

FPL Turkey Point Monitoring Plan

Audit Checklist

Groundwater Sampling

Site/Location: _____

To use this field audit checklist effectively, the auditor must be familiar with FS 2200 (Groundwater Sampling) in "DEP Standard Operating Procedures for Field Activities", February 1, 2004 (DEP-SOP-001/01) Page 26 of 78 Revision Date: March 31, 2008 (Effective 12/3/08)

#	Audit Element	Acceptable (Y / N / NA)	Comments
	Information about the following topics (-) was recorded for each sample, as applicable:		
1	·Purging equipment		
2	·Purging procedure		
3	·Well diameter		
4	·Water table depth		
5	·Depth of well		
6	·Volume of water in the well		
7	·Equipment dimensions and volumes for pumps, tubing and flow containers (flow cells)		
8	·Purge volume calculations		
9	·Total volume of water purged		
10	·Total well volumes or equipment volumes purged		
11	·Date of purging		
12	·Starting and ending times for purging		
13	·Purging rate (pumping or flow rate) and associated calculations		
14	·Flow meter readings		
15	·Stabilization measurements for purge completion criteria		
16	·Elapsed time for one well volume or equipment volume purge at stabilized flow rate		
17	·Water level drawdown measurements during purging (depth to water table)		
18	A flow cell was used to measure stabilization parameters during pumping.		
19	Downhole measurements were used for wells purged by bailing.		
20	If the well was purged from the top of the water column above a <u>fully</u> submerged screen, at least one well volume was purged prior to commencing purge stabilization measurements and at least ¼ well volume was purged at the stabilized pumping rate between consecutive purge stabilization measurements.		
21	If the well was purged from the top of the water column in a <u>partially</u> submerged screen interval, at least one well volume was purged prior to commencing purge stabilization measurements and at least 2 minutes of continuous purging at the stabilized pumping rate elapsed between consecutive purge stabilization measurements.		
22	If the well was purged from the middle of a <u>fully</u> submerged screen interval, at least one <u>equipment</u> volume was purged prior to commencing purge stabilization measurements and at least 2 minutes of continuous purging at the stabilized		

	pumping rate elapsed between consecutive purge stabilization measurements.		
Determination of purging completion			
23	Three (3) consecutive measurements of the three parameters listed below were within stated limits		
24	• Temperature: $\pm 0.2^{\circ}\text{C}$		
25	• pH: ± 0.2 standard pH units		
26	• Specific Conductance: $\pm 5.0\%$ of reading		
27	Measured dissolved oxygen and turbidity were below the following thresholds.		
28	• DO $< 20\%$ saturation at the measured temperature		
29	• Turbidity < 20 NTU		
30	For wells where DO and turbidity thresholds could not be met for justified reasons, consecutive measurements were within the above stated limits for pH, conductivity and temperature; and, DO and turbidity measurements were within the following stated limits.		
31	• DO: ± 0.2 mg/L or 10%, whichever is greater		
32	• Turbidity: ± 5 NTUs or 10%, whichever is greater		
33	For wells failing to meet stabilization criteria after five (5) well volumes, testing instrumentation, calibrations, purging flow rate, flowcells and all tubing connections were determined to be functional and acceptable for measuring stabilization parameters.		
Purging Low Permeability Wells			
34	Dry-purged wells were purged only once according to FS 2212, section 3.4.1		
35	The well was known to purge dry due to low formation permeability and the samplers determined that the well could not be purged according to FS 2212 and FS 2213.		
36	Very small diameter Teflon, PE or PP tubing and the smallest possible pump chamber and flow cell volumes were used.		
37	The pump tubing wall was thick enough to minimize oxygen transfer.		
38	The pump or tubing intake was placed within the well screen interval.		
39	The purging flow rate was < 100 mL/min.		
40	Pump rate was adjusted to minimize drawdown.		
41	A minimum total of at least 2 equipment volumes was purged before stabilization parameters were measured and samples were collected.		
42	Temperature, pH, conductivity, DO and turbidity were measured once immediately prior to collecting the samples during stabilized pumping after at least 2 equipment volumes were purged.		
43	The same pump was used to purge and collect the samples.		

Collecting samples from Low Permeability Wells

44	The same pump and tubing was used to purge and collect the samples.		
45	The purge position of the pump or tubing intake was maintained throughout sample collection.		
46	The stabilized purge pumping rate was maintained throughout sample collection unless pumping was ceased to allow formation recharge.		
47	Samples were collected immediately after purging was completed while continuing a stabilized pumping rate or as soon as sufficient recharged sample water was available.		
48	Maximum elapsed times between purging and sampling		
49	Stabilization parameters were re-measured if the start of sample collection began more than one hour after completion of purging.		
50	The well was re-purged if the second set of stabilization measurements exceeded the original measurements by more than + 10%.		
51	Dry-purged wells were allowed to recharge after one purge before measuring stabilization parameters and collecting samples.		
52	Samples were collected within 6 hours of purging completion.		
53	General Requirements for Sample Collection Equipment		
54	Pumps were decontaminated or replaced between wells.		
55	Pump tubing was decontaminated or replaced between wells.		
56	Reusable bailers were decontaminated between wells.		
57	Material construction of pumps, tubing and bailers conformed to requirements of Tables FS 1000-1 through FS 1000-3 and Table FS 2200-1 for the analytes collected.		

Purging and sampling wells with in-place plumbing, air strippers or other plumbed remedial systems

58	The purging and sampling point was located upstream of storage or pressure tanks where possible.		
59	Hoses, aerators and filters removed were removed prior to purging and sampling where possible.		
60	The plumbed system was purged at the selected purge point (valve or spigot) until the purge completion criteria listed in FS 2212 section 3 were met.		
61	Air strippers and other remedial systems were purged for a minimum of one minute.		
62	The flow rate was reduced to less than 500 mL/minute (1/8" stream) or approximately 0.1 gal/minute before collecting samples.		

Auditor

Date

Organization

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