

# 1 Group A: Project Management Elements

## 1.1 Title and Approval Sheet

Revised Quality Assurance Project Plan  
Assessment of Water Quality Protection by Advanced Onsite Sewage Treatment and  
Disposal Systems (OSTDS): Performance, Management, Monitoring

FDEP Agreement No. G0239  
August 22 2011

Prepared for:



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## **1.4 Project/Task Organization**

Patricia Sanzone, with the Florida Department of Environmental Protection (FDEP), is the grant and FDEP project manager. She is responsible for oversight of the project administered by the Florida Department of Health.

Elke Ursin, with the Florida Department of Health (FDOH), is the FDOH project manager. She is responsible for maintaining an updated and approved quality assurance project plan (QAPP), facilitating peer review of the project reports by the Research Review and Advisory Committee (RRAC) and other interested parties, and submittal of all quarterly reports and deliverables to FDEP. In this role she will oversee the management of the project and its budget.

Eberhard Roeder, with the Florida Department of Health, will be the quality assurance (QA) officer for the project at the Florida Department of Health. He will be responsible for reviewing field procedures and gathered data in regard to completeness and accuracy prior to reporting to the FDEP.

Debra Roberts, contract staff with the Florida Department of Health, will be responsible for the data gathering, the field evaluation and sampling operations, and the day-to-day data management. She will also be responsible for implementation of the QAPP to ensure the quality and accuracy of sampling, as well as data reporting. She will administer limited analytical testing using field methods and develop revisions to the QAPP as appropriate.

Additional staff support for sampling and data gathering may be obtained from county health departments, and they will follow the same procedures as Debra Roberts. In the following document, references to “samplers” include both Debra Roberts and any additional support staff.

Florida Testing Services, LLC dba Xenco Laboratories will be the main laboratory performing laboratory analytical testing for the project. In addition, other NELAC-certified laboratories may be selected to perform limited laboratory analytical work, in particular for the analysis of fecal coliform.

The Research Review and Advisory Committee (RRAC of the Florida Department of Health) will review reports and provide comments.

Figure 1 shows the relationship between the different project participants.

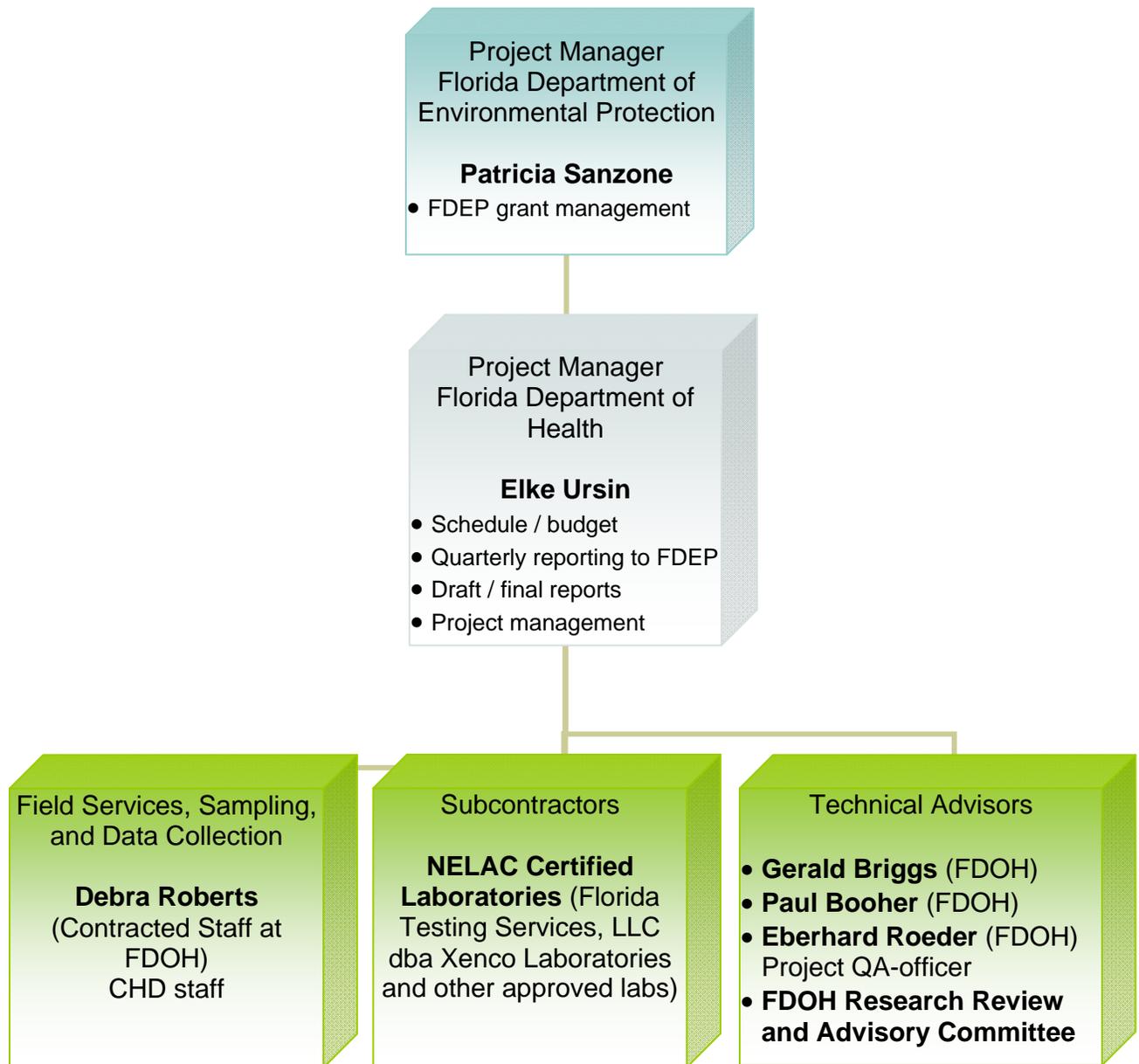


Figure 1. Organizational Chart for Project.

## **1.5 Problem Definition/Background**

Onsite sewage treatment and disposal systems (OSTDS) are one source of nutrients in nutrient impaired watersheds. Estimates of the extent of their contribution to nitrogen loadings for different watersheds in Florida have ranged from between less than 5% to more than 20%. Conventional OSTDS (septic-tank-drainfields) have limited capacity to reduce nitrogen concentrations in water discharged to the drainfields. Because of this, residential density limitations have been used as one approach to meet the nitrate drinking water standard of 10 mg/L, which is not necessarily protective of ecological health. The phosphorus loading from OSTDS has been of most concern in the Florida Keys, where small lots, poor soils, and building practices increase the risks of impacts on surface water.

To achieve higher reductions of nutrient concentrations, additional treatment steps in OSTDS are necessary. Advanced OSTDS can utilize various approaches to improve treatment before discharge to a drainfield, or the drainfield itself can be modified. On occasion, engineers have included the drainfield as part of the treatment process, usually as a means to achieve fecal coliform reduction. In such cases, the engineer is required to include shallow groundwater monitoring wells in the monitoring plan.

The emphasis of this study will be on assessing the effectiveness of pretreatment in advanced OSTDS before discharge to the drainfields. There are two large permitting categories in Florida onsite regulations that qualify as advanced treatment: Aerobic Treatment Units (ATUs) (Florida Administrative Code 64E-6.012), which are generally permitted based on certification by the National Sanitation Foundation; and performance-based treatment systems (PBTS) (Florida Administrative Code 64E-6, part IV), which are permitted based on design by an engineer experienced in wastewater. A third permitting category, rarely used, consists of engineer-designed alternative systems, such as sand filters.

Advanced systems have been required by local regulations, at least in part, with the objective to reduce nitrogen loading to sensitive areas (Florida Keys, St. George Island, Aucilla and Suwannee River floodplains, and Volusia County). In addition, Florida Administrative Code (FAC) 64E-6 requires advanced treatment, sometimes including nitrogen and fecal coliform reduction, for lots where the required setback or authorized lot flow restrictions cannot be met.

Advanced systems differ in three aspects from conventional treatment systems that consist of a septic tank with drainfield. First, the design of advanced systems is more variable than the prescriptive approach for conventional systems. Second, they need more frequent checkups and maintenance, which is the reason they require operating permits. Third, the performance expectations are more specific than absence of sewage on the ground surface, while failure definitions for advanced systems are more vague. The first two issues have been challenges for the permitting process. Site specific performance specifications are not captured completely in the three databases that are used statewide for tracking permits, two that were developed for conventional system permitting for the state, and one that was developed for inspection tracking by Carmody, Inc. The third issue has made it hard to determine how well this aspect of Florida's onsite program is working.

Until early 2001, operating permit fees allowed County Health Departments to perform limited sampling. In 2001, the legislature decided to limit operating permit fees. Since then, there has been no systematic statewide assessment of the management and performance of these systems. The proposed project aims to perform such a statewide assessment on a limited scale and develop improvements in the management of advanced systems where needed.

The objectives of the overall project are to:

1. Quantify the reduced loading of contaminants from advanced Onsite Sewage Treatment and Disposal Systems (OSTDS) to the environment;
2. Assess the operational status of systems under the current management framework, including a comparison of system functioning to expected permit levels of performance;
3. Survey perceptions of user groups regarding the management of such systems;
4. Validate elements of a monitoring protocol for consistent assessment of systems; and
5. Document best management practices.

This QAPP will address, either in part or entirety, data collection to support objective numbers 1, 2, 4, and 5. Objective 3, surveys of user perceptions, are performed separately. Portions of objective numbers 1, 2, 4, and 5 have been completed under a separate QAPP for another portion of the overall project, which was to assess diurnal variability in the Florida Keys. The data collected as part of the overall project will be used to recommend best management practices.

## **1.6 Project/Task Description**

This Quality Assurance Project Plan (QAPP) lays out the methodologies, procedures, and other requirements necessary for collecting field data adequate to support the assessments of operational status and reduction of contaminant loads. In reference to the grant agreement G0239 with the Department of Environmental Protection this QAPP documents procedures for:

**Task 4:** *Statewide assessment of operating conditions and performance of advanced onsite systems [Assessment of Operational Status and Performance]*

**Task 5:** *Periodic influent and effluent sampling for a sample of advanced systems [Assessment of Annual Variability of Performance]*

The primary guidance sources used to develop the QAPP and execute the project are the quality assurance requirements in the Florida Department of Environmental Protection's (FDEP) Agreement No. G0239, Attachment H, which is included as Appendix H. The grant agreement requires this QAPP to follow "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5", (EPA/240B-01/003 March 2001). Additional documents consulted were the Department of Environmental Protection's (FDEP) Quality Assurance Rule (Chapter 62-160, Florida Administrative Code (F.A.C.)); and the applicable FDEP-developed Standard Operating Protocols (SOPs) (FDEP-SOP-001/01).

General background on site selection and initial data gathering is provided in subsequent subsections. Field and analytical procedures are described in Section 2.4. Quality Control Procedures are described in Section 2.5.

## **1.6.1 Statewide Assessment of Operating Conditions and Performance of Advanced Onsite Systems (Task 4 of FDEP Agreement #G0239)**

### **1.6.1.1 Sample Size**

The project target of about 600 effluent samples will allow for 95% confidence that the median is between the 46<sup>th</sup> and 54<sup>th</sup> percentile of measured effluent concentrations. About 600 samples also will allow estimation of the 10<sup>th</sup> and 90<sup>th</sup> percentile within 2.5%. Additionally, approximately 100 additional systems are targeted to evaluate differences in treatment technologies, resulting in a total target of 700 effluent samples. Background information on the random system selection augmented by a stratified random sample for treatment technologies is described in Section 2.1.1.

In order to determine reduction of contaminants, some measure of influent strength will be necessary. The ability to measure influent strength depends on the presence and accessibility of a settling tank that feeds the treatment unit, which may well only be determined during the site visit. Therefore, influent sampling is anticipated to be a convenience sample. With 100 influent samples, we can be 95% confident that the true median influent concentration is between the 40<sup>th</sup> and 60<sup>th</sup> percentile of the measured influent concentrations. The number of influent samples is smaller than the number of effluent samples, because of anticipated accessibility problems, no treatment-type specific differences in influent strength are expected, and because effluent concentrations are more important in terms of environmental effect.

### **1.6.1.2 Data Gathering Overview**

The data gathering for the assessments consists of document gathering and field work. These are organized into six steps. Figure 2 illustrates the anticipated process of collecting data.

#### **1. Initial file review to determine system existence (Step 1)**

During initial permit review, project staff contact county health departments, and review Carmody and the Environmental Health Database, to determine if the system is an existing advanced system as described in Section 2.1.1.

#### **2. Permit file review (Step 2)**

Prior to sampling, system permit files will be reviewed. The review process is described in Section 2.1.2 and screen shots of the data entry forms are included in Appendix A. Evaluation criteria include an assessment if the system is current with its operating permit, maintenance contract, maintenance inspections, and CHD inspections, and how complete the permit file is.

#### **3. Site visit and initial system assessment (Step 3)**

The random selection of advanced systems will be inspected in coordination with annual county health department inspections. Where county health department records indicate that the establishment served by the system has not been occupied for at least three months, a site visit does not need to be performed, and the system will be recorded as “active but vacant”. During each inspection, the configuration of the unit will be compared to permit records as available and the initial indications of the system status characterized. Evaluation criteria include the presence of sewage outside of treatment receptacles, odors emanating from the system, and if the system

appears to be operating. The results of the initial system assessment will be collected on a project specific form (Appendix B)

#### 4. Operational Assessment (Step 4)

If the site conditions allow access to tank compartments and/or the effluent, a detailed operational system evaluation will be completed, which includes screening assessments of the sewage, operational status of the unit, and qualitative assessment of effluent. The results of the operational assessment will be collected on project specific forms (Appendix D and F).

Table 1 summarizes operational assessment parameters and associated methods and how results will be documented. Procedures not covered by FDEP SOPs are discussed subsequently in this document and are considered project-specific alternative procedures per FA 2230 Section 1.1.1.

**Table 1. In-Situ and Screening Parameters for Operational System Assessment**

Type of Measurement	Parameter	Method	Results documented on
Field Measurements w/ FDEP SOP	Field pH	FDEP FT 1100	Operational Assessment Form (Appendix D)
	Field Specific Conductance	FDEP FT 1200	Operational Assessment Form (Appendix D)
	Field Salinity	FDEP FT 1300	Operational Assessment Form (Appendix D)
	Field Temperature	FDEP FT 1400	Operational Assessment Form (Appendix D)
	Field Dissolved Oxygen	FDEP FT 1500	Operational Assessment Form (Appendix D)
Field Screening Measurements w/o FDEP SOP	Field Oxygen Reduction Potential	Manufacturer (YSI)	Operational Assessment Form (Appendix D)
	Sludge Judge	This QAPP ( <i>cf.</i> FS 5211)	Operational Assessment Form (Appendix D)
Field Observations	Various	This QAPP	Initial System Evaluation, Operational Assessment, Data Form for Field Screening Forms (Appendix B, D, and F)

#### 5. Sampling (Step 5)

Where effluent can be accessed, and for the first 100 systems where influent can be accessed, samples will be collected (Section 2.2.6). Effluent of systems that do not appear to be powered on will be initially sampled until 50 powered off systems have been sampled.

Table 2 lists the analytical parameters and methods for samples. Laboratory samples will be analyzed by a NELAC-certified laboratory for cBOD5, TSS, TN, TP and Total Alkalinity (Section 2.4). Florida Testing Services is the laboratory anticipated to perform laboratory analysis for cBOD5, TSS, TN, and TP. Fecal coliform effluent samples will only be sent for analysis where NELAC-certified lab facilities are close enough to meet holding times, which is anticipated in about half of the cases.

Additional field analyses will be performed. Test kit analyses for ortho-phosphorus, nitrate-nitrogen, and ammonia-nitrogen will be performed for about a 10% subset of samples to allow a comparison with laboratory analysis results. These 10% will be the first samples taken by samplers equipped with the test kit (Hach DR/890). Procedures not covered by FDEP SOPs are discussed subsequently in this document and are considered project-specific alternative procedures per FA 2230 Section 1.1.1.

6. Post sampling activities will include steps such as equipment cleaning, sampling transport, reporting of analytical results, data transfer, verification and validation. These activities are discussed in their respective sections. Section 2.2.3 describes the equipment cleaning process to ensure no cross-contamination between samples. Section 2.3 describes sample handling and custody.

**Table 2. Laboratory and Field Screening Parameters for Samples**

	Parameter	Method	Documentation	Frequency
Laboratory Parameters	CBOD <sub>5</sub>	SM 5210B	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	TSS	SM 2540D	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	TKN	EPA 351.2† or SM4500-NH3C (TKN)	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	NO <sub>x</sub> -N	EPA 353.2† or EPA 300	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	TP	EPA365.1 or EPA365.3	Laboratory Chain of Custody	50% of obtained influent and effluent samples
	Total Alkalinity	SM2320B	Laboratory Chain of Custody	3% of obtained influent and effluent samples
	Fecal Coliform	SM 9222D	Laboratory Chain of Custody	Obtained effluent samples where lab is available (~50% of sites)
Field Screening Measurements	Settled Sludge Volume	QAPP (modified SM 2710 C)	Operational Assessment Form	Where aeration chamber is accessible and aeration is occurring
	Free and total chlorine (where applicable)	K-2006 Taylor Kit	Operational Assessment Form	Effluent samples where chlorination is installed
	Total Alkalinity	K-2006 Taylor Kit	Field Analysis Results Form	100 % of effluent samples
	Visual/Olfactory	QAPP	Field Analysis Results Form	100 % of effluent samples
	Color	Hach DR/890 #8025	Field Analysis Results Form	100 % of effluent samples
	Turbidity	Hach DR/890 #8237	Field Analysis Results Form	100 % of effluent samples
Supplemental	Nitrate-N	Hach DR/890	Field Analysis	10% of effluent samples

Field Screening Measurements		#10020	Results Form	
	Ammonia-N	Hach DR/890 #10031	Field Analysis Results Form	10% of effluent samples
	Reactive P	Hach DR/890 #8048	Field Analysis Results Form	10% of effluent samples
	pH (contingency method)	Taylor Kit	Field Analysis Results Form	Effluent samples when probe does not work properly
	Test strips	Manufacturer	Field Note Book	>10 systems per strip

†Revision 2.0, 1993, will be used.

## 1.6.2 Periodic Influent and Effluent Sampling For a Sample of Advanced Systems (Task 5)

### 1.6.2.1 Sample Size and System Selection

Annual variability of effluent and influent quality will be assessed for a selection of volunteer systems. Selection of sampling locations for the 70 systems anticipated for periodic sampling to assess the annual variability of system performance will be less formally random than the selection process for Task 4. Sampling may be done to a larger fraction by trained county health department employees. These systems will be from counties where regular sampling is feasible based on travel time, staffing qualifications and numbers of systems. Initial candidates are Lee, Monroe, Charlotte, Brevard, Franklin, and Wakulla counties. Volunteers will be solicited among systems for which influent samples were taken as part of Task 4, during the first few months of executing site visits and assessments for that task. An effort will be made to achieve representation of a variety of technologies.

Criteria for inclusion of will include:

- Presence of additional systems in close vicinity to allow periodic sampling of multiple systems in a short time
- Willingness of the owner to participate
- Anticipated use during the sampling period
- Access to influent and effluent
- Presence of water use or sewage flow measurements
- Representation of a variety of systems

If none or few of the volunteer sites were part of the random sample for the operational survey, the number of sampled systems may have to be reduced within the overall budgeted cost or an amendment to increase funding may be necessary.

### 1.6.2.2 Data Gathering

For potential participants in the periodic sampling part of the project, the same file and permit information that is collected for the larger random sample assessment will be gathered. If that information indicates that the systems are suitable for participation, the same procedures will be used for assessments, sampling, and analyses that will be used as described in Section 1.6.1.2 for the one-time sampling. In particular, influent and effluent sampling will be performed for cBOD5, TSS, and TN for all systems, and for fecal coliform and TP for approximately half of the total number of systems sampled with a preference for advanced secondary systems. Attempts will be made to coordinate at least one of the sampling events at each site with the annual CHD inspection.

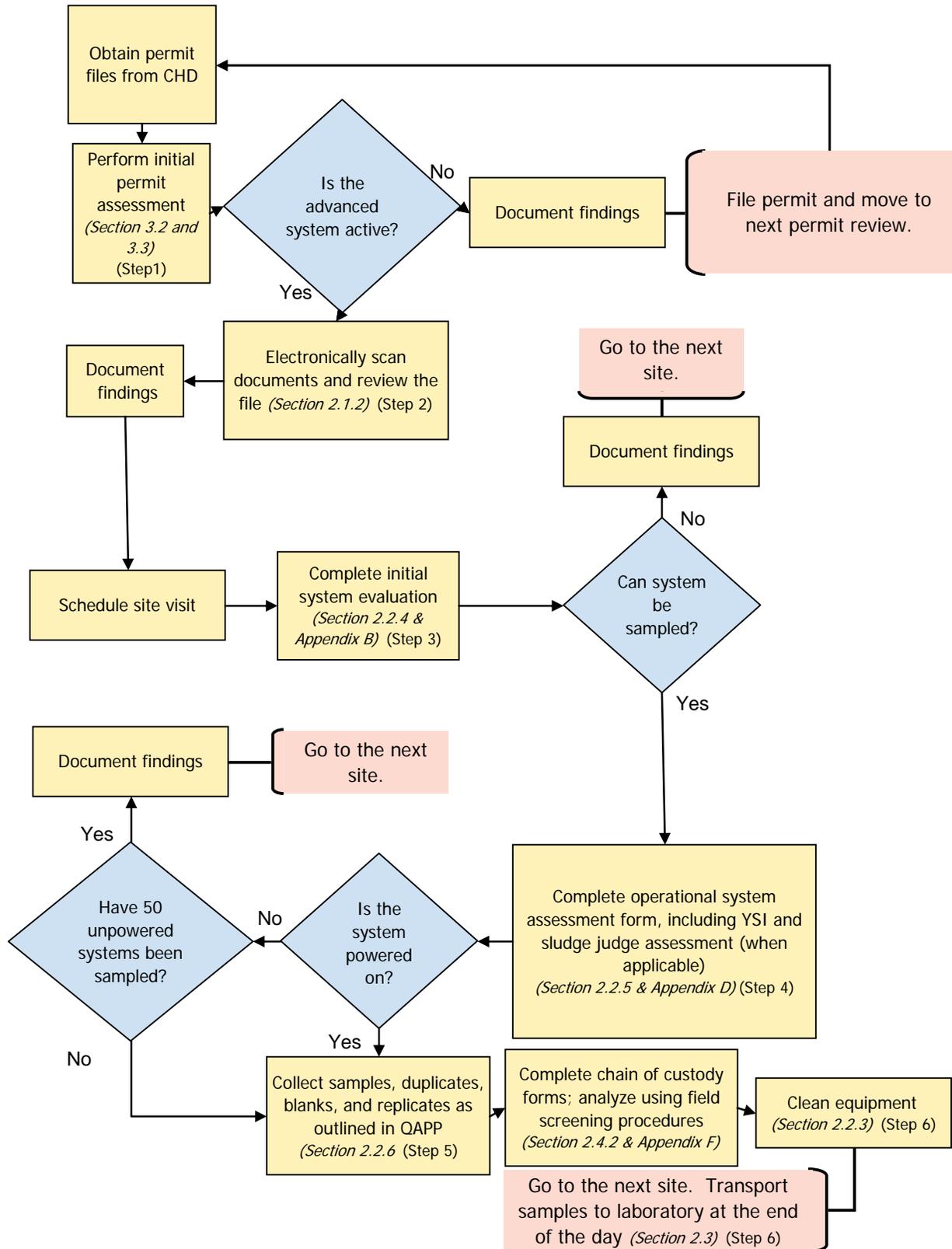


Figure 2. Data Collection Flow Chart

## **1.7 Quality Objectives and Criteria**

### **1.7.1 General**

The overall data quality objective is to obtain data that describe the operational performance of advanced onsite sewage treatment systems and their management. The data will also be used to compare system functioning with expected permit levels of performance. It is anticipated that the performance will vary widely between sites and concentrations will vary widely between influent and effluent concentrations.

