

## Executive Overview of Tritium Analysis

Exelon Nuclear

Sept. 28, 2006

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A team of more than 400 Exelon employees, contractors and consultants in August 2006 completed a company-wide assessment of tritium in the environment at all 11 Exelon Nuclear active and inactive generating plants. The following report summarizes the results of the assessment.

### ASSESSMENT RESULTS

There was no detectable tritium beyond the plant boundaries other than from permitted discharges, except for known historical releases at the Braidwood Generating Station in Illinois. Other findings include:

- In its effort to fully characterize tritium in groundwater at all locations, Exelon has drilled 507 test and monitoring wells in the ground and analyzed test results from more than 1,800 water samples. Of the 507 wells, 338 were installed as part of the Braidwood remediation program and 169 were drilled for the fleet wide assessment. Of the 1,800 samples analyzed, over 1,300 were part of the Braidwood remediation program and nearly 500 were part of the fleet wide assessment.
- Analyses of the nearly 500 water samples collected as part of the fleet wide assessment detected a slightly elevated level of tritium above the lowest level of detection (LLD) of 200 picocuries per liter of water (pCi/l) in 126 samples.
- The concentrations of tritium in all but one sample in this assessment were considerably lower than the safe drinking water maximum standard established by the U.S. Environmental Protection Agency, which is 20,000 pCi/l. The one exception was at Quad Cities, where an on-site groundwater concentration from a spill 25 years ago measured 32,600 pCi/l. Systemwide, other results ranged from 201 pCi/l to 13,500 pCi/l.
- There is no detectable tritium in the Susquehanna River other than from permitted discharges. However, based on groundwater flow patterns on Three Mile Island, there is groundwater containing very low levels of tritium migrating to the Susquehanna River and immediately diluting to non-detectable levels, posing no safety hazard.
- One leak of water containing tritium on plant property was identified at Three Mile Island in June 2006 during the assessment. The leak, in a condensate tank de-icing line, was isolated on plant property, was promptly corrected, and posed no safety hazard. There are no current active leaks of tritium at Three Mile Island.
- No gamma-emitting radionuclides were detected, and only one groundwater sample had a detectable level of strontium 90. That sample was from an isolated well at Dresden Station in Illinois at a concentration of  $2.17 \pm 0.783$  pCi/l, which is slightly above the lower level of detection (LLD) of 2.0 pCi/l, but well below the U. S. Environmental Protection Agency drinking water maximum standard of 8.0 pCi/l. The source was rainwater drainage from an open pipe during construction activities in 1975. Samples from all other wells in close proximity to this location had no detectable levels of

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strontium 90, indicating that it is isolated to this single, remote location on plant property.

- At one plant, Oyster Creek Generating Station in New Jersey, no detectable tritium, strontium 90 or beta-emitting radionuclides were identified in the environment.

## PROJECT OVERVIEW

Exelon Nuclear initiated the first-ever system-wide analysis of tritium by a nuclear power generating company in March 2006. Tritium, an isotope of hydrogen that emits low levels of radiation and is found in nearly all water sources, is formed naturally in the atmosphere and as a by-product of generating electricity using nuclear energy. Tritiated water from nuclear energy plants is released at significantly diluted levels into the environment following strict federal guidelines and the discharges are reported on an annual basis.

As part of the system-wide analysis, structures and components that store or transport tritium -- including storage tanks, piping, vents and vaults -- were thoroughly studied to determine actual or potential pathways for leaks or spills of radioactive substances. In addition, the assessment team conducted an overview of historical releases of radioactive material, as well as a study to determine hydrology, or groundwater flow, of the area.

## TESTING PROCEDURES

In addition to drilling and sampling done in connection with remediation work at Braidwood, water was sampled from 169 newly installed wells, 200 existing wells and 61 surface water locations system-wide to fully determine the existence or movement of any radionuclides. Tests on these groundwater and surface water samples were conducted at independent laboratories. All results were provided to the Nuclear Regulatory Commission, other appropriate regulatory agencies and local governments.

## LONG TERM IMPROVEMENTS

All stations will continue to periodically test groundwater through the fleet's expanded network of monitoring wells. In addition, each station is evaluating long-term leak detection and prevention methods identified during the assessment project, including:

- Increased systematic inspection of both above ground and buried piping and tanks containing tritiated water.
- The use of newly developed mapping systems and advanced technology to track any future leaks.
- Sealing of equipment that has contributed to historical leaks or spills.
- Installing containment devices, where needed, around strategic components.
- Ensuring that any future modifications of plant systems and equipment incorporate lessons learned from the assessment project.

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