



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
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MEMORANDUM TO: Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications,  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

FROM: Ken E. Brockman, Director /RA/  
Division of Reactor Projects

SUBJECT: FOREIGN MATERIAL IN STANDBY LIQUID CONTROL STORAGE  
TANKS

This memorandum is to highlight a safety concern identified at the River Bend Station that may have generic implications for other licensees. During monthly sampling of the standby liquid control (SLC) system storage tank in September 2000, part of a plastic bag was retrieved along with the sampling equipment. Both trains of SLC were declared inoperable while the licensee inspected the tank, removed several pieces of plastic, and performed an evaluation. This event was discussed in NRC Inspection Report 50-458/00-14 (excerpt attached) and Licensee Event Report 50-458/00-013-00 (attached). After removing all identified foreign material and performing an evaluation of the potential effect of any remaining material, the licensee declared the SLC subsystems operable. Although the NRC has not yet finally dispositioned the issue, the licensee's evaluation concluded that the safety significance of the event was minimal.

This event points out the importance of effective foreign material exclusion controls to prevent the introduction into the SLC storage tank of material which could impair the system's operability. In this case the buoyancy of the plastic material reduced the potential consequences. Our inspection also pointed out the need for effective periodic walkdowns of emergency operating procedure attachments. In this case, we found that the chemicals intended for use in the alternate SLC method were not available on site and that the licensee had not walked down the emergency operating procedure for alternate SLC injection for several years.

The Cooper Nuclear Station also identified plastic material in the SLC storage tank this fall, but because of the small quantity of plastic found, the system was not considered to be rendered inoperable. The issues of SLC storage tank foreign material exclusion and emergency operating procedure periodic walkdowns are proposed for consideration as topics of an information notice. Please contact Bill Johnson at (817) 860-8148 if you have any questions.

Attachments:

1. NRC Inspection Report 50-458/00-14 (excerpt)
2. Licensee Event Report 50-458/00-013-00

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RIV:C:DRP/B	D:DRP			
WDJohnson;tbh;dlf	KEBrockman			
<i>/RA/</i>	<i>/RA/</i>			
12/20/00	12/21/00			

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S. Morris, EDO Coordinator (**SAM1**)

**Excerpt from NRC Inspection Report 50/458-0014**1R04 Equipment Alignment (7111104).1 Verification of the Standby Liquid Control Systema. Inspection Scope

The inspectors performed an equipment alignment check on the standby liquid control (SLC) system to verify that the system was properly configured and to identify any discrepancies that might impact the function of the system and thereby potentially increase risk. The inspectors reviewed documents to determine the correct system lineup and performed a walkdown to identify any discrepancies between the existing system lineup and the correct lineup. The inspectors also reviewed outstanding maintenance work requests and deficiencies which would preclude the system from performing its function and reviewed outstanding design issues and items tracked by the licensee to ensure equipment alignment problems had been properly identified and resolved. The following procedures and documents were reviewed during the assessment:

- SOP-0028, "Standby Liquid Control"
- EOP-0005, Enclosure 15, "Alternate SLC Injection and SLC TK GAL to LB Conversion"
- OSP-0009, "Authors Guide/Control and Use of Emergency Operating and Severe Accident Procedures"
- Updated Safety Analysis Report (USAR)

b. Findings

The inspectors identified an unresolved item involving the storage of chemicals for alternate SLC injection and walkdowns of equipment needed to implement emergency operating procedure enclosures.

On March 3, 1999, a quality assurance chemistry audit identified chemical storage discrepancies (i.e., deteriorated packaging) with chemicals stored in the onsite warehouse. On July 14, 1999, warehouse personnel removed the identified chemicals from inventory as a corrective action for the deteriorated packaging problems identified during the quality assurance audit. On July 28, 1999, the chemicals that had been removed from inventory were transported to the environmental storage yard and subsequently shipped offsite.

On September 14, 2000, at 9:36 a.m., chemistry personnel found a 10-inch square piece of plastic in the SLC tank during the SLC system monthly sample. The SLC tank manway cover was removed and several additional pieces of plastic were observed floating on the surface. Approximately 20 pieces of plastic which ranged in size from 2 square feet to one-half square inch were identified and removed. Further inspection

of the tank with an underwater camera identified additional pieces of plastic on the sparger supports and the mixing heater located at the bottom of the SLC tank.

