

*Recommended Standards and Guidance for Performance,
Application, Design, and Operation and Maintenance*

Proprietary On-site Wastewater Treatment Products

July 2012



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Glossary of Terms: A glossary of common terms for all RS&Gs can be found on the DOH Web site at www.doh.wa.gov/Portals/1/Documents/Pubs/337-028.pdf.

Preface

The recommended standards contained in this document have been developed for statewide application. Regional differences may, however, result in application of this technology in a manner different than it is presented here. In some localities, greater allowances than those described here may reasonably be granted. In other localities, allowances that are provided for in this document may be restricted. In either setting, the local health officer has full authority in the application of this technology, consistent with Chapter 246-272A WAC and local jurisdictional rules. If any provision of these recommended standards is inconsistent with local jurisdictional rules, regulations, ordinances, policies, procedures, or practices, the local standards take precedence. Application of the recommended standards presented here is at the full discretion of the local health officer.

Local jurisdictional application of these recommended standards may be:

- 1) **Adopted as part of local rules, regulations or ordinances** - When the recommended standards, either as they are written or modified to more accurately reflect local conditions, are adopted as part of the local rules, their application is governed by local rule authority.
- 2) **Referred to as technical guidance in the application of the technology** - The recommended standards, either as they are written or modified to more accurately reflect local conditions, may be used locally as technical guidance.

Application of these recommended standards may occur in a manner that combines these two approaches. How these recommended standards are applied at the local jurisdictional level remains at the discretion of the local health officer and the local board of health.

The recommended standards presented here are provided in typical rule language to assist those local jurisdictions where adoption in local rules is the preferred option. Other information and guidance is presented in text boxes with a modified font style to easily distinguish it from the recommended standards.

Glossary of Terms: A glossary of common terms for all RS&Gs can be found on the DOH Web site at <http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-028.pdf>.

The recommended standards contained in this document have been primarily written to support the design of on-site sewage systems with design flows less than 3500 gpd, but may also be applied to large on-site sewage systems (LOSS).

With the adoption of the revised LOSS rule, chapter 246-272B WAC, in 2011, some provisions of the RS&Gs may not be appropriate or allowed for LOSS. Many applicable requirements from the RS&Gs have already been included in the LOSS rule. Design engineers and others interested in LOSS are directed to consult the rule and LOSS program staff before or instead of the RS&Gs.

Typical RS&G Organization:

Standards Section	Explanation
Performance	How this technology is expected to perform (treatment level and function)
Application	How this technology is to be applied. This section includes conditions that must be met prior to proceeding with design. Topics in this section describe the “approved” status of the technology, component listing requirements, permitting, installation, testing and inspection requirements, etc.
Design	How this technology is to be designed and constructed (includes minimum standards that must be met to obtain a permit).
Operation and Maintenance	How this technology is to be operated and maintained (includes responsibilities of various parties, recommended maintenance tasks and frequency, assurance measures, etc)
Appendices	Design examples, figures and tables, specific applications, and design and installation issues.

Introduction

Proprietary Treatment Products (PTPs) covered in this document are basically treatment components that are a discrete portion of an OSS treatment sequence defined by specifically identified points of influent and effluent between which biological wastewater treatment is intended to occur. Much of the treatment occurring in these types of products is either through aerobic attached growth, suspended growth, and/or filtration processes. A number of products are commercially available and they can be subcategorized as either aerobic treatment units, trickling filters, packed bed filters, or upflow media filters. When held under patent, or trademark, these treatment products are classified as “proprietary”.

A typical application is where the soil on the site is poor for sewage treatment. These systems are less reliant on existing original soil for treatment, but still are dependent on the native soil for final dispersal of the treated wastewater. High quality treatment performance may allow for reductions in the required soil depth for the drainfield, or may allow for a reduction in the size of the installed drainfield.

PTPs are not stand-alone wastewater treatment components, but provide wastewater treatment prior to dispersal to original, undisturbed, unsaturated soil or provide pre-treatment to other components of the treatment sequence before final dispersal. Some products may incorporate the soil dispersal component as an integral part of the treatment component and therefore do not have an effluent collection point. These systems will have some or all of their elements constructed on the site of installation and will require that design and installation sections be included in their letters of approval.

1. Performance Standards

1.1. Listing

- 1.1.1. Before a local health jurisdiction may issue an installation permit for an on-site sewage system incorporating a PTP, the brand and model must be included on the current DOH List of Registered On-site Treatment and Distribution Products (Registered List) (WAC 246-272A-0110(1)).
- 1.1.2. The DOH reviews and lists proprietary treatment products based upon the manufacturer-provided detailed information demonstrating that the PTP meets or exceeds the performance testing requirements defined in WAC 246-272A-0110 and in subsection 1.2 of this document.
- 1.1.3. The department lists the PTPs covered in this document in three categories (See Table 1):
 - 1.1.3.1. Category 1: PTPs designed to treat sewage with strength typical of a residential source when septic tank effluent is anticipated to be equal to or less than treatment level E.
 - 1.1.3.2. Category 2: PTPs designed to treat high-strength sewage when septic tank effluent is anticipated to be greater than treatment level E (such as at restaurants, grocery stores, mini marts, group homes, medical clinics, residences, etc.); and,
 - 1.1.3.3. Total Nitrogen (TN) Reduction PTPs in Categories 1 & 2 (above) designed to treat nitrogen in residential wastewater.

Please Note: Do not confuse these first two designations (Category 1, & 2) with the NSF International Standard 40 classification of Class I and Class II. They are all different designations. They are not used interchangeably.

