



**INTERIM STUDY AND REPORT ON PHASE II OF THE
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION
STRATEGIES STUDY (2010)**

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Bureau of Onsite Sewage Programs

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INTERIM STUDY AND REPORT ON PHASE II OF THE FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY (2011)

EXECUTIVE SUMMARY

The Florida Legislature has appropriated a total of \$2.9 million for Phase I and II of an anticipated 3-5 year project with a total estimated cost of \$5 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 \$2.0 million to complete the study.

The significance of this project is that it evaluates and develops strategies to reduce nitrogen impacts from OSTDS regulated by the Florida Department of Health (FDOH). Excessive nitrogen can have negative effects on public health and the environment.

The project has been divided into the following tasks:

- Task A – Technology Evaluation for Field Testing: Review, Prioritization, and Development
- Task B – Field Testing of Technologies and Cost Documentation
- Task C – Evaluation of Nitrogen Reduction Provided by Soils and Shallow Groundwater
- Task D – Nitrogen Fate and Transport Modeling

The contractor, in coordination with the FDOH and the Department's Research Review and Advisory Committee (RRAC), has successfully completed parts of Task 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; and completion of several sampling events at the test facility.

Current efforts and work expected to be completed this fiscal year include initiating field sampling of passive systems and the soil and groundwater under OSTDS at residential homes throughout Florida and at the test facility, and development of both simple and complex soil models.

Funding for fiscal year 2011-2012 is required to reap the benefits of all previous work and to complete the goals of this project. The tasks associated with this final phase 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 which will be calibrated with the field sampling results, and final reporting on all tasks with recommendations on onsite sewage nitrogen reduction strategies.

The FDOH and its Research Review and Advisory Committee recommend that the legislature:

- Provide additional funding and budget authority to the FDOH in the amount of \$2 million for the fiscal year 2011-2012 for continuation and completion of the contract and associated tasks.
- Provide FDOH budget authority for any remaining funds from 2010 appropriation to fiscal year 2011-2012.

Continued support for this project will ultimately benefit Florida's onsite system owners by finding cost-effective nitrogen reduction strategies, and will improve environmental and public health protection.

1 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 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 \$2.0 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 (FDEP) 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.

The significance of this project is that it evaluates and develops strategies to reduce nitrogen impacts from OSTDS regulated by the Florida Department of Health (FDOH). Excessive nitrogen can have 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 the Florida Department of Environmental Protection 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.

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. 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 FDOH 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

TECHNOLOGY OF LEADERS
1874
COLORADO

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.

2 PROJECT STATUS

Funding for the first and second phases of this project has been appropriated. A summary of each of the major project tasks and their associated funding phases is shown in Table 1. The contractor, in coordination with the RRAC and FDOH, has successfully completed parts of Task 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 preparations for field sampling, installation of between 4 and 9 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 development of both simple and complex soil models.

- 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 passive nitrogen removal study.
- For field testing of technologies (Task B), the quality assurance project plan has been finalized, 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 8 different

sampling points, and a template report on life cycle cost assessments will be completed.

- To evaluate of 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 and three sampling events will be completed sampling 6 test areas 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 has started to research how nitrogen behaves in the soil and groundwater and four sampling events, examining multiple parameters, will be completed. At least one 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.
- To address nitrogen fate and transport modeling for Task D, a final quality assurance project plan has been completed, and the first steps are the development of simple and complex soil models to show how nitrogen is affected by treatment in Florida-specific soil.

3 ANTICIPATED PROGRESS IN 2011-2012

During the 2011-2012 fiscal year, additional funding will be critical. The tasks associated with this final phase are anticipated to include installation of the remaining (4 to 9) field sites at residential homes throughout Florida for the testing of passive systems and to test the soil and groundwater under OSTDS, completion of all sampling efforts, and completion of all reporting.

- 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.
- For Task B, it is anticipated that 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.
- For Task C, it is anticipated that at least 3 monitoring events will occur at 4 home sites to evaluate nitrogen movement in the soil and groundwater in the field, 3 sampling events will occur at 6 test areas at the soil and groundwater test facility to show how groundwater fate and transport of nitrogen occurs in multiple soil treatment unit regimes, and final reporting for this task will be completed.
- For Task D, shallow groundwater models will be developed, calibrated, and validated, with many of them 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.

Table 1. Summary of Tasks and Associated Funding Phases.

Task	Phase I (Jan 2009- June 2010)	Phase II Current Funding	Phase III Future Funding
A Task A: Technology Selection & Prioritization			
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			
Quality assurance project plan		1	
Installation of ranked nitrogen reduction technologies at field sites		4	4
System performance monitoring events (8 sites)		4	4
Template report on life cycle cost assessments		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			
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			
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

4 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-million dollars is required to fund the completion of this study.

Project Tasks (described above) 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: largely complete. The initial funding has been targeted to prioritize systems for testing, summarize existing knowledge, develop testing protocols, and establish a test facility for detailed soil and groundwater monitoring and preliminary testing of pilot scale passive nitrogen reduction systems.

