Florida Department of Health
Florida Onsite Sewage Nitrogen Reduction Strategies Study

Contract CORCL

TASK B.8

Operation, Maintenance and Repairs Report for Passive Nitrogen Reduction System B-HS7

March, 2015

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9 and pilot tested in Task A.26. To meet this objective, full-scale treatment systems were installed at various residential sites in Florida, operated on septic tank effluent (STE) under actual onsite conditions, and monitored over an extended timeframe.

This report summarizes the operation, maintenance, and repairs required for the passive nitrogen reduction system (PNRS) installed at a home site in Marion County, Florida (B-HS7) in November, 2013. Design and construction details were presented previously in the Task B.6 Field System Installation Report for this system. The field system monitoring reports that document system performance, operation, and maintenance issues were presented previously in Task B.7 documents for each monitoring event. The B-HS7 system performance was monitored from December 2013 to February 2015.

The existing 900 gallon dual chamber septic tank continues to provide primary treatment for the PNRS system. The PNRS system consists of a 300 gallon concrete pump tank, low-pressure distribution network, and an in-ground Stage 1 nitrification biofilter directly over a lined Stage 2 denitrification biofilter. The treated effluent was expected to percolate through the Stage 1 native fine sand media into the liner filled with lignocellulosic media, and then discharge into the soil around the perimeter of the liner by overflowing the liner. In actuality, it appears that the liner was not large enough to capture the unsaturated plume from the Stage 1 biofilter, and some of the nitrified effluent missed the liner. This is thought to be the reason for the high nitrate concentrations in suction lysimeter samples from the liner perimeter. Therefore, it appears that the liner for this type of system needs to be designed much larger to capture all percolating effluent. Additionally, it appears that the fine sand media holds considerable water at the sand lignocellulosic interface, and this also may contribute to nitrified effluent moisture transfer away from the liner. A better transitional interface between the sand the lignocellulosic media is needed, to direct the effluent into the liner.

Despite the problems described above, a system of this type would provide the simplest operation and maintenance of all the systems tested to date. Overall this system required very little maintenance. A Hazen and Sawyer technician visited the site on a monthly basis; however, the only routine maintenance required was cleaning of the septic tank effluent screen, and this should be required very

infrequently. During start-up of the system, adjustments to the pump float were made to provide the target dose volume as summarized in Table 1. During the summer storm season, it was determined that the pump had been erroneously installed with a connection to a GFI breaker which will commonly trip during thunderstorms in Florida. During a large storm in July 2014, the GFI breaker tripped which caused a loss of power to the pump which resulted in a high water level in the pump tank. The GFI breaker was replaced with a regular 30-amp breaker by an electrician. Since that time, the pump has operated as intended. A description of the start-up issues, routine operation and maintenance items (O&M), the entity that performed the repair/maintenance, and the associated cost are included in Table 1. Table 2 is the summary log of repairs, maintenance actions, inspection results and system observations since start-up. This data, along with data from the other full-scale systems evaluated in Task B, will be used to estimate O&M effort and cost for full-scale passive nitrogen reduction systems (PNRS) in the Life Cycle Cost Analysis (Task B.13).

Table 1. Site B-HS7: Summary of start-up, routine operation and maintenance issues, repairs and refinement actions

Date	Start-up Issues	Routine Operations & Maintenance Issues	Repairs	System Refinement	Time Required (hr)	Estimated Cost[1]
11/14/13	Pump start-up and float adjusments were made				2	$150.00
11/19/13	H&S made adjustments to float on pump to adjust dose volume				2	$150.00
7/16/14		H&S cleaned primary tank effluent screen	H&S reset pump breaker, water level returned to normal operating level		2	$150.00
7/18/14			ME replaced pump GFI breaker with regular breaker		1	$75.00
10/22/14		H&S cleaned primary tank effluent screen			0.5	$37.50
12/18/14		H&S cleaned primary tank effluent screen			0.5	$37.50
2/4/15		H&S cleaned primary tank effluent screen			0.5	$37.50

ME = maintenance entity = Averett Septic

H&S = Hazen and Sawyer (field technician)

HO = homeowner

CHD = county health department

[1]An hourly rate of $75 was assumed for maintenance entity labor.

Table 2. Site B-HS7: System inspections, observations, maintenance actions, and repairs log

Date	Description
11/13/2013	Construction - Pump tank, liner and lignocellulosic media installed
11/14/2013	Construction - Pump, feed line, laterals, infiltrator chambers installed, wet pressure test
11/15/2013	Construction - final grading, hay and seed applied
11/18/2013	Construction - electrician finished electrical work
11/19/2013	System Start-up
	Bull run valve (BRV) switched from old drainfield to PNRS system
11/26/2013	Site visit. System ok
	Flipped BRV to old drainfield for Thanksgiving holiday ~ 30-40 people staying at the house
12/2/2013	Site visit. System ok
	Flipped BRV back to PNRS system
12/6/2013	Site visit. System ok
	Flipped BRV to old drainfield for holiday party ~ 80 people attending
12/9/2013	Homeowner flipped BRV back to PNRS system
12/10/2013	Site visit. System ok
	Preparation for preliminary sample event
12/12/2013	Preliminary sample event No. 1
1/3/2014	Site visit. System ok
1/17/2014	Preparation for Sample Event No. 1
1/20/2014	Sample Event No. 1
3/5/2014	Site visit. System ok
3/13/2014	Site visit. System ok
3/19/2014	Preparation for Sample Event No. 2
3/20/2014	Sample Event No. 2
4/28/2014	Site visit. System ok
5/7/2014	Preparation for Sample Event No. 3
5/8/2014	Sample Event No. 3
5/27/2014	Site visit. System ok
6/18/2014	Preparation for Sample Event No. 4
6/19/2014	Sample Event No. 4
7/16/2014	Site visit.
	Primary tank and pump tank high water level.
	System was still on GFI breaker which had tripped.
	Pump came on and lowered the levels.
	Cleaned primary tank effluent screen.
8/19/2014	Preparation for Sample Event No. 5
8/20/2014	Sample Event No. 5
	Checked primary tank effluent screen- ok no maintenance required.
9/23/2014	Site visit. System ok
10/20/2014	Preparation for Sample Event No. 6
10/22/2014	Sample Event No. 6
	Cleaned primary tank effluent screen.
11/24/2014	Site visit. System ok
12/16/2014	Preparation for Sample Event No. 7
	Fixed leaky valve on the background lysimeter (BHS7-BKG)
12/18/2014	Sample Event No. 7
	Cleaned primary tank effluent screen which was severely clogged (high water level in tank).

Table 2 (cont.). Site B-HS7: System inspections, observations, maintenance actions, and repairs log

Date	Description
1/14/2015	Site visit. System ok
2/2/2015	Preparation for Sample Event No. 8
2/4/2015	Sample Event No. 8
	Cleaned primary tank effluent screen