

## The INL and the Snake River Plain Aquifer

A recent study by the U.S. Geological Survey of the Snake River Plain Aquifer below the Idaho National Laboratory may have caused some public concern about what we are doing to protect the aquifer. Following is an updated fact sheet about the INL and the aquifer which we hope will answer questions you may have about this topic. If you have other questions or need more information, please contact Brad Bugger, U.S. DOE public affairs officer, at (208) 526-0833.

The Snake River Plain Aquifer underneath the Idaho National Laboratory is one of the most productive groundwater resources in the U.S. Each year about 2 million acre-feet of water is drawn from the aquifer. Approximately 95 percent of the water withdrawn from the aquifer is used for irrigation, 3 percent for domestic water, and 2 percent for industrial purposes. The aquifer is the primary water source for more than 280,000 people in southeastern Idaho.



This unit is one of several that is used to "vacuum" volatile organic contaminants from the zone beneath the buried waste, removing them before they migrate into the Snake River Plain Aquifer below.

Although not the only source of contamination, historic activities at the Idaho National Laboratory have affected the quality of the aquifer water. In the past, the INL employed industrial waste disposal practices common at the time that included injecting contaminated waste water directly into the aquifer. Some of these practices led to contamination of the groundwater below some areas of the INL with heavy metals, chemicals and radioactive elements. These waste disposal practices are no longer used and are prohibited under current environmental regulations. Other waste disposal practices, including burying materials contaminated with radioactive and hazardous materials, have also contributed to aquifer contamination in the past.

For more than two decades, the U.S. Department of Energy, governed by federal and state laws, has been cleaning up the aquifer below the INL and taking actions to protect it from additional contamination. While some of the groundwater below the INL is still contaminated, in more than 50 years of groundwater monitoring no contaminants have been detected near or outside the INL boundary in concentrations exceeding federal safe drinking water standards.

Recent monitoring by the U.S. Geological Survey, Idaho Department of Environmental Quality, and INL site contractors in wells near the southern boundary of the INL found concentrations of the wastewater constituent tritium, a radioactive form of hydrogen, at detectable concentrations. These concentration levels were above what is normally considered "background levels," in deep layers of the aquifer. Previous monitoring at the INL did not allow for collection of samples at the depths these constituents were found. But it is important to note that the concentrations of these newly-discovered contaminants were still well below federal safe drinking water standards.

Over the past two decades, DOE and its regulating agencies, the U.S. Environmental Protection Agency and the Idaho Department of Environmental Quality, have undertaken scientific studies at the nine facility areas at INL to understand the extent to which past activities contaminated the groundwater. The studies required under the federal Superfund law were to determine if

cleanup was needed to reduce risks to within legally acceptable limits, and if so, what cleanup measures were appropriate.

The agencies determined that past activities at Test Area North, the Advanced Test Reactor Complex (formerly called the Test Reactor Area), the Radioactive Waste Management Complex, the Idaho Nuclear Technology and Engineering Center (formerly known as the Idaho Chemical Processing Plant) and the Central Facilities Area contributed contaminants to the aquifer in concentrations requiring cleanup of the aquifer and/or of sources of the contamination. Those cleanups are either under way and progressing well, or are complete and undergoing monitoring to confirm effectiveness.

Studies showed that the aquifer didn't require remedial actions at the four other facilities: the Naval Reactors Facility, Experimental Breeder Reactor-1, the Power Burst Facility/Auxiliary Reactor Area, and the Materials and Fuels Complex (formerly called Argonne National Laboratory-West).

A Remedial Investigation/Baseline Risk Assessment for the Radioactive Waste Management Complex – where radioactive and hazardous waste has been disposed over several decades -- was completed and made public in May of 2006. The study found that a small portion of the aquifer near the facility had been contaminated, and predicted that additional contaminants would reach the aquifer if no protective action were taken. The only widespread contaminants from the complex to be found in the aquifer are volatile organic contaminants – particularly carbon tetrachloride (“carbon tet”). The carbon tet found in the aquifer is attributed to waste buried at the disposal site because it has not been discovered in the aquifer upgradient from the Radioactive Waste Management Complex.

Beginning in 1996, vapor vacuum extraction from the “vadose zone” (the area between the surface of the waste disposal area and the aquifer, which is about 600 feet down) has been used to reduce the amount and concentrations of carbon tet that reaches the aquifer. Historically, concentrations of carbon tet that exceeded safe drinking water standards were found in seven different monitoring wells on the INL Site. After continuous treatment with vapor vacuum extraction and the beginning of the excavation of waste containing carbon tet, the latest aquifer monitoring in May, 2010 showed levels exceeding safe drinking water standards in only one monitoring well.

In 2008, DOE and its regulators agreed on a comprehensive cleanup strategy for the Radioactive Waste Management Complex. The selected remedy controls the source of contamination through retrieval of buried waste, as well as using in situ grouting (using a grout mixture to stabilize potentially mobile contaminants), continued vapor vacuum extraction of carbon tet, and eventually, a barrier over the surface of the remaining buried waste. The effectiveness of these measures will be monitored long-term, and access and control of the area will be controlled over time.

Retrieving waste reduces inventories of carbon tet. In situ grouting reduces mobility of two potential contaminants – technetium-99 and iodine-129 -- which are found in the waste buried there. Operating the existing vapor vacuum extraction and treatment system continues to remove and treat carbon tet – and other volatile organic compounds – in the vadose zone. The extraction and treatment system, coupled with waste retrieval, addresses the greatest and most imminent threat to groundwater quality.

Meanwhile, a record of decision was completed in May 2007 for the Idaho Nuclear Technology and Engineering Center's tank farm contaminated soil and contaminated groundwater. The record of decision was based on a study completed in 2006 that determined the nature and extent of contamination, assessed risks to people and the environment, and concluded that action was necessary to protect workers and the Snake River Plain Aquifer.

Multiple approaches will be used to reduce infiltration of waster through the contaminated tank farm soils and to the shallow "perched water" (a zone of water about 110 below the tank farm), where most of the contaminants of concern to the aquifer reside. This will include various water control measures, such as installation of an asphalt cover over the tank farm and surrounding area; monitoring of perched water levels as an early detection system for underground pipe leaks; and more intensive storm water management. Once the INTEC facility is closed, a final, thick soil cover will be installed that is designed to accept and dispense moisture to plants at the surface, while limiting water infiltration to the underlying cover layers. Controlling water at this site will help eliminate a potential "driver" of surface and sub-surface contaminants into the aquifer below.

In 2009, a record of decision was signed for site-wide groundwater at the INL. The record of decision was based on a multi-year environmental investigation of the aquifer beneath the site, and concluded that groundwater leaving the INL site boundary will continue to be safe for domestic and agricultural uses. This investigation was responsible for regional aquifer concerns related to the INL that could not be addressed on an area-specific basis, or any other areas at the INL that were not covered by other investigations.

Based on decades of sampling by several agencies and institutions, and on computer modeling results, the DOE and its regulatory agencies agreed that water leaving the INL boundary currently meets established drinking water standards and will continue to do so in the foreseeable future. That is why the three agencies – the U.S. DOE, U.S. Environmental Protection Agency and the Idaho Department of Environmental Quality – selected a "no action" approach that will include ongoing monitoring to assure water quality remains high over time.

Finally, DOE is required to complete five-year reviews as long as contaminants remain in place above risk-based levels to ensure the selected remedies continue to protect workers, the public and the environment. DOE will monitor the groundwater over the long-term to assure the accuracy of computer modeling which predicts the water leaving site boundaries will be safe to use, and that contaminants do not migrate off the INL site at levels of concern.