Data will be acceptable if the following objectives are met:

- a) Samples and additional field information were collected, transported, and recorded in accordance with the procedures described or referenced in this QAPP.
- b) Numerical values of analytes were determined by FDOH-certified labs according to EPA or standard methods (samples), or according to FDEP's SOPs and manufacturer's instructions as described in this QAPP (probes and field kits).
- c) Data were reviewed, and accepted, rejected, or qualified in accordance with the applicable procedures in Section 4 (Group D of the EPA QAPP structure). Project target is that all data are accurately recorded, and that less than 5% are not useable.

Sampling design and SOPs are discussed in Section 2 (Group B).

Data Quality Indicators-(DQIs) include measures of accuracy, precision, representativeness, completeness, and comparability. Data Quality Objectives (DQOs) are the performance criteria by which these measures can be judged. Measurement performance criteria such as acceptance criteria for field and laboratory duplicate and laboratory spike sample results as well as calibration requirements for field measurements, are presented in Tables 3 and 4, respectively, and discussed in Section 4.1.

Accuracy (agreement between measured and true values) will be ensured by following standard operating procedures and using a certified laboratory for laboratory analyses. False positive and false negative results will be avoided by following the prescribed EPA or standard method techniques for laboratory analysis. The influence of analytical bias (consistent direction of difference between measured and true values), if present, will be limited because laboratory methods such as spiked matrix samples, address bias, and field methods will be calibrated, and equipment blanks will be taken. The use of data for relative comparisons (poorly or well performing systems) will also limit the influence of bias.

Precision of field sampling (variability around a sample mean) for samples will be assessed by taking duplicates in the extent of at least 5%. This measure of precision includes variability due to sampling procedure, handling, transport, laboratory analysis, and data transfer. The objective is that at least 75% of duplicates for each analyte will have a relative deviation of less than 20%. Precision will be aided by using trained, professional staff that adheres to the QAPP and the referenced SOPs, and review of data entry.

Representativeness and completeness are objectives of particular concern to field sampling staff. Representativeness is the degree to which data accurately and precisely represent the

characteristics of a population. In this project, representativeness for advanced systems is aimed for in the sample site selection process (see Section 2.1.). Professional judgment is necessary to some extent to estimate the representativeness of sampling locations at each particular site. To support this estimate, several samples will be taken at sites where it is possible to compare sampling ports and other locations (see Section 2.2). By taking duplicate samples we will obtain a quantification of precision. Knowing the precision gives an indication of how representative any one sample is for a system in general. By sampling consistently, according to the procedures of this QAPP, the gathered data will represent the information that can be gained during such an effort, and an assessment of the quality of this information is an objective of this project.

Completeness is the percentage of measurements that are taken, considered valid, and are entered into the data management system. The project will achieve a level of completeness of over 90% of all applicable site data fields. Because not all sites will allow access to gather all information the 90% will be relative to different population sizes for different parameters.

Data sets are considered comparable when there is confidence that they can be considered equivalent in the measurement of a specific variable. By using the same or similar laboratory methods and FDEP SOPs for field measurements, data obtained in this study will be comparable to other studies.

One objective of this data gathering effort is the evaluation of different measures of the same variable (e.g. color by colorimeter and by visual observation). Different measures shall be considered comparable if there is a consistent relationship between them, such as a correlation coefficient of at least 0.8. Data from this study will be assumed to be comparable to the precursor study in the Florida Keys, which used largely the same methods, and will be compared to other onsite sewage studies using similar methods to assess differences, even if methodology of these other studies may not be as well documented.

### **1.7.2 Laboratory Methods Data Quality Objectives**

The FL DOH Environmental Laboratory Certification Program (ELCP) is regulated by EPA's National Environmental Laboratory Accreditation Conference (NELAC) (<http://www.epa.gov/NELAC/>) and certifies laboratories to follow EPA guidelines (Chapter 64E-1, F.A.C.).

Precision of laboratory analysis is assessed by laboratory duplicates and spiked matrix duplicates. For laboratory analytical methods, the precision is evaluated initially by the laboratory and reviewed by the FDOH-sampler and shall meet the criteria applicable to each method (see Table 3). Table 3 was originally based on the methods used by the anticipated laboratory of the analytical provider in Boca Raton. Due to a reorganization and equipment issues, in July of 2011, different laboratories, using alternative methods, took over this task. cBOD5 and TSS are analyzed in the Lakeland, FL, lab; NOx-N and TP are analyzed in the Houston, TX, lab, and TKN is analyzed in the Atlanta, GA, lab.

The objective is that at least 90% of data will meet the laboratory's accuracy standards,

**Table 3. Data Quality Objectives for Laboratory Analyses.**

Parameter	CBOD5	TSS	TKN	NOx-N	TP	Total Alkalinity
Method	SM 5210B	SM 2540D	EPA 351.2 † or SM4500-NH3C (TKN)	EPA 353.2 † or EPA300	EPA365.1 or EPA365.3	SM2320B
Number of Calibration Standards	N/A	N/A	6 (n/a for SM4500)	6	6	N/A
Calibration Acceptance Criteria (correlation)	N/A	N/A	Corr >0.995 (n/a for SM4500)	Corr >0.995	Corr >0.995	N/A
Calibration Blank Criteria	N/A	N/A	<0.3	<0.2	<0.03	N/A
QC Check Sample Recovery Criteria (%)	70-120	80-120	90-110 (77-161 for SM4500)	90-110 (80-120 for EPA300)	90-110 (80-120 for EPA365.3)	80-120
Matrix Spike Recovery Criteria (%)	N/A	N/A	90-110 (77-161 for SM4500)	90-110 (80-120 for EPA300)	90-110 (80-120 for EPA365.3)	N/A
Laboratory and Field Duplicate Samples Acceptance Criteria (%RPD)	25 (20 starting Jul. '11)	20	20	25 (20 for EPA300)	20	20
Practical Quantitation Limit (mg/L)	2.0	4.0	0.30 (0.5 for SM4500)	0.20 (0.05 for EPA300)	0.03	4.0
Method Detection Limit (mg/L)	2.0	3.5	0.09 (0.28 for SM4500)	0.1 (0.008 for EPA300)	0.055 (0.007 for EPA 365.3)	2.2

†Revision 2.0, 1993, will be used.

### 1.7.3 Field Measuring Methods Data Quality Objectives

For field parameters, the main data quality indicators are the adherence to standard operating procedures, and the quality of the instrument calibrations. For instrument calibrations, FDEP SOPs provide the acceptance criteria shown in Table 4.

**Table 4. Field Parameter Calibration Data Quality Objectives.**

Parameter	Acceptable criteria	Units
Temperature	+/- 0.2	Celsius
Specific Conductivity (SC)	+/- 5 % of solution value	mS/cm
Dissolved Oxygen (DO)	+/- 0.3 mg/L	mg/L
Power of hydrogen (pH)	+/- 0.2	None
Redox Potential (ORP)	n/a	mV

### 1.7.4 Field Screening Methods Data Quality Objectives

For field screening methods, precision will be assessed by comparing results by two different samplers on the same site at the same time, and by evaluating duplicates. The objective is that at least 75% of duplicates for each analyte will have a relative deviation of less than 20%.

For the field screening methods for nitrate and ammonia nitrogen and reactive phosphorus, the accuracy will be assessed in a second manner by comparison to 120% of the laboratory results for nitrate/nitrite nitrogen, TKN, and Total Phosphorus per FDEP-QA-002/02 (4.1.2.8 and 4.1.2.10).

## **1.8 Special Training/Certification**

### **1.8.1 General Procedures**

Field sampling will be undertaken by the main field sampler, Debra Roberts, and/or other trained staff. Chemical and microbiological analyses will be completed by NELAC-certified laboratories using Standard Methods and SOPs for this project. Data review and transfer will be performed by field sampling staff. Quality assurance will be supervised by Eberhard Roeder.

Samplers shall be familiar with and follow the sampling procedures and the SOPs for this project. As needed, training of new staff will be provided by existing staff or the quality assurance officer. The training shall include joint site visits to a minimum of four sites resulting in at least one site that is suitable for sampling. Consistency and staff familiarity with the procedures shall be assessed by comparing data obtained by trainer and trainee using the same procedures.

### **1.8.2 Health and Safety**

The field activities will consist of driving to and from sites, calibration of field instruments, sensory site assessment, checking of electrical equipment, carrying equipment and samples, opening of treatment receptacles and inspection ports, field measurements and water quality sampling, decontamination of field equipment, and delivery of samples to courier services or analytical laboratories. Biological hazards are associated with exposure to high concentrations of microorganisms in sanitary sewage. No confined space entry is anticipated. Noise levels are anticipated to not require special protection. All field activities are anticipated to take place in areas that do not pose chemical hazards, with the possible exception of chlorinators that may be encountered.

Proper personal hygiene and use of personal protective equipment (PPE) will significantly reduce or eliminate biological and chemical safety hazards. Employees will wear gloves and appropriate PPE as needed. Employees are ultimately responsible for developing and applying good chemical hygiene practices. The sampler will pay attention to physical hazards encountered during work activities. Slip, trip and fall potential will be minimized by conducting site work solely during daylight hours when at all possible and by orderly setup and removal of

equipment. FDOH’s workplace safety guide will be followed ([http://dohiws.doh.state.fl.us/Divisions/Administration/Gen\\_Services/SupportSvcs/Safety/Reports/WorkplaceSafetyGuide.pdf](http://dohiws.doh.state.fl.us/Divisions/Administration/Gen_Services/SupportSvcs/Safety/Reports/WorkplaceSafetyGuide.pdf)).

Table 5 provides an overview of general hazards that may be present during field work and measures to address.

**Table 5. Overview over anticipated hazards and control measures during field sampling.**

Activity/ Potential Hazards	Control Measures
General	
General	Work during daylight hours Visually survey the site and avoid hazardous areas to the degree feasible No smoking, eating or drinking at the site during operation. Personal Protective Equipment (PPE): gloves, close-toed shoes, eyewear. Provide supervisor with trip plans.
Injuries	First aid kit will be available. If it is an emergency, seek immediate medical attention. If not an emergency, or following urgent treatment then: Notify the employee's immediate supervisor (or any other immediately available supervisor in their absence) and ask them to: Report the injury to OptaComp's Intake Center <b>877-518-2583</b> The Intake Center will complete the First Report of Injury or Illness Form The injured employee will then be advised of the appropriate medical provider/facility for treatment and the availability of the prescription drug program. File incident reports using FDOH's incident reporting system ( <a href="http://dohiws.doh.state.fl.us/Divisions/Insp_General/IncidentReport/IncidentReportingPolicy5.pdf">http://dohiws.doh.state.fl.us/Divisions/Insp_General/IncidentReport/IncidentReportingPolicy5.pdf</a> ) Employees, including OPS and contract employees need to follow policy FDOHP 5-6-08 on incident reporting, and notify their supervisors
Heat/cold stress Sunburn, weather conditions	Breaks will be taken to minimize potential for heat/cold stress. Staff will have water and a climate controllable location (i.e., truck) available near the work area. PPE: Gloves and other PPE to prevent direct contact with metal equipment and prevent exposure to weather conditions. Use sunscreen as needed.
Blood Borne Pathogens	If blood is present, the area will be controlled to prevent exposure to blood and potential blood borne pathogens
Animals (dogs, snakes, insects,...)	Survey for presence. Make noticeable approach. Keep safe distance. Keep insect repellent close by and use as needed.
Driving	Employees operating or riding in State vehicles, or personal vehicles on official state business shall follow Florida driving laws and FDOH’s workplace safety guide ( <a href="http://dohiws.doh.state.fl.us/Divisions/Administration/Gen_Services/SupportSvcs/Safety/Reports/WorkplaceSafetyGuide.pdf">http://dohiws.doh.state.fl.us/Divisions/Administration/Gen_Services/SupportSvcs/Safety/Reports/WorkplaceSafetyGuide.pdf</a> ).
Environmental Sample Collection	
slip, fall, trip,	Work during daylight; pay attention to surroundings; orderly setup and removal of equipment; PPE,

Strain	Use proper lifting techniques (use legs not back, do not exceed individual capability, use lifting device where appropriate)
spills, splashes, leaks	Check and address spills/leaks of wastewater. Open sampling ports and manhole covers with caution. Use extreme caution with bottles that contain acids as preservatives or reagents Recognize potential bacterial, virus or blood borne pathogens and eliminate exposure through adequate PPE and work practices. PPE: gloves, close-toed shoes, eyewear. Waste Management (WM): Clean spills/leaks. Segregate trash. Place trash in appropriate waste bins. Excess effluent will be returned to the onsite system.
Electrical	Check for potential contact of water/wastewater with electrical cords.
Chemical	Systems with trash tanks, or systems where aeration is not functional, may contain noxious gases, such hydrogen sulfide. Open sampling ports and manhole covers with caution, and downwind from person. At systems with chlorinators, only. At low pH, conversion to hydrochlorous acid can result in the production of chlorine gas, which can be hazardous. Open sampling ports and manhole covers with caution, and downwind from person, for sites that include a chlorinator.
Sample field analysis	
Spills, splashes, leaks, broken glass	Follow instructions for field screening analyses Use extreme caution with containers of acids as preservatives or reagents. Field sampling staff must maintain current inventories for all chemicals stored in their control and/or in other storage areas and have Material Safety Data Sheets (MSDS) readily accessible for all hazardous chemicals stored under their control. Clean all spills immediately. Ensure proper spill kits are available. Broken glass should be immediately swept. Properly store incompatible materials (e.g., separate storage for acids and bases). Close chemical containers when not in immediate use. PPE: work clothes, gloves, close-toed shoes, and eyewear. Waste Management: Clean spills/leaks. Segregate trash.

Additional safety information for related occupations is available at:

- [http://www.ilo.org/legacy/english/protection/safework/cis/products/hdo/pdf/oper\\_wastewtr.pdf](http://www.ilo.org/legacy/english/protection/safework/cis/products/hdo/pdf/oper_wastewtr.pdf)
- <http://www.afscme.org/issues/1183.cfm>

## **1.9 Documents and Records**

### **1.9.1 QAPP**

The FDOH project manager, Elke Ursin, will maintain this quality assurance project plan. Sufficient copies of the most recently approved QAPP will be available at the Florida Department of Health, Bureau of Onsite Sewage Programs Office for field staff. Draft and minor changes approved by FDEP’s project manager will be distributed by electronic mail to the distribution list (A3), and major revisions will be sent out by mail for signature.

### **1.9.2 Initial Planning Review Audit**

Within 15 days of completing the first sampling and analysis event, the FDOH team and all associated subcontractors shall review the QAPP relative to the completed field and laboratory activities to determine if the data quality objectives are being met, identify any improvements to be made to the process, and refine the sampling and/or analytical design or schedule. The review

shall utilize the applicable sections of FDEP's field performance evaluation guidelines ([http://publicfiles.dep.state.fl.us/dear/labs/sas/library/docs/TMDL\\_field.doc](http://publicfiles.dep.state.fl.us/dear/labs/sas/library/docs/TMDL_field.doc)).

Within one month of the review, a summary of the review, including any corrective action plans or amendments to the planning document, shall be sent to the FDEP project manager and a copy shall be maintained with the permanent project records.

### **1.9.3 Ongoing Planning Review Audit**

Planning reviews as described above shall occur annually. It is not anticipated that this project will extend long enough to warrant a second planning review audit.

### **1.9.4 Fieldwork and Laboratory Documentation**

The sampler will retain appropriate documentation of fieldwork in the offices of the Bureau. After completion of the project, the FDOH project manager will organize storage of documentation for a minimum of five years after project completion. Documents will include field records (such as the examples provided in the appendices), field notebooks, results from laboratories, and results of additional quality control samples or assessments. All laboratory reports shall be issued in accordance with NELAC requirements (see descriptive fields in 1.9.5).

All field and laboratory records that are associated with work performed under this contract shall be organized so that any information can be quickly and easily retrieved for inspection, copying or distribution. The format of all data reporting will be consistent with the requirements and procedures for data validation and data assessment described in Section 4.

### **1.9.5 Quarterly Progress Report**

Quarterly progress reports will be prepared by the FDOH project manager. The quarterly reports shall be submitted to the FDEP project manager.

The reports shall include lab and field data electronically in either Excel or Access format. For laboratory results, the following shall be included:

- Laboratory sample identification (ID) and associated Field ID
- Analytical/test method
- Parameter/analyte name
- Analytical result (including dilution factor)
- Result unit
- Applicable FDEP Qualifiers per Table 1 of Chapter 62-160, F.A.C.
- Result comment(s) to include corrective/preventive actions taken for any failed QC measure (e.g., QC sample, calibration failure, etc.) or other problem related to the analysis of the samples
- Date and time of sample preparation (if applicable)
- Date and time of sample analysis

- Results of laboratory verification of field preservation
- Sample matrix
- FDOH NELAP certification number for each laboratory (must be associated with the test result(s) generated by the laboratory)
- MDL
- PQL
- Sample type (such as blank type, duplicate type, etc.)
- Field and laboratory QC blank results:
  - o Laboratory QC blank analysis results as required by the method, NELAC Chapter 5 and the planning document;
  - o Field quality control results including trip blanks, field blanks, equipment blanks, and field duplicates (or replicates) as specified in this QAPP
- Results of sample matrix spikes, laboratory duplicates or matrix spike duplicates, as applicable
- Results of surrogate spike analyses (if performed)
- Results of laboratory control samples (LCS)
- Link between each reported quality control measure (e.g., QC blanks, matrix spikes, LCS, duplicates, calibration failure, etc.) and the associated sample result(s)
- Acceptance criteria used to evaluate each reported quality control measure

The following field-related information shall be reported:

- Site name
- Field ID for each sample container and the associated analytes (test methods) for which the container was collected
- Date and time of sample collection
- Sample collection depth, if applicable
- Sample collection method identified by the FDEP SOP number, where applicable
- Sample collection method identified by field screening measurements without a FDEP SOP, where applicable (Field Oxygen Reduction Potential, sludge judge, field observations)
- Field test measurement results, if applicable:
  - o FDEP SOP number (FT-series), where applicable
  - o Parameter name
  - o Result
  - o Result unit
  - o Applicable Data Qualifiers per Table 1 of Chapter 62-160, F.A.C.
- Narrative comments discussing corrective/preventive actions taken for any failed QC measure (e.g., blank contamination, meter calibration failure, split sample results, etc.), unacceptable field measurement or other problems related to the sampling event

### 1.9.6 Final Reports

Draft final and final reports will be routed through the FDOH project manager to FDEP's project manager. They will summarize the work, present and discuss the results, and may reach conclusions. The final report will include statements about data usability relative to the Data Quality Objectives and Data Quality Indicators specified in this QAPP, and Attachment F.

Additional reports or presentations may be given by FDOH-staff about this project. The FDEP project manager will receive a copy of such presentations. Reports will be made available through the Department of Health's web site at: <http://www.doh.state.fl.us/environment/ostds>

## 2 Group B: Data Generation and Acquisition

### 2.1 Sampling Process Design (Experimental Design)

#### 2.1.1 Site Selection

The onsite systems selected for evaluation during this project are comprised of an augmented random sample of systems that will be evaluated once, and a smaller set of systems that will be evaluated four times at periodic intervals. Sites selected for the random sampling were composed of two overlapping groups, and the process is illustrated in Figure 3. The first group consisted of a random sample of about 700 systems (600 systems and 100 reserve) drawn from all systems. The second group was selected to evaluate different treatment technologies. Approximately 70 systems each were selected to represent three treatment approaches: unsaturated fixed media, combined media, and extended aeration. These groups contained reserves as a precautionary measure in the event that some systems do not exist anymore, are classified incorrectly as an advanced system, do not provide an adequate amount of sample volume, or are not accessible for testing. The overlap caused by the fact that some of the systems selected for technology evaluation were also part of the random sample resulted in an initial set of about 800 systems to be evaluated and possibly sampled. More details are given below.

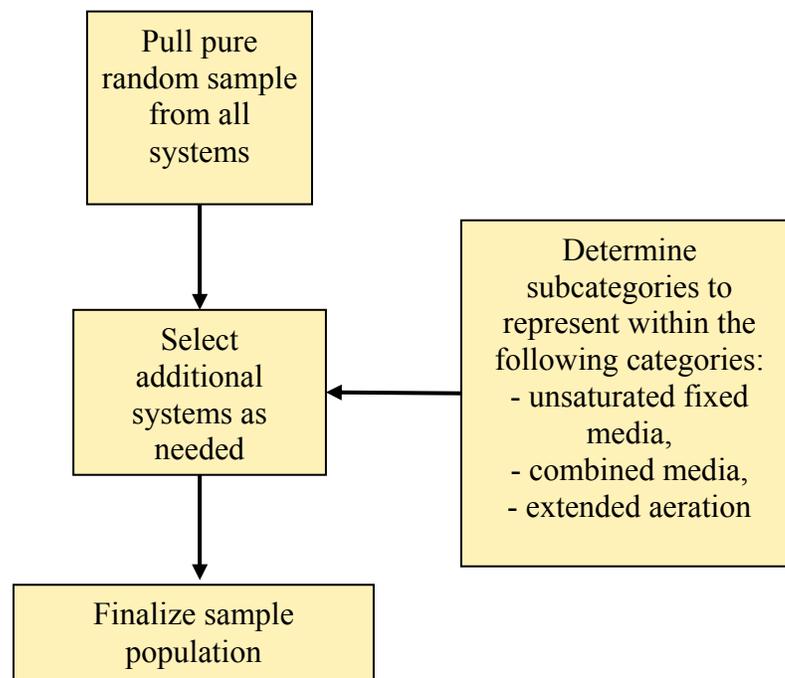


Figure 3. Site Selection Flow Chart

The source of data for the systems eligible for sampling was a statewide compilation of advanced systems in the database that was created as part of the overall grant project. This database compiled data from several sources (FDOH Environmental Health Database, Carmody Systems Inc., some individual county health department databases, and limited information in the State Health Office on innovative systems) regarding the location of advanced systems throughout the state. The aggregation of data had the goal to identify individual addresses that were served by advanced onsite systems. After extensive data matching to eliminate duplicates and match records from different sources, one dataset organized in an Excel spreadsheet was created. A random number was assigned to each record using the formula "=RAND()". After fixing the random number to the assigned value, random samples of size  $x$  can be selected by looking for the lowest  $x$  random numbers for a group that meets specific criteria (e.g. the whole group or a specific treatment approach).

The random sample of 700 sites was selected first. Once the list was created, summaries of the data by county were performed. Monroe County had 167 of the 700 systems selected which were over-representative of the full dataset by about 2.7%. There was some discussion on whether there were any issues with the number of systems that were coming from Monroe County. Ultimately, upon discussion with FDEP, it was decided to reduce the number of systems from Monroe County to make the percent difference between the site selection and the full dataset equal. This reduced the number of systems for Monroe County to 148, which is about 21.2% of the selected systems. The 19 systems from Monroe County that were removed as a result of this equalization were replaced by moving down the list of random numbers and selecting replacements that were not from Monroe. Subsequently, a duplicate site was identified, leading to a total of 699 sites. Figure 4 illustrates the location of systems resulting from the first round of random site selection.

In order to select technology assessment sample sites the following procedure was used. 70 sites were selected to represent each of three treatment approaches: unsaturated fixed media, combined media, and extended aeration. Combined media sites were evenly divided between two manufacturers, which also represented different aeration subtypes. Extended aeration sites were evenly divided between the two common aeration subtypes, diffusers or aspirators. Of 16,594 sites, 9,206 had some information on treatment technology product based on either specified manufacturer or product information in one of the source databases or based on tank information that corresponded to technologies. To ensure representation of a variety of technologies and manufacturers in each resulting subgroup, the number of sites selected from each technology subtype was proportional to the decadal logarithm of the number of sites with that product in the database. For each particular technology, the first respective number of sites was selected based on the random number discussed previously. This resulted in an overlap, with only 98 additional sites needed, while 112 sites were already included in the original random sample. These 98 sites provide representation of less common technologies. Table 6 shows the result of manufacturers and products selected for sampling.

Additional sites may be selected for sampling as time and budget allows. If more than 200 systems are not accessible for sampling, a determination will be made on the feasibility of adding

systems, in consultation with the FDEP project manager, and after budget and schedule considerations.

