  - a. With the exception of fecal coliform, all applicable sample data will be evaluated to determine the sample mean ( $\bar{x}$ ) and the sample standard deviation ( $s$ ). See *Appendix E: Statistical Equations* on page 19.
  - b. Using the sum of the sample mean plus one sample standard deviation, DEP will determine if the data supports that the technology meets the applicable performance standard. (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*, for the list of pretreatment technology performance standards.)
  - c. For applications that request fecal coliform pretreatment performance approval, using the sum of the sample mean plus two standard deviations, DEP will determine if the data supports that the technology meets the performance standard being requested by the applicant.
  - d. If the statistical analysis does not verify that the technology meets the applicant's requested performance standard

approval, the technology will be disapproved. If disapproved, the applicant may retest the technology with an approved certification organization, and restart the application process once testing is complete.

- e. If the statistical analysis verifies the technology meets DEP's performance standard, the technical review will proceed to Step Two.

Step Two - Field Testing Verification will be completed in accordance with *Appendix E: Statistical Equations* starting on page 19. The following applicants for the following technologies must successfully complete field testing prior to DEP Approval:

- Pretreatment Technologies that have not performed acceptable field testing, or
  - Pretreatment Technologies that have performed partially acceptable or unacceptable field testing, or
  - Previously classified alternate pretreatment technologies that DEP has determined that certification is not required.
1. Acceptance of previously completed field testing data will be determined on a case-by-case basis. All testing data (influent, effluent, and process control samples) collected for the technology will be provided to DEP regardless if the samples meet DEP's minimum requirements. Only field testing data that meets the minimum requirements as stated below will be used in verifying the performance of the technology. Field data that doesn't meet these requirements may be used by DEP but may hold much less weight in the decision-making process.
    - a. Field testing sites must have occurred in the Commonwealth of Pennsylvania or in a climate similar or colder than the Commonwealth of Pennsylvania, and
    - b. Testing must have been completed by a DEP-approved testing organization and has followed at a minimum the protocols stated in *Appendix F: Field Testing Verification Protocol* (starting on page 20), and
    - c. Testing should have occurred over 12 or more consecutive months.
  2. All DEP acceptable field testing data will be statistically evaluated to determine if the sample data meets at least a 90% confidence interval for each parameter in the performance standard approval being requested.



3. If the acceptable field testing data does not meet the 90% confidence interval for one or more parameters in the performance standard, field testing verification may continue with prior approval by DEP. Otherwise, the technology may be disapproved for use in the Commonwealth of Pennsylvania.
4. If the statistical analysis of the field testing data, 90% confidence interval or greater, verifies the technology has met DEP's performance standard, the technical review will proceed to Step Three.

Step Three - Applicant to provide information for pretreatment system/component approval document. The following categories of information should be provided: sewage planning considerations, system/component design considerations, siting and installation requirements, and O/M requirements for the technology. This information will be the basis for the approval document in step four.

1. Sewage Planning considerations will provide the basis for the General Site Suitability Requirements necessary to satisfy the Sewage Planning Requirements for New Land Development proposals that utilize the proposed pretreatment system/components as the requirements apply to the proposed pretreatment technology.
2. Design considerations will provide the basis for a designer to be able to design and successfully permit the pretreatment component/system.
3. Pretreatment Systems/components should be designed with a physical treatment barrier or a fail-safe mechanism to ensure that untreated or partially treated sewage will not be discharged to the absorption area.
4. Manufacturers of pretreatment components/systems who request treatment performance approval that will allow for effluent discharge to soils less than or 20-inches should incorporate time and pressure dosing of the absorption area into the system design.
5. Siting and installation requirements will provide the basis for a designer to be able to site and for a contractor to successfully install the pretreatment component/system.
6. O/M requirements will be reviewed to determine if they meet DEP's minimum O/M requirements for the electrical and mechanical components of an onlot treatment system, the minimum pumping requirements for the tanks, the minimum inspection requirements for the system, and the minimum administrative requirements to ensure that systems/components that are installed will provide long-term sewage disposal.

Step Four - DEP, in consultation with the manufacturer, will develop the technology approval document. A notice of the availability of the approval document and the DEP's basis for making the decision to approve the technology will be published in the *Pennsylvania Bulletin* for a 30-day comment period.

The technology approval document will provide the general site suitability requirements for each alternate system or component. These general site suitability requirements will provide the basis for determining if a proposed alternate system or component is permissible by a Sewage Enforcement Officer.

The technology approval document will address the following:

- Rated performance standard for the technology, if applicable
- Source of technology; proprietary or generic
- Type of technology; secondary pretreatment, advanced pretreatment, or combined pretreatment and distribution
- Planning requirements
- Permitting requirements
- Design considerations
- Siting and installation requirements
- O/M requirements
- Inspection and testing requirements

Step Five - After review and addressing public comments, DEP may issue a final approval letter to the applicant for the onlot technology. The technology approval document and comment/response document will then be uploaded to DEP's Onlot Approval website for public use.

## **V. Annual Performance Audit**

- A. An annual performance audit for proprietary onlot pretreatment components and/or systems will be conducted by a DEP-approved testing organization to verify ongoing performance in accordance with the following conditions:
1. The manufacturer should provide DEP with a list indicating the location of all components and/or systems the manufacturer has installed in the Commonwealth of Pennsylvania. This list shall be continually maintained throughout the life of the approval of the technology.
  2. Once a calendar year, DEP will refer to the list to randomly select a number of locations of installed components and/or systems to be inspected. The number of locations to be inspected shall correspond to 1% of the number of components and/or systems installed over the past ten years, for a minimum of five (5) locations and a maximum of ten (10) locations.
  3. The manufacturer should provide DEP with its choice for the independent third party testing organization who will complete the annual performance audit. DEP

will review the qualifications of the testing organization to verify its independence and indicate approval or disapproval. Only one testing organization should be used during each annual performance audit. All costs associated with the testing organization should be the responsibility of the manufacturer. DEP, the owner of the component and/or system being tested, and the local agency are not responsible for any costs associated with the annual performance audit.

