APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-482/94-04

License: NPF-42

Licensee: Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, Kansas

Facility Name: Wolf Creek Generating Station

Inspection At: Wolf Creek Generating Station, Coffey County, Burlington, Kansas

Inspection Conducted: April 4-8, 1994

Inspectors: K. Kennedy, Resident Inspector, Comanche Peak Steam Electric Station
G. Pick, Senior Resident Inspector, Wolf Creek Generating Station

Approved: John J Pellet 5/10/94
JJ Pellet, Chief, Operations Branch Date
Division of Reactor Safety

Inspection Summary

Areas Inspected: Routine, announced inspection of the Wolf Creek Generating Station emergency operating procedures (EOPs) upgrade program and procedures. The inspection also included the review of corrective actions taken by the licensee for previously identified inspection findings.

Results:

- The licensee corrected many of the programmatic weaknesses identified in previous inspections. Administrative procedures governing the development and revision of procedures were detailed and comprehensive. Revision 4 to the EOPs, written in accordance with the new writers guide, significantly enhanced the human factors and useability of these procedures (Section 2).

- The licensee failed to adequately implement portions of their improved program for the development and revision of procedures. Verification and validation activities associated with Revision 4 of the EOPs were less than adequate, resulting in three violations of Technical

Specification requirements. These violations are of particular concern because they represent a breakdown in the licensee's process for the verification and validation of emergency operating procedures and indicate a failure to correct weaknesses identified in previous NRC inspections (Sections 2.2.1, 2.2.2, 2.2.4).

- A weakness was noted in that most licensed operators did not receive training on Revision 4 of the EOPs prior to the implementation of these procedures. However, the use of the author of Revision 4 of the EOPs as a guest lecturer was considered a strength (Section 2.2.3).

- The licensee completed an initial engineering evaluation of the effects of radiation levels on the performance of local operator actions specified in the EOPs. Because they considered the results of the evaluation to be very conservative, further evaluations were planned beginning in June 1994. The review of the results of these additional evaluations will be tracked as an inspection followup item (482/9404-04) (Section 2.2.2).

Summary of Inspection Findings:

- Violation 482/9404-01 was opened (Section 2.2.1).

- Violation 482/9404-02 was opened (Section 2.2.2).

- Violation 482/9404-03 was opened (Section 2.2.4).

- Inspection Followup Item 482/9404-04 was opened (Section 2.2.2).

Attachment:

- Persons Contacted and Exit Meeting

1 PLANT STATUS

During this inspection period, the plant operated at 100 percent power.

2 EMERGENCY OPERATING PROCEDURES (EOPs) (42001, 42700)

The inspectors reviewed the licensee's efforts toward resolving issues identified during an inspection of Emergency Operating Procedures (EOPs) documented in NRC Inspection Report 50-482/92-24. Additionally, the team reviewed the results of a major revision to the EOPs and revisions to EOP program controlling procedures. To accomplish these reviews, the team walked down procedure local action steps and compared selected EOPs to the licensee's technical and programmatic guidance.

2.1 Programmatic Controls

NRC Inspection Report 50-482/92-24 identified a lack of detail in the procedures for the development and revision of EOPs. During this inspection, the inspectors reviewed the following procedures used for the development and revision of EOPs: ADM 07-100, "Preparation, Review, Approval and Distribution of WCGS Procedures," Revision 54; AP 35-001, "Procedure Writer's Guide," Revision 2; and ADM 01-052, "Emergency Procedure Generation Package," Revision 5.

The inspectors found that improvements had been made in the programmatic controls for procedures. ADM 01-052, "Emergency Procedure Generation Package," Revision 5, described the process for development and maintenance of the EOPs, Off-Normal Operating Procedures (OFNs), and the dual-column format Alarm Response Procedures (ALRs). This procedure described the information contained in a procedures generation package, the conversion from generic technical guidelines to plant specific procedures, the verification and validation process, and the program for training on EOPs. The procedure also defined the technical basis for procedures. Duties and responsibilities were specified for procedure writers and the responsible manager.

