Issue/Title: Pilgrim Nuclear Power Station (PNPS): Tritium in Groundwater Monitoring Wells

Topic: PNPS Updates as of January 21, 2014

Previous Plans: Routine testing results from groundwater monitoring well samples collected during the weeks of December 2, 2013 and December 16, 2013 were reported by Entergy. Split sample results for the weeks of December 2, 2013 and December 6, 2013 were also reported by MERL.

Table 1[1]: Week of December 2nd

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	12/2/2013	536	NDA(417)*
MW 202	12/2/2013	-	-
MW 202 I	12/2/2013	-	-
MW 203	12/2/2013	-	-
MW 204	12/2/2013	-	-
MW 205	12/2/2013	530	669
MW 206	12/2/2013	946	908
MW 207	12/2/2013	-	-
MW 208-S	12/2/2013	-	-
MW 208-I	12/2/2013	-	-
MW 209	12/2/2013	1,154	1,370
MW 210	12/2/2013	-	-
MW 211	12/2/2013	1,222	1,580
MW 212	12/2/2013	-	-
MW 213	12/2/2013	-	-
MW 214	12/2/2013	-	-
MW 215	12/2/2013	1,212	1,450
MW 216	12/2/2013	6,832	6,140
MW 217	12/2/2013	-	-
MW 218	12/2/2013	5,045	4,220
MW 219	12/2/2013	-	-
MW 3	12/2/2013	-	-
MW 4R	12/2/2013	892	724
SW-boat ramp	12/2/2013	-	-
SW-intake	12/9/2013	NDA(300)*	NDA(366)*

Table 2: Week of December 16th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	12/16/2013	394	NDA(372)*
MW 202	12/16/2013	-	-
MW 202 I	12/16/2013	-	-
MW 203	12/16/2013	-	-
MW 204	12/16/2013	-	-
MW 205	12/16/2013	379	496
MW 206	12/16/2013	1,043	799
MW 207	12/16/2013	-	-
MW 208-S	12/16/2013	-	-
MW 208-I	12/16/2013	-	-
MW 209	12/16/2013	1,233	1,340
MW 210	12/16/2013	-	-
MW 211	12/16/2013	1,128	1,190
MW 212	12/16/2013	-	-
MW 213	12/16/2013	-	-
MW 214	12/16/2013	-	-
MW 215	12/16/2013	1,199	1,050
MW 216	12/16/2013	5,737	5,250
MW 217	12/16/2013	-	-
MW 218	12/16/2013	3,879	3,070
MW 219	12/16/2013	10,499	8,480
MW 3	12/16/2013	-	-
MW 4R	12/16/2013	396	496
SW-boat ramp	12/16/2013	-	-
SW-intake	12/23/2013	NDA(300)*	**

*** NDA = not detected at less than activity value listed**
**** Analysis pending**
- not analyzed this week

[1] PNPS screening level for tritium in groundwater monitoring wells is 3,000 pCi/L, which is 1/10th of the NRC-approved Pilgrim Offsite Dose Calculation Manual standard for tritium in non-drinking water sources. The EPA drinking water standard is 20,000 pCi/L. The nearest drinking water wells are approximately 2.5 miles from the plant.

Current Status:

In addition to routine biweekly or weekly testing of groundwater monitoring wells, this update contains information related to a well exceeding the NRC-approved Pilgrim Offsite Dose Calculation Manual standard for tritium in non-drinking water sources of 30,000 pCi/L.

As previously reported, beginning in September 2013, Entergy started using their own onsite lab to screen their groundwater samples before they are sent out for analysis at their contract laboratory (GEL). Groundwater samples that are higher than 1,500 pCi/L of tritium detected in their on-site laboratory will continue to be analyzed by their contract laboratory, GEL, under the same expedited schedule as the past several years. Samples with tritium concentrations less than 1,500 pCi/L will be analyzed with a normal (30 day) turnaround rather than an expedited schedule. Also, as previously reported, there will be no change in the timeline and analysis of split samples conducted by MERL. Lastly, in light of the recent findings in newly installed well MW219, described below, MDPH discussed the desire for some additional sample analyses to be expedited by both Entergy and MERL.

