Regulation of Groundwater Quality at NRC Licensed Facilities

NRC regulates groundwater quality to protect both the public and the environment. Groundwater quality regulation is specific to the programs and activities that NRC regulates. Differences between NRC programs in the regulation of groundwater quality arise from different regulatory histories and legislative direction. In some sites and for some activities, groundwater quality is also regulated by the U.S. Environmental Protection Agency (EPA) or State agencies. With a few exceptions, NRC regulation focuses on radiological contamination, while EPA or State regulation of groundwater quality includes both radiological and non-radiological constituents. All NRC licensed facilities are reviewed and inspected to determine if the facility design and operational controls are adequate to prevent or reduce contaminant releases to the groundwater.

Nuclear Reactors (Nuclear Reactors, http://www.nrc.gov/reactors.html)

At **operating** (Power Reactors http://www.nrc.gov/reactors/power.html)and **new nuclear reactors** (New Reactors http://www.nrc.gov/reactors/new-reactors.html), NRC regulates radiological contamination from a nuclear reactor within and outside the site boundary. Outside the site boundary and for some activities inside the site boundary, EPA or State agencies regulate groundwater quality. NRC regulations (§ 50.34 Contents of applications.., http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-0034.html) require reactor licensees to describe how radioactive effluent and radiation exposures will stay within the limits set forth by NRC **regulations** (Part 20…, http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/) and for **new reactors** (Regulations…for New Reactors, http://www.nrc.gov/reactors/new-reactors/regs-guides-comm.html), minimize contamination. Groundwater monitoring for the facility environs is **required** (Appendix A to Part 50, http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html#1_appa) for radioactivity that may be released from normal operations or from accidents. **Research and test reactors** (Research and Test Reactors, http://www.nrc.gov/reactors/non-power.html) share a similar regulatory framework to operating power reactors.

Fuel Cycle Facilities (Fuel Cycle Facilities, http://www.nrc.gov/materials/fuel-cycle-fac.html)

NRC licenses fuel cycle facilities that convert, enrich, and fabricate uranium into fuel for use in nuclear reactors. Regulation of groundwater contamination at Fuel Cycle Facilities is similar to reactor facilities. As with reactors, NRC regulation of groundwater quality is focused on radionuclide contamination. Within the site boundary, NRC regulates radiological contamination from those parts of the facility regulated by the NRC, while EPA or State agencies regulate both non-radiological (chemical) and radiological contamination from all parts of the facility.

Uranium Recovery Operations (Uranium Recovery, http://www.nrc.gov/materials/uranium-recovery.html)

NRC's regulates groundwater contamination from uranium **in-situ recovery** (In Situ Recovery, http://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities.html) activities, **conventional milling**, (Conventional Uranium Mills, http://www.nrc.gov/materials/uranium-recovery/extraction-methods/conventional-mills.html) **heap leach** (Heap Leach and Ion-Exchange Facilities, http://www.nrc.gov/materials/uranium-recovery/extraction-methods/heap-leach-ion-exchange.html) activities, and from material generated by the processing of ore for its **uranium or thorium content** (Byproduct Material, http://www.nrc.gov/materials/byproduct-mat.html). NRC regulates radiological and non-radiological groundwater contamination both within and outside the site boundary. Depending on the State and type of facility, the EPA, a State agency, or both may also regulate groundwater quality within the site boundary To prevent groundwater contamination, monitoring is conducted close to the operations and if needed, groundwater restoration is required. For uranium in-situ recovery activities, groundwater restoration is normal part of licensed operations.

Decommissioning Nuclear Facilities (Decommissioning of Nuclear Facilities, http://www.nrc.gov/about-nrc/regulatory/decommissioning.html)

When licensees cease operations and pursue license termination, they must submit either a "decommissioning plan" (non-reactors) or a "license termination plan" (reactors). These plans contain a complete description of the conditions of the site, including any radiological contamination of ground water from the licensed activities. The plans must describe how groundwater, soil, manmade structures, and other characteristics of the site will be cleaned up so radiological dose from remaining contamination meets NRC **criteria** (Decommissioning Regulations, http://www.nrc.gov/about-nrc/regulatory/decommissioning/reg-guides-comm/regulations.html). In addition, to dose requirements, when groundwater concentrations at a site, exceed EPA's maximum contamination levels, NRC and EPA will **consult** (Memorandum of Understanding, http://www.nrc.gov/reading-rm/doc-collections/news/2002/mou2fin.pdf) with each other on the **remediation** (Letters & Memoranda, http://www.nrc.gov/about-nrc/regulatory/decommissioning/reg-guides-comm/comm/letters.html
of the site. Before a site is released for unrestricted use or for use with restrictions, NRC independently verifies that residual radioactivity at a site from NRC licensed activities meets approved release criteria.

Low-Level Waste Disposal (Low-Level Waste Disposal, http://www.nrc.gov/waste/llw-disposal.html)

Low-level waste includes material that is contaminated with radioactive material or has become radioactive through exposure to neutron radiation. Low-level waste disposal occurs at commercially operated low-level waste disposal facilities that must be licensed by either NRC or **Agreement States**.(Agreement State Program, http://www.nrc.gov/about-nrc/state-tribal/agreement-states.html NRC **regulations** (Low-Level Waste Disposal Regs…, http://www.nrc.gov/waste/llw-disposal/regs.html) and compatible State regulations establish requirements to site, design, and operate disposal facilities. They are focused on radiological contamination and include preoperational, operational, and post-operational groundwater

monitoring. The NRC does not presently license any low-level waste disposal sites. All operating disposal facilities are currently located in Agreement States that have their own licensing program.

High-Level Waste Disposal (High-Level Waste, http://www.nrc.gov/waste/high-level-waste.html)

High-level radioactive **wastes** (High-level waste, http://www.nrc.gov/reading-rm/basic-ref/glossary/high-level-waste.html) are the highly radioactive materials produced as a byproduct of the reactions that occur inside nuclear reactors. This waste must be disposed of in a way that provides protection for a very long time (e.g., thousands of years). NRC groundwater **regulation** (High-Level Waste Disposal Regulations, http://www.nrc.gov/waste/hlw-disposal/regs-guides-comm.html) of high-level waste disposal incorporates **EPA standards** (Yucca Mt Standards, http://www.epa.gov/radiation/yucca/) and is focused on protecting the public and environment from radiological contamination from the disposal of radioactive waste in deep geologic repositories.

Notes

Green Text – Words that will be linked to other web sites.
Red Text – Title of linked web site
Blue Text – Link to Web site link.