

Environmental Monitoring at Nuclear Power Plants

Nuclear power plants may give off a small amount of radiation while they are operating. The plants may also release small amounts of material that emit radiation. The NRC has strict rules to keep radiation levels in the environment very low and protect public health and safety. When it reviews a reactor license application, the NRC [analyzes](#) the possible impacts to people, animals, plants and sea life. This analysis is part of an Environmental Impact Statement the NRC publishes that also addresses ways to minimize the impacts.

The NRC requires nuclear power plants to be designed in a way that keeps radioactive material releases [as low as reasonably achievable](#). Plant operators must also:

- Comply with [radiation dose limits for the public](#)
- Monitor both what they release and the environment around the plant
- Report their results annually to the NRC. These reports are posted on the NRC website.



Device for monitoring airborne radiation

Regulations

Radiation is all around us. Most of it comes from natural sources such as cosmic rays, radon gas, and uranium and other elements in the ground. All Americans receive an average dose from natural sources of about 300 millirem each year. At most reactor sites, radiation from the plant cannot be detected at all. Radiation from a reactor generally cannot be detected further than one mile away. Within one mile, it could be a small fraction of the background dose.

Power reactors must comply with specific limits on doses to the public set by both the NRC and the Environmental Protection Agency (EPA). EPA's rules can be found in [40 CFR Part 190](#). The NRC rules are in [10 CFR Part 20](#). The NRC's rules define "as low as is reasonably achievable" (ALARA).

Each reactor license specifies ALARA levels and requires the licensee to make a report any time a level is exceeded. By complying with these rules, most reactors have kept doses to the public so small that they are difficult to distinguish from background radiation.

Monitoring Releases and the Environment

Reactor operators must monitor the release of any radioactive materials in liquid or the air, as well as any direct radiation from the plant. They must track their releases so they can report them to the NRC each year. If there is a release above ALARA levels, the plant must make a special report to the NRC. Plants have been very effective in controlling their releases. To date, there have been no releases above the ALARA levels.



NRC inspector watches sample-testing at Seabrook

Reactor operators also measure radiation levels in the environment. They must collect samples from the air, surface water (such as ponds, streams and lakes), groundwater, drinking water, milk, fish, and shoreline sediment. The licensee regularly has the accuracy of its measuring system verified by an independent lab. Licensees must report their results every year to the NRC.



Technicians process soil samples

The NRC posts these [annual reports](#) online. Radioactive releases (called effluents) appear in a plant's Effluent Report. How much radiation was measured in the environment appears in the Environment Report.

The NRC has on-site inspectors that live near the plants and work there every day. They check regularly to make sure plants are monitoring their releases and keeping them below ALARA levels. Other NRC inspectors who are radiation experts go to the sites for routine radiation inspections. The NRC documents the

results of its inspections in [reports](#) available to the public.

Tritium in Groundwater at Nuclear Plants

Several nuclear power plants have had leaks or spills of tritium that have been found on-site in wells used to monitor groundwater. Tritium is a mildly radioactive form of hydrogen made in a reactor. In these cases, the NRC expects each licensee to find the source of contamination (often leaks from [buried pipes](#)). The licensee must also have a program to prevent leaks, which the NRC reviews. [Tritium leaks](#) have not resulted in any drinking water supplies having tritium levels above the EPA's safe drinking water standards. In most cases, the tritium cannot be detected in groundwater samples off-site.

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