Procedure ADM 01-052 required that the verification of EOPs be performed by subject matter experts in the areas of generic technical guidelines, plant specific operating requirements, writer's guide factors, human factors, and operating experience related to the equipment to be manipulated in a procedure. The operations manager was responsible for determining the level of expertise necessary to perform each verification activity and designating the subject matter experts.

The procedure described the various methods available for the validation of new or revised procedures. Selection criteria for operators and crews used for validation, and for members of the validation reviewer team, were provided. ADM 01-052 specified that assumptions of the least experienced operators and the minimum shift staffing required by Technical Specifications were to be used when performing procedure validation.

Detailed checklists for procedure verification and validation activities were included as attachments to ADM 01-052. The EOP verification criteria included questions in the areas of compliance with the writer's guide, technical accuracy, setpoints, local operator actions, and equipment labeling. This checklist included consideration of the effects of radiation levels, steam, flooding, toxic gasses, and lighting levels on the performance of local operator actions. The validation criteria included an evaluation of the procedure's level of detail, understandability, plant compatibility, and user compatibility. Requirements to reverify and revalidate revised EOPs were detailed in the procedure.

2.2 Revision 4 to the Emergency Operating Procedures

Revision 4 of the EOPs was issued on November 20, 1993. The goals of the EOP upgrade program for Revision 4 were to standardize procedural steps throughout the EOPs, standardize and document the calculation of all EOP setpoints, add guidance to the procedures which was previously found only in background documents, and to create a plant specific EOP background document. The inspectors reviewed the process used by the licensee to develop and implement Revision 4 to the EOPs and the enhancements resulting from this revision.

2.2.1 Deviations From Generic Technical Guidelines

The review of Revision 3 of the EOPs, documented in NRC Inspection Report 50-482/92-24, identified problems with the licensee's justification for deviations from the Westinghouse Owners Group Emergency Response Guidelines (ERGs). Some deviations between the ERGs and Revision 3 of the EOPs had been justified in earlier EOP revisions and justification for some deviations did not exist.

During this inspection, the inspectors found that, for the issuance of Revision 4 of the EOPs, the licensee failed to justify each deviation from the generic technical guidelines and document these justifications in a maintained background document or data package for each procedure. This was contrary to ADM 01-052 which required that the technical basis for each EOP be described in a background document, that each deviation from the generic technical guidelines be assigned a type code from those listed in ADM 01-052, and that justification for each deviation from the generic technical guidelines be documented in a background document or data package for the procedure. The failure to justify deviations in Revision 4 of the EOPs from the technical guidelines and document these justifications is a violation of Technical Specification 6.8.1.b (482/9404-01).

In response to this finding, the licensee issued Performance Improvement Request (PIR) 94-0690. The licensee stated that they made a conscious decision to issue Revision 4 of the EOPs without the required background documents and written justification for each deviation. This decision was made so that available resources could be devoted to issuing Revision 4 of the EOPs in order to meet available license requalification training dates. In addition, Revision 4 solved a significant number of technical and human factor

concerns, and they did not want to delay its implementation. Although they were not documented in a background document, deviations from the generic technical guidelines were identified and considered by the procedure writer during the development of Revision 4. The licensee indicated that at the time Revision 4 was implemented, a significant portion of the background documents for Revision 5 of the EOPs, scheduled to be issued in May 1994, had been completed in draft form. During this inspection, the inspectors noted that a draft of the Revision 5 EOPs and the plant specific background document had been completed and was undergoing review.

2.2.2 Validation and Verification

A detailed review of the licensee's verification and validation activities conducted for Revision 4 to EMG FR-S1, "Response to Nuclear Power Generation/ATWT"; EMG E-1, "Loss of Reactor or Secondary Coolant"; and other selected procedures was performed.

Licensee personnel evaluated the procedures using verification criteria provided in ADM 01-052, Attachment A, "ALR, EMG, and OFN Verification Criteria." The inspectors found that comments made by the reviewers, as documented on ADM 01-052, Attachment B, "Comment Control Form," were evaluated and resolved by the procedure writer, who provided a written resolution on Attachment B. The originator of the comment reviewed the resolution and signed Attachment B, indicating that the comment had been satisfactorily resolved. ADM 01-052 stated that comments which could not be resolved at this level would be escalated to the next level of management. All of the comments selected for review by the inspectors had been resolved without escalation.

