



Florida Department of Health
Bureau of Onsite Sewage Programs
Research Review and Advisory Committee Meeting

DATE AND TIME: April 20, 2011 at 1:00 p.m. EDT

PLACE: Florida Department of Health Southwood Complex
Betty Easley Center
4075 Esplanade Way, Room #178
Tallahassee, FL 32399

Or via conference call / web conference:

Toll free call in number: 1-888-808-6959

Conference code: 1454070

Website: <http://connectpro22543231.na5.acrobat.com/rrac/>

This meeting is open to the public

AGENDA: FINAL

1. Introductions and Housekeeping
2. Review Minutes of Meeting March 24, 2011
3. Nitrogen Study
 - a. Status report for Legislature
4. Other Business
5. Public Comment
6. Closing Comments, Next Meeting, and Adjournment

Florida Department of Health
Research Review and Advisory Committee for the Bureau of Onsite Sewage Programs

Draft Minutes of the Meeting held at the Betty Easley Conference Center, Tallahassee, FL
March 24, 2011

In attendance:

- **Committee Members and Alternates:**

- In person:**

- Bob Himschoot (member, Septic Tank Industry)
- Carl Ludecke (vice-chairman, member, Home Building Industry)
- Bill Melton (member, Consumer)
- Eanix Poole (alternate, Consumer)
- Patti Sanzone (member, Environmental Interest Group)

- Via teleconference:**

- Quentin (Bob) Beitel (alternate, Real Estate Profession)
- Kim Dove (member, Division of Environmental Health)
- Tom Miller (member, Local Government)
- John Schert (member, State University System)
- Clay Tappan (chairman, member, Professional Engineer)
- Pam Tucker (member, Real Estate Profession)
- David Richardson (alternate, Local Government)

- Absent members and alternates:**

- Sam Averett (alternate, Septic Tank Industry)
- John Dryden (alternate, State University System)
- Tom Higginbotham (alternate, Division of Environmental Health)
- Kriss Kaye (alternate, Home Building Industry)
- Mike McInarnay (alternate, Septic Tank Industry)
- Jim Peters (alternate, Professional Engineer)
- Restaurant Industry (no appointed member/alternate)

- **Visitors:**

- In person:**

- Robert Arredondo (DCA)
- Keith Hetrick (Broad & Cassel for FHBA)
- Richard Hicks (DEP)
- Sean McGuigan (Presby Env.)
- Steve Meints (Clearstream)
- Dave Presby (Presby Env.)
- Lee Rashkin (Presby Env.)
- Shanin Speas-Frost (DEP)

- Via teleconference:**

- Damann Anderson (Hazen and Sawyer)
- Kim Dinkins (Marion County)
- Gina Herron
- Katherine Lowe (CSM)
- John McCray (CSM)
- Maria Pecoraro (Rep. Nelson)
- Andrea Samson
- Daniel Smith (AET)
- Richard Spaulding (DOH)
- Pam Tucker

- **Department of Health (DOH), Bureau of Onsite Sewage Programs:**

- In person:**

- Eberhard Roeder, Professional Engineer
- Elke Ursin, Environmental Health Program Consultant

- Via teleconference:**

- Kim Duffek, Environmental Health Program Consultant
- Paul Booher, Professional Engineer

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1. **Introductions** – Nine out of ten groups were present, representing a quorum. Missing the Restaurant Industry. Chairman Tappan called the meeting to order at 9:35 a.m. Introductions were made and some housekeeping issues were discussed.
2. **Changes to RRAC Composition** – Every year around December and January terms expire. The expirations are staggered so that each year 3-4 groups need to be renewed. New appointees include Tom Miller and David Richardson representing local government. Reappointments are Bill Melton and Eanix Poole representing consumers, and John Schert and John Dryden representing the state university system. Leaving the committee is Pam Tucker, Jim Oskowis, and Vince Seibold. The Florida Restaurant Association failed to name replacements for the committee and the two positions remain vacant. Clay Tappan pointed out that there is no replacement right now for the Real Estate Industry member position. Elke Ursin stated that that is correct, and that the alternate, Quentin Beitel, would be the voting member until a new member is appointed. Pam Tucker stated that she is still interested in keeping up with what is happening, but that she could not make another commitment to serve on the panel. Quentin Beitel acknowledged the great work that Pam has done and that she has inspired a lot of people in their industry throughout the state, and there was general consensus from DOH staff and the RRAC that she will be missed.
3. **Review of Previous Meeting Minutes** – The minutes of December 10, 2010 were reviewed.

Motion by Patti Sanzone and seconded by Bob Himschoot to approve the minutes as presented. All were in favor with none opposed and the motion passed unanimously.

4. Nitrogen Study

- a) **Comments on deliverables and next steps** – Elke Ursin presented the overall purpose of the study and presented several updates to each of the tasks.

Damann Anderson presented on a concern that Representative Nelson had regarding the definition of passive. Representative Nelson expressed concerns regarding the use of pumps for all passive nitrogen reduction systems. Damann stated that pumps would not be required for all these systems, that the definition states there shall be no more than one pump, so if topography allows for it the pump could be eliminated from the design. Damann proposed looking at a gravity system at a home site with available topography in Task B to satisfy these concerns. Bill Melton stated that after reading the Wakulla study report, he would rather not see any pumps at all because of issues that occur if they don't work. Carl Ludecke stated that in some situations you have to have a pump. He said that the systems that are being turned off in the Wakulla study report are the ones with aerators and with gravity flow through the system so when the aerator is turned off the sewage still moves through the system. Damann stated that allowing for the one pump is a similar concept to what is currently required for mound systems throughout the state. Clay Tappan stated that when the original definition of passive was written, including the option for no more than one pump to move effluent was to include systems that would need a pump based on site conditions. Having a pump was not a requirement, but was allowed, if necessary, based on site conditions. There is a difference between pumps required for operational improvement (part of an advanced system, recirculation, etc.) and functional necessity (lift dosing to meet site restrictions). Maria Pecoraro asked if these type of systems would require a generator if there is no power due to a natural disaster and Damann stated that this would be no different than any of the other systems out there currently with a pump. Carl Ludecke stated that the pump does not run

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constantly, it only runs as the demand is needed. If the power goes out, the tanks and drainfields are built with extra capacity to handle some of the flow. For systems out in rural areas where there is a well for drinking water, when the power goes out the well does not work so there is no flow generated. Damann stated that they are working on developing a system and whether or not a pump is required is a different issue. Maria stated that Representative Nelson's concerns are regarding existing septic systems that have no electricity that might now require electricity if a pump is required. Damann stated that the only places where a pump would be required would be places where a pump would be required anyway for a septic system due to topography or water table setback issues. There were some questions regarding how many systems have a pump and Elke Ursin will provide this information to the RRAC email distribution list shortly after the meeting. Bill Melton asked Damann how much drop in elevation is needed for the system they are working on and Damann stated approximately 6-8 feet.

Quentin Beitel made a motion, seconded by Bill Melton, to require one of the field tests to be a gravity system. All were in favor, none opposed, and the motion passed.

Quentin Beitel asked if there is anything that can be done to clean up the definition of passive. Carl Ludecke said that passive is non-mechanical and there is an exception to allow one pump to move effluent. Eberhard Roeder stated that back when the definition was originally made, mechanical aeration pumps were to be excluded and a pump to allow for distribution and head was allowed. Damann stated that the idea was to have a system that is no more complicated than the systems around today. Maria stated that this definition was crafted 5 years ago during a RRAC meeting. Maria stated there is an issue with nitrogen, but that there needs to be an understanding of what homeowners are going to be able to do in a practical sense. Maria stated some of Representative Nelson's other concerns were that there seemed to be a lack of coordination with other studies going on and that there was not enough research done on different drainfield materials or other media. Clay stated that regarding the issue with lack of coordination, RRAC has had two or three presentations from the University of Central Florida regarding their system and wanted to avoid doing extensive testing on existing products to avoid duplication of efforts. Damann stated that this study has researched all sorts of media alternatives, in any number of configurations, and several are being tested at the testing center. Pam Tucker stated that homeowners think that a passive system has no mechanics. Homeowners are fearful of rules that require mechanics. Because the definition is not clear, there is a gap in understanding. Maria agreed with Pam's comments and stated that homeowners are coming to them with these concerns. Keith Hetrick stated that there will be no rulemaking until the study is done. These systems are not complex mechanical systems; these are cost-effective systems for homeowners that do not have a high level of maintenance. Elke Ursin stated that Gerald Briggs had told her that the current draft of the house and senate budget includes a line item for the Nitrogen Reduction Strategies study in the amount of \$2,725,000. Rick Hicks stated that there might be a possibility that the definition of passive as it is right now might restrict the funding for this project. Maria stated that Representative Nelson has a concern over the inclusion of pumps on a passive system. He understands the topography and water table restrictions but that a pump cannot be the first option. If the site can utilize gravity flow then that should be the default. Eberhard Roeder stated that this definition has been used all throughout this project and if this definition is changed it may not be consistent with the contract and the competitive instrument used to hire the contractor. Maria stated that the study needs to include non-mechanical systems. Carl Ludecke stated that the study does include this. Damann stated that a passive system is a non-mechanical treatment system however one pump is allowed,

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but not required, to get the effluent to the treatment system. Maria's concerns were that rulemaking could require that all systems need a pump. Damann stated that the pump would be allowed, but not required. There seemed to be a general consensus that a passive system does not require a pump. Patti Sanzone stated that what this study is looking at is not a conventional system. A conventional system does not do much for nitrogen removal. Damann is trying to get a system to reduce nitrogen that is cost-effective. Damann stated that a mound system with a pump achieves better treatment than a gravity-fed mound system. Patti stated that the study will give us the answers, at this point we do not know what they are. Patti asked Maria if the Legislators have any problem with the current rules when it comes to pumping to a drainfield. Maria stated that they are reviewing those rules, but that a pump should not be mandatory for people that do not need a pump. Patti stated that development in Florida is currently focusing on developing marginal lands, and that these areas often have pumps in order to meet state requirements. Eberhard Roeder stated that the legislative language for this year said that the contract shall remain in full force. Changing the definition of passive may not be allowed. Keith Hetrick suggested changing the definition of passive from "includes no more than one effluent dosing pump" to "allows no more than one effluent dosing pump if necessary". Shanin Speas-Frost asked why this is coming up now when this definition has been around since 2007. Patti Sanzone asked that information from homeowners be passed to DOH so that these issues can be responded to. Andrea Samson is a homeowner in the Wekiva area. She said that homeowners are responding to accusations that their systems are polluting the groundwater. The focus of this study was to substantiate the need for nitrogen removal, and the fate and transport component of this project is critical. Legislators need to be convinced that the study is providing homeowners with nitrogen removal materials that can be used with conventional existing systems. They want solutions that are affordable in response to a demonstrated need. Bill Melton said that the ultimate goal of this project is to find the cheapest, most effective, and most efficient way to achieve nitrogen reduction, but that we do not know what the answer is yet. Maria stated that the legislators all value the work that this committee does. Eberhard Roeder stated that he has a concern regarding recirculating systems in Task A and if the definition is changed this would exclude them from being tested. Keith Hetrick said the main focus and priority for Phase II from the legislative language was developing, testing, and recommending cost-effective passive technology design criteria for nitrogen reduction. He stated that originally what they were referring to in the law was that the focus be on passive technologies that can be retrofitted to conventional systems. If the conventional system has a pump then it would still have a pump. He stated that the original intent was not the whole system, but just the passive technology portion. If we are now trying to alter the original system so that it does not have a pump then that is a much different mission than what was originally discussed. The 2008 language from the law mentions looking at multiple types of nitrogen reducing technologies, and the focus is on the technology to reduce nitrogen. We do not want to do anything to disrupt the contract mid-stream. This is a \$5 million project that has been vetted and is on time and on budget and he does not want something to disrupt this. Maria stated that the system needs to be non-mechanical. Patti stated that Keith made an excellent presentation. RRAC is following the law and does not want RRAC or DOH to react to something that may not need to be reacted to without full RRAC involvement. Maria stated that the legislators are reacting to homeowners concerns. Damann said that the project is going to look at a completely passive system as part of this project. Maria will send a draft letter that will ultimately come from the RRAC, to DOH staff clarifying the issue, and will then be sent to the RRAC for their review by Elke.

