

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
OFFICE OF NEW REACTORS  
WASHINGTON, DC 20555-0001

January 26, 2012

NRC INFORMATION NOTICE 2012-01: SEISMIC CONSIDERATIONS—PRINCIPALLY  
ISSUES INVOLVING TANKS

**ADDRESSEES**

All holders of an operating license or construction permit for a nuclear power reactor under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of or applicants for a standard design certification, standard design approval, manufacturing license, or combined license issued under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

**PURPOSE**

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of recent operating experience related to seismic concerns. The NRC expects recipients to review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. Suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

**DESCRIPTION OF CIRCUMSTANCES**

LaSalle County Station

In October 2010, NRC inspectors raised concerns about the adequacy of the seismic analysis for the standby liquid control (SLC) test tanks at LaSalle County Station. The test tanks are nonsafety related but are located near safety-related components in the SLC system. The inspectors determined that the seismic analysis had several errors and omissions. The analysis did not include the tank legs and one of the pipe connections.

The licensee revised its seismic analysis using the correct inputs and determined that when the SLC test tanks contain water they could potentially fall over or collapse during a seismic event and impact safety-related equipment located nearby. By procedure, the water levels in the test tanks were allowed to be maintained at 75 percent full following testing. As a corrective action, the licensee drained the test tanks and revised its procedure to require that the test tanks be drained after testing. The revised analysis also determined that the test tanks would not collapse during a seismic event if they are empty.

**ML11292A175**

The licensee stated that the original design for LaSalle County Station did not consider the possibility of nonsafety-related, nonseismically-qualified items falling over during a seismic event. This was identified as an industry issue near the completion of the plant's construction. The site took action to address this issue; however, the original design analysis for the SLC test tanks was determined to be inadequate.

Besides the corrective actions mentioned above, the licensee revised its procedure for the SLC system testing to state that the SLC system must be declared inoperable when the test tanks contain water. The licensee is considering additional corrective actions.

The following documents contain additional information on these issues at LaSalle County Station:

- NRC, "LaSalle County Station, Units 1 and 2 Component Design Basis Inspection (CDBI) 05000373/2010006(DRS); 05000374/2010006(DRS)," dated February 15, 2011, Agencywide Documents Access and Management System (ADAMS) Accession No. [ML110460708](#)
- Exelon Generation Company, "Licensee Event Report 2010-003-00," LaSalle County Station, dated December 21, 2010, ADAMS Accession No. [ML103560658](#)

#### River Bend Station

On January 14, 2009, a licensee investigation of operational practices related to the SLC system concluded that, from March 14, 2003, to October 28, 2008, a seismic event could have rendered the SLC system incapable of performing its design safety function as credited in the station accident analysis. Although the safety significance of this event was low, the licensee reported it in accordance with 10 CFR 50.73, "Licensee Event Report System," as an operation prohibited by technical specifications (TS) and a loss of the safety function of the SLC.

This condition resulted from an inadequately evaluated change made to a surveillance test procedure that allowed water to remain in the SLC test tank following testing. The test tank is classified as a seismic Class 2 component, which means that it is designed and installed so that its failure cannot damage equipment important to safety as a result of a seismic event. However, the test tank is not seismically qualified while water is in the tank because this condition was not analyzed. Therefore, a seismic event could potentially render both trains of SLC inoperable if it occurred when water was left in the test tank. As a corrective action, the licensee put administrative controls in place to ensure that the tank is drained after testing and revised its surveillance test procedures.

On August 27, 2009, following maintenance on SLC pump B, operators filled the SLC test tank to perform a test. The test was aborted when the pump failed to start. The test tank was drained and normal system lineup was restored. On August 28, 2009, NRC inspectors observed 3 to 5 inches of water in the test tank and informed the licensee. The licensee declared both trains of SLC inoperable and entered an 8-hour action statement for the associated limiting condition for operation (LCO). The licensee determined that the two valves used to fill the test tank for the SLC pump operability test were not tightly closed, allowing slow leakage into the test tank. The licensee closed the two valves and drained the test tank to exit the action statement for the LCO. The as-found condition was evaluated and it was determined

that the amount of water present would not have caused a failure of the tank with a design basis seismic event.

The following documents contain additional information on these issues at River Bend Station:

- Entergy Operations, Inc., "Licensee Event Report 50-458/09-001-00," River Bend Station, dated March 11, 2009, ADAMS Accession No. [ML090760981](#)
- NRC, "River Bend Station—NRC Integrated Inspection Report 05000458/2009002," dated May 8, 2009, ADAMS Accession No. [ML091280577](#)
- NRC, "River Bend Station—NRC Integrated Inspection Report 05000458/2009004," dated November 12, 2009, ADAMS Accession No. [ML093160691](#)

#### Shearon Harris Nuclear Power Plant

On May 24, 2010, the refueling water storage tank (RWST) at Shearon Harris Nuclear Power Plant was aligned to the nonseismic fuel pool purification system (FPPS), causing the RWST to be made inoperable. The RWST is a safety-related system that is seismically qualified and described in TS. The FPPS is a nonsafety-related, nonseismic system that can be cross-connected to the RWST by a safety-related boundary valve that is normally closed.

On March 3, 2006, the licensee revised a procedure for the FPPS to permit purification of the RWST in plant operating Modes 1 through 4. The evaluation under 10 CFR 50.59, "Changes, Tests and Experiments," to support the procedure revision credited an operator action to manually close the open boundary valve and incorrectly concluded that this compensatory measure would maintain the RWST operable. NRC inspectors determined that opening the boundary valve while the plant was operating in Modes 1 through 4 would make the RWST inoperable regardless of what administrative controls were in place to close the valve.

