

**Tritium Questions and Answers (Technical Version)**

**Q. What is Tritium?**

A. Tritium (chemical symbol H-3) is a radioactive isotope of the element hydrogen (chemical symbol H). Tritium is produced naturally in the upper atmosphere. It is used commercially in items such as exit signs and wristwatches and is also a byproduct of the nuclear process.

Deleted: It is commonly found in water and is generally not considered hazardous. (NRC.GOV)

**Q. How was tritium discovered at the Harris Nuclear Plant?**

A. Progress Energy Environmental Specialists discovered the low levels of tritium while doing routine groundwater monitoring. The Harris Plant has several programs in place to monitor the environment and the plant's impact on it. The discovery of this tritiated water shows the monitoring programs work.

Progress Energy hired an independent hydrologist to determine the source of the tritium. Based upon the very low levels of tritiated water discovered, there is no threat to the health and safety of the public, or to employees.

**Q. Where was the tritiated water discovered?**

A. Tritiated water was discovered in a manhole near a large pipe that connects the cooling tower basin to Harris Lake. The location of the manhole is on a peninsula surrounded on three sides by Harris Lake and it is reasonable to assume there is a leak in this area of the pipe. The closest property boundary to the site of the leak is 1.79 miles away. The report shows the tritiated water is contained on plant property.

**Q. When was the tritium discovered?**

A. The tritium was discovered during routine monitoring in December. Once it was determined there were low levels of tritium in the area, Progress Energy hired an independent hydrologist to pinpoint the source of the tritium. We received his report this week.

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**Q. What are the highest levels you found?**

A. The tritium limit for safe drinking water is set at 20,000 picocuries per liter by the EPA. The tritiated water found on the Harris property shows a level of 2,120 picocuries per liter- well below the EPA guidelines.

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**Q. Where did the tritium originate? How did it get into the cooling tower blowdown discharge pipe?**

A. Tritium is a byproduct of the nuclear process. It is safely discharged routinely through permitted, approved releases in the cooling tower blowdown line to Harris Lake. This lake water is reused for non-radioactive heat transfer in the cooling tower. The pipe that discharges water from the cooling tower back into Harris Lake has developed a small leak, and is releasing water containing low levels of tritium in the surrounding soil.

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**Q. Is 2,120 picocuries per liter harmful?**

A. The EPA drinking water limit for tritium is 20,000 picocuries per liter, therefore, a 2,120 picocurie per liter sample is approximately 10% of the drinking water limit. The radiation dose from drinking water at about 1,600 picocurie per liter for a full year is characterized as follows (using EPA assumptions):

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- at least 10,000 times lower than the dose from a medical procedure involving a full-body computed tomography (CT) scan (e.g., 3,000 to 10,000 millirem from a CT scan vs. 0.3 mrem from tritiated drinking water)
- one thousand times lower than the dose from natural background radiation (e.g., 300 mrem from natural background radiation vs. 0.3 mrem from tritiated water)
- one hundred times lower than the dose from either dental x-rays or natural radioactivity (potassium) in your body (e.g., 30 mrem from potassium vs. 0.3 mrem from tritiated water)
- ten times lower than a round-trip cross-country airplane flight (e.g., 3 mrem from New York to Los Angeles and back vs. 0.3 mrem from tritiated water)

**Q. Is there a health or safety hazard from this leak for people living near the plant or working at the plant?**

A. No, the tritium found does not pose a health or safety hazard to the public or to employees. The hydrology report indicates there is no offsite impact. And again, the amount of tritium found is approximately 10% of the EPA drinking water limit of 20,000 picocuries per liter.

**Q. Can those elevated levels of tritium migrate into any public drinking water supplies?**

A. Two recent independent hydrogeology studies (2006 and 2009) indicate the groundwater around HNP would not affect public drinking water. The area around the HNP plant was excavated during construction and the backfill area acts as a "bowl" which controls the movement of groundwater. The studies indicate that water in this area would likely flow Southeast towards Harris Lake.