1.2. Performance Testing

1.2.1. Product Testing

- 1.2.1.1. Category 1 PTPs must be tested according to the product standards and testing protocol established by the National Sanitation Foundation in the NSF Standard No. 40 Residential Wastewater Treatment Systems, (protocols dated between July 1996 and September 15, 2005). PTPs must be tested by a testing facility accredited by ANSI, independent from the manufacturer. On-going product certification and listing by NSF (or other entity) is not required.

- 1.2.1.2. Bacteriological Reduction Performance - In order to be registered for treatment level A, B, or C in Category 1, a manufacturer must verify bacteriological reduction performance by sampling for fecal coliform according to the requirements in WAC 246-272A-0130. Manufacturers may not register products for treatment level C using disinfection. Bacteriological reduction performance must be determined while the PTP or treatment sequence is tested according to the ANSI/NSF Standard 40 testing protocol. During this testing the following requirements apply:
- 1.2.1.2.1. Collect samples from both the influent and effluent streams, identifying the treatment performance achieved by the full treatment process (component or sequence).
 - 1.2.1.2.2. Obtain influent characteristics falling within a range of 10^6 - 10^8 fecal coliform/100mL calculated as 30-day geometric means during the test.
 - 1.2.1.2.3. Obtain samples for fecal coliform during both the design loading and stress loading recovery periods identified by NSF Standard 40. Grabs samples shall be collected from both the influent and effluent on three separate days of the week. Each set of influent and effluent grab samples must be taken from a different dosing time frame (morning, afternoon, or evening) so that samples have been taken from each dosing time frame by the end of the week.
 - 1.2.1.2.4. Test the influent to any disinfection unit and measure the flow rate, pH, temperature, turbidity, and color at each occasion of sampling performed in 1.2.1.2.3. of this subsection.
 - 1.2.1.2.5. A minimum of 68 data days are required during system performance testing and evaluation. For consistency with NSF/ANSI Standard 40 sample collection requirements during stress loading, samples should be collected on the day each stress condition is initiated and during stress recovery periods. No samples need to be collected during individual stress tests.
 - 1.2.1.2.6. Conduct analyses according to Standard Methods.
 - 1.2.1.2.7. An excursion allowance may be used provided it is consistent with ANSI/NSF Standard 40 effluent concentration excursions requirements. No excursion allowance may be applied for any period after the first calendar month of PTP performance testing and evaluation, such as for data obtained during stress recovery periods.

- 1.2.1.2.8. If conditions during the testing and evaluation period result in system upset, improper sampling, improper dosing, or influent characteristics outside the ranges specified in subsection 1.2.1.2.2., an assessment shall be conducted to determine the extent to which these conditions adversely affected the performance of the system. Based on this assessment, specific data points may be excluded from the 30-day geometric means of effluent measurements. Rationale for all data exclusion shall be documented in the final report.
 - 1.2.1.2.9. Manufacturers shall address a catastrophic site problem, such as influent characteristics, malfunctions of test apparatus, and acts of God, which jeopardizes the validity of the performance testing and evaluation, according to the procedures described in NSF/ANSI Standard 40.
- 1.2.2. Category 2 PTPs must be tested according to EPA/NSF Protocol for the Verification of Wastewater Treatment Technologies/EPA Environmental Technology Verification (April 2001). The verification test, which is reviewed by DOH for product registration, must be conducted by a testing facility meeting the requirements established by the Testing Organization and Verification Organization, consistent with the test protocol and plan. On-going product certification and listing by NSF (or other entity) is not required.
- 1.2.3. Total Nitrogen Reduction PTPs in Categories 1 and 2 must be tested according to EPA/NSF Protocol for the Verification of Residential Wastewater Treatment Technologies for Nutrient Reduction/ EPA Environmental Technology Verification (November, 2000). The verification test, which is reviewed by DOH for product registration, must be conducted by a testing facility meeting the requirements established by the Testing Organization and Verification Organization, consistent with the test protocol and plan. In addition to verifying treatment performance for Total Nitrogen Reduction product registration, a manufacturer may use full test average results in the verification test to qualify for Category 1 registration only for the purpose of verifying product performance to meet treatment level E threshold values. On-going product certification and listing by NSF (or other entity) is not required.

Please Note: For system performance testing, the minimum fecal coliform influent and effluent sampling frequency is 3 days a week for 26 consecutive weeks. Prior to product testing, manufacturers should evaluate the risk-benefit of selecting this minimum sampling frequency to save cost over a higher sampling frequency to avoid unnecessary system retesting. To decrease the risk of obtaining testing results that fail to meet treatment level threshold values, manufacturers are encouraged to consider increasing sampling frequency to as much as 5 days a week. Statistical analysis of fecal coliform sampling frequency indicates systems that perform well have a higher chance of failing with less frequent sampling (possibly resulting in testing results with higher 30-day geometric means). Conversely, systems that perform well have a greater chance of passing with more frequent sampling (possibly resulting in testing results with lower 30-day geometric means).

1.3. Product Performance

- 1.3.1. Category 1 PTP (designed to treat sewage typical of a residential source) must demonstrate product performance according to Table 1 based upon the results of performance testing required in subsection 1.2.1.
- 1.3.2. Category 2 PTP (designed to treat high-strength residential or commercial sewage) the following performance requirements must be met:
 - 1.3.2.1. All full test averages must meet treatment level E; and
 - 1.3.2.2. Establish the treatment capacity of the product tested in pounds per day for CBOD₅.
- 1.3.3. Total Nitrogen Reduction PTPs in Categories 1 & 2 (designed to treat nitrogen) performance must provide an effluent quality equal to or less than treatment level N, when presented as the full test average.