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Elke Ursin prepared a spreadsheet with a funding update on what has been spent to date on the project by task.

- b) Task D modeling amendment discussion** – John McCray, professor with the Colorado School of Mines and department head of the environmental science and engineering division, presented on the proposed Task D amendment. Task D goal is to account for the true treatment that happens in soils. The type of treatment depends on many things such as hydrology and soil type. To simply assume that all of the nitrogen leaving a system makes it to the groundwater is too conservative of an approach. In the end they want to develop a tool that is relatively simple to use to find out treatment performance and impacts to groundwater. The general scope and budget do not change with what they are proposing; instead they propose to move some funds from Phase 3 into Phase 2. He described the difference between a simple model and simple to use tool. The simple to use tool will be more robust. He gave an example of a simple model being like a bicycle: it is relatively easy to see how it works and is easy to use; and a simple to use tool being like a car: it is complicated underneath but is also relatively easy to use. Currently the contract has a simple model and they would like to change it so that it is a simple to use tool that will be built from a complex model. Katherine Lowe with the Colorado School of Mines stated that this type of model can be manipulated in many different ways resulting in numerous changes in the output graphs. This will allow you to determine if the soil system will achieve the treatment that is desired, and will allow the user to see the limitations to achieving that treatment level. John McCray presented the suggested amendment. Phase I will not change. Phase II will go from development of a simple soil model and a complex soil model to starting with the complex soil modeling and then tailoring that to a simple soil tool. Phase III will include a groundwater model and linking it with the complex soil model. By shifting funds into Phase II to cover this amendment, portions of Tasks B and C will go into Phase III. Based on the current schedule it appears that this would be done anyway. Damann stated that based on the work that FSU and DEP are doing, this model will provide the missing soil component in their model. Rick Hicks stated that this soil model tool can give ideas for areas of the state where no additional wastewater treatment is needed if the soil conditions are adequate. It is important to advance this tool sooner rather than later. Quentin Beitel asked who can use the deliverables that come out of this task. Elke Ursin stated that all of the work products as a result of this contract are all public information. Katherine Lowe stated that one of the deliverables includes modifications of a model called STUMOD which is available in the public domain. John McCray said that nothing is proprietary; it is all free information for future development. Eanix Poole asked whether this model could address densities and John McCray stated that the model itself cannot do that, but if used in aggregate (i.e. in as Geographic Information System) it could be done. Rick Hicks asked if this was part of the contract and Katherine Lowe stated that Phase III has a component that interfaces with a groundwater model.

Bill Melton made a motion, seconded by Patti Sanzone, to move forward with the Task D amendment to make the contract in line with the Quality Assurance Project Plan. All were in favor, none opposed, and the motion passed.

- c) Discussion on status report for Legislature** –The status report for the Legislature, as outlined in the legislative language in this year's budget, is due on May 16, 2011 and will need to be routed internally at least a month prior to be completed on time. Elke Ursin presented a draft to the RRAC. She asked what RRAC expected this report to look like and how this can be approved by RRAC in the timeframe available. Quentin Beitel stated the this report should highlight accomplishments, go into detail about where we are in the current phase, support the

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need for funding, mention that the project will be looking at installing a passive gravity-fed system at a home site, and update the Task D section based on what was approved at this meeting. RRAC discussed modifications to the draft status report and agreed that the final format will be almost identical to the legislative progress report from February with some updates regarding current status and current spending.

Bill Melton made a motion, seconded by Patti Sanzone, to do an email vote for approval of this report similar to the process done for the last legislative report. All were in favor, none opposed, and the motion passed.

5. **Presentation by Presby Environmental Inc. on passive denitrification processes** – David Presby presented on their De-Nyte wastewater denitrification system. He stated that some of the work that is being done on the nitrogen study has been done by him previously. They are located in New Hampshire and Maine and are looking to expand. Their product is a container with a special mix of media that goes underneath the drainfield to reduce nitrogen. A physical demonstration of the product was made. Carl Ludecke asked how this product can get approved in Florida, and Sean McGuigan stated that they met with Roxanne Groover with the Florida Onsite Wastewater Association and submitted information to FDOH for part of the system, but not the De-Nyte system. Once they get their initial product approved then they will apply for the rest of the approvals. They appreciated the opportunity to present to the RRAC.

6. **Research Priorities Workshop** – The basic process to get the ranking done as quickly and efficiently as possible was outlined. During the December 10, 2010 RRAC meeting, everyone brainstormed up to 5 ideas for potential research projects. Then each person recited his or her responses which were written down by staff. Then a group discussion occurred to clarify and discuss the potential research projects. These project suggestions were streamlined into 17 projects which had project descriptions roughly scoped out giving a background, objectives and outcomes, the research approach, any potential collaboration, the duration, the estimated cost, and the ease of implementation. RRAC members submitted their rankings to Elke Ursin, which were tabulated in an Excel spreadsheet during the meeting. The resulting priority list is as follows:

Ranking	Project
1	Continuation of Inventory of OSTDS in Florida
2	Effectiveness of Outlet Filters
3	Life Expectancy of Onsite Systems
4	Drip Disposal With Septic Tank Quality Effluent
5	Correlations Between Water Quality, OSTDS, and Health Effects

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These projects will be presented at the next Technical Review and Advisory Panel for their approval per the statutory requirements. Staff will begin scoping out these projects and will present on them at a future RRAC meeting.

- 7. Update on Study of Performance of Advanced System in Florida** – Elke Ursin presented some of the recent progress on this project. A grant amendment was executed to extend the end date to 9/30/2011, allow for the purchase of equipment, and allow the county health departments to assist with the sampling effort. She then provided an update of what has been accomplished by task for this project. The summary report outline and data analysis for the Monroe County project is being done. The basic design for the database is complete and is continuously being updated to streamline data entry. A query and report is being developed to automate the summary statistics. The survey results are being tabulated and analyzed with several cross-tab analysis categories having been sent to the contract provider for them to include in their analysis. For the sampling portion of this project, there have been several developments. The Quality Assurance Project Plan was routed to DEP on January 18, 2011 and DEP responded back on March 18, 2011. Staff sent responses back to DEP this morning prior to the meeting. The contract with the lab has been amended to add more units for sample analysis. Permit file reviews are ongoing with 442 files having been reviewed. The sample set was expanded by 204 systems for a total of 1,000 due to a large number of systems not being an active advanced system. They were either abandoned (many in the Keys fit in this category), a conventional system, connected to sewer, etc. The Monroe County Health Department has agreed to participate in the sampling effort. Charlotte CHD volunteered too. Brevard has declined and we are looking for at least one more county to assist. Debra Roberts, the contract staff working on this project, was on a conference call this morning with the Environmental Health Directors throughout the state to let them all know that we need volunteers. The quality assurance on the data entry is ongoing. Eberhard Roeder went on a quality assurance/training trip to the Keys and sampled several systems and standardized the protocol. DOH staff performed a sampling event on March 22nd in Wakulla. The final task for this project is evaluating management practices, and staff is working on developing a method to choose counties to focus on. One way might be looking at high/low user satisfaction from the user surveys. Another way could be looking at high/low scores on county program evaluations as they related to advanced system scoring categories.
- 8. Update on Alternative Drainfield Products Study** – Elke Ursin presented an update of what has been accomplished for this project. For 2010 data, a clean-up was done to make sure the system installation date on the repair form is accurate. The county health departments were notified via email and most errors were data entry errors that involved the system install date being the same as, close to, or later than the application date. Data mining of existing permit data was done to link original installations with corresponding repairs based on geocoded addresses. These were then filtered by those that had product information. The plan is to retrace the steps to ensure data accuracy, and then other data fields will be pulled into the dataset to do a data analysis. Data mining and analysis will continue and will be reported back to RRAC.
- 9. Other Business** – No other business was discussed.
- 10. Public Comment** – The public were allowed to comment throughout the meeting. There was no additional public comment.

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11. Closing Comments, Next Meeting, and Adjournment – Potential dates for the next RRAC meeting will be emailed to RRAC members and alternates to determine the next meeting date. It is anticipated that this meeting will occur sometime in April to allow for a discussion of the Nitrogen Study Status Report for the Legislature.

Carl Ludecke made a motion, seconded by Bill Melton, to adjourn at 2:54 p.m. All were in favor, none opposed, and the motion passed.

DRAFT

Florida Department of Health
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Approved Minutes of the Meeting held at the Betty Easley Conference Center, Tallahassee, FL
April 20, 2011

In attendance:

- **Committee Members and Alternates:**

- In person:**

- Bill Melton (member, Consumer)
 - Patti Sanzone (member, Environmental Interest Group)
 - Clay Tappan (chairman, member, Professional Engineer)

- Via teleconference:**

- Quentin (Bob) Beitel (alternate, Real Estate Profession)
 - Kim Dove (member, Division of Environmental Health)
 - Bob Himschoot (member, Septic Tank Industry)
 - Kriss Kaye (alternate, Home Building Industry)
 - Carl Ludecke (vice-chairman, member, Home Building Industry)
 - Tom Miller (member, Local Government)
 - Jim Peters (alternate, Professional Engineer)
 - Eanix Poole (alternate, Consumer)
 - John Schert (member, State University System)

- Absent members and alternates:**

- Sam Averett (alternate, Septic Tank Industry)
 - John Dryden (alternate, State University System)
 - Tom Higginbotham (alternate, Division of Environmental Health)
 - Mike McInarnay (alternate, Septic Tank Industry)
 - David Richardson (alternate, Local Government)
 - Restaurant Industry (no appointed member/alternate)

- **Visitors:**

- In person:**

- Robert Arredondo (DCA)
 - Richard Hicks (DEP)
 - Maria Pecoraro (Rep. Nelson)
 - Lee Smith (ECT)
 - Shanin Speas-Frost (DEP)

- Via teleconference:**

- Damann Anderson (Hazen and Sawyer)
 - Andrea Samson
 - Jim Spinnenweber
 - Pam Tucker

- **Department of Health (DOH), Bureau of Onsite Sewage Programs:**

- In person:**

- Eberhard Roeder, Professional Engineer
 - Elke Ursin, Environmental Health Program Consultant

- Via teleconference:**

- Paul Booher, Professional Engineer
 - Kim Duffek, Environmental Health Program Consultant
 - Kara Loewe, Distributed Computer Systems Consultant

1. **Introductions** – Nine out of ten groups were present, representing a quorum. The group that was not represented was the Restaurant Industry. Chairman Tappan called the meeting to order at 1:03 p.m. Introductions were made and some housekeeping issues were discussed.

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- 2. Review of Previous Meeting Minutes** – The minutes of March 24, 2011 were reviewed. Clay Tappan suggested a change to the minutes to clarify what he stated during the meeting regarding the reason why extensive testing on existing untested products is not part of the study. He said that these product manufacturers should be doing their own research and development not at taxpayer's expense. Quentin Beitel asked whether Patti Sanzone is representing DEP while at these meetings, and she said that as a RRAC member she is representing an environmental interest group but that she attends the RRAC meetings regardless of whether she is a member or not as part of her job duties. Shanin Speas-Frost and Rick Hicks are at the meeting representing DEP as part of the legislative language directing DEP to have maximum technical input over the nitrogen study. Quentin Beitel asked whether the 319 project was a project that RRAC is responsible for and Elke Ursin stated that this is a federal grant so technically RRAC is not responsible but that RRAC is generally made aware of these projects and input is requested due to their expertise. Quentin Beitel asked whether the information requested in the minutes was provided on the number of pumped systems in Florida and Elke Ursin stated that they were provided shortly after the last meeting.

Motion by Bob Himschoot, seconded by Carl Ludecke, to approve the minutes as amended. All were in favor with none opposed and the motion passed unanimously.

3. Nitrogen Study

- a) Discussion on status report for Legislature** –The status report for the Legislature, as outlined in the legislative language in this year's budget, is due on May 16, 2011 and will need to be routed internally shortly after this meeting. Elke Ursin presented a revised draft to the RRAC based on comments made at the March 24, 2011 meeting. A total of \$1,886,919 is remaining in budget as of April 15, 2011. RRAC discussed modifications to the draft status report.

