

August 16, 2012

MEMORANDUM TO: Harold Chernoff, Chief  
Operating Experience Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

FROM: John McHale, Chief **/RA/**  
Operator Licensing and Training Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

SUBJECT: EVALUATION OF ISSUE FOR RESOLUTION 2012-04 RELATING  
TO WOLF CREEK—LOSS OF OFFSITE POWER AND  
NOTIFICATION OF UNUSUAL EVENT

The Operator Licensing and Training Branch (IOLB) has reviewed Issue for Resolution (IFR) 2012-04 relating to Wolf Creek—Loss of Offsite Power (LOOP) and Notification of Unusual Event (NOUE). The IOLB's evaluation focused on operator performance during the event, and whether their performance was negatively affected by the quality of plant procedures, the quality of operator training, and the ability of the control room simulator (as used in training) to accurately model the actual plant. Enclosed is our evaluation. This completes our review and evaluation efforts associated with TAC No. ME8004.

Enclosure:  
As stated

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<b>DATE</b>	8/16/2012	8/16/2012

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**EVALUATION OF ISSUE FOR RESOLUTION (IFR) 2012-04:**  
**WOLF CREEK—LOSS OF OFFSITE POWER (LOOP) AND**  
**NOTIFICATION OF UNUSUAL EVENT (NOUE)**

## **1.0 Purpose of Evaluation**

The purpose of this evaluation was to review a recent operating event which occurred at the Wolf Creek Generating Station and provide recommendations for any generic communications or regulatory actions. On January 13, 2012, Wolf Creek declared a NOUE following a LOOP and automatic reactor trip. The Operator Licensing and Training Branch's (IOLB) evaluation focused on operator performance during the event, and whether their performance was negatively affected by the quality of plant procedures, the quality of their training, and the ability of the control room simulator (as used in training) to accurately model the actual plant.

## **2.0 Brief Description of the Event**

On January 13, 2012, with the Wolf Creek Generating Station, Unit 1, operating at 100 percent power, a LOOP and automatic reactor trip occurred. The LOOP was the result of two equipment failures: (1) a fault on the main generator output breaker, and (2) a differential relay trip of the startup transformer. The LOOP lasted almost 3 hours before offsite power was partially restored. During the event, the A and B emergency diesel generators powered the safety buses, and all other safety systems performed their functions to support safe shutdown and cooldown of the plant. However, the event was complicated by five additional equipment malfunctions:

- The turbine-driven auxiliary feedwater (AFW) pump experienced an inadvertent overspeed trip mechanism actuation while the operators were shutting down the pump.
- The B emergency diesel generator developed a ground on the field circuit but continued to function normally.
- The essential service water system experienced a water hammer event and a 5 gpm leak inside containment.
- One source range nuclear instrument gave inaccurate readings.
- Operators experienced considerable difficulty and delays in getting the temporary diesel-driven fire pump in service, so normal fire fighting water was not available for 9 hours.

The above event is described in detail in the following documents:

- Licensee Event Report (LER) No. 2012-001-00, dated March 12, 2012, at ADAMS Accession No. ML12080A215
- NRC Augmented Inspection Team (AIT) Report No. 05000482/2012008, dated April 4, 2012, at ADAMS Accession No. ML12095A414

ENCLOSURE

### 3.0 Operator Performance

Overall, operator performance during the event was satisfactory, with two exceptions presented below. In particular, the AIT report noted that:

- The operating crew promptly identified the reactor trip and LOOP, and identified important off-normal parameters and alarms in a timely manner.
- The crew appropriately identified and addressed abnormal equipment alignments associated with non-safety-related equipment that could challenge personnel safety.
- The operating crew performed adequately to stabilize the plant, minimize potential dangers due to the prolonged LOOP, established critical parameter limits for systems required for safe shutdown, and safely conducted a natural circulation cooldown.
- The EOPs were properly implemented, including the natural circulation cooldown procedure, EMG ES-04, and the operators exhibited fundamental operator competencies when responding to the event while using EOPs.
- In response to the source range nuclear instrument that gave inaccurate readings, the crew recognized the increasing counts, declared the detector inoperable, and in accordance with the Technical Requirements Manual bases document, the operating crew relied on the Gamma Metrics detectors in place of the source range detectors.
- Once offsite power was restored, the crew safely completed a transition to shutdown cooling and maintained the plant in a cold shutdown condition.
- The operating crew was both timely and accurate in their reporting of the NOUE to local, state, and federal entities.
- Operating crew supervision exercised adequate oversight of plant status, crew performance, and site resources.

