

**The Commonwealth of Massachusetts**  
**Executive Office of Health and Human Services**  
**Department of Public Health**  
**Bureau of Environmental Health**  
**250 Washington Street, Boston, MA 02108-4619**  
**Phone: 617-624-5757 Fax: 617-624-5777**  
**TTY: 617-624-5286**

**CHARLES D. BAKER**  
Governor

**KARYN E. POLITO**  
Lieutenant Governor

**MARYLOU SUDDERS**  
Secretary

**MONICA BHAREL, MD, MPH**  
Commissioner

Tel: 617-624-6000  
[www.mass.gov/dph](http://www.mass.gov/dph)

**Update of the Tritium in Groundwater Investigation at  
Pilgrim Nuclear Power Station, Plymouth, MA  
January - June 2018**

The purpose of this report is to provide an update on the monitoring of tritium in groundwater and surface water during the first six months of 2018 at the Pilgrim Nuclear Power Station (PNPS) located in Plymouth, MA. The history of the investigation, which began in 2010, and previous update reports are available online<sup>1</sup>.

## **BACKGROUND**

Entergy collects samples at 23 groundwater wells and one surface water location on-site at PNPS. The sampling intervals for the first six months of 2018 ranged from weekly to quarterly, and are based on past monitoring results and analysis of possible groundwater tritium pathways. Well and surface water samples are sent by Entergy to an independent analytical lab, Teledyne, and duplicate (or "split") samples are provided to the Massachusetts Department of Public Health (DPH) for analysis at the Massachusetts Environmental Radiation Lab (MERL). Entergy regularly reports the Teledyne results to DPH, the Massachusetts Emergency Management Agency (MEMA), and the Nuclear Regulatory Committee (NRC). Summaries of both laboratory results are on the DPH website<sup>2</sup>.

This letter updates results from both Entergy and MERL for sampling performed during the first six months of 2018. Results were compared to a conservative, health-protective screening level of 3,000 picocuries per liter (pCi/L), or 1/10<sup>th</sup> the NRC-approved level of 30,000 pCi/L tritium in non-drinking water sources, and to the US Environmental Protection Agency (EPA) drinking water standard for tritium of 20,000 pCi/L. The closest municipal drinking water wells are 2.5 miles from PNPS and are not expected to be impacted by on-site tritium sources.

## **SUMMARY**

- Sampling results for 7 of 23 routinely sampled groundwater wells indicate no detectable activity above background. No detectable tritium was measured in surface water samples.

---

<sup>1</sup> Previous PNPS Tritium in Groundwater Investigation Updates are available here:

<https://www.mass.gov/lists/environmental-monitoring-data-for-tritium-in-groundwater-at-pilgrim-nuclear-power-station>

With the exception of MW-219, tritium levels in the remaining 15 wells were detectable and either stable or tended to decrease over time, including in MW-216 and MW-218 (which, along with MW-219, are historical wells of interest). All results were below the EPA drinking water standard for tritium of 20,000 pCi/L.

- Sampling frequency for MW-219 was increased from every third week to weekly at the end of May, following a steadily increasing trend in tritium levels, to a maximum of 19,200 pCi/L in June. Surveillance at MW-219 was increased throughout the remainder of 2018. Data available as of the date of this report show that levels of tritium in MW-219 have been steadily decreasing since September, and are below the EPA drinking water standard of 20,000 pCi/L.
- On-site efforts by Entergy have continued to focus on identifying sources of tritium and monitoring for new sources, with emphasis on increased monitoring of MW-219 and routine surveillance for leaks in the Condenser Bay area.
- The closest municipal drinking water wells are 2.5 miles from PNPS and are not expected to be impacted by on-site tritium sources.
- Staff from the DPH Bureau of Environmental Health continues to review new information from the monitoring efforts and to maintain regular contact with MEMA, NRC, and Entergy.

## RESULTS

Tritium levels at all of the 23 on-site groundwater wells that are routinely monitored were less than the EPA drinking water standard of 20,000 pCi/L.<sup>2</sup> Tritium levels at MW-219 exceeded 3,000 pCi/L, fluctuating between 747 and 5,560 pCi/L through April; increasing to 12,200 pCi/L in May and then fluctuating between 4,950 and 19,200 pCi/L through the end of June. Figure 1 shows sampling results in 2018 for the three wells of historic interest (MW-216, MW-218, MW-219), two of which (MW-218 and MW-219) had tritium levels that exceeded 2,000 pCi/L (1/10<sup>th</sup> of the EPA drinking water standard) during this monitoring period.

The majority of monitoring wells are sampled quarterly. Target sampling frequency for MW-218 is every three weeks; target sampling frequency for MW-219 alternated between once every three weeks and weekly. For two additional wells, MW-206 and MW-215, the target sampling frequency is every third week, due to their location in preferential pathways of water from seismic gaps; both have low tritium levels ranging from non-detectable to 1,651 and 1,210 pCi/L, respectively. Results for the 17 wells sampled quarterly ranged from non-detectable to 2,320 pCi/L at MW-211. No tritium was detected in surface water samples collected during the first half of 2018.