At 2:22 p.m., due to the potential for the plastic to enter the SLC pump suction piping, both SLC subsystems were declared inoperable. The plastic material was removed and further inspections of the SLC tank were performed with an underwater camera. No additional foreign material was identified. Additionally, a boroscope inspection of the horizontal suction piping from the tank outlet to the downward elbow was performed. No material was identified during the inspection. Based on the inspection and the buoyancy of the plastic material, the licensee concluded that the remaining SLC pump suction piping would not contain any significant amount of plastic material.

The licensee evaluated the effect that 1 square inch pieces of plastic would have on system performance. The evaluation determined that pieces of plastic less than 1 square inch which might be introduced into the SLC pump suction would not preclude the system from injecting sodium pentaborate into the reactor. The licensee believed that any remaining plastic material would be less than 1 square inch.

At 8:59 p.m., both SLC subsystems were declared operable due to the inspections of the SLC system, the removal of the plastic material, and the engineering evaluation. This event was documented in Condition Report (CR) 2000-1618.

The licensee established a significant event review team to investigate the event and evaluate the safety significance of the plastic material in the SLC tank. The licensee determined that the incremental risk from this event, assuming that the SLC system was out of service for a one year time frame, was  $3.0E-8$ . Since the upper limit for nonrisk significant changes in conditional core damage probability was  $1.0E-6$ , the licensee concluded the event was nonrisk significant. Due to low flow velocities and the buoyancy of the plastic, the licensee believed that the SLC system would have been able to perform its function provided the SLC storage tank was in a steady state condition. The licensee specified that additional technical evaluations and computer modeling could prove the SLC system past operability during steady state conditions. However, given their low safety significance determination result, no actions were planned by the licensee to provide an additional evaluation of operability of the SLC system.

The only time period the licensee could not postulate the SLC system's behavior was during the 10-minute air sparge before the monthly chemistry sample of the SLC tank contents. During and immediately following an air sparge, the location of the plastic material in the SLC tank could not be postulated. Therefore, the licensee concluded that the SLC system may not have been able to provide its intended safety function during periods in which the SLC tank was being sparged with air.

Procedure EOP-0005, Enclosure 15, "Alternate SLC Injection and SLC TK GAL to LB Conversion," required that operations personnel contact the main warehouse/storeroom to transport approximately 2500 pounds each of sodium borate and boric acid to the auxiliary building. In the event the SLC system did not function, these chemicals would

be mixed together to form a sodium pentaborate mixture. The mixture would then be injected into the reactor pressure vessel via the high pressure core spray system to shut down the reactor.

On September 25, 2000, the inspectors conducted a walkdown with Procedure EOP-0005, Enclosure 15, and identified that the sodium borate and boric acid chemicals were not available in the warehouse or onsite for alternate SLC use. The inspectors notified the licensee and replacement chemicals were shipped from the Grand Gulf Nuclear Station and arrived onsite at approximately 4 a.m., on September 26, 2000. Further investigation by the licensee revealed that these chemicals had been removed from the site as a followup action to the removal of the chemicals from the warehouse inventory on July 28, 1999. CR 2000-1680 was generated to document this condition.

Sections 11.1.1 and 11.1.2 of Procedure OSP-0009, "Authors Guide/Control and Use of Emergency Operating and Severe Accident Procedures," required that operations personnel perform yearly walkdowns of each emergency operating procedure enclosure. On October 2, 2000, in response to the inspectors' observation of the missing chemicals, operations personnel completed a review of their documentation of emergency operating procedure enclosure audits and yearly walkdowns. The review determined that the yearly walkdowns of each emergency operating procedure enclosure had not been performed since November 26, 1996. This issue was documented in CR 2000-1723.

The inspectors completed a Phase 2 significance determination process (SDP) evaluation to assess the preliminary safety significance of the SLC and alternate SLC system unavailability for greater than 30 days for the anticipated transient without scram event. The Phase 2 SDP indicated that the loss of both the normal and alternate SLC functions, with no remaining mitigation capability, would have substantial safety significance. The licensee's probabilistic risk analysis determined that the loss of the SLC functions would be of very low safety significance. Due to the variance in the safety significance determinations, the unavailability of the normal and alternate SLC systems is considered an unresolved item pending review of the safety significance by an NRC senior reactor analyst (URI 50-458/0014-01).