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**Q. Does Harris Lake contain tritium?**

A. Yes, Harris Lake does contain tritium as a result of approved routine releases. Harris Lake is a man-made lake, built and owned by Progress Energy. This lake is the approved, permitted release point for discharges necessary to support continued plant operations. Tritium levels in Harris Lake are well below the limits established by federal regulations. HNP has a staff of Environmental Specialists and Chemists who monitor site water quality and its impact on wildlife.

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**Q. What will prevent the tritium from leaking/seeping into Harris Lake?**

A. The water in the cooling tower blowdown line was originally intended for discharge into Harris Lake. Any tritiated water entering Harris Lake from the leak would not adversely impact the lake.

**Q. Is it safe to fish or swim in Harris Lake?**

A. Yes, it is safe to fish or swim in Harris Lake. The lake and the fish are routinely monitored. If it was unsafe the North Carolina Department of Environment and Natural Resources as well as the North Carolina Wildlife Resources Commission would alert the public. That has never happened.

**Q. What will prevent the tritium from reaching my property?**

A. Two recent independent hydrogeology studies (2006 and 2009) indicate the groundwater around HNP would not affect public drinking water. The area around the HNP plant was excavated during construction and the backfill area acts as a "bowl" which controls the movement of groundwater. The studies indicate that water in this area would likely flow Southeast towards Harris Lake. The closest site boundary to the leak is 1.79 miles away.

Deleted: (Reference COL Unit 2 and 3, Silar Service Report)

Deleted: Harris Nuclear Plant Property Line.

**Q. How can you be sure where I get my drinking water from?**

A. If you have specific questions about your drinking water or well, you should contact local officials for more information.

**Q. What depth is the well with such high levels of tritium?**

A. The well which showed the highest level (1,450 picocuries per liter) of tritium is at a depth of 15 feet. A manhole adjacent to the well contained water with 2,120 picocuries per liter of tritium.

**Q. Could water at 15' down eventually migrate to a public drinking water well or aquifer?**

A. It is important to remember the hydrology in this region of North Carolina is mostly clay-like soil with very little flow.

**Q. How many wells did you drill and where are they?**

A. As part of the investigation, nine new monitoring wells were installed. Of these wells, five of them showed tritium values from 350 to 1,450 picocuries per liter. The two wells closest to the manhole had the highest values. In addition, the wells showed limited migration of the water. For example, a 30 foot deep well located about 20 feet from the cooling tower blowdown pipe manhole did not indicate tritium. Water inside the manhole had tritium levels of 2,120 picocuries per liter. The tritiated water seems to be confined to the area immediately surrounding the pipe.

**Q. What will all this sampling and monitoring do?**

A. Data from the wells will indicate the levels and location of the tritium, as well as direction and rate of groundwater movement.

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**Q. How can you tell underground water flow by drilling wells?**

A. By drilling into the ground in at least three locations you can determine flow based on depth to water. By using special tools and pumping the aquifer you can determine velocity. Combining these two attributes will create a picture of how the underground water behaves.

**Q. What did you find when you drilled the wells?**

A. We found a low concentration of tritium in the wells immediately surrounding the leaking pipe. All other on-site groundwater monitoring wells have not detected any tritium.

**Q. Are you prepared to test for tritium beyond the plant's property boundary?**

A. We are always prepared to do what is right for the health and safety of our neighbors, and for the environment. Due to the low levels and long migration times we do not expect that this leak has migrated off site.

**Q. What will you do if it does reach the public drinking supply?**

A. Due to the low levels of activity and long migration times, we have every reason to believe that public drinking water wells or aquifers will not be affected. The independent hydrology study commissioned by Harris Plant confirms this position.

**Q. Is there a way to remove tritium already in the groundwater?**

A. The most common form of tritium is in water. Some removal methods include the use of extraction wells or soil removal.

**Q. I heard from an employee that you are still pumping water through the pipe.**

A. The line is the plant's only method for releasing non-radioactive cooling water and routine permitted releases into Harris Lake. We are continuing to monitor the leak and will take appropriate corrective actions. Engineers and maintenance workers will develop a plan to resolve this issue. Clearly, they need to study the pipe and the leak to determine the best course of action. Fixing the pipe is the right thing to do and Progress Energy is committed to taking care of this issue.