Satisfactory completion of the various procedure verification activities, including resolution of all comments, was documented on ADM 01-052, Attachment C, "ALR, EMG, and OFN Verification Checklist." The inspectors noted weaknesses in the completion of Attachment C. The purpose of Signature Block 6 of Attachment C was to document the verification that all deviations from the Westinghouse Owners Group ERGs were technically accurate, properly classified, and adequately justified in the background document. The inspector noted that Block 6 was marked "Not Applicable" for each of the Revision 4 EOPs. No other written comment or explanation was provided on the checklists for marking this item Not Applicable. As discussed in Section 2.2.1, the failure to justify deviations from the generic guidelines was a violation of Technical Specifications. The inspectors also noted that there was not a signature in Block 7 of Attachment C, which documented the verification that all modifications to event mitigation strategy had been walked down or a table top review had been performed to ensure the procedure could accomplish its intended function. A note in Block 7, beside the "Not Applicable" block, referenced the validation of the Revision 4 EOPs performed in January 1993. The inspectors found that ADM 01-052 did not provide guidance on classifying a verification step as not applicable or on omitting a signature from a block.

Two of the verifications on Attachment C addressed the plant walkdown of local operator actions. Signature Block 4 verified that all changes to local operator actions had been walked down and were technically accurate. Signature Block 5 verified that all changes to the equipment designators had been walked down to ensure that the procedure matched the installed labels. ADM 01-052, Attachment A, provided criteria to be used for the verification of local operator actions. Criterion 4.2 of Attachment A stated "Can all local operator actions be performed under worst case environmental conditions postulated for the procedure? Environmental conditions to be considered shall include radiation levels, steam, flooding, toxic gases, and lighting levels." The licensee stated that this criterion had been evaluated by plant operators during the walkdown of the procedure and that no formal evaluation of these environmental conditions had been performed by subject matter experts prior to implementation of Revision 4 of the EOPs. The inspectors determined that the effects of the worst case environmental conditions on the performance of local operator actions called for in the EOPs had not been adequately considered during the verification of Revision 4 of the EOPs, as required by ADM 01-052. This was identified as a violation of Technical Specification 6.8.1.b (482/9404-02).

The licensee indicated that an engineering evaluation had been initiated to ensure that Revision 4 of the EOPs was technically correct with respect to plant design, independent of the normal verification process. This was to ensure that system and component alignments were correct for the conditions postulated for the procedure, the plant systems and components were being operated within their design limits, and if local operator actions could be performed under worst case environmental conditions (radiation, steam, flooding, toxic gases, and lighting levels).

The first evaluation, completed on February 4, 1994, focused on determining if local operator actions could be performed under design basis accident radiation levels. The evaluation determined that all areas of the plant would be accessible for events which did not involve a loss of coolant accident (LOCA). However, the evaluation also determined that some areas which may require access during a design basis accident LOCA would not be accessible. The licensee considered the results of the evaluation to be very conservative. The evaluation stated that the dose rates used in the calculations were based on NUREG-0737 source terms for equipment accessibility during the accident and were assumed for a LOCA inside containment with the failure of both trains of the emergency core cooling system (ECCS). If at least one train of ECCS performed properly, or if natural circulation was achieved prior to fuel damage during a LOCA, more realistic source terms could be assumed, resulting in all rooms being accessible. Because they considered the results of the engineering evaluation to be very conservative, further evaluations were planned beginning in June 1994. The review of the results of these additional evaluations as they relate to the performance of EOP local operator actions and the other factors described will be tracked as an inspection followup item (482/9404-04).

The licensee stated that the local operator actions in the areas determined to be inaccessible were required as response-not-obtained or contingency actions.

The licensee utilized the control room simulator to validate Revision 4 of the EOPs. The inspectors reviewed the documentation of this validation, the comments which resulted from the validation, and the resolution of these comments. No discrepancies were noted.

