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From: Monte Phillips
To: DRP - BWR Staff; DRP - PWR Staff; DRS - HPs (PST)
Date: 12/12/05 12:30PM
Subject: OpE - Braidwood - Tritium Contamination in Ground Water

The Subject OpE discussed the tritium contamination of ground water as a result of a leaking discharge pipe.

You may view the posting at the OpE Community Forum line of our Region III Reactor Inspector Website

<http://r3intra.nrc.gov/drp2003/REACTORWEBSITE/Operating%20Experience%20Community/OpE%20community%20forum.htm>

CC: Ann Marie Stone; David Hills; Julio Lara

L-47



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February 17, 2006

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Release

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Ross Telson (12/2/2005 12:08:31 pm)

Revised on 2/16/2006 8:41:51 am

Braidwood Potential Off-Site Migration of Tritium Contamination (PNO-RIII-05-016)

On December 1, 2005, Region III issued the referenced preliminary notification. The licensee, on November 30th, informed the region that elevated levels of tritium had been detected in groundwater and that it was believed to have migrated in the groundwater off the site. The licensee believes that the groundwater tritium contamination was the result of past leakage from circulating water discharge piping that also carries planned radioactive effluent releases. The licensee has suspended radioactive releases via the current discharge path pending further investigation. A licensee press release is scheduled for today.

The PN notes that tritium levels as high as 58,000 picocuries per liter had been measured in shallow on-site monitoring wells. The region also reported, on the December 2 projects call, that licensee monitoring of three off-site residential wells nearby had revealed only background levels of tritium (~40 to 45 pci/l), that the US EPA limit for tritium in drinking water was 20,000 pci/l, and that the NRC limit for tritium discharges per 10 CFR 20 was 1,000,000 pci/l (subject to additional requirements). The NRC will split some future samples with the licensee to independently verify release information.

Additional background information (maps showing locations of the wells and the locations of some of the vacuum breakers, circ water blowdown system description, a simple one line drawing of the system, a map, and liquid release data for 11/2005) were provided, courtesy of Peter Habighorst and Richard Skokowski.

12/5/05 Update: See EN 42184 Braidwood Offsite Notification - Elevated Levels of Tritium Found in Groundwater

12/7/05 Update: BRAIDWOOD POTENTIAL OFF-SITE MIGRATION OF TRITIUM CONTAMINATION (UPDATE)

2/16/06 Update News Article: Exelon Nuclear to Launch Tritium Inspection Program at Its 10 Nuclear Energy Plants

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**Reactor Operating Events
Event Notification Report**

***** Not For Public Distribution ***
Event Notification Report**

Release

U.S. Nuclear Regulatory Commission - Operations Center
Event Reports For EN No (42184)
(May include 2-day hold)

42184

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| | |
|---|---|
| Power Reactor | Event Number: 42184 |
| Facility: BRAIDWOOD Region: 3 State: IL Unit: [1] [2] [] RX Type: [1] W-4-LP,[2] W-4-LP NRC Notified By: MIKE DEBOARD HQ OPS Officer: ARLON COSTA | Notification Date: 12/02/2005 Notification Time: 11:45 [ET] Event Date: 12/02/2005 Event Time: 10:00 [CST] Last Update Date: 12/02/2005 |
| Emergency Class: NON EMERGENCY 10 CFR Section: 50.72(b)(2)(xi) - OFFSITE NOTIFICATION | Person (Organization): PATRICK LOUDEN (R3) ERIC BENNER (NRR) THOMAS BLOUNT (IRD) |

| Unit | SCRAM Code | RX CRIT | Initial PWR | Initial RX Mode | Current PWR | Current RX Mode |
|------|------------|---------|-------------|-----------------|-------------|-----------------|
| 1 | N | Y | 100 | Power Operation | 100 | Power Operation |
| 2 | N | Y | 100 | Power Operation | 100 | Power Operation |

Event Text

OFFSITE NOTIFICATION - ELEVATED LEVELS OF TRITIUM FOUND IN GROUNDWATER

"This notification is being made pursuant to 10 CFR 50.72(b)(2)(xi) for a press release issued by Exelon Nuclear at 10:00 AM CST on December 2, 2005 regarding elevated levels of tritium found in groundwater on the Braidwood Station site property near the plant's north boundary. An environmental monitoring program at the Braidwood Generating Station has found higher than normal concentrations of tritium close to an underground pipe inside the plant's northern boundary, and the station has begun a remediation program. An Exelon Nuclear environmental team is drilling test wells on and just beyond the Braidwood property line in order to determine how much tritium may have moved beyond the plant boundaries and ultimately to clean up the tritium. Exelon Nuclear has notified NRC regional personnel, appropriate state agencies, local and state elected officials and four property owners who are potentially affected.