**Table 6. Technology selection based on technology, products and manufacturer**

Technology Approach	Manufacturer	Product	Aeration_Subtype	Product Sample	Subtype Sample	Approach sample
Combined	Bio-Microbics	FAST	Diffuser	35	35	70
	Jet	Jet	Aspirator	35	35	
Extended aeration	Acquired Wastewater Technologies	Alliance	Diffuser	2	35	70
	Ecological Tanks, Inc.	Aqua Aire	Diffuser	2		
	Ecological Tanks, Inc.	Aqua Safe	Diffuser	2		
	Aqua-Klear	Aqua-Klear	Diffuser	4		
	American Wastewater Acquired Wastewater Technologies	B.E.S.T. 1	Diffuser	3		
		Cajun Aire	Diffuser	3		
	Clearstream	Clearstream	Diffuser	3		
	Delta	DF or UC	Diffuser	3		
	Hoot	Hoot	Diffuser	4		
	Hydro-Action	Hydro-Action	Diffuser	2		
	H.E. McGrew	Mighty Mac	Diffuser	3		
	Consolidated	Nayadic	Diffuser	4		
	Consolidated	Multi-Flo	Aspirator	15		
	Consolidated	Enviro-Guard	Aspirator	3		
Norweco	Singulair	Aspirator	17			
Fixed media	Orenco	AdvanTex		6	70	
	Quanics	Aerocell		4		
	Quanics	Biocoir		4		
	Premier Tech	EcoFlo		9		
	EcoPure	EcoPure		8		
	Earthtek	EnviroFilter		14		
	Klargester	Klargester		2		
	Rotodisk	Rotodisk		3		
	Ruck	Ruck		7		
	NoMound	NoMound		8		
Sandfilter	Sandfilter		5			



Figure 4. Distribution of Sample Sites

### 2.1.2 Permit File Review

Sampling staff will coordinate with the respective county health departments to gather system information prior to visiting a site. The objectives of the prior information gathering are to prepare sampling staff for the site visit, to gather the available information on this system in the project database, and to review permitting practices in the county health departments. The following documents about the construction and operating permitting history will be collected to provide information on the system, and information will be entered into the database associated with this project:

1. Construction Permit Application (DH 4015 p1)
2. Site Evaluation (DH 4015 p3)
3. Construction Permit (DH 4016 p1)
4. Final Inspection Documents (DH 4016 p2)
5. Site Plan
6. Engineer Design Drawing (if applicable)
7. As-Built

8. Operating Permit
9. Operating Permit Application (DH 4081)
10. Maintenance Entity Contract
11. Checklist used while conducting CHD inspections (if applicable)
12. Checklist of all activities associated with file (if applicable)
13. CHD Inspection Reports
14. ME Inspection Reports
15. Enforcement Action (if applicable)

**For PBTS and Innovative Systems Only:**

1. System Design Calculations
2. System Design Criteria
3. Whether soil was used as part of the treatment system
4. Contingency Plan
5. Certification of Design
6. An Operation and Maintenance Manual
7. A cover letter addressed to CHD stating the applicant's intent to apply for a performance-based treatment system

The documents will be reviewed for completeness. Files that are sent as incomplete will be noted in the database and will be evaluated as a part of the assessment of the county management practices in Section 3.3. County health department staff will be notified of incomplete files.

If a permit file review reveals that the system should not be included in this project, e.g., because it is not an advanced system or because it has been abandoned, then this will be noted in the project database. Similarly, it will be noted in the database if the permit file cannot be located.

### **2.1.3 Site Visits and Assessments**

The core element of this project is the assessment of system functioning by visiting the sites and evaluating their operation both qualitatively and quantitatively. The components of this evaluation are presented in Section 2.2.

### **2.1.4 Additional Information on County Management Practices**

One objective of this project is to assess management practices in order to find successful examples. The following data will be collected as part of this project: past county program evaluations; the permitting, inspection, and maintenance records from systems selected for sampling, discussed in the previous section; results from a survey that was sent as a part of this overall project to gather information from different stakeholder groups; and the procedures that the county health department uses. This section discusses how past county program evaluations and the permit records mentioned above will be used and electronically stored to facilitate a quantitative means of assessing management practices.

#### 2.1.4.1 Historical Results of Program Evaluations

A system of program evaluations was developed by the Department of Health to ensure consistency between county health departments in implementing the onsite sewage program and to identify additional staff training opportunities. The evaluation is performed generally every three years by Bureau of Onsite Sewage Program staff. Program evaluation tools are recorded in an Excel spreadsheet and generate an overall score and component scores based on findings. This project will look at the overall score and at the scores for ATU operating permits, PBTS operating permits, and maintenance entity service permits.

The program evaluation tool is periodically revised to incorporate rule or other changes. In regards to advanced systems, the tool currently focuses on documentation of permitting processes. Since the dropping of an ATU sampling requirement the criteria have remained fairly consistent, with only a recent addition to assess PBTS operating permits separately.

A summary of evaluations completed during 2000 to 2010 will provide historical data which will be used as a baseline to identify common trends within a particular county and determine if there is a systematic trend. Capturing this information will play a critical role in determining the strengths and weakness within the local county health department management practices. These data will allow an evaluation of which counties manage this program “best” in regard to consistency and completeness of documentation requirements. This will later be an input to identify best management practice recommendations in the final project report.

#### 2.1.4.2 Permit File Review Relative to Program Evaluation Criteria

The review of system files collected as described in Section 2.1.2. will include collection of certain data fields that are also included in the program evaluation tool to evaluate documented management practices. The particular components of the 2009-2011 program evaluation tool that will be used with this project are those relating to ATU operating permits and PBTS operating permits. This will allow the scoring of project records to be standardized for comparison with historical records. Questions that will be answered with this data review are:

- Is the current operating permit on file?
- Is the original operating permit application on file?
- Is there an inspection report completed by the CHD for a completed permit year?
- Is there an initial inspection report completed by the ME for a completed permit year?
- Is there a second inspection report completed by the ME for a completed permit year?
- Is the current ME contract on file?
- Are there monitoring requirements? [Only applicable to PBTS permits]

#### 2.1.4.3 Evaluation of Survey of User Groups

A series of surveys were created by FDOH personnel and distributed by Florida State University (FSU) to various user groups as one of the tasks in the overall project. These user groups consisted of system users, system manufacturers, maintenance entities, system engineers, septic tank contractors, and department of health regulators. The survey questions varied depending on the targeted user group. Systems that are selected for sampling will include a notation in the database on whether the system owner was sent a survey and whether a completed survey was sent back. Information completed by the system user will be compared to the information in the

permit file and information on the sampling results to assess whether there is a correlation between user knowledge about their system and system performance.

#### 2.1.4.4 Procedures of County Health Departments

More qualitative observations on the inspection protocols used by counties and on enforcement steps taken, if applicable, will be obtained by staff working on the project on two occasions: The permit file review will allow gathering of information on the forms used during County Health Department inspections and on documented enforcement. Additionally, during the site visits, project staff will gather data to allow comparison of CHD-staff protocols relative to the procedures used during this project.

## 2.2 Sampling Methods

### 2.2.1 General Field Work Procedures

The sampler(s) will be familiar with the procedures provided in this QAPP and the applicable FDEP SOPs referenced in it. Table 7 lists the general field work procedures that will be guiding this project.

**Table 7. List of Related Standard Operating Procedures (SOP) by FDEP**

SOP	Description
FC 1000	Cleaning / Decontamination Procedures
FD 1000	Documentation Procedures
FQ 1000	Field Quality Control Requirements
FS 1000	General Sampling Procedures
FS 2400	Wastewater Sampling
FT 1000	General Field Testing and Measurement
FT 1100, 1200, 1400, 1500	Field Measurement of pH, Specific Conductance, Temperature, Dissolved Oxygen, respectively

The sampler(s) will keep a field journal, which will include a general record of work performed including dates of site visits and meetings with County Health Department staff, summary of work performed at each site and additional notes that are not covered by the forms referenced below.

Standardization will be accomplished during joint site visits with the QA officer or a previously trained staff during the first five site visits.

### 2.2.2 Activities Prior to Site Visit

Prior to the site-visit, the sampler will make necessary preparations. Determination of the specific lab locations for fecal coliform analysis will occur as a part of the planning of sampling field trips. Approved labs that are in close proximity to the sampling location will be contacted prior to sampling to determine their ability to accept samples as well as to determine whether the cost is competitive. Sample containers and chain-of-custody forms for these labs will be secured prior to sampling.

The site visit will be coordinated between the sampler and the respective county health department. Where county health department records indicate that the establishment served by the system has not been occupied for at least three months, a site visit does not need to be performed, and the system will be recorded as “active but vacant”. Depending on the practices of the county health departments for their annual inspections, the maintenance entity and/or the owner will be informed on the intended site visit. Based on the permit file review and in coordination with the County Health Department, the sampler will prepare the following:

#### General

- Print assessment forms for the site (Appendix B, C, E)
- Print calibration forms for field measurements (modified FD9000-8, Appendix E)
- Obtain site plan with system information if available
- Obtain treatment system manufacturer’s manual
- Determine shipping locations and times for laboratory samples
- Determine availability of laboratory for fecal coliform analysis
- Obtain sampling containers from respective labs. Florida Testing Services, LLC, dba Xenco Laboratories, will provide intermediate sample containers and all required sample containers with preservatives as necessary, and deliver to FDOH. Suitable local labs will supply sampling containers for fecal coliforms.
- Obtain supplies for field screening and cleaning and ensure equipment is clean
- Plan trip

#### Within one week of anticipated site visit:

- Contact County Health Department
- Coordinate with County Health Department on customary notification of owner/maintenance entity
- Review system information
- Obtain status of operating permit and maintenance contract and confirm dates of last two maintenance inspections and last county health department inspection for the site
- Coordinate with CHD if CHD-inspector will participate in site visit

#### On the day of the site visit

Calibrate or verify continuing calibration of field measuring devices according to applicable FDEP SOPs (FT 1000-FT 1500) and procedures outlined in this QAPP (can occur at the site).

### **2.2.3 Equipment Cleaning**

Two levels of cleaning are distinguished for this project:

1. Cleaning at the temporary base of operations (e.g., a county health department, hotel, or other accommodation). These cleanings will be documented in the field notebook, including the documentation requirements in FC 1000.
2. Field cleaning at a site and traveling from site to site.

### 2.2.3.1 Cleaning at Temporary Bases of Operation

Equipment, including intermediary sample container, will be cleaned following the procedures of FC 1100. This cleaning shall occur before a set of site visits and at least weekly during extended campaigns of site visits. The following refers to the applicable sub-sections of the FC 1000-series.

- Clean containers for laboratory analyses obtained from NELAC-certified lab: FC 1310 1.3
- Ice chest and shipping containers: FC 1190
- Field instruments and sludge judge: FC 1210
- Automatic samplers serving as peristaltic pumps: FC 1140 Section 1 and 2.
- Reusable plastic composite sample containers (may serve as intermediary sampling device) (FC1140), other plastic intermediary sampling devices (FC 1132), sludge judge, or new or reused tubing (FC 1160) will use the following procedure, with steps struck through in accordance with Table FC 1000-1.

#### **FC 1132. General Cleaning Procedure for Plastic Sampling Equipment**

1. Rinse equipment with hot tap water.
  2. Soak equipment in a hot, sudsy water solution (Liqui-Nox or equivalent - see FC 1001, Section 1).
  3. If necessary, use a brush to remove particulate matter or surface film.
  4. Rinse thoroughly with hot tap water.
  5. ~~Thoroughly rinse (wet all surfaces) with the appropriate acid solution (see FC 1001, section 4). Check manufacturer's instructions for cleaning restrictions and/or recommendations.~~
  6. Rinse thoroughly with analyte-free water. Use enough water to ensure that all equipment surfaces are thoroughly flushed with water. Allow to air dry as long as possible.
  7. Wrap clean sampling equipment according to the procedure described in FC 1003, Section 6.
- Some containers used for field analyses may consist of Teflon, stainless steel, and glass (FC 1131). When considering that Table FC 1000-1 allows leaving out solvent rinses for the analytes of interest here, the cleaning procedure for such materials will be the same as for plastic sampling equipment.

On occasion, conditions will represent on-site/field cleaning situations without hot water (FC 1110). Then ambient temperature water may be substituted both in the hot-sudsy water bath and hot water rinses.

### 2.2.3.2 Field Cleaning (between Sample Locations and between Sites)

1. Rinse with sample water from the next sampling location (see procedures for sampling 2.2.6.4)
2. After completing the sampling at one site, rinse with (tap) water.

## 2.2.4 Site Visit and Initial System Evaluation

Upon arrival at a site location an assessment of the system will be made using the initial system evaluation form (Appendix B). The information on this form will be gathered based on observation, without accessing the sewage or opening of tanks. In this way the information is comparable to what is obtainable using the procedures of many county health departments. The initial system evaluation form incorporates elements of checklists developed by the Consortium of Institutes of Decentralized Wastewater Treatment (<http://www.onsiteconsortium.org/omspchecklists.html>), and guidance given by the Bureau Onsite Sewage Programs for the Florida County Health Departments.

The location of the tanks will be determined by referencing site plans obtained during the permit review. A visual assessment will be done to locate all components shown on the site plans. (Section 2.1.2). If the system does not appear to exist then the sampler will document this and proceed to the next site. If the system appears to be temporarily inaccessible, the sampler may return at a later time if this is feasible based on work in the area.

During this assessment, the sampler will make a determination if the sewage is accessible. This determination will depend on the construction of the system and may depend on the presence of a maintenance entity that can assist with opening locked access covers.

The occupants, if present, will also be asked if they would like to participate in the periodic annual sampling events (Task 5 of the overall project), and be given a user survey (Appendix C) to complete. A determination will be made on which sites will be selected for periodic sampling based on those that volunteer their system and those that are deemed acceptable after the site evaluation.

## 2.2.5 Operational Assessment

Where sewage and/or the interior of tanks are accessible, the sampler will perform a more detailed assessment and take samples. The assessment will be done using the operational system assessment checklist (Appendix D). This operational assessment form incorporates elements of checklists developed by the Consortium of Institutes of Decentralized Wastewater Treatment (<http://www.onsiteconsortium.org/omspchecklists.html>), and experiences gained during the sampling in the Keys performed during Task 1 of this project.

The general order of accessing sewage with sampling or measuring equipment will be from the effluent to the influent to minimize potential for cross contamination. Exceptions to this may occur when a sampling port is empty and water addition to the influent is needed to establish flow to the sampling port. Such an addition introduces the potential for diluting the influent. In such a case the influent, if accessible, may be characterized first, the equipment rinsed and the effluent characterized subsequently.

The date, sampler, time, percent of cloud cover, current rainfall level (none, light, moderate, or heavy), and the rainfall level (in inches) for the past 6 days will be recorded at the top of the System Operation Evaluation Form (Appendix D). To obtain the rainfall level for the past 7 days, the sampler will visit <http://water.weather.gov/precip/?yesterday=1> on the day of the sampling event. Select the Timeframe “Yesterday’s data” and select the period “(previous day’s date) – Last 7 Days”, then select the Product as “Observed”, the Location as “NWS WFOs” (Florida cities are: Jacksonville, Key West, Melbourne, Miami, Tallahassee, and the Tampa Bay Area), and the Units as “English”. Record the rainfall amount, in inches, for the general location of the sampling site.

The operational assessment contains the following elements:

#### 2.2.5.1 Visual Assessment of the Interior of the Tank or Compartment

After the access is opened, the sampler will visually observe the interior of the tank, primarily to see if there is evidence for operational problems, the tank being damaged, and signs of leaking or of non-sewage water being added. As an assessment of the operational conditions, the sampler will observe if there is an oily sheen present on top of the liquid, and characterize the odor. For aeration chambers and media filters, additional observations will indicate the operational conditions, such as strength of aeration as indicated by the presence of mixing, clogging, and plugging of attached growth and media filters. The results are recorded on the operational assessment form (Appendix D).

#### 2.2.5.2 In-situ Measurements

All in-situ data measurements of temperature, pH, dissolved oxygen (DO), specific conductance (SC), and redox potential (ORP) will be achieved with a YSI model multi-parameter device. This instrument includes probes for dissolved oxygen, pH, specific conductance, and may include a probe for oxygen reduction potential, and provides related measures for salinity and dissolved oxygen saturation. To obtain measurements, the sampler will slowly lower the probe into the water so that the top of the instrument is between two and eight inches below the water level, which will result in measurements taken between approximately six and twelve inches below the surface. However, if there are scum and/or sludge layers thicker than about an inch, the sampler will target the instrument to take measurements in the clear zone. The direction of measurement points will be generally from effluent to influent.

The sampler will evaluate the sewage conditions in compartments that are accessible, and in sampling ports that provide a continuous reservoir. Where sewage is not directly accessible or where this is more convenient, the in-situ measurements can be taken on aliquots of samples taken in an intermediate container after filling sample containers in accordance with Section 2.2.6.4 and FDEP SOP FS 2400. Results will be recorded on the operational assessment form in Appendix D, which includes a table in the format of FD 9000-7.

The sampler will follow the respective FDEP SOPs (FT 1000-FT 1500) with the following exceptions. To address the experience that dissolved oxygen and oxygen reduction potential in septic sewage trend very slowly downward, while other parameters stabilize quickly, the measurements shall be recorded after between one and two minutes and the trend for dissolved oxygen concentrations noted.

The YSI will be calibrated when a continuing calibration verification failed or more than 36 hours have passed since the last continuing calibration verification for pH, dissolved oxygen, specific conductance, followed by an initial calibration check to confirm instrument reliability. Alternatively, a new calibration is not necessary if a continuing calibration verification is within half the acceptance criteria of Table 4. pH calibration will be completed with the use of three buffer solutions that will bracket field measurements. Prior to use, and after opening the buffer solution, the date opened will be annotated on the container. The expiration date of the buffers should not exceed one year after the open date. The temperature sensor will be checked against a National Institute for Standards and Technology (NIST) traceable thermometer initially, then periodically as needed. After initial calibration, the continuing calibration will be verified at the beginning and end of each sampling day.

If acceptable initial calibration verification standards are not met a second attempt will be made to calibrate the YSI. After the second attempt to calibrate device proves to be unsuccessful a complete diagnosis by field personnel per the manufactures instructions will be completed to ensure accuracy. A probe's reading will be qualified in the project database for further consideration during final data analyses and reporting if calibrations are not within acceptable ranges.

While redox potential will be measured with the same instrument, it serves only as a screening tool. The objective is to gain insight into variations of low redox conditions that have low-oxygen concentrations in common. Instead of a continuously calibrated probe, the consistency of this measurement will be monitored by measuring field blanks for both redox potential and dissolved oxygen. One such instrument is currently available. Additional YSI probes that may be used may not contain a redox potential probe, in which case this parameter will not be measured.

### 2.2.5.3 Sampling

Systems that are accessible, have an adequate volume of wastewater, and are powered on will be sampled in accordance with FDEP SOP's (FS 1000 and 2400). Wastewater sample collection is described in Section 2.2.6. Where sewage is accessible, the sampler will take samples for on-site or laboratory analysis. The samples are for:

- Effluent analysis
- Influent analysis
- Aeration chamber assessment
- Tap water analysis

The effluent and influent analysis and sampling requirements are described in more detail in Section 2.2.6. Effluent sampling will generally be performed before any sludge judging to avoid stirring up of sludge. The first 50 systems that are powered off will be sampled to establish effluent concentrations from non-operating systems.

Influent sampling will generally be performed after sludge judging (Section 2.2.5.4) has established where the clear zone is. Overall, about 10% of systems (or about 100) will be sampled for influent. At least initially, every accessible influent will be sampled in anticipation

that this will provide sufficient samples. However, to avoid measurements from pretreatment compartments that interact with treatment compartments, influent samples should only be taken if the dissolved oxygen concentration is less than 2 mg/L or the oxygen reduction potential is negative.

The aeration chamber assessment will consist of taking a sample, assessing the color of the biomass, and observing the settled sludge volume of the mixed liquor.

At up to 10% of sites, targeted to be the same sites at which influent samples are obtained, tap water samples will be taken to characterize specific conductance, alkalinity and nutrient content in the water that is carrying the wastewater. For these samples, cBOD5 and TSS will not be analyzed.

#### 2.2.5.4 Sludge Judge

Depending on access, the sampler will measure thickness of scum, clear, and sludge layers in the water column. This measurement will be performed in all accessible compartments, unless visual inspections indicate that there are no scum and sludge layers, or the sampler is concerned that the measurement might interfere with treatment components. Sludge judge equipment is used to assess the thickness of the scum and sludge layer.

The sampler will lower the sludge judge slowly into the tank. The float valve will open which allows material to flow in. When the bottom is reached, the rope will be tugged slightly to set the check valve, trapping the mixture inside. When the sludge judge has been raised clear of the liquid level in the tank, the amount of scum and sludge can be read using the footage markers on the pipe sections. The scum measurement is the actual observed accumulated thickness of tank scum at the top of the tank. The sludge measurement is the actual observed accumulated thickness of tank sludge on the bottom of the septic tank. The total liquid depth will also be recorded. Color and clarity or structure of the different layers will be observed. This information will be recorded of the operational assessment form. To empty the sludge judge, the check valve pin will be pressed against a hard surface. This opens the check valve, allowing the contents to drain out. This step will be performed in a way that minimizes disturbance of the wastewater in the tank and spilling. Once emptied, the sludge judge will be rinsed with water and cleaned with a sludge judge brush.

### **2.2.6 Wastewater Sample Collection**

#### 2.2.6.1 General

The FDEP SOPs FS 1000 “General Sampling” and FS 2400 “Wastewater Sampling” will guide the sampling efforts. About 2 L of sample will be needed for all analyses. All samples collected during this project will consist of only grab samples. A grab sample reflects performance only at the point in time that the sample was collected. The following sub-sections describe the sampling that will be performed at each suitable site. Upon completion of the sample collection, the wastewater will be discarded back into the treatment tank from which it was originally collected.

For systems that are powered off at the time of sampling event, the first 50 of these systems will be sampled. Once 50 powered off systems have been evaluated, if a powered off system is encountered it will not be sampled.

Aliquots of samples will be either collected in a large enough intermediary container (~2 L) to fill all sample containers, or if a continuous free flow exists, either in the treatment system, or by using a sample pumping apparatus, individual sample containers can be filled directly from that flow.

### 2.2.6.2 Sample Container Preparation

Laboratory sample containers will be pre-preserved and pre-cleaned by the laboratory. Label bottles with system ID number, sample type, sampling location, sampling method, and QC element (duplicate, field blank, etc.), time, and date of sample collection and note this on the chain-of-custody form. The sample ID will include sample information and will have the following format:

System\_ID-sampling\_type-sampling\_location-sampling\_method-orig/dup-date-time

Table 8 illustrates the abbreviations to be used to characterize samples. Date shall be in mm/dd/yy format and time in military (24 hour) hh:mm format.

Prepare intermediary field sample containers by using decontamination procedures of FC 1000 (see Section 2.2.3).

**Table 8. Illustration of Sample ID coding Fields**

System_ID (up to 5- digits)	Sample_type	Sampling location (at end or after)	Sampling_method (can be used in combination)	original/dup
		<i>Note: if there are sample locations in parallel (e.g. two ATUs or two sampling ports under a drainfield), denote this by appending the number 1, 2 after the sampling location as shown below (e.g., CL1).</i>		<i>Note: if there are split or replicate samples (obtained from the same mixed volume), denote this by appending a, b, etc to the number as shown below (e.g., 01a, 01b).</i>
14352	Eff-effluent	AC-aeration chamber CL-clarifier DS-disinfection ND- not determined OT-other MF-media filter (except phosphorus) PO-phosphorus sorption media PU- pump/dosing/ recirc chamber SP-sampling port (before drainfield) MW-monitoring well or sampling port after drainfield	d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	01-original sample 02-duplicate
14352	Inf-influent	TT-trash/pretreatment tank SP-sampling port	d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	01-original sample 02-duplicate
14352	Tap-tap water	NA	d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	01-original sample 02-duplicate
00000	QC-quality control	FBL-field blank FEB-field-cleaned equipment blank PEB-pre-cleaned equipment blank	d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	01-original sample 02-duplicate

### 2.2.6.3 Sampling Point Selection

Depending on site conditions and accessibility a variety of possible sampling points may exist to choose from. In many cases, though, it will be difficult to find even one accessible sampling point. If discrete treatment steps exist, such as mineral aggregate and phosphorus filters in the Florida Keys, a particular effort will be made to sample before and after individual treatment steps.

