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

Topic: PNPS Updates as of May 2, 2013

Previous Plans: Results from groundwater monitoring well samples collected during the weeks of March 4, 2013, March 18, 2013, and April 1, 2013 were reported by Entergy. Split sample results for the weeks of March 4, 2013, March 18, 2013, and April 1, 2013 were also reported by MERL.

Current Status:

Table 1[1]: Week of March 4th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	03/04/2013	530	479
MW 202	03/04/2013	-	-
MW 202 I	03/04/2013	-	-
MW 203	03/04/2013	-	-
MW 204	03/04/2013	-	-
MW 205	03/04/2013	473	692
MW 206	03/04/2013	1,398	1,470
MW 207	03/04/2013	-	-
MW 208-S	03/04/2013	-	-
MW 208-I	03/04/2013	-	-
MW 209	03/11/2013	962	799
MW 210	03/04/2013	-	-
MW 211	03/04/2013	917	879
MW 212	03/04/2013	-	-
MW 213	03/04/2013	-	-
MW 214	03/04/2013	-	-
MW 215	03/04/2013	944	972
MW 216	03/04/2013	4,027	3,570
MW 217	03/04/2013	-	-
MW 3	03/04/2013	-	-
MW 4	03/04/2013	-	-
SW-boat ramp	03/04/2013	-	-
SW-intake	03/11/2013	NDA(300)*	NDA(408)*

Table 2: Week of March 18th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	03/18/2013	328	540
MW 202	03/18/2013		-
MW 202 I	03/18/2013		-
MW 203	03/18/2013		-
MW 204	03/18/2013		-
MW 205	03/18/2013	473	722
MW 206	03/18/2013	366	405
MW 207	03/18/2013		-
MW 208-S	03/18/2013		-
MW 208-I	03/18/2013		-
MW 209	03/18/2013	745	977
MW 210	03/18/2013		-
MW 211	03/18/2013	1,227	1,340
MW 212	03/18/2013		-
MW 213	03/18/2013		-
MW 214	03/18/2013		-
MW 215	03/18/2013	875	1,020
MW 216	03/18/2013	1,851	1,780
MW 217	03/18/2013		-
MW 3	03/18/2013		-
MW 4	03/18/2013		-
SW-boat ramp	03/18/2013		-
SW-intake	03/18/2013	NDA(300)*	NDA(373)*

* NDA = not detected at less than activity value listed

** Results 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.

Table 3: Week of April 1st

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	04/01/2013	NDA(300)*	NDA(336)*
MW 202	04/01/2013	-	-
MW 202 I	04/01/2013	-	-
MW 203	04/01/2013	-	-
MW 204	04/01/2013	-	-
MW 205	04/01/2013	475	533
MW 206	04/01/2013	498	459
MW 207	04/01/2013	-	-
MW 208-S	04/01/2013	-	-
MW 208-I	04/01/2013	-	-
MW 209	04/01/2013	740	888
MW 210	04/01/2013	-	-
MW 211	04/01/2013	-	-
MW 212	04/01/2013	-	-
MW 213	04/01/2013	-	-
MW 214	04/01/2013	-	-
MW 215	04/01/2013	943	841
MW 216	04/01/2013	786	630
MW 217	04/01/2013	-	-
MW 3	04/01/2013	-	-
MW 4	04/01/2013	-	-
SW-boat ramp	04/01/2013	-	-
SW-intake	04/01/2013	NDA(300)*	NDA(343)*

The groundwater monitoring results reported by Entergy show MW205 decreased to a level of 692 pCi/L of tritium detected during the week of March 4th, remained about the same at a level of 722 pCi/L of tritium detected during the week of March18th, and decreased slightly to a level of 533 pCi/L of tritium detected the week of April 1st (the previous result during the week of February 18th was 851 pCi/L). Entergy results show that MW206 increased slightly to a level of 1,470 pCi/L of tritium detected during the week of March 4th, decreased to a level of 405 pCi/L of tritium detected during the week of March 18th, and remained about the same at a level of 459 pCi/L of tritium detected the week of April 1st (the previous result during the week of February 18th was 1,350 pCi/L). MW211 was not accessible due to a heavy vault cover blocking it due to an investigation of the neutralization sump discharge line the week of April 1st, discussed below. Weekly sampling results for MW216 are discussed below. Results for the other wells sampled during the weeks of February 4th and February 18th were within typical ranges detected since the groundwater monitoring for tritium began. MERL split sample results for the weeks of March 4th, March 18th, and April 1st were generally consistent with Entergy's results.