Quentin Beitel made a motion, seconded by Bob Himschoot, to approve the status report for the Legislature as amended during the meeting. All were in favor, none opposed, and the motion passed.

- b) Other business** – Elke Ursin stated that Hazen and Sawyer and the Colorado School of Mines are both presenting on the passive nitrogen reduction strategies study at this years National Onsite Wastewater Recycling Association (NOWRA) in Columbus Ohio in June. She stated that it is competitive to get your paper/presentation approved, and it will be great exposure for this project to a national audience. She will send the final paper/presentation to the RRAC when it is available.

A discussion was had on the results of the pump information requested at the last RRAC meeting. Elke Ursin presented the table with the results and clarified that these numbers are a conservative estimate. There is no definitive field on the final inspection form that is filled out for every case where a pump is installed. The form is developed to note issues and deficiencies in what was installed and has a blank to enter the number of pumps installed, but these fields are not always filled out if there were no issues/deficiencies. Often this information is checked as being in compliance, but that does not definitively indicate that there was a pump installed. The numbers shown in the table presented show when a number greater than zero was entered for the field that indicates the number of pumps. She reemphasized that these numbers are likely the low estimate for the number of pumps. Clay

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Tappan indicated that he was surprised that there were so few mounded systems with pumps. Carl Ludecke indicated that often the house is built up in new construction.

Maria Pecoraro presented on the letter from several members of the Legislature regarding the definition of passive. She stated that this letter explains their intention regarding what the definition of passive is. She stated that if there are any questions or comments that anyone is welcome to meet with Representative Nelson. Bob Himschoot stated that this definition seems to match RRAC's definition. Maria Pecoraro asked how the current contracted definition complements a conventional system and Damann Anderson stated that a passive system could complement an existing system depending on the condition of the existing system. Clay Tappan stated that a mound complements a conventional system. He stated that the pump is to move effluent; the only mandatory part would be the reactive media for nitrogen removal. Damann Anderson stated that the treatment system may need to be dosed in some situations. Bill Melton stated that by adding a component between the tank and drainfield you lose fall and will probably need a pump. Clay Tappan mentioned that there is no rulemaking associated with this project so he cannot answer the question Maria is asking about how specifically a homeowner could use his existing system, but he feels that if the tank and drainfield are working fine they may not need to do anything and be grandfathered in. Damann Anderson stated that the legislation that enacted this project does not say that these nitrogen reducing systems will complement existing systems, it says that these systems will complement conventional onsite systems. He said that if the existing system does not have the characteristics by which it can be used, then a pump may be needed. Clay Tappan stated that at the end of this, no one is going to say that a specific system needs to be put in. He said that the homeowner will still have the choice on whether to go with an active system or a passive system. He said that this study is providing a cost-effective option for the homeowner. Rick Hicks stated that the basic concept is that a tank will be put in downstream of the septic tank and if they cannot get gravity flow to the existing drainfield they will most likely need to put in a pump. Damann Anderson stated that this study is looking for a more passive long-term life cycle cost. The initial cost may not be that much cheaper than some of the systems available today. Maria Pecoraro stated that anything that costs over \$500 will make many people angry. Damann Anderson stated that not everyone will need to do this, only those that need to reduce nitrogen. Maria Pecoraro stated that taxpayers are concerned that they will have a mandate put on them that requires a significant upfront cost. Bob Himschoot stated that one of the other options communities may have is to connect to sewer which often costs \$25,000 to connect and then there are monthly bills on top of that. He stated that in order to achieve nitrogen reduction there are two options: sewer, where the effluent is transported to a central facility and monitored on a daily basis; or onsite systems, which can treat the effluent onsite and achieve the water quality and health standards. Shanin Speas-Frost stated that everyone foots the bill for wastewater. She stated that two-thirds of the population is on sewer and pay monthly. She stated that the onsite sewage system owners do not put away money monthly and now it is time for upgrades to happen for nitrogen reduction and this study is coming up with options to make it more amenable for them. Maria Pecoraro stated that the letter is clear that they understand that there is a need to protect Florida's ecosystems but that they are also accountable to voters.

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She stated that if there were options for homeowners to spread payments over longer periods of time that that will help. Shanin Speas-Frost stated that what Maria is saying about spreading costs sounds a lot like EPA's existing models 4 and 5 for management of decentralized systems. Pam Tucker stated that when she sells a house with a septic system the homeowner mortgages the house and the land, including the septic system. Clay Tappan stated that there will most likely not be one rule that will cover every ecosystem, water body, or utility. He stated that this study has evolved to provide an alternative option. He does not see a significant difference between the definition of passive in the letter from the members of the Legislature and the definition in the contract. The pump is to be used to move effluent. Maria Pecoraro stated that if the study can make a gravity system work, that that is a step in the right direction. She stated that she understands that gravity is not always going to work. There was a discussion on some other pending legislation regarding onsite sewage treatment and disposal systems. Andrea Samson asked how many different types of media are being studied, and Clay Tappan and Damann Anderson stated that there are multiple types of media being studied between the tank and the drainfield as well as researching an option to build the media into the drainfield. On the market right now there are many different types of mechanical treatment systems that use a wide variety of process descriptions to reduce nitrogen. Andrea Samson stated that she has done some calculations regarding exfiltration from central sewer lines and if 10% exfiltration into the groundwater is assumed from the house to the sewer plant and then that number is compared to the DOH failure number of 10%, there is a 22:1 ratio between what sewers are contributing as compared to septic systems. She stated that she is sincerely trying to solve the problem but does not see septic system owners as the problem. There is a proof of need, and if this is proved there is a need for solutions that work with conventional systems so that everyone can get back to living. She stated that she is delighted with the study and supports its continuation. She was pleased to hear that there will be some presentations made to a national audience. She stated that this study is doing groundbreaking work that the world needs to know about. Maria Pecoraro asked if the committee could give her a response to the letter and she will forward it on. Quentin Beitel made a motion, seconded by Carl Ludecke, for Chairman Tappan to meet with DOH staff to develop a response to the legislative letter. There was a discussion and the general consensus was that a formal response letter is not necessary, that the letter from the legislature is in line with what is currently being done. Quentin Beitel withdrew the motion. Staff will send the draft meeting minutes to Maria Pecoraro and other interested parties once they have been drafted. Maria Pecoraro read the names of the legislative members who signed the letter: Representative Nelson, Representative Plakon, Representative Ford, Representative Broxson, Representative Gaetz, Representative Dorworth, Representative Porter, Representative Corcoran, Representative Coley, Representative Ingram, Representative Drake, Representative Bemby, and Representative Kreegel.

Elke Ursin presented the latest funding figures for the study, updated as of April 15, 2011. These numbers will be posted on the website after the meeting.

- 4. Other Business** – Elke Ursin provided an update on the 319 project on the performance and management of advanced onsite systems. One of the main issues that has occurred since the last meeting is that the contract staff employee who was to perform the bulk of the sampling has

Florida Department of Health
Research Review and Advisory Committee for the Bureau of Onsite Sewage Programs

resigned her position. Currently Eb Roeder and she are working on hiring a Wakulla County Health Department employee to conduct the statewide sampling that is not being covered by other counties. This employee is certified in onsite sewage and currently permits and inspects advanced systems. A formal grant change order will be required to shift funds between categories to allow this change. Elke Ursin asked how the RRAC thought they should proceed regarding vacant and foreclosed homes and whether they should be sampled if they are included in our random sample. Bob Himschoot suggested not to waste time and money sampling these sites if DOH deems the site inactive. Patti Sanzone asked how many back-up systems have been selected, and Elke Ursin stated that currently there are 1000 systems selected and there is a goal to sample 700 systems. After the file review, which is revealing these vacant/foreclosed systems, there are approximately 723 systems that are active advanced systems including those that are vacant/foreclosed. Patti Sanzone suggested that the sampler use their judgment and not sample one system that is several hours away that could be vacant/foreclosed but that if it is close to others to go ahead and check it out. Quentin Beitel asked if a preliminary call is made to the owner before going out and Elke Ursin stated that that may skew the sampling results as this is to be a snapshot of what is going on in the field and if the system is turned off or not working right announcing the visit may give the owner time to correct the issue. She stated that they are coordinating to the best extent possible with the County Health Departments and maintenance entities. Quentin Beitel asked how they can get over the liability issue with going onto someone's property, and Bob Himschoot stated that the statute allows for this as it is a system that is permitted with DOH. Elke Ursin stated that the first step when getting to a site is to knock on the door and ask for permission to do the sampling. If the owner does not grant permission the site will not be sampled. The counties that have signed agreements to conduct the sampling are Monroe, Lee, Charlotte, and Volusia. Eb Roeder has standardized all except Volusia. These counties cover about half of the systems that are to be sampled with this project and the Wakulla employee will sample the rest. Bob Himschoot asked how the information will be logged and Elke Ursin stated that it will be done in the Access database created for this project. Bob Himschoot stated that there are some problems and issues with some of the county health departments not recognizing the transfer of electronic information through Carmody. Elke Ursin stated that there seems to be a disconnect. Her understanding is that the county health departments should be accepting Carmody information. She will get with someone in her office to try and resolve these issues once Bob Himschoot sends her some specific examples.

Elke Ursin stated that the research priorities will be presented at the next Technical Review and Advisory Panel meeting which could occur within the next month.

Maria Pecoraro will email Elke Ursin the details regarding when the Legislature will discuss the budget which will be forwarded to the RRAC.

5. **Public Comment** – The public were allowed to comment throughout the meeting. There was no additional public comment.
6. **Closing Comments, Next Meeting, and Adjournment** – Potential dates for the next RRAC meeting will be emailed to RRAC members and alternates to determine the next meeting date. It is anticipated that this meeting will occur sometime after the 2011-2012 budget has been approved.

Bill Melton made a motion, seconded by Patti Sanzone, to adjourn at 3:49 p.m. All were in favor, none opposed, and the motion passed.



STATUS REPORT ON PHASE II OF THE FLORIDA ONSITE
SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

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Bureau of Onsite Sewage Programs

May 16, 2011

Deleted: February 1,

H. Frank Farmer, Jr., M.D., Ph.D.
State Surgeon General

Rick Scott
Governor

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**STATUS REPORT ON PHASE II OF THE FLORIDA
ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY**

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EXECUTIVE SUMMARY

The Florida Legislature has appropriated a total of \$2.9 million for Phases I and II of an anticipated 3-5 year project with a total estimated cost of \$5.1 million to develop passive strategies for nitrogen reduction for onsite sewage treatment and disposal systems (OSTDS). This report is submitted in compliance with Line Item 486 Section 3, Conference Report on House Bill 5001, General Appropriations Act for Fiscal Year 2010-2011. Currently, this project is in its third year and requires an additional \$2.2 million to complete the study.

Funds appropriated and expended to date have established necessary viable protocols and have been appropriately used to test, calibrate, and refine technologies and strategies to be tested in the field. Without further funding for the final Phase 3 of the project, necessary and extensive field testing will not occur and, if field testing does not occur, the project will essentially not yield results that can be used to develop viable, cost-effective alternative passive technologies for use by homeowners for nitrogen issues associated with onsite systems.

Regardless of the source, excessive nitrogen has negative effects on public health and the environment. The significance of this innovative project is that it evaluates and develops strategies to reduce nitrogen impacts from OSTDS regulated by the Florida Department of Health (DOH). The goal is to develop systems that are affordable and ecologically protective with reduced engineering and installation costs that assist in sustainable development. This project has been endorsed by Florida TaxWatch as a good use of public funds.

The contractor, in coordination with DOH and the Department's Research Review and Advisory Committee (RRAC), has successfully completed portions of each major task. Work expected to be completed this fiscal year includes: initiating field sampling of passive systems; field sampling of the soil and groundwater under OSTDS at residential homes throughout Florida and at the test facility; and initiating development of a complex soil model.

