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TECHNICAL MEMORANDUM # 1

TO:	Eberhard Roeder Elke Ursin
FROM:	Dick Otis
DATE:	December 14, 2006
RE:	Table Format for Categorization and Quantification of Nitrogen Loading from Onsite Wastewater Treatment Systems

I have developed a draft of a format for the categorization table on which I would like you to review and comment. I have changed some of the inputs suggested in the RFP for reasons I explain below. If we can agree on a format, then it will just be a matter of populating the table with the appropriate data.

Study Background

For me to better understand the purpose of the Categorization and Quantification of Nitrogen Loading from Onsite Wastewater Treatment System Types table, I have described my understanding of the background and objective of the Wekiva Onsite Nitrogen Contribution Study below. I would like your help in clarifying my understanding of the background of this study so that might better meet the objective of Task 2.

I understand that the development of this table is part of the larger Wekiva Onsite Nitrogen Contribution Study that the Florida Legislature directed the Florida Department of Health (FDOH) to conduct as part of the Wekiva Parkway and Protection Act (WPPA) signed into law in June of 2004. A specific directive in this Act required FDOH "to study onsite disposal system standards needed to achieve nitrogen reductions protective of groundwater quality within the Wekiva Study Area." FDOH responded with the *"Wekiva Basin Onsite Sewage Treatment and Disposal System Study"* report in December 2004, which recommended that the Department establish a discharge limit of 10 gm/L of total nitrogen for new systems, systems being modified, and existing systems located in the primary and secondary protection zones of the Wekiva Study Area. Also, the report recommended that the economic feasibility of sewering versus nutrient removal upgrades to existing onsite systems be evaluated.

It's not entirely clear to me but it seems that this "contribution study" was subsequently commissioned by the Florida Legislature because of concerns expressed by homebuilders and realtors questioning whether documented impacts of onsite treatment system performance on water quality were sufficiently serious to justify the substantial increase in system costs that are expected to result with the promulgation of the proposed rules. This assignment by the legislature directs FDOH to assess whether onsite wastewater treatment systems (OWTS) are a significant source of nitrogen to the underlying groundwater relative to other sources and to recommend a range of possible cost-effective OWTS nitrogen removal reduction strategies if the OWTS contributions are determined to be significant.

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Table Purpose

To assess the significance of the nitrogen contributions from OWTS in the Wekiva Study Area, it will be necessary to enumerate and aggregate the nitrogen contributions from each of the systems that exist within the area. Therefore, the Categorization and Quantification of Nitrogen Loading from OWTS Types table will provide the 'key' for making these assignments. The table is to present estimates of the mass of total nitrogen that is discharged into the water environment by each type of OWTS that exist in the study area. For each existing OWTS type identified, separate estimates are to be provided for different influent wastewater characteristics and the various characteristics of predominate soil types in which the systems are installed.

Table Format

What I propose is several tables. The first table will be a 'source' table that lists various types of facilities (e.g., residential, commercial, public) with their typical daily wastewater flows using an appropriate unit (e.g., gallons per capita, per square foot, per meal served, etc.) and a typical range of nitrogen concentration for each. This table can be used to estimate the total daily mass of nitrogen in the influent of various wastewater sources.

The other tables would present estimates of nitrogen removal capabilities of various types of treatment systems installed in the various predominate soils within the study area. I propose separate tables for each soil type considered. A limited number of soil characteristics would be considered in grouping the various soil mapping units such as texture, structure, and depth to groundwater. I would like your help in identifying appropriate groupings of the soils in the study area for these tables. They will need to be broad groupings with no more than 2 to 3 groups.

Each of the soil tables would be broken down into system types, pretreatment used, wastewater application rate to the soil, and method of application. These are what I consider to be the important design factors that will impact the amount of nitrogen discharged by OWTS. The types of systems will include in-ground, mound, and other types used in significant numbers (3 types). The rates of application will range from 0.1 to > 1.5 gpd/ft^2 using increments of 0.5 gpd/ft^2 (4 ranges). The methods of application will include gravity and dosing (2 methods). For each of these 36 combinations for a given soil group, performance data, both at the 'end of pipe' of the system and at the water table below the system, will be sought and entered into the table with citations to identify the source of the data.

Use of the Tables

From the performance data that we are able to collect (please note the "we"!), percent removals will be estimated. Then, given a type and size of a facility, the influent mass of nitrogen can be estimated from the source table. The type of OWTS used by the facility and the soil group in which it is installed can be used to estimate the percent of nitrogen removed by the system. This will establish the mass and concentration of nitrogen that is discharged to the environment by the system.

I anticipate that there will be many blanks in the tables because of the lack of good data. We may find that the combinations of characteristics used to generate the tables should be rolled up to some degree. We will need to assess what to do once we have completed the data collection phase.

Further Consideration

This task limits the length of travel of nitrogen in the soil to the distance of the water table from the infiltrative surface of the dispersal system. However, there is a body of literature that documents nitrogen removal within the soil and groundwater. The amounts of removal would be a function of travel distance and time except in karst formations. Therefore, it is likely that this study will underestimate the amount of nitrogen removed before the percolate reaches surface bodies of water. Collection of these data is beyond the scope of this task but I believe they should be gathered to more closely approximate the contribution of nitrogen by OWTS to the springs in the Wekiva Study Area.