Date: Wed, 14 Jan 1998 13:14:32 -0700
From: Meredith Brown <racer@lanl.gov>
Subject: Blue Alert: Maintenance Activity Leads to Shutdown

Title: **BLUE-Routine Maintenance Activity Leads to Facility Shutdown**

The following Idaho National Engineering and Environmental Laboratory (INEEL) Lockheed Martin Idaho Technologies Blue Alert Lessons Learned is being issued to inform you that a graded approach should be taken to routine maintenance activities.

Identifier: INEEL Lessons Learned #97316
Dated: October 13, 1997

Lessons Learned Statement: Maintenance of crucial systems should incorporate a graded approach. All personnel (including managers, operators, and craft workers) should be alerted to potential consequences
of routine procedures when consequences of failure can be costly. Specific work control packages should be prepared to ensure heightened awareness and attention to detail when conducting maintenance on computer hardware components in critical or important systems. Additional verifications and repeat backs may be necessary when key personnel cannot be physically present.

Discussion: One of two fully redundant communication boards failed on the Distributed Control System (DCS) at the New Waste Calcining Facility. The boards are located next to each other in a bank of boards. When the board failed, a diagnostic alarm alerted the controller. The second board continued to function, preventing the system from losing communication capabilities. The controller contacted the system engineer, who confirmed the failure and instructed the facility maintenance technicians to replace the failed board with a spare board.

The maintenance technicians conducted these activities under a standing (generic) work order. Because this was considered a routine activity, no unique work control package was prepared.

The maintenance technician brought the spare board to the control room. The failed board was positively identified. The technician was unable to remove (pull free) the failed board on his first try. When he repositioned his grip for a firmer pull, he inadvertently grabbed the redundant, operating board next to the failed board and pulled it free.

Disconnecting the operating communication board caused a loss of control on the system. The shift supervisor ordered the calciner to be shut down pursuant to the abnormal operating procedure. The maintenance technician replaced both the operating board and the failed board and the control system was restored to normal operating mode. After confirming that system functions had been fully restored, the shift supervisor then requested and was granted permission to restart.

Analysis: The system engineer provided instructions in how to locate, identify, and change out the failed board. However, the engineer was not physically present during the procedure.

Instructions were given over the telephone and an operator relayed the instructions to the technician (the technician could not reach the telephone from his position next to the communication boards).

Conduct of operations in the control room is generally high. However, routine maintenance procedures conducted in the room do not receive the same level of rigor. During this routine maintenance procedure, some informal, independent verification was used. However, during the most critical step-the actual removal of the failed board-verification was not made.

This incident resulted in a minimal effect on the plant and associated systems. The facility was shut down for a short amount of time (approximately 3 hours) and was restarted with no programmatic impacts measured. However, the event could have had severe impacts including collapse of the fluidized bed, delay of start-up, and adverse impacts to agreements with the state of Idaho.

Recommended Actions:

1. A graded approach should be used when consequences of failure can be costly.

2. Routine maintenance procedures on critical systems should be conducted with a level of rigor commensurate with the significance of the system.

3. When personnel directing an operation cannot be physically present, a greater degree of care (including repeat backs and verification) should be exercised.

4. To ensure sufficient training and oversight, specific work control packages should be created for maintenance procedures on critical systems.

Originating Organization: Idaho Chemical Processing Plant Maintenance
Contact: Craig Stewart, (208) 526-3282
Name of Authorized Derivative Classifier: Dale Claflin, (208) 526-1199
Name of Reviewing Official: Dale Claflin, (208) 526-1199
Priority Descriptor: BLUE
Keywords: maintenance, computer hardware, graded approach, verification
Functional Categories: Maintenance, Startup/Operation, Training/Qualification/ Education

References: ORPS ID-LITC-WASTEMNGT-1997-0014

Follow-up Action: Information in this report is accurate to the best of our knowledge. As a means of measuring the effectiveness of this report, please notify Terry Pierce at (208) 526-4288 (or by electronic mail at txp@inel.gov) or the INEEL Lessons Learned Program Office at (208) 526-1530 (e-mail at mae@inel.gov or lmitll@inel.gov) of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.