4. Once the locations have been determined by DEP, DEP will contact the approved testing organization, provide it with the locations, and in consultation with the testing organization, determine the dates and times for the audit inspections. Before proceeding with the inspections, DEP will inform the manufacturer, ten (10) days before the inspection, of the locations and dates of the scheduled samplings. The testing organization will not provide this information to the manufacturer unless requested by DEP.
5. The testing organization should provide DEP with the testing plan for completing the audit. The test plan, at a minimum, should ensure conformance with the sampling protocols as noted in *Appendix F: Field Testing Verification Protocol* (starting on page 20).
6. The manufacturer and/or a representative of the manufacturer may not contact the owner, visit the location, or provide any maintenance outside of the O/M agreement, to the selected components and/or systems within ten (10) days of the scheduled audit. The manufacturer and/or a representative of the manufacturer may accompany the testing organization to one or more of the audit locations.
7. DEP will provide the testing organization with the required inspection elements and sampling parameters that will be used during the inspections. The inspection form and a copy of the DEP certified lab results shall be provided to DEP.
8. During the inspection, the testing organization should first ensure that the component and/or system is functioning correctly. If such is the case, the testing organization should draw grab samples for fecal coliform, if applicable, record the required on-site readings, and draw composite samples for the required parameters. If the component and/or system is not functioning correctly, the testing organization should advise the owner and DEP in writing.
9. All samples shall be analyzed by a DEP certified laboratory.
10. Effluent samples from 80% of the locations inspected shall comply with the standards set forth in the manufacturer's technology approval.
  - a. If not, the testing organization, in consultation with DEP, should draw another series of samples from the installations that obtained substandard results.
  - b. If the results of these new analyses confirm initial results obtained, and more than 20% of the installations remain substandard, DEP will advise the manufacturer thereof, and

- c. During the next annual audit, DEP will require twice as many installations to be inspected and sampled, including inspecting and sampling all the previously nonconforming installations. In this case, 80% of the installations should be compliant. In all cases, DEP will advise the owner and the manufacturer, in writing, of the effluent samples that fail to meet the treatment standards.
11. DEP will provide the manufacturer with the final results of the performance audit. When a case of nonconformity of a component and/or system is detected, the manufacturer shall provide DEP a corrective action plan (CAP) explaining the case or cases of nonconformity and specifying the action to be taken to establish compliance of the elements under investigation.
12. Upon approval of the CAP, the manufacturer should implement the CAP and advise DEP in writing upon completion. Some cases of nonconformity may require an additional audit visit and testing following the specified instructions at the beginning of this section.
13. A period of suspension may be applied, either from the moment a case of nonconformity is detected or following an accepted period to correct the situation, depending on the type of nonconformity involved. If at the end of the period of suspension, the case of nonconformity has not been corrected, DEP may remove the technology from the onlot technology approval list.
14. A performance audit report will be generated showing the results and provided to DEP. At a minimum, the performance audit report will include:
- Current property owner name;
  - Date and time of the audit;
  - Weather conditions at time of audit;
  - Detailed description of site;
  - Specifications for the tested system;
  - Geographic location of system with GPS coordinates;
  - List of individuals involved in the audit of the system;
  - Inspection report;
  - All O/M performed on the system during the previous 365 days;
  - List of any physical or process control changes to the system in the previous 365 days;
  - Complete description of sampling and analytical methods;
  - All testing results, including all sample data and analyses or other data summaries or evaluations; and
  - Rationale for exclusion of data or removal of the system from the audit.
15. Selected sites should be operated under a valid maintenance agreement or contract. No maintenance will be performed 10 days prior to the audit on the system outside of routine maintenance, as specified in the system O&M manual. Any maintenance conducted on the unit cannot be done on the same day as

sampling. All maintenance on the component, components and/or the system should be documented.

16. Selected sites should have all necessary agreements with the property owner in place to perform the performance audit prior to effluent sampling.
- B. The failure of the proprietary onlot component and/or system to pass two consecutive performance audits may result in the onlot component and/or system being removed from the Commonwealth's Onlot Approval list.

## **VI. Implementation of the Treatment Standard on Shallow Limiting Soils**

Shallow limiting soils present a difficult challenge when developing a site. Though the treatment standards were not specifically developed for these types of site conditions, certain aspects of the standards directly relate to shallow limiting soil sites. Considering the challenge shallow limiting soils represent, DEP determined further guidance was necessary for these types of site conditions. The implementation of the onlot pretreatment technology performance standards (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*) are based on three primary factors, type of application (New Land Development, Repair or Replacement), depth to limiting zone, and soil group type (See Pages 39-41 *Appendix G: Modified Tyler Table with Soil Types*). Two tables were developed, Table 1: Level of Treatment for New Land Development on Shallow Limiting Soils and Table 2: Level of Treatment for Repairs or Replacements on Shallow Limiting Soils, to provide clarification on DEP's requirements in shallow limiting soil conditions.

- A. For new land development, the following treatment requirements were developed:
1. For soil groups II-VI with mineral soils depth to high water  $\geq 12$  inches and  $< 20$  inches, and depth to rock  $\geq 16$  inches, the technology must meet the Advanced Pretreatment Standard with the D-2 fecal coliform standard (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*).
  2. For soil group I with mineral soils depth to high water  $\geq 12$  inches and  $< 20$  inches, and depth to rock  $\geq 16$  inches, the technology will need to meet the Advanced Pretreatment Standard with the D-3 fecal coliform standard (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*).
- B. For repairs or replacements, the following treatment requirements were developed:
1. For soil groups II-VI with mineral soils depth to high water  $\geq 12$  inches and  $< 20$  inches, and depth to rock  $\geq 16$  inches, the technology will need to meet the Advanced Pretreatment Standard with the D-2 fecal coliform standard (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*).
  2. For soil group II-VI with mineral soils depth to high water  $\geq 8$  inches and  $< 12$  inches, and depth to rock  $\geq 16$  inches, the technology will need to meet the Advanced Pretreatment Standard with the D-3 fecal coliform standard (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*).

3. For soil group I with mineral soils depth to high water  $\geq 8$  inches and  $< 20$  inches, and depth to rock  $\geq 16$  inches, the technology will need to meet the Advanced Pretreatment Standard with the D-3 fecal coliform standard (See page 15 *Appendix A: Onlot Pretreatment Technology Performance Standards*).

**Table 1: Level of Treatment for New Land Development on Shallow Limiting Soils**

<b>New Land Development</b>			
<b>Level of Treatment Required</b>	<b>Depth to High Water</b>	<b>Depth to Rock</b>	<b>Soil Group Type</b>
Advanced Pretreatment with Fecal Coliform to 1,000 MPN/100 ml	≥12" and <20"	≥16"	II-VI
Advanced Pretreatment with Fecal Coliform to 200 MPN/100 ml	≥12" and <20"	≥16"	I*

**Table 2: Level of Treatment for Repairs or Replacements on Shallow Limiting Soils**

<b>Repair System or Replacement System</b>			
<b>Level of Treatment Required</b>	<b>Depth to High Water</b>	<b>Depth to Rock</b>	<b>Soil Group Type</b>
Advanced Pretreatment with Fecal Coliform to 1,000 MPN/100 ml	≥12" and <20"	≥16"	II-VI
Advanced Pretreatment with Fecal Coliform to 200 MPN/100 ml	≥8" and <20"	≥16"	I*
	≥8" and <12"	≥16"	II-VI

**\*Coarse Sand, Sand, Loamy Coarse Sand and Loamy Sand**

**APPENDIX A: ONLOT PRETREATMENT TECHNOLOGY PERFORMANCE STANDARDS**

<b>Onlot Sewage Facility Basic Performance Standards Table</b>		
<b>Level of Pretreatment</b>	<b>CBOD<sub>5</sub> mg/L</b>	<b>TSS mg/L</b>
Primary Treatment	≤125	≤80
Secondary Treatment	≤25	≤30
Advanced Treatment	≤10	≤10

<b>Onlot Sewage Facility Fecal Coliform Performance Standards Table</b>	
<b>Level of Pretreatment</b>	<b>Fecal C MPN/100ml</b>
D-1	≤50,000
D-2	≤1000
D-3	≤200
D-4	≤1

<b>Onlot Sewage Facility TN Reduction Performance Standards Table</b>	
<b>Level of Pretreatment</b>	<b>TN mg/L</b>
N-1	≥ 50% reduction
N-1	≤20
N-2	≤10



**APPENDIX B: ALTERNATE ONLOT LISTINGS – PROPRIETARY  
NON-PRETREATMENT AND NONPROPRIETARY PRETREATMENT**

<b>Listed Technology</b>	<b>Type</b>	<b>Distribution (Y/N)</b>
Alternate Aggregates	Nonproprietary	N
At Grade Absorption Area	Nonproprietary	Y
Shallow Limiting Zone At Grade Absorption Area	Nonproprietary	Y
Shallow Placement Pressure Dosed System	Nonproprietary	Y
Steep Slope Elevated Sand Mound	Nonproprietary	Y
Leaching Chambers	Infiltrator, Inc.	Y
Flow Equalization	Nonproprietary	N
Greywater	Nonproprietary	N
Composting Toilets	Bio Sun Systems	N
Sundrive Biovaporator	Sundrive, Inc.	N
UV Disinfection	Nonproprietary	N
Modified Subsurface Sand Filter	Nonproprietary	N

## **APPENDIX C: APPLICATION ADMINISTRATIVE REQUIREMENTS**

- 1) Manufacturer's name, mailing address, street address and phone number.
- 2) Contact individual's name, mailing address, street address, phone number, and email address.
- 3) Statement from the manufacturer that the contact represents the company in this matter.
- 4) Name, including specific brand and model, of the proprietary treatment product.
- 5) Product description and technical information/engineering basis of the design of the process, including process flow drawings and schematics; materials and characteristics; component design specifications; design capacity, volumes and flow assumptions and calculations; components; dimensional drawings and photographs.
- 6) Siting and installation requirements.
- 7) Technical and scientific documents referenced in the application must be provided in their entirety.
- 8) Detailed description, procedure, and schedule of routine service and system maintenance events.
- 9) All field testing data; influent samples, effluent samples, process control samples, etc.
- 10) Identification of information subject to confidential trade secrets.
- 11) Copies of product brochures and manuals.
- 12) List of states and/or Canadian provinces where the technology is registered/approved for use.
- 13) Description of any additional requirements outside the standard design imposed by the states and/or Canadian provinces and the reason for them. Requirements such as, but not limited to, sizing of components and appurtenances, operation and maintenance, siting of system, distribution requirements, etc.
- 14) Copy of the technology approval and the official technology use documentation for each state/province.
- 15) List of states and/or Canadian provinces where the technology was not approved for use.
- 16) All documentation provided by the state/province stating why it was not approved.
- 17) Final certification report from the certification organization or a statement from a qualified certification organization stating that the technology is unable to be tested.

## APPENDIX D: ACCEPTABLE CERTIFICATIONS

<b>Certifications</b>				
<b>Certification</b>	<b>CBOD<sub>5</sub> mg/L</b>	<b>TSS mg/L</b>	<b>TN mg/L</b>	<b>Fecal C MPN/100 ml</b>
NSF/ANSI 40 Residential Wastewater Treatment Systems	Yes	Yes	No	No
NSF/ANSI 46 Components and Devices	No	No	No	Yes
NSF/ANSI 245 Nitrogen Reduction	Yes	Yes	Yes	No
NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems	Yes	Yes	Yes	Yes
CAN/BNQ 3680-600 Onsite Residential Wastewater Treatment Technologies	Yes	Yes	Yes	Yes
NSF/ANSI 41 Non-Liquid Saturated Treatment Systems	NA	NA	NA	NA
NSF Protocol P157 Electrical Incinerating Toilets-Health and Sanitation	NA	NA	NA	NA

## APPENDIX E: STATISTICAL EQUATIONS

Number of samples = n

$$\text{Sample Mean } \bar{x} = \frac{\sum X}{n}$$

$$\text{Sample Standard Deviation } s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x - \bar{x})^2}$$

$$\text{t-test } t = (\text{Performance Standard} - \bar{x}) * \left(\frac{\sqrt{n}}{s}\right)$$

$$\text{Confidence Interval} = \bar{x} \pm t \left(\frac{s}{\sqrt{n}}\right)$$

**APPENDIX F: FIELD TESTING VERIFICATION PROTOCOL**

**FIELD TESTING VERIFICATION PROTOCOL  
for Field Verification of  
Proposed Alternate Onlot Pretreatment Components and/or Systems**

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## **Section 1 Purpose**

This document is a protocol to be used by applicants seeking approval of alternate onlot pretreatment units to be used within the Commonwealth of Pennsylvania. Field verification of alternate onlot pretreatment components and/or systems is an important and required step in the process for approval for use of alternate sewage systems or components in the Commonwealth. The Protocol is only for field verification of treatment systems with rated capacities between 400-1,500 gallons/day.

The manufacturer will submit a Test Plan, based on this protocol. The sampling procedure outlined in this document is for field verification testing. It assumes that for proprietary technologies, third party certification has been completed, and DEP's statistical analysis of the certification testing data is in compliance with DEP's requirements.

The Test Plan will be reviewed by DEP: DEP will 1) approve the Test Plan and allow field verification testing to begin, 2) request changes to the Test Plan prior to approval, or 3) deny the request for field verification if the Test Plan does not meet the requirements to move forward.

This Field Testing Verification Protocol is designed to clearly describe the data collection requirements to be included in the field verification testing. It is the responsibility of the applicant to complete the Field Testing Verification Protocol in accordance with this document.

Applicants seeking approval for use as a nitrogen reduction technology must use the Chesapeake Bay Test Plan Application Template instead of this Field Testing Verification Protocol.

## **Section 2 Protocol Description and Objectives**

The Test Plan should include a description of the project, an overview of the testing to be performed, and the test objectives. The Test Plan should consist of four main parts: Project Description, Sampling Plan, Operation and Maintenance, and Assessment.

The Project Description shall include an overview of the project, the identification of the model(s) that will be used in the test population, the associated design flow(s), and information for all models for which approval is sought, including engineering diagrams. The manufacturer is to include expected product field performance based on previous data collection, including but not limited to data collected in compliance.

The Sampling Plan should include an identification of critical measurements, data quality objectives, data quality indicator goals, the schedule for completing testing, milestones, and a detailed sampling program.

The Operation and Maintenance should include the installation manual, the owner's manual, the use and maintenance manual, the field logbook, and the troubleshooting and repair manual.

The Assessment should include a quality assurance project plan, audits, and procedure for assessments.

### Section 3 Definitions

*Applicant*: a person designated by both the owner of the onlot wastewater treatment technology and by the owner of the plant where the onlot wastewater treatment system is manufactured, to present an application for the certification of the onlot wastewater treatment system to the Pennsylvania Department of Environmental Protection.

*BOD5*: 5-day biochemical oxygen demand in mg/l - the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter in a period of 5 days.

*CBOD5*: carbonaceous 5-day biochemical oxygen demand in mg/l - the concentration of oxygen utilized by microorganisms in the non-nitrogenous oxidation of organic matter during a period of 5 days at a temperature of 20° C.

*Composite sample*: two or more samples or subsamples collected from the same point at different times, mixed together in appropriate known proportions (either discretely or continuously), from which the average value of a desired parameter may be obtained.

*CI*: *Confidence interval* for the estimate of the parameter. Such intervals may be either one-sided or two-sided. They will contain the true value of the estimated parameter for a specified fraction of time. This specified fraction is referred to as the confidence level.

*Fecal Coliform*: fecal coliform bacteria whose concentrations are measured in MPN/100 ml, most probable number of total coliform bacteria per 100 ml.

*Grab sample*: an individual sample taken from inlet or outlet of an onlot residential wastewater treatment technology or one of its components at a given time and location.

*Manufacturer*: a natural person or legal entity that manufactures onlot wastewater treatment systems, or, as required by the applicant, components of such systems, and that is seeking to obtain product certification by the Pennsylvania Department of Environmental Protection. When the onlot wastewater treatment system is constituted of components made by other manufacturers, the applicant shall designate a main manufacturer. All the other manufacturers shall be deemed subcontractors of the main manufacturer, referred to as the manufacturer, who is responsible for the component quality follow-up. Manufacturers will be required to submit complete application forms to a certification organization for technology performance verification, provide field-ready versions of the technology, assist with installation at a qualified test center, and provide necessary funding for test center and field verification testing.

*Onlot wastewater treatment system*: ensemble of treatment units allowing onlot treatment of wastewater.

*Subcontractor*: natural person or legal entity who manufactures a component(s) for the onlot wastewater treatment system. This manufacturer is deemed to be a subcontractor of the main manufacturer, referred to as the manufacturer.

*Testing organization*: An entity that implements the technology-specific field test plan and/or performance audit, including documentation and sample reporting to DEP. The testing organization should be an independent third party; a person or body that is independent of the person or organization that sells the treatment unit, as well as independent from the manufacturer and user of the treatment unit.



They are independent because they are not affiliated with the producer, the seller, or the end user of the item being tested (i.e., no commercial bias is present). An individual, such as a professional engineer, geologist, university professor, or other qualified professional, can also act as a testing organization. The qualifications of the testing organization should be provided and will be subject to review and approval by DEP as part of the field test verification application review.

TSS: Total suspended solids in mg/l - The pollutant parameter total suspended solids.

## **Section 4 References**

NSF/ANSI 40 - 2013: Residential Wastewater Treatment Systems.

NSF/ANSI 350 - 2017: Onsite Residential and Commercial Water Reuse Treatment Systems.

NSF/ANSI 360 - 2014: Wastewater Treatment Systems - Field Performance Verification.

EPA ETV: EPA Environmental Technology Verification Program 1) Protocol for the Verification of Residential Wastewater Treatment Technologies for Nutrient Reduction, ETV program, November 2000  
2) Verification Protocol for Secondary Effluent and Water Reuse Disinfection Applications, ETV program, October 2002.

NQ 3680-600/2009: Onsite Residential Wastewater Treatment Technologies, BNQ.

NQ 3680-910/2000: Wastewater Treatment – Stand-Alone Wastewater Treatment Systems for Isolated Dwellings, BNQ.

NQ 3680-915/2000: Wastewater Treatment – Stand-Alone Wastewater Treatment Systems for Isolated Dwellings – Certification Protocol, BNQ.

## **Section 5 Project Organization**

### **5.1 Key Project Contacts**

In addition to the manufacturer, who is the entity that develops, designs, and produces residential wastewater treatment systems, there is one other important entity in this process to ensure that the product undergoes third party testing. Third party testing is testing conducted by an independent party under contract to the manufacturer to test a particular product pursuant to an approved Test Plan, with an obligation to report all results.

The Testing Organization is defined as an independent third party that implements the technology-specific Test Plan described herein, including documentation and sample reporting to DEP. The testing organization should be independent; a person or body that is recognized as being independent of the person or organization that sells the treatment unit, as well as independent from the manufacturer and user of the treatment unit. They are independent because they are not affiliated with the producer, the seller, or the end user of the item being tested (i.e., no commercial bias is present). An individual, such as professional engineer, geologist, university professor, or other qualified professional, can also act as a testing organization. The information contained in Table 1 and the qualifications of the testing organization must be provided in the Project Description part of the Test Plan. Only one Testing Organization should

be used for all systems tested under this protocol and will be subject to review and approval as part of the test plan application review.

DEP will conduct its own independent review and verification of the data collected during the field test verification process.

## 5.2 Location of Installed Units

Table 2 and Table 3 are to be used by the applicant to submit the locations for the units to be tested during field verification as follows:

- 20 Pennsylvania sites must be submitted by the applicant for review and approval by DEP;
- 15 sites will be selected, with a minimum of 12 units to be tested and 3 sites to remain as reserves. More sampling and reserve sites can be approved if the manufacturer has a reason to test additional sites.
- DEP does not require field test locations until the Test Plan is approved. The applicant should submit this information prior to sampling and is subject to approval by DEP. The table must include the following information:
  - Site location (street address, town, county, state, GPS coordinates)
  - Occupancy
  - Property owner contact information
  - Any stipulations on access to the treatment system
  - Copies of all signed homeowner permissions to enter the property should be attached to this plan. This information is required to be submitted after the Test Plan is approved and prior to sampling. Due to the potential complications of finding appropriate locations, the list provided in Table 3 can be reviewed and updated as needed.
- All systems should be representative of residential use and should meet the following requirements:
  - System is used in a manner consistent with the manufacturer's guidelines; and
  - Homeowner certifies that they are not being compensated with direct remuneration by the manufacturer for being part of the evaluation. Exceptions to compensation may include a reduced cost for the installation of the system being tested or the offer of an extended warranty or service contract.

## Section 6 Sampling Plan

### 6.1 Sampling Points

Describe the sampling/monitoring points for all measurements, including locations and access points.

### 6.2 Frequency and Number of Samples

The Sampling Plan should include the frequency of sampling/monitoring events, as well as the number of each sample type and/or location, including quality control (QC) and reserve samples. The sampling strategy and procedures should be included and evidence should be presented to demonstrate that the strategy is appropriate for meeting verification objectives. Sampling on an

individual unit will not begin until the unit has operated continuously for at least 60 consecutive days.

Sampling should include, at a minimum:

- Effluent samples, except for fecal coliform, will be 24-hour time composite samples using the same sampling method for all sites being tested. The applicant should describe how the composite sample will be collected and how it represents an accurate composite of the 24-hour flow through the system.
- Effluent fecal coliform samples will be grab samples using the same sampling method for all sites being tested. The samples will occur during the 24-hour time composite effluent samples. The applicant should describe how the grab sample will be collected.
- Influent samples will be a grab sample using the same sampling method for all sites being tested. The samples will occur during the 24-hour time composite effluent samples. The applicant must describe how the grab sample will be collected.
- Samples will be collected once per month for 12 consecutive months at each field site. A minimum of 15 days between sample events at each site is necessary. The applicant has a maximum of 24 months from the Test Plan approval date to complete the testing program and submit all required deliverables.

### 6.3 Data Measurements

- All measurements shall be identified for each sample type, and test-specific target analytes should be listed in the Sampling Plan.
- Measurements to be conducted on influent samples include BOD<sub>5</sub>, pH, and alkalinity.
- Measurements to be conducted on effluent samples include CBOD<sub>5</sub>, TSS, DO, pH, and alkalinity. Additionally, Fecal Coliform measurements when the applicant is requesting approval under the fecal coliform standard. Effluent wastewater temperature and ambient air temperature will also be recorded.
- Additionally, an estimate of influent flow should be included based on the site's water bill. If no water bill is available, the pump event counter or telemetry system can be used to estimate the flow. If no counter is available through the system, an assumed occupancy flow estimate of 45 gallons/person/day should be used.
- Effluent flows should be estimated based upon the rated flow rate of the effluent pump and the operational period of the effluent pump.
- The samples collected should be analyzed as shown in Table 4 and Table 5. The test organization shall certify in its report that samples were taken by a qualified person and that sampling standards, methods and preservation deadlines were all met.

### 6.4 Data Evaluation

A statistical analysis of the data should be provided and include at a minimum:

- Median;
- Mean;
- Standard Deviation;
- Confidence Interval.

The effluent data will be evaluated based on the requested performance standard for system approval. If the system is determined to not be performing as expected, DEP may request additional testing or disapprove the technology.

A confidence interval is a basic statistical concept that provides information about the range in which the “true mean” lies for a specified confidence level. The most commonly used confidence levels are 90%, 95%, and 99%. In general, the more confident you want to be that the “true mean” lies within the range you select, the wider the range becomes. *See Section 6.16: Calculating Confidence Interval*

Further, the Testing Organization should inform DEP when tests cannot be completed. For example, if any of the requirements in Sec. IV Step Two are not met during the first year of the field testing verification.

#### 6.5 Safety and Hygiene Plans

The Sampling Plan should include or reference safety and hygiene plans for the relevant testing organization and laboratory.

#### 6.6 Site Evaluation and Factors

Site evaluation includes general site description such as access to the system, access to outlet, power availability, security, site drawings and photos, and installation instructions and details. The Sampling Plan should identify known site-specific factors that may affect sampling/monitoring procedures.

#### 6.7 Site Preparation

Any site preparation needed prior to sampling/monitoring should be described in the Sampling Plan.

#### 6.8 Sampling Procedure

Each sampling/monitoring procedure to be used should be discussed or referenced in the Sampling Plan. Any components added to the system to facilitate sampling that would not otherwise be a part of the system installation should be identified in the Sampling Plan.

#### 6.9 Representative Samples

The Sampling Plan should include a discussion of the procedures to be used to assure that representative samples are collected.

#### 6.10 Sample Volumes

A list of sample volumes to be collected and the amount of sample required for each analysis, including QC sample analysis, should be specified in the Sampling Plan. Information on sample volumes should be provided in a table.

## 6.11 Split Samples

For samples requiring a split sample for either QA/QC purposes or for shipment to a different laboratory, the Sampling Plan should identify who is responsible for splitting samples and where the splitting is performed.

## 6.12 Sample Containers and Preservation Methods

Sample containers and preservation methods (i.e., refrigeration, acidification, etc.) including specific reagents, equipment, and supplies required for sample preservation should be described in the Test Plan. Information on sample preservation should be provided in a table.

## 6.13 Hold Time Requirements

Hold time requirements should be specified in the Sampling Plan and provided in a table.

## 6.14 Sample Transportation

Procedures for transporting samples should be described in the Sampling Plan.

## 6.15 Sample Archiving

Sample archiving requirements, or sample retention policies, for the organizations conducting the sampling and analysis should be provided in the Sampling Plan.

## 6.16 Calculating Confidence Intervals

In analyzing data, it is first essential to recognize that the data collected represents only a “sample” of the actual range of effluent quality produced by a system over time. Therefore, the information obtained, (CBOD<sub>5</sub>, TSS, FC, etc.), is not the “true mean.” Instead, it represents an estimate of the “true mean” that one would find if the system were monitored continuously. As you take more samples, the closer you will be to finding the “true mean” that the system produces over the range of actual operating conditions experienced in the field. The confidence level indicates how sure one can be that the estimated mean (calculated from the sample data collected) is near the “true mean.”

The above concept is translated into statistics by calculating a confidence interval at a desired level of certainty by assuming the population being sampled is normally distributed around the mean. In the case of a mean CBOD<sub>5</sub> or TSS value, and many of the other parameters analyzed for on-site sewage treatment systems, this is a good assumption. For some, however, most notably bacterial information (e.g. total and fecal coliform), the data tend not to be normally distributed. To allow us to use the statistics we are used to (mean, standard deviation, etc.) we must TRANSFORM the data into a form that is normally distributed. For bacterial data, the transformation that has proven most effective is the LOG transformation. Once transformed, we can use the transformed data to calculate the confidence interval, and then transform, the confidence interval back to its original form.

In our case, we are considering a one-sided interval since considering compliance with the upper limits. The tail area probability chart can be found in any standard statistical text. The formula for the upper confidence limit is:

$$Upper\ CI = \bar{x} + (t_{0.10}) \left( \frac{s}{\sqrt{n}} \right)$$

Where: Upper CI = Upper limit of the Confidence Interval (Confidence Interval - range in which “true mean” lies with specified certainty);

$\bar{x}$  = Sample Mean;

$(t_{0.10})$  = t-value at 90% confidence interval. A value based on the number of samples and degree of certainty desired and obtained from any statistical reference text;

n = number of samples;

s = standard deviation of sample calculated

## **Section 7 System Operation and Maintenance**

The Test Plan should address system Operation and Maintenance program and shall include: the installation manual, the owner’s manual, the use and maintenance manual, the field logbook, and the trouble-shooting and repair manual.

### **7.1 System Installation**

The installation manual shall include at the minimum: identification number, photos, and diagram of all the components; specification for design, construction and materials for each component; electrical diagram; instructions for delivery and unpacking operations, safety instructions, identification of fragile components and steps to prevent damages; synoptic diagram of each component and all functions of the systems after assembled and connected; other requirements such as plumbing, electricity, ventilation, protection of air intake, burying of system, protection against hydrostatic displacement, waterproofing, slope and various fittings and accessories; energy source and amount of energy; sequential procedure for components; instructions for replacement or repair in case of defects; other procedures.

### **7.2 System Operation**

Each unit will be operated under residential use and occupied by at least two people for the duration of the study. Intermittent periods of time with a lower to no occupancy will not be considered as disqualifying but should be recorded in the field logbook and reported in the final report.

All data collected shall be reported shall be used to establish the field performance results. Changes in occupancy or the manner of use, which occur over the period of field evaluation, shall be noted.

The owner's manual should include: model description and identification number; hydraulic capacity in GPD; level or levels (or classes) to which the system applies based on the DEP performance standard requirements; description of the system operation, flow-path and electrical diagram; instruction for starting and operating the system; user and manufacturer's responsibilities; list of the household products not allowed in the system; list of reagents, chemical composition, microbiological properties and concentration level; warranty and limitations; requirements of period removal of system residue; list of actions when the system is intermittently used or not used for an extended period of time; explanation of methods and criteria for detecting problems and malfunctions with the components of the system; description of warning signs in case of problems; service provider's name and contacts in case of problems.

### 7.3 System Maintenance

All units should be operated under a valid maintenance agreement or contract, and in accordance with the system O&M manual, and extend through the period covering the final sample collection. System inspections shall be conducted according to both the applicant specifications and DEP requirements. At a minimum, inspections by the testing organization will occur during each sampling day. No maintenance will be performed on the unit outside of routine maintenance, as specified in the system O&M manual. Any maintenance conducted on the unit cannot be done on the same day as sampling. The system maintenance provider shall be independent of the testing organization.

The use and maintenance manual should include a component-specific maintenance program; method for removing and eliminating solid residue; procedure for visual inspection; description of visual and olfactory techniques for evaluating effluent and mixed liquid; method for collecting samples; quality of effluent produced accounting to DEP.

### 7.4 Field Log Book

A log should be kept detailing any observations during the field testing including information on site conditions or factors specified in Section 6.6. All maintenance performed on the unit will be recorded in the field logbook and submitted along with the other deliverables (Section 10.2).

Additionally, any changes in operation or disruptions to sampling should be described in the log book. Notes should be made in the field logbook to record any site conditions that could impact operation of the system or collection of samples, such as the number of residents in the home, changes in resident conditions that could impact system operation (such as medications), mechanical or electrical problems with the system, etc.

### 7.5 Trouble-Shooting and Repair

The troubleshooting and repair manual should include: description of the technique for visual evaluation of the system allowing identification of the problem; sequential method for identifying failure of components; step-by-step procedure for repair and replacement.

## **Section 8 Analytical Procedures**

Sample analysis will be conducted using an appropriate EPA method or method in Standard Methods for the Examination of Water and Wastewater.

### **8.1 Measurement Methods**

Each measurement method to be used should be described in detail or referenced in the Sampling Plan. Where appropriate, modifications to EPA approved or similarly validated methods should be specified. Methods should be appropriate to the matrix/analyte being tested. Details on the sample methods, and accuracy and precision criteria for the analytical methods, should be provided.

### **8.2 Calibration Procedures**

For measurements requiring a calibrated system, the Sampling Plan should include specific calibration procedures applicable to each target analyzed, and the procedures for verifying both initial and continuing calibrations (including frequency and acceptance criteria, and corrective actions to be performed if acceptance criteria are not met).

## **Section 9 Quality Assurance Project Plan (QAPP)**

The applicant is responsible for submitting a QAPP that follows the guidelines in NSF 360 Section 7: Quality Assurance/Quality Control. The QAPP should be attached to this Test Plan and address the following points:

- Procedures to maintain chain-of-custody (e.g., custody seals, records) during sample transfer from the field to the laboratory, in the laboratory, among contractors, and subcontractors should be described in the QAPP to ensure that sample integrity is maintained.
- The QAPP should include quantitative acceptance criteria for QA objectives associated with accuracy, precision, detection limits, and completeness for critical measurements (process, physical, and analytical, as applicable) for each matrix.
- Any additional test-specific QA objectives should be included in the QAPP, including acceptance criteria. This includes items such as mass balance requirements.
- The specific procedures used to assess all identified QA objectives shall be fully described in the QAPP.
- The QAPP should list and define all other QC checks and/or procedures (i.e., blanks, surrogates, controls, etc.) used for the verification testing, both field and laboratory.
- For each specified QC check or procedure, required frequencies, associated acceptance criteria, and corrective actions to be performed, if acceptance criteria are not met, should be included in the QAPP.
- The QAPP should describe how the sampling equipment is calibrated and the frequency of calibration.
- The QAPP should describe how cross-contamination between samples is avoided.
- All QA Managers and their relationship within the organizations (i.e. location within each organization) should be identified in the QAPP with evidence that the QA Manager is independent of project management.



- Responsibilities of all other project participants should be identified in the QAPP, meaning that organizations responsible for planning, coordination, sample collection, sample custody, measurements (i.e. chemical, physical, and process), data reduction, data validation, and report preparation shall be clearly identified in the QAPP.
- Any change from the approved plan, in sampling procedure, should be approved in advance by DEP.
- All treatment units being sampled should be designed, installed and configured precisely as the treatment units that received initial approval.
- The applicant should provide a list of the raw materials that have been verified or tested. This list should include information on whether the raw materials comply, or fail to comply, with the appropriate verifications and tests.

## **Section 10 Data Reporting and Data Reduction**

### 10.1 Data Reporting

The reporting requirements (e.g., units, method) for each measurement and matrix should be identified in the Test Plan.

### 10.2 Expected Deliverables

The deliverables expected from each organization responsible for field and laboratory activities should be listed in the Test Plan. The data should be provided in Microsoft Excel format. Data may also be submitted using the template in Table 6.

### 10.3 Documents

The Test Plan should include the following documents at a minimum:

- Project Description
- Table 3 including description of site selection; Specifications for the tested system, Description of typical installation, Geographic location of systems tested;
- List of key participants;
- Sampling Plan (complete description of sampling and analytical methods);
- All testing results including all sample data and any statistical analyses or other data summaries or evaluations;
- Rationale for exclusion of data or removal of a system from statistical analysis.
- Field Log Book
- Table 6: Completed Data Submission
- Table 7: Verification Statement Template
- Operation and Maintenance manuals (Section 7)
- QAPP
- Final Report (a summary of the Test Plan)

## **Section 11 Assessments**

### **11.1 Audits**

The Test Plan should identify all audits (i.e., both internal systems audits and internal performance audits, where applicable) to be performed, who will perform these audits, and who will receive the audit reports. Additional supervised inspections may be conducted.

### **11.2 Procedures for Corrective Actions**

The Test Plan should provide procedures to be followed to ensure that necessary corrective actions will be performed in response to audit findings. The responsible party(s) for implementing corrective actions should be identified.

## **Section 12 Complementary Documents**

References should be provided in the Test Plan either in the body of the text as footnotes or in a separate section. DEP may request a copy of the references.

## **Section 13 Changes to Systems Already Certified**

If the design specifications for an approval model are altered, DEP may require the altered component to complete the onlot wastewater treatment system approval process including the field verification; the approval process may be adjusted at the discretion of DEP depending upon the extent of the design changes.

If the manufacturer wishes to add new models of the Onlot wastewater treatment systems that are already certified, then a request for approval should be submitted to DEP. The applicant should include the following:

- A copy of the certification of the original system.
- Each model presented by the manufacturer for which the applicant is seeking certification shall include the manufacturer's trademark and its specific number, the type of technology and the hydraulic capacity (a model of the onlot wastewater treatment systems may have different hydraulic capacities).
- A complete description of the new design and technical specifications, including detailed plans and components list, all the testing, assessment and certification of the systems.
- The reasons for the request to add a new model.

If the changes that affect the components are considered crucial to the attainment of the environmental quality results, DEP shall request the applicant to proceed with a new application for the full approval process.

When it has been established that certification program requirements have been met, DEP may amend the original certification.

**Table 1: Project Contacts**

<b>Testing Organization</b>	Name:
Contact Person	Phone Number: Address:  Email Address:
<b>Applicant's</b>	Name:
Contact Person	Phone Number: Address:  Email Address:

**Table 2: Field Verification Test Plan**

**System Name:** \_\_\_\_\_

**System Model(s):** \_\_\_\_\_

**System Model(s) Number:** \_\_\_\_\_

_____	_____
<b>Testing Organization – Representative Name</b>	<b>Title</b>
_____	_____
<b>Testing Organization Representative – Signature</b>	<b>Date</b>
_____	_____
<b>Applicant – Representative Name</b>	<b>Title</b>
_____	_____
<b>Applicant – Signature</b>	<b>Date</b>

**Table 3: Location of Installed Systems Template<sup>3</sup>**

Site ID	Street Address	Town/County	State	Occupancy	Intended Use	Contact Name	Contact Phone	Stipulations on Access
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								

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<sup>3</sup> Footnote: 20 sites must be submitted by the applicant for review and approval. 15 sites will be selected, with a minimum of 12 units to be tested and 3 sites to remain as reserves. If the applicant would like to test more than 12 units then additional sites should be proposed for selection as sampling and reserve sites.

**Table 4: Influent Parameter Analysis**

<b>Influent Parameter</b>	<b>Sample Type</b>	<b>Testing Location</b>
BOD <sub>5</sub>	Grab	Laboratory
pH	Grab	Test site
Alkalinity (mg/L as CaCo3)	Grab	Laboratory

**Table 5: Effluent Parameter Analysis**

<b>Effluent Parameter</b>	<b>Sample Type</b>	<b>Testing Location</b>
CBOD <sub>5</sub> (mg/L)	24 h composite	Laboratory
Total suspended solids (mg/L)	24 h composite	Laboratory
Dissolved Oxygen	Grab	Test site
pH	Grab	Test site
Alkalinity (mg/L as CaCO <sub>3</sub> )	24 h composite	Laboratory
Fecal Coliform (MPN/100 ml)	Grab	Laboratory
Temperature (wastewater)	Grab	Test site
Temperature (ambient air)	Grab	Test site

**Table 6: Database Submission Template**

**A. Model Information**

<b>Model Name</b>		<b>Model Number</b>	
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**B. Manufacturer Information**

<b>Name</b>	
<b>Address</b>	
<b>Phone</b>	
<b>Email</b>	

**C. Local Distributor Information**

<b>Name</b>	
<b>Address</b>	
<b>Contact</b>	
<b>Phone</b>	
<b>Email</b>	

**D. Existing Certifications** Please check all that apply.

- Third Party Certification: \_\_\_\_\_
- NSF 40 Certification
- NSF 350 Certification
- EPA ETV Certification
- Canadian BNQ Certification
- Other: \_\_\_\_\_

**WATER QUALITY DATA**

<b>Model Name</b>		
<b>Manufacturer Name</b>		
<b>Sample Location</b>	<b>Sample Date</b>	<b>Sample Parameter</b>

**Table 7: Verification Statement Template**

As a recognized third party testing organization, I certify that the data submitted herein accurately represents the system.

**Testing Organization** \_\_\_\_\_

**Name** \_\_\_\_\_

**Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

### Appendix G: Modified Tyler Table with Soil Types

					Hydraulic Linear Loading Rate (gal/ft/d)									
					Infiltration (Basal) Loading Rate (gal/ft <sup>2</sup> /d)	0-4% Slope			5-9% Slope			>10% Slope		
Soil Type	Texture	Shape	Grade	<30 mg/l BOD		8-12"	12-24"	24-48"	8-12"	12-24"	24-48"	8-12"	12-24"	24-48"
I	Coarse Sand (COS)	Structureless	Single (0SF)	1.6	4.0	5.0	6.0	5.0	6.0	7.0	6.0	7.0	8.0	
I	Sand (S)	Structureless	Single (0SF)	1.6	4.0	5.0	6.0	5.0	6.0	7.0	6.0	7.0	8.0	
I	Loamy Coarse Sand (LCOS)	Structureless	Single (0SF)	1.6	4.0	5.0	6.0	5.0	6.0	7.0	6.0	7.0	8.0	
I	Loamy Sand (LS)	Structureless	Single (0SF)	1.6	4.0	5.0	6.0	5.0	6.0	7.0	6.0	7.0	8.0	
II	Coarse Sandy Loam (COSL)	PR/BK/GR	Moderate (2), Strong (3)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
II	Sandy Loam (SL)	PR/BK/GR	Moderate (2), Strong (3)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
II	Fine Sand (FS)	Structureless	Single (0SG)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
II	Very Fine Sand (VFS)	Structureless	Single (0SG)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
II	Loamy Fine Sand (LFS)	Structureless	Single (0SG)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
II	Loamy Very Fine Sand (LVFS)	Structureless	Single (0SG)	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
III	Loam (L)	PR/BK/GR	Moderate (2), Strong (3)	0.8	3.3	3.8	4.3	3.6	4.1	4.6	3.9	4.4	4.9	
III	Silt (SIL)	PR/BK/GR	Moderate (2), Strong (3)	0.8	2.7	3.0	3.3	3.0	3.5	4.0	3.3	3.8	4.3	
III	Fine Sandy Loam (FSL)	PR/BK/GR	Moderate (2), Strong (3)	0.8	3.3	3.8	4.3	3.6	4.1	4.6	3.9	4.4	4.9	
III	Very Fine Sandy Loam (VFSL)	PR/BK/GR	Moderate (2), Strong (3)	0.8	3.3	3.8	4.3	3.6	4.1	4.6	3.9	4.4	4.9	
III	Coarse Sandy Loam (COSL)	PR/BK/GR	Weak (1)	0.7	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
III	Sandy Loam (SL)	PR/BK/GR	Weak (1)	0.7	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0	
IV	Loam (L)	PR/BK/GR	Weak (1)	0.6	3.0	3.5	4.0	3.3	3.8	4.3	3.6	4.1	4.6	
IV	Silt (SIL)	PR/BK/GR	Weak (1)	0.6	2.4	2.7	3.0	2.7	3.0	3.3	3.0	3.5	4.0	
IV	Sandy Clay Loam (SCL)	PR/BK/GR	Moderate (2), Strong (3)	0.6	2.4	2.9	3.4	2.7	3.0	3.3	3.0	3.5	4.0	
IV	Clay Loam (CL)	PR/BK/GR	Moderate (2), Strong (3)	0.6	2.4	2.9	3.4	2.7	3.0	3.3	3.0	3.5	4.0	
IV	Silty Clay Loam (SICL)	PR/BK/GR	Moderate (2), Strong (3)	0.6	2.4	2.9	3.4	2.7	3.0	3.3	3.0	3.5	4.0	
IV	Coarse Sandy Loam (COSL)	Structureless	Massive (0M)	0.6	3.0	3.5	4.0	3.6	4.1	4.6	5.0	6.0	7.0	
IV	Sandy Loam (SL)	Structureless	Massive (0M)	0.6	3.0	3.5	4.0	3.6	4.1	4.6	5.0	6.0	7.0	
IV	Fine Sandy Loam (FSL)	PR/BK/GR	Weak (1)	0.6	3.0	3.5	4.0	3.3	3.8	4.3	3.6	4.1	4.6	
IV	Very Fine Sandy Loam (VFSL)	PR/BK/GR	Weak (1)	0.6	3.0	3.5	4.0	3.3	3.8	4.3	3.6	4.1	4.6	



Soil Type	Texture	Shape	Grade	Infiltration (Basal) Loading Rate (gal/ft <sup>2</sup> /d)  <30 mg/l BOD	Hydraulic Linear Loading Rate (gal/ft/d)								
					0-4% Slope			5-9% Slope			>10% Slope		
					8-12"	12-24"	24-48"	8-12"	12-24"	24-48"	8-12"	12-24"	24-48"
V	Coarse Sandy Loam (COSL)	PL	Weak (1)	0.5	3.0	3.5	4.0	3.6	4.1	4.6	4.0	5.0	6.0
V	Sandy Loam (SL)	PL	Weak (1)	0.5	3.0	3.5	4.0	3.6	4.1	4.6	4.0	5.0	6.0
V	Fine Sandy Loam (FSL)	Structureless	Massive (0M)	0.5	2.0	2.3	2.6	2.4	2.7	3.0	2.7	3.2	3.7
V	Very Fine Sandy Loam (VFSL)	Structureless	Massive (0M)	0.5	2.0	2.3	2.6	2.4	2.7	3.0	2.7	3.2	3.7
V	Loam (L)	Structureless	Massive (0M)	0.5	2.0	2.3	2.6	2.4	2.7	3.0	2.7	3.2	3.7
VI	Sandy Clay Loam (SCL)	PR/BK/GR	Weak (1)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Clay Loam (CL)	PR/BK/GR	Weak (1)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Silty Clay Loam (SICL)	PR/BK/GR	Weak (1)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Sandy Clay (SC)	PR/BK/GR	Moderate (2), Strong (3)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Clay (C)	PR/BK/GR	Moderate (2), Strong (3)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Silty Clay (SIC)	PR/BK/GR	Moderate (2), Strong (3)	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
VI	Silt (SIL)	Structureless	Massive (0M)	0.2	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4

					Hydraulic Linear Loading Rate (gal/ft/d)
					Infiltration (Basal) Loading Rate (gal/ft <sup>2</sup> /d)
Soil Type	Texture	Shape	Grade	<30 mg/l BOD	All Slopes
					8-48"
VII	Coarse Sandy Loam (COSL)	PL	Moderate (2), Strong (3)	0.0	
VII	Sandy Loam (SL)	PL	Moderate (2), Strong (3)	0.0	
VII	Fine Sandy Loam (FSL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Very Fine Sandy Loam (VFSL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Loam (L)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Silt (SIL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Sandy Clay Loam (SCL)	Structureless	Massive (0M)	0.0	
VII	Sandy Clay Loam (SCL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Clay Loam (CL)	Structureless	Massive (0M)	0.0	
VII	Clay Loam (CL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Silty Clay Loam (SICL)	Structureless	Massive (0M)	0.0	
VII	Silty Clay Loam (SICL)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Sandy Clay (SC)	Structureless	Massive (0M)	0.0	
VII	Sandy Clay (SC)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Sandy Clay (SC)	PR/BK/GR	Weak (1)	0.0	
VII	Clay (C)	Structureless	Massive (0M)	0.0	
VII	Clay (C)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Clay (C)	PR/BK/GR	Weak (1)	0.0	
VII	Silty Clay (SIC)	Structureless	Massive (0M)	0.0	
VII	Silty Clay (SIC)	PL	Weak (1), Moderate (2), Strong (3)	0.0	
VII	Silty Clay (SIC)	PR/BK/GR	Weak (1)	0.0	