

P.7 Downhole Monitoring System for Tritium in Groundwater and Vadose Zones

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Abstract

Tritium is a radioactive isotope of hydrogen produced as a by-product of the nuclear fuel cycle. It is also an integral part of the nuclear weapons industry and has been released into the environment through both the production and testing of nuclear weapons. There are many sites across the DOE complex where tritium has been released into the subsurface through the disposal of radioactive waste and at the Nevada Test Site, through the underground testing of nuclear weapons.

Numerous DOE facilities have an on-going regulatory need to be able to monitor tritium concentrations in groundwater within deep hydrologic zones and in the shallower non-saturated vadose zone beneath waste disposal pits and shafts and other release sites. Typical access to groundwater is through deep monitoring wells (less than 2 inches in diameter) and situated in remote locations.

In response to this need, Science & Engineering Associates, Inc. (SEA) and its subcontractor, the University of Nevada Las Vegas (UNLV) Harry Reid Center (HRC) for Environmental Studies proposes to conduct the applied research and engineering necessary to design a real time, down hole monitoring system for the detection and measurement of tritium levels in the groundwater and in the shallower vadose zone beneath disposal pits and other locations where tritium has been released into the subsurface. Active participation for potential test sites of the monitoring system for groundwater contamination will be sought at the Nevada Test Site and for tritium contamination in the vadose zone at the Lawrence Livermore National Laboratory.

The monitoring system will be designed to detect tritium in the subsurface below federal and/or state regulatory limits for safe drinking water. This development effort will include design, fabrication, calibration and field-testing of a manufacturing prototype monitoring system. The development effort is being funded through the U.S. Department of Energy, National Energy Technology Laboratory.