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Further testing is required to verify the results to date and to provide data for development of the specifications for full system designs. The tasks associated with the final phase include: continuation and completion of field monitoring of the performance and cost of technologies at home sites and of nitrogen fate and transport in the shallow groundwater; development of nitrogen fate and transport models that will be calibrated with the field sampling results; and final reporting on all tasks with recommendations on onsite sewage nitrogen reduction strategies.

DOH and its Research Review and Advisory Committee recommend that the Legislature:

1. Provide additional funding and budget authority to DOH in the amount of \$2.2 million for the fiscal year 2011-2012 for continuation and completion of the tasks associated with this legislatively mandated study.
2. Provide DOH budget authority for any remaining funds from the 2010 appropriation to carry over to fiscal year 2011-2012.

Continued support for this project will ultimately benefit Florida's approximately 2.7 million onsite system owners by finding cost-effective nitrogen reduction strategies that will improve environmental and public health protection. If fully funded, the results of this project will assist economic growth and jobs creation while producing systems that protect groundwater with both reduced life-cycle costs and lower energy demands.

INTRODUCTION

The 2010 Legislature appropriated \$2.0 million for Phase II of an anticipated 3-5 year project with a total estimated cost of \$5.1 million to develop passive strategies for nitrogen reduction for onsite sewage treatment and disposal systems (OSTDS). This followed an initial appropriation of \$900,000 by the 2008 Legislature for the first phase of this study. Currently, this project is in its third year and requires an additional \$2.2 million to complete the study. This report is submitted in compliance with Line Item 486 Section 3, Conference Report on House Bill 5001, General Appropriations Act for Fiscal Year 2010-2011, which appropriated the funding for the study.

This study was based on budget language in 2008 (Line Item 1682, House Bill 5001, General Appropriations Act for Fiscal Year 2008-2009) that instructed:

...the Department of Health to further develop cost-effective nitrogen reduction strategies. The Department of Health shall contract, by request for proposal, for Phase I of an anticipated 3-year project to develop passive strategies for nitrogen reduction that complement use of conventional onsite wastewater treatment systems. The project shall be controlled by the Department of Health's Research Review and Advisory Committee and shall include the following components: 1) comprehensive review of existing or ongoing studies on passive technologies; 2) field testing of nitrogen reducing technologies at actual home sites for comparison of conventional, passive technologies and performance-based treatment systems to determine nitrogen reduction performance; 3) documentation of all capital, energy and life-cycle costs of various technologies for nitrogen reduction; 4) evaluation of nitrogen reduction provided by soils and the shallow groundwater below and down gradient of various systems; and 5) development of a simple model for predicting nitrogen fate and transport from onsite wastewater systems. A progress report shall be presented to the Executive Office of the Governor, the President of the Senate and the Speaker of the House of Representatives on February 1, 2009, including recommendations for funding additional phases of the study.

The 2010 legislative direction (included in Appendix A) specified that the existing contract for this project will remain in full force; that the Department, the Department's Research Review and Advisory Committee (RRAC), and the Florida Department of Environmental Protection (DEP) shall work together to provide technical oversight and that DEP will have maximum technical input; that the main focus and priority for work in Phase II shall be in developing, testing, and recommending cost-effective passive technologies for nitrogen reduction; that field installations for this project will be subject to significant testing and monitoring; and that no state agency shall implement any rule or policy that requires nitrogen reducing systems or increases their costs until the study is complete.

Regardless of the source, excessive nitrogen has negative effects on public health and the environment. The primary motivations for this study are the environmental impacts that the increased levels of nitrogen in water bodies can cause. Programs within DEP identify water bodies impaired by excessive nitrogen, establish targets for maximum nutrient loads, and develop management action plans to restore the water bodies. The relative contribution of OSTDS to total nitrogen impacts varies from watershed to watershed with estimates ranging from below five to more than 20 percent. There is widespread interest in the management of OSTDS and their nitrogen impacts. This project has been endorsed by Florida TaxWatch as a study that is a good use of public funds and that provides homeowners with cost-effective options for nitrogen reduction (email communication from Kurt Wenner to Jerry McDaniel June

2, 2008). The significance of this innovative project is that it evaluates and develops strategies to reduce nitrogen impacts from OSTDS regulated by the Florida Department of Health (DOH). The goal is to develop systems that complement the use of conventional OSTDS and are also affordable and ecologically protective with reduced engineering and installation costs that assist in sustainable development.

The study contract was awarded in January 2009 to a Project Team led by Hazen and Sawyer, P.C., and was based upon an anticipated budget of \$5 million over a 3 – 5 year project timeframe, with an additional \$100,000 budget to DOH for project management. As a result of the time required for contracting, unspent monies in fiscal year 2008-2009 were budgeted in 2009 to complete the initial tasks of the project. The contract identifies the following tasks:

Task A – Technology Evaluation for Field Testing: Review, Prioritization, and

Development: This task includes literature review, technology evaluation, prioritization of technologies to be examined during field testing, and further experimentation with approaches tested in a previous DOH passive nitrogen removal study. Objectives of this task are to prioritize technologies for testing at actual home sites and to perform controlled tests at a test facility to develop design criteria for new passive nitrogen reduction systems.

Task B – Field Testing of Technologies and Cost Documentation: This task includes installation of top ranked nitrogen reduction technologies at actual homes, with documentation of their performance and cost.

Task C – Evaluation of Nitrogen Reduction Provided by Soils and Shallow Groundwater: This task includes several field evaluations of nitrogen reduction in Florida soils and shallow groundwater and also will provide data for the development of a simple planning model in Task D.

Task D – Nitrogen Fate and Transport Modeling: The objective of this task is to develop a simple fate and transport model of nitrogen from OSTDS that can be used for assessment, planning and siting of OSTDS.

FLORIDA DEPARTMENT OF HEALTH

Florida Onsite Sewage Nitrogen Reduction Strategies Project
FDOH Contract CORCL

Objective:
To develop nitrogen reduction strategies for onsite sewage treatment and disposal systems (OSTDS) in Florida

Study Areas:

- A* Development and pilot testing of passive nitrogen reduction systems (PNRS)
- B* Field testing of full-scale nitrogen reduction systems to determine performance and cost
- C* Assessment of the fate and transport of nitrogen from OSTDS in soil and groundwater
- D* Development of decision support tools for OSTDS planning and nitrogen reduction

HAZEN AND SAWYER
Environmental Engineers & Scientists in association with

AET
Applied Environmental Technology

OTIS ENVIRONMENTAL CONSULTANTS

UF
UNIVERSITY OF FLORIDA
Gulf Coast Research and Education Center

Figure 1. Sign posted at the University of Florida's Gulf Coast Research & Education Center's test facility.

1 PROJECT STATUS

Funding for the first and second phases of this project has been appropriated. A summary of the major project elements and their timing with funding phases is shown in Table 1. The contractor, in coordination with the RRAC and DOH, has successfully completed parts of Tasks A, B, C, and D, including literature reviews; ranking of nitrogen reduction technologies for field testing; design and construction of a test facility for further development of passive technologies; development of quality assurance documents for the test facility work, groundwater monitoring, field testing, and nitrogen fate and transport modeling; and completion of several sampling events at the test facility.



Figure 2. Test facility constructed at the University of Florida's Gulf Coast Research & Education Center.

Current efforts and work expected to be completed this fiscal year include: initiating field sampling of passive systems; installation of field sites at residential homes throughout Florida for the testing of passive systems and to test the soil and groundwater under OSTDS; design and construction of a soil and groundwater test facility; sampling at the soil and groundwater test facility; continued sampling of passive technologies at the test facility; and **initiating** development of a complex soil model. In particular, the following work by task will proceed with the current funding level:

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1. The technology evaluation (Task A) will include a total of 7 sample events at the passive nitrogen test facility, measuring 14 different analytes at 23 sampling points, as well as a final report on the pilot passive nitrogen removal study at the Gulf Coast Research and Education Center (GCREC).
Current Status as of April 15, 2011: A total of 5 sample events have been completed.
2. For field testing of technologies (Task B), the quality assurance project plan has been finalized. Approximately four onsite systems utilizing various nitrogen removal

technologies will be installed at home locations throughout the State of Florida. It is anticipated that four field system performance monitoring events will be conducted on these systems, measuring 16 different analytes at 2-8 different sampling points. A life cycle cost assessment template will also be completed.

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Current Status as of April 15, 2011: Over 10 homeowners have agreed to participate in the study to date for Tasks B and C and a final determination of which sites will be used for which task will be accomplished in the near future. One of the home sites will have a passive gravity-fed system installed. Construction will commence for one onsite system once permitting is approved.

3. To evaluate nitrogen reduction provided by soils and shallow groundwater (Task C), it is anticipated that a soil and groundwater test facility will be constructed to show how groundwater fate and transport of nitrogen occurs in multiple soil treatment unit regimes. Three sampling events will be completed, sampling six different locations at each site, measuring multiple parameters in the effluent, soil, groundwater, and soil moisture. Instrumentation of the existing OSTDS mound system at the University of Florida's Gulf Coast Research & Education Center (GCREC) in Wimauma, Florida will be done to study how nitrogen behaves in the soil and groundwater. Four sampling events, examining multiple parameters, will be completed at the existing OSTDS mound system at GCREC. At least one soil and groundwater monitoring event will occur at up to four home sites to evaluate nitrogen movement in the soil and groundwater in the field, measuring multiple parameters in the effluent, soil, and groundwater.

Current Status as of April 15, 2011: Additive's testing has commenced and is required to be completed prior to construction of the soil and groundwater test facility. Instrumentation of the existing OSTDS mound system at GCREC has been completed and 2 sample events have been conducted. Over 10 homeowners have agreed to participate in the study to date for Tasks B and C and a final determination of which sites will be used for which task will be accomplished in the near future. One home site has been selected and instrumentation has begun.

4. To address nitrogen fate and transport modeling for Task D, a final quality assurance project plan has been completed, and the first steps will include the development of a complex soil model to show how nitrogen is affected by treatment in Florida-specific soils.

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Current Status as of April 15, 2011: Work has focused primarily on soil modeling under the current budget. A complex soil model is underway and will be utilized to generate a simple tool for prediction of nitrogen removal in the unsaturated zone of Florida soils.

2 ANTICIPATED PROGRESS IN 2011-2012

During the 2011-2012 fiscal year, additional funding will be critical to complete the tasks associated with the final phase. These include: continuation and completion of field monitoring of performance and cost of technologies at home sites and of nitrogen fate and transport in the shallow groundwater; development of various nitrogen fate and transport models that will be calibrated with the field sampling results; and final reporting on all tasks with recommendations on onsite sewage nitrogen reduction strategies. In particular, the following work by task will occur with the final phase of funding, which is being requested with this report:

1. For Task A, the final task report will be written, which will include a summary of the accomplishments of the passive nitrogen removal test facility.
2. For Task B, it is anticipated that an additional four onsite systems utilizing various nitrogen removal technologies will be installed at home locations throughout the State of Florida, four field system performance monitoring events will be conducted

on these systems, and final reporting on all of the field work associated with this task, including life cycle cost assessments, will be completed.

3. For Task C, monitoring events will occur at four home sites to evaluate nitrogen movement in the soil and groundwater in the field, and at six groundwater test areas at the soil and groundwater test facility to show how groundwater fate and transport of nitrogen occurs. Final reporting for this task will be completed.
4. For Task D, **complex soil model will be completed and integrated with groundwater models which** will be developed, calibrated, and validated, utilizing the results of the field work collected in previous tasks, and a final task report will be written summarizing the results of this task.

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3 FUNDING NEEDS

Activities in fiscal years 2008-2011 have prepared the framework for rapid implementation of all remaining project tasks in fiscal year 2011-2012. Funding for fiscal year 2011-2012 is required to reap the benefits of all previous work and to complete the goals of this project. For the 2011-2012 budget year, \$2.2 million dollars is required to fund the completion of this study.

Funds appropriated and expended to date have established necessary viable protocols and have been appropriately used to test, calibrate, and refine technologies and strategies to be tested in the field. Without further funding for the final Phase 3 of the project, necessary and extensive field testing, the major portion of Task B, will not occur and, if field testing does not occur, the project will essentially not yield results that can be used to develop viable, cost-effective alternative passive technologies for use by homeowners for nitrogen issues associated with onsite systems.