Please Note: The treatment levels used in Table 1 are not intended to be applied as field compliance standards. Their intended use is for establishing treatment product performance in a product testing setting under established protocols by qualified testing entities.

Table 1. Product Performance Requirements for Proprietary Treatment Products						
Treatment Component/Sequence Category	Product Performance Requirements					
Category 1 Designed to treat sewage with strength typical of a residential source when septic tank effluent is anticipated to be equal to or less than treatment level E.	Treatment System Performance Testing Levels					
	Level	Parameters				
		CBOD₅	TSS	O&G	FC	TN
	A	10 mg/L	10 mg/L	----	200/100 ml	----
	B	15 mg/L	15 mg/L	----	1,000/100 ml	----
	C	25 mg/L	30 mg/L	----	50,000/100 ml	----
	D	25 mg/L	30 mg/L	----	----	----
	E	125 mg/L	80 mg/L	20 mg/L	----	----
	N	----	----	----	----	20 mg/L
	<p>Values for Levels A - D are 30-day values (averages for CBOD₅, TSS, and geometric mean for FC.) All 30-day averages throughout the test period must meet these values in order to be registered at these levels.</p> <p>Values for treatment levels E and N are derived from full test averages.</p>					
	Category 2 Designed to treat high-strength sewage when septic tank effluent is anticipated to be greater than treatment level E. (Such as at restaurants, grocery stores, mini-marts, group homes, medical clinics, residences, etc.)	<p>All of the following requirements must be met:</p> <ul style="list-style-type: none"> (1) All full test averages must meet treatment level E; and (2) Establish the treatment capacity of the product tested in pounds per day for CBOD₅. 				
Total Nitrogen Reduction in Categories 1 & 2 (Above)	<p>Test results must establish product performance effluent quality meeting Level N, when presented as the full test average.</p>					

2. Application Standards

2.1. Registered List of Proprietary Treatment Products

Local health jurisdictions may only permit those PTPs on the Registered List. Only the specific models listed in the document are approved. If other models in a manufacturer's product-line do not appear on the list, they are not approved for use in Washington State. If in doubt, contact DOH for current listing information.

- 2.1.1. Category 1 PTPs are reviewed, and listed based upon the results of performance testing (see subsection 1.2.1) in accordance with the test results reporting requirements in Table 2. PTPs are listed by the treatment process, manufacturer and model. The manufacturer must supply the testing organization and the department full system specifications and operating procedures for the purposes of verifying that the data gathered during testing is from a system with the specifications claimed. In order to be registered for treatment level A, B, or C, a manufacturer must provide testing data according to the requirements in WAC 246-272A-0110 demonstrating that each of the parameters (CBOD5, TSS, and fecal coliform) is met. All test data provided must be produced by an ANSI accredited, third-party testing and certification organization whose accreditation is specific to on-site waster treatment products. Fecal coliform test results submitted must be according to the requirements established in WAC 246-272A-0130 Bacteriological reduction; including the testing organization reporting:
 - 2.1.1.1. the geometric mean of fecal of coliform test results from all samples taken within thirty-day or monthly calendar periods;
 - 2.1.1.2. the individual results of all samples taken throughout the test period design and stress loading;
 - 2.1.1.3. a value of "1" for each zero data point for the calculation of fecal coliform geometric means. Values that signify the lower range of sensitivity for the test are decreased one significant number. For example, a value of "less than 2" becomes 1.9. Results with "greater than values" should to be avoided by analyzing multiple dilutions;
 - 2.1.1.4. influent flow rate, pH, temperature, turbidity, and color to any disinfection unit at each occasion of sampling performed in subsection 1.2.1.2.;
 - 2.1.1.5. all maintenance and servicing conducted during the testing period, including for example, instances of cleaning a UV lamp, or replenishment of chlorine chemical if applicable. Process modifications are not permitted during the testing and evaluation period;

- 2.1.1.6. recorded system upsets or catastrophic system failures for submission to the department. Rationale for all data exclusion according to the allowances in subsection 1.2.1.2.6. and 1.2.1.2.7. must be documented in the final report.
- 2.1.2. Category 2 and Total Nitrogen Reduction PTPs are reviewed, and listed based upon the results of performance testing (see subsection 1.2.1.) in accordance with the test results reporting requirements in Table 2 below.

Table 2. Test Results Reporting Requirements for Proprietary Treatment Products

<i>Treatment Component / Sequence Category</i>	<i>Testing Results Reported</i>
<p>Category 1 Designed to treat sewage with strength typical of a residential source when septic tank effluent is anticipated to be equal to or less than treatment level E.</p>	<p>Report test results of influent and effluent sampling obtained throughout the testing period (including normal and stress loading periods) for evaluation of constituent reduction for the parameters: CBOD₅, and TSS:</p> <ul style="list-style-type: none"> ▪ Average ▪ Minimum ▪ Median ▪ 30-day Average (for each month) ▪ Standard Deviation ▪ Maximum ▪ Interquartile Range <p>When testing for bacteriological reduction performance, report fecal coliform test results of influent and effluent sampling by geometric mean from samples drawn within thirty-day or monthly calendar periods, obtained from a minimum of three samples per week throughout the testing period. See WAC 246-272A-0130. Test report must also include the individual results of all samples drawn throughout the test period.</p>
<p>Category 2 Designed to treat high-strength sewage when septic tank effluent is anticipated to be greater than treatment level E. Such as at restaurants, grocery stores, mini-marts, group homes, medical clinics, residences, etc.</p>	<p>Report all individual test results and full test average values of influent and effluent sampling obtained throughout the testing period for: CBOD₅, TSS, and O&G. Establish the treatment capacity of the product tested in pounds per day for CBOD₅ by using the full test average of the influent concentration and daily hydraulic loading delivered to the PTP. Test report must also include the individual results of all samples drawn throughout the test period.</p>
<p>Total Nitrogen Reduction in Categories 1 and 2 (Above)</p>	<p>Report test results on all required performance criteria according to the format prescribed in the test described in subsection 1.2.3. Test report must also include the individual results of all samples draw throughout the test period.</p>