---

<sup>2</sup> Summary tables of groundwater and surface water monitoring results are on the DPH website: <https://www.mass.gov/lists/environmental-monitoring-data-for-tritium-in-groundwater-at-pilgrim-nuclear-power-station#summaries---results->

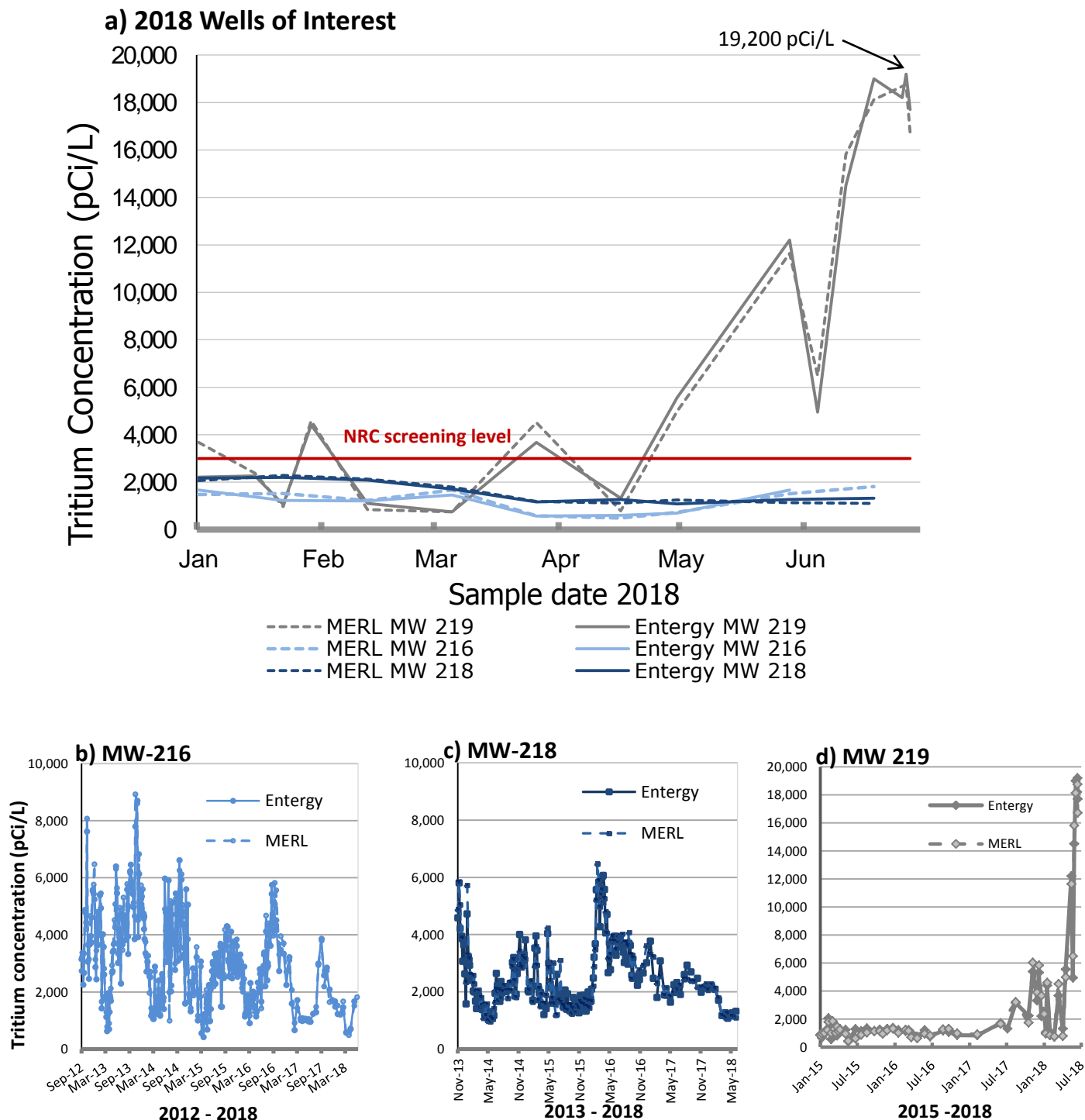
## **DISCUSSION**

Monitoring results for the first six months of 2018 showed stabilization or reduction in groundwater tritium levels at most wells. MW-216 has historically shown a pattern of cyclic fluctuations characterized by lower levels in March and April; results for the first six months of 2018 were comparable to previous year trends. Tritium levels at MW-218 continued to decrease during the first six months of 2018.

Tritium levels at MW-219 fluctuated around 3,000 pCi/L between January and mid-April, followed by an increase to a maximum of 19,200 pCi at the end of June. With the increase in tritium levels, sampling frequency at MW-219 was increased to once per week. Entergy continued to work with their environmental consultant to investigate potential tritium sources through review of historical site documents and identification of possible migration pathways along underground structures in the vicinity of MW-219. Camera inspections and sampling of standing water in up-gradient Catch Basins 10 and 11 indicated they were an unlikely source. Entergy has continued with increased monitoring and investigations to identify a tritium source and to ensure that tritium levels in MW-219 have stabilized. As noted earlier, data available as of the date of this memorandum show that levels of tritium in MW-219 have been steadily decreasing since September, and now remain well below the EPA drinking water standard of 20,000 pCi/L.

Periodic reduced power events at the plant have continued to allow entry to the high-radiation Condenser Bay area to check and repair any leaks and inspect the seismic gap areas that were previously sealed.

Staff from the DPH Bureau of Environmental Health will continue to review groundwater monitoring results, and maintain contact with MEMA, NRC, and Entergy to discuss on-going tritium in groundwater activities at PNPS.



**Figure 1.** 2018 and historical results for three wells of interest, MW-216, MW-218, MW-219 from tritium in groundwater samples collected from Pilgrim Nuclear Power Station (PNPS). Data are plotted separately based on PNPS operator (solid lines) or DPH (dotted lines) produced results. The solid red line at 3,000 pCi/L represents the screening level, which is  $1/10^{\text{th}}$  of the 30,000 pCi/L NRC level of concern. **a)** Results from samples collected from January through June 2018 at wells of historic interest (MW-216, MW-218, MW-219) showing a maximum level of 19,200 on June 26, 2018 at MW-219. **b -d)** Historical monitoring results for MW-216, MW-218, and MW-219.