**Q. How long have you been putting tritium into the environment?**

A. We have released tritium into the environment by permitted, approved processes that are monitored by the NRC and state agencies since plant startup. These releases are part of normal plant operating procedures.

**Q. What will you do with the leaking pipe?**

A. Data collection and evaluation is still taking place, which will be used to determine appropriate corrective measures. Engineers and maintenance workers will develop a plan to resolve this issue. Clearly, they need to study the pipe and the leak to determine the best course of action. Fixing the pipe is the right thing to do and Progress Energy is committed to taking care of this issue.

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**Q. How can you say there is no hazard when you can't track how much tritium has been getting into the environment?**

A. We do track planned releases of tritium into the environment. In fact, we have approved permitted releases that are carefully monitored by the Nuclear Regulatory Commission. The results of numerous studies indicate that tritium less than the EPA drinking water limit will not impact public health and safety.

**Q. Do you measure tritium as part of the dose to your workforce?**

A. We monitor some individuals for tritium exposure based on their occupations. We carefully monitor and control any employee's exposure to radiation and have very strict limits for yearly dose.

**Q. What will this do to my property value?**

A. It would be impossible for us to speculate on future property values due to the various factors involved, which do not involve the Harris Nuclear Plant.

**Q. How do you monitor tritium at the HNP?**

A. We routinely test all on-site groundwater wells and water supplies as part of our Environmental Monitoring Program. There have been no indications of plant related radionuclide material in any of these wells. The results are published in our site's annual environmental operation report.

**Q. How much will the monitoring and investigation cost, and will these costs be passed along to your customers?**

A. We do not know the final costs of the investigation.

**Q. Why didn't we investigate the possibility of a leaking pipe sooner?**

A. The water in the manhole was discovered as part of our routine inspections in accordance with the Environmental Monitoring Program. Once our onsite specialists determined there were low levels of tritium in the water, Progress Energy hired a hydrologist to study the issue in more detail. Our first priority is always to protect the health and safety of the public.

**Q. How does tritium change in the environment?**

A. Tritium readily forms water when exposed to oxygen. It then gradually decays. Tritium has a half-life of 12.3 years.

**Q. Are low levels of tritium in water safe?**

A. Yes. The U.S. Environmental Protection Agency sets standards for acceptable public drinking water. Under these standards, any concentration of tritium up to 20,000 picocuries per liter is safe to drink. According to EPA figures, a person who drinks two liters of water per day with tritium of 20,000 picocuries per liter would receive four millirem of radiological exposure from the tritium per year. This would be the equivalent to the amount of exposure a person would receive on a cross-country airline flight.

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**Q. What did Harris do when it found the tritium?**

A. Progress Energy employees routinely monitor the area. Once it was determined there were low levels of tritium in the water, Progress Energy hired an independent hydrologist to determine the source.

**Q. How does tritium get into the body?**

A. Tritium primarily enters the body when people swallow tritiated water. People may also inhale tritium as a gas in the air, or absorb it through their skin.

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**Q. What does tritium do once it gets into the body?**

A. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted through the urine within a month or so after ingestion.

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**Q. How does tritium affect people's health?**

A. Tritium is one of the least dangerous radionuclides because it is very weak radiation and leaves the body relatively quickly. Half of the tritium is excreted within approximately 10 days. The levels of tritium found in the areas identified do not pose a health or safety hazard to the public.

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**Q. Have tritium leaks been discovered at other nuclear plants in North Carolina or the United States? What did they do about it?**

A. Other plant sites have discovered tritium in groundwater. The NRC website lists recent events and the outcomes.

**Q. What can I find more information about tritium?**

A. Two federal agencies (The Nuclear Regulatory Commission and the Environmental Protection Agency) provide detailed information on their websites:  
<http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html>  
<http://www.epa.gov/radiation/radionuclides/tritium.htm>

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