2.2. Permitting

- 2.2.1. An installation permit and, if required, an operational permit must be obtained from the local health jurisdiction before installation of a PTP.
- 2.2.2. For sites where either treatment level A, B, C, D, E, or N must be met, some means acceptable to the local health jurisdiction must be implemented to assure proper on-going operation and maintenance (O&M) of the PTP and the remaining system components as long as the facility is served by the on-site sewage system. The following options may be used separately or in combination to assure long-term O&M of PTPs:
 - 2.2.2.1. recording the requirement for an on-going service contract on the property deed;
 - 2.2.2.2. issuing an operating permit (in addition to the initial installation permit), with the requirement for maintaining a service contract; and
 - 2.2.2.3. requiring a management entity to provide O&M assurance. Examples of management entities include: cities & towns, public utility districts, water & sewer districts, special-use districts, and corporations to assure long-term management.
- 2.2.3. Local health jurisdictions may implement O&M assurance measures (see subsection 2.2.2.) for sites other than those where treatment levels are required to be met.

2.3. Influent Characteristics

2.3.1. Residential Wastewater

- 2.3.1.1. Typical-strength residential sewage: Category 1 PTPs are listed by DOH for treatment of sewage with strength typical of a residential source when septic tank effluent is anticipated to be equal to or less than treatment level E. The influent wastewater characteristics delivered to a PTP in NSF Standard No. 40 testing is a 30-day average CBOD₅ concentration between 100 mg/L and 300 mg/L and a 30-day average TSS concentration of 100 mg/L and 350 mg/L. The influent wastewater characteristics when testing for bacteriological reduction is a range of 10⁶-10⁸ fecal coliform/100mL calculated as thirty-day geometric means during the test.
- 2.3.1.2. High-strength sewage: Category 2 PTPs are listed by DOH for treatment of high strength when septic tank effluent is anticipated to be greater than treatment level E. This category may include PTPs that are designed to treat high-strength sewage from residential, non-residential or commercial sources (Such as restaurants, grocery stores, mini-marts, group homes, medical clinics, residences, etc.). These high-strength wastewaters exhibit

levels of constituents (BOD₅ TSS, O&G) somewhat greater to dramatically greater than that existing in typical-strength residential wastewater.

2.4. Pre-treatment

If the wastewater is residential sewage, settleable and floatable solid separation by a properly sized two-compartment septic tank with effluent baffle screening will normally suffice. Determination of the specific type of pre-treatment needed before a PTP depends on the conditions of brand-specific product testing.

2.4.1. For those PTPs using a septic tank (single or multiple) compartment or other treatment device to pre-treat wastewater during performance testing:

2.4.1.1. a tank or device of at least equivalent design and volume capacity is required as a component of the sewage system; and

2.4.1.2. a conventional two-compartment septic tank may be used in the place of a single compartment tank, if consistent with the manufacturer's recommendations.

2.4.2. For those PTPs not using a septic tank and other approved pretreatment device to pre-treat wastewater during the performance testing, pretreatment is required only when the PTP manufacturer recommends the installation of a pretreatment tank or unit in specific settings or applications. Pretreatment tank or unit size and configuration must be consistent with the manufacturer's recommendation.

2.5. PTP Model / Size Selection

2.5.1. Residential Wastewater

2.5.1.1. Category 1 PTPs (typical-strength residential sewage applications): follow the manufacturer's recommendation to match the model / size of the PTP with the daily design wastewater flow anticipated from the dwelling.

2.5.1.2. Category 2 PTPs (high-strength sewage applications): follow the manufacturer's recommendation to match the model / size of the PTP with the daily design wastewater flow and BOD₅, TSS or O&G loading anticipated.

2.5.1.3. Total Nitrogen Reduction in Categories 1 & 2 applications: follow the manufacturer's recommendation to match the model / size of the PTP with the daily design wastewater flow and Total Nitrogen loading.

2.6. Access Ports

- 2.6.1. Ground-level access ports must be sized and located to facilitate installation, removal, sampling, examination, maintenance, and servicing of components or compartments that require routine maintenance or inspection. Access ports must be sufficiently sized and located to facilitate:
 - 2.6.1.1. visually inspecting and removing mechanical or electrical components;
 - 2.6.1.2. removing components that require periodic cleaning or replacement;
 - 2.6.1.3. visually inspecting liquid levels and collecting samples; and
 - 2.6.1.4. removing (manual or pumping) accumulated residuals.
- 2.6.2. Access ports must be protected against unauthorized intrusion. Acceptable protective measures include, but are not limited to, padlocks or covers that can be removed only with tools.

