

**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)

**Tritium in Groundwater Monitoring at  
Pilgrim Nuclear Power Station, Plymouth, MA  
July - December 2019**

This report provides data from the ongoing monitoring of tritium in groundwater and surface water 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>.

**Summary**

- Monitoring results for July-December 2019 indicate that tritium levels do not present a health risk.
- No detectable tritium was measured in either surface water samples or in 12 of 23 routinely sampled groundwater wells. Tritium levels in the other wells were detectable and, except for Monitoring Well (MW)-216, were either stable or tended to decrease over time.
- All measured levels of tritium in groundwater (including MW-216) are less than the US EPA drinking water standard for tritium of 20,000 pCi/L.

**Background**

Holtec collects samples at 23 groundwater wells and one surface water location on-site at PNPS. The sampling intervals for the last six months of 2019 ranged from once every three weeks to quarterly, based on past monitoring results and analysis of possible tritium pathways in groundwater. Well and surface water samples were sent to an independent analytical lab, Teledyne, with duplicate (or "split") samples provided to the Massachusetts Department of Public Health (DPH) for analysis at the Massachusetts Environmental Radiation Lab (MERL). Holtec regularly reports the Teledyne results to DPH, the Massachusetts Emergency

<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>

Management Agency (MEMA), and the Nuclear Regulatory Commission (NRC). Summaries of both laboratory results are then provided on the DPH website<sup>2</sup>.

Results are 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 of tritium in non-drinking water sources, as well as to the US Environmental Protection Agency (EPA) drinking water standard for tritium of 20,000 pCi/L. As the closest municipal drinking water wells are 2.5 miles from PNPS, municipal water is not expected to be impacted by the tritium on-site at PNPS.

## Results and Discussion

Groundwater monitoring results for the last six months of 2019 showed stabilization or a reduction in tritium levels at most wells; there was no detectable tritium activity in surface water samples or in 12 of the 23 on-site groundwater wells that are routinely monitored<sup>2</sup>.

- Figure 1 shows sampling results in 2019 for three wells where tritium levels exceeded the screening level of 3,000 pCi/L (MW-209, MW-215, and MW-216) as well as historical results for wells of interest (MW-216, MW-218, and MW-219). For the last six months of 2019, MW-216 was the only well with tritium levels greater than 3,000 pCi/L.
- Elevated tritium levels in MW-216 are consistent with the historically cyclical pattern at this well and may be related to its location in a preferential pathway of water from seismic gaps (i.e., separation joints between different parts of a building that allow independent movement during an earthquake).
- Tritium levels in MW-209 decreased from 2,520 pCi/L on July 2, to 404 pCi/L on December 6.<sup>3</sup>
- Tritium levels in MW-215 remained at approximately 1,000 pCi/L throughout the last 6 months of 2019.