To date, weekly sampling results from Entergy for MW216 indicate fluctuations between 630 pCi/L to 7,620 pCi/L of tritium detected for the weeks of September 17th through April 1st. The most recent results for MW216 were 1,120 pCi/L of tritium detected the week of March 25th and 630 pCi/L of tritium detected the week of April 1st. MERL split sample results for MW216 for September 17th through April 1st have also been generally consistent with Entergy's results. MDPH is continuing to closely monitor tritium levels in MW216 and in MW206 which appear to be fluctuating with similar trends. MW201, which is down-gradient of MW206 and MW216 also seems to be weakly fluctuating along with these two wells, although at much lower levels. As previously noted, possible sources of tritium to groundwater in the vicinity of these monitoring wells that continue to be evaluated include the radwaste discharge line and a preferential pathway along the deep foundation of the reactor building upstream of MW216 and MW206, a legacy spill (i.e. the 1988 spill in the vicinity of MW216 and MW206 discussed in a previous update), and roof drain dry wells in the area. New developments discussed below indicate levels in MW216 could be related to the neutralization sump discharge line as well. MW216 continues to be sampled weekly.

Entergy surface water sampling results for the intake canal downstream of MW205 for the weeks of March 11th, March 18th, and April 1st indicated no detectable tritium. MERL split sample results for surface water also indicated no detectable tritium for samples collected during the weeks of March 11th, March 18th, and April 1st.

Entergy recently reported that the neutralization sump discharge line, which serves as a permitted discharge line to the discharge canal, was separated below grade. This was discovered when water from the sump, was discharged on March 25th in the last of a set of 4 routine discharges in March associated with preparations for the upcoming refueling outage. Water was discovered in the vicinity of an electrical junction box in the reactor building auxiliary bay during this discharge. The discharge was immediately stopped and an investigation was initiated.

The neutralization sump discharge line is used to discharge water in accordance with Entergy's permit. Discharge water originates from various sumps in the plant including the turbine and reactor buildings. Over the course of 4 discharges in March 2013, approximately 40,000 gallons was discharged at about 10,000 gallons per discharge. Entergy is working to identify when the pipe separated, the estimated spilled volume to groundwater, tritium concentrations in the spill, and the extent of the spill.

Remote camera/boroscope investigations revealed the neutralization sump discharge line appeared separated at a fitting located about 15 to 20 feet from the reactor building auxiliary bay, on the west side of the reactor building in a location up gradient of groundwater monitoring wells MW211, MW209, MW215 and MW205. This line was one of a number of potential sources identified by Entergy that MDPH has suggested be further investigated as possible tritium sources.

This line is reportedly infrequently used. Prior to March 2013, the previous discharge from this line was a set of 4 discharges in January 2012. The January 2012 discharges were estimated to total 40,000 gallons. It is used approximately once per year for sets of 3 or 4 routine discharges and each of the discharges usually contain about 10,000 gallons of water. MDPH asked Entergy when the line was last inspected, and Entergy reported it had never been inspected previously. However, Entergy reported that it was scheduled to be tested back in February of 2013, but reportedly due to resource issues was rescheduled to May of 2013. This pipe is part of the underground pipe and tank inspection program at Pilgrim. MDPH is also discussing these latest developments with MDEP.

MDPH is evaluating historical data on the timing and tritium concentrations of discharges from this line to see if there are any correlations between discharges and tritium levels in any of the groundwater monitoring wells. The location of the separated pipe was 20 to 30 feet up gradient from monitoring well MW211. So far, MW211 has had tritium levels ranging from 626 pCi/L to 1,790 pCi/L since it was installed in August 2010. Previously sampled every two weeks, MDPH recommended weekly sampling, which began the week of April 15th.

The implications of this discovery will be further evaluated. MW211, MW209, MW215, and MW205 are downgradient of the neutralization sump discharge line. If this line had a smaller leak leading up to the breach, infrequent discharges of tritiated water may help explain tritium levels in MW211, MW209, MW215, and MW205. Entergy will also be evaluating whether there may be other pathways through which any potential water leaking from the neutralization sump discharge line may have affected other wells, such as MW206 and MW216. For example, there is a possibility that water could have travelled along an underground electrical duct bank and/or manhole system. Entergy is evaluating this duct bank and manhole system and plans to sample manholes for tritium.

The neutralization sump line is presently out of service. The discharge was stopped on March 25th and Entergy is working on plans to excavate and repair or replace it. MDPH has asked Entergy to coordinate the timing of this work so that agency staff can be present when the line is excavated in the next several weeks. During the excavation soil samples will be taken and analyzed for tritium as well as other radionuclides.

As more information about the potential connection of the neutralization sump discharge line to tritium in groundwater becomes available through ongoing activities such as the correlation of historic discharges from the neutralization sump discharge line and tritium concentrations in groundwater monitoring wells, more frequent sampling of MW211, duct bank manhole sampling, the upcoming excavation and soil sampling, and any other activities, MDPH will provide it in these updates.

Looking Forward:

MDPH will continue to closely follow all investigational activities that are currently underway at PNPS, especially the new developments concerning the neutralization sump discharge line.