



Discarded Tritium Exit Signs

Exit signs are mounted in almost every building we go into, like high schools, grocery stores, movie theaters and shopping malls. Most people probably don't know that many exit signs contain tritium, a radioactive form of hydrogen. Mixing tritium with a chemical that emits light in the presence of radiation, known as a phosphor in a tube (a sealed source), creates a continuous, self-powered light source. This useful property of tritium can be applied to situations where a dim light is needed but where using batteries or electricity is not possible. Using tritium in exit signs ensures that the sign will remain illuminated in the event of an electrical outage or a fire. If the tubes in the exit signs are severely damaged, the tritium, which exists in the sign as a high temperature gas, might escape into the local area but most likely will quickly disperse in the air. Because a damaged exit sign will have relatively high levels of tritium in it, you should not handle it.

While damage to tritium exit signs is rare, it is most likely to occur when a sign is dropped during installation or smashed in the demolition of a building. If not damaged during demolition, tritium exit signs can be broken when they are illegally dumped in community landfills.

Tritium is naturally produced by the interaction of cosmic rays with the atmosphere. Tritium can also be produced by man-made processes, as is the case of tritium exit signs. Tritium decays by emitting a low-energy beta particle that cannot penetrate the outer layer of human skin. Therefore, the main hazard associated with tritium is internal exposure by inhalation. Internal contamination occurs when people swallow or breathe in radioactive materials, or when radioactive materials enter the body through an open wound or are absorbed through the skin. Some types of radioactive materials stay in the body and are deposited in different body organs. Other types are eliminated in blood, sweat, urine, and feces.

As with all ionizing radiation, exposure to tritium increases the risk of developing cancer. However, tritium exposure is likely to have a limited biological impact because it emits very weak radiation and leaves the body relatively quickly. Because of tritium's short biological half-life, tritium must be ingested in rather large amounts to pose a significant health risk.

Who is protecting you

U.S. Environmental Protection Agency (EPA)

Under the Clean Air Act, EPA establishes regulatory requirements for hazardous air pollutants including tritium air releases. Under the Safe Water Drinking Act, EPA sets limits for acceptable levels of tritium in drinking water. EPA also responds to emergencies involving tritium releases to the environment. In addition, before being approved for public use, sites previously contaminated with tritium must meet EPA's risk-based criteria for soil and ground water.

U.S. Department of Labor (DOL)

DOL's Occupational Safety and Health issues regulations and standards for the safety of workers in a wide range of occupational settings including construction and demolition.

U.S. Nuclear Regulatory Agency (NRC)

The primary mission of the NRC is to protect public health and safety and the environment from the effects of radiation from nuclear reactors, sealed sources containing radioactive materials, and radioactive waste facilities.

The States

Each state has one or more programs to address radiation protection issues and respond to and investigate incidents involving tritium.

Thirty-three states have signed formal agreements with NRC, providing these states regulatory responsibility over small quantities of special nuclear material and its source and by-products. These states are known as NRC-Agreement States.

What can you do to protect yourself

Some basic precautions can minimize the risks. The tritium in exit signs can be identified by the tube (sealed source) that contains tritium. In an exit sign, the tubes are used to spell out the word "EXIT."

- Never tamper with a tritium exit sign.
- A tritium exit sign should be clearly labeled with a statement that it contains tritium.
- Return outdated tritium exit signs to the manufacturer. The address of the manufacturer usually can be found on the back of the tritium exit sign. The manufacturer can provide instructions on how to ship the tritium exit sign safely.

Disposal of the broken sign should be arranged through the manufacturer or a health physics consultant. When an exit sign containing tritium is damaged and the sealed tube within the sign is broken, you should:

- Leave the sign alone; do not touch it.
- Evacuate the area immediately.
- Isolate the area; do not allow entry.
- Ventilate the area to the outside.
- Identify all individuals possibly exposed.
- If you think you have been contaminated, you should:
 - Shower with soap and water (or at least wash face and hands);
 - Change clothing and put the potentially contaminated clothes in a plastic bag for testing to confirm exposure;
 - Drink plenty of fluids; and
 - Collect a urine sample.
- Call your local fire or police departments.
- Call your State Radiation Protection Program.
- Call the manufacturer for technical information.

Resources

You can explore this radiation source further through the resources at the following URL:
<http://www.epa.gov/radtown/exit-signs.htm#resources>

We provide these resources on-line rather than here so we can keep the links up-to-date.