MW205 and MW206 Trends:

MW205 and MW206 have continued to indicate historically low results since the summer months of 2013 (MW205 has been mostly non-detect to just over 1,000 pCi/L of tritium detected since July 2013 and MW206 has mostly been non-detect to just under 1,700 pCi/L of tritium detected since March 2013). The most recent split groundwater monitoring results for MW205 reported by Entergy show 669 pCi/L of tritium was detected the week of December 2nd and 496 pCi/L was detected the week of December 16th (the previous Entergy result for the week of November 18th indicated 700 pCi/L of tritium detected). Entergy groundwater monitoring results for MW206 show 908 pCi/L of tritium was detected the week of December 2nd and 799 pCi/L of tritium was detected the week of December 16th (the previous Entergy result for November 18th indicated 1,670 pCi/L of tritium detected). MERL split sample results were generally consistent with Entergy results.

New Wells:

As previously described, three new wells were installed in November and December 2013. Two were installed as part of a deeper investigation of the separation in the neutralization sump discharge line (MW218 and MW219) and one well was replaced (MW4R replaced MW4). Newly installed wells are sampled weekly until trends in tritium levels are established and MDPH, MEMA, and Entergy agree on a sampling schedule. MDPH is providing an updated map showing the new well locations on the department's website.

MW218 Location and Initial Results:

MW218 was installed the week of November 11, 2013, and is located in the immediate vicinity of the neutralization sump discharge line break on the west side of the reactor building. MW218 is being sampled weekly, like all new wells, and results to date are as follows:

MW218 Results to Date

Date	Entergy Result (pCi/L)	MERL Result (pCi/L)
11/18/13	4,590	4,887
11/25/13	5,810	5,831
12/2/13	4,220	5,045
12/9/13	3,950	3,823
12/16/2013	3,070	3,879
12/23/2013	3,650	Pending
12/30/2013	2,630	Pending
1/6/2013	1,580	Pending

These elevated tritium levels may possibly be attributed to the separation in the neutralization sump discharge line discovered last year.

MW219 Location and Initial Results:

MW219 was installed as part of the neutralization sump discharge line separation investigation on December 10th to help determine where tritium may have migrated from the break. It is located on the west side of the reactor building and is down gradient of catch basin 10 (CB-10), where the neutralization sump discharge line empties, and the water then travels from CB-10 to the permitted outfall in the discharge canal. The location for this new well was chosen based on a pipe anomaly identified in video investigations of the neutralization sump discharge line. MW219 is also up gradient of MW205. MW219 is being sampled weekly and results to date are as follows:

MW219 Results

Date	Entergy Result (pCi/L)	MERL Result (pCi/L)
12/9/2013	2,120	Pending
12/16/2013	8,480	10,499
12/23/2013	7,600	Pending
12/30/2013	69,000	70,599
1/6/2013	20,000	21,012
1/9/2013	12,200	13,764
1/13/2013	2,470	Pending

On Thursday January 9th, Entergy notified MDPH of preliminary tritium results in a sample collected from MW219 the week of December 30th and confirmed results were reported verbally to DPH on January 10th at 69,000 pCi/L of tritium. MDPH and MEMA have also been in close contact with the NRC on this elevated detection. Because this tritium level (69,000 pCi/L) is above 30,000 pCi/L, the NRC-approved Pilgrim Offsite Dose Calculation Manual standard for tritium in non-drinking water sources, this result triggered more NRC involvement. Because this level was detected on site, Entergy will be required to submit a report to the NRC within 30 days as part of their voluntary groundwater protection initiative. This 30-day report to NRC will report the tritium detection, describe what may have caused it, and lay out the company's plans to address it.

Entergy reported that after the neutralization sump discharge line was taken out of service last spring, a temporary above ground line was put in place to discharge tritiated water directly into CB-10, from there the discharge moves on to the permitted outfall to the discharge canal. The first permitted discharges containing tritium through the new aboveground line were completed on December 3rd, 10th, and 20th, each consisting of about 9,000 gallons. MW219 is located just down-gradient from CB-10 and thus, findings from MW219 may have resulted from these recent discharges. CB-10 may have some integrity problems and is being further investigated. Because there have been no additional tritium discharges since December 20th, and subsequent tritium results for MW219 have been trending lower, it appears likely that the higher levels in MW219 are attributed to the recent discharges to CB-10. Entergy has suspended any further discharges through this system until investigations and remediation are complete. It should be noted that the most recent samples (through January 13th) after the high detection in MW219 from the surface water location downstream of this area have been non-detect for tritium. Surface water results are discussed in more detail below.