2.7. Failure Sensing and Signaling Equipment

- 2.7.1. The PTP must possess a mechanism or process capable of detecting:
 - 2.7.1.1. failure of electrical and mechanical components that are critical to the treatment process; and,
 - 2.7.1.2. high liquid level conditions above the normal operating specifications.
- 2.7.2. The PTP must possess a mechanism or process capable of notifying the system owner of failures identified by failure sensing components identified in subsection 2.7.1. The mechanism must deliver a visible and audible signal in the following manner:
 - 2.7.2.1. The visual alarm signal must be conspicuous at a distance of 50 feet (15 meters) from the system and its appurtenances.
 - 2.7.2.2. The audible alarm signal strength must be between 70 and 90 dbA at 5 feet (1.5 meters) and discernible at a distance of 50 feet (15 meters) from the system and its appurtenances.
 - 2.7.2.3. The visual and auditory signals must continue to function in the event of electrical, mechanical, or hydraulic malfunction of the system. The audible signal may be disabled for service as long as the visual signal remains active while cause for the alarm is identified and alleviated.
- 2.7.3. A clearly visible label or plate with instructions for obtaining service must be permanently located near the failure signal.

2.8. Data Plate

2.8.1. The PTP must have permanent and legible data plates located:

- 2.8.1.1. on the front of the electrical control box, (only if the PTP has an electrical control box or panel); and,
- 2.8.1.2. on the tank, aeration equipment assembly, on the riser at a location accessed during maintenance cycles and inspections or on some other accessible fixed element of the installation.

2.8.2. Each data plate must include:

- 2.8.2.1. manufacturer's name and address;
- 2.8.2.2. model number;
- 2.8.2.3. serial number (required on one data plate only);
- 2.8.2.4. rated daily hydraulic capacity of the system; and,
- 2.8.2.5. the performance expectations as determined by performance testing and evaluation.

2.9. Installation

PTPs must be installed:

- 2.9.1. according to the manufacturer's instructions in compliance with state and local rules; and
- 2.9.2. by an authorized representative of the manufacturer who is approved by the local health jurisdiction.

2.10. Sampling Ports

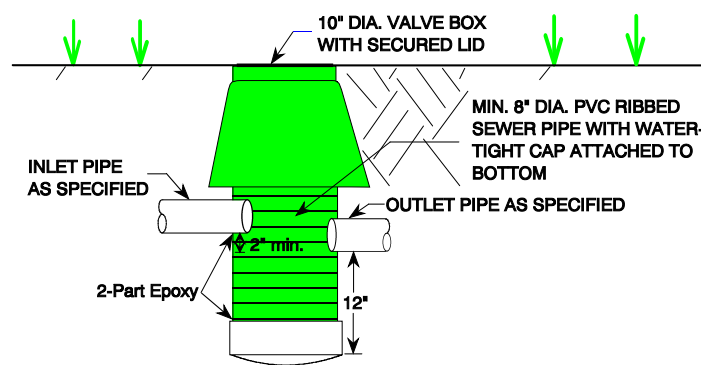
- 2.10.1. A sampling port must be designed, constructed, and installed to provide easy access for collecting a "free fall" liquid sample from the effluent stream. The sampling port may be located within the PTP or other system component (such as a pump chamber) provided that the wastewater stream being sampled is representative of the effluent stream from the PTP.

Sample ports are installed for diagnostic and monitoring activities associated with system performance requirements. Samples are easier to obtain from pressurized transport lines than

from gravity flow. Figure 1. illustrates a suggested method to access gravity flow for sample collection.

Free fall is a term used to describe wastewater movement where samples should be taken to minimize contamination during collection. If collecting a sample from a discharge port under pressure, the water should be flowing freely and the collection container should not touch any part of the pipe work. When collecting a sample from gravity flow it should be taken from the flow as spill from a weir or drop to minimize possible contamination.

Figure 1. Example of an In-Line Sampling Port



- 2.10.2. For PTPs using effluent disinfection to meet the fecal coliform criteria of either treatment level A or B, the sampling port must be located downstream of the disinfection component (including the contact chamber if chemical disinfection is used) so samples will accurately reflect disinfection performance.
- 2.10.3. Sampling ports must be protected against unauthorized intrusion. Acceptable protective measures include, but are not limited to, a padlock or cover that can be removed only with tools.
- 2.10.4. PTPs that incorporate the dispersal component as an integral part of their product will not have an effluent collection point and therefore installations will not be required to have a sampling port for the final treated effluent. For the purpose of product testing for DOH listing, a sampling methodology acceptable to the approved testing facility must be developed. This methodology must capture the treated effluent before dispersal to the native soil. This exclusion does not eliminate the requirement for appropriate access and observation ports (subsection 2.6.).

2.11. Soil Dispersal Component

- 2.11.1. Discharge of effluent from a PTP to a soil dispersal component (subsurface soil absorption) is required. Direct discharge of effluent from a PTP to surface water or upon the ground surface is prohibited by WAC 246-272A-0230(2) (a).
- 2.11.2. WAC 246-272A provides for SSAS design allowances, which vary according to treatment performance levels.
- 2.11.3. The size and design of the soil dispersal component must be consistent with the methods and procedures indicated by WAC 246-272A-0200, WAC 246-272A-0220 WAC 246-272A-0230, and WAC 246-272A-0234.
- 2.11.4. The soil dispersal component location must meet minimum horizontal setback distances as specified by WAC 246-272A-0210, and 246-272A-0280.
- 2.11.5. Development using a PTP must meet the minimum land area requirements specified in WAC 246-272A-0320.
- 2.11.6. PTPs that incorporate the soil dispersal component as an integral part of their product will need their testing protocol to include a methodology to test the effectiveness of the dispersal component.