"The tritium was found in shallow groundwater 8 to 15 feet deep on company property. It poses no health or safety risk to the public and does not threaten drinking water wells in the area. Tritium is a naturally occurring isotope of hydrogen that emits a very low level of radiation and is a natural part of water. It is found in more concentrated levels in water used in nuclear reactors. The closest private residential wells to the site showed no tritium above natural background levels. A sample of water from a pond 50 yards north of the plant property line showed tritium levels of about 2,400 picocuries per liter, above background levels but less than one-eighth of the federal drinking water limit. The residential and pond test samples were taken with the consent of property owners and the results received on Dec. 1.

"The underground pipe that passes near the monitored site in the past has carried water containing tritium from the

Release

plant to the Kankakee River, where it was periodically discharged under federal guidelines as part of normal plant operations. No tritiated water is currently in the pipe and no tritium is currently being introduced into the ground. Braidwood has not released levels of tritium that exceeded federal limits."

The licensee notified the NRC Resident Inspector, State and local agencies and has issued a press release.

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Last Updated on 3/26/2004 by NRRWebServices

release

December 7, 2005

PRELIMINARY NOTIFICATION OF EVENT OR UNUSUAL OCCURRENCE -- PNO-RIII-05-016A

This preliminary notification constitutes EARLY notice of events of POSSIBLE safety or public interest significance. The information is as initially received without verification or evaluation, and is basically all that is known by the Region III staff on this date.

Facility

Braidwood 1 and 2
Exelon Generation Co.
Braceville, Illinois
Docket: 50-456 and 50-457
License: NPF-72; NPF-77

Licensee Emergency Classification

- Notification of Unusual Event
- Alert
- Site Area Emergency
- General Emergency
- Not Applicable

SUBJECT: POTENTIAL OFF-SITE MIGRATION OF TRITIUM CONTAMINATION (UPDATE)

DESCRIPTION:

On December 6, 2005, the licensee notified the NRC that low levels of tritium had been found in a drinking water well at an off-site residence as it continues to evaluate and characterize the migration of tritium in groundwater near the plant. Tritium, which is the radioactive form of hydrogen, occurs in small quantities in nature and is also produced during reactor operations.

The licensee's initial evaluation indicated that the tritium in the groundwater was a result of past leakage from a pipe which carries normally non-radioactive circulating water discharge to the Kankakee River, about five miles from the site. Several millions gallons of water leaked from the discharge pipe in 1998 and 2000. The discharge pipe is also used for planned liquid radioactive effluent releases with the effluent mixing with the circulating water being discharged. (Braidwood, like most nuclear plants, releases small concentrations of radioactive liquids under controlled and monitored conditions and within limits imposed by the NRC.) The licensee is continuing to evaluate the tritium contamination to assure they have identified all possible leakage paths from the circulating water discharge line.

Preliminary sampling results from the drinking water well at a residence about 1/4 mile from the site boundary showed a tritium level of 1,150 picocuries per liter, which is a small fraction of the EPA drinking water standard of 20,000 picocuries per liter. Samples have been collected at several other residential drinking water wells in the area and no measurable levels of tritium above background were found, according to licensee data.

Measurable levels of tritium have been found offsite in shallow monitoring wells drilled last week to assess the tritium movement and in a small pond. The offsite sampling program was initiated after the licensee has measured tritium levels in shallow onsite monitoring wells as high as 58,000 picocuries per liter. The highest level found in an offsite shallow monitoring well is

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34,000 picocuries per liter. These levels of tritium are a small fraction of NRC limits for radioactive effluent releases to the environment and do not represent a health and safety hazard.

Region III dispatched a radiation specialist to the site on December 1, 2005, to assist the NRC resident inspectors in their review of the circumstances surrounding the elevated measurements and the licensee's activities addressing the elevated tritium levels. The NRC has also split samples with the licensee for both drinking water wells and monitoring wells and sent the samples to an NRC contract laboratory for independent analysis. The first results are expected on December 9, 2005. Additional NRC independent samples are planned, and this preliminary notification will be updated as NRC analytical results become available.

