UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

March 14, 1988

NRC INFORMATION NOTICE NO. 88-08: CHEMICAL REACTIONS WITH RADIOACTIVE WASTE SOLIDIFICATION AGENTS

Addressees:

All NRC licensees generating or processing low level radioactive waste.

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from unexpected adverse chemical reaction between contaminants in radioactive wastes and certain solidification agents. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Discussion:

On May 13 and 20, 1987, radioactive waste personnel at Tennessee Valley Authority's (TVA's or licensee's) Sequoyah Nuclear Plant began processing their laundry waste water and hot shower drain tank waste water through the condensate demineralizer waste evaporator before sampling for discharge. This procedure was new and being performed to reduce the radioactivity in the liquid waste effluents and to meet the criterion of "as low as is reasonably achievable" outlined in 10 CFR Part 50 Appendix I, which addresses the control of radioactive materials in gaseous and liquid effluents. Previously, only batches found to be in excess of discharge limits were processed before being released.

The condensate demineralizer evaporator bottoms were placed in a radioactive waste liner and were then solidified on site by Chem-Nuclear Systems, Inc. (CNSI) following a process control program (PCP) formulated by CNSI. As the waste was being mixed with CNSI's proprietary defoaming agent (N-24) and solidification agent (P-20), the mixture experienced an exothermic reaction in which the temperature of the waste exceeded 240°F. This temperature was above the boiling point of the mixture and it began to expand, overflowing the liner through the fill head and inspection plate and over the side of the container. This overflow then hardened and had to be chipped away. The maximum dose rate of the overflow was 3 rem per hour.

The licensee and Chem-Nuclear conducted studies to determine the cause of the problem. Through followup testing, CNSI identified that a detergent in the

waste reacted violently with the CNSI solidification agent, undergoing a reaction as the temperature of the mixture reached 218°F. No other material within the waste stream, including other detergents, was found to have any reaction with the solidification agent. The specific detergent, an industrial liquid laundry detergent sold as DECON 4324-NP under the brand name Turco, had been used in laundering the licensee's protective clothing. The change in the method of handling the liquid waste from the laundry increased the volume and concentration of the detergent in the evaporator bottoms. The licensee has stopped using the detergent and has experienced no similar problems. TVA plans additional studies to identify which chemicals in the detergent cause this reaction.

Licensees are reminded of the importance that waste be processed strictly in accordance with the approved PCP developed for the specific waste stream substances to be solidified. Some mixtures of waste contaminants and solidification agents may react adversely with one another. These reactions may not be noticeable during the specimen tests performed before the actual solidification occurs; therefore, it is important to be alert to variances in solidification parameters specified by PCPs, such as increasing temperature of the mixture and reduced amount of solidification agent required to fill the liner or other container.

Additional considerations appropriate for solidifying evaporator bottoms and ion-exchange resins are discussed in NUREG/CR-4601, "Technical Considerations Affecting Preparation of Ion-Exchange Resins for Disposal," issued in May 1986 by the Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Roy Weddington, RII
(404) 331-2604

Jaime Guillen, NRR
(301) 492-1153

Attachment: List of Recently Issued NRC Information Notices

# LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

| Information Notice No. | Subject | Date of Issuance | Issued to |
|---|---|---|---|
| 88-07 | Inadvertent Transfer of Licensed Material to Uncontrolled Locations | 3/7/88 | All NRC broad licensees and licensees authorized to possess byproduct material as sealed sources in teletherapy units or "self-contained" irradiators. |
| 88-06 | Foreign Objects in Steam Generators | 2/29/88 | All holders of OLs or CPs for PWRs. |
| 88-05 | Fire in Annunciator Control Cabinets | 2/11/88 | All holders of OLs or CPs for nuclear power reactors. |
| 88-04 | Inadequate Qualification and Documentation of Fire Barrier Penetration Seals | 2/5/88 | All holders of OLs or CPs for nuclear power reactors. |
| 88-03 | Cracks in Shroud Support Access Hole Cover Welds | 2/2/88 | All holders of OLs or CPs for BWRs. |
| 88-02 | Lost or Stolen Gauges | 2/2/88 | All NRC licensees authorized to possess gauges under a specific or general license. |
| 88-01 | Safety Injection Pipe Failure | 1/27/88 | All holders of OLs or CPs for nuclear power reactors. |
| 86-81, Supp. 1 | Broken External Closure Springs on Atwood & Morrill Main Steam Isolation Valves | 1/11/88 | All holders of OLs or CPs for nuclear power reactors. |
| 87-67 | Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11 | 12/31/87 | All holders of OLs or CPs for nuclear power reactors. |

OL = Operating License
CP = Construction Permit

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*Transmitted by memorandum dated October 18, 1987 to C. E. Rossi from J. N. Grace

*SEE PREVIOUS CONCURRENCES

| | | | | |
|---|---|---|---|---|
| | | | D/DOEA:NRR<br>GERossi<br>03/8/88 | C/OGCB:DOEA:NRR<br>CHBerlinger<br>03/7/88 |
| *OGCB:DOEA:NRR<br>JGuillen<br>01/22/88 | *RII<br>CMHosey<br>01/15/88 | *RII<br>RWeddington<br>01/15/88 | *AC/TEB:DLLWMD:NMSS<br>JJSurmeier<br>03/04/88 | *PPMB:ARM<br>TechEd<br>12/16/87 |

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