

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-482
License No.: NPF-42
Report No.: 50-482/99-07
Licensee: Wolf Creek Nuclear Operating Corporation
Facility: Wolf Creek Generating Station
Location: 1550 Oxen Lane, NE
Burlington, Kansas
Dates: June 14-18, 1999
Inspector: J. Blair Nicholas, Ph.D., Senior Radiation Specialist
Plant Support Branch
Approved By: Gail M. Good, Chief, Plant Support Branch
Division of Reactor Safety
Attachment: Supplemental Information

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EXECUTIVE SUMMARY

Wolf Creek Generating Station NRC Inspection Report No. 50-482/99-07

This announced, routine inspection reviewed radiation protection program activities. Areas reviewed included: external and internal exposure controls; controls of radioactive material and contamination, surveying and monitoring; high radiation area key control program; and source inventory program.

Plant Support

- The external exposure control program was effectively implemented. Appropriate radiological controlled area access controls were maintained. Radiation workers wore the proper dosimetry. Radiation, contamination, high, and locked high radiation areas were properly controlled and posted. Housekeeping within the radiological controlled area was generally very good. ALARA low dose waiting areas were appropriately located and clearly identified. Keys for locked high radiation areas were issued and controlled in accordance with station procedures. Radiation work permits contained clear, consistent radiological control information. A radiological pre-job briefing for movement of fuel in the spent fuel pool was professionally conducted. Radiation protection job coverage of the fuel movement in the spent fuel pool was appropriate. An effective dosimetry program was maintained. Personnel contamination events during Refueling Outage X showed a 67 percent reduction from the number experienced during the previous refueling outage (Section R1.1).
- An effective internal exposure control program was implemented. The use and positioning of air sampling equipment within the radiological controlled area were appropriate for monitoring radiological airborne conditions. The respirator inventory, maintenance, and issuance program was properly implemented. Proper total effective dose equivalent/as low as is reasonably achievable evaluations for respirator use were performed. Whole-body counting systems were calibrated and performance checked in accordance with station procedures. Internal dose assessment methodologies provided appropriate evaluations of internal dose (Section R1.2).
- Station workers used the personnel contamination monitors properly. Radioactive material, laundry, and trash containers were properly labeled and controlled. The portable radiation protection instrumentation program was properly maintained. The calibration and source response check programs for portable neutron and beta/gamma radiation survey instruments were implemented properly. Effective radioactive source inventory and leak testing programs were in place (Section R1.3).

Report Details

Summary of Plant Status

The plant operated at full power during the inspection. No events occurred during this inspection that adversely affected the inspection.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 External Exposure Controls

a. Inspection Scope (83750)

The inspector conducted several tours of the radiological controlled area. Selected radiation protection personnel involved in the external exposure control program were interviewed. The following items were reviewed:

- Radiological controlled area access/egress controls
- Control of high radiation areas
- Issuance and control of locked high radiation area keys
- Radiation work permits
- Job coverage by radiation protection personnel
- Containment entries and neutron monitoring
- Personnel dosimetry
- Personnel contamination events

b. Observations and Findings

The inspector observed personnel process in and out of the access/egress area of the radiological controlled area and noted that station workers used the computerized log-in/out and personnel contamination monitoring equipment properly. Radiation protection personnel at the access control desk provided timely response and direction to station workers who alarmed the personnel contamination monitors or needed assistance using the computerized log-in/out equipment. All radiation workers observed wore their dosimetry properly and knew to contact radiation protection personnel if their electronic dosimeters alarmed.

The inspector noted that, due to the layout of the personnel contamination monitors at the exit point from the radiological controlled area, there was a possibility of cross contamination of personnel and/or radioactive material being released from the radiological controlled area without being monitored. When this issue was discussed with radiation protection management, the inspector was informed that the radiation protection department was evaluating the layout of the radiological controlled area egress area to improve the traffic flow and eliminate the possibility of cross contamination and the unmonitored release of radioactive material.