To obtain measurements and samples out of tanks, the sampler will slowly lower the sample taking device so that samples are taken between approximately six and twelve inches below the surface. However, for effluent sampling locations with a visible scum layer present, the sampler will initially estimate the thickness of the scum by moving it out of the way of the sampling device, e.g. during the in-situ measurements (2.2.5.2) with the YSI and adjust the depth correspondingly. If there are scum and/or sludge layers thicker than about an inch in the influent compartment as determined by the sludge judge, the sampler will target the sampling device to take measurements in the center of the clear zone. Where the liquid is shallow, such as in Tee-traps or distribution boxes, the sampler will aim to locate the intake of the sample taking device in the center of the water column.

The following will be the order of preference for effluent sampling. Other situations may exist and the sampler will judge how suitable they are relative to the criteria listed.

When sampling ports are available between the last tank and the drainfield, or where the engineer specified a sample location, a sample will be collected at that location. To address the concern if sample ports installed in the effluent transmission line are representative of the effluent, an additional sample point may be sampled that ranks higher in the listing.

1. Sampling petcock/spigot on line from dosing tank to drainfield or on recirculation line. Let pump run for one minute before taking a sample.
2. Free-falling effluent into dosing tank or in some kinds of distribution boxes. If there is no flow, assess influent first, and then establish flow by adding water to the plumbing cleanout, or by asking user to create flow.
3. Effluent in dosing tank, or other additional tank after treatment
4. P-trap sampling port in line to drainfield. Observe if there is flow and solids accumulation. Take sample from just below the water level.
5. Tee-sampling port/cleanout in line to drainfield. If there is no flow, assess influent first, and then establish flow by adding water to the plumbing cleanout, or by asking user to create flow.
6. Effluent in clarifier, close to where flow leaves the clarifier.
7. Cross-sampling port or distribution box in line to drainfield. Empty cross first and observe solids accumulation, then proceed as for Tee-sampling ports to fill the volume.

For influent sampling, samples will be obtained from a pretreatment compartment or tank. If scum or sludge layers appear to be present in this compartment or tank, the sludge judge will be used first to assess where the clear zone is from which a sample of the sewage can be obtained that has already undergone primary treatment, and the approximate center of that zone will be targeted for sampling.

For aeration chamber sampling, the sample will be taken generally at six to 12 inches below the surface in a well mixed area of the aeration chamber.

For tap water sampling, the sample will be taken from a faucet outside or inside the house after letting it run at least for one minute.

#### 2.2.6.4 Sample Collection

Once the sample location is determined, the sampler will obtain wastewater samples. FS 2400 provides procedures for this process. The samples will be manual grab samples (FS 2422, FS 2430.1). As indicated before (2.2.5.2), where wastewater is not directly accessible or where this is more convenient, the in-situ measurements can be taken on aliquots of samples (FS 2422).

Wear powder-free latex gloves at all times during sample container handling. New gloves will be worn at each sample site and changed if objects other than containers are handled.

Samples will be collected in the following manner, depending on equipment and sample location:

- 1) For sampling from a spigot/petcock into sample containers (FS 2430 1.5): reduce flow to 500 mL/min, and purge by waiting for at least a minute (FS 2400 2.7). Purging with 500 mL may also be used before collecting a sample from a peristaltic pump.
- 2) For sampling with an intermediate container from free falling effluent (FS 2430 1.3.3): rinse the container as appropriate then fill with the sample. An alternative will be to fill directly into the sample containers.
- 3) For sampling with a peristaltic pump into sample containers or into an intermediate container (FS 2430 1.3.4): For the case of one particular instrument that will be used, the Global Water WS700 wastewater sampler operating manual provides detailed instructions for wastewater collected with a peristaltic pump. Other equipment can be utilized in the applicable manner. The procedure is as follows:
  - 1) For P-traps, cross-traps and distribution boxes, or where solids have apparently accumulated, use a hand pump or this pump to purge the volume until it clears, and wait for it to fill up again. Dispose of the material, by returning it to the treatment system after sampling is completed, or downstream of the sampling location.
  - 2) Insert the sampling hose into the access opening and submerge the strainer to the predetermined sample location (about six-twelve inches under water level in tanks, the center of the clear zone of the influent tank, or other location so as to avoid contact with the sample port or chamber bottom; (for Tee-ports contact may be unavoidable)).
  - 3) Set the collection volume on the sampler to 500 mL. Complete the flushing cycle including the backpumping, collecting the rinsate. (The rinsate can be used for preconditioning an intermediate container if used). Then set the collection volume to "full", and fill the sample containers.
  - 4) For cross-traps, distribution boxes, and P-traps, do not use the automatic backflushing mechanism, which may stir up sediments, but interrupt the timer to manually flush the tubing with at least approximately 500 mL of effluent, and then fill an intermediate container. Observe tubing to avoid entrainment of solids. If an

intermediate sample container is used, rinse it with sample once. Fill the intermediate sample container. Cap and invert the intermediate sample container five times to obtain a homogenous mixture. Pour the contents into the respective sample bottles.

- 5) If other methods cannot be used, the sampler may collect a sample by submerging an intermediate container into the wastewater.

Once sample is obtained, take the following steps:

- 1) Fill the sample bottles in the following order:
  - a. TP/TN lab bottle (FS 2000: 1.4.1. slowly pour the sample down the side of the container so that the preservative does not splatter and cause burns.)
  - b. TSS/alkalinity lab bottle
  - c. 500 mL container for use in field analytical determinations (Hach, Taylor, visual/olfactory)
  - d. CBOD5 lab bottle (not for tap water and blanks)
  - e. 100 mL whirl-pack for fecal coliform if this analysis will be performed
- 2) Keep the remainder for field instrument measurements if needed.
- 3) If it is determined that the volume of wastewater that can be collected is not enough for complete sample collection, then this will be noted in the field log book and the operational assessment form, and samples will be taken to the extent feasible.
- 4) Complete labeling of sample containers (see Section 2.2.6.2)
- 5) Within 15 minutes of sample collection, put samples in wet ice (FS1006).
- 6) Segregate individual sets of laboratory samples in a sealable plastic bag (e.g., zip-top bag) to avoid cross contamination during transport.

### **2.3 Sample Handling and Custody**

Samples collected for analysis in containers supplied by the NELAC certified laboratory with proper preservatives will be stored in wet ice at 4 degrees Celsius. Grab samples for laboratory analysis will be taken to the nearest courier drop-off location or hand-delivered. The cooler is shipped to the commercial lab with a completed chain-of-custody record (Appendix G). The purpose of the chain-of-custody is to supply a detailed record of sample description, collection information, and any transfer of custody from sample collection through receipt into the laboratories.

Fecal coliform samples will be delivered to the NELAC laboratory that the sampler will have identified as suitable for the sample collection of that day within the required holding time constraints. That laboratory's chain of custody will be used.

All sample collection details will be documented on the chain-of custody form (Appendix G) with sample information consisting of:

- Sample identification numbers
- Sample collection dates and time
- Number of containers per sample
- Preservation used for each container

- Samplers name and affiliation
- Project name and location
- Analyses requested
- Container material, type, and volume of the samples at delivery
- Name, date, and times relinquished and accepted

## 2.4 Analytical Methods

### 2.4.1 Laboratory Analytical Methods

Table 9 provides a listing of the water quality parameters to be sampled for laboratory analysis along with the analytical methods, preservation requirements, and sample holding times. Fecal coliform samples may be analyzed either by the same lab or by another NELAC-certified lab, depending on the feasibility of getting samples there within the holding time. The fecal coliform samples will be hand delivered to NELAC certified Laboratories throughout the state.

**Table 9. Laboratory Sample Analysis Parameters**

Parameter	Method	Method Detection Limit	Laboratory	Holding time	Preservative
CBOD <sub>5</sub>	SM 5210B	2.0 mg/L	FTS	48 hrs	Cool, 4°C
TSS	SM 2540D	3.5 mg/L	FTS	7 days	Cool, 4°C
TKN	EPA 351.2† or SM4500-NH3C (TKN)	0.0867 mg/L	FTS	28 days	H <sub>2</sub> SO <sub>4</sub>
NO <sub>x</sub> -N	EPA 353.2† or EPA300	0.05 mg/L	FTS	28 days	H <sub>2</sub> SO <sub>4</sub>
TP	EPA365.1 or EPA365.3	0.055 mg/L	FTS	28 days	H <sub>2</sub> SO <sub>4</sub>
Fecal Coliform	SM 9222D	1cfu/100 mL	Various	6 hrs	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>
Total Alkalinity	SM2320B	2.2 mg/L	FTS	14 days	Cool, 4°C

FTS = Florida Testing Services, LLC

†Revision 2.0, 1993, will be used.

### 2.4.2 Field Screening Analytical Procedures

#### 2.4.2.1 Settled Sludge Volume Test

This is a simplified field procedure of SM 2710 C based on the procedure that aerobic treatment unit manufacturers sometimes recommend (e.g., [http://www.norweco.com/pdf/sing\\_pmp.pdf](http://www.norweco.com/pdf/sing_pmp.pdf)) Aerator must have been on for at least 10 minutes.

1. Obtain a 1L sample of mixed liquor (=from a mixed aeration chamber) from about 2ft or mid depth of the aeration chamber.
2. Pour sample into a 9 cm or wider graduated cylinder or beaker, either directly or from multiple smaller intermediary containers. If a larger intermediary container is used, close it, and invert it five times before pouring into the graduated cylinder.
3. Let stand on horizontal surface in an undisturbed location for 30 minutes protected from direct sunlight.
4. Measure the settleable solids volume of settled sludge in mL/L (SSv30) by looking for the interface between settled solids and the supernatant after about five minutes and after 30 minutes.
5. Characterize settled biomass and solids, and supernatant:  
Biomass color:  Black  Brown  Mustard  Gray  White  Other \_\_\_\_  None  
Biomass structure:  fluffy  flocced  grainy  
Supernatant:  cloudy  clear
6. Record observations in the operational assessment form (Appendix D).

Note: SSv30 should generally be between 200 and 600-750 mL/L.

#### 2.4.2.2 Visual/Olfactory Protocols

The visual and olfactory (V/O) examination will be used to immediately provide the sample collector with an assessment of the status of treatment. The data will be subsequently compared to laboratory analysis results for cBOD5 and TSS. Where a sample can be obtained, the following procedure will be used:

1. Sampling staff will take effluent samples and perform the effluent V/O assessment.
2. Exclusion criteria for the V/O vs. laboratory assessment will be: obvious wastewater surge causing bypass of treatment, waste strength not typical of household waste, and/or that electrical hazards exist.
3. Access the effluent sample point according to the system schematic. From the autosampler container, transfer at least 300 ml of effluent into the V/O analysis container (provided in the laboratory cooler-kit).
4. Determine effluent discharge color using the following rating scale:  
Color  Black  Brown  Mustard  Gray  White  Other \_\_\_\_  None
5. Determine effluent discharge turbidity using the following rating scale:  
Turbidity  Clear  Cloudy  Muddy  Grainy  Milky
6. Determine the effluent discharge odor using the following rating scale;  
Odor Intensity:  
0 None perceivable 1 barely perceivable 2 faint but identifiable 3 easily perceivable 4 Strong  
Quality:  
 Septic  Earthy/Musty/Moldy  Chemical  Sour/Rancid/Putrid  Other  N/A

7. Record V/O observations on the field analysis form (Appendix D).

### 2.4.2.3 Titration Measurements

#### 2.4.2.3.1 Free and Total Chlorine Test

Chlorine will be measured by using a K-2006 Taylor test kit. This test will only be performed on those systems that include chlorination. The steps on how to use the Taylor kit to measure chlorine are:

1. Rinse and fill small comparator tube to 9mL mark with water to be tested.
2. Add 5 drops R-0001 and 5 drops R-0002. Cap and invert to mix.
3. Match color with color standard. Record as parts per million (ppm) free chlorine (FC) on the operational assessment form (Appendix D).
4. Add 5 drops R-0003. Cap and invert to mix.
5. Match color immediately. Record as ppm total chlorine (TC) on the operational assessment form (Appendix D).

Note: Combined chlorine can be calculated by subtracting FC from TC. The formula is:  
 $TC - FC = CC$ .

#### 2.4.2.3.2 Total Alkalinity

Alkalinity will be measured by using a K-2006 Taylor test kit. The steps on how to use the Taylor kit to measure alkalinity are:

1. Rinse and fill large comparator tube to 25 mL mark with water to be tested.
2. Add 2 drops R-0007. Swirl to mix.
3. Add 5 drops R-0008. Swirl to mix. Sample should turn green. If sample does not turn green, discard sample and repeat testing process.
4. Add R-0009 one drop at a time. After each drop, count and swirl to mix until color changes from green to red.
5. Multiply drops added in step 4 by 10. Then record as part per million (ppm) total alkalinity as calcium carbonate on the field analysis form (Appendix F).

Note: When high Total Alkalinity, such as in the influent, is anticipated the following variation on the procedure may be used: Use 10mL sample, add 1 drop R-0007, 3 drops R-0008, and multiply drops added in step 4 by 25.

#### 2.4.2.3.3 pH

This is a contingency method for the case that the pH probe for field measurements is not operational or cannot be calibrated to measure pH. In those cases pH may be measured by using a K-2006 Taylor test kit. The steps on how to use the Taylor kit to measure pH are:

1. Rinse and fill large comparator tube to 44 mL mark with water to be tested.
2. Add 5 drops R-0004. Cap and invert to mix.

3. Match color with color standard. Record as pH units and save sample if pH needs adjustment. If sample color is between two values, pH is the average between the two. If the result is outside of the range on the comparator, the pH will need to be lowered or raised. Observe the color to determine whether the pH needs to be lowered (pH higher than 8.0) or raised (pH lower than 7.0). To lower pH: go to acid demand test. To raise pH: Go to base demand test.

*Acid Demand Test:*

- Use treated sample from pH test.
- Add R-0005 one drop at a time. After each drop, count, mix, and compare with pH color standard until desired pH is matched. See kit treatment table supplied with the kit to continue.

*Base Demand Test:*

- Use treated sample from pH test.
- Add R-0006 one drop at a time. After each drop, count, mix, and compare with pH color standard until desired pH is matched. See treatment table supplied with the kit to continue.

4. Record the results on the field analysis form (Appendix F).

## 2.4.2.4 Colorimetric Methods using Hach DR/890

### 2.4.2.4.1 Turbidity

Turbidity (in formazin attenuation units) will be measured on unfiltered effluent samples using the adsorptometric method (Hach Method 8237, Hach Procedures 9<sup>th</sup> ed. 02/09) in a Hach DR/890. The procedure is as follows (modified from 10 mL to 25 mL on April 18, 2011):

1. Enter the stored program number for APHA turbidity.  
Press: PRGM. The display will show: PRGM ?  
Press: 95 ENTER. The display will show FAU and the ZERO icon.
2. Fill a sample cell with 25 mL of deionized water (the blank).  
*Note: Wipe the surface of the cell with a soft cloth.*  
*Note: For highly colored samples, use a filtered portion of sample in place of the deionized water.*
3. Place the blank into the cell holder. Tightly cover the sample cell with the instrument cap.  
Press: ZERO. The cursor will move to the right, then the display will show: 0 FAU.
4. Fill another sample cell with 25 mL of sample.  
*Note: Mix the sample well before transferring it to the sample cell.*  
*Note: Wipe the surface of the cell with a soft cloth.*
5. Place the sample cell into the cell holder. Tightly cover the sample cell with the instrument cap.
6. Press: READ. The cursor will move to the right, then the result in Formazin Attenuation Units (FAU) will be displayed.
7. Record results on the field analysis results form (Appendix F).

Testing by a single laboratory, using a turbidity standard solution of 200 FAU with the instrument, a single operator obtained a standard deviation of  $\pm 2$  FAU. The estimated detection limit for program 95 is 21 FAU.

Sample can be stored up to 48 hours at 4 degree C in wet ice. Analyze the sample at the same temperature as it was collected.

### 2.4.2.4.2 Apparent Color

Apparent color (in units Pt-Co) will be measured on unfiltered effluent samples using Hach Method 8025 (Hach Procedures 9<sup>th</sup> ed. 02/09) in a HACH DR/890. The procedure is the following:

1. Fill a sample cell (the blank) with 25 mL of filtered deionized water. Discard the excess.
2. Enter the stored program number for APHA color.  
Press: PRGM. The display will show: PRGM ?  
Press: 19 ENTER. The display will show PtCo and the ZERO icon.
3. Fill a second sample cell (the prepared sample) with 25 mL of the sample.
4. Place the blank into the cell holder. Tightly cover the sample cell with the instrument cap.
5. Press: ZERO. The cursor will move to the right, then the display will show: 0 mg/L Pt Co.

6. Place the prepared sample into the cell holder. Tightly cover the sample cell with the instrument cap.
7. Press: READ. The cursor will move to the right, then the result in Platinum-Cobalt color units (Pt-Co) will be displayed.
8. Record the results on the field analysis results form (Appendix F).

The manufacturer states that this method can provide a single operator precision of +/- 10 Pt-Co color units when measuring 250 Pt-Co standards. The estimated detection limit for program 19 is 25 Pt-Co color units.

Sample can be stored up to 48 hours at 4 degree C in wet ice. Warm the sample to room temperature before running the test.

#### 2.4.2.4.3 Phosphorus (Reactive) as PO<sub>4</sub>-P

Reactive Phosphorus will be measured using Hach Method 8048 (PhosVer 3 (ascorbic acid) Method, Powder Pillow Procedure; Hach Procedures 9<sup>th</sup> ed. 02/09, p. 473) in a Hach DR/890.

Reactive Phosphorus (Equivalent to EPA Method 365.2) can be used as a lower estimate of Total Phosphorus. This method could be implemented in the field. This study will measure this for approximately 10% of effluent samples to undertake a comparison of laboratory analysis data for Total Phosphorus with Hach kit measurement data for Reactive Phosphorus. The procedure is as follows:

1. Enter the stored program number for reactive phosphorus (PO<sub>4</sub>), ascorbic acid method. Press: PRGM, the display will show PRGM ?
2. Press: 79 ENTER. The display will show mg/L, PO<sub>4</sub> and the ZERO icon.
3. Fill a sample cell with 10 mL of sample. (Note: generally, a 1mL sample/9mL DI water or 2 mL sample/8 mL DI water dilution will increase chances of getting a valid reading).
4. Add the contents of one PhosVer 3 Phosphate Powder Pillow for 10-mL sample to the cell (the prepared sample). Shake for 15 seconds. Note: A blue color will form if phosphate is present.
5. Press: TIMER ENTER. A two-minute reaction period will begin. Perform Steps 6-9 during this period. (Note: If the acid-persulfate digestion was used, an 8-10 minute reaction period is required.)
6. Fill another sample cell with 10 mL of sample (the blank). Note: per YSI, you may use 25 mL blank as you did for color and turbidity.
7. Clean the outside of the sample cells with a towel.
8. Place the blank into the cell holder with the diamond-shaped marker toward the keypad. Tightly cover the sample cell with the instrument cap.
9. Press: ZERO. The cursor will move to the right, then the display will show: 0.00 mg/L PO<sub>4</sub>. (Note: If Reagent Blank Correction is on, the display may flash "limit". See Section 1.)
10. After the timer beeps, place the prepared sample into the cell holder with the diamond-shaped marker toward the keypad. Tightly cover the sample cell with the instrument cap.
11. Press: READ. The cursor will move to the right, then the result in mg/L phosphate (PO<sub>4</sub> 3-) will be displayed.
12. Multiply by 0.3261 to obtain results the results in mg/L PO<sub>4</sub>-P, and adjust for dilution (multiply by (10 mL/sample volume used)).

13. Record results in the field analysis results form (Appendix F).
18. Empty used sample contents into a holding container. This container will be neutralized and placed in the solid waste after sampling is complete. Or: Work in well ventilated area. Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system. Rinse containers three times with an appropriate solvent. Dispose of empty container as normal trash.

Note: Do not use P-containing detergents to clean glassware or vials for this procedure.

Note: Analyze samples immediately after collection for best results.

Precision: Testing by a single laboratory, using a standard solution of 1.00 mg/L PO<sub>4</sub><sup>3-</sup> and two lots of reagents with the instrument, a single operator obtained a standard deviation of ±0.05 mg/L PO<sub>4</sub><sup>3-</sup>. Estimated Detection Limit (EDL) for program 79 is 0.05 mg/L PO<sub>4</sub><sup>3-</sup>.

#### 2.4.2.4.4 Nitrate as NO<sub>3</sub>-N

Nitrate-N will be measured using Hach Method 10020 (high range, Test'n'Tube, Chromotropic Acid Method; Hach Procedures 9<sup>th</sup> ed. 02/09). This method could be used in the field. This study will measure this for at least 10% of effluent samples to undertake a comparison with laboratory analysis data.

1. Press the "PRGM 7" key. The display will show "PRGM ?"
2. Press "TIME 5" then "PRGM 7" (57) and then press "ENTER". The display will show mg/L, NO<sub>3</sub>-N and the ZERO icon.
3. Insert the COD/TNT adapter into the cell holder by rotating the adapter until it drops into place. Then push down to fully insert it.
4. Remove the cap from a Nitrate Pretreatment Solution Vial and add 1 mL of sample (the blank).
5. Cap the tube and invert 10 times to mix.
6. Clean the outside of the vial with a towel.
7. Place the blank in the vial adapter with the Hach logo facing the front of the instrument. Press straight down on the top of the vial until it seats solidly into the adapter.
8. Cover the vial tightly with the instrument cap.
9. Press "ZERO" The cursor will move to the right, then the display will show 0.0 mg/L NO<sub>3</sub>-N.
10. Remove the vial from the instrument. Remove the cap from the vial.
11. Using a funnel, add the contents of one NitraVer X Reagent B Powder Pillow to the vial. Cap. Invert 10 times to mix (this will be the prepared sample).
12. Press "TIMER CE" and "ENTER". A five minute reaction period will begin. Do not invert the vial again.
13. After the timer beeps, clean the outside of the vial with a damp towel and follow with a dry one to remove fingerprints and other marks.
14. Place the prepared sample in the adapter with the Hach logo facing the front of the instrument.
15. Cover the vial tightly with the instrument cap.

16. Press "READ" The cursor will move to the right, then the result in mg/L nitrate nitrogen ( $\text{NO}_3 - \text{N}$ ) will be displayed.
17. Record the results on the field analysis results form (Appendix F).
18. Empty used sample contents into a holding container. This container will be neutralized and placed in the solid waste after sampling is complete. Or: Work in a well ventilated area. Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system. Rinse empty containers three times with an appropriate solvent. Dispose of empty container as normal trash.

Note: Store at 4 °C (39°F) or lower if the sample is to be analyzed within 24 to 48 hours. Warm the sample to room temperature before running the test.

Note: Testing by a single laboratory using standard solutions of 25.0 mg/L nitrate nitrogen ( $\text{NO}_3 - \text{N}$ ) and two representative lots of reagent with the instrument, a single operator obtained a standard deviation of +0.3 mg/L nitrate nitrogen for program #50 and  $\pm 1.7$  mg/L nitrate nitrogen for program # 51.

#### 2.4.2.4.5 Ammonia as $\text{NH}_3\text{-N}$

Ammonia-nitrogen will be determined using Hach Method 10031 (high range, Test'n'Tube, Salicylate Method; Hach Procedures 9<sup>th</sup> ed. 02/09). This method could be used in the field. This study will measure this for at least 10% of effluent samples to undertake a comparison with laboratory analysis data. The procedure is as follows:

1. Press the "PRGM 7" key. The display will show "PRGM ?"
2. Press "CONC 6" and "PRGM 7" (67), then press "ENTER". The display will show mg/L  $\text{NH}_3\text{-N}$  and the ZERO icon.
3. Insert the COD/TNT adapter into the cell holder by rotating the adapter until it drops into place. Then push down to fully insert it.
4. Remove the caps from 2 AmVer Diluent Reagent high range vials. Add 0.1 mL of sample to one vial (the sample). Add 0.1 mL of deionized water to the other vial (the blank).
5. Add the contents of 1 Ammonia Salicylate Reagent Powder Pillow for 5 mL sample to each vial.
6. Add the contents of 1 Ammonia Cyanurate Reagent Powder Pillow for 5 mL sample to each vial.
7. Cap the vials tightly and shake thoroughly to dissolve the powder.
8. Press: "TIMER CE" then "ENTER". A 20 minute reaction period will begin.
9. Clean the outside of the vial with a towel. After the timer beeps, place the blank into the vial adapter. Tightly cover the vial with the instrument cap.
10. Press: "ZERO 0". The cursor will move to the right, then the display will show: 0.00 mg/L  $\text{NH}_3\text{-N}$ .
11. Place the prepared sample in the adapter. Push straight down on the top of the vial until it seats solidly into the adapter.
12. Tightly cover the vial with the instrument cap.
13. Press: "READ". The cursor will move to the right, then the result in mg/L  $\text{NH}_3 - \text{N}$  will be displayed.

