Project

Our groundwater modeling approach and regulatory insight help client decommission nuclear plant

Summary

- Our client found a release of tritium, a radioactive hydrogen isotope, while decommissioning its water reactor plant. Per state regulatory orders, the client had to partner with an environmental consultant that understood state regulations to investigate.
- Haley & Aldrich had the expertise to both conduct the investigation and build positive relationships with regulators.
- From previous work at the site, we knew the levels of tritium in groundwater were below U.S. Environmental Protection Agency (EPA) drinking water standards and therefore acceptable with no remediation. We designed a dye-tracing investigation to track impacts and bolster our case that the client could proceed with decommissioning.

- Data showed that the groundwater traveled as we had predicted, and traditional groundwater samples confirmed tritium levels below state and federal standards — making full plant closure possible.

Client challenge

A Midwest water reactor plant was in the process of a decommissioning and terminating its Nuclear Regulatory Commission (NRC) license when leaders discovered that some of the work caused a release of tritium via a vent. With cold winter temperatures, the condensation dripped to the ground surface, comingled with stormwater, and migrated to a low spot — infiltrating the ground and reaching groundwater. The client acted according to NRC regulations by reporting the release, and demonstrating that the release did not require further action. While the NRC regulations didn't require the plant to investigate tritium levels in the groundwater, state regulators deemed that the release and alternate polluting substance required notification and action.

The radiological side of nuclear plant decontamination and decommissioning is regulated by the NRC. The state ordered that our client complete an investigation, as well as contract with an environmental consulting firm with knowledge of state regulations to design and perform the work. The client was unfamiliar with state non-radiological and environmental regulatory processes, was concerned about its relationship with the state regulatory agency, and needed help navigating their path forward. The Haley & Aldrich team, already working on-site supporting the groundwater monitoring work for the decommissions, understood the depth and seriousness of the state's request.

Because the client already considered Haley & Aldrich a trusted advisor with a deep understanding of state regulations, its leaders asked us to help them meet the state's requirements.

Our approach

Our approach was to first focus on forging positive new relationships with state regulators and strengthening existing relationships. Developing transparent, productive communication with state regulators put our experts and client in a better position to negotiate compliance parameters. We helped our client build relationships with the state through transparent and reliable communication, keeping them aware of each step of the process. Through our efforts, we demonstrated to the state that our client was taking their requests seriously and protecting the environment.

We also knew that satisfying the state's requirements required creative solutions as the levels of tritium were already below EPA drinking water standards and were acceptable with no remediation required. We had to repair the perception of the release, as there were no resulting environmental damages. We understood site conditions and potential sources as we had previously performed a historical site assessment to discern previous tank locations and possible tritium impacts.

We designed a dye-tracing investigation to confirm the release mechanism and further document the flow path and extent of potential impacts. To maintain public trust, we did not want the dye to be seen leaching into the Mississippi River, which could create a negative public perception. We collaborated with dye-tracing laboratory Ozarks

Underground Laboratory (OUL) to devise a Department of Natural Resources-approved test that would protect the groundwater and allow us to collect the required information.

Our team encountered another roadblock when it came to lab processing. Because tritium is a radioactive substance, no laboratory that can see such low levels of dyes hold an NRC license to receive radioactive materials. Fortunately, OUL developed a collection method using charcoal packaging that ensured we did not need to use an NRC-licensed lab. Since tritium is water, once our packets were dried, the tritium evaporated, leaving only the dye behind. This way, we could send the samples to OUL and see how far and how fast the groundwater traveled. This saved our client costs and time and met the state's requirements.

OUL data showed that the groundwater traveled as we had predicted, and traditional groundwater samples demonstrated that the tritium levels were below state and EPA federal drinking water. We also demonstrated that there was no potential for the potable wells on site or the Mississippi River to be impacted. Through our careful historical analysis and innovative groundwater modeling approach, we clearly showed the state where leaks started, where they went, and that tritium posed no threat to the state's drinking water.

> *"They shut it down and contained it. They did everything they needed to do."*
>
> Tim Zeichert, Hydrogeologist, Wisconsin Department of Natural Resources

Once the state was satisfied, they issued a No Further Action letter, allowing full site closure of the plant. With the combination of our technical expertise, out-of-the-box thinking, and clear, transparent communication with regulators, we helped our client comply with the state and ultimately complete decommissioning in 2020.

Value delivered

- Used our relationship-building and negotiation skills to help our client overcome unexpected state regulations
- Collaborated with a laboratory to devise a dye-modeling approach that allowed the tracing of a tritium plume but did not result in dyes to be visible in the Mississippi River by the public
- Combined our expertise and relationship intelligence to help our client regain state confidence and support

For more information, contact:

Nadia Glucksberg

Senior Principal Consultant, Hydrogeology