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

Topic: PNPS Updates as of February 7, 2014

Previous Plans: Routine testing results from groundwater monitoring well samples collected during the weeks of December 30, 2013 and January 13, 2014 were partially reported by Entergy. Split sample results for the weeks of December 30, 2013 and January 13, 2014 were also reported by MERL.

Table 1[1]: Week of December 30th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	12/30/2013	NDA(300)*	**
MW 202	12/30/2013	-	-
MW 202 I	12/30/2013	-	-
MW 203	12/30/2013	-	-
MW 204	12/30/2013	-	-
MW 205	12/30/2013	NDA(300)*	**
MW 206	12/30/2013	852	**
MW 207	12/30/2013	-	-
MW 208-S	12/30/2013	-	-
MW 208-I	12/30/2013	-	-
MW 209	12/30/2013	1,059	**
MW 210	12/30/2013	-	-
MW 211	12/30/2013	1,286	**
MW 212	12/30/2013	-	-
MW 213	12/30/2013	-	-
MW 214	12/30/2013	-	-
MW 215	12/30/2013	1,157	**
MW 216	12/30/2013	5,595	4,760
MW 217	12/30/2013	-	-
MW 218	12/30/2013	3,292	2,630
MW 219	12/30/2013	70,599	69,000
MW 3	12/30/2013	-	-
MW 4R	12/30/2013	483	**
SW-boat ramp	12/30/2013	-	-
SW-intake	1/6/2014	NDA(300)*	NDA(379)*

Table 2: Week of January 13th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	1/13/2014	NDA(300)*	ND(389)*
MW 202	1/13/2014	-	-
MW 202 I	1/13/2014	-	-
MW 203	1/13/2014	-	-
MW 204	1/13/2014	-	-
MW 205	1/13/2014	NDA(300)*	NDA(359)*
MW 206	1/13/2014	NDA(300)*	NDA(353)*
MW 207	1/13/2014	-	-
MW 208-S	1/13/2014	-	-
MW 208-I	1/13/2014	-	-
MW 209	1/13/2014	871	1,170
MW 210	1/13/2014	-	-
MW 211	1/13/2014	1,207	841
MW 212	1/13/2014	-	-
MW 213	1/13/2014	-	-
MW 214	1/13/2014	-	-
MW 215	1/13/2014	1,130	771
MW 216	1/13/2014	4,628	3,850
MW 217	1/13/2014	-	-
MW 218	1/13/2014	5,733	4,730
MW 219	1/13/2014	2,736	2,470
MW 3	1/13/2014	-	-
MW 4R	1/13/2014	520	548
SW-boat ramp	1/13/2014	-	-
SW-intake	1/13/2014	NDA(300)*	NDA(347)*

*** 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.

It is important to note that due to the need to expedite analyses of samples taken after the discovery of elevated tritium detections in newly installed wells this update includes Entergy results of some samples taken in January while some Entergy results for a number of other samples taken in December are still pending.

MW205 and MW206 Trends:

MW205 and MW206 have continued to indicate historically low results for the past six months. The most recent groundwater monitoring results for MW205 reported by Entergy show no detectable tritium for the week of January13th, and results for the week of December 30th are currently being analyzed by their contract lab (the previous Entergy result for the week of December 16th indicated 496 pCi/L of tritium detected). MERL split sample results for MW205 during the weeks of December 30th and January 13th indicated no detectable tritium. Entergy groundwater monitoring results for MW206 show no detectable tritium for the week of January13th, and results for the week of December 30th are currently being analyzed by their contract lab (the previous Entergy result for the week of December 16th indicated 799 pCi/L of tritium detected). MERL split sample results for MW206 during the week of December 30th indicated 852 pCi/L of tritium detected and split sample results for the week of January 13th indicated no detectable tritium.

New Wells:

As previously described, three new wells were installed in November and December 2013. Two of these wells were installed as part of an investigation of the separation in the neutralization sump discharge line (MW218 and MW219) and the other well was a replacement well (MW4R replaced MW4). MW4 was originally installed in the 1990s to monitor a transformer oil spill and is smaller and shallower than the other groundwater monitoring wells. MW4R's width and depth are consistent with the other groundwater monitoring wells at PNPS. Newly installed wells are sampled weekly until trends in tritium levels are established and MDPH, MEMA, and Entergy agree on a sampling schedule. MDPH has provided an updated map showing the new well locations on the department's website. It should be noted that these new wells are reportedly

approximately 24 to 25 feet below ground surface with a depth to groundwater of approximately 15 to 16 feet below ground surface. As with the other groundwater wells, samples are reportedly collected from the middle of the water column using a technique that does not change the water height in the well.

MW218 Results:

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	3,545
12/30/2013	2,630	3,292
1/6/2013	1,580	2,346
1/13/2013	4,730	5,733
1/20/2013	Pending	3,293

As previously reported, these elevated tritium levels may possibly be attributed to the separation in the neutralization sump discharge line discovered last year.