14. Record the result on the field analysis results form (Appendix F).
15. Empty used sample contents into a holding container. This container will be neutralized and placed in the solid waste after sampling is complete. Or: Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric or an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system. Rinse containers three times with water. Dispose of empty container as normal trash.

Notes: Best results are obtained with immediate analysis.

Testing by a single laboratory, using a standard solution of 50 mg/L ammonia nitrogen (NH<sub>3</sub>-N) and two representative lots of reagent with the instrument, a single operator obtained a standard deviation of +5 mg/ L NH<sub>3</sub>-N. The estimated detection limit for program 67 is 1 mg/L NH<sub>3</sub>-N.

#### 2.4.2.5 Test Strip & Other Evaluations

Occasionally, test strips or other more qualitative measurement methods may be evaluated to assess comparability of results from such a fairly easy assessment tool to the more complex analytical methods employed in this study. Results will be documented in (Appendix F).

When test strips are evaluated, generally one package of them will be used. The procedure will follow the visual/olfactory assessment and can use the same container:

1. Complete visual/olfactory assessment.
2. Immerse a test strip into the sample for the time specified by the manufacturer.
3. Wait for the time specified by the manufacturer.
4. Read the resulting colors as given in the manufacturer's directions.
5. Record the results on the Field Analysis Results Form (Appendix F).

## **2.5 Quality Control**

### **2.5.1 Field QA/QC Samples**

#### **2.5.1.1 Frequency**

This section describes the procedures for and numbers of QC samples taken in the field. At least 10% of samples will be quality control samples. Considering a project total of approximately 700 effluent samples, at least 70 QA/QC samples will be collected.

It is anticipated that the number of samples at any particular site will be between one and three. It is anticipated that up to four sites can be visited per day. For consistency, every fourth site will be used to obtain a QC sample to obtain the required number of samples. These will consist of either: equipment blanks, duplicate samples, or field blanks. These types will generally be taken in rotation. The particular site may vary by up to three and the particular type may vary somewhat depending on accessibility of wastewater. Table 10 provides an illustration of the QC samples that will be taken, and the subsections below explain the different types of blanks. The

results of this procedure will be reviewed monthly to assess the frequency and results of such samples.

All QC samples will be preserved, documented, and transported along with the samples that they correspond to. Wherever feasible, QC samples shall be done for both field screening methods and laboratory samples.

**Table 10. Frequency and types of field QC-samples (illustrative)**

Cumulative # of sites sampled	# of samples (illustrative)	QC sample	Pre/field-cleaned Equipment Blank (not needed for cBOD5, TSS, fecal coliform)	Duplicate
1	1: eff.	Yes (every fourth)	Pre-cleaned	
2	3: eff. inf. Tap			
3	1. eff			
4	3: eff. inf. Tap			
5	1. eff	Yes (every fourth)		Duplicate
6	3: eff. inf. Tap			
7	1. eff			
8	1. eff			
9	3: eff. at three locations	Yes (every fourth)	Field-cleaned	
10	3: eff. inf. Tap			
11	3: eff. inf. Tap			
12	1. eff			
13	1. eff	Yes (every fourth)		Duplicate
14	3: eff. inf. Tap			
15	1. eff			
16	1. eff			
17	1. eff	Yes (every fourth)	Pre-cleaned	
18	3: eff. at three locations			
19	3: eff. inf. Tap			
20	3: eff. inf. Tap			
Total	40	5	3	2

eff. – effluent, inf. – influent,

Note: in addition, laboratory matrix spikes and either matrix spike duplicates or laboratory duplicates will be analyzed initially and at the end of the project (see Section 2.5.2).

## 2.5.1.2 Types of Field QA/QC Samples

### 2.5.1.2.1 Field Equipment Blanks

At least one equipment blank on the cleaned sampling devices will be collected and analyzed for every 20 laboratory samples in each analyte group, except, in accordance with FQ 1200, equipment blanks will not be taken for biological oxygen demand. An equipment blank will be prepared in the field before sampling begins (pre-cleaned equipment blank FQ 1211) or after field-cleaning has been completed (field-cleaned equipment blank FQ 1212) by rinsing and filling an intermediate sample container with deionized (DI) water, then taking a sample of it using the sampling procedures and equipment above (direct pour into sample container or pumping into sample container).

Blanks for analyte groups of interest are collected and analyzed for each type of equipment that is in use during the sampling event. When equipment is cleaned in the field, one equipment blank for each parameter group will be collected and analyzed on the decontaminated equipment.

#### 2.5.1.2.2 Field Duplicates

At least one field duplicate will be collected and analyzed for every 20 samples. A field duplicate for a grab sample will be collected using the same procedures as the original samples within 15 minutes of the original sample (FS 2422), that is e.g., that the intermediate sample container will be filled anew. One field duplicate is collected and analyzed for each parameter.

During times when the QA officer joins the sampler in the field, additional duplicates may be taken to characterize the between-sampler variability.

#### 2.5.1.2.3 Field Blanks

Field blanks consist of pouring analyte-free water directly into a sample container. In accordance with FQ 1214, field blanks need not be collected if equipment blanks are collected. Occasionally a field blank may be collected if there is little need for collecting equipment blanks, e.g. if many sites can be sampled directly into sample containers.

### **2.5.2 Laboratory Quality Control**

All sample analyses for the laboratory parameters listed in Table 2, with the exception of fecal coliform samples, will be performed by Florida Testing Services, LLC dba Xenco Laboratories in Boca Raton, Florida. Florida Testing Service, LLC holds accreditation with the National Environmental Laboratory Accreditation Conference (NELAC) in all project parameters. Appendix I includes a listing of the lab's general accreditation and the relevant scope of accreditation with individual parameters/methods. As part of their accreditation, all approved laboratories maintain SOPs that accurately reflect all phases of current laboratory activities such as assessing data integrity, corrective actions, and all test methods. FDOH shall ensure that any required laboratory and field quality system and management systems audits are performed according to the respective Quality Manuals for each contracted and sub-contracted entity. These audits shall be documented in FDOH's records.

Quality Control (QC) analyses are essential for continual assessment of analytical procedures, QC analyses include the use of blanks, internal standards, matrix spikes or matrix spike duplicates, check samples (spiked blank samples), and proficiency testing (PT) samples. Proper use of this data helps to ensure the protection of legally valid analytical results. In addition, quality control methods provide constant documentation and evaluation of acceptable analytical method performance.

Per Appendix H, at least one set of matrix spikes and either matrix spike duplicates or laboratory duplicates will be performed using project samples analyses at least the first time a wastewater sample is collected, and the last time a wastewater sample is collected. The criteria by which quality of laboratory data will be evaluated are discussed in Section 1.7 and 4 of this QAPP.

The Laboratory Quality Assurance System of QC procedures, preset QC limit, review of data package, and approval of reports is designed to catch errors and problems prior to data being reported to FDOH. However, when corrective action affects previously reported data, FDOH will be notified in writing describing the problem and resolution.

The following describes the different types of laboratory control checks, an excerpt of Florida Testing Service's manual (section 11.6 of Quality Assurance Manual 10/05/2009):

#### 2.5.2.1 Quality Control Set

The laboratory refers to the Quality Control Set as a batch or workgroup. Each workgroup consists of a method reagent blank, laboratory control spikes/or samples (LCS), matrix spikes and/or duplicates (MS, MSD) and 20 or less samples. Passing continuing calibration verifications must bracket samples for most methods.

#### 2.5.2.2 Method Reagent Blanks (Negative Control)

The laboratory systematically prepares and analyzes method blanks with each batch of samples prepared, to continuously evaluate analytical system interferences and background contamination levels.

A method blank refers to a sample that contains no analyte. For liquid analysis, organic-free or de-ionized water is used. The method blank serves to measure contamination associated with laboratory storage, preparation, or instrumentation. This blank is prepared with every analytical batch of twenty samples or less.

#### 2.5.2.3 Laboratory Control Spikes/ or Samples (LCS) (Positive Control)

Laboratory control samples (LCS) are analyzed routinely to confirm proper methods performance. Laboratory control samples may be purchased as prepared whole volume samples or in concentrate or dry reagent form to be prepared by the laboratory analyst. Laboratory control samples must be from a source different from that used to prepare the calibration standards. Analysis of laboratory control samples in conjunction with matrix spikes and duplicates allow delineation between matrix effects that may affect analysis of individual samples and overall method performance affecting analysis of all samples. Unless otherwise specified within the SOP, an LCS is analyzed with batch of up to 20 samples.

Blank water is spiked with a known amount of analyte(s) and subjected to the same procedures as the samples. The LCS indicates the accuracy of the analytical method. For organic methods generally one LCS is performed, and an LCS duplicate is added when no matrix spike samples are available or as per FDOH's request. The LCS and LCSD are analyzed with every workgroup of 20 samples or less.

#### 2.5.2.4 Matrix Spikes (Positive Controls)

Quality Control is performed on actual samples or on samples of a similar matrix. The matrix spike is a sample spiked with a known amount of analyte(s) and subjected to the same procedures as the samples. Duplicate Matrix Spikes (MSD) are analyzed for most methods performed. The MS and MSD are analyzed with every workgroup of 20 samples or less. Samples from different matrices are to be spiked representatively. Matrix spikes indicate the accuracy of the test on real world samples. Duplicate Matrix Spikes can also be used to assess the precision of the analysis. A minimum of 10% representative compounds are to be spiked for methods where the compound list is long. Within a two year period all analytes are to be spiked.

#### 2.5.2.5 Sample Duplicate (Positive Controls)

Duplicate samples can be analyzed when there is not sufficient amount of representative sample available to perform matrix spike and matrix spike duplicate or the matrix does not allow it. Additionally field duplicate samples are analyzed in specified frequencies or as per FDOH's request. Duplicates are also analyzed instead of spikes for some inorganic methods, such as TSS.

#### 2.5.2.6 Surrogates (Positive Controls)

Surrogates standard are added to all samples, standards, and blanks for all organic chromatography methods except when the matrix does not allow it or a surrogate is not available. Surrogate control limits are calculated from laboratory historical data

#### 2.5.2.7 Reference Standard (Positive Controls)

Reference standard from a NIST certified source may be used to further validate the analysis or may be used instead of the LCS when a specific matrix blank is not available to spike.

#### 2.5.2.8 Additional QC Checks

Quality control check includes the assay of standards, monitoring acids, and solvents used in the preparation stages. Instrument blanks are run according to the methods. Any additional QC check required by the method such as internal standards etc, will be done in accordance to the method or project specific plan.

### **2.5.3 Special Considerations for Microbiology Analysis**

Microbiological analyses require special consideration because generally, a reanalysis after re-calibration is not possible due to short holding times. Microbiology QA/QC procedures for fecal coliform analyses conducted at Florida Testing Services are discussed below. Other labs will be NELAC certified and will perform similar procedures.

The water quality is tested monthly for pH, TOC, NH<sub>3</sub>, O-Nitrogen, residual chlorine, conductivity, and standard plate count. Annually the water is tested for metals and a suitability test is conducted. Analyst parallel results are conducted monthly. Temperature is monitored and documented twice a day for all instrumentation that requires temperature monitoring, such as incubators, autoclaves, etc. Temperature devices are calibrated at least annually with NIST certified thermometers at the temperature where they are used at or at bracketing temperatures. The stability of temperature distribution and time required to achieve equilibrium conditions in instruments such as incubators, ovens, etc., may be established and documented. Autoclave tape is used to verify the sterilization procedure. Incubators are maintained at 35+/- 0.5 C and documented.

Membrane filter analysis: For each set of samples, a control blank is run at the beginning (dilution water blank), every tenth sample (sample carry over blank), and at the end of the analysis. 5% of all positive environment samples analyzed by membrane filter are verified

according to the method. At least 10% of all positive samples that have been processed are analyzed in duplicate on one analysis per month for MF and MPN analysis.

#### **2.5.4 Field Procedures Quality Control**

All field work by samplers will be performed in accordance with the procedures outlined above or referenced as FDEP SOPs. For field screening methods, between-analyst precision will be assessed by comparing concurrent results by two different samplers on the same samples for at least five samples and five sites. The criteria by which quality of field data will be evaluated are discussed in Section 1.7 and 4.

### **2.6 Instrument/Equipment Testing, Inspection, and Maintenance**

The contract laboratories involved will follow their respective quality assurance manuals in testing, inspecting, and maintaining instruments.

Field instruments that measure parameters that are covered by a FDEP SOP FT-series, the SOP will be followed in testing instrument function, for other instruments, manufacturer instructions will be followed. Manufacturer instructions will be followed for maintenance. Anticipated maintenance will consider cleaning and changing of batteries as necessary.

### **2.7 Instrument/Equipment Calibration and Frequency**

#### **2.7.1 Laboratory Quality Assurance Procedures**

Prior to the analysis of samples, and following significant changes in hardware or analytical systems, the laboratory conducts initial performance evaluations of each analytical method to demonstrate the ability to achieve acceptable results. Criteria for these evaluations are documented in the individual SOPs pertaining to each method. Method detection level (MDL) studies are conducted on each new method. Thereafter limit of detection verification is performed annually to confirm the MDL.

Florida Testing Services, LLC will follow the minimum Quality Control requirements specific in each method. In lieu of any specific method requirements, the Quality Control measurements in Sections 4.1 and 4.2 are to be practiced.

### **2.8 Inspection/Acceptance of Supplies and Consumables**

The necessary supplies for field sampling include approved collection containers, insulated containers for transporting samples, personal protective equipment, health/safety supplies, water sampling device, labels for samples, sample preservatives (ice), waste collection containers, calibration standards, spare batteries, first aid kit, screw driver, waterproof writing utensil, decontamination kit(s), consumable reagents, distilled dilution water, pipets, appropriate

glassware, packing list, Zip-Loc® bags, fully charged cell phone, camera and accessories, official identification, field log forms, and sampling COC/SOPs/checklists.

The sampler will be responsible for inspecting and accepting sampling and laboratory supplies at FDOH and before leaving for the field.

The approved collection containers will only be accepted if the delivery container and individual containers are sealed. Only new, unopened, sterile Whirl-Pak® sampling bags with their tear-away seals still intact will be used for microbiological samples. All other sample containers will have been precleaned by the laboratory providing them. All sample containers will be inspected prior to use and will be discarded if any defects are found. Unless otherwise noted, the manufacturer's specifications for product performance and purity will be used as the acceptance criteria. If any standard, reference material, or chemical reagent is used after the expiration date, there will be a documentation showing that the reagent is providing an acceptable response, such as meeting recovery or duplicate criteria in comparison to fresh material.

## **2.9 Non-direct Measurements**

In addition to the measurements described previously, the following data sets may be utilized for data analysis and report development.

-Water use records. Data describing the water use patterns of establishments that were assessed as part of this project may be obtained from water suppliers, billing records or any other method that presents itself.

-Historical sampling data. Data from sampling by others may be gathered as part of this project as it is available in permit files or records of maintenance entities. The purpose of such gathering will be chiefly to compare results of different sampling organizations, and will also be used to see trends in a system's functioning and to make comparisons to the original permitted system's performance conditions, if any.. Such data will be organized and described to reflect that they were not necessarily gathered under procedures as stringent as described in this QAPP.

## **2.10 Data Management**

### **2.10.1 Laboratory Data Management**

Florida Testing Services, LLC dba Xenco Laboratory will transfer all validated data into a computerized spreadsheet. All data qualifiers will be entered as part of this process into a separate column to show the qualifications of each data point in the tables. Raw data will be assembled with QC summaries into data packages by the analysts. The data packet includes the data transfer sheet which is produced when the data is entered into the LIMS. Laboratory analyst comments are written on the raw data or data transfer sheet. The data package includes summaries of QC sample performance such as duplicate, Standard Reference Material (SRM), blank, and spike results. Calibration data and QA action forms will be included. Florida Testing Services, LLC dba Xenco Laboratory will provide these electronic documents to FDOH in either Excel or Access format.

### **2.10.2 FDOH Data Management**

### 2.10.2.1 Record Keeping

All field and laboratory records that are associated with work performed will be organized so that any information can be quickly and easily retrieved for inspection, copying, or distribution.

### 2.10.2.2 Data Recording

Laboratory results will be reviewed by the contract manager for compliance with the contract and this planning document, in particular the criteria in Section 4. Any suspected data outliers or anomalies will be discussed with laboratory personnel for resolution, reanalysis or qualification.

The data will be transferred from field and laboratory records to computer files. The MS-Access database used for the previous phases of the project will be modified as needed for this phase. This database will be maintained on a server accessible to the Bureau of Onsite Sewage Programs. The sampler or other FDOH staff will enter field data, and enter or to the extent feasible, import electronically available laboratory results. Any data reported with a "U" qualifier, for example, 5U, will not be represented as (<) less than 5 in the project report. The computer files will label data fields, so that field-measured parameters are identified as such, and so that field screening measurements that were obtained using methods other than FDEP SOPs or not recognized by FDEP to be equivalent to laboratory methods receive the qualifier "H".

### 2.10.2.3 Data Validation

To ensure that the data are accurately entered, the following data entry QA/QC procedures will be followed: the quality assurance officer or a third person will test the accuracy of the data entry process by cross checking the first ten data values entered by any new data entry person and performing a random check of at least 5% of values entered thereafter. Elements of the check are described further in Section 4.2. If an error is encountered, it will be repaired, and another randomly selected 5% will be checked. This process will continue until at least 95% accuracy has been achieved. Any changes done during this quality control check will be noted in the database in a comment field.

Additionally, the full content of the final project report will be reviewed prior to distribution.

## **3 Group C: Assessment and Oversight**

### **3.1 Assessments and Response Actions**

#### **3.1.1 Chemical Laboratory Internal Assessments**

The following are excerpts from Florida Testing Services' quality assurance manual that address laboratory internal assessments:

Chemical calibrations using the multiple primary calibration standards must pass prior to running any samples. Additionally a second source calibration check standard must be measured and must provide an acceptable result. Should calibration verifications fail the sample run is stopped, the problem fixed, and any sample run since the last passing calibration verification are repeated. For duplicate failures outside acceptable criteria the specific samples are reanalyzed.

The results of the blank and duplicate control must be acceptable for the analyses to be considered valid. If the performance is not acceptable, the laboratory director must be immediately informed, and the system performance must be evaluated and corrected. Should the overall system performance be deemed unacceptable even following the evaluation of all samples, samples which ran during the time of “out-of-range” must be flagged in the database. Problems are typically identified by evaluating each step of the analysis, media, reagents, and controls.

Corrective action procedures fall into two categories in the laboratories: QC batch (analytical) failures which are isolated and documented on Non-conformance/Corrective Action Reports (CAR), and systematic failures which require changes in procedures or extensive investigation to determine the cause of the failure.

All laboratory associates can initiate corrective action. The Quality Assurance Department reviews and maintains records via Non-conformance/Corrective Action Reports.

If any calculations are suspected to contain errors, complete investigation is necessary. When the problem is found and resolved, all procedures must be documented. When there is a special project involved, FDOH is notified by the laboratory project manager. The notification is documented in the history log for that log number within the lab database system.

#### Identification of a problem

The first step in a corrective action process is the identification of a situation which requires corrective action. In general, any situation which involves an out of control process or failure to meet regulations requires corrective action.

#### Specific examples:

- Quality control data consistently outside established control limits and the analyst is not able to resolve the problem.
- A specific laboratory practice is not in compliance with requirements.
- Performance evaluation results show repeated outliers for a given analysis or analyte.
- Assessment of accuracy, precision, surrogates, or detection limits indicate the laboratory is not meeting required objectives.

If a corrective action is deemed necessary, a policy statement is drafted and reviewed by laboratory management. When all management agrees on the drafted policy statement, it will be given a control identification number and will be distributed to the employees via email or hand delivered.

Additionally, the Quality Assurance department at Florida Testing Laboratory conducts a system audit annually. The system audit includes the evaluation of procedures described in Good Laboratory Practices Procedures and NELAC Quality Systems. Such procedures may include balance calibration check logbooks, temperature logbooks check, instrument maintenance log checks, sample custody records, and procedures. Standard sequence and analytical logs, safety, and waste procedures are also included in the systems audit. The project specific audit focuses on

one or more projects randomly selected by the QA department. The project is traced from taking custody of the sample to the final analytical report, checking all aspects of quality control criteria that are required by method, state, or program.

If during an audit a major deficiency is revealed that may impact results of a project, FDOH will be informed by a notification letter within 48 hours, which includes any corrective action necessary.

In addition to the annual internal audit the QA department conducts periodic checks of quality systems, project, state, or method specific requirements.

The Quality Assurance department submits reports to the management (President) of the laboratory. These reports include information about old and new work and any internal issues that may have been revealed during an internal audit or QA spot check. The report may also include information about performance evaluation samples and corrective action procedures.

### **3.1.2 Microbiology Laboratory Internal Assessment**

For microbiology analysis any blank failures or extremes in duplicate values are assessed for possible causes and appropriate action is taken to correct the problem. These could be data such as too numerous to count and subsequent samples would be run at a higher dilution.

Contamination of a blank may indicate the need for decontamination steps in the laboratory. All data would be qualified as appropriate with any notes included on unusual occurrences.

### **3.1.3 Project QAPP Assessments**

As discussed in Section 1.9.2, within 15 days of completing the first sampling and analysis event, FDOH and all associated subcontractors will review this QAPP relative to the completed field and laboratory activities to determine if the data quality objectives are being met, identify any improvements to be made to the process, and refine the sampling and/or analytical design or schedule. Within one month of the review, a summary of the review, including any corrective action plans or amendments to the QAPP, shall be sent to the FDEP project manager and a copy shall be maintained with the permanent project records.

### **3.1.4 Laboratory Results Verification and Validity Assessment**

Sampling staff will review laboratory results provided by the various laboratories continuously for meeting the reporting requirements discussed in Section 2.10 and data quality objectives in Section 4.

The intent of the assessment is to determine if the quality objectives are being met, which consist of laboratory report completeness, agreement of laboratory data with chain-of-custody records, acceptability of results based on instrument calibrations, and analyses of blanks, duplicates, and matrix spike samples.

In addition to the field generated QA/QC sample results to establish data validity, the laboratory-generated quality control samples consisting of method blanks, laboratory control samples, method spikes, and duplicates will be reviewed in each laboratory report for data acceptability. Any laboratory QA/QC results that do not meet established acceptance criteria may result in reanalysis of the project sample batch associated with the QA/QC samples. QA/QC issues pertaining to laboratory data will be communicated by the approved NELAC Laboratory Supervisor to the FDOH project manager. The decision on data use in the project report will be made by the FDOH project manager and based on the extent of the excursion outside acceptable criteria.

If an analyte detected in the sample is also found in any field-generated QC blank that is associated with the sample, the laboratory and sampler shall investigate and attempt to determine the cause of the QC blank contamination. If an analyte is detected in the blank at greater than the detection limit and 10-percent of a quantified project sample, a reanalysis of the blank will be required. The outcome of this investigation shall be reported and shall include a discussion of the corrective measures taken to minimize future occurrences of QC blank contamination, and shall ensure that the analyte in the affected sample is reported as estimated (“J” with a narrative explanation) unless the analyte concentration in the affected sample is at least 10 times the reported QC blank value concentration.

If a review of results by the sampler results in a determination that the reported data do not meet other data quality objectives specified in this QAPP, the sampler will notify the project QA officer and the laboratory. If no immediate resolution can be agreed upon, a more detailed audit of the laboratory as described in Rule 62-160.650, F.A.C., may be undertaken by FDOH, and the FDEP project manager will be informed.