The licensee determined that one of the causes of the event was ambiguous guidance used for its 10 CFR 50.59 evaluations. It determined that the FPPS procedure change resulted in a deviation from General Design Criterion 2, "Design Bases for Protection against Natural Phenomena," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, which requires prior NRC approval to perform the activity. The licensee's corrective actions include changing the FPPS procedure to remove the capability to purify the RWST in Modes 1 through 4 and clarifying its procedural guidance for 10 CFR 50.59 evaluations regarding the impact of proposed activities on the design and licensing basis.

The following documents contain additional information on these issues at Shearon Harris Nuclear Power Plant:

- Progress Energy, "Licensee Event Report 50-400/2010-003-00," Shearon Harris Nuclear Power Plant, dated November 15, 2010, ADAMS Accession No. [ML103270052](#)
- NRC, "Shearon Harris Nuclear Power Plant—NRC Integrated Inspection Report 05000400/2010005," dated January 28, 2011, ADAMS Accession No. [ML110280469](#)

A description of other plants that have also had seismic-related issues involving the SLC or RWST is available at ADAMS Accession No. [ML11292A190](#).

## BACKGROUND

Recent events have increased industry focus on the potential impact of seismic events. These include the earthquake and tsunami in Japan on March 11, 2011, that affected the Fukushima Dai-ichi nuclear plant and the U.S. earthquake near the North Anna Power Station site on August 23, 2011 ([Event Notice 47201](#)). On September 1, 2011, the NRC issued, in the *Federal Register*, "Draft Generic Letter 2011-XX: Seismic Risk Evaluations for Operating Reactors" (ADAMS Accession No. [ML111710783](#)), to solicit public comment on the potential NRC request that licensees reevaluate their vulnerability to seismic events.

Lists of recent NRC generic communications, inspection findings, and licensee event reports related to seismic issues are available at ADAMS Accession Nos. [ML11292A191](#), [ML11292A192](#), and [ML11292A197](#), respectively.

## DISCUSSION

This IN provides examples and references to events in which licensees failed to recognize various seismic considerations and system alignment issues that could impact safety. The NRC staff has identified recent concerns about SLC test tanks that were not seismically qualified when they contained water. This operating experience may apply to other tanks found on site at nuclear plants. The NRC identified other examples in which licensees failed to recognize that aligning nonseismic piping to the RWST would require TS LCO action statement entry, system modifications, or license amendments.

The SLC test tanks described in this IN were not safety-related but those at River Bend Station were required to be seismically qualified because they could potentially impact nearby safety-related equipment during a seismic event. Incorrect seismic structural analyses or inadequately reviewed procedure changes led to licensees using tanks, such as the SLC test tanks, in a manner that left them vulnerable to seismic hazards. Operating experience indicates that it is important to verify that the SLC system test tanks and similar tanks have adequate seismic analysis and are procedurally controlled to ensure that seismic vulnerabilities are appropriately managed and TS are followed.

TS requirements for safety systems are derived from a licensee's Final Safety Analysis Report, and are designed to ensure that the plant is operated in accordance with the current licensing basis. In accordance with 10 CFR 50.36, "Technical Specifications," when an LCO is not met, the licensee is required to "shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met." Intentionally aligning the seismically qualified RWST piping to the nonseismic FPPS piping by opening a boundary valve, immediately calls into question the full seismic qualification and, subsequently, the operability of the RWST system. LCO 3.0.2 requires that upon discovery of a failure to meet an LCO, the required actions of the associated conditions must be met. If a boundary valve is discovered to be open when it must be closed to support RWST operability, then the RWST is inoperable; TS for the RWST would be met by following the required actions of the associated conditions. LCO 3.0.2 does allow intentionally relying on TS actions for reasons that include, but are not limited to, performance of surveillances, preventive maintenance, corrective maintenance, or investigation of operational problems. However, TS would not allow applying compensatory

measures, such as manual actions in place of the closed boundary valve, for periods longer than the TS completion time for restoring the RWST to operable status, unless the TS expressly permit operation under such measures or the licensee can demonstrate that the RWST still meets the TS definition of operability without reliance on compensatory measures. In the case of the RWST alignment to the FPPS, the TS for the RWST specified no such allowance, and the licensee had not demonstrated RWST operability with the FPPS boundary valve open. Licensees should exercise caution when considering the use of compensatory measures for planned maintenance activities. Applying compensatory measures for TS required equipment in lieu of meeting the requirements of the LCO could constitute a change to the TS, which is prohibited by 10 CFR 50.59(c)(1)(i) without prior NRC approval. NRC Inspection Manual Part 9900, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," does allow licensees to use compensatory measures when a licensee discovers a structure, system, or component is degraded, nonconforming, or inoperable; however, the Part 9900 guidance is not applicable to planned maintenance activities.

The NRC expects recipients to review the information in this notice for applicability to their facilities and consider actions, as appropriate, to avoid similar seismic concerns at their sites.

## **CONTACT**

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below or to the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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Note: NRC generic communications may be found on the NRC public Web site, <http://www.nrc.gov>, under NRC Library/Document Collections/Generic Communications.

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Note: NRC generic communications may be found on the NRC public Web site, <http://www.nrc.gov>, under NRC Library/Document Collections/Generic Communications.

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\*via email

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