2.2.3 Training

The inspectors reviewed the training provided to licensed operators on Revision 4 of the EOPs. As discussed previously, Revision 4 of the EOPs was issued on November 20, 1993. In a memorandum sent to all licensed operators on November 22, 1993, the Manager of Operations provided a general one-page overview of the Revision 4 procedure changes. Formal classroom training and dynamic simulator training on the revised EOPs began on November 15, 1993, as part of the licensed operator requalification training. This training was completed during the week of December 20, 1993. The inspector noted that a majority of the licensed operators had not received any formal training on the revised procedures prior to their implementation on November 20, 1993. Considering the number and extent of the changes made to the EOPs, the failure to train operators on Revision 4 of the EOPs prior to their issuance was considered a weakness.

The inspector reviewed the classroom lesson plan and dynamic simulator scenarios used to train operators on Revision 4 of the EOPs. The lesson plan was comprehensive and thorough and adequately covered the revised EOPs. The simulator scenarios required the operators to recognize EOP entry conditions, enter and execute selected EOPs, and make transitions to other EOPs. A majority of the formal classroom training was taught by the individual who wrote Revision 4 to the EOPs. This was viewed as a strength.

2.2.4 Use of EOPs and Supporting Procedures

The inspectors reviewed Emergency Operating Procedure EMG E-1, "Loss of Reactor or Secondary Coolant," Revision 4, and Functional Restoration Guideline EMG FR-S1, "Response to Nuclear Power Generation/ATWT," Revision 4, for technical accuracy and operational correctness. The inspectors compared the procedures against the corresponding Westinghouse Owners Group ERGs and the guidelines contained in AP 35-001, "Procedure Writer's Guide," Revision 2.

The inspectors reviewed the entry conditions for EMG E-1 and EMG FR-S1 to verify that transitions to these procedures from other procedures were accurate and appropriate. EMG E-1 listed Step 56 of EMG FR-H1, "Response to Loss of Secondary Heat Sink," Revision 4, as an entry condition. The inspectors found that Step 56 of EMG FR-H1 did not exist. It appeared that Step 56 had been omitted from the procedure since EMG FR-H1 did contain Steps 55 and 57.

The licensee confirmed that Step 56 had been inadvertently omitted from the procedure. This step, a continuous action step, specified criteria for determining whether the residual heat removal pumps should be stopped to prevent pump overheating with the pumps recirculating against high reactor coolant system pressure. The response-not-obtained action for this step directed operators to transition to Procedure EMG E-1 on decreasing reactor coolant system pressure and the inability of the residual heat removal pumps to maintain reactor coolant system level.

The licensee immediately issued a procedure change to add Step 56 and associated cautions to all controlled copies of EMG FR-H1. This change was immediately placed into the control room copy of EMG FR-H1. The licensee conducted a complete review of all EOPs and did not find any other examples of missing steps. A controlled copy of off-normal procedures and selected alarm response procedures were also checked with no discrepancies found. The licensee issued Performance Improvement Request 94-0708 to document and evaluate the finding. The licensee's initial assessment concluded that the omission of this step occurred when a procedure writer modified vendor supplied computer software, used to maintain the EOPs, in order to compress a step in EMG FR-H1 so that the entire step would fit on one page. This type of software modification would have normally been performed by the vendor. However, since the procedure writer had formerly worked for the vendor and was knowledgeable on the software, the modification was made without the involvement of vendor personnel. Once the software had been modified and the step compressed, the software did not automatically repaginate the procedure due to the method used to modify the computer program. When the procedure was subsequently printed for approval and distribution, the page which contained Step 56 was not included. An adequate page and step check was not conducted and the procedure was issued with the missing step.

The failure to ensure that Procedure EMG FR-H1, Continuous Action Step 56 existed and the issuance of the procedure without this step were identified as a violation of Technical Specification 6.8.1.b (482/9404-03).

The licensee reviewed the Westinghouse Owners Group ERGs and evaluated the purpose of Procedure EMG FR-H1 and the specific purpose of Step 56. Operators would have been feeding and bleeding the reactor coolant system for a long period of time by the time they reached Procedure EMG FR-H1, Continuous Action Step 56. The licensee developed three possible scenarios and analyzed the effect that the missing step would have on the mitigation of a loss of secondary heat sink. The licensee demonstrated that absence of the step would not have significantly impacted mitigation of any accident because sufficient guidance existed in other locations in EMG FR-H1, and in other procedures, to ensure that the residual heat removal pumps would be stopped and/or the core would be cooled. The inspectors reviewed and agreed with the licensee's assessment.

