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

Topic: PNPS Updates as of August 6, 2013

Previous Plans: Results from groundwater monitoring well samples collected during the weeks of July 8, 2013 and July 22, 2013 were reported by Entergy. Split sample results for the weeks of July 8, 2013 and July 22, 2013 are currently being analyzed by MERL.

Current Status:

Table 1[1]: Week of July 8th

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	07/08/2013	**	NDA(337)*
MW 202	07/08/2013	-	-
MW 202 I	07/08/2013	-	-
MW 203	07/08/2013	-	-
MW 204	07/08/2013	-	-
MW 205	07/08/2013	**	3,080
MW 206	07/08/2013	**	NDA(337)*
MW 207	07/08/2013	-	-
MW 208-S	07/08/2013	-	-
MW 208-I	07/08/2013	-	-
MW 209	07/08/2013	**	NDA(430)*
MW 210	07/08/2013	-	-
MW 211	07/08/2013	**	829
MW 212	07/08/2013	-	-
MW 213	07/08/2013	-	-
MW 214	07/08/2013	-	-
MW 215	07/08/2013	**	753
MW 216	07/08/2013	**	4,200
MW 217	07/08/2013	-	-
MW 3	07/08/2013	-	-
MW 4	07/08/2013	-	-
SW-boat ramp	07/08/2013	-	-
SW-intake	07/08/2013	**	NDA(333)*

Table 2: Week of July 22nd

Location	Date	MERL pCi/L	GEL pCi/L
MW 201	07/22/2013	**	NDA(414)*
MW 202	07/22/2013	-	-
MW 202 I	07/22/2013	-	-
MW 203	07/22/2013	-	-
MW 204	07/22/2013	-	-
MW 205	07/22/2013	**	1,190
MW 206	07/22/2013	**	NDA(411)*
MW 207	07/22/2013	-	-
MW 208-S	07/22/2013	-	-
MW 208-I	07/22/2013	-	-
MW 209	07/22/2013	**	672
MW 210	07/22/2013	-	-
MW 211	07/22/2013	**	849
MW 212	07/22/2013	-	-
MW 213	07/22/2013	-	-
MW 214	07/22/2013	-	-
MW 215	07/22/2013	**	647
MW 216	07/22/2013	**	3,790
MW 217	07/22/2013	-	-
MW 3	07/22/2013	-	-
MW 4	07/22/2013	-	-
SW-boat ramp	07/22/2013	-	-
SW-intake	07/22/2013	**	NDA(414)*

*** 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.

The groundwater monitoring results reported by Entergy show MW205 increased to a level of 3,090 pCi/L of tritium detected during the week of July 8th, and decreased to a level of 1,190 pCi/L of tritium detected during the week of July 22nd (the previous result during the week of June 24th was 401 pCi/L). It should be noted that this is the highest tritium level detected in MW205 since December 2012. Entergy results show that for the weeks of July 8th and July 22nd no tritium was detected in MW206 (the previous result during the week of June 24th also indicated no detectable tritium). Weekly sampling results for MW216, MW209, and MW211 are discussed below. Results for the other wells sampled during the weeks of July 8th and July 22nd were within typical ranges detected since the groundwater monitoring for tritium began. MERL split sample results for the weeks July 8th and July 22nd are currently being analyzed by MERL

Since its installation in September 2012, MW216 has been sampled weekly. MW216 is currently trending higher than most other groundwater monitoring wells on site. The most recent Entergy results for MW216 indicated 2,300 pCi/L of tritium detected the week of July 15, 2013 and 3,790 pCi/L of tritium detected the week of July 22, 2013. MERL split sample results for MW216 for the weeks July 15, 2013 and July 22, 2013 are currently being analyzed by MERL. Potential sources of tritium in groundwater in the area of MW216 include roof drain run off, the radwaste discharge line, the residual effects of a historical spill in the area (that Entergy reported was remediated at the time of the spill), or a possible connection to the neutralization sump discharge line (which was recently confirmed to be separated) on the other side of the reactor building via a duct bank. MW206, the closest downstream monitoring well to MW216, was previously trending closely with MW216 until the week of May 27, 2013. Since that time, tritium has not been detected in samples from MW206 or was detected at concentrations slightly above detection limits.