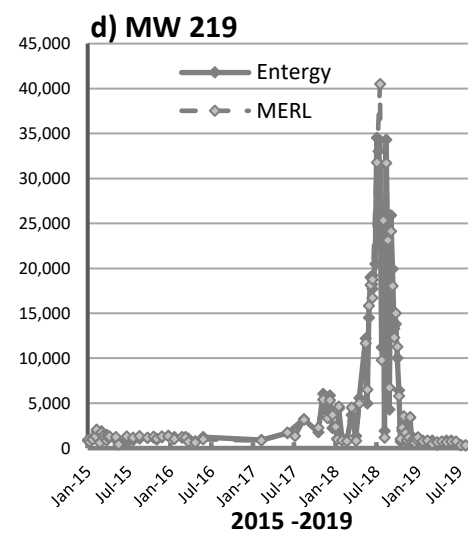
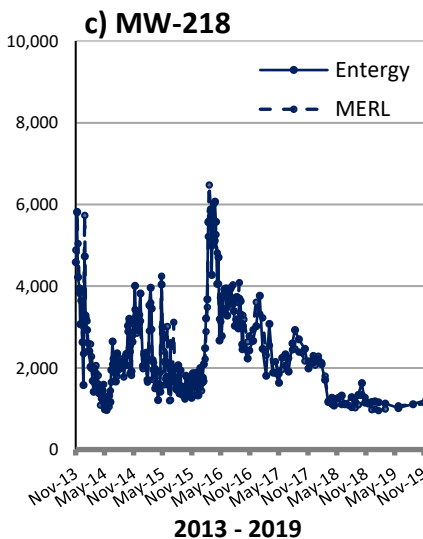
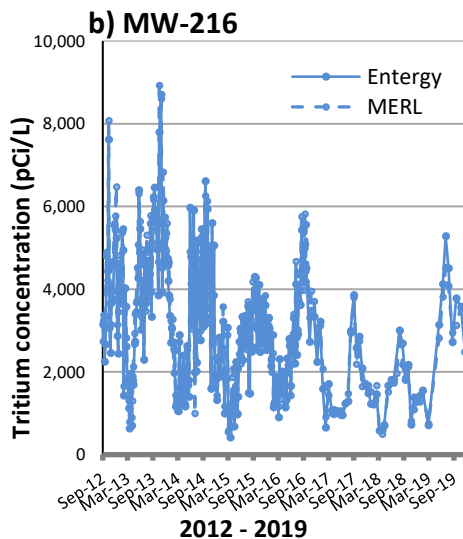
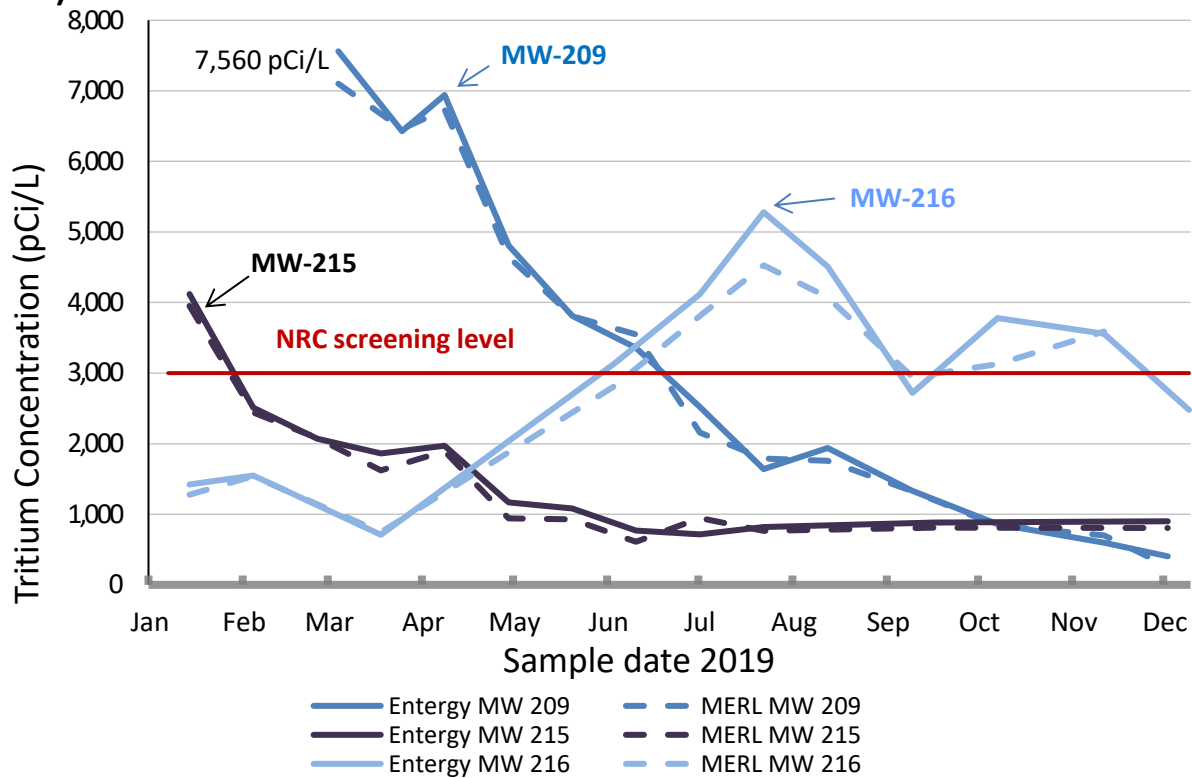
Following a sustained increase in tritium levels in MW-216, which exceeded 3,000 pCi/L starting in June, the target sampling frequency was increased from quarterly to once every three weeks. In July, the target sampling frequency for MW-211 and MW-215, at which tritium levels had stabilized at approximately 1,000 pCi/L, was reduced from once every three weeks to quarterly. In September, the target sampling frequency for MW-209, MW-216, and MW-219 was reduced from once every three weeks to monthly; these wells will continue to be sampled monthly until tritium levels stabilize below 3,000 pCi/L. The target sampling frequency for all other wells is quarterly. The target sampling frequency for surface water was reduced from weekly to monthly in August.

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<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->

<sup>3</sup> Based on Teledyne results

### a) 2019 Wells of Interest



**Figure 1.** 2019 results for wells with tritium levels greater than 3,000 pCi/L and historical results for three wells of interest 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<sup>th</sup> of the 30,000 pCi/L NRC level of concern. **a)** Results from samples collected from January through December 2019 for wells with tritium levels greater than 3,000 pCi/L (MW-209, MW-215 and MW-216) showing a maximum level of 7,560 on March 6, 2019 at MW-209. **b-d)** Historical monitoring results for MW-216, MW-218 and MW-219.