Although overall operator performance was satisfactory during the event, the AIT report did document two exceptions:

1. The operating crew did not observe/comply with a precaution stated in Procedure SYS AL120, "Motor-Driven or Turbine-Driven Pump Operations." Specifically, the precaution stated that operation of the turbine-driven AFW pump at low flow rates should be minimized due to cavitation concerns. Contrary to this precaution, the turbine-driven AFW pump flow rate cycled above and below the specified low flow value for almost the entire 12.5 hours of pump operation, and cumulatively, the pump ran for approximately 5 hours at a flow rate below that stated in the precaution.
2. The operators had difficulty starting the temporary diesel-driven fire pump and keeping it running. As a result, Wolf Creek was without fire suppression water pressure for 9 hours following the start of the event, and over the next couple of days, the licensee

struggled to keep the temporary diesel-driven fire pump operating and lost all fire water pressure multiple times.

#### **4.0 Plant Procedures**

From the AIT report, the overall quality of plant procedures was adequate to allow the operating crew to place the plant in a safe and stable condition. The AIT report noted no procedure adequacy or quality issues with the major procedures used by the operating crew during this event, including: EMG E-0, "Reactor Trip or Safety Injection," EMG ES-02, "Reactor Trip Response," and EMG ES-04, "Natural Circulation Cooldown." However, the AIT report did document two procedures which did have quality issues:

1. Procedure SYS AL120, "Motor-Driven or Turbine-Driven Pump Operations," did not incorporate guidance in accordance with the vendor's manual to secure the turbine-driven AFW pump at a minimum steam supply pressure of 77 psig. In fact, the turbine-driven AFW pump was operated below 77 psig steam supply pressure during this event for approximately one hour, and the operators did not secure the turbine-driven AFW pump until steam supply pressure was approximately 60 psig.
2. Procedure SYS FP-290, "Temporary Fire Pump Operations," had at least two quality issues noted by the AIT: inadequate instructions for priming and starting the pump, and an installation drawing for the pump that was missing key components (e.g., suction drain valves and the discharge check valve). The quality issues with this procedure were documented by the AIT as being one of the reasons Wolf Creek was without fire water pressure during the first 9 hours of this event.

#### **5.0 Operator Training**

From the AIT report, the overall quality of operator training was adequate to support the major actions of the crew, including crew actions to respond to the LOOP and automatic reactor trip, place the plant in a safe and stable condition, perform a natural circulation cooldown, and restore offsite power. However, the AIT report did directly document one instance of inadequate operator training, and provided one indication of a training weakness:

1. Training associated with starting and operating the temporary diesel-driven fire pump was inadequate. Operators were only given on-the-job training on operation of the temporary diesel-driven fire pump in the fall of 2011, but no lesson plan was used and some operators had only one attempt with starting the equipment. Inadequate training associated with starting and operating the temporary diesel-driven fire pump was documented by the AIT as being one of the reasons Wolf Creek was without fire water pressure during the first 9 hours of this event.

2. Contrary to a precaution stated in Procedure SYS AL120, "Motor-Driven or Turbine-Driven Pump Operations," the operating crew did not minimize the time that turbine-driven AFW pump operated below the specified low flow rate. In fact, the turbine-driven AFW pump cycled above and below the specified low flow value for almost the entire 12.5 hours of pump operation, and cumulatively, the pump ran for approximately 5 hours at a flow rate below the low flow value. Although not specified as such in AIT report, this could be viewed as a weakness in operator training.

## **6.0 Control Room Simulator Performance**

There have been plant events where operator performance was negatively influenced by training received in the control room simulator due to the simulator behaving significantly different than the actual plant ("negative training"). For example, during an event at Millstone 3 (April 17, 2005), operators incorrectly believed a main steam safety valve was stuck open based upon negative training received on an incorrectly modeled simulator. From the AIT report, there were no indications of negative training based upon an inaccurate simulator for this event.

## **7.0 Conclusions and Recommendations**

Based upon the discussion above, the IOLB staff concluded that operator performance, plant procedures, training, and simulator performance were all adequate with regard to this event. However, some notable exceptions were identified regarding operation of the temporary diesel-driven fire pump and the turbine-drive AFW pump. The IOLB staff recommends no generic communications or further regulatory actions, outside of the expected NRC follow-up of the unresolved items opened in the AIT report.