MW205 is down gradient of CB-10 and thus issues with CB-10 integrity may help explain past elevations in MW205 as well. MDPH has requested that MW205 be sampled weekly. MDPH has also requested that surface water down gradient of MW205 and MW219 also be sampled weekly.

MW4R Location and Initial Results:

MW4R is located near the southeast corner of the deep foundation of the reactor and turbine buildings. MR4R is up gradient of MW216 and MW206. MW4R was installed the week of November 4, 2013 and tritium results from this new well appear to be similar to historical results for MW4 (slightly above detection limits). The most recently available Entergy results indicate 724 pCi/L of tritium detected the week of December 2nd, 555 pCi/L detected the week of December 9th, and 496 pCi/L detected the week of

December 16th. MERL split sample results were generally consistent with Entergy results.

Other Wells Sampled on a Weekly Basis:

MW209 and MW211 are downgradient of the area of the neutralization sump discharge line separation and are also currently being sampled weekly. The most recent Entergy results for MW209 indicated 1,370 pCi/l of tritium detected the week of December 2, 2013, 1,120 pCi/L of tritium detected the week of December 9, 2013, and 1,340 pCi/L of tritium detected the week of December 16, 2013. The most recent Entergy results for MW211 indicated 1,580 pCi/L of tritium detected the week of December 2, 2013, 1,250 pCi/L of tritium detected the week of December 9, 2013, and 1,180 pCi/L of tritium detected the week of December 16, 2013. MERL split sample results were generally consistent with Entergy results.

Since its installation in September 2012, MW216 has been sampled weekly. MW216 continues to trend higher than most other groundwater monitoring wells on site. MW216 is just down gradient of the end of the deep foundation on the northeast corner of the turbine and reactor buildings. The most recent Entergy results for MW216 indicated 6,140 pCi/L of tritium detected the week of December 2, 2013, 4,680 pCi/L of tritium detected the week of December 9, 2013, and 5,250 pCi/L of tritium detected the week of December 16, 2013. MERL split sample results were generally consistent with Entergy results. As noted in a previous update, Entergy reported that dissolved oxygen and conductivity levels routinely measured in all groundwater monitoring wells are lower for MW216 than in other wells, and they are working with their contractor to better understand what this may mean in terms of identifying a potential tritium source in this well.

It should be noted that no groundwater monitoring well samples were taken the week of November 11, 2013 (a weekly well sampling round) due to a 10-day transducer study being conducted at all wells by Entergy's contractor. Entergy will share results from the transducer study with MDPH when they are available.

Other Wells Sampled on a Bi-Weekly Basis:

Entergy results for other wells (MW201 and MW215) sampled during the weeks of December 2nd and December 16th were within their typical ranges detected since the groundwater monitoring for tritium began. MERL split sample results were generally consistent with Entergy results.

Surface Water Results:

It is important to note that no tritium has been detected in any surface water sample taken as part of the tritium in groundwater investigation since sampling began in 2010. Entergy and MERL split surface water sample results for the intake canal downstream of MW205 for the weeks of November 25, 2013 and December 9, 2013 indicated no detectable tritium. MERL split sample results for this location for the week of December 23, 2013 indicated no detectable tritium, and Entergy results for the week of December 23, 2013 are currently being analyzed. Since the discovery of the MW219 elevation, both Entergy and MERL have expedited surface water samples at the location downstream of MW205. Results to date are shown below:

Surface water downstream of MW205 Results

Date	Entergy Result (pCi/L)	MERL Result (pCi/L)
11/25/2013	NDA < 308	NDA < 300
12/9/2013	NDA < 366	NDA < 300
12/23/2013	Pending	NDA < 300
1/6/2014	NDA < 379	NDA < 300
1/13/2014	NDA < 347	Pending

Other Activities:

MDPH attended a meeting with Entergy and their contractor the week of January 20, 2014 to review sampling results to date and discuss investigation plans for 2014. A future update will include info from this meeting.

Looking Forward:

MDPH will continue to closely follow all investigational activities that are currently underway at PNPS, notably MW219 results, sampling frequency of the monitoring wells of most concern and of surface water samples that MDPH recommended to be sample weekly, tritium in groundwater investigation plans for 2014, and transducer study results.