All laboratory control check validation will be documented. At a minimum, the following checks are performed unless specific methods or projects are more stringent, then those requirements shall be followed. The analyst has the first responsibility of these checks and data reduction. A peer or supervisor review follows. The laboratory QC department periodically reviews these checks and data to ensure continuing compliance. Any non-complaint control check is documented and brought to the laboratory QC department and the laboratory project manager’s attention with Non-Conformance/Corrective Action Report (NCR/CAR). Corrective action measures are taken and qualifier codes are assigned to any non-complaint reported data.

The laboratory utilizes control charts for most analyses to determine control limits for the matrix spikes, which are used to assess the above determinations.

### **3.1.5 Field Results Validity Assessment**

The project QA officer will review field results recorded by the sampler continuously for meeting the reporting requirements discussed in Section 2.10 and data quality objectives in Section 4.

### **3.1.6 Data Verification Assessment**

Assessment of the accuracy of data entry will be performed as discussed in Section 4 and reported on by the quality assurance officer as discussed in Section 3.2.

### **3.1.7 Data Usability Assessment**

Usability of data assessment will be performed as discussed in Section 4.

## **3.2 Reports to Management**

Reports by the FDOH project manager to the FDEP project manager and their frequency were identified in Section 1.9.

Laboratory results will be reported by the laboratory to the FDOH project manager.

Sampling staff will report on data gathering progress and results to the FDOH project manager generally weekly in person, by phone, or by e-mail.

Assessment results from Section 3.1 activities by sampling staff will be reported to the project QA-officer after completion of the assessment.

Quality assurance activity results will be reported by the quality assurance officers to the FDOH project manager monthly.

## **4 Group D: Data Validation and Usability**

### **4.1 Data Review, Verification, and Validation**

This section describes the criteria that will be used to accept or reject data. The overall objective for analytical data is to ensure that data of known and acceptable quality are provided. Data Quality Objectives (DQOs) are the quantitative and qualitative terms used to describe how well the data need to be in order to meet the project's objectives. DQOs were given in Section 1.7. The data quality objectives are measurable and refer to data quality indicators. Different data quality indicators are used for the different assessments discussed in Section 3.

#### **4.1.1 Verification Based on Accuracy of Data Entry**

For verification assessments (3.1.4 and 3.1.6), the criterion is that data in the resulting data set and report have to be accurate, i.e. identical to the data recorded during the actual measurement process.

For validity assessments (3.1.4, 3.1.5), one criterion will be that data were collected in accordance with the procedures described in this QAPP. Of particular interest are data quality indicators for accuracy and precision. Calculations for these are presented in the following subsection.

## 4.1.2 Validity Based on Precision and Accuracy

For validity assessments (3.1.4, 3.1.5), one criterion will be that data meet precision and accuracy requirements. Data assessment for chemical analyses will be based on results of method/equipment blanks, precision based on duplicate analyses, and accuracy based on matrix spike samples.

Table 3 provides the data quality objectives or acceptance criteria for accuracy and precision of laboratory chemical analyses. Analytical precision is a measurement of how far an individual measurement may deviate from a mean of replicate measurements. Precision is evaluated from analysis of field and laboratory duplicates and spiked duplicates. The standard deviation (SD), relative standard deviation (RSD), and/or relative percent difference (RPD) recorded from sample analyses are methods used to quantify precision.

If an analyte is detected in a blank at greater than the detection limit and 10 percent of a quantified project sample, a reanalysis will be required. The source of the blank contamination will be investigated to attempt resolution. If the detection persists, the data from that sample round will be deemed questionable and may be omitted from project data analyses. Data will be “J” flagged if used unless the analyte concentration in the affected sample is at least 10 times the reported QC blank value concentration.

Data assessment for microbiological analyses will consist of an evaluation of the performance of blanks and duplicates together with the sampling results. This evaluation will indicate how sample results data need to be qualified and what corrective actions are indicated. No fixed numerical acceptance criteria are used in this evaluation, and reanalysis of samples is not feasible due to the limited holding time of samples.

Data Quality Indicators (DQIs) for laboratory analyses will include the results of a combination of QA/QC field and laboratory sample types, including:

- Laboratory control samples
- Laboratory matrix spike and matrix duplicate samples
- Laboratory method blank samples
- Field blank samples
- Equipment blank samples
- Field duplicate samples

### 4.1.2.1 Formulas for Precision and Accuracy

The following are excerpts from Florida Testing Services laboratory’s quality assurance manual Section 11.8 on “specific routine procedures to assess data precision and accuracy and MDL’s”. The formulas will also be used in assessments of other data.

Accuracy is the ability of a procedure to determine the “true” concentration of an analyte; while precision is the reproducibility of a procedure demonstrated by the agreement between analyses performed on either duplicates or same sample or a pair of duplicate spikes.

The laboratory calculates the accuracy as % recovery using the following formulas:

$$\% \text{ Recovery} = \frac{\text{Mean X } 100}{\text{True Value}}$$

% Recovery for a standard concentration:

$$\% \text{ Recovery} = \frac{\text{Standard Concentration X } 100}{\text{True Value}}$$

% Recovery for sample spike:

$$\% \text{ Recovery} = \frac{(\text{Observed spike value} - \text{Background Value}) \times 100}{\text{Known Value}}$$

Precision is calculated based on the Relative Percent Difference formula (RPD):

$$\text{RDP} = \frac{[S1-S2]}{([S1+S2])/2} \times 100$$

Where: S1= Concentration in sample (or spike) 1

S2= Concentration in sample (or spike) 2

Alternatively the precision of duplicate samples may be calculated using the Relative Standard Deviation (%RSD):

$$\% \text{ RSD} = \frac{\text{standard deviation}}{\text{average}} \times 100$$

In case of pairs (duplicates) this formula becomes:

$$\% \text{ RSD} = \frac{[A-B] \times 2}{(A+B) \sqrt{2}} \times 100$$

Where A= Concentration in sample A and B= Concentration in sample B

### **4.1.3 Validity Based on Compliance with SOPs**

For validity assessments, one criterion will be that data were obtained while complying with the SOPs and procedures described in this QAPP. These include aspects of sample processing such as adequate preservation and adherence to sample holding time limits, the sufficiency of blanks and use of calibrated field instruments. The procedures are described in Section 4.2.

## **4.2 Verification and Validation Methods**

### **4.2.1 Verification Methods**

Verification methods aim at assuring that data reported are the data that were measured. Per FDEP document QA002/02, Section 4.1.3, the following data verification procedures will be performed to verify data entry. These verifications will be performed by the project QA officer or a designated third person with sample checks by the QA officer.

- All verifications and reviews must be clearly documented by date, nature of the review, and the reviewer/verifier.
- Verify that all other requirements specified in the contract have been satisfied.
- Recalculate at least 5% of all manual calculations for accuracy. This includes field data such as purging volume.
- Verify at least 5% of all data transfers that are not totally electronic. Data transfers are described in Section 2.10 data management.

#### **4.2.2 Validation Methods**

Validation methods aim at assessing and describing the quality of the data. Per FDEP document QA002/02, Section 4.1.3, the following data validation procedures will be performed to verify the validity of data. Qualified data are those that have restrictions to their quality.

An assessment of aliquot, sample, and sample set results for the final deliverables must be conducted to ensure that project data quality objectives are met and to correct errors not readily apparent from the assessment of analytical runs. In addition to assessing the contract-specified quality control measures and comparison checking, each of the usability assessment checks described below must be conducted for all samples, when relevant to the analysis.

These checks must be authorized by a reviewer different from the technician and/or analyst who produced the result, and who is a degreed natural scientist with at least 3 years of relevant postgraduate experience (sampler for laboratory results, quality assurance officer for field results). If errors or problems are identified through any of the following checks, corrective action must be taken that is appropriate to the problem (e.g., reanalysis, confirmation, data qualification, troubleshooting, documentation, etc.)

- Verify that the received date/time precedes the preparation date/time and that both dates/times precede the analysis date/time for all analytes, samples and tests.
- Verify that the preparation and/or analysis dates and times and names of sample preparation staff are correctly reported for each analyte. This is particularly important whenever samples have been prepared more than once.
- Verify that the analysis methodologies used were those required for the project.
- Verify that preservation was intact upon receipt of samples by the laboratory, and that preservation was appropriate for the sample aliquot. Results for improperly preserved samples must be appropriately qualified per Chapter 62-160, F.A.C., with an explanatory comment.
- Verify that preparations and analyses were performed within holding times. Any data generated from sample aliquots that exceeded holding times must be properly qualified with a "Q" qualifier code and an appropriate explanatory comment.

- Verify that reported MDLs meet project data quality objectives (unless precluded by sample matrix interference).
- Verify that all comments in the final report are appropriate to the analysis and that each result associated with a QC failure has an appropriate explanatory comment.
- Verify that all quality control elements are available and reported for all analytes, tests and batches. If the quality control elements do not meet criteria or are unavailable, appropriate qualification codes and comments must be present in the final report.
- Review sample results relative to project-specific criteria or action levels, such as surface water criteria, historical levels, expected results, etc. Confirm any exceedances of criteria or action levels that may be suspect or challenged, providing appropriate comments in the final report.
- Verify that suitable qualifiers and comments are employed for all qualified results, ensuring that qualifier codes from Chapter 62-160, F.A.C. are used, where relevant.
- Verify that the results between analytes run by two different methods are comparable.

### **4.3 Reconciliation with User Requirements**

As a part of the audit process and the final report, the FDOH will provide statements about data usability relative to the Data Quality Objectives and Data Quality Indicators, usability criteria, and quality control specified in this QAPP.

Screening of results. The data analysis and presentation will initially rely heavily on distributional analysis, graphs, and charts to display the performance outcomes of the sample analysis. All data that have numerical values associated with them will be considered usable for the initial phase of this analysis. Further usability assessments will include comparison of the overall data set to individual sampling events to identify potential data outliers requiring additional verification effort.

The usability assessment for qualified data will generally consider applicable Data Quality Indicators (DQIs) as discussed in FDEP's usability document:  
[http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/usability\\_doc.pdf](http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/usability_doc.pdf).

Comparisons between systems sampled during the current project and relationships between measurements. Usable data will include all data that have no qualifiers associated with them. Additionally, if some systems or quality parameters include a few, up to approximately a quarter, samples with qualifiers indicating very high or low values, these data will be reviewed to assess if replacement of the qualified data with a fixed numerical value would be consistent with the distribution of data. This replacement would allow use in regressions, comparison of means and medians, and rank-order correlations and comparisons. Even qualifiers indicating consistent biases during a sampling event would still be associated with useful data for use in assessing differences between stations.

Comparisons between system sampling results and regulatory standards. Usable data will include all data that allow an assessment if results meet or exceed regulatory standards. This will include all data that have no qualifiers associated with them. Additionally, estimated values may

be usable after further review. If some systems or quality parameters include a few, up to approximately a quarter, samples with qualifiers indicating very high or low values, these data will be reviewed to assess if replacement of the qualified data with a fixed numerical value would allow such a comparison.

## APPENDIX A Permit File Review Data Entry Forms

### Form 1: Record Inquiry Status

System ID: <input type="text"/>		Address: <input type="text"/>		Construction Permit No: <input type="text"/>	Old_carmodyID: <input type="text"/>
				Operating Permit No: <input type="text"/>	

Record Inquiry\_Status | Construction Permit Review | Operating Permit Review | PBTS Review | Treatment Train | File Review Status

Selected for Sampling?  Address\_change?  Permit\_number\_change?  
 Which permit number changed?

**Record Inquiry First Attempt**  
 Requested files when:   
 From whom:   
 Received files when:   
 Source:   
 Reviewed by:   
 Reviewed on (mm/dd/yyyy):

**Second Attempt**  
 Requested files when:   
 Received files when:   
 Source:   
 Omitted Documents:

**Third Attempt**  
 Requested files when:   
 Received files when:   
 Source:   
 Omitted Documents:

**List of Requested Documents Received:**

<input type="checkbox"/> Construction Permit Application	<input type="checkbox"/> Construction information available?
<input type="checkbox"/> Site Evaluation	<input type="checkbox"/> Operating information available?
<input type="checkbox"/> Construction Permit	<input type="checkbox"/> PBTS/Innovative System Design Calculations
<input type="checkbox"/> Final Inspection	<input type="checkbox"/> PBTS/Innovative System Design Criteria
<input type="checkbox"/> Site Plan	<input type="checkbox"/> PBTS/Innovative Soil Treatment Description
<input type="checkbox"/> Operating Permit	<input type="checkbox"/> PBTS/Innovative Contingency Plan
<input type="checkbox"/> Operating Permit Application	<input type="checkbox"/> PBTS/Innovative Certification of Design
<input type="checkbox"/> Maintenance Entity Contract	<input type="checkbox"/> PBTS/Innovative Operation and Maintenance Manua
<input type="checkbox"/> CHD Inspection Reports	<input type="checkbox"/> PBTS/Innovative Applicant Cover Letter
<input type="checkbox"/> Maintenance Entity Inspection Reports	

**Required Documents**

<input type="checkbox"/> Engineer Design Drawing	<input type="checkbox"/> PBTS/Innovative Monitoring Requirements
<input type="checkbox"/> As-Built	<input type="checkbox"/> Engineers Certificate of Compliance
<input type="checkbox"/> Inspection Checklist	
<input type="checkbox"/> File Activity Checklist	
<input type="checkbox"/> Enforcement Action for Advanced System?	<input type="text"/>

**Record Inquiry Complete?**

**Status**  
 System\_status\_is:   
 System treatment category is:

Comments on file search:

QC Comments Record Inquiry Status:

### Form 2: Construction Permit Review

Record Inquiry\_Status | Construction Permit Review | Operating Permit Review | PBTS Review | Treatment Train | File Review Status

**Construction Permit**  Construction Permit Received?  
 Date Issued:   Changes\_to\_Construction\_permit  
 Permit DF #1 size:  Permit DF #2 size:   
 Permit tank #1 size:  Permit tank #2 size:   
 Drainfield\_type:   Construction permit signed and approved?  
 Drainfield\_config:  Is a grease trap present? 1=yes; 0=no   
 Permit\_Comments:

**Final Inspection**  Final Inspection Received?  Changes to final system approval?  
**Tank Info:** tank 1 legend:  tank 2 legend:   
**Drainfield Info:**  
 Final DF #1 size:  Final DF #2 size:   
 elevation of drainfield (in):  benchmark/reference point  
 Drainfield\_dosing:  # of Dosing Pumps:   
 Drainfield\_material:  SetbackSurfaceWater:   
 Drainfield\_flow\_type:

**Approval Info:**  
 Final inspection form signed and approved?  
 FinalConstruction\_approval\_date:   
 FinalSystemApprovalDate:

**Construction Application**  Changes\_to\_Construction\_application  
 Construction Permit Application Received *Which multiple types were checked?*  
 application\_type:  application\_type\_comments:   
 I/M zoning:   
 res/com:   
 Establishment Type:   
 Establishment Type#2:  Application Date:

**Site Evaluation**  Changes\_to\_Site\_Evaluation  
 Site Evaluation Received?  
 Estimated\_sewage\_flow\_(table 1):  gpd  
 Authorized sewage flow (gpd):   
 Net usable area available:   
 Site\_elevation (in):  benchmark/reference point  
 EWSWT:  existing grade

**Site Plan**  Site Plan Received?  
 Monitoring\_locations\_shown? Monitoring\_locations\_where?:

**Engineer Design**  Engineer\_designed?  Engineer Design Drawing Received?

**As Built**  As-Built Received? Source\_Asbuilt:

**Miscellaneous**  
 Enforcement Action for Construction Permit?  
 Drainfield\_size\_reduction:   
 Was a variance issued?  
 Monitoring\_instructions:   
 Monitoring\_frequency:   
 Sampling\_Requirements:

**General Construction Permit Comments:**

### Form 3: Operating Permit Review

Record Inquiry_Status	Construction Permit Review	Operating Permit Review	PBTS Review	Treatment Train	File Review Status
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**Operating Permit Application**

Operating\_Permit\_Application\_Received?

New / Amended / Renewal:

Type of OP application:

Date of aerobic system installation approval:

Aerobic Unit Manufacturer:

ATU type:

>1500 gpd unit     multiple ATUs

TreatmentUnit:

GreaseTrapGallons:     Approved BusinessType:

DosingTankGallons:     Drainfield Size Sq. Feet:

LotSizeSquareFeet:     DrainfieldDescription:

SqFtAcres:     DrainfieldType:

Date\_of\_OP\_applicator:     DrainfieldLayout:

Approval date on OP application:

OriginalApplicationDate:

Operating permit ever issued?     Changes!\_to\_Operating\_permit\_application

**Operating Permit**     Changes\_to\_operating\_permit

Operating\_Permit\_Received?     Operating permit current?

Expiration of latest operating permit:

PermitIssueDate:

Documentation for lack of OP:  
*(vacant house, enforcement ongoing)*

Operating conditions:

QC Comments  
 Operating Permit Review:

**Maintenance / Inspections**

Effective\_date\_of\_previous OP\_permit\_year\_completed:

Inspection\_1\_by\_CHDs    Calculated number:

Inspection\_1\_by\_ME

Inspection\_2\_by\_ME

Inspection\_>2\_by\_ME

Maintenance\_Entity\_Contract

Maintenance\_Contract\_Expiration:

Last\_ME\_Inspection:

Monitoring\_submitted:

**Operating Permit Enforcement**

List Technical Problems:

Description of violations:

ME sent notice of discontinuation:

CHD Sent reminder to ME:

CHD sent reminder to owner:

CHD sent NOV to owner:

CHD sent notice of intended action:

CHD sent citation:

CHD sent administrative complaint:

Enforcement action results?:

General\_Operating\_permit\_Questions:

**Form 4: PBTS Review**

Record Inquiry_Status	Construction Permit Review	Operating Permit Review	PBTS Review	Treatment Train	File Review Status
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System treatment category is:      PBTS\_Present

PBTS\_application signed and sealed?

Authorized sewage flow increase

Setback reductions\_horizontal?

Setback reductions\_vertical

Performance\_standard\_class:

cBOD5 (mg/L):

TSS(mg/L):

TN(mg/L):

TP(mg/L):

fecal coliform (cfu/100mL):

comments\_performance\_standard:

Frequency\_of\_maintenance\_and\_monitoring:

Are\_there\_sampling\_requirements?:

Sampling\_Requirements:

Additional comments:

**List of Requested Documents Received:**

- PBTS/Innovative System Design Calculations
- PBTS/Innovative System Design Criteria
- PBTS/Innovative Soil Treatment Description
- PBTS/Innovative Contingency Plan
- PBTS/Innovative Certification of Design
- PBTS/Innovative Operation and Maintenance Manual
- PBTS/Innovative Applicant Cover Letter
- PBTS/Innovative Certificate of Compliance
- PBTS/Innovative Monitoring Requirements

Form 5: Treatment Train

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Record Inquiry_Status	Construction Permit Review	Operating Permit Review	PBTS Review	Treatment Train	File Review Status
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**Step 1** Source for 1st comp.:

Manufacturer:

Technology/Product Line:

Modifier:

Model:

Aeration:

Aeration Comments:

**Step 2** Source:

Component:

Manufacturer:

Approach:

Technology/Product Line:

Modifier:

Model:

Aeration:

Aeration Comments:

Changes\_to\_previous\_info Which changes?:

Form 6: File Review Status

Record Inquiry_Status	Construction Permit Review	Operating Permit Review	PBTS Review	Treatment Train	File Review Status
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Final File Review by:

Final File Review on (mm/dd/yyyy):

Final File Review Comments:

## APPENDIX B Initial System Evaluation Form

Initial System Evaluation (Step 3 in System Review) Date: \_\_\_\_\_ Sampler: \_\_\_\_\_

### A. System Information

System Ref. #: \_\_\_\_\_ Construction Permit # \_\_\_\_\_ Operating Permit # \_\_\_\_\_

Site Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

County: \_\_\_\_\_

Dates of two previous maintenance entity visits: \_\_\_\_\_ Date of previous CHD inspection: \_\_\_\_\_

Operating Permit current: Yes \_\_\_ No \_\_\_ Maintenance Contract current: Yes \_\_\_ No \_\_\_

Parties present at this visit: Maintenance Entity \_\_\_\_\_ CHD: \_\_\_\_\_ Owner/User: \_\_\_\_\_

Site Visit was announced by \_\_\_\_\_ to \_\_\_\_\_ days in advance.

Comments: \_\_\_\_\_

### B. Access to General Site Location

1. Access to site:  Permission given  Open  Obstructed (locked gate/fence)  Denied  Other

### C. Base for Initial System Evaluation (Check all that apply)

Observation from afar  Observation of above-ground parts and control panels

Probing of system location  Permit records

How many systems are at this address?  none found  one  more than one

If not one, comment: \_\_\_\_\_

### D. System Sketch (attach to form), see system components

from final construction inspection  from site plan  created during site visit

from engineer's as-built  other file material

### E. System Evaluation (elaborating on HSES 10-006)

1. Observe and record the general appearance/functioning of the treatment system.

a. Are there any signs of surfacing or breakouts near the treatment system? Yes \_\_\_ No \_\_\_

b. Are tanks, lids, or access covers broken or missing? Yes \_\_\_ No \_\_\_ NA \_\_\_

c. Are there any signs of settling or erosion near the system components? Yes \_\_\_ No \_\_\_

d. Does it appear as though the system is subject to vehicular traffic? Yes \_\_\_ No \_\_\_

e. Is there any encroachment onto the system? If yes, what is within 5ft of system? Yes \_\_\_ No \_\_\_

Building  Driveways  Utility easements  Patios  Decks  Gardening  Pets  Other \_\_\_\_\_

f. Evaluate presence of odor within 10ft of perimeter of system:

Intensity:  None perceivable  barely perceivable  faint but identifiable  clearly perceivable  strong

Quality:  Septic  Earthy/Musty/Moldy  Chemical  Sour/Rancid/Putrid  Other \_\_\_\_\_  N/A

Source of odor, if present: \_\_\_\_\_

g. Evaluate presence of sound (except alarm) within 10ft of perimeter of system:

Intensity:  None perceivable  Quiet  Clearly Perceivable  Loud

Source:  Compressor/Aspirator/Blower  Pump  Other  N/A

Comments: \_\_\_\_\_

e. Does the system appear water-tight? Yes \_\_\_ No \_\_\_ Unable to determine \_\_\_

If no, where does water seem to  enter or  leave system ?

access cover  lid  inlet/outlet  ports  tank  riser attachment to tank  other \_\_\_\_\_

f. Are any alarms on? Yes \_\_\_ No \_\_\_

If yes,  Air pressure  High water  Remote  Unknown  Other \_\_\_\_\_

g. Is there a means to assess sewage flow? (water meter, event counter, flow meter) Yes \_\_\_ No \_\_\_

If yes **and** influent is available for sampling, document meter reading \_\_\_\_\_

h. Comments: \_\_\_\_\_

2. Observe if system has been altered or the site has changed since approval.

a. Any landscape construction, utility work, or changes in drainage patterns? Yes \_\_\_ No \_\_\_ ND \_\_\_

b. Has system been obstructed? Yes \_\_\_ No \_\_\_

- c. Any apparent recent additions to the building(s) connected to system? Yes \_\_\_ No \_\_\_ ND \_\_\_  
 d. Are any components missing or modified? Yes \_\_\_ No \_\_\_ ND \_\_\_  
 e. Components that are on this site, and their order:  not determined: \_\_\_\_\_

Component	Order	Component	Order
<input type="checkbox"/> pretreatment/ trash ( <input type="checkbox"/> part of ATU <input type="checkbox"/> separate)		<input type="checkbox"/> grease interceptor	
<input type="checkbox"/> treatment unit ( <input type="checkbox"/> aeration <input type="checkbox"/> media filter)		<input type="checkbox"/> clarifier ( <input type="checkbox"/> part of ATU <input type="checkbox"/> separate)	
<input type="checkbox"/> pump tank/compartments (s)		<input type="checkbox"/> filter tank (media _____)	
<input type="checkbox"/> recirculation from _____ to _____		<input type="checkbox"/> disinfection ( <input type="checkbox"/> chlorine <input type="checkbox"/> other _____)	
<input type="checkbox"/> drainfield ( <input type="checkbox"/> mound/fill / <input type="checkbox"/> below grade)		<input type="checkbox"/> other (Sampling Port; _____)	

f. Comments: \_\_\_\_\_

3. Observe that there is power to the system.
- Is control panel for treatment system visible? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Is control panel for treatment system accessible? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Does power indicator, if present, indicate that power is on? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Does operation of system (aerator) indicate that power is on? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Does it appear that the power is switched off? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Comments: \_\_\_\_\_