Project Tasks (described previously) are broken down further into funding phases as follows:

Initial Funding in 2008-2010 (Phase I): \$900,000 already appropriated (in 2008 and 2009 state budgets) – status: **Complete**. The initial funding was targeted to prioritize systems for testing, summarize existing knowledge, develop testing protocols, and establish a test facility for detailed soil and groundwater monitoring and for preliminary testing of pilot scale passive nitrogen reduction systems.

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Funding in 2010-2011: \$2 million already appropriated (in 2010 state budgets) – status: Ongoing. This funding is for field monitoring over at least a one-year monitoring period of performance and cost of technologies at home sites, and of nitrogen fate and transport. This funding will also continue the development and monitoring work at the test facility and continue the modeling work.

Funding in 2011-2012: To adequately fund the final phase of the project, \$2.2 million will need to be appropriated during the 2011 legislative session. The preliminary results of the project are encouraging. Further testing is required to verify the results to date and to provide data for development of the engineering specifications for full system designs. The funds will be used to complete monitoring and other field activities, additional testing as deemed appropriate by the Legislature, and final reporting with recommendations on onsite sewage nitrogen reduction strategies for Florida's future.

Further information on this project, including previous legislative reports and detailed project reports, can be found on the Department's website:

<http://www.doh.state.fl.us/environment/ostds/research/Nitrogen.html>

Table 1. Summary of Funding Phase Tasks and Associated Number of Deliverables.

Task	Phase I ^a \$900,000 (July 2008- November 2010, completed)	Phase II ^a \$2,000,000 (Current Funding, in progress)	Phase III ^a \$2,200,000 (Future Funding, yet to be funded)
A Task A: Technology Selection & Prioritization	\$352,144	\$399,136	\$35,480
Literature review	1		
Ranking of nitrogen reduction technologies for field testing	1		
Design and construction of test facility	1		
Quality assurance project plan	1		
Monitoring and sample events		7	
Final test facility report		1	
Final task report			1
B Task B: Field Testing of Technologies	\$50,202	\$471,035	\$559,115
Quality assurance project plan		1	
Installation of ranked nitrogen reduction technologies at 8 field sites		4	4
System performance monitoring events at 8 sites		4	4
Life cycle cost assessment template development		1	
Final life cycle cost assessment report (per system)			8
Final task report			1
C Task C: Evaluation of Nitrogen Reduction by Soils & Shallow Groundwater	\$216,164	\$1,027,848	\$662,940
Quality assurance project plan	1		
Design of test facility	1		
Construction of test facility		1	
Monitoring and sample events (6 test areas)		3	3
Instrumentation of existing OSTDS mound at GCREC facility		1	
GCREC mound sample events		4	
Field sites sample events (4 sites)		1	3
Final task report			1
D Task D: Nitrogen Fate and Transport Models	\$74,357	\$93,857	\$639,808
Quality assurance project plan	0.5	0.5	
Simple soil model		1	
Complex soil model		1	
Shallow groundwater models for simple and complex soil models			2
Calibration of models to existing data sets			2
Uncertainty analysis for models			2
Validation and refinement of models			2
Final task report			1
Project Management (sum of contractor and DOH)	\$119,953	\$95,304	\$302,657
Contractor project management	\$90,695	\$77,932	\$249,247
DOH project management	\$29,258	\$17,372 ^b	\$53,410 ^b
Total Budget^c	\$812,820	\$2,087,180	\$2,200,000
Total Budget Remaining as of April 15, 2011	\$0	\$1,843,131	\$2,200,000

- a. Numbers in each subtask represent the numbers of budgeted deliverables.
- b. DOH project management costs for Phases II and III are estimated costs.
- c. Budgeted totals differ from the legislative funding amounts due to scheduling.

DOH – Department of Health
 GCREC – Gulf Coast Research & Education Center
 OSTDS – Onsite Sewage Treatment and Disposal Systems

Comment [Elke1]: Update this number with the actual number as of April 15th. The number I put in here is a number as of March 17, 2011.

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4 RECOMMENDATIONS

DOH and its Research Review and Advisory Committee recommend that the Legislature:

1. Provide additional funding and budget authority to DOH in the amount of \$2.2 million for the fiscal year 2011-2012 for continuation and completion of the tasks associated with the legislatively mandated Florida Onsite Sewage Nitrogen Reduction Strategies Study.
2. Provide DOH budget authority for any remaining funds from the 2010 appropriation to carry over to fiscal year 2011-2012.

This additional funding will be applied to the final phase of the project, primarily continuation and completion of field monitoring of performance and cost of technologies at home sites and of nitrogen fate and transport in the shallow groundwater, development of various nitrogen fate and transport models that will be calibrated with the field sampling results, and final reporting on all tasks with recommendations on onsite sewage nitrogen reduction strategies.

Continued support for this project will ultimately benefit Florida's approximately 2.7 million onsite system owners by finding cost-effective nitrogen reduction strategies that will improve environmental and public health protection. If fully funded, the results of this project will assist economic growth and jobs creation while producing systems that protect groundwater with both reduced life-cycle costs and lower energy demands.

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APPENDIX A. 2010 Legislative Language

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SECTION 3 – HUMAN SERVICES

486 SPECIAL CATEGORIES

CONTRACTED SERVICES

FROM GENERAL REVENUE FUND	153,772	
FROM ADMINISTRATIVE TRUST FUND . . .		337,765
FROM FEDERAL GRANTS TRUST FUND . . .		348,235
FROM GRANTS AND DONATIONS TRUST FUND		2,648,438
FROM RADIATION PROTECTION TRUST FUND		150,000

DRAFT

From the funds in Specific Appropriation 486, \$2,000,000 from the Grants and Donations Trust Fund is provided to the department to continue phase II and complete the study authorized in Specific Appropriation 1682 of chapter 2008-152, Laws of Florida. The report shall include recommendations on passive strategies for nitrogen reduction that complement use of conventional onsite wastewater treatment systems. The department shall submit an interim report of phase II on February 1, 2011, a subsequent status report on May 16, 2011, and a final report upon completion of phase II to the Governor, the President of the Senate, and the Speaker of the House of Representatives prior to proceeding with any nitrogen reduction activities.

DRAFT

Section 14. In order to implement Specific Appropriation 486 of the 2010-2011 General Appropriations Act, and for the 2010-2011 fiscal year only, the following requirements shall govern Phase 2 of the Department of Health's Florida Onsite Sewage Nitrogen Reduction Strategies Study:

(1) The underlying contract for which the study was let shall remain in full force and effect with the Department of Health and funding the contract for Phase 2 of the study shall be through the Department of Health.

(2) The Department of Health, the Department of Health's Research Review and Advisory Committee, and the Department of Environmental Protection shall work together to provide the necessary technical oversight of Phase 2 of the project, with the Department of Environmental Protection having maximum technical input.

(3) Management and oversight of Phase 2 shall be consistent with the terms of the existing contract; however, the main focus and priority for work to be completed for Phase 2 shall be in developing, testing, and recommending cost-effective passive technology design criteria for nitrogen reduction.

(4) The systems installed at actual home sites are experimental in nature and shall be installed with significant field testing and monitoring. The Department of Health is specifically authorized to allow installation of these experimental systems. In addition, before Phase 2 of the study is complete and notwithstanding any law to the contrary, a state agency may not adopt or implement a rule or policy that:

(a) Mandates, establishes, or implements any new nitrogen-reduction standards that apply to existing or new onsite sewage treatment systems or modification of such systems;

(b) Increases the cost of treatment for nitrogen reduction from onsite sewage treatment systems; or

(c) Directly requires or has the indirect effect of requiring, for nitrogen reduction, the use of performance-based treatment systems or any similar technology; provided the Department of Environmental Protection administrative orders recognizing onsite system modifications, developed

through a basin management action plan adopted pursuant to section 403.067, Florida Statutes, are not subject to the above restrictions where implementation of onsite system modifications are phased in after completion of Phase 2, except that no onsite system modification developed in a basin management action plan shall directly or indirectly require the installation of performance-based treatment systems.

DRAFT

1 Group A: Project Management Elements

1.1 Title and Approval Sheet

Draft 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
March 25 2011

Prepared for:



State of Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Prepared by:



Florida Department of Health
Bureau of Onsite Sewage Programs
4052 Bald Cypress Way Bin # A-08
Tallahassee, FL 32399-1713

Approving Signatures and Dates

FDEP Project Manager-Patricia Sanzone

Approved: Patricia A. Sanzone Date: 4/01/11

FDOH Contract Manager-Elke Ursin

Approved: [Signature] Date: 3/28/11

FDOH Project QA Officer-Eberhard Roeder

Approved: Eberhard Roeder Date: 3/28/11

FDOH Sampler-Debra Roberts

Approved: Debra Roberts Date: 3/28/11

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1.3 Distribution List

Patricia Sanzone
State of Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Patricia.Sanzone@dep.state.fl.us

Elke Ursin
Florida Department of Health
Bureau of Onsite Sewage Programs
4052 Bald Cypress Way Bin # A-08
Tallahassee, FL 32399-1713
Elke_Ursin@doh.state.fl.us

Eberhard Roeder
Florida Department of Health
Bureau of Onsite Sewage Programs
4052 Bald Cypress Way Bin # A-08
Tallahassee, FL 32399-1713
Eberhard_Roeder@doh.state.fl.us

Debra Roberts
Florida Department of Health
Bureau of Onsite Sewage Programs
4052 Bald Cypress Way Bin # A-08
Tallahassee, FL 32399-1713
Debra_Roberts@doh.state.fl.us

Wes Tyler
Florida Testing Services, LLC dba Xenco Laboratories
3231 NW 7th Ave.
Boca Raton, FL 33431
Wes.Tyler@xenco.com

Any additional samplers will be added here

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.

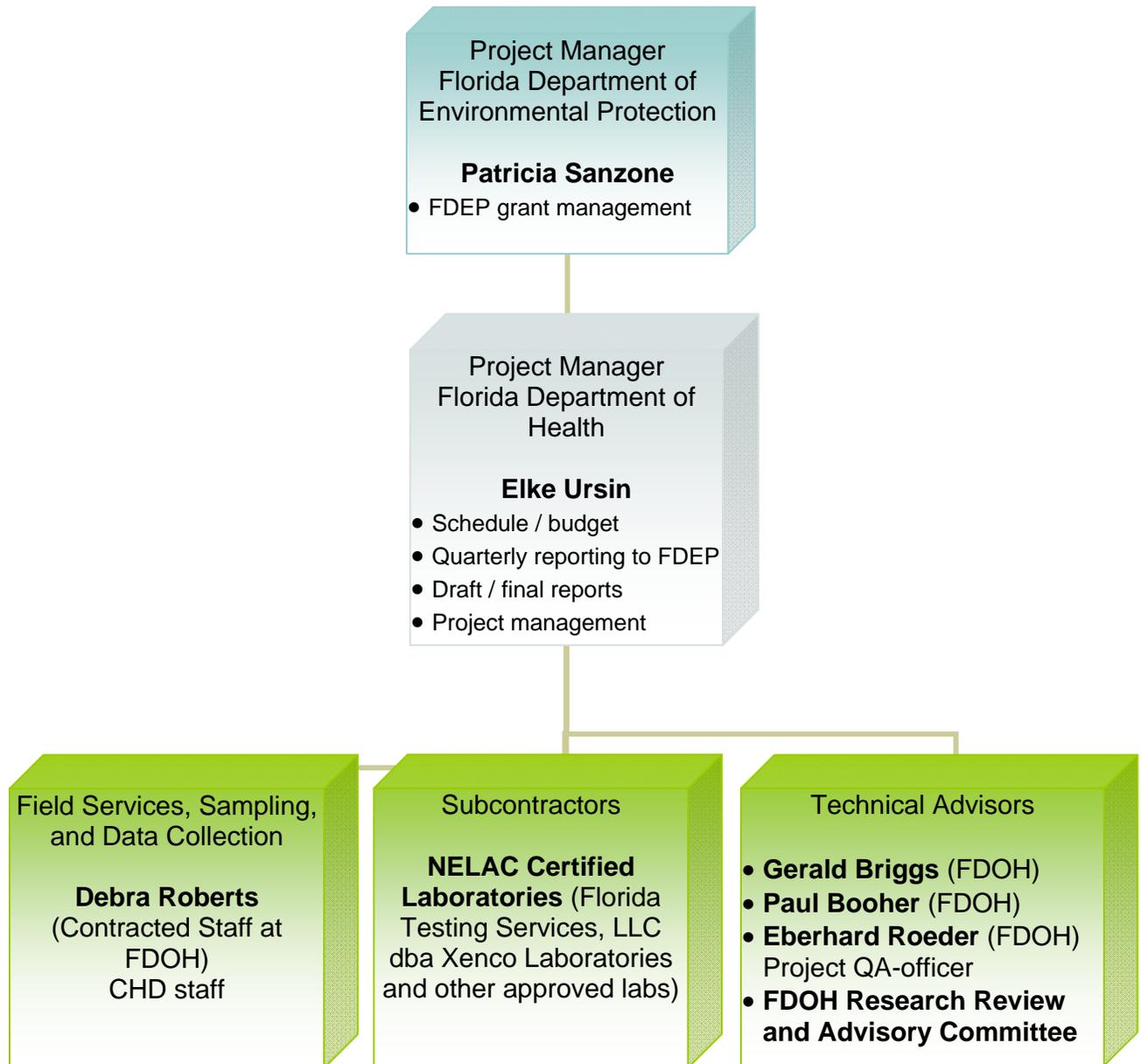


Figure 1. Organizational Chart for Project.