Funding in 2010-2011: \$2 million already appropriated (in 2010 state budgets) – status: ongoing. This funding is primarily 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: \$2 million will need to be appropriated during the 2011 legislative session to adequately fund the final phase of the project, primarily 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>

5 RECOMMENDATIONS

The FDOH and its Research Review and Advisory Committee recommend that the legislature:

- Provide additional funding and budget authority to the FDOH in the amount of \$2 million for the fiscal year 2011-2012 for continuation and completion of the contract and associated tasks.
- Provide FDOH budget authority for any remaining funds from 2010 appropriation to fiscal year 2011-2012.

Additional resources 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 which 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 onsite system owners by finding cost-effective nitrogen reduction strategies, and will improve environmental and public health protection.

APPENDIX A. 2010 Legislative Language

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SECTION 3 - HUMAN SERVICES

485	SPECIAL CATEGORIES		
	ACQUISITION OF MOTOR VEHICLES		
	FROM ADMINISTRATIVE TRUST FUND . . .		80,000
	FROM RADIATION PROTECTION TRUST		
	FUND		130,856
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

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.

487	SPECIAL CATEGORIES		
	GRANTS AND AIDS - CONTRACTED SERVICES		
	FROM FEDERAL GRANTS TRUST FUND . . .		750,000
488	SPECIAL CATEGORIES		
	RISK MANAGEMENT INSURANCE		
	FROM GENERAL REVENUE FUND	66,504	
	FROM RADIATION PROTECTION TRUST		
	FUND		14,575
489	SPECIAL CATEGORIES		
	TRANSFER TO DEPARTMENT OF MANAGEMENT		
	SERVICES - HUMAN RESOURCES SERVICES		
	PURCHASED PER STATEWIDE CONTRACT		
	FROM GENERAL REVENUE FUND	12,630	
	FROM ADMINISTRATIVE TRUST FUND . . .		18,342
	FROM FEDERAL GRANTS TRUST FUND . . .		9,712
	FROM GRANTS AND DONATIONS TRUST		
	FUND		8,282
	FROM RADIATION PROTECTION TRUST		
	FUND		40,522
490	SPECIAL CATEGORIES		
	STATE UNDERGROUND PETROLEUM ENVIRONMENTAL		
	RESPONSE (SUPER) ACT REIMBURSEMENT		
	FROM GRANTS AND DONATIONS TRUST		
	FUND		534,775

TOTAL:	ENVIRONMENTAL HEALTH SERVICES		
	FROM GENERAL REVENUE FUND	5,436,035	
	FROM TRUST FUNDS		23,407,013
	TOTAL POSITIONS	217.50	
	TOTAL ALL FUNDS		28,843,048

COUNTY HEALTH DEPARTMENTS LOCAL HEALTH NEEDS

	APPROVED SALARY RATE	474,197,601	
492	SALARIES AND BENEFITS	POSITIONS	12,359.00
	FROM COUNTY HEALTH DEPARTMENT		
	TRUST FUND		652,737,029
493	OTHER PERSONAL SERVICES		
	FROM COUNTY HEALTH DEPARTMENT		
	TRUST FUND		32,697,185

operating margin for the previous fiscal year to the Agency for Health Care Administration through hospital-audited financial data; and

(e) The department may not execute a contract for health care services at hospitals for rates other than rates based on a percentage of the Medicare allowable rate.

(2) For purposes of this section, the term “hospital” means any hospital licensed under chapter 395, Florida Statutes.

(3) This section expires July 1, 2011.

Section 12. In order to implement Specific Appropriations 3214 through 3216, 3218, 3222, and 3245A of the 2010-2011 General Appropriations Act, subsection (3) is added to section 44.108, Florida Statutes, to read:

44.108 Funding of mediation and arbitration.—

(3) For the 2010-2011 fiscal year only and notwithstanding any other provision of law to the contrary, moneys in the Mediation and Arbitration Trust Fund may be used as specified in the General Appropriations Act. This subsection expires July 1, 2011.

Section 13. In order to implement Specific Appropriations 324 through 355 of the 2010-2011 General Appropriations Act, paragraphs (b) and (c) of subsection (3) of section 394.908, Florida Statutes, are amended to read:

394.908 Substance abuse and mental health funding equity; distribution of appropriations.—In recognition of the historical inequity in the funding of substance abuse and mental health services for the department’s districts and regions and to rectify this inequity and provide for equitable funding in the future throughout the state, the following funding process shall be used:

(3)

(b) Notwithstanding paragraph (a) and for the 2010-2011 ~~2009-2010~~ fiscal year only, funds appropriated for forensic mental health treatment services shall be allocated to the areas of the state having the greatest demand for services and treatment capacity. This paragraph expires July 1, 2011 ~~2010~~.

(c) Notwithstanding paragraph (a) and for the 2010-2011 ~~2009-2010~~ fiscal year only, additional funds appropriated for substance abuse and mental health services from funds available through the Community-Based Medicaid Administrative Claiming Program shall be allocated as provided in the 2010-2011 ~~2009-2010~~ General Appropriations Act and in proportion to contributed provider earnings. This paragraph expires July 1, 2011 ~~2010~~.

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.

Section 15. Effective June 29, 2010, in order to implement Specific Appropriation 270 through 375 of the 2010-2011 General Appropriations Act, subsection (3) of section 1 of chapter 2007-174, Laws of Florida, is amended to read:

Section 1. Flexibility for the Department of Children and Family Services.-