4. Observe that there is an alarm and, if possible, test it.
- Is an alarm present for the treatment unit? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - If yes, which of the following are operational? Audio \_\_\_ Visual \_\_\_ Unable to test \_\_\_
  - Is an alarm present for the dosing tank, if tank is present? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - If yes, which of the following are operational? Audio \_\_\_ Visual \_\_\_ Unable to test \_\_\_

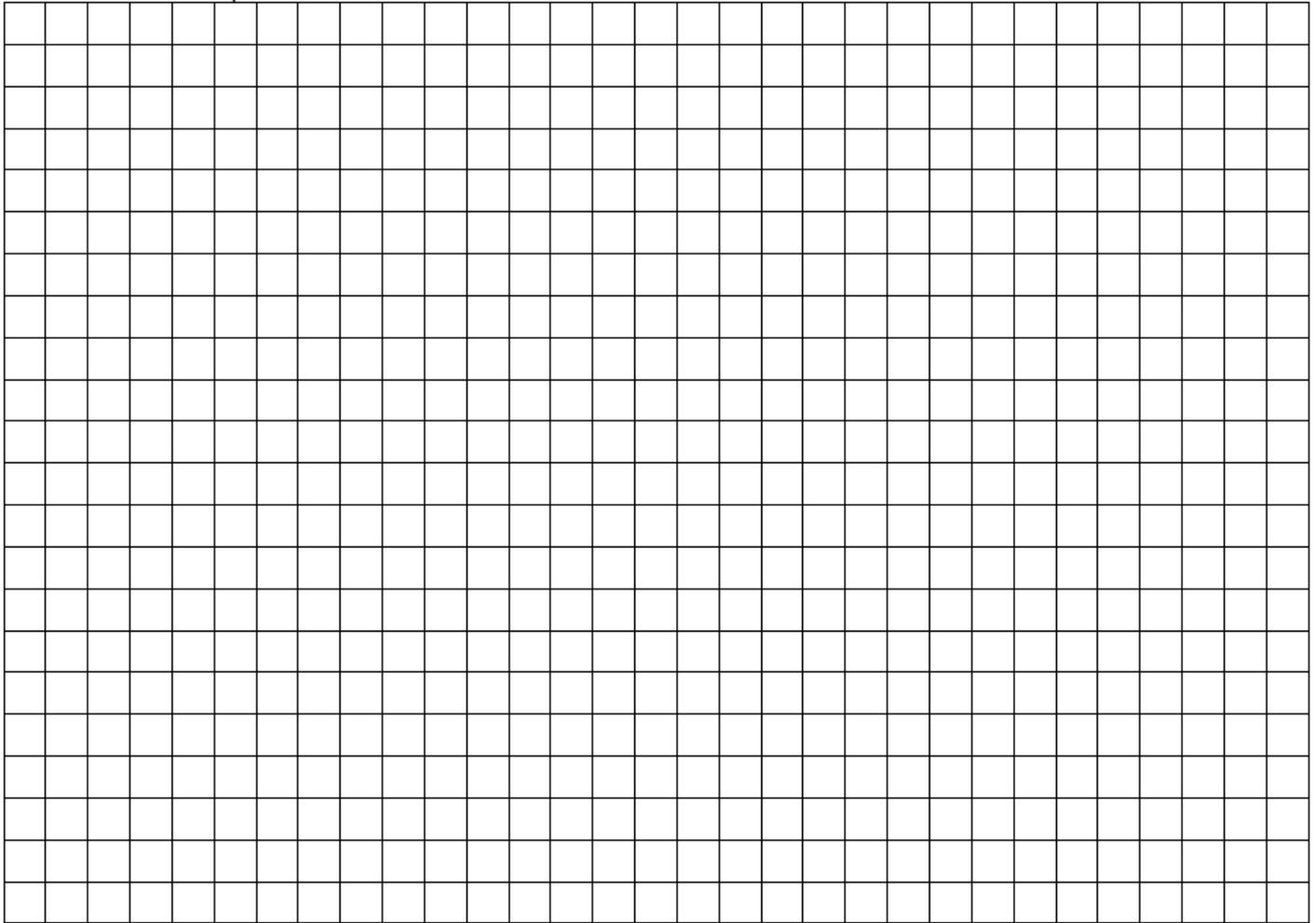
5. Observe the drainfield area and record conditions.
- Are there any trees in the drainfield? Yes \_\_\_ No \_\_\_ N/A \_\_\_
  - Relative to surrounding areas, how does the vegetation on the drainfield look?  
 Same  More vegetation.  Uneven vegetation  Less vegetation  
 Location(s): \_\_\_\_\_
  - Is there evidence that there is ponding in the drainfield? Yes \_\_\_ No \_\_\_ N/A \_\_\_  
 Standing water on the drainfield surface  Saturated soil only above  all  some drainfield area  
 Observation port shows \_\_\_ inches of standing water  Other \_\_\_\_\_
  - Comments: \_\_\_\_\_

**F. Access to Sewage**

- Is there an effluent sample port installed? Yes \_\_\_ No \_\_\_ N/A \_\_\_  
 a. Location: \_\_\_\_\_ Type:  P-trap  Tee  Cross  Distribution box  Petcock (drip)  Other  
 b. Odor within sample port: checked \_\_\_ not checked \_\_\_ N/A \_\_\_  
 c. Intensity:  None perceivable  barely perceivable  faint but identifiable  clearly perceivable  strong  
 d. Quality:  Septic  Earthy/Musty/Moldy  Chemical  Sour/Rancid/Putrid  Other \_\_\_\_\_  N/A
- Can you get access to the treatment tank?  Directly  Riser  No  N/A  
 a. Access location(s):  Inlet  Outlet  Center  Located at grade  Buried \_\_\_\_\_ "  Not determined  
 b. Are access covers securely fastened? Yes \_\_\_ No \_\_\_ N/A \_\_\_  
 c. Are access covers in operable condition? Yes \_\_\_ No \_\_\_ N/A \_\_\_
- Can you get access to a post-treatment or dosing tank?  Directly  Riser  No  N/A  
 a. Access location(s):  Inlet  Outlet  Center  Located at grade  Buried \_\_\_\_\_ "  Not determined  
 b. Are access covers securely fastened? Yes \_\_\_ No \_\_\_ N/A \_\_\_  
 c. Are access covers in operable condition? Yes \_\_\_ No \_\_\_ N/A \_\_\_
- Is it feasible to obtain an influent sample from this system? Yes \_\_\_ No \_\_\_ Questionable \_\_\_  
 a. Location:  Through building sewer cleanout to first compartment  Access to pretreatment compartment
- Comments: \_\_\_\_\_

**G. Site Sketch (Sketch the system if other documentation is not available or appears to be wrong)**

Scale: Each block represents 10 feet and 1 inch = 40 feet.



Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## APPENDIX C System User Survey (Optional)

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Address: \_\_\_\_\_ Project System ID: \_\_\_\_\_  
Phone: \_\_\_\_\_

### Home/Residents

1. Is this your first home with an on-site wastewater treatment system? YES / NO
2. Have you received any septic system user information? YES / NO
3. Did you receive as-built/construction drawings for the system? YES / NO
4. Type of use: Permanent / Seasonal  
If seasonal, number of months used per year \_\_\_\_\_
5. Number of people living in the home: \_\_\_\_\_
6. Adults: \_\_\_\_ M \_\_\_\_ F  
Children <13 years: \_\_\_\_ M \_\_\_\_ F  
Teenagers 13-17 years: \_\_\_\_ M \_\_\_\_ F
7. Number of bedrooms: \_\_\_\_\_
8. Number of bathrooms: \_\_\_\_\_
9. Water supply: Private well / public water / other supply \_\_\_\_\_
10. Do you have an in-home business? YES / NO If "yes", what type? \_\_\_\_\_

### Appliances and Cleaning Products

11. Home equipped with water conserving fixtures/appliances? YES / NO
12. Garbage disposal? YES / NO Use: \_\_\_\_\_ times/week
13. Dishwasher used? YES / NO Use: \_\_\_\_\_ times/week
14. Laundry: Maximum \_\_\_\_ loads per day consecutive loads: YES / NO  
Total \_\_\_\_ loads/week
15. Brand of laundry detergents used? \_\_\_\_\_ powder / liquid
16. Bleach used? YES / NO powder / liquid  
Use: \_\_\_\_ cups/load \_\_\_\_ loads/week
17. Water temperature for washing? Hot / Warm / Cold
18. Whirlpool tub? YES / NO Use: \_\_\_\_\_ times/week
19. Is a drain cleaner used? YES / NO Type: \_\_\_\_\_ Frequency of use: \_\_\_\_\_
20. Do you use septic system additives? YES / NO  
If "yes", what products? \_\_\_\_\_
21. Hand-washing soap brand? \_\_\_\_\_ Antibacterial? YES / NO
22. Number of rolls of toilet paper used per week? \_\_\_\_\_
23. Toilet cleaning product brand? \_\_\_\_\_
24. Cleanings/week \_\_\_\_\_
25. Continuous cleaner used in toilet tank? YES / NO
26. Please list commonly used cleaning supplies:  
Shower \_\_\_\_\_  
Kitchen \_\_\_\_\_  
Floors \_\_\_\_\_  
Other \_\_\_\_\_

27. Please list any antibacterial products used: \_\_\_\_\_
28. Water treatment device: YES / NO
29. Is a water softener used? YES / NO
30. Back flushes to: \_\_\_\_\_
31. Reverse osmosis? YES / NO
32. Discharges to: \_\_\_\_\_
33. Air conditioner unit(s)? YES / NO
34. Condensate drains to: \_\_\_\_\_
35. Footing drains or basement sump pumps connected into the system? YES / NO
36. Is the sump pump working? YES / NO
  
37. **Would you like to volunteer your system to be sampled periodically throughout the year? YES / NO**
  
38. **Additional comments:**

## APPENDIX D Operational Assessment Form

### System Operation Evaluation (Step 4 in System Review)

Time: \_\_\_\_\_ Cloud Cover (%): \_\_\_\_\_ Rainfall: \_\_\_\_\_ current \_\_\_\_\_ prev. 7 days (inches) \_\_\_\_\_  
 Date: \_\_\_\_\_ Sampler: \_\_\_\_\_

#### A. System Information

System ref. #: \_\_\_\_\_ Construction Permit # \_\_\_\_\_ Operating Permit # \_\_\_\_\_

Date of Last Pumpout: \_\_\_\_\_

Tank/Compartment # accessed (Section E.2.e from initial system eval.)							
Function							
Material							
Tank Structural Condition							
Liquid level relative to outlet (in) (NA for pump tank)		<input type="checkbox"/> Above <input type="checkbox"/> Below					
Liquid level relative to inlet (in) (NA for pump tank)		<input type="checkbox"/> Above <input type="checkbox"/> Below					
Evidence liquid level has been higher							
Evidence liquid level dropped (no pump)							
Evidence of non-sewage inflow							
Appears to be watertight (no visual leaks)							
Oily film/sheen present							
Odor (Intensity/Quality)							
Sample taken?		<input type="checkbox"/> Yes <input type="checkbox"/> No					
Scum	Depth (in)						
	Color						
	Clarity/Structure						
Clear Zone	Depth (in)						
	Color						
	Clarity/Structure						
Sludge	Depth (in)						
	Color						
	Clarity/Structure						
Comments							

**Current Rainfall Code**    1 None    2 Light    3 Moderate    4 Heavy

**Function Code**    AC aeration chamber    CL clarifier    DS disinfection  
 PU pump/dosing/recirc chamber    TT trash/pretreatment    NN not known    OT Other \_\_\_\_\_  
 MF media filter (except phosphorus)    PO phosphorus sorption media

**Material Code**    CO concrete    FG fiberglass    PE polyethylene    OT other \_\_\_\_\_

**Structural Condition Code**

- 0 structurally sound
- 1 rebar exposed
- 2 spalling
- 3 corrosion present
- 4 roots inside of compartment
- 5 cracks present
- 6 deflection noted
- 7 inlet seal missing/broken
- 8 outlet seal missing/broken
- 9 holes present
- 10 lid broken/missing
- 11 manhole cover missing/broken
- 12 other (list)

**Odor Code**

Intensity: 0 None perceivable 1 barely perceivable 2 faint but identifiable 3 easily perceivable 4 Strong

Quality: SEP Septic EARTHY Earthy/Musty/Moldy CHEM Chemical SOUR Sour/Rancid/Putrid OTH Other \_\_\_\_\_ N/A N/A



### APPENDIX E FD9000-8 (modified with ORP control reading)

*Boldly "X" this box if there is qualified data on this page.*

Form FD9000-8 CALIBRATION LOG (FDEP SOP FT 1000-FT 1500, FD 1000-FD 4000) 11-10-05

Project/Site: \_\_\_\_\_ Date: \_\_\_\_\_ Meter # \_\_\_\_\_

Temperature (Quarterly) For Date of Last Temperature Verification see \_\_\_\_\_ in log book

Dissolved Oxygen	DEP SOP FT 1500	Initials	Date	Time	Probe Charge	Probe Gain	mg/L	Temp °c	% DO	Saturation mg/L (from chart)	Pass or Fail
<b>Acceptance Criteria: +/- 0.3mg/l</b>											
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F

Specific Conductance	DEP SOP FT 1200	Initials	Date	Time	Standard µmhos/cm	Exp. Date	Lot #	Bottle #	Cell Constant	Reading µmhos/cm	Pass or Fail
<b>Acceptance Criteria: +/- 5%</b>											
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F

pH	DEP SOP FT 1100	Initials	Date	Time	Standard SU	Exp. Date	Lot #	Bottle #	Slope	Reading SU	Pass or Fail
<b>Acceptance Criteria: +/- 0.2 SU</b>											
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F
CAL	ICV	CCV									P F

Maintenance: Weekly pH Slope: \_\_\_\_\_ Specific Conductance Probe Cleaned? Yes No Dissolved Oxygen Membrane Changed: Yes No  
 Notes:

To monitor the performance of ORP-probe, record simultaneous readings of a tap or DI water sample:  
 ORP-reading :        mV    DO-reading:        mg/L    DO-saturation:        %

Perform only in Calibrate Mode: CAL - Calibrate -  
 Perform only in Run Mode: ICV - Initial Calibration Verification  
 Perform only in Run Mode: CCV - Continuing Calibration Verification

### APPENDIX F Data Form for Field Screening Analyses of Samples

Advanced Systems Assessment Field Analysis Form															Test Strip brand/lot/expiration date														
Sampler:																													
Sample Identification								Olfactory/Visual				HACH Colorimeter DR/890				Taylor Kits		Test Strip / Other											
SYSTEM I.D.	Sample Number	Sample Type	Sampling Location	Sampling Method	original/dup	Date mm/dd/yy	Time hh:mm	Lab Sample Taken (y/n)	Odor		Color	Clarity	Turbidity	Apparent Color	NO <sub>3</sub> -N	NH <sub>4</sub> -N	PO <sub>4</sub>	PO <sub>4</sub> -P (=PO <sub>4</sub> * .326)	Total Alkalinity	pH									
									Intensity	Quality											mg/L	mg/L	mg/L	mg/L	mg/L	su			
									code	code	code	code	FAU	units Pt-Co	mg/L	mg/L	mg/L	mg/L	mg/L CaCO <sub>3</sub>										
	1																												
	2																												
	3																												
	4																												
	5																												
	6																												
See Table 8									Analyst's Initials: _____									Analysis done within ____ hours: _____											
Sample Type	Eff =effluent Inf=Influent Tap=tap water QC=quality control												Sample	Additional Comments on Sample															
Sampling Location	For Eff: AC-aeration chamber CL-clarifier DS-disinfection ND- not determined OT-other MF-media filter (except phosphorus) PO-phosphorus sorption media PU- pump/dosing/ recirc chamber SP-sampling port; For Inf: TT-trash/pretreatment tank; for QC: PEB=p												Number																
Sampling Method	i=intermediate container d=directly from free fall, spigot etc. p=peristaltic pump												1																
original/dup	01-original sample 02-duplicate 1												2																
Odor Intensity	0 None perceivable 1barely perceivable 2 faint but identifiable 3 clearly perceivable 4 strong												3																
Odor Quality	Septic Earthy/Musty/Moldy Chemical Sour/Rancid/Putrid Other _____ N/A												4																
Color	BLack BRown MUstard GRay WHite TAN OTher _____ NOne												5																
Clarity	Clear Cloudy Milky Muddy Flocced Grainy Fluffy												6																

## **APPENDIX G CHAIN-OF-CUSTODY**



## APPENDIX H Quality Assurance Requirements for Federally Funded NPS BMP Monitoring Agreements (Attachment H of Grant Agreement)

1. All sampling and analyses performed under this Contract must conform to the requirements set forth in Chapter 62-160, Florida Administrative Code (F.A.C.) and "Requirements for Field and Analytical Work performed for the Department of Environmental Protection under Contract" (DEP-QA-002/02), February 2002.

### 2. LABORATORIES

- a. The CONTRACTOR shall ensure that all laboratory testing activities are performed by laboratories certified by the Florida Department of Health Environmental Laboratory Certification Program (DoH ELCP) for all applicable matrix/method/analyte combinations to be measured.
- b. If the laboratory is not certified for some or all of the proposed test measurements, the laboratory shall apply for certification within one month of Contract execution between the laboratory and the CONTRACTOR. Within six months of this Contract execution, the laboratory shall be fully certified for all applicable matrix/method/analyte combinations to be performed. Regardless of when the laboratory receives certification, the laboratory must implement all applicable standards of the National Environmental Laboratory Accreditation Conference (NELAC) upon Contract execution.
- c. Laboratories shall maintain certification as specified in item 2.a above during the life of the Contract. Should certification for an analyte or test method be lost, all affected tests shall be immediately sub-contracted to a laboratory with current DOH NELCP certification in the appropriate matrix/method/analyte combination(s). The CONTRACTOR shall notify the DEP contract manager in writing before any change to a sub-contracted laboratory is made.
- d. A copy of the DOH NELCP Certificate and the associated list of specific fields of accreditation for each contracted or sub-contracted laboratory shall be provided to the DEP contract manager upon Contract execution or upon receiving DOH certification (see items 2.a and 2.b above).
- e. The CONTRACTOR shall ensure that an acceptable initial demonstration of capability (IDOC), as described in Appendix C of Chapter 5 of the NELAC Standards is performed. Each laboratory that performs any of the proposed matrix/method/analyte combination(s) must have the requisite IDOC documentation and supporting laboratory records. IDOCs shall be performed before the test procedure is used to generate data for this Contract. If requested by the Department, documentation that supports the IDOC shall be made available for review.
- f. When performance test samples are not required by DOH NELCP for certification, the laboratory shall obtain, analyze and evaluate performance test samples, standard reference materials (SRM) or other externally assayed quality control (QC) samples, hereinafter known collectively as quality control check (QCC) samples.
  - (i) The laboratory shall ensure that the selected QCC samples(s) represent all matrix/method/analyte combinations that are not subject to certification requirements.
  - (ii) These samples shall be analyzed at six-month intervals and the results shall be within the acceptable range established by the QCC sample provider.
- g. Any non-standard laboratory procedures or methods that are proposed for use (i.e., those not approved by DEP for standard environmental analyses) shall be submitted for review and approval in accordance with DEP-QA-001/01, "New and Alternative Analytical Laboratory Methods," February 1, 2004. These procedures or methods shall be approved by the DEP contract manager before use under this Contract and must be cited or described in the required planning document (see Section 6).
- h. The CONTRACTOR shall ensure that Practical Quantitation Limits (PQLs) and Method Detection Limits (MDLs) required by the Contract are listed in the planning document (see Section 6).
- i. The CONTRACTOR shall ensure that the selected laboratory test methods listed in the planning document can provide results that meet the Contract data quality objectives.
- j. The CONTRACTOR shall ensure that all laboratory testing procedures follow the analytical methods as approved in the planning document (see Section 6).
- k. The CONTRACTOR shall ensure that the all laboratory quality control measures are consistent with Chapter 5 of the NELAC standards.

- l. In addition, the CONTRACTOR shall ensure that the quality control requirements specified in the attached addenda are followed.
- m. The CONTRACTOR shall ensure that all sample results are calculated according to the procedures specified in the analytical methods approved in the planning document.

### **3. FIELD ACTIVITIES**

- a. "Sample" refers to samples that have been either collected or analyzed under the terms of this Contract.
- b. The CONTRACTOR shall ensure that all sample collection and field testing activities are performed in accordance with the Department's "Standard Operating Procedures for Field Activities" (DEP-SOP-001/01, February 1, 2004). The specific standard operating procedures (SOPs) to be used for this Contract shall be cited in the planning document (see Section 6).
- c. Any non-standard field procedure shall be submitted for review and approval to the DEP contract manager in accordance with section FA 2000 of DEP-SOP-001/01. All non-standard procedures and methods must be approved by the DEP contract manager before use under this Contract and must be cited or described in the planning document.
- d. Per the quality control measures outlined in the DEP SOPs (FQ 1000 and the calibration requirements of the FT-series for field testing), the CONTRACTOR shall ensure that the following field quality controls (and any additional quality control measures specified in the addenda) are incorporated into the project design:
  - (i) Matrix-Related Quality Controls - The CONTRACTOR shall ensure that the laboratory is provided with sufficient sample volume to analyze at least one set of matrix spikes and either matrix spike duplicates or laboratory duplicates as follows:
    - (1) The first time a sample from a sample collection matrix (see Table FA 1000-1) is collected;
    - (2) The last time samples are collected for the sample collection matrix.
  - (ii) Field-Generated Quality Control (QC) Blanks – Blanks associated with field activities as defined in FQ 1210 of the DEP SOPs shall be collected according to the requirements of FQ 1230.
    - (1) If an analyte detected in the sample is also found in any field-generated QC blank that is associated with the sample, the CONTRACTOR shall investigate and attempt to determine the cause of the QC blank contamination. The outcome of this investigation shall be reported and shall include a discussion of the corrective measures taken to minimize future occurrences of QC blank contamination.
    - (2) If an analyte detected in the sample is also found in any field-generated QC blank that is associated with the sample, the CONTRACTOR shall ensure that the analyte in the affected sample is reported as estimated ("J" with a narrative explanation) unless the analyte concentration in the affected sample is at least 10 times the reported QC blank value concentration.

### **4. REPORTING, DOCUMENTATION AND RECORDS RETENTION**

- a. The CONTRACTOR shall ensure that all laboratory and field records as outlined in Rules 62-160.240 and .340, F.A.C. are retained for a minimum of five years after the project completion.
- b. All field and laboratory records that are associated with work performed under this Contract shall be organized so that any information can be quickly and easily retrieved for inspection, copying or distribution.
- c. The CONTRACTOR shall ensure that all laboratory reports are issued in accordance with NELAC requirements. These reports shall be submitted to the DEP contract manager as part of Quarterly Progress Reports and shall include the following information:
  - ▶ **Laboratory sample identification (ID) and associated Field ID**
  - ▶ Analytical/test method
  - ▶ Parameter/analyte name
  - ▶ Analytical result (including dilution factor)
  - ▶ Result unit
  - ▶ Applicable DEP Qualifiers per Table 1 of Chapter 62-160, F.A.C.
  - ▶ Result comment(s) to include corrective/preventive actions taken for any failed QC measure (e.g., QC sample, calibration failure, etc.) or other problem related to the analysis of the samples
  - ▶ Date and time of sample preparation (if applicable)

- ▶ Date and time of sample analysis
  - ▶ Results of laboratory verification of field preservation
  - ▶ Sample matrix
  - ▶ DOH NELCP certification number for each laboratory (must be associated with the test result(s) generated by the laboratory)
  - ▶ MDL
  - ▶ PQL
  - ▶ Sample type (such as blank type, duplicate type, etc.)
  - ▶ Field and laboratory QC blank results:
    - **Laboratory QC blank analysis results as required by the method, NELAC Chapter 5 and the planning document (see Section 6 below);**
    - **Field quality control results including trip blanks, field blanks, equipment blanks, and field duplicates (or replicates) as specified in the planning document (see Section 6)**
  - ▶ Results of sample matrix spikes, laboratory duplicates or matrix spike duplicates, as applicable
  - ▶ Results of surrogate spike analyses (if performed)
  - ▶ Results of laboratory control samples (LCS)
  - ▶ Link between each reported quality control measure (e.g., QC blanks, matrix spikes, LCS, duplicates, calibration failure, etc.) and the associated sample result(s)
  - ▶ Acceptance criteria used to evaluate each reported quality control measure
- d. The CONTRACTOR shall ensure that the following field-related information is reported to the DEP contract manager:
- ▶ Site and/or stormwater BMP name
  - ▶ Field ID for each sample container and the associated analytes (test methods) for which the container was collected
  - ▶ Date and time of sample collection
  - ▶ Sample collection depth, if applicable
  - ▶ Sample collection method identified by the DEP SOP number, where applicable
  - ▶ If performed, indicate samples that were filtered
  - ▶ Field test measurement results, if applicable:
    - DEP SOP number (FT-series), where applicable
    - Parameter name
    - Result
    - Result unit
    - Applicable Data Qualifiers per Table 1 of Chapter 62-160, F.A.C.
  - ▶ Narrative comments discussing corrective/preventive actions taken for any failed QC measure (e.g., blank contamination, meter calibration failure, split sample results, etc.), unacceptable field measurement or other problems related to the sampling event.
- e. The CONTRACTOR shall submit the lab and field data above electronically in either Excel or Access format.