The licensee is continuing to evaluate the tritium movement and is developing plans for further monitoring and possible mitigation measures. The licensee issued a news release on December 1, 2005, and has contacted affected property owners as well as State and local officials.

Region III was notified of the initial elevated tritium measurements on November 30, 2005. The information in this preliminary notification has been reviewed with licensee management and is current as of 11 a.m. on December 7, 2005.

Exelon Nuclear to Launch Tritium Inspection Program at Its 10 Nuclear Energy Plants
WARRENVILLE, Ill., Feb 15, 2006 /PRNewswire-FirstCall

Exelon Nuclear is launching an initiative across its 10-station nuclear fleet to systematically assess systems that handle tritium and take the necessary actions to minimize the risk of inadvertent discharge of tritium to the environment.

The assessments will take place in 2006 and will cover pipes, pumps, valves, tanks and other pieces of equipment that carry tritiated water in and around the plants.

The initiative is intended to significantly reduce the possibility of a tritium release of the type that occurred in the past involving the lake "blowdown" line at Braidwood Generating Station near Braceville, Ill. While the Braidwood leak poses no health or safety threat to the environment or the public, "we recognize that inadvertent releases are unacceptable and we are committed to eliminating them," said Exelon Nuclear Chief Operating Officer Charles Pardee.

The initiative also will establish new standards for inspections, responses to, and remediation of tritium releases that have the potential to affect the environment or the public.

Standards for responses to tritium releases would be modeled, in part, after a recent response at the Dresden Generating Station, where intensified monitoring and inspection detected a small underground tritium leak shortly after it occurred. The small leak, which was confirmed by test data over this past weekend, dripped at a rate of about a half-cup per minute and was discovered within a few weeks after it began.

In this case, the suspect pipe was scheduled for replacement as part of a repair and monitoring program undertaken at Dresden. The leak was confined to shallow ground in a small area near the center of the plant property alongside the plant structure and inside the protected security area. It is not expected to approach the edges of the plant property and poses no health or safety threat.

"Our purpose is to ensure that we have a full understanding of the health of our systems that handle tritium, and that we have satisfied ourselves, our stakeholders and the communities in which we are members, that our equipment has a high degree of integrity," Pardee said. "Just as important, we want to ensure that we are fully prepared to properly respond to a leak should one occur."

Tritium is a radioactive isotope of hydrogen that is found naturally in small concentrations in most surface water. It is produced in higher concentrations in water used in nuclear reactors and is a normal byproduct of commercial nuclear power production. Tritium is typically discharged into the environment under strict federal guidelines.

The U.S. Environmental Protection Agency has established a safe drinking water limit of 20,000 picocuries of tritium per liter of water.

At Dresden, tritium found in one test well near the center of the plant property measured 500,000 picocuries per liter. Surrounding test wells 10 to 20 feet away showed tritium concentrations of 20,000 picocuries per liter or less, indicating a small area of tritium that dissipates rapidly at the edges. The affected area is believed to be about 30 feet across near the center of the plant's 1,782 acres, adjacent to the plant structure and inside the protected security area. Testing along the site boundary confirmed that no tritium has approached the property edge.

The equipment inspection program announced today has already been initiated at the Byron Nuclear Generating Station in Ogle County, Ill., which is similar to Braidwood in its design. As does Braidwood, Byron uses a blowdown line to release tritium to a nearby river -- the Rock River -- as part of normal permitted plant operations.

Recent inspections at Byron initiated in response to the Braidwood issue found standing water inside concrete vaults in the ground that are part of the Byron blowdown line, which runs along a strip of company property to the river. The vaults house valves known as "vacuum breakers" that can malfunction and leak. Water in the vaults was tested last week and found to contain a tritium concentration of 86,000 picocuries per liter. Additional engineering work and environmental sampling is being undertaken this week to determine if tritium has migrated into the ground outside the vaults. The Byron tritium concentrations pose no health or safety threat to employees or the public.

In addition to the inspection program, a project team comprised of Exelon Nuclear engineers, chemists and environmental scientists, as well as expert consultants, is looking for technological ways to reduce the amount of tritium produced and released at all nuclear plants. The effort is separate from the inspection program.

"We owe it to our neighbors and our employees to ensure the environmental integrity of our plants," Pardee said. "We take great pride in the positive environmental attributes of nuclear energy, and we must preserve and enhance the notion that there is no cleaner, safer or more reliable way to produce electricity."