The inspector conducted several tours of the radiological controlled area and performed independent radiation measurements to confirm the appropriateness of radiological postings. The inspector observed that radiation areas, contamination areas, and high radiation areas were properly controlled and posted. Housekeeping within the radiological controlled area was generally very good. The inspector noted that areas were well maintained and free of debris. ALARA low dose waiting areas were appropriately placed and clearly identified with fluorescent fuchsia colored signs in rooms throughout the radiological controlled area. The inspector verified that selected Technical Specification required locked high radiation area doors were locked and posted properly. Radiological postings and survey maps displayed at the entry to rooms correctly specified radiological conditions in the room. However, the inspector observed that the radiological survey maps posted outside many of the rooms in the radiological controlled area were not always orientated so that they clearly represented the room layout relative to a person's position at the entrance to the room. In some cases, the radiological survey maps were oriented 90 to 180 degrees out of alignment with the entrance to the room. Radiation protection supervision agreed to review this observation. On July 17, 1999, Performance Improvement Request 99-2220 was written concerning this observation.

The inspector reviewed the locked high radiation area key control program and found that locked high radiation area keys were controlled by the security department. A list of personnel authorized to checkout locked high radiation area keys was maintained by the security department. The inspector reviewed the security department's key issue log and verified that only authorized personnel were issued locked high radiation area keys. The inspector observed a security officer issue locked high radiation area keys, receive returned keys, and make appropriate entries in the key issue log. The inspector noted that the security access/egress system did not allow personnel, who were issued keys, to exit the protected area without returning the keys. The inspector verified that a high radiation area key inventory was performed by the security department at the close of each shift. Keys for locked high radiation areas were issued and controlled in accordance with station procedures.

The inspector reviewed randomly selected radiation work permits and noted that the permits contained clear, consistent radiological control information. The numbering system used for the radiation work permits made it easier to review job history information. The same radiation work permit number was used for similar work with the exception of the year designator.

The inspector attended the radiological pre-job briefing for the movement of fuel in the spent fuel pool in preparation for the re-rack modification. The briefing was conducted in a professional manner by two radiation protection technicians. The radiation work permit requirements and the measured and anticipated radiological conditions in the work area were presented. All personnel were attentive, and a good discussion was held between the workers and the radiation protection technicians concerning the job evolutions. The inspector observed several fuel bundle movements in the spent fuel pool and determined that the radiation protection job coverage was appropriate and in accordance with the radiation work permit requirements.

The inspector gathered data on containment entries and neutron dose rates. Review of the data revealed that there were approximately 55 containment entries made during 1998, and approximately 29 containment entries were made during the first 6 months of 1999 excluding the Refueling Outage X. Surveys of neutron dose rates were conducted by the licensee in the reactor containment building at 100 percent reactor power. Neutron dose rates in the containment building ranged from 2-120 millirem per hour. A review of the licensee's spectral analysis of the containment building showed that the average neutron energy spectra in the reactor containment building at power was 17-59 kilo-electron volts (keV).

The licensee utilized a four-chip thermoluminescent dosimeter consisting of two lithium borate chips and two calcium sulfate chips to determine the neutron dose of record. The licensee estimated the neutron exposures to workers using neutron dose rate survey information and stay time data prior to processing the thermoluminescent dosimeters. Personnel exposures due to neutron radiation remained relatively constant during the past years with the highest individual calculated neutron dose in 1996 of 36 millirem (mrem) to the lowest individual calculated neutron dose of 30 mrem in 1998. During the first 6 months of 1999, the highest individual neutron dose was 31 mrem.

The licensee used a vendor to process its thermoluminescent dosimeters. The vendor processing program was National Voluntary Laboratory Accreditation Program accredited in all categories. Electronic dosimeter dose results used for accounting daily dose estimates were conservative with regard to thermoluminescent dosimeter doses.

A review of personal contamination logs revealed that there were 22 personnel contamination events investigated in 1998, but none of the personnel contamination events resulted in a skin dose assigned to the workers. As of June 16, 1999, no non-outage personnel contamination events had been identified. However, during Refueling Outage X, there were 116 personnel contamination events. This was significantly less than the goal of 150 personnel contamination events established for the outage. From a review of licensee supplied data, the inspector determined that the above number of personnel contamination events corresponded to a 67 percent reduction in personnel contamination events from the 348 personnel contamination events experienced during Refueling Outage IX.

c. Conclusions

The external exposure control program was effectively implemented. Appropriate radiological controlled area access controls were maintained. Radiation workers wore the proper dosimetry. Radiation, contamination, high, and locked high radiation areas were properly controlled and posted. Housekeeping within the radiological controlled area was generally very good. ALARA low dose waiting areas were appropriately located and clearly identified. Keys for locked high radiation areas were issued and controlled in accordance with station procedures. Radiation work permits contained clear, consistent radiological control information. A radiological pre-job briefing for movement of fuel in the spent fuel pool was professionally conducted. Radiation protection job coverage of the fuel movement in the spent fuel pool was appropriate. An effective dosimetry program was maintained. Personnel contamination events during

Refueling Outage X showed a 67 percent reduction from the number experienced during the previous refueling outage.

R1.2 Internal Exposure Controls

a. Inspection Scope (83750)

Selected radiation protection personnel involved with the internal exposure control program were interviewed. The following items were reviewed:

- Air sampling program
- Respiratory protection program
- Whole-body counting program
- Internal dose assessment program

b. Observations and Findings

The use and positioning of continuous air monitors within the radiological controlled area were appropriate for monitoring radiological airborne conditions in the work areas. All continuous air monitors observed in the radiological controlled area had current calibration dates and were response checked in accordance with station procedures. The inspector determined that, in addition to the continuous air monitors, the job specific air sampler used during the movement of fuel in the spent fuel pool was properly placed to evaluate radiological airborne hazards during work evolutions.

In 1999, 91 full-face negative pressure respirators were issued, which included 69 respirators issued during Refueling Outage X. From a review of the respirator issue log, the inspector determined that respirators were properly issued to qualified individuals and that appropriate total effective dose equivalent/as low as is reasonably achievable (TEDE/ALARA) evaluations were completed to justify respirator use. The inspector determined that respirator maintenance, inspection, and inventories were performed in accordance with station procedures. Proper storage of respirators was observed. No problems were identified with the respirator issue and control program.

The inspector noted that the licensee utilized two types of whole-body counting systems. These systems included a sodium iodide "chair" type whole-body counting system and a standup fast-scan whole-body counting system. The inspector determined that the calibration and quality control programs for the whole-body counting systems were implemented in accordance with station procedures. The inspector verified that the whole-body counting systems were calibrated semiannually using standards traceable to the National Institute of Standards and Technology, and quality control checks, including energy calibrations, were performed daily prior to use and every 12 hours when the whole-body counting systems were in continuous use.

The inspector reviewed the internal dose assessment program and determined that there were no positive whole-body counts during 1998 and during the non-outage time in 1999 that exceeded the licensee's action level of 1 mrem for recording committed effective dose equivalent. The inspector noted that during Refueling Outage X there were 5 whole-body counts which exceeded the licensee's action level for recorded

committed effective dose equivalent. The highest individual committed effective dose equivalent was 10 mrem. From a review of selected internal dose assessments, the inspector determined that the dose assessments were properly evaluated.

c. Conclusions

An effective internal exposure control program was implemented. The use and positioning of air sampling equipment within the radiological controlled area were appropriate for monitoring radiological airborne conditions. The respirator inventory, maintenance, and issuance program was properly implemented. Proper total effective dose equivalent/as low as is reasonably achievable evaluations for respirator use were performed. Whole-body counting systems were calibrated and performance checked in accordance with station procedures. Internal dose assessment methodologies provided appropriate evaluations of internal dose.