MW219 Results:

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	NA*
12/16/2013	8,480	10,499
12/23/2013	7,600	6,484
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	2,736
1/20/2013	Pending	2,191

*Sample collected as part of well installation procedures; not routine sampling.

MW219 is located just down-gradient from catch basin 10 (CB-10) and thus, tritium detected in MW219 may be attributed to recent permitted neutralization sump discharges that occurred through a temporary above ground line in December 2013. CB-10 is being further investigated and is the likely cause of the elevated tritium. 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 reportedly suspended any further permitted discharges of tritium through this system until investigations and remediation are complete. MW205 is down gradient of CB-10 and thus issues with CB-10 integrity may help explain past elevations in MW205 as well. MDPH will continue to monitor results for MW219 and other down-gradient wells closely.

MW4R 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 548 pCi/L of tritium detected the week of January 13th, and Entergy results for the week of January 20th are currently being analyzed by their contract lab. MERL split sample results for MW4R indicated 520 pCi/L of tritium detected for the week of January 13th and 581 pCi/L of tritium detected for the week of January 20th.

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 1,170 pCi/l of tritium detected the week of January 13, 2014, and Entergy results for the week of January 20, 2014 are currently being analyzed by their contract lab. MERL split sample results for MW209 during the week of January 13, 2014 indicated 871 pCi/L of tritium, and 1,191 pCi/L of tritium detected during the week of January 20, 2014. The most recent Entergy results for MW211 indicated 841 pCi/L of tritium detected the week of January 13, 2014, and Entergy results for the week of January 20, 2014 are currently being analyzed by their contract lab. MERL split sample results for MW211 during the week of January 13, 2014 indicated 1,207 pCi/L of tritium detected, and 1,126 pCi/L of tritium detected during the week of January 20, 2014.

MW216 continues to have higher detections 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 3,850 pCi/L of tritium detected the week of January 13, 2014, and Entergy results for the week of January 20, 2014 are currently being analyzed by their contract lab. MERL split sample results for MW216 indicated 4,628 pCi/L of tritium

detected the week of January 13, 2014, and 3,760 pCi/L of tritium detected the week of January 20, 2014. As noted in a previous updates, Entergy has 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 contributing to this well.

Other Wells Sampled on a Bi-Weekly Basis:

Entergy results for other wells (MW201 and MW215) sampled during the weeks of December 30th and January 13th were within their typical ranges detected since the groundwater monitoring for tritium began for both Entergy results that were available and MERL split sample results.

Surface Water Results:

As previously noted, no tritium has been detected in any surface water sample taken as part of the tritium in groundwater investigation since sampling began in 2010. Since the discovery of elevated tritium in MW219, both Entergy and MERL have expedited surface water samples at the location downstream of MW205 and MW219. 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	NDA < 300
1/20/2014	Pending	NDA < 300

Other Activities:

MDPH and NRC staff attended a meeting with Entergy and their contractor on January 21, 2014 to review sampling results to date, and discuss groundwater investigation plans for 2014. Items discussed include three lines of investigation focused on understanding the tritium in groundwater on the east and west sides of the reactor building. These investigations are summarized below.

West of the Reactor Building (i.e., tritium detections at MW219, MW218, MW205, MW209, MW211, and MW215)

Plans for the west side involve an investigation focused on the neutralization sump discharge line separation and CB-10. Approaches discussed include: remediating the soil in the areas of the neutralization sump discharge line separation and CB-10; rerouting future neutralization sump discharges through either an entirely new line, or through the building to another permitted discharge pathway (e.g. the radwaste discharge line); and investigating the integrity of CB-10; .

East of the Reactor Building (i.e., tritium detections at MW216, and past detections at MW206)

Plans being considered for the east side involve: an investigation of the catch basins in the area of MW216 and MW206 that accept roof drain runoff; a precipitation study to determine the role of tritium washout; an evaluation of the conductivity and dissolved oxygen in MW216; an evaluation of water migration from inside the plant to groundwater via seismic gaps[2] between the reactor and turbine buildings; and an evaluation of the contribution of historic spills to the current level of tritium in groundwater.

[2] "Seismic gaps" are spaces between two foundations that allow them to move independently in a seismic event.

East and West Side Groundwater Elevation Study

This plan involves the collection of detailed water elevation data over a 10-day period. Data were collected using ten transducers placed at ground water monitoring wells on both the east and west sides of the reactor building in November 2013 by Entergy's contractor. An evaluation of data collected in November 2013 is currently underway. In addition, Entergy has purchased three transducers that they are rotating through wells on the site to collect supplemental groundwater elevation data.

Looking Forward:

MDPH will continue to closely follow all investigational activities that are currently underway at PNPS, notably MW219 and MW216 results, tritium in groundwater investigation plans for 2014, and transducer study results.