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 46th and 54th percentile of measured effluent concentrations. About 600 samples also will allow estimation of the 10th and 90th 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 40th and 60th 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. 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 ₅	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†	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	NO _x -N	EPA 353.2†	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	TP	EPA365.1	Laboratory Chain of Custody	100% of obtained influent and effluent samples
	Total Alkalinity	SM2320B	Laboratory Chain of Custody	100% 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 Field Screening Measurements	Nitrate-N	Hach DR/890 #10020	Field Analysis 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.

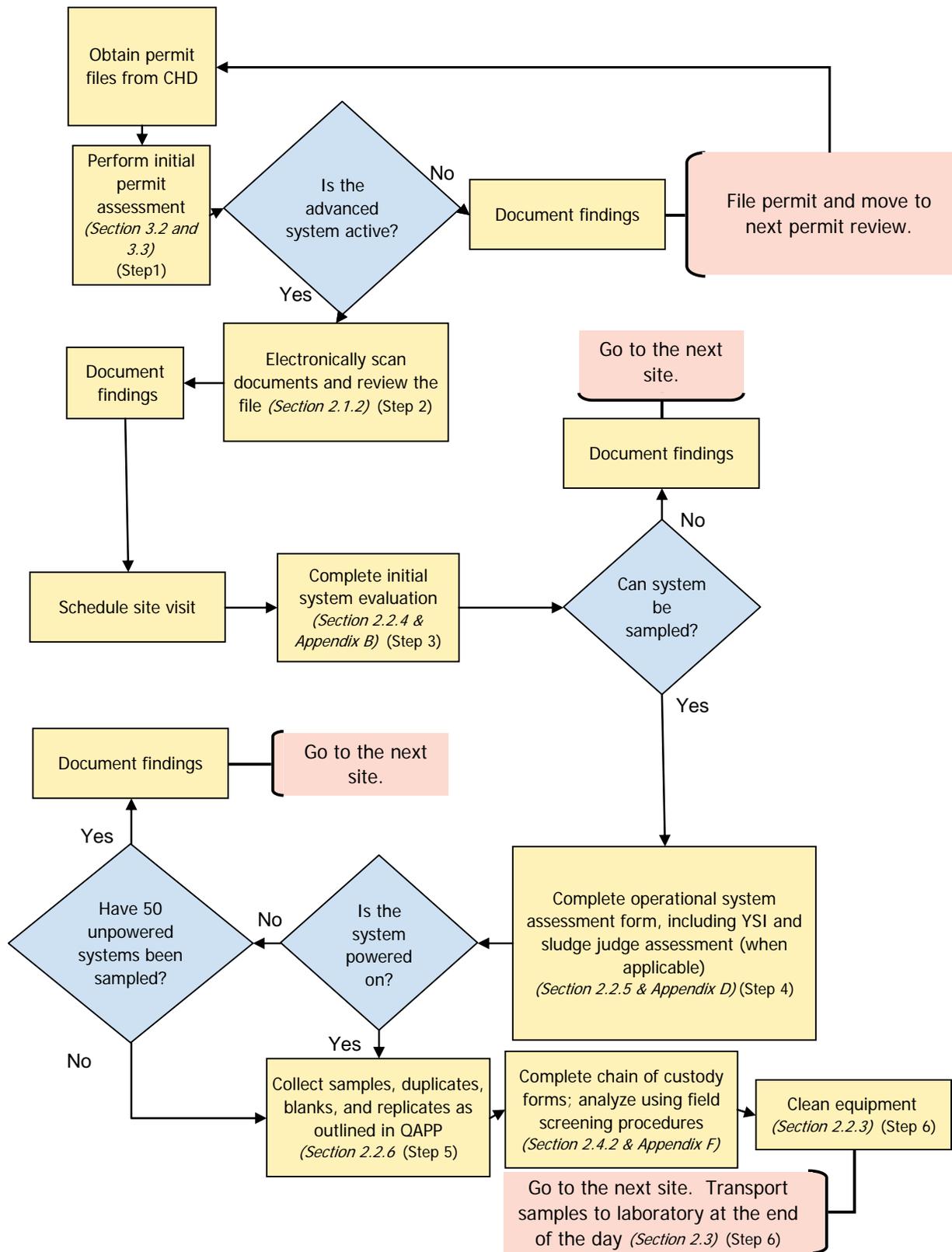


Figure 2. Data Collection Flow Chart

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).

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 †	EPA 353.2 †	EPA365.1	SM2320B
Number of Calibration Standards	N/A	N/A	6	6	6	N/A
Calibration Acceptance Criteria (correlation)	N/A	N/A	Corr >0.995	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	90-110	90-110	80-120
Matrix Spike Recovery Criteria (%)	N/A	N/A	90-110	90-110	90-110	N/A
Laboratory and Field Duplicate Samples Acceptance Criteria (%RPD)	25	20	20	25	20	20
Practical Quantitation Limit (mg/L)	2.0	4.0	0.30	0.20	0.03	4.0
Method Detection Limit (mg/L)	2.0	3.5	0.09	0.1	0.055	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).

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 877-518-2583 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 http://dohiws.doh.state.fl.us/Divisions/Insp_General/IncidentReport/IncidentReportingPolicy5.pdf 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 http://dohiws.doh.state.fl.us/Divisions/Administration/Gen_Services/SupportSvcs/Safety/Reports/WorkplaceSafetyGuide.pdf .
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

	<p>noxious gases, such hydrogen sulfide. Open sampling ports and manhole covers with caution, and downwind from person.</p> <p>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.</p>
Sample field analysis	
<p>Spills, splashes, leaks, broken glass</p>	<p>Follow instructions for field screening analyses</p> <p>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.</p> <p>Clean all spills immediately. Ensure proper spill kits are available. Broken glass should be immediately swept.</p> <p>Properly store incompatible materials (e.g., separate storage for acids and bases).</p> <p>Close chemical containers when not in immediate use.</p> <p>PPE: work clothes, gloves, close-toed shoes, and eyewear.</p> <p>Waste Management: Clean spills/leaks. Segregate trash.</p>

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.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).

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:

- Laboratory QC blank analysis results as required by the method, NELAC Chapter 5 and the planning document;
- 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:
 - FDEP 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

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.

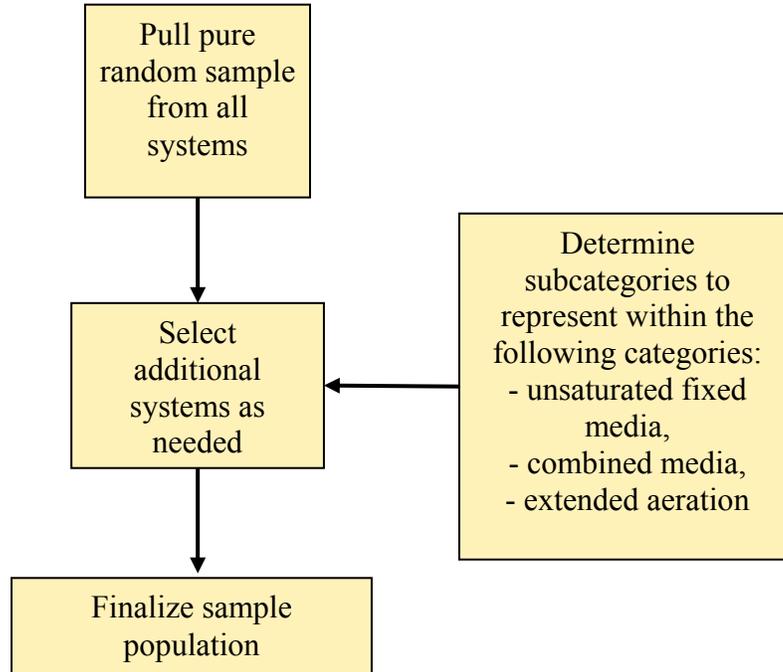


Figure 3. Site Selection Flow Chart

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	B.E.S.T. 1	Diffuser	3		
	Acquired Wastewater Technologies	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. 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 Assessment

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 whenever 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. 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 on 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-QC-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)	QC
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	d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	01-original sample 02-duplicate
	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
	Tap-tap water		d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	
	QC-quality control		d-direct from free fall, spigot etc. i-intermediary container p-peristaltic pump	FBL-field blank FEB-field- cleaned equipment blank PEB-pre- cleaned equipment blank

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) 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 cross-traps and distribution boxes, use the pump to pump the volume empty, 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) 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.
 - 3) 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.

- 4) 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
 - 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) 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 ₅	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†	0.0867 mg/L	FTS	28 days	H ₂ SO ₄
NO _x -N	EPA 353.2†	0.05 mg/L	FTS	28 days	H ₂ SO ₄
TP	EPA365.1	0.055 mg/L	FTS	28 days	H ₂ SO ₄
Fecal Coliform	SM 9222D	1cfu/100 mL	Various	6 hrs	Na ₂ S ₂ O ₃
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)

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 9th ed. 02/09) in a Hach DR/890. The procedure is as follows:

1. Enter the stored program number for APHA color.
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 10 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 10 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 ± 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 9th 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 PO₄-P

Reactive Phosphorus will be measured using Hach Method 8048 (PhosVer 3 Method, Test 'N Tube Procedure; Hach Procedures 9th ed. 02/09) 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 (PO₄), Test'N'Tube. Press: PRGM, the display will show PRGM ?
2. Press: 82 ENTER. The display will show mg/L, PO₄ 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. Use a TenSette Pipet to add 5.0 mL of sample to a Reactive Phosphorus Test'N'Tube dilution Vial. Cap and mix. Note: in most cases at least a 5:1 dilution (1 mL sample and 4 mL DI water) will be needed to remain within the measurement range.
5. Clean the outside of the vial with a towel.
6. Place the sample vial into the adapter. Push straight down on the vial until it seats solidly into the adapter.
7. Tightly cover the sample vial with the instrument cap.

8. Press: ZERO. The cursor will move to the right, then the display will show: 0.00 mg/L PO₄
9. Using a funnel, add the contents of one PhosVer 3 Phosphate Powder Pillow to the vial.
10. Cap the vial tightly and shake for 10-15 seconds.
11. Press: TIMER ENTER A 2-minute reaction time will begin.
12. Immediately after the timer beeps, place the sample vial in the adapter.
13. Push straight down on the top of the vial until it seats solidly in the adapter.
14. Tightly cover the vial with the instrument cap.
15. Press: READ. The cursor will move to the right, then the result in mg/L phosphate (PO₄) will display.
16. Multiply by 0.3261 to obtain results the results in mg/L PO₄-P, and adjust for dilution.
17. 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.