Following discovery of the separation in the neutralization sump discharge line earlier this year, MW209 and MW211 were moved to a weekly sampling frequency because they are located down-gradient from this line. Weekly results for MW209 and MW211 appear to be trending slightly with MW216. The most recent Entergy results for MW209

indicated no detectable tritium the week of July 15, 2013 and 672 pCi/L of tritium detected the week of July 22, 2013. The most recent Entergy results for MW211 indicated 1,010 pCi/L of tritium detected the week of July 15, 2013 and 849 pCi/L of tritium detected the week of July 22, 2013. MERL split sample results for MW209 and MW211 for the weeks July 15, 2013 and July 22, 2013 are currently being analyzed by MERL.

Entergy surface water sampling results for the intake canal downstream of MW205 for the weeks of July 8th and July 22nd indicated no detectable tritium. MERL split sample results for surface water for the weeks of July 8th and July 22nd are currently being analyzed by MERL.

As previously described, the neutralization sump discharge line, which serves as a permitted discharge line to the discharge canal, was separated below grade. As part of the ongoing investigation into this separation, soft-dig excavations down to the neutralization sump discharge line were conducted the week of July 15th. MDPH staff was present during the first soft-dig down to the separation area. The pipe separation was observed and soil samples were collected. Soft-dig excavations down to the neutralization sump discharge line also occurred at the point where the neutralization sump discharge line enters catch basin (CB)-10, and at about 10 feet east of CB-10, where an anomaly in the interior of the pipe was observed during earlier video inspections of the line that took place in May. Soil samples were collected at these two locations as well.

At all three soft-dig excavations soil samples were collected at depths 3 feet from the surface, 5 feet from the surface, 6 feet from the surface, and at the level of the pipe, which was 7 feet from the surface. Soil samples were screened for gamma radiation in counts per minute measurements of manganese-54, cobalt-60, and cesium-137 prior to being shipped off-site for laboratory analysis. Entergy reported that soil samples collected at all depths at the excavation down to the separation in the neutralization sump discharge line contained gamma radiation counts slightly above detectable levels,

but below levels of health concern for the general public, thereby triggering the need for Entergy to ship the samples as radioactive waste according to the US Nuclear Regulatory Commission (NRC) and US Department of Transportation shipping requirements (DOT). These initial screening results indicating the presence of radionuclides in soil confirm that a release has occurred near the separation area. Initial readings indicated that detectable gamma radiation was also present at all depths at the excavation location approximately 10 feet east of CB-10., However, gamma radiation was not detected in soil samples at any depth at the excavation where the neutralization sump discharge line enters CB-10. The soil samples have been shipped to Entergy's lab to be quantified for gamma radionuclides (i.e. in pCi/kg), and analyzed for tritium, and hard-to-detects (e.g., strontium-90). Split soil samples are being be sent to MERL for analysis.

The ongoing investigation of the neutralization sump discharge line also includes plans to install two new wells, one near the area of the separation to be installed between MW211 and the reactor building auxiliary bay, and one near CB-10. In addition, transducers are being considered for installation at the two new wells and at select other wells to evaluate groundwater level changes in this area of the plant. Entergy's contractor also continues to evaluate available data to estimate how long the neutralization sump discharge line may have been separated/leaking, how much discharge water may have been released, how much tritium the discharge water may have contained, and which monitoring wells it would reach or may have reached in the past based upon the hydrogeology of the site and soil characteristics. Entergy's contractor will accomplish this in part by looking at the soil sample results (when available), determining the feasibility of nitrate / nitrite testing in the monitoring wells (the neutralization sump water is known to contain these compounds), and by looking into the dilution factor from clean non-tritiated water being discharged on the order of every two weeks prior to the line being taken out of service March 25, 2013.

It should be noted that concurrent with installing the two new wells as part of the neutralization sump discharge line separation investigation, plans are being considered

to reinstall MW-4, which is on the southeast side of the turbine building near where the radwaste discharge line exits the turbine building. This well was originally installed in the 1990s to monitor a transformer oil spill and is smaller and shallower than the other groundwater monitoring wells. MDPH supports installation of a replacement well at this location as it would make the well width and depth consistent with the other groundwater monitoring wells and provide additional information on any potential role the radwaste discharge line may be playing in the tritium detected in groundwater.

Looking Forward:

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