

Media Briefing on Tritium and Groundwater Contamination



Vermont Yankee

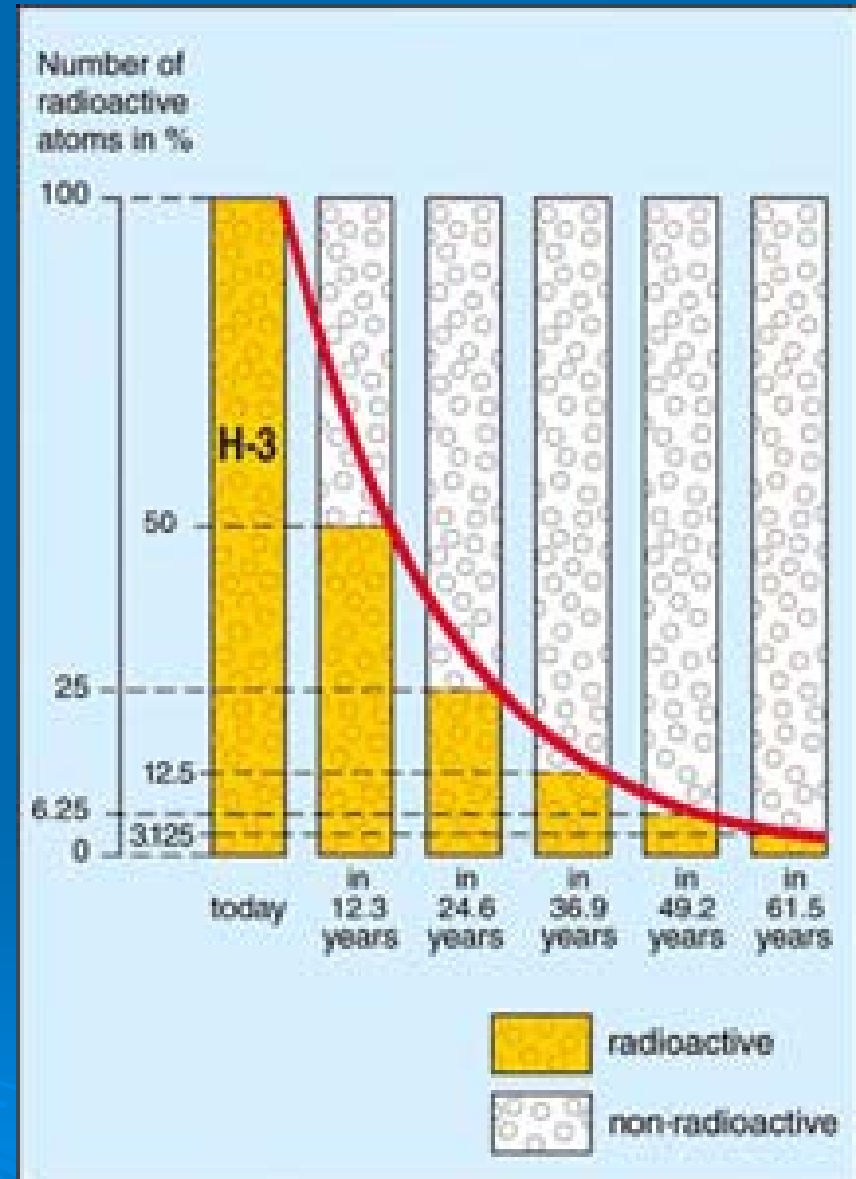
U.S. Nuclear Regulatory Commission
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What is tritium?

- Tritium is a naturally occurring radioactive form of hydrogen; it is produced in the atmosphere when cosmic rays collide with air molecules
- It is also a byproduct of the fission process in nuclear power plants
- Tritium can bond with oxygen to form water, resulting in 'tritiated water'; such water is chemically identical to normal water and the tritium cannot be filtered out of the water

Lifespan of tritium

- Tritium has a half-life of 12.3 years; that means it will have lost half of its radioactivity during that period of time



Types of radiation

- There are four types of radiation: alpha, beta, gamma and neutrons
 - **Alpha** – It is only able to travel a short distance and is not considered an external hazard; not able to penetrate clothing
 - **Beta** – It may travel several feet in air and is moderately penetrating. However, some beta emitters, including **tritium**, produce very low-energy, poorly penetrating radiation that may be difficult or impossible to detect
 - **Gamma** – A highly penetrating form of radiation; dense materials are needed for shielding from gamma radiation
 - **Neutrons** – Normally limited to the reactor and spent fuel

Tritium in the human body

- Tritium is almost always in liquid form
- It primarily enters the body when people eat or drink food or water containing tritium or absorb it through the skin
- Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the soft tissues
- Half of the tritium is excreted within approximately 10 days after exposure

Health risks of tritium

➤ From the EPA fact sheet on tritium:

“As with all ionizing radiation, exposure to tritium increases the risk of developing cancer. However, because it emits very low energy radiation and leaves the body relatively quickly, for a given amount of activity ingested, tritium is one of the least dangerous radionuclides.”



Uses for tritium

- Exit signs, watches, gun sights, other uses



NRC Regulations on liquid radioactive releases

- Nuclear power plant liquid and gaseous releases to the environment are required to be planned, monitored and documented
- NRC regulations (10 CFR Part 20 and 10 CFR Part 50) place limits on these releases to ensure safety standards are being met, such as NRC ALARA limits and EPA drinking-water standards
- On an annual basis, NRC guidelines require that the release of radioactive liquids from a nuclear power plant not result in a radiation dose of greater than 3 millirems to any individual in an unrestricted area

EPA regulations on tritium

- The U.S. Environmental Protection Agency (EPA) sets the safe drinking water limit for tritium at 20,000 picocuries per liter
- In 1976, the EPA said that concentration would yield the equivalent of 4 millirems of radiation exposure. This is considered a safe level as set by EPA for tritium under the Safe Drinking Act

Tritium in groundwater at nuclear power plants

- The levels of tritium identified in groundwater on-site at Vermont Yankee and other U.S. nuclear power plants have been within radiation protection limits and do not pose a threat to public health and safety
- There has not been any tritium detected in off-site areas or in any drinking water at Vermont Yankee, or in the Connecticut River
- Nevertheless, the NRC takes unanticipated and unmonitored releases of radioactivity very seriously
- The NRC has been inspecting at Vermont Yankee and has found that Entergy is aggressively looking for the source of the leakage

What the NRC has done in response

- The NRC established a 'Lessons Learned' Task Force to address the inadvertent, unmonitored liquid releases of radioactivity from nuclear power plants
- That task force issued a report in September 2006

What the NRC has done in response (cont'd.)

- The Task Force developed a list of 26 recommendations
- They include the development of guidance for detecting, evaluating and monitoring releases from operating nuclear power plants via unmonitored pathways
- Nearly all of the recommendations have been implemented. This has led to better awareness, detection, tracking, trending and communication with local and state authorities

What the NRC has done in response (cont'd.)

- Buried piping is subject to inspection and testing requirements spelled out in NRC regulations and standards from the American Society of Mechanical Engineers (ASME)
- These standards call for regular flow testing and other surveillance for buried safety-related pipes
- The NRC's Chairman has asked the staff to look at improvements that can be made in ensuring the integrity of buried piping

Additional information/questions

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