

Why GAO Did This Study

All U.S. nuclear power plant sites have had some groundwater contamination from radioactive leaks, and some of these leaks came from underground piping systems. The Nuclear Regulatory Commission (NRC) regulates nuclear power plants to protect public health and the environment from radiation hazards. GAO was asked to (1) determine experts' opinions on the impacts, if any, of underground piping system leaks on public health and the environment; (2) assess NRC requirements of licensees for inspecting these systems and monitoring and reporting on leaks; (3) identify actions the nuclear power industry, licensees, and NRC have taken in response to leaks; and (4) identify additional NRC requirements, if any, that key stakeholders think could help prevent, detect, and disclose leaks. GAO convened expert discussion groups through the National Academy of Sciences and asked experts to review three case studies, analyzed documents, visited seven plant sites and two NRC regional offices, and interviewed stakeholders.

What GAO Recommends

GAO recommends that NRC periodically assess the effectiveness of the groundwater initiative and determine whether structural integrity tests should be included in licensee inspection requirements, when they become feasible, based on industry research.

NRC stated it agrees with the report and recommendations and asserted that NRC has taken relevant actions.

View [GAO-11-563](#) or key components. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

NUCLEAR REGULATORY COMMISSION

Oversight of Underground Piping Systems Commensurate with Risk, but Proactive Measures Could Help Address Future Leaks

What GAO Found

While experts in our public health discussion group generally agreed that radioactive leaks at the three nuclear power plants in our case studies of actual events had no discernible impact on the public's health, these experts noted that additional information could enhance the identification of the leaks and the characterization of their impacts. The experts in our environmental impact discussion group concluded that environmental resources beyond the plant site have not been impacted discernibly, but that on-site contamination could affect plant decommissioning; for example, the licensee may have to conduct costly remediation to meet NRC regulations for unrestricted release of the site. Experts also identified the need for licensees to transparently report monitoring data and for licensees' groundwater monitoring programs to be independently reviewed.

NRC inspection requirements focus on ensuring the functionality of underground piping systems that are essential for both the safe operation and the shutdown of plants rather than providing information about the condition of the underground piping systems. In addition, NRC's groundwater monitoring requirements generally focus on monitoring off-site locations, where a member of the public could be exposed to radiation, but not on on-site groundwater monitoring, which can improve the likelihood that leaks will be detected before they migrate off-site.

In response to leaks, the nuclear power industry has implemented two voluntary initiatives to increase public confidence in plant safety. The first initiative was intended to improve on-site groundwater monitoring to promptly detect leaks. The second was intended to provide reasonable assurance of underground piping systems' structural and leaktight integrity. Licensees' responses to detected leaks have varied, ranging from repairing the leak source and documenting the leak's extent, to performing extensive mitigation. In addition, NRC has assessed its regulatory framework for, and oversight of, inspection of underground piping systems and groundwater monitoring. Based on the low risk posed by spills to date, NRC determined that no further regulations are needed at this time but has committed to such actions as gathering information on underground piping leak trends and reviewing codes and standards for underground piping.

Key stakeholders identified additional NRC requirements that they thought could help prevent, detect, and disclose leaks. Some saw a need for NRC to require licensees to inspect the structural integrity of underground piping using techniques used in the oil and gas industry, while noting the challenges to applying such techniques at nuclear power plants. Industry is undertaking research to overcome these challenges. Stakeholders also noted that NRC should enhance its on-site groundwater monitoring requirements to promptly detect leaks and minimize their impacts. Finally, stakeholders said that NRC should require licensees to provide leak information in a more timely fashion and should make that information more accessible to the public.