3. Design Standards

PTPs are exclusively proprietary products representing a wide variety of designs, materials used, and methods of assembly. As such, there are no specific recommended standards for the design of PTPs other than those design requirements for system components that are specified in WAC 246-272A-0238 to facilitate operation, monitoring, and maintenance. Where some or all of the elements of a PTP are constructed on the site of installation, the requirement for design and installation sections will be included in their letters of approval.

4. Operation & Maintenance Standards

4.1. General

- 4.1.1. The owner of the residence or facility served by the PTP is responsible for assuring proper operation and providing timely maintenance of the PTP and all other components of the on-site wastewater treatment and dispersal system.
- 4.1.2. The authorized representative for the PTP must instruct, or assure that instruction regarding proper operation of the PTP is provided to, the owner of the residence or facility.
- 4.1.3. The on-site wastewater system designer must instruct, or assure that instruction is provided to, the owner of the residence or facility regarding proper operation of the entire on-site wastewater system. This instruction should emphasize operating and maintaining the entire on-site wastewater system within the parameter ranges for which it is designed.
- 4.1.4. Conditions in the soil dispersal component must be observed and recorded by the service provider during all operation and maintenance activities for the PTP and other system components. These observations must be reported to the local health jurisdiction responsible for permitting the system in a manner that is consistent with the local permit and operation & maintenance requirements.
- 4.1.5. If monitoring reveals a soil dispersal component failure (defined by WAC 246-272A-0010), or history of long-term, continuous and increasing effluent ponding within this component, which if left unresolved will result in failure, the owner of the system must take appropriate action, according to the direction and satisfaction of the local health jurisdiction to alleviate the situation. Any repair, or modification activity must be reported as part of the monitoring activity for the site. Appropriate actions may include:
 - 4.1.5.1. repairing or modifying the soil dispersal component (local permits must be obtained before construction begins according to local health jurisdiction requirements for repairs);
 - 4.1.5.2. pertaining to reduced-size soil dispersal components, enlarging the area to initial design size required by WAC 246-272A (local permits must be obtained before construction begins according to local health jurisdiction requirements); or
 - 4.1.5.3. modifying the wastewater strength and/or quantity from the structure served.

- 4.1.6. A service contract for on-going service and maintenance of the entire wastewater system, as described in subsection 4.7. of this standard, is required. The service and maintenance requirements may be modified by the local health jurisdiction, but as a minimum continued service and maintenance must be addressed for the life of the system by an operation and maintenance plan.

The O&M Service Contract is the common vehicle by which the PTP industry assures satisfactory long-term operation of PTPs. Each new unit purchase customarily comes with the initial 2-year service contract included in the purchase price. To help assure that system owners continue the contract relationship with a qualified service provider, the PTP industry generally encourages local permitting agencies to stipulate the requirement for an on-going service contract as one of the permit requirements. Such a requirement alone may encourage PTP owners to renew service contracts. But for others, it places the local permitting agency in the role of "contract enforcement".

Other approaches to assuring long-term O&M of PTPs include:

- recording the requirement for an on-going service contract on the property deed;*
- issuing an Operating Permit (in addition to the initial installation permit), with the requirement for maintaining a service contract; or*
- requiring a management entity to provide O&M assurance. Examples of management entities include: cities & towns, public utility districts, water & sewer districts, special-use districts, and corporations and home-owner associations with demonstrated capacity to assure long-term management.*

All PTPs need servicing consistent with the product manufacturer's recommendations to assure long-term system performance. Where PTP performance is being relied upon to provide public health and environmental protection on marginal sites (limited vertical separation, size, and soil-treatment potential), local permitting agencies are encouraged to identify and implement O&M assurance management elements appropriate for their jurisdictions.

4.2. Limited warranty

4.2.1. The PTP manufacturer must:

- 4.2.1.1. warrant all components of the PTP to be free from defects in material and workmanship for a minimum of 2 years from the date of installation; and
- 4.2.1.2. fulfill the terms of the warranty by repairing or exchanging any components that, in the manufacturer's judgment, show evidence of defect.

4.3. Owner's manual

- 4.3.1. The on-site wastewater system designer must (for each on-site wastewater system using a PTP) develop / assemble an accompanying comprehensive owner's manual. The manual may be a collection of individual system component manuals. This document must include:
 - 4.3.1.1. system installation manual;
 - 4.3.1.2. operation and maintenance manual;
 - 4.3.1.3. troubleshooting and repair manual; and
 - 4.3.1.4. record drawing with the name and contact number of the designer and installer.