2.2.5 Procedure Enhancements

The changes made to the EOPs in Revision 4 significantly enhanced the human factors and useability of these procedures. The inspectors verified that, with few exceptions, the format, language, cautions, notes, action words, component designators, and procedure steps adhered to the conventions specified in Procedure AP 35-001, "Procedure Writers Guide," Revision 2. Procedure steps were written on one page with no continuation to subsequent pages. Standardized steps and step sequencing were used throughout the EOPs, resulting in more consistent step structure and more consistent procedures. In general, steps were written using short, precise language, resulting in shorter and more concise sentences. Revision 4 added foldout pages to all procedures and removed cautions and notes which duplicated the foldout page items. Switch numbers and component identification numbers were added, where appropriate. In some instances, guidance from the background information of the Westinghouse Owners Group ERGs was incorporated into the procedure.

2.2.6 Plant Walkthrough

The inspectors performed a field verification of Procedures EMG E-1 and EMG FR-S1 to ensure that required local operator actions, and any actions necessary because remote actions failed to achieve the desired results (i.e., those referred to in the response-not-obtained column), could be accomplished. The inspectors performed the field verification to confirm that the emergency operating procedures could be physically and correctly performed outside the control room.

The inspectors found the procedures to be accurately written and determined that component identifiers matched main control board handswitch and local component designators. The inspectors determined that the equipment necessary to accomplish local actions had been properly prestaged. The nonlicensed operator who accompanied the inspectors on the walkthrough was knowledgeable in the performance of local operator actions contained in these procedures.

2.3 Conclusions

The inspectors determined that the licensee had corrected many of the programmatic weaknesses identified in previous inspections. Administrative procedures governing the development and revision of procedures were detailed and comprehensive.

Although improvements were noted in the EOP programmatic controls, weaknesses were identified in the licensee's implementation of these improved programmatic controls. Verification and validation activities associated with Revision 4 of the EOPs were less than adequate, resulting in three violations of Technical Specification requirements. The licensee failed to justify deviations from the Westinghouse Owners Group ERGs in a background document for each procedure, failed to adequately consider the effects of the worst case environmental conditions on the performance of local operator actions

contained in the EOPs, and issued EMG FR-H1, "Response to Loss of Secondary Heat Sink," Revision 4, with a missing step.

A weakness was identified, in that most licensed operators were not trained on Revision 4 of the EOPs prior to their implementation. However, the use of the individual who developed and wrote Revision 4 of the EOPs as a guest lecturer was considered a strength.

The inspectors determined that the changes made by Revision 4 of the EOPs significantly enhanced the human factors and useability of these procedures.

3 Offnormal Procedure Reviews

The inspector reviewed Procedures OFN BG-009, "Immediate Boration," Revision 0, and OFN KJ-032, "Local Emergency Diesel Startup," Revision 1. The inspector verified that the licensee developed offnormal procedures in accordance with Procedures ADM 01-052 and AP 35-001.

The inspector, accompanied by a nonlicensed operator, verified that all local actions required by the procedures could be accomplished as written. The inspector found that plant labeling was easy to understand and agreed with the procedures. The inspector did not identify any problems during the review of this area.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

G. Boyer, Manager, Training
D. Fehr, Manager, Operations Training
R. Flannigan, Manager, Nuclear Safety Engineering
*W. Lindsay, Manager, Quality Assurance
*B. McKinney, Manager, Operations
O. Maynard, Vice President, Plant Operations
R. Meister, Engineering Specialist, Regulatory Compliance
*L. Parmenter, Operations
T. Riley, Supervisor, Regulatory Compliance
*R. Sims, Supervisor, Operations
G. Smith, Training
J. Weeks, Assistant to Vice President, Plant Operations
*S. Wideman, Supervisor, Licensing
M. Williams, Manager, Plant Support

* Denotes personnel that attended the exit meeting. In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on April 8, 1994. During this meeting, the inspectors reviewed the scope and findings of the inspection. The licensee did not disagree with the results of the inspection, but expressed their disappointment and that these results did not represent their expectations for performance. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspectors.