

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Clean Water

DOCUMENT NUMBER: 385-2208-003

TITLE: Alternative On-lot Sewage Pretreatment Technology Verification Policy (TVP)

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

AUTHORITY: The Pennsylvania Sewage Facilities Act, 35 P.S. §§ 750.1-750.20, 25 Pa. Code Chapter 73

POLICY: The Department of Environmental Protection (DEP) will evaluate new concepts, or technologies that are applicable to on-lot sewage systems and components that have been classified as on-lot 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 on-lot 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. The guidance provides a consistent approach for the submission, review and approval/disapproval of existing and proposed alternate pretreatment technologies. This guidance rescinds the previous Technology Verification Protocol Guidance (DEP Doc ID 381-2208-001)

APPLICABILITY: This policy applies to persons and manufacturers seeking approval of new or previously classified alternate on-lot sewage system and component technologies.

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 DEP to give these rules that weight or deference. This document establishes the framework, within which the DEP will exercise its administrative discretion in the future. The DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

PAGE LENGTH: 37 pages

I. DEFINITIONS AND ACRONYMS

A. Definitions

Act - Pennsylvania Sewage Facilities Act (35 P.S. §§ 750.1 750.20).

Act 26 –The act of July20, 2017 (P.L. 321, No.26), amending the Pennsylvania Sewage Facilities Act.

Advanced secondary on-lot sewage pretreatment – Level of pretreatment of sewage that achieves a reduction in the five-day Carbonaceous Biochemical Oxygen Demand (CBOD₅) and Total Suspended Solids (TSS) to a level at or below 10 mg/l, respectively.

Alternate sewage system – A method of demonstrated on-lot sewage treatment and disposal not described in 25 Pa. Code Chapter 72 or 73.

Applicant: A person who submits an application for the certification of the on-lot sewage pretreatment 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.

Confidence interval: 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.

Conventional sewage system – A system employing the use of demonstrated on-lot sewage treatment and disposal technology in a manner specifically recognized by 25 Pa. Code Chapter 73. The term does not include alternate or experimental sewage systems.

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 an inlet or outlet of an on-lot sewage system or any of its components at a given time and location.

Manufacturer: A person or legal entity that manufactures on-lot sewage systems or any component of an on-lot sewage system.

On-lot sewage system component – Any subsection or component of an on-lot sewage system such as an absorption area; treatment tank(s); media filter(s); dosing tank; disinfection system; equalization tank(s); or any component necessary for an on-lot sewage system to function properly.

On-lot sewage system – An individual or community sewage system, whether public or privately owned, which uses a system of components for collecting, treating and disposing of sewage into a soil absorption area or spray field or by retention in a retaining tank serving one or more lots.

On-lot sewage treatment system: A sewage treatment system consisting of an ensemble of component parts that provide on-lot treatment of sewage.

Sewage – A substance that contains the waste products or excrement or other discharge from the bodies of human beings or animals and noxious or deleterious substances being harmful or inimical to the public health, or to animal or aquatic life, or to the use of water for domestic water supply or recreation. The term includes any substance which constitutes pollution under The Clean Streams Law.

Sewage Pretreatment – Any component or combination of components that provides treatment of sewage prior to conveyance to a final treatment and dispersal component or reuse; often, this treatment is designed to meet primary, secondary, advanced secondary, and/or fecal coliform and total nitrogen performance standards.

Sewage Treatment – Any method, technique or process designed to remove solids and/or pollutants from sewage.

Subcontractor: A person or legal entity who manufactures a component(s) for an on-lot sewage pretreatment system. This manufacturer is deemed to be a subcontractor of the main manufacturer, referred to as the manufacturer.

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

Shallow limiting zone – As it relates to the siting of absorption areas, excluding spray fields, the mineral soil depth to a seasonal high water table between 12 and 20 inches, or a mineral soil depth to a limiting zone as indicated by bedrock or coarse fragments with insufficient fine soil to fill voids that are located within 16 inches and less than 20 inches at the limiting zone.

B. Acronyms

DEP – Pennsylvania Department of Environmental Protection

NLD – New Land Development

OAT – On-lot Alternative Technology

O&M – Operation and Maintenance

SEO – Sewage Enforcement Officer

II. INTRODUCTION

The Pennsylvania Sewage Facilities Act establishes the framework for the development and implementation of plans for the sanitary disposal of sewage waste. Effective pretreatment 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.¹ Section 5 of the Sewage Facilities Act requires each municipality to submit to the 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 the DEP. On July 20, 2017, the Act was amended (Act 26) to revise the sewage planning process to allow for the consideration of alternate on-lot sewage systems or components during the planning process.

Act 26 amended Section 5 of the Act to require the DEP to “develop scientific, technical and field testing standards upon which an evaluation of each on-lot sewage system that has been classified as an alternate system in accordance with 25 Pa. Code § 73.72 (Alternate sewage systems) shall be based.” 35 P.S. §705.5(c.2)(1). These standards are to be developed in consultation with the Sewage Advisory Committee (SAC). 35 P.S. §705.5(c.2)(1).

The existing regulations, in 25 Pa. Code § 73.72, establish the criteria for evaluation of alternate systems or components on a case-by-case basis. The regulations were developed primarily to address malfunctioning on-lot sewage systems or components on lots that have specific site suitability deficiencies or engineering problems. Prior to Act 26, SEOs could only permit on-lot alternate technologies (OATs) as per 25 Pa. Code § 72.23(d).

As provided in 25 Pa. Code § 73.72(b), a person desiring to install an alternate system is required to submit complete preliminary design plans and specifications to the SEO and the DEP for review and comment prior to applying to the local agency for an installation permit of an OAT. The DEP may delegate the review of certain OATs to qualified SEOs within their area of jurisdiction.

Initial evaluations of OATs are based on the criteria in 25 Pa. Code § 73.72(c). The DEP develops general requirements that must be considered by an SEO before issuing a permit for the use of OATs. These general requirements for evaluating OATs are available for use by SEOs through the approval document and are on the DEP’s website.² The local agency is responsible for making a decision on a permit application for the system based on consideration of the DEP comments. Persons seeking to use these approved OATs are not required to submit their proposals to the DEP for further review.

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

¹ 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. ...”)

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

The process that the DEP has used to approve alternate on-lot sewage systems or components has also gone this same route. This *On-lot Sewage Pretreatment Technology Verification Protocol* complies with Act 26 and formalizes the alternate on-lot sewage system approval process. Given the advancements in on-lot pretreatment 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, provides a more consistent and robust process for on-lot alternate system or component review and determination. In accordance with the Act, the process, set forth herein, ensures that the best management practices being employed for pretreatment 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 should follow for the system or component to be approved for use in Pennsylvania. Given that it is difficult for the existing alternate systems or components to meet requirements that have not been established, the 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 pretreatment 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 sewage 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 O&M 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 standards 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 standards for the technology, and ensures systems or components are being operated and maintained appropriately.

Pretreatment systems or components approved under this TVP that meet the required pretreatment standards may also be systems or components 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 or components authorized under this permit are typically for residential sewage flows of 2,000 gallons per day (gpd) or less. The pretreatment standard that the on-lot sewage system or component must meet to be considered a SFTF under the general permit is advanced secondary pretreatment and Treatment

Level FC-3 for Fecal Coliform (*Appendix A1: On-lot Pretreatment Technology Performance Standards* for a list of Performance Standards).

III. SCOPE

This policy is intended to provide guidelines for testing and verifying the performance of experimental on-lot sewage system and component technologies and alternate on-lot sewage system and component technologies, that are applicable to on-lot sewage pretreatment and disposal. The prior practice of classifying systems or components on a case-by-case basis resulted in inconsistencies in classifications, improper use and management of alternate and experimental on-lot sewage systems or components, and a delay in making proven alternate and experimental systems or components available for general use.

This policy extends to all commercially ready proprietary and non-proprietary pretreatment systems or components of an experimental or alternate on-lot sewage system that are reproducible from one location to another. This includes systems or components applicable to individual and community on-lot systems or components designed to treat no more than 10,000 gallons per day of sewage 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. On-lot sewage systems or components not described in 25 Pa. Code Chapter 73 are the focus 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.

IV. ROLES AND RESPONSIBILITIES

- A. Certification Organization - One or more certification organizations acceptable to the DEP will be selected by the technology manufacturer to oversee the technology verification process through test center verification. To be acceptable to the DEP, an organization should 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 the DEP that it can implement this TVP guidance. Examples of acceptable ANSI certification organizations can be found at the following weblink, <https://www.ansi.org/Accreditation/product-certification/Directory>, and SCC certification organizations can be found at the following weblink, https://www.scc.ca/en/search/accredited_bodies.
- B. Testing Organization - An entity that implements the technology-specific field test plan and/or performance audit, including documentation and sample reporting to the 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 pretreatment unit, as well as independent from the manufacturer and user of the pretreatment unit. 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 the DEP as part of the field test verification application review.

- C. Technology Manufacturer - A person or legal entity that manufactures on-lot sewage systems or components. This person or entity may obtain product certification from the DEP. When the on-lot sewage system consists of components made by other manufacturers, a primary manufacturer should be designated for the purposes of obtaining product certification. All the other manufacturers will be deemed affiliates of the primary manufacturer (hereinafter referred to as the manufacturer) for DEP purposes.
- D. Service Provider - An individual, company or other entity who is certified by the manufacturer to provide O&M to a manufacturer for a specific component, specific components, or a system. By being affiliated with the manufacturer, a service provider will not be independent and thus not able to act as a testing organization for the manufactured product.
- E. The DEP - Develops and maintains the on-lot sewage pretreatment technology performance standards, technology verification application process, and review methodology. Reviews the technology verification applications to verify the on-lot sewage technology performance and approves or disapproves on-lot technologies classified as alternate technologies for use in Pennsylvania.

V. **Technology Application Review Process**

A. The Technology Application Review Process consists of the following steps:

1. Step One – Administrative review of the application
2. Step Two – Technical review of the application
3. Step Three – Final Approval Process

B. Step One – Administrative Review of Application

1. DEP will perform an administrative review of the information provided by the manufacturer to verify all the requested documents were submitted.
 - a. All applications for on-lot technology verification must be submitted to the DEP. Applications should include all necessary information to confirm that the technology performs at the pretreatment level specified in the application. The 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 the DEP; all calculations and testing data will be provided in an electronic format that is acceptable to the DEP. See *Appendix B: Application Administrative Requirements* for the administrative completeness items.
 - b. All proprietary pretreatment technologies should have the appropriate certification unless the proprietary pretreatment technology is technologically incapable of being tested by a certification organization. See *Appendix C: Acceptable Certifications* for currently acceptable certifications. The appropriate certification should 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 should be provided with the application.

- c. An exception to the certification requirement may be granted for classified pretreatment OATs that were on the DEP OAT approval document, formally known as OAT listing, prior to September 18, 2017, and for which certification testing has not been performed. Manufacturers of these alternate systems or 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 *Appendix E: Field Testing Verification Protocol*.
 - d. Non-proprietary pretreatment systems or components need not have a certification. The DEP will technically and scientifically evaluate these technologies to ensure conformance with performance standards.
 - e. Alternate on-lot sewage system components that provide distribution of effluent should 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 should be provided to the DEP for alternate component approval.
 - f. The DEP may require additional information, when applicable, to determine the performance of a technology.
2. Once the application is considered administratively complete, DEP will begin a technical review.

C. Step Two – Technical Review of the Application

1. Verification of Third-Party Certification – A statistical analysis of the certification data to verify the technology meets the performance standards in *Appendix A1: On-lot Pretreatment Technology Performance Standards*.
 - a. As authorized under 25 Pa. Code § 73.72(c)(8), certification testing must have occurred in a climate which is similar to or colder than the climate in Pennsylvania. Pretreatment technology performance will be categorized based upon the level of pretreatment achieved. The levels of performance are shown in *Appendix A1: On-lot Pretreatment Technology Performance Standards*.
 - b. DEP will proceed to Step C.2 below, Verification of Field Testing Data, for proprietary technologies that are incapable of being tested by a certification organization and non-proprietary technologies.
 - c. DEP will statistically evaluate proprietary technologies with certification data to determine if they meet the performance standard(s) for the approval being requested.
 - i. Except for fecal coliform, all applicable sample data will be evaluated to determine the sample mean (\bar{x}) and the sample standard deviation (s). See *Appendix D: Statistical Equations*.

- ii. Using the sum of the sample mean plus one sample standard deviation, DEP will determine whether the data supports the conclusion that the technology meets the applicable performance standard. (*See Appendix A1: On-lot Pretreatment Technology Performance Standards*, for the list of pretreatment technology performance standards.)
 - iii. For applications that request fecal coliform pretreatment performance approval, using the sum of the sample geometric mean plus two standard deviations, DEP will determine whether the data supports the conclusion that the technology meets the applicable performance standard. (*See Appendix A1: On-lot Pretreatment Technology Performance Standards*, for the fecal coliform performance standards.)
 - iv. If the statistical analysis does not verify that the technology meets DEP's performance standard, DEP will disapprove the technology. If disapproved, the applicant may retest the technology with an approved certification organization and restart the application process after testing is complete.
 - v. If the statistical analysis verifies the technology meets DEP's performance standard, the technical review will proceed to Verification of Field Testing Data.
2. Verification of Field Testing Data – This subsection outlines the process DEP will follow for the statistical analysis of the field testing data to verify the technology's performance in the field.
- a. DEP will verify the field testing data under Appendix E: Field Testing Verification Protocol. Any existing performance verification data that the manufacturer wishes to be considered to supplement or supplant requested testing must be submitted along with the verification application in a format acceptable to the DEP.
 - b. DEP will determine acceptance of previously completed field testing data on a case-by-case basis. All testing data (influent, effluent, and process control samples) collected for the technology will be provided to the DEP regardless of whether the samples meet the DEP's minimum requirements. DEP will only use field testing data that meets the minimum requirements as stated below in verifying the performance of the technology. DEP may use field data that does not meet these requirements, but the data may hold less weight in the decision-making process.
 - i. Field testing sites must either be in Pennsylvania or at a site where the climate is similar to or colder than the climate in Pennsylvania. One method of determining whether a field testing location is acceptable would be to use USDA Plant Hardiness Zone Mapping; however, other methods may be acceptable; and
 - ii. Testing must have been completed by a DEP approved testing organization and must have followed at a minimum the protocols stated in Appendix E: Field Testing Verification Protocol, and
 - iii. Testing should have occurred over 12 or more consecutive months.

- c. All the DEP acceptable field testing data will be statistically evaluated to determine whether the sample data meets at least a 90% confidence interval for each parameter in the performance standard for which is being requested.
- d. 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 the DEP. Otherwise, the technology may be disapproved for use in Pennsylvania.
- e. If the statistical analysis of the field testing data (90% confidence interval or greater) verifies the technology meets the DEP's performance standard, DEP will proceed to the Final Approval Process in the technical review, outlined in Subsection D, below. Note, the standard deviation calculated in this step and the top confidence interval statistical mean will be used in the Performance Audit described in Section VI.

D. Step Three – Final Approval Process

1. Design considerations will provide the basis for a designer to design the OAT.
 - a. OATs 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.
 - b. Manufacturers of pretreatment components or systems who request pretreatment performance approval that will allow for effluent discharge to mineral soils less than 20-inches should incorporate time and pressure dosing of the absorption area into the system design, or another method that is demonstrated to achieve similar or better performance.
2. Siting and installation requirements will provide the basis for a designer to be able to site and for a contractor to successfully install the OAT.
3. O&M requirements will be reviewed to determine whether they meet conform to industry standards relating to O&M requirements for the electrical and mechanical components of an on-lot pretreatment system, the minimum pumping requirements for the tanks, the minimum inspection requirements for the system, the minimum administrative requirements, and anything else necessary to ensure that the OATs will provide long-term sewage disposal.
4. The DEP, in consultation with the manufacturer, will then develop the OAT approval document. The technology approval document will include the following:
 - a. Rated performance standard for the technology, if applicable
 - b. Source of technology; proprietary or generic
 - c. Type of technology; secondary, advanced secondary, or combined pretreatment and distribution

- d. Planning requirements
 - e. Permitting requirements
 - f. Design considerations
 - g. Siting and installation requirements
 - h. O&M requirements
 - i. Inspection and testing requirements
5. DEP will publish a notice of the availability of the OAT approval document and the DEP's basis for making the decision to approve the technology in the *Pennsylvania Bulletin* for a 30-day comment period.
 6. After reviewing and addressing public comments, the DEP may issue a final approval letter to the applicant for the OAT. DEP will then upload the OAT approval document and comment/response document to DEP's OAT Approvals webpage for public use.

VI. Performance Audit

- A. A performance audit verifies ongoing field performance of an OAT. The following is the process for the performance audit.
 1. General
 - a. The manufacturer should provide the DEP with a list of all the manufacturer's OATs installed in Pennsylvania following approval under the process established under this guidance document. This list should be updated every six (6) months except when otherwise requested by the DEP.
 - b. As per the OAT approval document, all necessary agreements with the owner of the installation site for the testing organization to complete the performance audit should be finalized and in place. The OAT approval document and the permit for installation will detail the necessity for a third-party testing organization's ability to enter the property as part of the performance audit.
 - c. As will be described in the OAT approval document, installation sites should be operated under a valid maintenance agreement or contract. All maintenance on the component, components and/or the system will be documented.
 - d. The manufacturer should provide the DEP with its choice for the independent third-party testing organization which will complete the performance audit. The DEP will review the qualifications of the testing organization to verify its independence and indicate approval or disapproval.
 2. Site selection

- a. Once a calendar year, or as DEP otherwise determines at the end of a five-year (5) performance audit cycle, the DEP will refer to the manufacturer's list of systems or components installed in Pennsylvania to randomly select installed OATs to be inspected. The number of locations to be inspected should correspond to 1% of the number of OATs installed over the past ten years, for a minimum of five (5) locations and a maximum of ten (10) locations. Performance audit samples will be collected once per year at each audit site.
- b. The 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 performance audit sampling. The testing organization should not inform the manufacturer of the locations and dates of the performance audit sampling unless specifically agreed to with the DEP. The manufacturer and/or a representative of the manufacturer may accompany the testing organization to one or more of the audit locations on the scheduled date of the performance audit sampling.
- c. All OATs selected for inclusion in the performance audit should have operated continuously for at least 60 days, or as agreed to with the manufacturer. Further, OATs selected should serve buildings or residences occupied by at least two (2) people and producing effluent at the time of the performance audit sampling.

3. Sampling plan requirements

- a. The DEP will provide the testing organization with the required inspection elements and sampling parameters that will be used during the performance audit sampling. All samples must be analyzed by a laboratory accredited by the DEP Laboratory Accreditation Program or NELAP. The performance audit sampling form and a copy of the DEP or NELAP certified lab results should be provided to the DEP and the manufacturer.
- b. The testing organization should provide the DEP with the performance audit sampling plan for completing the audit. The sampling plan, at a minimum, should ensure conformance with the sampling protocols as noted in Section 5 Sampling Plan of Appendix E: *Field Testing Verification Protocol*, **except** for the requirement in Section 5.2 bullet four that "[s]amples will be collected once every two months for 12 consecutive months..." Instead, samples should be collected once per year per site unless results require additional sampling of the site.
- c. During the performance audit sampling, the testing organization should first ensure that the OAT is producing effluent. If such is the case, the testing organization should make note of it and inform the DEP and the manufacturer that the OAT was not producing an effluent. If the component and/or system is not functioning correctly, the testing organization should advise the owner and the DEP in writing. Maintenance should not be performed within 10 days of the audit on the system outside of routine maintenance, as specified in the system O&M manual. Any maintenance conducted on the unit should not be done on the same day as sampling.

4. Action Level

- a. Effluent samples from each location inspected should be less than or equal to two times the performance standard level of pretreatment as set forth in the manufacturer's OAT approval document. For example, the action level for TSS and BOD would be 20 mg/l for the advanced secondary level of pretreatment.
 - b. If during the performance audit sampling, the testing organization and/or the manufacturer representative observe untreated or partially treated sewage on the surface of the ground, entering a surface water of the Commonwealth, backing up from the absorption area into any components of the OAT, or backing up into a structure, the testing organization should notify the local agency's SEO.
 - c. The DEP will provide the manufacturer with the results of the performance audit. When a case of nonconformity of a component and/or system is detected, the manufacturer should provide the DEP a Corrective Action Plan (CAP) to DEP explaining the case or cases of nonconformity and specifying the action(s) to be taken to establish or return to conformity with the applicable requirements.
 - d. Upon approval of the CAP, the manufacturer should implement the CAP and advise the DEP in writing upon completion. Some cases of nonconformity may require an additional audit visit and sampling following the instructions specified in section VI.A.3.
 - e. During the next performance audit, the manufacturer should include in the sampling plan, any sites that obtained substandard results in addition to the sites randomly selected in accordance with Section VI.A.2.a.
 - f. DEP may suspend the planning and permitting of new installations of an OAT, either from the moment a case of nonconformity is detected or following the close of a period to correct the situation, depending on the type of nonconformity involved. If at the end of the period of suspension, the case(s) of nonconformity has not been corrected, the DEP may suspend the OAT approval.
5. Performance audit report
- a. A performance audit report must be provided to the DEP. At a minimum, the performance audit report should include:
 - i. Current property owner name;
 - ii. Verification that the model installed is the model approved for use in PA;
 - iii. Date and time of the audit;
 - iv. Weather conditions at time of audit;
 - v. Detailed description of site;
 - vi. Specifications for the tested system;

- vii. Geographic location of system with GPS coordinates;
 - viii. List of individuals involved in the audit of the system;
 - ix. Inspection report if generated;
 - x. All O&M performed on the system during the previous 365 days;
 - xi. List of any physical or process control changes to the system in the previous 365 days;
 - xii. Complete description of sampling and analytical methods;
 - xiii. All testing results, including all sample data and analyses or other data summaries or evaluations; and
 - xiv. Rationale for exclusion of data or removal of the system from the audit.
- b. The testing organization should provide this information on a form provided by the DEP.
- B. The DEP will review the performance audit data every five (5) years for each technology to determine the following:
- a. If the manufacturer's technology should continue with a performance audit at a reduced frequency.
 - b. The new 90% top confidence intervals, calculated using data from the verification of field testing data during the approval process, and the data collected during the performance audits. The new 90% top confidence intervals will be used to evaluate whether the OAT continues to meet the standards for the approved level of pretreatment, as shown in *Appendix A1: On-lot Pretreatment Technology Performance Standards*.

VII. Levels of Pretreatment on Soils with Shallow Limiting Zones

- A. *Appendix A1: On-lot Pretreatment Technology Performance Standards* is based on three primary factors: type of application (NLD, Repair or Replacement of the system), depth to limiting zone, and soil type (*Appendix F: Modified Tyler Infiltration Loading Rate Table*).
 - B. *Appendix A2: Level of Pretreatment for New Land Development on Soils with Shallow Limiting Zones and Appendix A3: Level of Pretreatment for Systems in Cases of Repairs, Replacements, and Existing Lots on Soils with Shallow Limiting Zones* provide clarification on the levels of pretreatment required. For the purpose of this guidance document, existing lots will be lots created prior to the effective date of Act 26, namely September 18, 2017.
- 1. For NLD, the following pretreatment requirements are:

- a. For soil types with infiltration loading rates between 0.2-1.0 gal/ft²/day as per *Appendix F: Modified Tyler Infiltration Loading Rate Table*, and with mineral soils depth to seasonal high water ≥ 12 inches and < 20 inches, and depth to rock ≥ 16 inches and < 20 inches, the technology must meet the Advanced Secondary Pretreatment Standard with the FC-2 fecal coliform standard (Appendix A1: On-lot Pretreatment Technology Performance Standards).
 - b. For soil types with infiltration loading rates greater than 1.0 gal/ft²/day as per *Appendix F: Modified Tyler Infiltration Loading Rate Table*, and with mineral soils depth to seasonal high water ≥ 12 inches and < 20 inches, and depth to rock ≥ 16 inches and < 20 inches, the technology will need to meet the Advanced Secondary Pretreatment Standard with the FC-3 fecal coliform standard (Appendix A1: On-lot Pretreatment Technology Performance Standards).
2. For repairs, replacements or existing lots, the pretreatment requirements are:
- a. For soil types with infiltration loading rates between 0.2-1.0 gal/ft²/day as per *Appendix F: Modified Tyler Infiltration Loading Rate Table*, and with mineral soils depth to seasonal high water table ≥ 12 inches and < 20 inches, and depth to rock ≥ 16 inches and < 20 inches, the technology will need to meet the Advanced Secondary Pretreatment Standard with the FC-2 fecal coliform standard (Appendix A1: On-lot Pretreatment Technology Performance Standards).
 - b. For soil types with infiltration loading rates between 0.2-1.0 gal/ft²/day as per *Appendix F: Modified Tyler Infiltration Loading Rate Table*, and with mineral soils depth to seasonal high water table < 12 inches, the technology will need to meet the Advanced Secondary Pretreatment Standard with the FC-3 fecal coliform standard (Appendix A1: On-lot Pretreatment Technology Performance Standards).
 - c. For soil types with infiltration loading rates greater than 1.0 gal/ft²/day as per *Appendix F: Modified Tyler Infiltration Loading Rate Table*, and with mineral soils depth to seasonal high water table < 20 inches and depth to rock of ≥ 16 inches and < 20 inches the technology will need to meet the Advanced Secondary Pretreatment Standard with the FC-3 fecal coliform standard (Appendix A1: On-lot Pretreatment Technology Performance Standards).

APPENDIX A1: ON-LOT PRETREATMENT TECHNOLOGY PERFORMANCE STANDARDS

On-lot Sewage System Basic Performance Standards Table		
Level of Pretreatment	CBOD₅ mg/L	TSS mg/L
Primary	≤125	≤80
Secondary	≤25	≤30
Advanced Secondary	≤10	≤10

On-lot Sewage System Fecal Coliform (FC) Performance Standards Table	
Level of Pretreatment	MPN/100ml
FC-1	≤50,000
FC-2	≤1000
FC-3	≤200
FC-4	≤1

On-lot Sewage System Total Nitrogen (TN) Reduction Performance Standards Table	
Level of Pretreatment	mg/L
TN-1	≥ 50% reduction or ≤ 20
TN-2	≤10

APPENDIX A2: LEVEL OF PRETREATMENT FOR NEW LAND DEVELOPMENT ON SOILS WITH SHALLOW LIMITING ZONES

Level of Pretreatment Required	Depth to Seasonal High Water Table	Depth to Rock	Soil Type Infiltration Loading Rate gal/ft²/day
Advanced Secondary Pretreatment with Fecal Coliform to 1,000 MPN/100 ml	≥12" and <20"	≥16"	0.2-1.0
Advanced Secondary Pretreatment with Fecal Coliform to 200 MPN/100 ml	≥12" and <20"	≥16"	>1.0

APPENDIX A3: LEVEL OF PRETREATMENT FOR SYSTEMS IN CASES OF REPAIRS, REPLACEMENT, OR EXISTING LOTS³ ON SOILS WITH SHALLOW LIMITING ZONES

Level of Pretreatment Required	Depth to Seasonal High Water Table	Depth to Rock	Soil Type Infiltration Loading Rate gal/ft²/day
Advanced Secondary Pretreatment with Fecal Coliform to 1,000 MPN/100 ml	≥12" and <20"	≥16"	0.2-1.0
Advanced Secondary Pretreatment with Fecal Coliform to 200 MPN/100 ml	<20"	≥16"	>1.0
	<12"	N/A	0.2-1.0

³ Existing lots will be lots created prior to the effective date of Act 26, September 18, 2017

APPENDIX B: 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 pretreatment product.
- 5) All criteria under 25 Pa Code § 73.72 (c)(1-4), including product description; engineering basis of the design of the process; process flow drawings and schematics; materials and characteristics; component design specifications; 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, 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, and the like.
- 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. This includes a description of requirements such as, but not limited to, sizing of components and appurtenances, O&M, siting of system, and distribution requirements.
- 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 C: ACCEPTABLE CERTIFICATIONS

Certifications				
Certification	CBOD₅ mg/L	TSS mg/L	TN mg/L	Fecal C MPN/100 ml
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 D: 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 E: FIELD TESTING VERIFICATION PROTOCOL

Section 1. Purpose

This Appendix E (Appendix E or protocol) is a protocol to be used by applicants seeking approval of alternate on-lot pretreatment units to be used in the Commonwealth of Pennsylvania. Field verification of alternate on-lot pretreatment systems or components is an important and required step in the process for approving alternate sewage systems or components for use in the Commonwealth. This protocol is only for field verification of pretreatment systems or components 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 Appendix E is for field verification testing. It assumes that for proprietary technologies, third-party certification has been completed, and the DEP's statistical analysis of the certification testing data follows the DEP's requirements.

The Test Plan will be reviewed by the DEP, which will 1) approve the Test Plan and allow field verification testing to begin, or 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 Appendix E is designed to clearly describe the data collection requirements to be included in the field verification Test Plan. It is the responsibility of the applicant to complete the requirements in accordance with this Appendix E.

Applicants seeking approval for use as a nitrogen reduction technology should use the Chesapeake Bay Test Plan Application Template instead of this Appendix E.

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, O&M, and Assessment.

The Project Description should 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 O&M 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. 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 4. Project Organization

4.1 Key Project Contacts

In addition to the manufacturer, who is the entity that develops, designs, and produces on-lot sewage systems or components, there is one other important entity in this process to ensure that the product undergoes third-party testing: the testing organization (section IV.B). Third-party testing is testing conducted by an independent party under contract to the manufacturer to test a product under an approved Test Plan, with an obligation to report all results. The information contained in Table 1 of this Appendix E 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 or components tested under this protocol and will be subject to review and approval as part of the test plan application review.

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

4.2 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 the 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. Note, for nitrogen reducing technologies, six (6) additional

- testing sites may be needed in other states to meet the minimum requirement in the Chesapeake Bay Data Sharing Agreement⁴.
- The DEP does not require field test locations until the Test Plan is approved. The applicant should submit field test locations prior to sampling. Field test locations are subject to approval by the DEP. The field test location submittal 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 pretreatment system or component
 - 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 domestic strength sewage 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 5. Sampling Plan

5.1 Sampling Points

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

5.2 Frequency and Number of Samples

The Sampling Plan should include the frequency of sampling and 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 should not begin until the unit has operated continuously for at least 60 consecutive days or as agreed to between the DEP and the manufacturer.

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.

⁴ <https://federalleadership.chesapeakebay.net/file.axd?file=2015%2f4%2fTest+Plan+Application+Template.pdf>

- 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 every two months for 12 consecutive months at each field site. A minimum of 30 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.

5.3 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 BOD₅, pH, and alkalinity.
- Measurements to be conducted on effluent samples include CBOD₅, TSS, DO, pH, and alkalinity. Additionally, Fecal Coliform measurements shall also be conducted when the applicant is requesting approval under the fecal coliform standard. Effluent temperature and ambient air temperature must 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.

5.4 Data Evaluation

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

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

The effluent data will be evaluated based on the requested performance standard for system approval. If the system is determined not to be performing as expected, the 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 5.16: Calculating Confidence Interval.*

Further, the Testing Organization should inform the DEP when tests cannot be completed. For example, the Testing Organization should inform the DEP if the OAT is not producing effluent at the time of sampling.

5.5 Safety and Hygiene Plans

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

5.6 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 or monitoring procedures.

5.7 Site Preparation

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

5.8 Sampling Procedure

Each sampling and 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.

5.9 Representative Samples

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

5.10 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.

5.11 Split Samples

For samples requiring a split sample for either Quality Assurance (QA) or 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.

5.12 Sample Containers and Preservation Methods

Sample containers and preservation methods (such as refrigeration, acidification, and the like), 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.

5.13 Hold Time Requirements

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

5.14 Sample Transportation

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

5.15 Sample Archiving

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

5.16 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 (including CBOD₅, TSS, FC, and other parameters), 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 CBOD₅ or TSS value, and many of the other parameters analyzed for on-site sewage systems or components, this is a good assumption. For some, however, most notably bacterial information (for example, total and fecal coliform), the data tend not to be normally distributed. To use the statistics (such as mean, standard deviation, and the like) the DEP 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, the DEP can use the transformed data to calculate the confidence interval, and then transform, the confidence interval back to its original form.

In this evaluation, the DEP is 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:

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

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

5.17 Sample Analysis

All samples shall be analyzed by a laboratory accredited under the DEP Laboratory Accreditation Program or the National Environmental Laboratory Accreditation Program (NELAP).

Section 6. System Operation and Maintenance

The Test Plan should address the system O&M 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.

6.1 System Installation

The installation manual shall include at a 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; and other procedures.

6.2 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; and service provider's name and contacts in case of problems.

6.3 System Maintenance

All units should be operated under a valid maintenance agreement or contract, and in accordance with the system O&M manual. The maintenance agreement or contract should extend through the period covering the final sample collection. System inspections shall be conducted according to both the applicant specifications and the 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; and quality of effluent produced accounting to the DEP.

6.4 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 5.6 of this Appendix E. All maintenance performed on the unit will be recorded in the field logbook and submitted along with the other deliverables (see Section 9.2 of this Appendix E).

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, and the like.

6.5 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; and step-by-step procedure for repair and replacement.

Section 7. Analytical Procedures

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

7.1 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 or analyte being tested. Details on the sample methods, and accuracy and precision criteria for the analytical methods, should be provided.

7.2 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 8. Quality Assurance Project Plan (QAPP)

The applicant is responsible for submitting a QAPP that follows the guidelines in NSF 360 *Section 6: Quality Assurance/Quality Control*. The QAPP should be attached to this Test Plan and address the following points:

- Procedures to maintain chain-of-custody (such as custody seals and records, for example) during sample transfer from the field to the laboratory, in the laboratory, and among contractors and subcontractors. The procedures to maintain chain-of-custody 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 procedures (including blanks, surrogates, controls, and other QC checks and procedures) 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 (in other words, their 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 (specifically, 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 the DEP.
- All components being sampled should be designed, installed and configured as approved in the NSF/ANSI certification.
- The applicant should provide a list of the aggregate(s) used in the installation of the system or component that have been verified or tested. This list should include information on whether the aggregate(s) comply, or fail to comply, with the appropriate verifications and tests.

Section 9. Data Reporting and Data Reduction

9.1 Data Reporting

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

9.2 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.

9.3 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; and geographic location of systems or components 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
- O&M manuals (see *Section 6* of this Appendix E)
- QAPP
- Final Report (a summary of the Test Plan)

Section 10. Assessments

10.1 Audits

The Test Plan should identify all audits (specifically, both internal systems or components 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.

10.2 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 11. Complementary Documents

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

Section 12. Changes to Systems or Components Already Certified

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

If the manufacturer wishes to add new models of the on-lot sewage systems or components that are already certified, then a request for approval should be submitted to the 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. Each model must include the manufacturer's trademark and its specific number, the type of technology and the hydraulic capacity (a model of the on-lot sewage systems or components 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 or components.
- 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, the 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, the DEP may amend the original certification.

Table 1: Project Contacts

Testing Organization	Name:
Contact Person	Phone Number: Address: Email Address:
Applicant's	Name:
Contact Person	Phone Number: Address: Email Address:

Table 2: Field Verification Test Plan

System Name: _____

System Model(s): _____

System Model(s) Number: _____

_____	_____
Testing Organization – Representative Name	Title
_____	_____
Testing Organization Representative – Signature	Date
_____	_____
Applicant – Representative Name	Title
_____	_____
Applicant – Signature	Date

Table 3: Location of Installed On-lot Sewage Systems or Components Template⁵

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.								

⁵ Twenty sites must be submitted by the applicant for review and approval. Fifteen 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

Influent Parameter	Sample Type	Testing Location
BOD ₅	Grab	Laboratory
pH	Grab	Test site
Alkalinity (mg/L as CaCO ₃)	Grab	Laboratory

Table 5: Effluent Parameter Analysis

Effluent Parameter	Sample Type	Testing Location
CBOD ₅ (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 ₃)	24 h composite	Laboratory
Fecal Coliform (MPN/100 ml)	Grab	Laboratory
Temperature (sewage)	Grab	Test site
Temperature (ambient air)	Grab	Test site

Table 6: Database Submission Template

A. Model Information

Model Name		Model Number	
-------------------	--	---------------------	--

B. Manufacturer Information

Name	
Address	
Phone	
Email	

C. Local Distributor Information

Name	
Address	
Contact	
Phone	
Email	

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

Model Name		
Manufacturer Name		
Sample Location	Sample Date	Sample Parameter

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 F: Modified Tyler Infiltration Loading Rate Table

Soil Characteristics			Infiltration Loading Rate, gal/ft ² /d
Texture	Structure		
	Shape	Grade	
COS, S, LCOS, LS	--	0SG	1.6
FS, VFS, LFS, LVFS	--	0SG	1.0
CSL, SL	--	0M	0.6
	PL	1	0.5
		2, 3	
	PR/BK/ GR	1	0.7
		2, 3	1.0
FSL, VFSL	--	0M	0.5
	PL	1, 2, 3	
	PR/BK/ GR	1	0.6
		2, 3	0.8
L	--	0M	0.5
	PL	1, 2, 3	
	PR/BK/ GR	1	0.6
		2, 3	0.8
SIL	--	0M	0.2
	PL	1, 2, 3	
	PR/BK/ GR	1	0.6
		2, 3	0.8
SCL, CL, SICL	--	0M	
	PL	1, 2, 3	
	PR/BK/ GR	1	0.3
		2, 3	0.6
SC, C, SIC	--	0M	
	PL	1, 2, 3	
	PR/BK/ GR	1	
		2, 3	0.3