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

April 19, 2012

NRC INFORMATION NOTICE 2012-04: IMPACTS ON NORMAL PLANT OPERATIONS DUE TO LEAKS OR SPILLS OF CHEMICALS

ADDRESSEES

All holders of an operating license or construction permit for a nuclear power reactor issued 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.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of the recent operating experience on leaks or spills of chemicals such as Freon, ammonia, sodium hypochlorite, and other water treatment chemicals that have adversely affected plant operations. The NRC expects that recipients will 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

Prairie Island Nuclear Generating Plant

On January 5, 2012, the licensee for Prairie Island Nuclear Generating Plant, Units 1 and 2, declared an Alert due to an unisolable leak from one of the licensee's two sodium hypochlorite tanks in the chlorine house, adjacent to the plant screen house. The leak occurred when a section of piping broke between one tank and its isolation valve. A chemistry technician in the area secured the isolable tank, shut off the sodium hypochlorite pumps, started ventilation in the area, and notified the control room.

In accordance with its emergency action level (EAL) guidelines, the licensee declared an Alert based on a report of toxic gases contiguous to the plant screen house in concentrations that might result in an atmosphere immediately dangerous to life and health. The contents of the tank spilled into the bermed area around the tanks. A licensee contractor cleaned up the spill and the licensee exited the Alert that same day.

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Additional Information is available in Event Notification (EN) #47569.

Dresden Nuclear Power Station

On July 15, 2011, a nonlicensed operator at Dresden Nuclear Power Station reported smelling a chemical odor when exiting the Unit 2/3 intake structure. The licensee found that the discharge relief valve threaded tail pipe connection for one of the sodium hypochlorite pumps had failed, causing sodium hypochlorite to spill into the chemical tank berm sump, which is located within the bermed area around the hypochlorite tank farm. The licensee roped off and restricted access to the area, including the intake structure, to protect personnel from the chemical fumes. The Unit 2/3 intake structure is considered a vital area because it houses the safety-related cooling water pumps for all three emergency diesel generators. In accordance with its EAL guidelines, the licensee declared an Alert because access to a vital area was restricted. The licensee was able to isolate the sodium hypochlorite leak. After the fumes dissipated, the licensee restored access to the intake structure and exited the Alert.

The licensee later learned that 4 days before, on July 11, 2011, a leak of Hydroxyethylidenediphosphonic acid (HEDP), a low-pH acid used as a scale inhibitor, had occurred when a relief valve failed to properly reseat. Cleanup of this spill did not completely remove all of the HEDP from the bermed area sump. The HEDP tank and the sodium hypochlorite tank are within the same bermed area. As a result, when the sodium hypochlorite spilled, it flowed into the sump and reacted with the HEDP releasing chlorine gas. The licensee reviewed the Material Safety Data Sheet for the sodium hypochlorite, where it states that the chemical is not to be stored near acids.

Additional information is available in EN #47054 and NRC Inspection Report 50-237/2011-004 and 50-249/2011-004, dated November 7, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11311A339).

Susquehanna Steam Electric Station

On August 10, 2010, the licensee for Susquehanna Steam Electric Station (SSES), Unit 1, declared an Alert due to a leak of Freon-12 in the Unit 1 Reactor Building. The Freon refrigerant leak was from the 1A Reactor Building chiller and was discovered when plant operators investigated the chiller after it tripped. Additional workers, including maintenance technicians and site safety representatives, went to the area to assess the Freon leak, after which, one of the maintenance technicians reported to operations that he felt ill from the Freon gas. At this point, the Shift Manager evacuated the Unit 1 Reactor Building and, in accordance with the EAL guidelines, declared an Alert, due to the release inside the Unit 1 reactor building—a plant vital area—of a toxic gas that is immediately dangerous to life and health. After several hours, the licensee exited the Alert after all Freon from the 1A Reactor Building Chiller was transferred to a storage vessel and there was reasonable assurance that the event could not re-occur. No personnel were injured or required medical attention.

One of the methods described in the SSES EAL guidelines for determining if the concentration of toxic gas is immediately dangerous to life and health is measuring the concentrations with toxic gas instruments. During this event, however, the licensee did not have any equipment, either installed or portable, to measure the concentration of Freon in the atmosphere. Therefore, they did not have adequate equipment to assess EAL entry criteria for given immediately dangerous to life and health values. This was identified as a violation of NRC requirements.

Additional information is available in EN #46164 and NRC Inspection Report 50-387/2010-004 and 50-388/2010-004, dated November 12, 2010 (ADAMS Accession No. ML103160334).

Quad Cities Nuclear Power Station

On May 19, 2010, the licensee for Quad Cities Nuclear Power Station declared an Unusual Event due to a Freon leak in the Access Facility to the plant. The Access Facility is the normal entrance and exit point for personnel at the station. While technicians were working on the Access Facility's ventilation refrigerant unit, they noted a Freon refrigerant leak on a valve. Local atmosphere monitors began to alarm, so the technicians exited the area and notified plant security and operations personnel. Access to the Access Facility was restricted, and operations personnel evacuated the building and, in accordance with the EAL guidelines, declared an Unusual Event due to toxic gases that could affect normal plant operation. After the Freon had completely discharged from the refrigerant unit and a habitable atmosphere had been reestablished, the licensee exited the Unusual Event.

Additional information is available in EN #45935 and NRC Inspection Report 50-254/2010-003 and 50-265/2010-003, dated August 5, 2010 (ADAMS Accession No. ML102180023).

Other Recent Examples of Toxic Gas Releases

EN #47275—Callaway Nuclear Plant Alert Due to Freon Gas Release, dated September 18, 2011

EN #47303—Limerick Generating Station Units 1 and 2 Unusual Event Due to Sodium Hypochlorite Spill, dated September 29, 2011

EN #47348—Watts Bar Nuclear Plant Unit 1 Unusual Event Due to Elevated Ammonia Levels, dated October 17, 2011

EN #47401—San Onofre Nuclear Generating Station Unit 3 Alert Due to Ammonia Leak, dated November 1, 2011

BACKGROUND

Criterion 4, "Environmental and Dynamic Effects Design Bases," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, in part, that structures, systems, and components important to safety be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents.

Criterion 19, "Control Room," of Appendix A to 10 CFR Part 50, requires plants to have a control room from which operators can take actions to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.

NRC Regulatory Guide 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," describes assumptions acceptable to the NRC staff for use in assessing the habitability of the control room during and after a postulated external release of hazardous chemicals from mobile or stationary sources, off site or on site.

NRC Regulatory Guide 1.101, "Emergency Response Planning and Preparedness for Nuclear Power Reactors," provides guidance to licensees on acceptable standards for the development of emergency classification and action level schemes, including EALs, based on hazardous atmospheres and restricted access to areas of the plant.

DISCUSSION

The events described above involve failures of equipment (e.g., tanks, piping, valves) in industrial or nonnuclear systems which have no specific NRC requirements for their control, maintenance, and operation. However, these systems have the potential to release toxic chemicals into the atmosphere which could impair the plant operator's ability to access equipment needed to operate and manipulate the plant during both normal and emergency conditions and could adversely affect the health and safety of personnel on site.

CONTACT

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

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