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April 30, 2010
10-048

Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
ATTN: Document Control Desk

Reference: License SNM-42, Docket 70-27

Subject: 30-Day Written Report for Event Notification # 45805

Dear Sir:

Babcock & Wilcox Nuclear Operations Group, Inc. (B&W NOG) is providing a 30-Day written report for its Lynchburg facility for Event Notification # 45805 per 10 CFR 70.50(c)(2). The event notification was reported under 10 CFR 74.50 Appendix A (b)(2), loss or degradation of items relied on for safety that results in failure to meet the performance requirements of §70.61.

The enclosure presents the detailed information on this event and corrective actions. If there are any questions in this regard, please contact me at (434) 522-5665.

Sincerely,

Cheryl Arff for Barry Cole

Barry L. Cole
Manager, Licensing and Safety Analysis
(Licensing Officer)

Enclosure

cc: NRC, Region II
NRC, Resident Inspector
NRC, M. Baker

IE72

30-Day Written Report for Event Notification # 45805 – April 1, 2010

Event Description

On March 29, 2010, Nuclear Criticality Safety (NCS) was notified that an Ultrasonic Testing (UT) Smart Crane had failed its functional test. The Smart Crane is an active engineered control that prevents simultaneous immersion in water of two fuel bearing components of concern in an Ultrasonic Testing (UT) tank. Earlier in the morning, the crane tripped into a fault mode while being moved to a storage position; there was no fuel bearing component attached to the crane at the time. Plant Maintenance personnel reset the crane's Programmable Logic Controller (PLC) and the required functional tests were performed per procedure prior to returning the crane to service. When the functional test was performed on Tank # 3, the crane failed the test. Tank # 3 was loaded with a component of concern (> 500 lbs) and the crane failed to prevent movement of a test weight into the tank's exclusion zone. The Smart Crane should have recognized Tank # 3 as loaded and should have stopped the test weights at the edge of the tank's exclusion zone.

The crane's PLC was subsequently checked and it was determined that it did not indicate Tank # 3 as loaded with a component of concern. The PLC was manually set to identify Tank # 3 as loaded with a component of concern and testing resumed. The crane then failed a test on Tank # 1. The UT tank did not contain a component of concern (i.e., it weighed < 500 lbs.). As such, the operator using the crane should have been able to transfer the test weights into tank's exclusion zone, but the crane's safety interlock stopped the weights at the zone boundary.

Initially, these failures were thought to be caused by errors in conducting earlier tests. If the weights are inadvertently released from the crane within the exclusion zone at the conclusion of a test, the tank status (loaded/unloaded) can be affected. As a result of an earlier corrective action, forklift barriers had been erected to limit the free space around the tanks. It was anticipated that these barriers were possibly interfering with the movement of the weights in/out of the exclusion zone during test.

Tank # 1 was reset and all tanks successfully passed the required functional tests and the crane was returned to service. As an added measure the operators were requested to log the status of the Smart Crane indicating lights (which verify that the system's PLC is operating correctly relative to the presence of components in a tank and the crane's position) as the crane moved from tank to tank. On the night of March 30, 2010, the indicating lights did not provide the correct indication of tank loaded/unloaded status. The operation was immediately shutdown and NCS was notified. On March 31, 2010, Plant Maintenance determined the crane's linear encoder had failed and was not

accurately tracking the crane's position. This failure mode allowed the crane to move, but gave a false indication of crane position to the PLC.

Initial Evaluation

The defined failure mode did not provide the PLC with accurate data to determine the crane's position. In this state, the Smart Crane would not prevent an operator from loading two items of concern in a single tank. This was a failure of the Smart Crane as an Item Relied on For Safety (IROFS).

There was no immediate risk of a criticality or threat to the safety of workers or the public as a result of this event. An operator never attempted to load two components of concern into a UT tank. However, with inaccurate position information, the Smart Crane could not be credited as an IROFS, and double contingency could no longer be assured. A criticality was no longer highly unlikely.

The NRC was formally notified within 24 hours on April 1 in accordance with 10 CFR 70, Appendix A, (b)(2) – Loss or degradation of items relied on for safety that result in failure to meet the performance requirement of 70.61. An investigation was performed to review the event, identify the causal factors, and to identify corrective actions.

Immediate actions taken following the event are as follows:

1. The failed linear encoder was replaced. The safety function was verified by successful completion of the Smart Crane's functional testing per procedure.

2. Extent of condition and cause reviews were completed for PLC controlled cranes utilizing linear encoder data to track location. The other cranes were functioning properly. However, the same failure mode is possible on two other Smart Cranes that rely on this type of linear encoder feedback.

3. An additional independent administrative IROFS was implemented to ensure the performance criteria of 10 CFR 70.61 would be maintained should subsequent Smart Crane failures occur. The crane control pendant is maintained under lock and key; its use requires continual oversight by a second individual and confirmation that a UT tank is empty before loading a component. This IROFS was implemented for all three Smart Cranes in the UT area of concern.

Investigation Team Findings

An investigation team was chartered to investigate this event. The team used TapRoot ® cause analysis techniques to create an event timeline and to identify the causal factor, which is discussed below.

Causal Factor – The Causal Factor for this event is an equipment failure. The linear encoder which tracks the position of the crane failed. The position information provided by the linear encoder is used by the PLC to monitor the location of the crane relative to each of the four UT tanks and their exclusion zones. When a component is loaded into or unloaded from a tank, the PLC identifies the affected tank by its location along the crane's travel path and assigns a loaded or empty status to the tank. Any attempt to load a second component into a loaded tank is prevented by the PLC using the data from the linear encoder to correlate the crane's position relative to a loaded tank. The failure of the linear encoder allowed the crane to move, but gave a false indication of the crane's position. The PLC could no longer accurately track the position of the crane or the load state of a UT tank. The safety function assigned to the Smart Crane was compromised by the failure of the linear encoder.

Corrective Actions to Prevent Recurrence

As a result of the investigation, the following corrective actions were identified to prevent recurrence:

Causal Factor and Corrective Actions

Causal Factor: The hardware failure of the Smart Crane System encoder is the causal factor contributing to the IROFS failure and ultimate failure to maintain performance criteria.

Corrective Action 1: Evaluate the preventive maintenance (PM) plans for the smart crane systems and implement the identified improvements.

Completion Date 1: 10/30/2010

Corrective Action 2: Revise the area operating procedure to include a periodic system check.

Completion Date 2 6/30/2010