APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-482/92-31

Operating License No.: NPF-42

Docket No.: 50-482

Licensee: Wolf Creek Nuclear Operating Corporation
P. O. Box 411
Burlington, Kansas 66839

Facility Name: Wolf Creek Generating Station

Inspection At: Coffey County, Burlington, Kansas

Inspection Conducted: October 11 through November 21, 1992

Inspectors: G. A. Pick, Senior Resident Inspector
L. E. Myers, Resident Inspector

Approved: [signature] for 12/9/92
A. T. Howell, Chief, Project Section D Date
Division of Reactor Projects

Inspection Summary

Areas Inspected: Routine, unannounced inspection including plant status, prompt onsite response to events, operational safety verification, maintenance observations, surveillance observations, cold weather preparations, management meeting, and followup.

Results:

- The licensee's overall response to the reactor trip was excellent. However, during the response to the reactor trip, the inspectors determined that operators did not use the repeat back technique in their communications. Also, because operations personnel had not received training on a change in the operation of the letdown radiation monitor, they were suprised by the alarm entering the action range (Section 2).

- The licensee's implementation of their program to evaluate indeterminate conditions was effectively implemented (Sections 3.3 and 3.6).

- The licensee's action to form a task team to identify a refueling water storage tank low boron concentration condition was considered good.

However, the inspectors identified several weaknesses in that licensee personnel failed to inform operations personnel about the altered configuration, failed to review similar situations, and failed to consider all contributing causes. The licensee failed to revise an inadequate alarm response procedure until prompted by the inspectors, which resulted in a violation. The licensee also had previous opportunities to correct a deficiency with the refueling water storage tank drain line. The inspectors considered this to be an additional example resulting from past problems associated with the corrective action program (Section 3.2).

- The licensee conducted an excellent medical emergency preparedness drill (Section 3.7).

- Generally, the licensee conducted maintenance in a thorough, well controlled manner (Section 4). However, the inspectors identified potential weaknesses in work controls related to heavy loads in the spent fuel pool. This issue will be tracked by an unresolved item (Section 4.3). The inspectors determined that inadequate postmaintenance testing prevented the licensee from identifying a misadjusted rotor immediately following maintenance activities, which resulted in a violation. Also, the maintenance instructions provided incorrect guidance to the maintenance worker. The instructions were incorrect because an error occurred while transferring data from one design document to another. This deficiency resulted in a noncited violation for inadequate control of design information (Section 3.6). The failure of craft personnel to identify an obvious component deficiency is a weakness (Section 4.2).

- The knowledge level and deliberateness of a nonlicensed operator during operator rounds indicated that nonlicensed personnel were sensitized to the importance of proper logtaking (Section 5.1).

- The licensee expended considerable effort to protect the plant against the effects of cold weather. The licensee's sensitivity to the problems associated with cold weather was demonstrated by their efforts to make operable an auxiliary steam feedwater pump. The licensee had a very good program to protect against cold weather (Section 6).

- A violation occurred because of operator inattention to detail, which is a continuing problem. There was a loss of charging flow and a decrease in letdown flow for approximately 20 seconds because a licensed operator failed to follow a procedure (Section 8).

Summary of Inspection Findings:

- Violation 482/9231-01 was opened (Section 3.2).
- Violation 482/9231-02 was opened (Section 3.6).
- Unresolved Item 482/9231-03 was opened (Section 4.3).

- Violation 482/9231-04 was opened (Section 8).
- Unresolved Item 482/9228-01 was closed (Section 8).

Attachments:

- Attachment 1 - Simplified Diagram of the Refueling Water Storage Tank
- Attachment 2 - Persons Contacted and Exit Meeting
- Attachment 3 - List of Acronyms

DETAILS

1 PLANT STATUS (71707)

At the beginning of the inspection period, the plant operated at 100 percent power. On November 10, 1992, the turbine tripped because of degraded grid voltage. Personnel at the Rose Hill substation, west of the plant, accidently shorted the secondary side of a 345 to 138 kilovolt transformer while performing maintenance. Operators took the plant critical on November 11, 1992, and the unit achieved 100 percent power on November 13, 1992. At the end of the inspection period, the plant was operating at 100 percent power.

2 PROMPT ONSITE RESPONSE TO EVENTS (93702, 71707)

2.1 Plant Trip

On November 10, 1992, at 11:05 a.m. the main generator tripped because of degraded grid voltage. The main generator trip caused a turbine trip that, by design, caused the reactor trip. Subsequently, the licensee was notified that troubleshooting activities at the Rose Hill substation created a line fault that may have tripped the Wolf Creek Generating Station main generator. Personnel working on a 345 to 138 kilovolt transformer inadvertently shorted the 138 kilovolt side to ground. The licensee determined that a ground fault occurred when personnel made incidental contact between an overhead ground and the energized portion of a 138 kilovolt transformer during implementation of a clearance procedure. Annunciator 98C, "Response Spectrum OBE (Operating Basis Earthquake) Exceeded," alarmed during the reactor trip. Following the seismic alarm, the shift supervisor dispatched personnel to perform a plant walkdown, including the containment, to look for equipment problems. At 2:10 p.m., chemistry reported that dose equivalent iodine (DEI) was measured to be 1.01 microcurie/milliliter (uCi/ml) of primary coolant, which exceeded the Technical Specification (TS) limiting conditions for operation. The supervising operator promptly entered TS 3.4.8, which required the primary coolant to be sampled every 4 hours whenever the DEI exceeds 1.0 uCi/ml. The licensee entered Offnormal Procedure OFN 00-006, Revision 1, "High Reactor Coolant Activity," and verified the letdown flow rate to be 120 gallons per minute as specified in the procedure. The licensee exited TS 3.4.8 and Procedure OFN 00-006 at 2:35 p.m. when DEI levels were measured at 0.966 uCi/ml. The licensee conducted a walkdown of the switchyard, the main generator exciter, and the main generator. No problems were identified.

2.2 Posttrip Review and Shutdown Activities

Plant management conducted a meeting to determine: (1) the cause of the turbine trip, (2) the significance of anomalies or equipment failures, (3) forced outage list work activities that must be completed prior to starting the reactor, and (4) the approximate duration of the shutdown. The licensee's forced outage work list identified two mandatory actions, which involved replacing a failed rod control system power supply and performing a

TS surveillance. The licensee replaced the rod control power supply restoring the desired redundancy and completed TS required testing of the manual shunt trip as committed when they received an emergency TS amendment on August 29, 1992 (refer to NRC Inspection Report 50-482/92-18).

The inspectors attended the posttrip review session conducted on November 10, 1992. Licensee personnel participating in the posttrip review had each reviewed all the available information related to the plant trip. The plant walkdowns revealed no adverse equipment or pipe support conditions. Chemistry personnel determined that under transient conditions with failed fuel, a spike in primary coolant iodine activity, by a factor of 100, was not unusual. From review of the electrical system design, instrumentation and control (I&C) personnel determined that the Wolf Creek Generating Station switchyard distance relaying was not designed to sense the line fault because it occurred on the secondary side of the offsite transformer. All safety-related and nonsafety-related equipment actuated as designed. The posttrip review team classified the reactor trip as Condition I in accordance with Procedure ADM 02-400, Revision 9, "Posttrip Reviews," and recommended that the reactor be started once all mode restraints were satisfied.

2.3 Plant Startup

The inspectors monitored the plant startup that occurred on November 11, 1992. The shift supervisor briefed the crew, describing the overall sequence of activities to take the reactor critical and the subsequent power increase. The precautions and limitations of Procedure GEN 00-003, Revision 26, "Hot Standby to Minimum Load," were reviewed. During the approach to criticality at a position of 45 steps on Control Bank D, the digital rod position indicator (DRPI) indicated that Control Rod D-12 had dropped. The reactor operator immediately stopped the control rod withdrawal. The supervising operator entered Offnormal Procedure OFN 00-011, Revision 3, "Dropped or Misaligned Rod, and Realignment," and TS 3.1.3.1 that specified, for an urgent failure alarm in the rod control system, restore the inoperable rod to operable.

The operators contacted I&C personnel so that an investigation could be conducted. The shift supervisor directed the operators to reinsert the control rods and reenter Mode 3, HOT STANDBY, until the technicians resolved the rod control system problems. As the operator began inserting control rods, Control Rod D-12 indicated 30 steps on the DRPI with Control Rod Bank D at 39 steps on the demand counter; consequently, operators stopped the control rod insertion. After the operators consulted with I&C personnel and determined no further problems would occur by further rod insertions, the operators continued the shutdown. As operators inserted the control rods, Control Rod D-12 traveled into the reactor core with the other Control Bank D rods. When all Control Bank D rods were at 0 steps and Control Bank C rods were at 115 steps, the supervising operator exited TS 3.1.3.1 because he was confident that all rods were aligned. After all control rods were inserted, the licensee entered Mode 3 and exited Procedure OFN 00-011.

The I&C technicians determined the problem was within the DRPI system. A review of vendor documents revealed that the probable cause of the indication error was a signal cable, a magnetic indicating coil, or a circuit card. The I&C technicians determined that above 30 steps the data encoder card for Control Rod D-12 in Data Cabinet B failed to translate the voltage signal into a digital signal. Subsequently, the technicians used a card tester verifying that the data encoder card was defective. After replacing the data encoder card for Control Rod D-12, the technicians verified that the data encoder card developed the appropriate digital signal over the entire range of control rod movement.

After replacement of the DRPI data encoder card, the licensee recalculated a new estimated critical boron concentration in preparation for a plant startup. The reactor became critical at 110 steps on Control Bank D and a boron concentration of 856 parts per million (ppm). The operators increased reactor power to 30 percent then maintained a constant power level for 5 hours until the secondary chemistry met specifications. The operators had adjusted the power range nuclear instruments periodically during the power increase. On November 13, 1992, at 99 percent reactor power by the nuclear instruments, the operators stabilized the power increase and performed a calorimetric, primary heat balance. By performing the calorimetric, the operators determined the actual power level was 96 percent. After adjusting the nuclear instruments, the operators increased power to 100 percent.

2.4 Assessment

The inspectors responded immediately to the control room. The inspectors observed the licensed operators respond to the trip. Command and control was excellent and communications among the reactor operators and supervising operator were generally good; however, the inspectors noted that the operators did not use the repeat-back technique while responding to the reactor trip. The shift supervisor remained in the background, carefully observing the plant and the crew and maintaining an overview of the event response. The shift crew appropriately responded to the event in accordance with procedures. The inspectors noted that the call superintendent and other operations personnel had arrived in the control room to provide support to the onduty crew. I&C personnel had been contacted within the first 5 minutes and were examining the exciter relays.

Management provided good oversight at the status meeting that was held following the reactor trip. Personnel came prepared with time estimates for equipment that required repair. The forced outage list was reviewed and the mandatory items, rod control system power supply and the manual reactor trip shunt trip surveillance, were directed to be completed.

Personnel involved in the posttrip review represented a multidisciplined task group as specified in Procedure ADM 02-400. The discussions regarding the sequence of events were thorough. The posttrip review group properly classified the trip as a Condition I because the cause was positively known and all safety systems functioned properly. The licensee promptly reported the reactor trip to the NRC operations center and provided updates as new information about the trip became available. The licensee will submit Licensee Event Report 92-016 for this event.

The inspectors determined from discussions with I&C personnel that the seismic alarm was a momentary spike and was not representative of a seismic event. The recorded magnitude of the event barely exceeded the alarm threshold and was much lower than the previous seismic data associated with the noise events in February and March 1992. The inspectors also reviewed the basis for the momentary DEI spike. The licensee had a similar occurrence at the start of Refuel 2 when they manually scrammed the reactor while shutting down with some failed fuel elements. The reviews of the anomalies were thorough. The inspectors determined that the investigation of the DRPI system problems was well planned and implemented.

The inspectors noted that the operators were surprised that the computer alarm for the letdown system radiation monitor had saturated and alarmed. The inspectors interviewed personnel and reviewed Procedure CHM 03-131, Revision 0, "Failed Fuel Monitor SJ RE01 Setpoint Adjustment." The procedure was issued in September 1992 and provided a method to assure that the letdown radiation monitor was more sensitive to reactor coolant activity. The procedure allowed the monitor alarm setpoints to be varied rather than being set at the previous, relatively high, constant values of 13.6 uCi/ml for the alert setpoint and 136 uCi/ml for the alarm setpoint. The procedure required a 30-day average coolant activity to be determined. The alert setpoint for the radiation monitor was set at 0.5 uCi/ml above the 30-day average value, and the alarm setpoint was set at 5.0 uCi/ml above the 30-day average. The inspectors determined that the operators had not received training on the changes to the alarm setpoint. During the screening process of design changes, the licensee determined that this change was not significant enough to warrant training. As a result, the operators did not expect the alarm. The inspectors considered the lack of training because of the setpoint change to be a weakness.

During the containment walkdown, quality control personnel identified a 1/16-inch diameter boric acid crystal at spare Canopy Seal Penetration 25; however, no active leakage was observed. Because there was no active leakage and a previous vendor evaluation determined that a small amount of leakage was acceptable, the licensee evaluated the discrepancy and determined that the plant could be operated in this condition until Refuel VI. The spare canopy seal weld had similar leakage identified following the previous forced shutdown in February 1992. At that time, the licensee determined that the leakage was not pressure boundary leakage because the connection was threaded and seal welded to prevent backing off.

During the reactor startup, the inspectors noted that the licensed operators performed the startup activities and required surveillances in accordance with procedures. Excellent communications existed among the reactor operators and the supervising operator. The supervising operator ensured his directions were understood. The shift supervisor quickly decided to shut down the reactor and stop the approach to criticality when the DRPI problem occurred.

2.5 Conclusions

Operations personnel demonstrated excellent performance during both the plant trip recovery and the startup evolutions. Plant management maintained effective oversight during the forced outage. The inspectors determined that control room personnel did not use repeat backs during communications; however, no miscommunications were observed. The lack of operator training for a setpoint change associated with the letdown system radiation monitor was considered a weakness. The plant startup activities were conservative. The licensee conducted thorough investigations into deficiencies identified during the forced shutdown.

3 OPERATIONAL SAFETY VERIFICATION (71707)

The objectives of this inspection were to ensure that the facility was being operated safely and in conformance with license and regulatory requirements and that the licensee's management control systems were effectively discharging the licensee's responsibilities for continued safe operation. The inspectors monitored licensee activities related to: performance enhancement program (PEP) employee survey results meeting, low boron concentration in the refueling water storage tank (RWST), boron injection tank outlet isolation valve - valve actuator maintenance, control room annunciators, fuel reliability indicator (FRI), RWST suction valve - valve actuator maintenance, and an emergency preparedness drill.

The methods used to perform this inspection included direct observation of activities and equipment, control room operations, tours of the facility, interviews and discussions with licensee personnel, independent verification of safety-system status and TS limiting conditions for operation, corrective actions, and review of facility records.

3.1 PEP Employee Survey Results Meeting

On October 21, 1992, licensee management conducted meetings with all employees to summarize the results of the PEP employee survey and present management's response to the survey. The survey was designed to identify issues and concerns needing improvement. A third-party consultant and the PEP team initiated the survey in July 1992.

The survey questionnaire was presented to all employees in August 1992. The questionnaire included 106 questions designed to explore employee perceptions about organizational groups and categories of functional areas, such as: (1) management, (2) personnel policies, (3) communications, and (4) procedures. Over 94 percent of the employees responded to the questionnaire. The results were statistically analyzed for perceptions in and among organizational groups and in functional areas. Management incorporated the employees survey results into the development of the PEP action plans.

The inspectors attended one of the meetings. Licensee management explained the PEP and communicated that changes would result as action plans were developed and implemented.

3.2 Low Boron Concentration in RWST

On October 15, 1992, at 12:14 p.m. the licensee entered the action statements for TS 3.1.2.6 and TS 3.5.5 after the RWST boron concentration was measured at 2151 ppm. TS 3.1.2.6 and TS 3.5.5 require that the boron concentration be maintained between 2400 and 2500 ppm while in Modes 1, 2, 3, and 4. The action statements require that with the RWST inoperable, restore the boron concentration to within specifications in 1 hour or begin a controlled shutdown. The licensee initiated preparations for a plant shutdown, initiated preparations for requesting a Temporary Waiver of Compliance from NRC, and requested chemistry to resample and analyze the boron concentration. After chemistry personnel had increased the sample flush volume, they determined the boron concentration to be 2403 ppm. Subsequently, the licensee exited the TS action statements.

The inspectors determined that the RWST high-level alarm annunciated in the control room at 10:35 a.m. on October 15, 1992. The licensee nominally maintains the RWST level at 98 percent with the high-level alarm at 99 percent. The reactor operator responded to the alarm in accordance with the procedure by requesting chemistry to sample the RWST and initiating steps to lower the RWST level. The reactor operator dispatched a nonlicensed operator to open Valve BN V017, RWST drain valve (refer to Attachment 1), to lower the level and clear the alarm. The nonlicensed operator reported that upon opening the valve no flow was observed, and the control room observed no change in level. Concurrently, a chemistry technician sampled from the drain line located upstream of Valve BN V017. The operators initiated letdown of the RWST through the spent fuel pool cleanup system, an alternate drain path, to recover level. The high level alarm cleared at 12:38 p.m. The licensee determined that there were no activities ongoing that could have caused water to flow into the tank, thereby resulting in an RWST level increase. Consequently, the licensee concluded that the high level alarm was spurious and was generated because the true level was being maintained too close to the setpoint.

Chemistry resampled the RWST at both the tank drain line and the 24-inch header to the emergency core cooling system pumps. These results were 2[illegible] and 2443 ppm, respectively. Chemistry, after determining the piping configuration of the RWST drain line, increased the flush volume at the sample point from 2.5 to 20 gallons and obtained a sample with a concentration of 2403 ppm at 2:22 p.m. Another sample obtained at 2:35 p.m. indicated that the boron concentration was 2440 ppm. Chemistry personnel took additional samples from the normal sample location and from the spent fuel pool clean-up recirculation sample point. In addition, the results of previous weekly analysis were reviewed. All results were approximately 2440 ppm which was within the error of analysis. These data indicated that the RWST boron concentration had been within specification the entire time.

The normal sample point for determining the RWST boron concentration is a 3/4-inch sample line attached to the 6-inch drain pipe. Downstream of the sample point is Valve BN V017. Next, the tank overflow pipe joins the drain pipe between Valve BN V017 and Check Valve LF V034, RWST overflow to drain system. After Check Valve LF V034, the drain pipe is routed to the waste holdup tanks in the radwaste building. The licensee suspected that Check Valve LF V034 was stuck closed so that when the nonlicensed operator opened Valve BN V017, water in the overflow pipe backflowed into the sample-point pipe volume.

On October 16, 1992, the licensee organized a task force of individuals from nuclear safety engineering, systems engineering, operations, and chemistry to investigate the circumstances leading to the event.

As a result of the initial investigation, the task force found:

- No water flowed into the RWST.
- Since the drain line originated from a 3-foot deep sump inside the RWST, 11 feet from the tank side, the sample flush volume was inadequate. The task force initiated Reportability Evaluation Request 92-075 to ensure the issue would be evaluated for reportability and initiated Performance Improvement Request CP 92-0704 to ensure all the corrective actions were completed.
- Water with a boron concentration of 1700 ppm existed in the overflow line as determined by sampling the top of the full overflow pipe. The standing water supported the conclusion that Check Valve LF V034 was stuck closed. The licensee determined that the borated water in the overflow pipe was diluted by condensation.
- No source of water into the tank would cause overflow out the tank vent, and the tank vent was adequately sized to handle the inflow. Consequently, the tank would not overpressurize.

The task force initiated a work request (WR) to examine the operability of Check Valve LF V034 and the insulating flange downstream of the check valve. Also, the task force reviewed previous WRs that indicated Check Valve LF V034 was sticking. In 1985 maintenance personnel determined that the check valve operated correctly but that an insulating flange may not have had the correct configuration and did not permit flow. In 1988 the licensee administratively closed the WR without actually examining the downstream piping and the insulating flange. The inspectors considered the failure to complete the previously scheduled work activity a significant weakness that contributed to this event. The inspectors considered this to be an additional example of past corrective action weaknesses (for which enforcement action has been taken) that are now being resolved.

As documented on the performance improvement request, chemistry changed Procedure CHM 01-080, Revision 4, "Sampling of the Refueling Water Storage

Tank," to require a 20-gallon flush when sampling from the RWST drain line sample point. The licensee determined this flush amount was necessary because the volume preceding the sample point was 8 volumes greater than originally calculated. In addition, chemistry evaluated sampling flush methods for all other tanks and found no discrepancies.

The licensee determined that the check valve operated properly and that the drain line downstream of the check valve was full of water. The insulating flange probably had a blank in the flange that existed since the original hydrostatic test of the line. When replacement gaskets for the flanged connection are received, the pipe will be drained to confirm the blank in the insulating flange.

The inspectors concluded that the task force formed to investigate this event identified appropriate corrective actions. However, the inspectors noted that the licensee had missed previous opportunities to correct the RWST drain line configuration deficiencies.

The inspectors determined that the task force did not fully consider other important aspects of the investigation. The need for operator training was not investigated. The inspectors determined, through interviews, that licensed operators lacked the knowledge that the RWST had no bladder. The generic issues were not explored. An in-depth review of other tanks to assure that overflow drain lines were in the correct configuration was not conducted. An information tag was placed on the chemical and volume control system panel near the boric acid tank controller used to fill the RWST. Operators responding in accordance with the alarm procedure would be directed to utilize the overflow drain valve. However, until the drain line blockage was corrected, the RWST drain valve would not function, as designed, since the blockage was downstream of the valve. The licensee failed to initiate a temporary change to the alarm procedure.

After the inspectors pointed out the deficiencies in the investigation, the licensee reviewed training aspects of the event and initiated a review of generic issues. Also, the licensee initiated and completed a temporary change to the alarm procedure. When the inspectors questioned the licensee concerning other information tag weaknesses, the licensee stated that they presently perform quarterly information tag audits. The licensee performs the audits to verify that the information tag is needed and that the information tag still provides the required information. Additionally, the licensee stated they will complete an audit of all outstanding information tags to determine whether similar deficiencies exist. Alarm Procedure ALR 00-047E, Revision 4, "RWST LEV HILO," Step 4.4.3 directs personnel to drain the RWST upon receipt of a high level alarm by opening Valve BN V017. As described above, the pipe downstream was blocked and the drain path unavailable. The failure to initiate a temporary change to Procedure ALR 00-047E is a violation of TS 6.8.1.a (482/9231-01).

3.3 Boron Injection Tank Outlet Isolation Valve - Valve Actuator Maintenance

On October 28, 1992, while performing maintenance on Motor-Operated Valve (MOV) EM HV8801B, boron injection tank outlet isolation, in accordance with WR 50396-92 instructions, electricians identified a potentially nonqualified torque switch and limit switch gear case. The torque switch was manufactured from melamine (white) plastic material instead of the fibrite (brown) plastic material, and the limit switch gear case was aluminum instead of brass.

The licensee had recently issued Procedure MGE LT-008, Revision 0, "Routine Electrical Limitorque Operator Maintenance," to provide upgraded instructions for routine preventive maintenance of MOVs. Procedure MGE LT-008, Step 4.10 specified that the torque switch should be fibrite and that the limit switch gear case should be brass for environmentally qualified valves outside of containment. Consequently, the electricians questioned the adequacy of the internal components of the actuator.

The licensee entered Procedure KGP-1215, Revision 0, "Evaluation of Nonconforming Condition of Installed Plant Equipment," that provided guidance for evaluating indeterminate conditions. The licensee entered the procedure to determine whether the valve was operable with the existing apparent deficiencies. MOV EM HV8801B is a limit-closed valve and does not rely upon the torque switch for motor control. The licensee determined from review of their Motor Operated Valve Application Guide and Electric Power Research Institute information that the use of an aluminum limit switch gear casing was a concern, inside the containment only, because of the chemical reactions between sodium hydroxide and aluminum. The licensee concluded that the deficiencies would not have affected the ability of the valve to perform its required safety functions.

As corrective action to eliminate future confusion, the licensee initiated a procedure change service request that clarified the required environmental conditions for aluminum versus brass limit switch gear boxes outside of containment. The licensee's long-term plans included replacing the aluminum limit switch gear boxes with brass as each valve is overhauled for the valves located outside of containment. From review of the work package, the inspectors determined that no other problems occurred during conduct of the maintenance. The Valve Operations and Test Evaluation System test was satisfactorily accomplished. The inspectors determined from discussions with the licensee that the melamine torque switch was not a concern for this valve because of shrinkage induced by radiation; however, this valve was susceptible to roll-pin failures.

Upon receipt of a 10 CFR 21 report dated December 11, 1990, concerning SMB00 torque switch roll pin failures, the licensee initiated several Industry Technical Information Program (ITIP) Items:

- Item 1513 required that engineering to evaluate the torque switches used in conjunction with heavy spring packs.

- Item 1514 required maintenance personnel to develop a replacement schedule.

- Item 1515 required operations to develop guidance to minimize declutching of the actuator for the affected valves and required verifying valve operability after declutching the valve actuator.

The inspectors verified that operations had developed an information tag that described actions to be taken when declutching the affected valves. Maintenance personnel had developed a schedule to replace the melamine torque switches susceptible to roll-pin failures by the end of Refuel VI. Forty-six out of 88 safety-related valves had their torque switches replaced during Refuel V. Similarly, 4 out of 16 nonsafety-related valves had their torque switches replaced in Refuel V.

Plant Modification Request 3749 provided a disposition for torque switches with the affected roll pins located in the warehouse and in the field. The affected torque switches located in the warehouse had been returned to the vendor and refurbished. Some of the affected torque switches located in the field were to be replaced during Refuel V or at the first available opportunity. The disposition recommended that all remaining affected valves have the torque switch replaced during Refuel VI.

3.4 Control Room Annunciators

On October 16, 1992, the Callaway Plant experienced a loss of control board annunciators. On October 17, 1992, while removing jumpers from field multiplexor power supplies, the fuses on all four field multiplexors and other logic power supplies failed. The failed power supplies resulted in a significant number of the control panel annunciators being illuminated. The licensee thought only the illuminated annunciators were inoperable. Subsequently, the licensee determined that all annunciators were inoperable. This condition existed for 56 minutes until the fuses were replaced.

The inspectors questioned licensee personnel about whether the events at Callaway could occur at Wolf Creek and what actions were being implemented. The licensee informed the inspectors that they were awaiting a root cause to be identified by the Callaway plant but that they were maintaining communication with their counterparts. The licensee contacted the Callaway plant and determined that fuses in the power supplies located in the control room should be checked weekly. The weekly checks were necessary to ensure that the power supply fuses had not failed since an inoperable power supply would prevent annunciators from alarming. Subsequently, the licensee implemented a requirement to periodically monitor the fuses in the power supply panel to verify that the annunciators were operable.

The licensee developed a temporary modification that provided indicating lights behind the control panel that remained illuminated whenever the power supplies were energized. The licensee added requirements to the control room logs for monitoring the power supply status lights once every 8 hours. While implementing the temporary modification, the licensee removed the fuses one at a time and photographed the main control board annunciators. The licensee used the photographs to identify the annunciators illuminated upon a loss of each power supply. The licensee highlighted the annunciator drawings identifying all annunciators associated with each individual power supply that would be inoperable upon loss of the power supply. The annunciator drawings were placed in the control room to provide guidance to the operators upon a loss of annunciators.

The inspectors determined that emergency preparedness personnel were communicating with operations personnel and had initiated changes to their emergency action levels. The licensee's emergency action levels specified that an alert should be declared upon a loss of all direct current (DC) power. The inspectors determined that the affected emergency action level previously specified "most or all annunciators or a loss of DC power;" however, the licensee changed the emergency action levels to eliminate the ambiguity of that phrase to prevent misinterpretation. At that time, the licensee believed that their annunciator system could only be lost by a loss of all DC power. Because of recent industry events, particularly the event at Callaway, the licensee conducted a more detailed investigation into the annunciator system. The licensee determined that a loss of a single breaker on the PK 51 DC bus could eliminate the ability of all annunciators to function. The oversight could have resulted in licensed personnel failing to make an appropriate emergency classification.

The licensee informed the inspectors that they had been reviewing their annunciator design in response to ITIP Item 2069, Significant Event Report 16-92: "Loss of Control Room Annunciators and Plant Monitoring Computer System," which was assigned to their design engineering group and the training department. Specific licensee actions that were in process included a review of the system design by system engineering and a review of Offnormal Procedure OFN 00-029, "Loss of Nonvital 125 volt DC Bus PK01, PK02, PK03, and PK04," by operations personnel for adequacy. The licensee initiated Simulator Modification Package 92-143 to accomplish the simulator modifications with a required completion date of April 1, 1994. The inspectors determined from interviews with the involved licensee personnel that changes were being made to Procedure OFN 00-029 to specifically address a loss of annunciation.

Although the licensee had established a completion date of April 1994 for modeling the simulator for a complete loss of annunciators, the inspectors determined from discussions with training personnel that the simulator modeling should be completed by February 1993 because of the increased sensitivity following the Callaway event. The Training Department will discuss this event in Requalification Cycle 92-3 that will begin in February 1993.

3.5 Failed Fuel Elements

The inspectors monitored the increase in the FRI parameter. Procedure ADM 01-221, Revision 3, "Failed Fuel Action Plan," defined FRI and defined four action levels. The FRI is the steady state reactor coolant system Iodine 131 activity corrected for the tramp uranium contribution and normalized to a common purification rate. Tramp uranium is uranium particles that remain on the outside of fuel elements following the manufacturing process.

The licensee estimated, from review of chemistry parameters, that approximately three to four fuel elements had pinhole cladding failures. The first indication was an increase in the reactor coolant system gaseous activity obtained from the ratio of Xenon 133 to Xenon 135. The licensee entered FRI Action Level One on September 18, 1992, because of the increased primary coolant gaseous activity. Upon entering action level one, the licensee began evaluating data to determine the number and type of fuel failures. The licensee initiated actions to review fabrication and design records and initiated plans to perform fuel inspections during the refueling outage.

3.6 RWST Suction Valve - Valve Actuator Maintenance

On November 7, 1992, as operators placed Residual Heat Removal (RHR) Pump B in pull to lock while performing Procedure STS BN-201, Revision 3, "Borated Refueling Water Storage System Inservice Valve Test," the operators noted that the engineered safety features status panel light for MOV BN HV8812B, RWST to RHR B suction, illuminated white and no alarm was received when they closed the valve. The light extinguished upon the opening the valve.
Procedure STS BN-201 provided guidance for stroke time testing of valves that are located in the flow path from the RWST to safety-related pumps. These light indications occurred in a different order than expected; consequently, the operator initiated WR 05598-92 so that technicians would investigate the annunciator problem. The operators believed that the problem was with the status panel light circuit; consequently, the operator did not consider that the valve may be inoperable. The licensed operator demonstrated a good awareness of all control panel indications available.

On November 9, 1992, at 4:10 p.m., the shift supervisor declared RHR Pump B inoperable because of the uncertainty of the operability of MOV BN HV8812B resulting from Limit Switch Rotor 3 being set 180 degrees from the required position. The licensee entered TS 3.5.2 that allowed 72 hours to repair the valve or begin a controlled plant shutdown. The licensee initiated an operability review for the valve operability in accordance with Procedure KGP-1215. The licensee's operability evaluation documented that the Rotor 3 contacts included a spare, the engineered safety features status panel indicating light, the RWST lo-lo level test interlock circuitry, and the interlock permissive for Valve BB PCV8702B, RHR Pump B suction from Reactor Coolant System Loop 4 hot leg.

Valve BB PCV8702B is used when RHR Train B is placed in service for cooling the reactor coolant system after the reactor is shutdown. With Limit Switch Rotor 3 set incorrectly, Valve BB PCV8702B would not receive a permissive signal to open, as designed, when MOV BN HV8812B was closed. The failure of

Valve BB PCV8702B to open resulted in the inability of the licensee to use RHR Train B to remove decay heat whenever the reactor was shutdown. The licensee determined that no automatic functions for MOV BN HV8812B were disabled; therefore, the valve remained operable. The licensee had reviewed the maintenance history for MOV BN HV8812A, RWST to RHR A suction, and the licensee determined that no adjustments were made to MOV BN HV8812A. Consequently, a common mode failure did not exist.

The licensee determined that the limit switch rotor position for Rotor 3 was incorrectly specified as 6 percent FROM FULL OPEN. Further review determined that upon transfer of data from the licensee's previous MOV Setpoint Document WCMA-04 to the new MOV design configuration sheets located in Document E-025-00007, a data transfer error occurred for MOV BN HV8812B, Limit Switch Rotor 3. The WCMA-04, Limit Switch Rotor 3 setting was specified as 6 percent FROM FULL CLOSED. The licensee's review determined the root cause was personnel oversight. The licensee identified several contributng causes. The first cause identified was the similarity in appearance of the "O" and the "C" on the data sheets. Another contributing factor was most transfers were one-to-one; however, 9 of 153 valves did not follow the convention, including this valve. A total of 2300 pieces of data were transfered and verified. Consequently, the licensee also attributed personnel error and inattention to detail to the independent reviewer. Electricians referred to the E-025-0007 design configuration document for rotor settings as part of maintenance activities that specify setting limit-switch rotors. The licensee documented this discrepancy on Performance Improvement Request NP 92-0741.

The inspectors determined that the inadequate E-025-00007 specification data sheet resulted in maintenance work instructions that were inappropriate to the circumstances. The licensee corrected the affected valve data specification sheet and identified other valve data sheets that were affected. Four of the data sheets had data transposition errors related to rotor settings. The licensee reviewed maintenance activities related to each of the four valves determining that the only valve worked was MOV BN HV8812B. The failure to have adequate instructions for the adjustment violated 10 CFR 50, Appendix B, Criterion III, because the licensee failed to ensure that design requirements were properly translated into work instructions. However, the violation will not be cited because the criteria specified in paragraph VII.B.2 of the NRC Enforcement Policy were satisfied. The licensee identified this deficiency and evaluated the occurrence for reportability. The licensee promptly reviewed other potentially affected valves for similar data transportation errors. The licensee reviewed their process, determining that the appropriate programmatic reviews had been conducted.

The licensee determined that MOV BN HV8812B rotors were reset during corrective maintenance conducted in September 1992 to repair the soft clutch mechanism and replace the motor pinion gear in accordance with WR 04681-92 (refer to NRC Inspection Report 50-482/92-28, Section 3.2). While reviewing the work activities accomplished under WR 04681-92 and licensee activities related to followup of the abnormal status panel indication, the inspectors determined that corrective WR 04681-92 had required performance of

Procedure STS BN-201, as a postmaintenance test. This inadequate postmaintenance test was different from the issues raised in NRC Inspection Report 50-482/92-30 because the previous inadequate postmaintenance test was related to planned preventive maintenance activities. The licensee's corrective actions described at the Enforcement Conference addressed review of preventive maintenance work instructions. The inspectors reviewed Procedure STS BN-201 determining that the test did not require operators to monitor the status panel indicating lights. Consequently, the operators did not identify the offnormal status light indication during the postmaintenance test activities.

The failure to notice the improper light status following the maintenance activities resulted in Train B shutdown cooling being inoperable for approximately 55 days, from September 17 through November 9, 1992. Throughout this period, the plant was in Modes 1 through 3. Consequently, the ability to remove decay heat was not required to be operable. The licensee's maintenance program requirements were specified, in part, by Procedure ADM 01-057, Revision 25, "Work Request," Attachment 8. The attachment provided guidance and expectations for the performance of postmaintenance testing. In particular, Attachment 8, Step 2.A, specified that postmaintenance testing is used to verify that the maintenance was performed correctly, the equipment performs its intended function, and that a new deficiency has not been created. The inspectors determined that the postmaintenance test instructions were not appropriate to the circumstances as required by Procedures ADM 01-057. This is a violation (482/9231-02) because the postmaintenance test failed to assure that the limit switch rotors were properly adjusted.

3.7 Emergency Preparedness Drill

On November 20, 1992, the licensee conducted a medical emergency with contamination emergency preparedness drill. The drill was well designed and exercised all groups involved. The scenario placed a worker in a contaminated area (in protective clothing) in the auxiliary building who responded to the emergency evacuation alarm by clearing the area. The individual panicked and exited through a turbine building stairwell (a clean area) and, subsequently, fell down the stairs which resulted in a simulated serious injury. The inspectors observed portions of the drill and attended the critique following the drill.

The critique was well performed and included free and open discussions of the lessons learned in command and control, communications, health physics boundary problems in an unexpected circumstance, and medical treatment. Lessons learned will be incorporated into training and further exercises are planned to assure resolution of observed problems.

3.8 Conclusions

Licensee PEP activities continued, and the licensee reported the results of the employee survey to the employees.

The use of a task group to perform a root cause investigation into the apparent RWST level increase and the inadequate sampling methodology was a positive licensee response to an event. The root cause and immediate corrective action determinations were good; however, the overall result of the investigation was diminished because personnel did not consider the generic implications by reviewing the other tank configurations for similar deficiencies and since the operators were not properly notified of the drain line configuration. The task group did not evaluate other contributing causes. The inspectors also concluded that the licensee had previous opportunities to correct a problem with the RWST drain line and considered this an additional example resulting from corrective action program weaknesses.

Licensee maintenance personnel identified potential MOV operability issues. Personnel promptly completed the operability evaluations.

The licensee's review of how the loss of annunciator event at Callaway affected Wolf Creek Generating Station was good.

The licensee's evaluation of the fuel clad failures was thorough.

A noncited violation was identified because a weakness in design controls resulted in inadequate maintenance instructions. The inspectors identified a violation because the licensee had conducted an inadequate postmaintenance test. The postmaintenance test failed to identify that an error was introduced during performance of an MOV maintenance activity.

The licensee conducted an excellent medical emergency drill and critique.

4 MAINTENANCE OBSERVATIONS (62703)

The purpose of inspections in this area was to ascertain that maintenance activities on safety-related systems and components were conducted in accordance with approved procedures and TS. Methods used in this inspection included direct observations of maintenance activities and review of records.

4.1 Safety-Related Battery and Battery Charger Maintenance

In response to several failures during the past year associated with the NK 23 safety-related battery charger, the inspectors reviewed the maintenance history of the battery chargers and the batteries, discussed the history with the electrical maintenance engineer responsible for the DC bus components, and observed battery maintenance activities.

There have been two failures of the NK 23 charger amplifier and firing boards, in November 1991 and, again, in June 1992 (refer to NRC Inspection Report 50-482/92-08). The failure of the amplifier and firing boards caused voltage fluctuations on the DC bus. Historically, there was one other failure of amplifier and firing boards, which affected the NK 24 charger, since the battery chargers were installed.

The licensee returned the amplifier and firing boards to the vendor for evaluation of the failure mechanism. The vendor determined both boards operated satisfactorily after initial troubleshooting and after being subjected to a 100-hour operational test. However, the vendor communicated that the float potentiometer, a variable resistor in the circuit but not on the firing board, could have caused the appearance of a failure. The float potentiometer can change resistance characteristics because of heat degradation. The licensee discussed this problem with other utilities and determined that industry experiences were mixed. The licensee incorporated into their charger maintenance activities inspecting, adjusting, and, if necessary, replacing the float potentiometer if further voltage fluctuations occur.

Intermittent battery monitoring alarms on the NK 13 battery monitor has been a long-standing problem that the licensee has pursued for resolution. The battery monitor compares the total battery voltage of 135 volt DC to the voltage created by each half of the battery cells. The setpoint has a very low tolerance range of ± 0.01 volt DC. Four battery cells located on the same side of the NK 13 battery were determined to have low voltage but were within specifications. The low voltage condition of the cells has maintained the voltage very close to the low voltage setpoint of the battery monitor but above the TS limits. The vendor suggested that the electrolyte levels could be adjusted by transferring electrolyte from high to low specific gravity cells to equalize the voltage on both halves of the battery. The licensee implemented this procedure four times without success.

To resolve this issue, the licensee decided that charging the cells individually, or up to four cells in series, could increase the cell voltage. A procedure was developed, reviewed, and approved by the Plant Safety Review Committee for the activity. The inspectors observed portions of WR 02164-92. The WR included the use of Procedure MPE BA-013, Revision 0, "Charging Individual Battery Cells," and special work instructions. The inspectors found that the WR provided good instructions for the performance of the activity, with precautions for proper isolation of the battery charger from the safety-related battery. The inspectors determined from discussions with licensee personnel that the cell charging was not fully successful. The craft personnel were knowledgeable of the task and followed the WR.

Another long-standing problem, since 1985, has been the corrosion of the cell terminal posts. The individual battery cells utilize a soft seal, an O-ring, between flat washers and seal nuts at the battery posts. Electrolyte vapor has leaked from the seals, which corrodes the terminal post and terminals. When initially identified, the licensee and vendor could not determine an effective solution, consequently, the licensee aggressively developed a program to inspect the batteries for corrosion. The licensee performs visual inspections weekly and quarterly. If the visual inspection reveals corrosion, the terminal resistance is checked prior to and following cleaning activities. The battery post and terminal is cleaned and covered with a protective grease. During the last refueling outage, the licensee completely disassembled and cleaned the batteries. There was no indication of corrosion in the seal area that could cause the cell cover to crack and break. The licensee determined the soft post seal design prevented cracking of the battery cover. The vendor suggested using an epoxy seal in the O-ring area. However, the licensee ruled out that recommendation because a buildup of corrosion could cause battery cover cracking if a hard seal was present. The licensee is considering replacement of the batteries before the end of life because of the corrosion problem. The licensee maintains a historical and trending program to monitor both the charger and battery problems. The inspectors, in addition to conducting the above evaluation, reviewed and observed portions of the battery inspections.

The inspectors concluded the licensee addressed the problems with battery chargers very well and in sufficient depth. The activities associated with the battery corrosion and the low voltage condition of some battery cells by the licensee is commendable. The history and trending program of the Class 1E DC bus and associated equipment was excellent.

4.2 RHR Train B Maintenance

During the RHR Train B maintenance outage, the inspectors observed the implementation of:

- WR 52303-92, RHR B Pump Motor Oil Sampling, on November 4, 1992, and

- WR 52306-92, RHR B Room Cooler Maintenance and Inspection, on November 4, 1992.

During the performance of WRs 52303-92 and 52306-92 by electricians in the RHR B pump room, the inspectors noticed a flexible connector disconnected between the fixed conduit and flexible conduit for the bearing oil temperature that was routed to the top of the RHR pump motor. The maintenance workers did not notice nor document the disconnected conduit. The inspectors informed the electrician's supervisor of the loose connector after review of the completed WRs. The electrical supervisor agreed that the workman's perceptions of their responsibility was narrow since only equipment required to be repaired was considered. The supervisor agreed that the workman should take a broader view of the utilization of environmental discrepancy sheet while in a work area and stated that this expectation would be communicated in shift meetings. The licensee promptly initiated a WR to have the connector repaired. The inspectors considered the electricians' failure to identify this discrepancy to be a weakness.

4.3 Gate Seal Inspection and Replacement in the Spent Fuel Pool

On November 5, 1992, the licensee began inspection activities on the gate seal for the cask loading pool and the fuel transfer canal gates. In order to inspect the gates, the gates were lifted off the storage location and moved to a location where the divers could safely examine the seals. While relocating the fuel transfer canal gate, a quality assurance auditor raised a concern that the gate may have been over spent fuel elements. The licensee stopped the work activities after placing the gate in a safe condition. The licensee initiated a reportability evaluation request to determine reportability and an investigation to determine the circumstances surrounding this issue. This issue was significant because it may have been a violation of TS 3.9.7, which states that loads in excess of 2250 pounds shall be prohibited from travel over fuel assemblies in the spent fuel pool. The licensee replanned and successfully completed the work after resolving the method of movement of the gate so that it would not travel over fuel assemblies. The inspectors observed the movement of the cask loading pool gate but not the movement of the fuel transfer canal gate. Radiological controls in place for the diver's work were excellent. The licensee did not complete the reportability evaluation nor their investigation before the report period ended. The inspectors noted that work planning and control related to this issue may be inadequate. This item will remain unresolved (482/9231-03) pending further NRC inspection.

4.4 Safety-Injection Accumulator Level Indication

The inspectors reviewed WRs associated with the Safety Injection Accumulator Tank B level indication. On October 12, 1992, the level indication failed high, and the licensee initiated WR 05300-92 to troubleshoot EP LI0952, Safety Injection Accumulator Tank B level transmitter. The transmitter failed when moisture penetrated the flexible conduit and entered into the transmitter from a Containment Cooler B drain pan water leak. During troubleshooting, the I&C technicians examined the other accumulator level and pressure transmitter conduits for similar conditions, with no problems being identified. The licensee initiated WR 05335-92 to install a moisture seal at the flexible conduit connector to prevent moisture intrusion after replacing the transmitter. The transmitter wiring connections are not environmentally qualified. The licensee is considering installing moisture seals on the other accumulator flexible connectors during the next outage. The inspectors determined that the licensee immediately examined the failure for generic issues.

4.5 Steam Generator Blowdown Tank Drain Line Weld Repairs

On November 18, 1992, a pinhole steam leak occurred in the 8-inch steam generator blowdown tank drain line to the heater drain tank. The leak occurred on the drain pipe directly opposite of a 3-inch penetration from the startup feedwater pump recirculation line. The startup feedwater pump recirculation line has an orifice installed upstream of the recirculation penetration. The licensee concluded that the impingement of the flow from the orifice eroded the drain pipe opposite of the orifice. Ultrasonic examination revealed that the indication was 1/2 inch in diameter with a pinhole penetrating the pipe. Since the leak was not able to be isolated, the licensee encapsulated the line surrounding the pinhole leak. The inspectors reviewed the WR, observed portions of the work activities, discussed the results of the ultrasonic examination with the test engineers, and discussed the issue with the engineer responsible for the erosion/corrosion program. The inspectors concluded the licensee had adequately assessed and effectively resolved the leak.

4.6 Miscellaneous Maintenance Activities

The inspectors observed the following work activities:

- WR 50403-92, Safety Injection Train B Discharge Accumulator Injection Valve - Motor Operated Valve EM HV8821B, on October 14, 1992,
- WR 52202-92, Safety Injection Pump B Oil Change, on October 14, 1992,
- WR 52395-92, Safety Injection Pump B Breaker, Preventive Maintenance Inspection, on October 14, 1992, and
- WR 00243-92, Safety Injection Pump B Breaker, Replace Prop Spring, on October 14, 1992.

The craft personnel performed the maintenance activities in accordance with detailed work instructions that were appropriate to the work conducted. The craft were experienced and knowledgeable. The inspectors determined that work was stopped when an instruction was not clear. Maintenance equipment and test instruments were within calibration. Personnel adhered to the radiation work permit instructions, where applicable, for protective clothes and other radiation worker practices.

4.7 Conclusions

The licensee maintenance practices relative to the safety-related batteries was commendable. Craft personnel performing specific maintenance in the RHR B room did not identify and document a loose connector; the inspectors considered the failure to identify the component deficiency to be a weakness. The inspectors identified an unresolved item because licensee work controls for loads over spent fuel may have resulted in a TS violation. The licensee effectively repaired a failed level transmitter and a pinhole leak created by erosion.

5 SURVEILLANCE OBSERVATIONS (61726)

The purpose of this inspection was to ascertain whether surveillance of safety-significant systems and components was being conducted in accordance with TS and approved procedures.

5.1 Operator Daily Logs

In October 1992 the inspectors accompanied a nonlicensed operator on his rounds in the auxiliary building. The nonlicensed operator utilized Procedure CKL ZL-001, Revision 16, "Auxiliary Building Log and Daily Reading Sheets " The inspectors determined that the nonlicensed operator was:

(1) knowledgeable and aware of the plant conditions, (2) cautious and deliberate during the rounds, took appropriate readings, checked equipment for levels, touched pump bearings for excessive heat buildup, and observed each area for leaks or spills, and (3) key carded into each door, as required.

5.2 <u>Shutdown Margin Determination</u>

On November 11, 1992, the inspectors observed reactor engineers perform Procedure STS RE-004, Revision 11, "Shutdown Margin Determination," as required during the reactor startup. The inspectors determined that the reactor engineers performing the surveillance were knowledgeable about the procedure requirements. The licensee had a software program on a personal computer that required specific inputs such as the time since the shutdown, power level prior to shutdown, and the current boron concentration. After inputing the parameters, the program provided an estimate of the shutdown margin. The procedure was performed at various intervals while the plant was in Mode 3, with all data meeting specifications.

5.3 <u>Conclusions</u>

The knowledge level and deliberations of a nonlicensed operator during operator rounds indicated that nonlicensed personnel were sensitized to the importance of proper logtaking.

6 COLD WEATHER PREPARATION (71714)

The inspectors conducted this inspection to evaluate the effectiveness of licensee actions to protect plant equipment during extremely cold weather.

6.1 <u>Licensee Preparations</u>

The inspectors verified that Procedure STN GP-001, Revision 9, "Plant Winterization," provided detailed guidance for implementing cold weather protection. The procedure provided cautions for ensuring area space heaters and heat tracing for the tanks operated properly. The procedure specified that upon unavailability of the auxiliary steam system, the outside tanks were required to be placed on recirculation. Procedure ADM 02-030, Revision 12, "Reading Sheets and Shift Rounds Instructions," provided general guidance for operators conducting rounds to monitor heat trace circuits.

The inspectors independently verified that the plant heating steam system supplies to various safety-related air supply units were operable. The inspectors verified that the power supplied to selected heat trace circuits was properly lined up. The inspectors compared a listing of required winterization preventive maintenance activities to completed preventive maintenance activities to ensure work was being implemented.

The inspectors verified that: the licensee's cold weather checklists were properly completed; maintenance activities were implemented to assure that heat tracing, space heaters, and thermostats operated properly; required cold weather inspections were completed; alarm response procedures provided adequate guidance for responding to freeze protection alarms; and fire protection systems were monitored.

6.2 Auxiliary Steam System Activities

The licensee began implementing cold weather protection preparations in August 1992 when they conducted an auxiliary steam boiler train outage to ensure the auxiliary steam boiler and the various auxiliary steam system pumps operated properly. Between August 3 and October 24, 1992, the licensee replaced pump shafts for the auxiliary steam feedwater pumps on four occasions because the pump shafts had seized during operation. The licensee believed a stress riser occurred because the interior threads in the pump shaft that held the pump impeller bolt were bored too far into the hole. Following the second shaft failure, vendor personnel observed the disassembly and reassembly of the auxiliary steam feedwater pump, verifying that all critical measurements met specifications and that the pump was properly reassembled. The licensee modified the shaft after a third failure. The new pump shaft was threaded with the impeller attached by a nut. The auxiliary steam feedwater pump with the redesigned shaft operated for 4 days prior to failing when the pump shaft seized. The licensee had investigated several potential causes for the shaft cracking; however, the licensee could not determine the cause of the numerous recent failures.

Following the initial failure on September 4, 1992, the licensee researched the possibility of obtaining new parts. The licensee determined that their model of auxiliary steam feedwater pump was not manufactured as a unit but spare parts could be manufactured. However, the parts were fabricated as customized parts with at least a 6-week lead time. The licensee began reviewing other pump designs so that they could lower the part procurement lead time and reduce the expense. The system engineers determined that the piping would require modification for a different pump and began developing a plant modification. After the new shaft design failed on October 20, 1992, the licensee expedited procuring new pumps and prepared Plant Modification Request 4465, "Auxiliary Steam Feedwater Pump Replacement," to modify the pipe configuration.

The licensee changed the pumps and modified the piping configuration in accordance with Plant Modification Request 04465. The licensee installed the Train A auxiliary steam feedwater pump on October 24, 1992, and placed the auxiliary steam system in service on October 25, 1992. The Train B auxiliary steam feedwater pump was installed on October 29, 1992. Throughout the period that the pumps were out of service, the licensee placed the water storage tanks on recirculation to prevent any chance of freezing.

6.3 Conclusions

The licensee expended considerable effort to protect the plant against the effects of cold weather. The licensee's sensitivity to the problems associated with cold weather was demonstrated by their efforts to make operable an auxiliary steam feedwater pump. The licensee had a very good program to protect against cold weather.

7 MANAGEMENT MEETING (30702)

On October 23, 1992, a public meeting between NRC and the Wolf Creek Nuclear Operating Corporation was conducted in the Region IV NRC office to discuss the licensee's Management Action Plan and the development and implementation of the PEP. The meeting provided a brief summary of the number of Management Action Plan items that will be incorporated into the PEP and the number of action items that will undergo closure as defined by the Management Action Plan. The meeting provided beneficial information about both programs.

The presentation on the PEP program provided a history of the program development to date and an overview of upcoming program milestones. The program resulted from third party reviews conducted at the request of the owner companies. The consultant aided the PEP team in developing the program from interviews with plant management and a review of assessments conducted by NRC and other reviewing organizations. After initial development of the program action plan areas of emphasis, an employee survey was conducted. The PEP action plans should be completely developed by the end of the first quarter of 1993.

8 FOLLOWUP (92700)

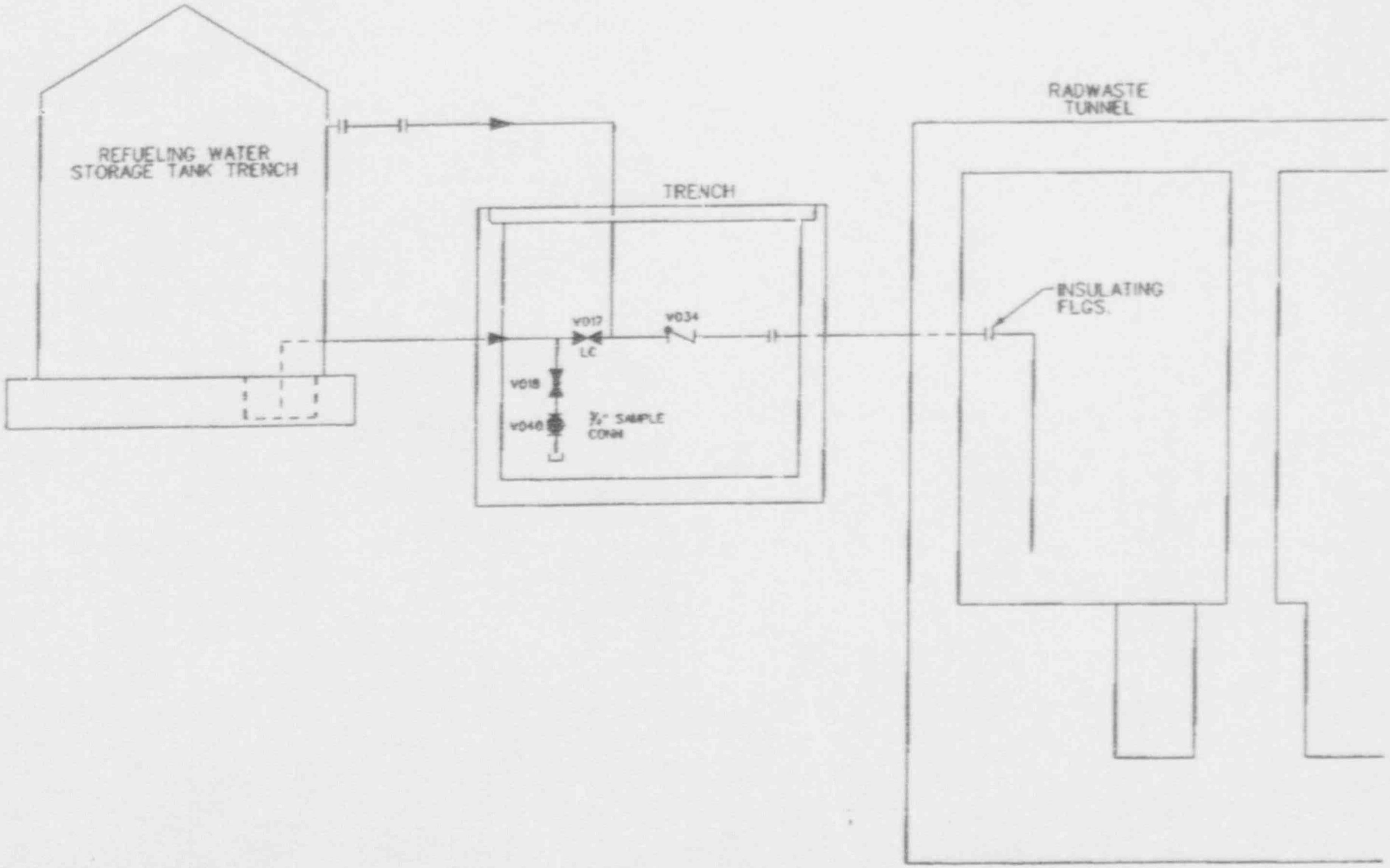
8.1 <u>(Closed) Unresolved Item 482/9228-01: Loss of Charging and Letdown Flows</u>

On October 1, 1992, while an operator transferred from Centrifugal Charging Pump (CCP) A to the positive displacement pump (PDP), charging flow stopped and letdown flow decreased on two occasions for approximately 20 and 27 seconds, respectively. The initial loss of flow occurred when a licensed operator failed to close the PDP recirculation valve in accordance with the procedure. The second loss of flow was postulated to be caused by hydrogen gas leaving solution on the suction side of the PDP and collecting in the pulsation damper. At the end of the last inspection period, the inspectors questioned the licensee as to whether the gas bubble could have gas-bound the CCPs.

Procedure SYS BG-201, Revision 15, "Shifting Between Positive Displacement and Centrifugal Charging Pumps," provided instructions in step 4.2.6 to close the PDP recirculation valve, MOV BG HV8109. While transferring from CCP A to the PDP on October 1, 1992, a licensed operator failed to close MOV BG HV8109 as specified, which resulted in decreased letdown flow and a loss of charging flow. The failure to follow the procedure is a violation of TS 6.8.1.a (482/9231-04). This procedural violation was caused by licensed operator inattention to detail.

During this inspection period, the inspectors reviewed the licensee's calculations for head loss in the suction piping from the volume control tank to the PDP and the CCPs. The licensee's calculations demonstrated that the gas could not leave solution on the suction side of the pumps. Since the gas could not leave solution, there was no possibility of binding the CCPs. At the end of the inspection period, the licensee stated they would provide an engineering evaluation by December 14, 1992, that described the most probable cause of the second PDP loss of flow. The licensee believed that the hydrogen might have been formed in the PDP pump cylinders, since the licensee had previously experienced cylinder spring failures created by hydrogen embrittlement.

ATTACHMENT 1



ATTACHMENT 2

1 PERSONS CONTACTED

P. D. Adam, Supervisor, Reactor Engineering
R. S. Benedict, Manager, Quality Control
A. B. Clason, Supervisor, Maintenance Engineering
R. D. Flannigan, Manager, Nuclear Safety Engineering
D. E. Gerrelts, Manager, Instrumentation and Control
N. W. Hoadley, Manager, Equipment Engineering
R. W. Holloway, Manager, Maintenance and Modifications
L. W. Holloway, Supervisor, System Engineering
D. Jacobs, Supervisor, Mechanical Maintenance
R. K. Lewis, Supervisor, Results Engineering
W. M. Lindsay, Manager, Quality Assurance
R. L. Logsdon, Manager, Chemistry
J. D. Lutz, Regulatory Compliance Engineer
O. L. Maynard, Vice President, Plant Operations
K. J. Moles, Manager, Regulatory Services
T. S. Morrill, Manager, Radiation Protection
D. G. Moseby, Supervisor, Operations
F. T. Rhodes, Vice President, Engineering
T. L. Riley, Supervisor, Regulatory Compliance
B. B. Smith, Manager, Modifications
C. M. Sprout, Manager, System Engineering
J. D. Stamm, Manager, Plant Design Engineering
H. L. Stubby, Supervisor, Technical Training
S. G. Wideman, Supervisor Licensing
M. G. Williams, Manager, Plant Support
B. D. Withers, President and Chief Executive Officer

The above licensee personnel 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 November 25, 1992. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

ATTACHMENT 3

LIST OF ACRONYMS

CCP	centrifugal charging pump
DC	direct current
DEI	dose equivalent iodine
DRPI	digital rod position indication
FRI	fuel reliability indicator
I&C	instrumentation and controls
ITIP	Industry Technical Information Program
MOV	motor operated valve
PDP	positive displacement pump
PEP	Performance Enhancement Program
ppm	parts per million
RHR	residual heat removal
RWST	refueling water storage tank
TS	Technical Specifications
uCi/ml	microcurie per milliliter
WR	work request