- 4.3.2. The authorized PTP representative must provide a manufacturer-prepared manual to the wastewater system designer, the system owner and, if requested, to the local health jurisdiction at the time of system installation. The information in this manual(s) must be presented in a manner which can be easily understood by the owner and include, at a minimum:
 - 4.3.2.1. a parts list which includes all primary functional components, equipment manufacturer(s) and model designations;
 - 4.3.2.2. a statement designating current classification of the PTP as NSF Class I or II, and its approval listing rating by the Department of Health;
 - 4.3.2.3. a statement of product performance demonstrated during testing;
 - 4.3.2.4. a statement regarding the use of pre-treatment with the PTP, including whether or not a pre-treatment tank was used during product testing and any application-specific recommendations for using pre-treatment tanks;
 - 4.3.2.5. a functional description of how the process functions, including diagrams which illustrate basic system design and flow-path;
 - 4.3.2.6. a clear statement which provides examples of the types of waste that can be effectively treated by the system;
 - 4.3.2.7. a list of household substances that, if discharged into the system could adversely affect system performance or groundwater quality;
 - 4.3.2.8. comprehensive operating instructions that clearly delineate proper function of the system, operating and maintenance responsibilities of the owner and

authorized service personnel, and service-related obligations of the manufacturer(s);

- 4.3.2.9. requirements for periodic removal of residuals from the system;
- 4.3.2.10. a course of action to be taken if the system is subjected to electrical power interruption beyond 48 hours;
- 4.3.2.11. a course of action to be applied if the system will be used intermittently or if extended periods of non-use are anticipated;
- 4.3.2.12. detailed methods and criteria for identifying system malfunction or problems;
- 4.3.2.13. a statement instructing the owner to reference the PTP data plate in the event that a problem is identified or service obligations related to the PTP need to be met by the manufacturer;
- 4.3.2.14. the name and telephone number of a service representative to be contacted in the event that the system experiences a problem;
- 4.3.2.15. a description of the initial and extended service policies as stated in subsection 4.7;
- 4.3.2.16. electrical schematics for the system if not appearing as a permanent attachment on the system; and
- 4.3.2.17. emergency contact numbers for service providers, pumpers and local health.

4.4. Installation Manual

- 4.4.1. The PTP manufacturer, and manufacturers of other components of the system must provide comprehensive and detailed installation instructions to:
 - 4.4.1.1. authorized representatives;
 - 4.4.1.2. the wastewater system designer and/or installer; and
 - 4.4.1.3. the local health jurisdiction upon request.

- 4.4.2. The installation manual must be written to be easily understood by the installer and include, at a minimum:
- 4.4.2.1. a numbered parts list of system components with accompanying illustration, photographs, or prints in which the components are respectively identified;
 - 4.4.2.2. design, construction, and material specifications, for the system's components;
 - 4.4.2.3. schematic drawings of the system's electrical components;
 - 4.4.2.4. off-loading and unpacking instructions which include:
 - 4.4.2.4.1. safety considerations;
 - 4.4.2.4.2. identification of fragile components, and
 - 4.4.2.4.3. measures to avoid damaging the system;
 - 4.4.2.5. a process overview which explains the function of each component and a description of how the entire system functions when all components are properly assembled and connected;
 - 4.4.2.6. a clear description of installation requirements for, but not limited to, plumbing, electrical power, ventilation, air intake protection, bedding, hydrostatic displacement protection (floating in high ground water conditions), water tightness, slope, and miscellaneous fittings and appurtenances;
 - 4.4.2.7. a sequential installation procedure from the residence out to the effluent discharge connection;
 - 4.4.2.8. repair or replacement instructions in the event that a system possesses flaws that would inhibit proper functioning with a list of sources where replacement components can be obtained; and
 - 4.4.2.9. a detailed start-up procedure.

4.5. Operation and Maintenance Manual

- 4.5.1. The PTP manufacturer must provide comprehensive and detailed operation and maintenance instructions to authorized representatives and, if requested to the local health jurisdiction. The operation and maintenance manual(s) must be written so as to be easily understood by the owner and O&M service provider and include as a minimum:
- 4.5.1.1. a maintenance schedule for all critical components;
 - 4.5.1.2. requirements and recommended procedures for periodic removal of residuals from the system;
 - 4.5.1.3. a detailed procedure for visually evaluating function of system components;
 - 4.5.1.4. a description of olfactory and visual techniques for confirming correct process parameters (i.e. mixed liquor concentration and biomass health) and system performance;
 - 4.5.1.5. a recommended method for collecting and transporting effluent samples;
 - 4.5.1.6. the effluent quality parameters expected to be produced by a properly operating system as established through analytical methods described or referenced by NSF Standard 40; and
 - 4.5.1.7. safety concerns that may need to be addressed.
- 4.5.2. The manufacturer of other components of the on-site system must make available to the wastewater system designer and/or installer, documentation similar to that described by 4.5.1.

4.6. Trouble Shooting and Repair Manual

- 4.6.1. PTP manufacturers must provide comprehensive and detailed troubleshooting and repair instructions to authorized representatives and, if requested, the local health jurisdiction. The manual(s) must be written so as to be easily understood by the intended reader and must include, at a minimum:
- 4.6.1.1. a guide for evaluating the system and narrowing the scope of problems based on internal process conditions, effluent parameters, characteristics, system operation, and history;
 - 4.6.1.2. a sequential method for isolating specific component failure; and
 - 4.6.1.3. a step by step guide for repairing or replacing all components of the system.

- 4.6.2. The manufacturer of other components of the on-site system must make available to the wastewater system designer and/or installer, documentation similar to that described by 4.6.1.