## 5. AUDITS

- a. AUDITS BY THE DEPARTMENT – Pursuant to Rule 62-160.650, F.A.C., the Department may conduct audits of field and/or laboratory activities. In addition to allowing Department representatives to conduct onsite audits, the CONTRACTOR, upon request by the Department, must provide all field and laboratory records pertinent to the contracted field and laboratory activities. If an audit by the Department results in a determination that the reported data are not usable for the purpose(s) or do not meet the data quality objectives specified by the Contract, the DEP contract manager shall pursue remedies available to the Department, including those outlined in Section 8 below.
- b. PLANNING REVIEW AUDITS –
- (i) Initial: Within 15 days of completing the first sampling and analysis event, the CONTRACTOR and all associated subcontractors shall review the planning document (see Section 6 below) relative to the completed field and laboratory activities to determine if the data quality objectives are being met, identify any improvements to be made to the process, and refine the sampling and/or analytical design

- or schedule. Within one month of the review, a summary of the review, including any corrective action plans or amendments to the planning document, shall be sent to the DEP contract manager and a copy shall be maintained with the permanent project records.
- (ii) Ongoing: Planning reviews as described in item (i) above shall occur annually.
- c. QUALITY SYSTEMS AUDITS – The CONTRACTOR and all subcontractors shall ensure that any required laboratory and field quality system and management systems audits are performed according to the respective Quality Manuals for each contracted and sub-contracted entity. These audits shall be documented in the CONTRACTOR’s and subcontractors’ records.
  - d. STATEMENTS OF USABILITY – As a part of the audit process and the final report, the CONTRACTOR shall provide statements about data usability relative to the Contract Data Quality Objectives and Data Quality Indicators specified in the planning document, this attachment and the addenda.
    - (i) The CONTRACTOR shall ensure that all acceptance and usability criteria required by this Contract not specified above are listed in the planning document.
    - (ii) The CONTRACTOR shall ensure that the results of all quality control measures described above are evaluated according to the acceptance criteria listed in this attachment, the addenda and the planning document.
    - (iii) The CONTRACTOR shall ensure that all sample results are evaluated according to the additional usability criteria specified in the planning document.

#### **6. PLANNING DOCUMENT**

- a. The CONTRACTOR shall submit the planning document identified below to the DEP contract manager no later than 120 days prior to the commencement of field and laboratory activities. Failure to submit the planning document in this required timeframe shall result in a delay of approval to begin work until the document has been submitted to the Department and approved by the DEP contract manager. The document shall be submitted as a Quality Assurance Project Plan (QAPP) that is prepared in accordance with “EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5”, (EPA/240B-01/003 March 2001).
- b. The CONTRACTOR and subcontractors may submit a version of the planning document to the Department for approval no more than three times. If the CONTRACTOR fails to obtain approval for the planning document after the third (final) submission to the Department, the DEP contract manager may suspend or terminate the Contract.
- c. The DEP Contract number shall appear on the title page of the submitted planning document. Within forty-five (45) days of receipt of the properly identified planning document by the Department, the Department shall review and either approve the planning document or provide comments to the CONTRACTOR and affected subcontractors as to why the planning document is not approved. If further revisions are needed, the CONTRACTOR shall then have fifteen (15) days from the receipt of review comments to respond. The Department shall respond to all revisions to the planning document within thirty (30) days of receipt of any revisions.
- d. If the review of the planning document by the Department is delayed, through no fault of the CONTRACTOR, beyond sixty (60) days after the planning document is received by the Department, the CONTRACTOR shall have the option, after the planning document is approved, of requesting and receiving an extension in the term of the Contract for a time period not to exceed the period of delayed review and approval. This option must be exercised at least sixty (60) days prior to the current termination date of the Contract.
- e. Sampling and analysis for the Contract may not begin until the planning document has been approved.
- f. Once approved, the CONTRACTOR shall follow the protocols specified in the approved planning document including, but not limited to:
  - ▶ Ensuring that all stated quality control measures are collected, analyzed and evaluated for acceptability;
  - ▶ Using only the protocols approved in the planning document; and
  - ▶ Using only the equipment approved in the planning document.
- g. If any significant changes in procedures or test methods, changes in equipment, changes in subcontractor organizations or changes in key personnel occur, the CONTRACTOR shall submit appropriate revisions of the planning document to the DEP contract manager for review. The proposed revisions may not be

implemented until they have been approved by the DEP contract manager. If the CONTRACTOR fails to submit the required revisions, the DEP contract manager may suspend or terminate the Contract.

- h. When the approved planning document requires modification, the amendments shall be
- (i) Provided in a new planning document, or
  - (ii) Provided as amended sections of the current planning document, or
  - (iii) Documented through written or electronic correspondence with the DEP contract manager and incorporated into the approved planning document.

**7. DELIVERABLES**

a. The following lists the expected schedule for the deliverables that are associated with the Quality Assurance requirements of this Contract:

- (i) Copy of DOH NELCP Certificate(s) and the associated list(s) of specific fields of accreditation, per item 2.d above.
- (ii) Non-standard laboratory or field procedures – The CONTRACTOR shall submit to the DEP contract manager all required information necessary for review of non-standard procedures per items 2.h. and 3.b. above.
- (iii) Reports of planning review audits as specified in item 5.b. above.
- (iv) Statements of Usability as specified in item 5.d. above.
- (v) Planning document per Section 6, above.

**8. CONSEQUENCES**

a. Failure to comply with any requirement of this attachment may result in:

- (i) Immediate termination of the Contract.
- (ii) Withheld payment for the affected activities.
- (iii) Contract suspension until the requirement(s) has been met.
- (iv) A request to refund already disbursed payments.
- (v) A request to redo work affected by the non-compliant activity.
- (vi) Other remedies available to the Department.

## APPENDIX I LABORATORY ACCREDITATION INFORMATION



State of Florida  
Department of Health, Bureau of Laboratories  
This is to certify that

E86240

FLORIDA TESTING SERVICES, LLC, DBA XENCO LABORATORIES -  
BOCA RATON  
3231 N.W. 7TH AVENUE  
BOCA RATON, FL 33431

has complied with Florida Administrative Code 64E-1,  
for the examination of Environmental samples in the following categories

DRINKING WATER - GROUP I UNREGULATED CONTAMINANTS, DRINKING WATER - GROUP II UNREGULATED CONTAMINANTS, DRINKING WATER - OTHER REGULATED CONTAMINANTS, DRINKING WATER - MICROBIOLOGY, DRINKING WATER - PRIMARY INORGANIC CONTAMINANTS, DRINKING WATER - SECONDARY INORGANIC CONTAMINANTS, DRINKING WATER - SYNTHETIC ORGANIC CONTAMINANTS, NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - MICROBIOLOGY, NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - MICROBIOLOGY, SOLID AND CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE July 01, 2010 THROUGH June 30, 2011



Max Salfinger, M.D.  
Chief, Bureau of Laboratories  
Florida Department of Health  
DH Form 1697, 7/04  
NON-TRANSFERABLE E86240-26-07/01/2010  
Supersedes all previously issued certificates



State of Florida  
Department of Health, Bureau of Laboratories  
This is to certify that

E84098

FLORIDA TESTING SERVICES, LLC DBA XENCO LABORATORIES -  
LAKELAND  
4320 OLD HIGHWAY 37  
LAKELAND, FL 33813

has complied with Florida Administrative Code 64E-1,  
for the examination of Environmental samples in the following categories

DRINKING WATER - MICROBIOLOGY, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - MICROBIOLOGY, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - MICROBIOLOGY

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2011 Expiration Date: June 30, 2012



Max Salfinger, M.D.  
Chief, Bureau of Laboratories  
Florida Department of Health  
DH Form 1697, 7/04  
NON-TRANSFERABLE E84098-30-07/01/2011  
Supersedes all previously issued certificates



State of Florida  
Department of Health, Bureau of Laboratories  
This is to certify that  
E87429



XENCO LABORATORIES - ATLANTA  
6017 FINANCIAL DRIVE  
NORCROSS, GA 30071

has complied with Florida Administrative Code 64E-1,  
for the examination of Environmental samples in the following categories

NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS,  
NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS -  
EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND  
CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

**Date Issued: July 01, 2011    Expiration Date: June 30, 2012**



Max Salfinger, M.D.  
Chief, Bureau of Laboratories  
Florida Department of Health  
DH Form 1697, 7/04  
NON-TRANSFERABLE E87429-25-07/01/2011  
Supersedes all previously issued certificates



State of Florida  
Department of Health, Bureau of Laboratories  
This is to certify that  
E871002



XENCO LABORATORIES - HOUSTON  
4143 GREENBRIAR DR.  
STAFFORD, TX 77477

has complied with Florida Administrative Code 64E-1,  
for the examination of Environmental samples in the following categories

DRINKING WATER - GROUP I UNREGULATED CONTAMINANTS, DRINKING WATER - GROUP II UNREGULATED CONTAMINANTS, DRINKING WATER - OTHER REGULATED CONTAMINANTS, DRINKING WATER - PRIMARY INORGANIC CONTAMINANTS, DRINKING WATER - SECONDARY INORGANIC CONTAMINANTS, DRINKING WATER - SECONDARY INORGANIC CONTAMINANTS, DRINKING WATER - SYNTHETIC ORGANIC CONTAMINANTS, NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2011 Expiration Date: June 30, 2012



Max Salfinger, M.D.  
Chief, Bureau of Laboratories  
Florida Department of Health  
DH Form 1697, 7/04

NON-TRANSFERABLE E871002-15-07/01/2011  
Supersedes all previously issued certificates

Laboratories Certified Under NELAP by the Florida Department of Health  
 Listing of Organization FOAs Query Results  
 Database Version: 10/30/2010 8:00:16 AM

Laboratory Name: Florida Testing Services LLC dba Xenco  
 Laboratories - Boca Raton  
 DOH ID: E86240

Matrix	Category	Analyte	AnalyteCode	Method	MethodCode	Certification Date
Non-Potable Water	General Chemistry	Un-ionized Ammonia	752	DEP SOP 10/03/83	846	2/25/2002
Non-Potable Water	General Chemistry	Ignitability	1780	EPA 1010	10116606	7/1/2003
Non-Potable Water	General Chemistry	Conductivity	1810	EPA 120.1	10006209	2/25/2002
Non-Potable Water	General Chemistry	Residue-volatile	1970	EPA 160.4	10010205	2/25/2002
Non-Potable Water	General Chemistry	Oil & Grease	1860	EPA 1664A	10127603	4/1/2010
Non-Potable Water	General Chemistry	Total Petroleum Hydrocarbons (TPH)	2050	EPA 1664A	10127603	4/1/2010
Non-Potable Water	General Chemistry	Turbidity	2055	EPA 180.1	10011402	2/25/2002
Non-Potable Water	General Chemistry	Bromide	1540	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Chloride	1575	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Fluoride	1730	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Nitrate as N	1810	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Nitrate-nitrite	1820	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Nitrite as N	1840	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Sulfate	2000	EPA 300.0	10053006	2/25/2002
Non-Potable Water	General Chemistry	Amenable cyanide	1510	EPA 335.1	10059800	2/25/2002
Non-Potable Water	General Chemistry	Total cyanide	1645	EPA 335.4	10061208	5/21/2007
Non-Potable Water	General Chemistry	Ammonia as N	1515	EPA 350.1	10063204	2/25/2002
Non-Potable Water	General Chemistry	Kjeldahl nitrogen - total	1795	EPA 351.2	10065006	2/25/2002
Non-Potable Water	General Chemistry	Organic nitrogen	1865	EPA 351.2 - EPA 350.1	809	2/25/2002
Non-Potable Water	General Chemistry	Nitrate as N	1810	EPA 353.2	10067206	2/25/2002
Non-Potable Water	General Chemistry	Nitrate-nitrite	1820	EPA 353.2	10067206	2/25/2002
Non-Potable Water	General Chemistry	Orthophosphate as P	1870	EPA 365.1	10069600	2/25/2002
Non-Potable Water	General Chemistry	Phosphorus total	1910	EPA 365.1	10069600	2/25/2002
Non-Potable Water	General Chemistry	Chemical oxygen demand	1565	EPA 410.4	10077006	2/25/2002
Non-Potable Water	General Chemistry	Total phenolics	1905	EPA 420.4	10080203	12/2/2006
Non-Potable Water	General Chemistry	Chromium VI	1045	EPA 7196	10162206	7/1/2003
Non-Potable Water	General Chemistry	Total cyanide	1645	EPA 9012	10193201	7/1/2003
Non-Potable Water	General Chemistry	pH	1900	EPA 9040	10196802	7/1/2003
Non-Potable Water	General Chemistry	Bromide	1540	EPA 9056	10199005	7/1/2003
Non-Potable Water	General Chemistry	Chloride	1575	EPA 9056	10199005	7/1/2003
Non-Potable Water	General Chemistry	Fluoride	1730	EPA 9056	10199005	7/1/2003
Non-Potable Water	General Chemistry	Sulfate	2000	EPA 9056	10199005	7/1/2003
Non-Potable Water	General Chemistry	Total organic carbon	2040	EPA 9060	10200201	7/1/2003
Non-Potable Water	General Chemistry	Total phenolics	1905	EPA 9066	10206609	7/1/2003
Non-Potable Water	General Chemistry	Chlorophylls	9345	SM 10200 H	248	9/10/2003
Non-Potable Water	General Chemistry	Color	1605	SM 2120 B	20001803	2/25/2002
Non-Potable Water	General Chemistry	Turbidity	2055	SM 2130 B	20002408	2/25/2002
Non-Potable Water	General Chemistry	Alkalinity as CaCO3	1505	SM 2320 B	20003003	5/21/2007
Non-Potable Water	General Chemistry	Corrosivity (langlier index)	1620	SM 2330 B	20003207	2/25/2002
Non-Potable Water	General Chemistry	Hardness	1750	SM 2340 B	20003401	5/8/2003
Non-Potable Water	General Chemistry	Salinity	1975	SM 2520 B	20004006	5/8/2003
Non-Potable Water	General Chemistry	Residue-total	1950	SM 2540 B	20004608	1/9/2006
Non-Potable Water	General Chemistry	Residue-filterable (TDS)	1955	SM 2540 C	20004404	5/21/2007
Non-Potable Water	General Chemistry	Residue-nonfilterable (TSS)	1960	SM 2540 D	20004802	5/21/2007
Non-Potable Water	General Chemistry	Residue-volatile	1970	SM 2540 E	679	1/9/2006
Non-Potable Water	General Chemistry	Chloride	1575	SM 4500-CI E	20020002	5/21/2007
Non-Potable Water	General Chemistry	Amenable cyanide	1510	SM 4500-CN G	20021607	5/21/2007
Non-Potable Water	General Chemistry	pH	1900	SM 4500-H+B	20016404	5/21/2007
Non-Potable Water	General Chemistry	Sulfide	2005	SM 4500-S F (20th/21st Ed.)	804	5/21/2007
Non-Potable Water	General Chemistry	Biochemical oxygen demand	1530	SM 5210 B	20027401	2/25/2002
Non-Potable Water	General Chemistry	Carbonaceous BOD (CBOD)	1555	SM 5210 B	20027401	2/25/2002
Non-Potable Water	General Chemistry	Total organic carbon	2040	SM 5310 B	20028006	5/21/2007
Non-Potable Water	General Chemistry	Surfactants - MBAS	2025	SM 5540 C	20029009	2/25/2002
Non-Potable Water	General Chemistry	Organic nitrogen	1865	TKN minus AMMONIA	299	5/8/2009
Non-Potable Water	Metals	Total hardness as CaCO3	1755	SM 2340 B	20003401	2/25/2002
Non-Potable Water	Microbiology	Heterotrophic plate count	2555	SIMPLATE	238	6/28/2004
Non-Potable Water	Microbiology	Total coliforms	2500	SM 9221 B	20035807	2/25/2002
Non-Potable Water	Microbiology	Fecal coliforms	2530	SM 9221 E	20036208	2/25/2002
Non-Potable Water	Microbiology	Total coliforms	2500	SM 9222 B	20036600	2/25/2002
Non-Potable Water	Microbiology	Fecal coliforms	2530	SM 9222 D	20037405	2/25/2002
Non-Potable Water	Microbiology	Fecal streptococci	2540	SM 9230 B	20037803	2/25/2002

### Alternative Lab Certifications: Lakeland (excerpt 08/03/2011)

Laboratories Certified Under NELAP by the Florida Department of Health  
 Listing of Organization FOAs Query Results  
 Database Version: 7/30/2011 8:00:16 AM

Laboratory Name Florida Testing Services LLC dba Xenco  
 Laboratories - Lakeland  
 DOH ID: E84098

Matrix	Category	Analyte	AnalyteCode	Method	MethodCode	Certification Date
Non-Potable Water	General Chemistry	Residue-nonfilterable (TSS)	1960	EPA 160.2	10009402	11/15/2002
Non-Potable Water	General Chemistry	Total nitrate-nitrite	1825	EPA 300.0	10053006	11/15/2002
Non-Potable Water	General Chemistry	Alkalinity as CaCO3	1505	EPA 310.1	10054601	11/15/2002
Non-Potable Water	General Chemistry	Ammonia as N	1515	EPA 350.1	10063204	11/15/2002
Non-Potable Water	General Chemistry	Kjeldahl nitrogen - total	1795	EPA 351.2	10065006	11/15/2002
Non-Potable Water	General Chemistry	Organic nitrogen	1865	EPA 351.2 - EPA 350.1	809	11/15/2002
Non-Potable Water	General Chemistry	Nitrate-nitrite	1820	EPA 353.2	10067206	11/15/2002
Non-Potable Water	General Chemistry	Phosphorus total	1910	EPA 365.4	10071008	11/15/2002
Non-Potable Water	General Chemistry	Alkalinity as CaCO3	1505	SM 2320 B	20003003	7/11/2007
Non-Potable Water	General Chemistry	Residue-nonfilterable (TSS)	1960	SM 2540 D	20004802	7/11/2007
Non-Potable Water	General Chemistry	Carbonaceous BOD (CBOD)	1555	SM 5210 B	20027401	11/15/2002
Non-Potable Water	Microbiology	Fecal coliforms	2530	SM 9222 D	20037405	11/15/2002
Non-Potable Water	Microbiology	Fecal streptococci	2540	SM 9230 C	20038000	11/15/2002

### Alternative Lab Certifications: Houston (excerpt 08/04/2011), TP, NOx

Laboratories Certified Under NELAP by the Florida Department of Health  
 Listing of Organization FOAs Query Results  
 Database Version: 7/30/2011 8:00:16 AM

Laboratory Name Xenco Laboratories - Houston  
 DOH ID: E871002

Matrix	Category	Analyte	AnalyteCode	Method	MethodCode	Certification Date
Non-Potable Water	General Chemistry	Total nitrate-nitrite	1825	EPA 300.0	10053006	8/28/2006
Non-Potable Water	General Chemistry	Phosphorus total	1910	EPA 365.3	10070607	11/20/2009
Non-Potable Water	General Chemistry	Total nitrate-nitrite	1825	EPA 9056	10199005	8/28/2006

### Alternative Lab Certifications: Atlanta (excerpt 08/04/2011), TKN

Laboratories Certified Under NELAP by the Florida Department of Health  
 Listing of Organization FOAs Query Results  
 Database Version: 7/30/2011 8:00:16 AM

Laboratory Name XENCO Laboratories - Atlanta  
 DOH ID: E87429

Matrix	Category	Analyte	AnalyteCode	Method	MethodCode	Certification Date
Non-Potable Water	General Chemistry	Kjeldahl nitrogen - total	1795	SM 4500-NH3C	20023603	1/24/2008

## APPENDIX J REVISIONS TO QAPP

Date	Section	Revision
4/1/11	Appendix F	Changed QC number codes from 001 and 002 for original and duplicate samples to 01 and 02 to match other parts of the QAPP. Added sample location column and corresponding coding references.
4/4/11	2.2.6.2 Table 8	Modified the nomenclature for clarity and consistency.
4/4/11	2.4.2.4.1	Updated to the correct parameter: turbidity.
4/6/11	2.2.5.2	Changed YSI in-situ device calibration requirement. Previously, calibration was required after a break of more than 36 hours since last verification. The new calibration requirement is that it is not needed if verification is within half of acceptance standards.
4/6/11	Appendix B	Replaced with revised version, modified for clarify and consistency.
4/6/11	Appendix D	Replaced with revised version, modified for clarify and consistency.
4/6/11	Table 2	Updated to reflect that TP, Fecal Coliform, and Total alkalinity will not be taken for 100% of samples. Instead, TP and Fecal Coliform will be analyzed for 50% of all samples, and Total alkalinity will be analyzed for 3% of all samples.
4/18/11	2.4.2.4.1 p. 45	Use 25 mL for Hach-turbidity (instead of 10 mL). This way, both color and turbidity in the Hach testing use the same amount; Confirmed by Hach Tech Support to be o.k.
4/26/11	1.6.1.2 p. 10 2.2.2 p. 31	Where county health department records indicate that the establishment served by the system has not been occupied for at least three months, a site visit does not need to be performed, and the system will be recorded as "active and vacant".
4/26/11	Appendix B p.2 item 2.e.	Add "Sampling Port" to "other" to make it easier to indicate location of sampling port in order of components; Some formatting and page breaks to keep tables together
5/4/11	2.4.2.4.3 (reactive P); p.46	Discovered inconsistency between method description and ordered chemicals. For powder pillows, use "program 79" in Hach DR/890 (not 82). Changed procedure.
5/4/11	2.2.6.4 p.40/41	Clarified initial purging by moving it into step 1 of sample collection method 3 (peristaltic pump) (established during Charlotte County training 4/7-8/11). "For P-traps, cross-traps and distribution boxes, or where solids have apparently accumulated, use a hand pump or this pump to purge the volume until it clears, and wait for it to fill up again. Dispose of the material, by returning it to the treatment system after sampling is completed, or downstream of the sampling location." Also added reminder that samples get put in ice within 15 min
5/27/11	2.4.2.4 p. 46 ff.	Included disposal information from Hach MSDS (can dilute, neutralize, and flush with 5 minutes of cold water).

		Can use 25 mL DI water in blank for ortho-P Hach test.
06/15/11	Table 8; p. 38	Accounted for parallel trains and replicate/split samples: <i>Note: if there are sample locations in parallel (e.g. two ATUs or two sampling ports under a drainfield), denote this by appending the number 1, 2 after the sampling location as shown below (e.g., CLI). Note: if there are split or replicate samples (obtained from the same mixed volume), denote this by appending a, b, etc to the number as shown below (e.g., 01a, 01b).</i>
08/03/11	Table 8; p. 38	Added location designation "MW" for monitoring well after drainfield to distinguish from sampling ports before drainfield SP-sampling port (before drainfield) MW-monitoring well or sampling port after drainfield
08/04+ 17/11	Tables 2, 3, 9; Appendix I	Added alternative laboratory methods for TP (EPA 365.3), TKN (SM4500-NH3C (TKN)) and NOx (EPA300). This became necessary due to a reorganization of lab locations and break down of one lab instrument. According to the lab, holding times and achievable detection limits are not impacted. Added alternative lab locations (Lakeland, Houston, Atlanta) certifications to Appendix I.