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 5.00 mg/L PO₄-3- and two lots of reagent with the instrument, a single operator obtained a standard deviation of ±0.08 mg/L PO₄ 3-. Estimated Detection Limit (EDL) for program 82 is 0.07 mg/L PO₄ 3-.

2.4.2.4.4 Nitrate as NO₃-N

Nitrate-N will be measured using Hach Method 10020 (high range, Test'n'Tube, Chromotropic Acid Method; Hach Procedures 9th 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, NO₃-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 NO₃-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.

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 ± 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 9th 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 NH₃ – 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.

Notes: Best results are obtained with immediate analysis.

Testing by a single laboratory, using a standard solution of 50 mg/L ammonia nitrogen (NH₃-N) and two representative lots of reagent with the instrument, a single operator obtained a standard deviation of +5 mg/ L NH₃-N. The estimated detection limit for program 67 is 1 mg/L NH₃-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, NH₃, 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:

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

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

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

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.

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					
<input type="checkbox"/> Selected for Sampling? <input type="checkbox"/> Address_change? <input type="checkbox"/> Permit_number_change?					
Which permit number changed? <input type="text"/>					
Record Inquiry First Attempt Requested files when: <input type="text"/> From whom: <input type="text"/> Received files when: <input type="text"/> Source: <input type="text"/> Reviewed by: <input type="text"/> Reviewed on (mm/dd/yyyy): <input type="text"/>		Second Attempt Requested files when: <input type="text"/> Received files when: <input type="text"/> Source: <input type="text"/> Omitted Documents: <input type="text"/>		Third Attempt Requested files when: <input type="text"/> Received files when: <input type="text"/> Source: <input type="text"/> Omitted Documents: <input type="text"/>	
List of Requested Documents Received:					
<input type="checkbox"/> Construction information available? <input type="checkbox"/> Operating information available?		<input type="checkbox"/> PBTS/Innovative System Design Calculations <input type="checkbox"/> PBTS/Innovative System Design Criteria <input type="checkbox"/> PBTS/Innovative Soil Treatment Description <input type="checkbox"/> PBTS/Innovative Contingency Plan <input type="checkbox"/> PBTS/Innovative Certification of Design <input type="checkbox"/> PBTS/Innovative Operation and Maintenance Manua <input type="checkbox"/> PBTS/Innovative Applicant Cover Letter			
Required Documents <input type="checkbox"/> Construction Permit Application <input type="checkbox"/> Site Evaluation <input type="checkbox"/> Construction Permit <input type="checkbox"/> Final Inspection <input type="checkbox"/> Site Plan <input type="checkbox"/> Operating Permit <input type="checkbox"/> Operating Permit Application <input type="checkbox"/> Maintenance Entity Contract <input type="checkbox"/> CHD Inspection Reports <input type="checkbox"/> Maintenance Entity Inspection Reports		<input type="checkbox"/> Engineer Design Drawing <input type="checkbox"/> As-Built <input type="checkbox"/> Inspection Checklist <input type="checkbox"/> File Activity Checklist <input type="checkbox"/> Enforcement Action for Advanced System? <input type="text"/>			
<input type="checkbox"/> PBTS/Innovative Monitoring Requirements <input type="checkbox"/> Engineers Certificate of Compliance					
Record Inquiry Complete? <input type="checkbox"/>					
Status System_status_is: <input type="text"/> System treatment category is: <input type="text"/>					
Comments on file search: <input type="text"/>					
QC Comments Record Inquiry Status: <input type="text"/>					

Form 2: Construction Permit Review

Record Inquiry_Status Construction Permit Review Operating Permit Review PBTS Review Treatment Train File Review Status					
Construction Permit <input type="checkbox"/> Construction Permit Received?					
Date Issued: <input type="text"/> <input type="checkbox"/> Changes_to_Construction_permit					
Permit DF #1 size: <input type="text"/> Permit DF #2 size: <input type="text"/>		<input type="checkbox"/> Changes_to_Site_Evaluation			
Permit tank #1 size: <input type="text"/> Permit tank #2 size: <input type="text"/>		<input type="checkbox"/> Site Evaluation Received?			
Drainfield_type: <input type="text"/> <input type="checkbox"/> Construction permit signed and approved?		Estimated_sewage_flow_(table 1): <input type="text"/> gpd			
Drainfield_config: <input type="text"/> Is a grease trap present? 1=yes; 0=no <input type="text"/>		Authorized sewage flow (gpd): <input type="text"/>			
Permit_Comments: <input type="text"/>		Net usable area available: <input type="text"/>			
		Site_elevation (in): <input type="text"/> benchmark/reference point			
		EWSWT: <input type="text"/> existing grade			
Final Inspection <input type="checkbox"/> Final Inspection Received? <input type="checkbox"/> Changes to final system approval?					
Tank Info: tank 1 legend: <input type="text"/> tank 2 legend: <input type="text"/>		Site Plan <input type="checkbox"/> Site Plan Received?			
Drainfield Info:		<input type="checkbox"/> Monitoring_locations_shown? Monitoring_locations_where?: <input type="text"/>			
Final DF #1 size: <input type="text"/> Final DF #2 size: <input type="text"/>		Engineer Design <input type="checkbox"/> Engineer_designed? <input type="checkbox"/> Engineer Design Drawing Received?			
elevation of drainfield (in): <input type="text"/> benchmark/reference point		As Built <input type="checkbox"/> As-Built Received? Source_Asbuilt: <input type="text"/>			
Drainfield_dosing: <input type="text"/> # of Dosing Pumps: <input type="text"/>		Miscellaneous			
Drainfield_material: <input type="text"/> SetbackSurfaceWater: <input type="text"/>		<input type="checkbox"/> Enforcement Action for Construction Permit?			
Drainfield_flow_type: <input type="text"/>		Drainfield_size_reduction: <input type="text"/>			
Approval Info:					
<input type="checkbox"/> Final Inspection form signed and approved?					
Final Construction_approval_date: <input type="text"/>		<input type="checkbox"/> Was a variance issued?			
FinalSystemApprovalDate: <input type="text"/>		Monitoring_instructions: <input type="text"/>			
Construction Application <input type="checkbox"/> Changes_to_Construction_application					
Which multiple types were checked?					
application_type: <input type="text"/> application_type_comments: <input type="text"/>		Monitoring_frequency: <input type="text"/>			
I/M zoning: <input type="text"/>		Sampling_Requirements: <input type="text"/>			
res/com: <input type="text"/>		General Construction Permit Comments:			
Establishment Type: <input type="text"/>		<input type="text"/>			
Establishment Type#2: <input type="text"/> Application Date: <input type="text"/>					

Form 3: Operating Permit Review

Record Inquiry_Status		Construction Permit Review		Operating Permit Review		PBTS Review		Treatment Train		File Review Status	
<p>Operating Permit Application</p> <p><input type="checkbox"/> Operating_Permit_Application_Received?</p> <p>New / Amended / Renewal: <input type="text"/></p> <p>Type of OP application: <input type="text"/></p> <p>Date of aerobic system installation approval: <input type="text"/></p> <p>Aerobic Unit Manufacturer: <input type="text"/></p> <p>ATU type: <input type="text"/></p> <p><input type="checkbox"/> >1500 gpd unit <input type="checkbox"/> multiple ATUs</p> <p>TreatmentUnit: <input type="text"/></p> <p>GreaseTrapGallons: <input type="text"/> Approved BusinessType: <input type="text"/></p> <p>DosingTankGallons: <input type="text"/> Drainfield Size Sq. Feet: <input type="text"/></p> <p>LotSizeSquareFeet: <input type="text"/> DrainfieldDescription: <input type="text"/></p> <p>SqFtAcres: <input type="text"/> DrainfieldType: <input type="text"/></p> <p>Date_of_OP_application: <input type="text"/> DrainfieldLayout: <input type="text"/></p> <p>Approval date on OP application: <input type="text"/></p> <p>OriginalApplicationDate: <input type="text"/></p> <p><input type="checkbox"/> Operating permit ever issued? <input type="checkbox"/> Changes¹_to_Operating_permit_application</p> <p>Operating Permit <input type="checkbox"/> Changes_to_operating_permit</p> <p><input type="checkbox"/> Operating_Permit_Received? <input type="checkbox"/> Operating permit current?</p> <p>Expiration of latest operating permit: <input type="text"/></p> <p>PermitIssueDate: <input type="text"/></p> <p>Documentation for lack of OP: <i>(vacant house, enforcement ongoing)</i> <input type="text"/></p> <p>Operating conditions: <input type="text"/></p> <p>QC Comments Operating Permit Review: <input type="text"/></p>						<p>Maintenance / Inspections</p> <p>Effective_date_of_previous_OP_permit_year_completed: <input type="text"/></p> <p><input type="checkbox"/> Inspection_1_by_CHDs <input type="text"/> Calculated number <input type="text"/></p> <p><input type="checkbox"/> Inspection_1_by_ME</p> <p><input type="checkbox"/> Inspection_2_by_ME</p> <p><input type="checkbox"/> Inspection_>2_by_ME</p> <p><input type="checkbox"/> Maintenance_Entity_Contract</p> <p>Maintenance_Contract_Expiration: <input type="text"/></p> <p>Last_ME_Inspection: <input type="text"/></p> <p>Monitoring_submitted: <input type="text"/></p> <p>Calculated number above should match Effective_date_of_previous OP_permit_year_completed date. If it doesn't put the calculated number into the Effective_date... field.</p>					
<p>Operating Permit Enforcement</p> <p>List Technical Problems: <input type="text"/></p> <p>Description of violations: <input type="text"/></p> <p>ME sent notice of discontinuation: <input type="text"/></p> <p>CHD Sent reminder to ME: <input type="text"/></p> <p>CHD sent reminder to owner: <input type="text"/></p> <p>CHD sent NOV to owner: <input type="text"/></p> <p>CHD sent notice of intended action: <input type="text"/></p> <p>CHD sent citation: <input type="text"/></p> <p>CHD sent administrative complaint: <input type="text"/></p> <p>Enforcement action results?: <input type="text"/></p> <p>General_Operating_permit_Questions: <input type="text"/></p>											

Form 4: PBTS Review

Record Inquiry_Status		Construction Permit Review		Operating Permit Review		PBTS Review		Treatment Train		File Review Status	
<p>System treatment category is: <input type="text"/> <input type="checkbox"/> PBTS_Present</p> <p><input type="checkbox"/> PBTS_application signed and sealed?</p> <p><input type="checkbox"/> Authorized sewage flow increase</p> <p><input type="checkbox"/> Setback reductions_horizontal?</p> <p><input type="checkbox"/> Setback reductions_vertical</p> <p>Performance_standard_class: <input type="text"/></p> <p>cBOD5 (mg/L): <input type="text"/></p> <p>TSS(mg/L): <input type="text"/></p> <p>TN(mg/L): <input type="text"/></p> <p>TP(mg/L): <input type="text"/></p> <p>fecal coliform (cfu/100mL): <input type="text"/></p> <p>comments_performance_standard: <input type="text"/></p> <p>Frequency_of_maintenance_and_monitoring: <input type="text"/></p> <p>Are_there_sampling_requirements?: <input type="text"/></p> <p>Sampling_Requirements: <input type="text"/></p> <p>Additional comments: <input type="text"/></p>						<p>List of Requested Documents Received:</p> <p><input type="checkbox"/> PBTS/Innovative System Design Calculations</p> <p><input type="checkbox"/> PBTS/Innovative System Design Criteria</p> <p><input type="checkbox"/> PBTS/Innovative Soil Treatment Description</p> <p><input type="checkbox"/> PBTS/Innovative Contingency Plan</p> <p><input type="checkbox"/> PBTS/Innovative Certification of Design</p> <p><input type="checkbox"/> PBTS/Innovative Operation and Maintenance Manual</p> <p><input type="checkbox"/> PBTS/Innovative Applicant Cover Letter</p> <p><input type="checkbox"/> PBTS/Innovative Certificate of Compliance</p> <p><input type="checkbox"/> PBTS/Innovative Monitoring Requirements</p>					