4.7. Service-Related Obligations

- 4.7.1. The entire on-site wastewater treatment and dispersal system with a PTP must be assured proper O&M through an initial and renewed service contract for the life of the system or other means approved by the local health jurisdiction. A single service contract and service provider for both the PTP and the other components is preferable to multiple contracts for service providers.
- 4.7.2. A 2-year initial service policy must be furnished to the owner by the PTP manufacturer or authorized representative with the following conditions:
- 4.7.2.1. cost of the initial service policy must be included with the original purchase price of the PTP;
 - 4.7.2.2. the initial service policy must contain provisions for four inspection/service visits (scheduled once every 6 months over the 2-year period) during which electrical, mechanical, and other applicable components are inspected, adjusted, and serviced;
 - 4.7.2.3. the initial service policy must contain provisions for a PTP effluent quality inspection consisting of a visual assessment for color, turbidity, and scum overflow, an olfactory assessment for odor, and any other performance assessment / operational diagnosis, including sampling of treated effluent (post-disinfection if disinfection is used) required by the local health jurisdiction; and
 - 4.7.2.4. the initial service policy must contain a clause stating that the owner must be notified, in writing, about any improper system function that cannot be remedied during the time of inspection, and the written notification must include an estimated date of correction by the manufacturer or their representative.
- 4.7.3. Service providers must maintain accurate records of their service contracts, customers, performance data, and time lines for renewing the contracts. These records must be available for inspection upon request by the local health jurisdiction. The local health jurisdiction may require copies of these records to be submitted to the local health agency responsible for permitting the system.
- 4.7.4. A manufacturer or authorized representative must make available, for purchase by the owner, an extended service policy with terms comparable to those of the

initial service policy, which includes O&M service for the entire on-site wastewater system, not just the PTP. The service provider must notify the local health jurisdiction of service contracts that are not renewed.

- 4.7.5. In the event that a mechanical or electrical component of the PTP requires off-site repair, the local authorized representative must maintain a stock of mechanical and electrical components that can be temporarily installed until repairs are completed if repairs are expected to render the unit inoperable for longer than 48 hours.
- 4.7.6. Emergency service must be available within 48 hours of a service request.
- 4.7.7. The PTP service provider must possess adequate knowledge and skill regarding on-site wastewater treatment, effluent dispersal concepts and system function. The service provider must be:
 - 4.7.7.1. product-certified by each manufacturer for any PTPs they intend to service;
 - 4.7.7.2. able to provide documentation of product certification as evidence upon request; and
 - 4.7.7.3. able to demonstrate competency in the servicing (Operation & Maintenance) of on-site sewage systems.

Completion of a course of instruction at the Northwest On-Site Wastewater Training Center / Puyallup, Washington, or other equivalent training facility may be most useful to the O&M professional. Completion of such courses as Basics of Operation, Maintenance, and Monitoring may help develop the knowledge and skills needed to provide appropriate O&M to the wide range of on-site sewage systems needing routine servicing.

- 4.7.8. O&M service contracts establish the initial and on-going relationship between the O&M service provider and system owner. The service provider may be the PTP manufacturer / service representative or the system owner. The contract must identify the roles and responsibilities assigned to the service provider. The specifics of O&M service contracts may vary product-to-product and locality-to-locality, but all O&M service contracts must include information / conditions of agreement such as:
 - 4.7.8.1. owner's name & address;
 - 4.7.8.2. property address & legal description;
 - 4.7.8.3. local health jurisdiction permit requirements;

- 4.7.8.4. specific contacts, owner address, service provider, and local health jurisdiction;
 - 4.7.8.5. detail of service to be provided;
 - 4.7.8.6. schedule of service provider duties;
 - 4.7.8.7. cost and length of service contract time period;
 - 4.7.8.8. details of product warranty;
 - 4.7.8.9. owner's responsibilities under the contract and routine operation of the wastewater treatment and dispersal system;
 - 4.7.8.10. document recording, such as notification to the mortgage-holder or attachment to the deed of trust; and
 - 4.7.8.11. document verification / notary public.
- 4.7.9. O&M service record keeping and reports required for the local health jurisdiction must specify:
- 4.7.9.1. what data is to be reported;
 - 4.7.9.2. to whom the reports are to be submitted;
 - 4.7.9.3. the format for presenting information; and
 - 4.7.9.4. the frequency of reporting.

Appendix A - Monitoring: Impact of Site Limitations and System Complexity

The monitoring frequency and level of detail information reported relates to limitations presented by site conditions and system complexity. Monitoring and reporting to assure proper function becomes increasingly critical for more vulnerable sites and/or complex systems. Tables 3 and 4, which may be used to guide decisions related to monitoring and reporting, illustrate this concept, which is applied to all conventional and alternative on-site sewage treatment systems.

**Table 3.
Relationship Between Site Limitations and System Complexity for Conventional and Alternative On-Site Sewage Treatment Systems**

Issue	Characteristics / Level of Limitation and Complexity		
	Lower	←←←←←←←←	→→→→→→→→ Higher
Site Limitation	Meets state rules for <i>conventional gravity system</i>	Meets state rules for <i>conventional pressure distribution system</i>	Limitation increases with - <i>less</i> vertical separation, smaller lot sizes, less horizontal separation, and, <i>greater</i> surface slope, wastewater flow, wastewater strength, etc.
System Complexity	Gravity-flow (no pumps, controls, etc.)	Pressurized distribution (requires pumps & controls)	Complexity increases with - <i>increasing</i> reliance upon, or combinations of: pumps; blowers; motors; mechanical, electronic, or computer-operated controls & warning devices; disinfection (materials & equipment); reduction in drainfield size; quality control of artificial (non-original soil) treatment media, etc.

**Table 4.
Suggested Monitoring Frequency Based Upon Site Limitations and System Complexity for Conventional and Alternative On-Site Sewage Treatment Systems**

	Level			
Site Limitation	Low	Low	High	High
System Complexity	Low	High	Low	High
Monitoring Frequency	<i>Low = Annually</i>		<i>Medium = Semi-annually</i>	
			<i>High = Quarterly, or greater</i>	