Form 5: Treatment Train

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

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. Is there any surfacing or breakouts? Yes ___ No ___

b. Are tanks, lids or access covers broken or missing? Yes ___ No ___

c. Are the system components free from settling or erosion? Yes ___ No ___

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

e. Is the system free from encroachment? If no, what is within 5ft of system? Yes ___ No ___

Building Driveways Utility easements Patios Decks Gardening Pets Other _____

f. Evaluate presence of odor within 10 ft 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 10 ft 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 ?

riser/tank access cover lid inlet/outlet ports 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 ___

- b. Has system been obstructed? Yes ___ No ___
- c. Any apparent recent additions to the building(s) connected to system? Yes ___ No ___
- d. Are all components present and not modified? Yes ___ No ___

e. Components that are on this site, and their order:

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 _____	

f. Comments: _____

3. Observe that there is power to the system.

- a. Is control panel for treatment system visible? Yes ___ No ___ N/A ___
- b. Is control panel for treatment system accessible? Yes ___ No ___ N/A ___
- c. Does power indicator, if present, indicate that power is on? Yes ___ No ___ N/A ___
- d. Does operation of system (aerator) indicate that power is on? Yes ___ No ___ N/A ___
- e. Does it appear that the power is switched off? Yes ___ No ___ N/A ___
- f. Comments: _____

4. Observe that there is an alarm and, if possible, test it.

- a. Is an alarm present for the treatment unit? Yes ___ No ___ N/A ___
- b. If yes, which of the following are operational? Audio ___ Visual ___
- c. Is an alarm present for the dosing tank, if tank is present? Yes ___ No ___ N/A ___
- d. If yes, which of the following are operational? Audio ___ Visual ___

5. Observe the drainfield area and record conditions.

- a. Are there any trees in the drainfield? Yes ___ No ___ N/A ___
- b. Relative to surrounding areas, how does the vegetation on the drainfield look?
 Same More vegetation. Uneven vegetation Less vegetation
 Location(s): _____
- c. 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 _____
- d. Comments: _____

F. Access to Sewage

1. 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
2. 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
3. Are access covers securely fastened? Yes ___ No ___ N/A ___
4. 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
5. Are access covers securely fastened? Yes ___ No ___ N/A ___
6. Are access covers in operable condition? Yes ___ No ___ N/A ___
7. Is it feasible to obtain an influent sample from this system? Yes ___ No ___ Questionable ___

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)		<input type="checkbox"/> Above <input type="checkbox"/> Below				
Liquid level relative to inlet (in)		<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 2 spalling 3 corrosion present 4 roots inside of compartment
 1 rebar exposed 6 deflection noted 7 inlet seal missing/broken 8 outlet seal missing/broken
 5 cracks present 10 lid broken/missing 11 manhole cover missing/broken 12 other (list)
 9 holes present

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

Color Code BL Black BR Brown MU Mustard GR Gray WH White TAN Tan OTH Other _____ NO None

Clarity/Structure Code CLEAR Clear CLOUD Cloudy MILK Milky MUD Muddy FLOC Flocced GRA Grainy FLU Fluffy

Aeration Chamber N.A. Yes No

1. Aeration chamber
 Mixing in aeration chamber: Yes No Comment: _____
 Settled Sludge Volume test: Sample obtained Yes No
 Settled _____ mL/L, Floating _____ mL/L in _____ min
 Settled _____ mL/L, Floating _____ mL/L in 30 min
 Biomass color: Black Brown Mustard Gray White Other _____
 Biomass structure: fluffy flocced grainy
 Supernatant: cloudy clear
2. Additional tasks for attached-growth media evaluation:
 - a. Plugging Yes No
 - b. Floating Yes No
 - d. Media replaced Yes No Unknown

Media Filters N.A. Yes No

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Distribution of sewage across media:
 Device: _____
 Uniform distribution <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Operating properly <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Ponding <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Comments: _____ | <ol style="list-style-type: none"> 2. Filter drainage systems
 Ponding in media filter sump <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Gravity drainage operational <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Solids buildup in sump area <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Underdrain vents present <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Underdrain vents operable <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No |
|---|---|

Chlorination System N.A. Yes No

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Chlorination
 Manufacturer: _____
 Chlorinator: _____ Dechlorinator: _____
 Model #: _____
 Method: <input type="checkbox"/> Tablet <input type="checkbox"/> Liquid
 Unit appears in good condition. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Location in/after tank # _____ | <ol style="list-style-type: none"> 2. Tablet chlorination (if applicable):
 Chlorinator appears operable <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Chlorine tablets in place <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Tablets in contact with effluent <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No
 Contact chamber operable <input type="checkbox"/> N.D. <input type="checkbox"/> Yes <input type="checkbox"/> No 3. Chlorine residual: <input type="checkbox"/> Free _____ ppm
 <input type="checkbox"/> Total _____ ppm |
|--|---|
- Effluent screen/tertiary filter location: _____ evidence of clogging N.A. Yes No

SYSTEM NUMBER / TANK NUMBER	STATI ON DESC RIPTI ON	PARAM ETER	DATE	TIME	WATER TEMP	DO	%SAT DO	Trend	ORP	COND	SALIN ITY	PH
		UNIT	yy/mm/dd	hr:min	Celsius	mg/L	%		mV	µS/cm	ppt	su

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
Acceptance Criteria: +/- 0.3mg/l											
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
Acceptance Criteria: +/- 5%											
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
Acceptance Criteria: +/- 0.2 SU											
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 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



A handwritten signature in black ink.

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

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

Florida Testing Services LLC dba Xenco
 Laboratory Name: 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	1610	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	12/2/2008
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	10200609	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	20036800	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	20037603	2/25/2002



Representative Bryan Nelson

Florida House of Representatives
District 38

409 South Park Avenue
Apopka, FL 32703
(407) 884-2023 ~ (407) 884-2025 (f)

Chairman
Insurance & Banking Subcommittee
Bryan.Nelson@MyFloridaHouse.Gov

204 House Office Building
402 South Monroe Street
Tallahassee, FL 32399
(850) 488-2023 ~ (850) 921-8930 (f)

March 25, 2011

Research Review and Advisory Committee
C/O Ms. Elke Ursin
Environmental Health Program Consultant
Bureau of Onsite Sewage Programs
Florida Department of Health

Via Electronic Correspondence

Dear Members of Research Review and Advisory Committee:

It has come to our attention that clarification is necessary regarding the definition of "passive" as utilized for the Florida Onsite Sewage Nitrogen Reduction Strategies Project authorized by the Florida Legislature. It is our firm intent to resolve this issue by providing explicit clarification for what passive should mean in regards to the above-mentioned study.

Passive on-site wastewater treatment is to be defined as "a type of onsite sewage treatment and disposable system that carries household wastewater from the residence to a septic tank, and includes an absorption component known as a gravity drainfield, with exception only in the case that the 24" water separation cannot be met by the property, in which case up to one pump may be used to facilitate the transfer of effluent upwards. As passive system excludes the use of aerator pumps, but may use a reactive media to assist in nitrogen removal."

As stated within the budget language in 2008 (Line Item 1682, House Bill 5001, General Appropriations Act for Fiscal Year 2008-2009), this study was authorized to "...develop **passive** strategies for nitrogen reduction that **complement use of conventional** onsite wastewater treatment systems."

Certainly, the committee understands the importance of preserving our natural resources while providing the necessary services for our community. Smart, responsible development and environmental policies should be advocated for the benefit of Florida's residents and environment. We look forward to the continued success of this study within the parameters specified and now clarified. Should there be any questions or concerns, please do not hesitate to contact our offices.

Sincerely,
Members of the Florida Legislature Signed Below

Proudly Serving Northwest Orange County

Insurance and Banking Subcommittee, Chair; Economic Affairs Committee; Government Operations Appropriations Subcommittee; Government Operations Policy Committee; Select Committee on Water Policy; Orange County Legislative Delegation, Past Chair



Department of Health
Bureau of Onsite Sewage Programs
Research Review and Advisory Committee

Thursday April 20, 2011

1:00 pm - 4:00 pm



Agenda:

- Introductions and Housekeeping
- Review Minutes of Meeting March 24, 2011
- Nitrogen Study
 - Status report for Legislature
- Other Business
- Public Comment
- Closing Comments, Next Meeting, and Adjournment



Introductions & Housekeeping

- Roll call
- Identification of audience
- How to view web conference
- DO NOT PUT YOUR PHONE ON HOLD!!!!
- Download reports:

<http://www.myfloridaeh.com/ostds/research/Index.html>



Review Minutes of Meeting March 24, 2011

- See draft minutes



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Purpose: Develop passive strategies for nitrogen reduction that complement use of conventional onsite sewage treatment and disposal systems, and further develop cost-effective nitrogen reduction strategies



Florida Onsite Sewage Nitrogen Reduction Strategies Study

- Status report on nitrogen study due May 16, 2011
- Discuss draft report
- Number to go in Table 1 for Total Budget Remaining as of April 15, 2011 is:
\$1,886,919



Florida Onsite Sewage Nitrogen Reduction Strategies Study

- Hazen and Sawyer and the Colorado School of Mines are presenting on this study at this years National Onsite Wastewater Recycling Association (NOWRA) in Columbus Ohio



Florida Onsite Sewage Nitrogen Reduction Strategies Study

- Discuss letter from Legislature re: definition of passive

Systems finalized since 1/1/2007 with dosing pump information

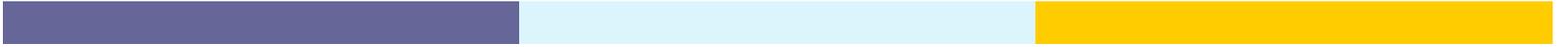
	Total	Filled			Mound			Standard		
		Total	New	Repair	Total	New	Repair	Total	New	Repair
Total	106,000	7,740	4,035	3,705	23,186	16,762	6,424	75,074	29,478	45,596
no pumps	94,474	5,505	3,399	2,106	16,692	11,645	5,047	72,277	28,462	43,815
pumps	11,527	2,236	636	1,600	6,494	5,117	1,377	2,797	1,016	1,781



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Funding update

	Total Estimated Cost	Allocated Funds	Estimated to be Spent for Phase I	Estimated to be Spent for Phase II	Estimated to be Spent for Phase III	Total Spent as of April 15, 2011	Remaining Unspent Allocated Funds	Remaining Funding Needs
Task A	\$786,760	\$751,280	\$352,144	\$399,136	\$35,480	\$472,559	\$278,721	\$35,480
Task B	\$1,080,352	\$521,237	\$50,202	\$471,035	\$559,115	\$71,565	\$449,672	\$559,115
Task C	\$1,906,952	\$1,244,012	\$216,164	\$1,027,848	\$662,940	\$254,201	\$989,811	\$662,940
Task D	\$808,022	\$168,214	\$74,357	\$93,857	\$639,808	\$90,015	\$78,199	\$639,808
Task E	\$417,874	\$168,627	\$90,695	\$77,932	\$249,247	\$124,741	\$43,886	\$249,247
Other Costs Not in Nitrogen Contract (RRAC, etc.)	\$100,040	\$46,630	\$29,258	\$17,372	\$53,410	\$30,661	\$15,969	\$53,410
Total	\$5,100,000	\$2,900,000	\$812,820	\$2,087,180	\$2,200,000	\$1,043,742	\$1,856,258	\$2,200,000



Other Business



319 Project on Performance and Management of Advanced Onsite Systems

Purpose: Assess water quality protection by advanced OSTDS throughout Florida

Update:

- Contract staff has resigned her position
- Currently working on hiring Wakulla County Health Department employee to conduct the statewide sampling not covered by other counties
- Question re: vacant & foreclosed and whether to sample
 - Sample only if less than x# months vacant
 - How to know whether truly vacant?



Public Comment



Next Meeting

Upcoming meeting topics:

- Discussion on process forward for ranked priority project ideas
- Status report on nitrogen study due May 16, 2011 (need to route by mid-April)

Proposed dates for next meeting:

- Suggestions?



Closing Comments and Adjournment