R1.3 Control of Radioactive Materials and Contamination, Surveys, and Monitoring

a. Inspection Scope (83750)

The inspector interviewed radiation protection personnel and reviewed the following:

- Control of radioactive material
- Portable instrumentation calibration and performance checking programs
- Radioactive source control and leak testing programs

b. Observations and Findings

During tours of the radiological controlled area, the inspector observed that radioactive material containers were properly labeled, controlled, and maintained. Contaminated areas were clearly posted and marked with tape and rope. Step-off pads were placed at the entrances/exits to contaminated areas. Control of radioactive material was good.

The inspector determined that an adequate supply of portable instrumentation was operable and available. All instrumentation in use was appropriately performance source checked daily. A program to investigate the use of portable instrumentation when an instrument failed the performance source check was in place.

The inspector determined that the portable neutron survey instruments were properly calibrated and performance source checked. The neutron survey instruments were calibrated by a vendor. The inspector reviewed several calibration certification documents and determined that the neutron survey meters were calibrated using a PuBe (plutonium-beryllium) source that was traceable to the National Institute of Standards and Technology. The meters were calibrated to exposure rates ranging from 2 mrem per hour through 200 mrem per hour. The portable neutron survey instruments were performance source checked prior to use with a certified AmBe (americium-beryllium) source.

The inspector reviewed the radioactive source inventory and leak testing records for the last 24 months. The inspector noted that inventories and leak tests of sealed

radioactive sources were performed every 6 months as required. The inspector randomly selected 15 radioactive sources from the licensee's source accountability record. All but one radioactive source, HPH-131, was found in its designated storage location. Upon investigation and review of the radioactive source inventory performed during December 1998, the inspector determined that source HPH-131 was disposed of as radwaste in December 1998. While this disposition of the source was documented on the radioactive source inventory record, the source accountability record had not been updated. The inspector determined that there was no procedural requirement to update the source accountability record. On June 17, 1999, the licensee updated the source accountability record, and Performance Improvement Request 99-2211 was written documenting this issue.

c. Conclusions

Station workers used the personnel contamination monitors properly. Radioactive material, laundry, and trash containers were properly labeled and controlled. The portable radiation protection instrumentation program was properly maintained. The calibration and source response check programs for portable neutron and beta/gamma radiation survey instruments were implemented properly. Effective radioactive source inventory and leak testing programs were in place.

R8 Miscellaneous Radiological Protection and Chemistry Issues

8.1 (Closed) Violation 50-482/9809-03: Failure to control radioactive material

The inspector verified that the corrective actions described in the licensee's response letter dated April 10, 1998, were implemented. No additional problems were identified dealing specifically with the surveying of items for the unconditional release of radioactive materials greater than the release criteria stated in the licensee's radiation protection procedure.

8.2 (Closed) Violation 50-482/9811-01: Failure to label containers of radioactive material

The inspector verified that the corrective actions described in the licensee's response letter dated April 28, 1998, were implemented. No additional problems were identified dealing specifically with the labeling of bags as radioactive material containers.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on June 18, 1999. The licensee acknowledged the findings presented. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Angus, Manager, Licensing and Corrective Action
T. Anselmi, Supervisor, Engineering Support
R. Denton, Quality Specialist, Quality Evaluations
T. East, Superintendent, Emergency Planning
M. Guyer, Superintendent, Operations Support
R. Hammond, Health Physics Supervisor, Projects
C. Holman, Quality Specialist, Quality Evaluations
S. Koenig, Manager, Performance Improvement Assessment
B. McKinney, Vice President Operations and Plant Manager
C. Medency, Health Physics Supervisor
K. Moles, Manager, Information Services
D. Parks, Manager, Training
C. Reekie, Licensing
J. Schepers, Acting Manager, Chemistry/Radiation Protection
R. Stumbaugh, Health Physics Supervisor
C. Warren, Vice President and Chief Operating Officer

NRC

F. Brush, Senior Resident Inspector

INSPECTION PROCEDURE USED

83750 Occupational Radiation Exposure

ITEMS CLOSED

Closed

9809-03	VIO	Failure to post and control a high radiation area
9811-01	VIO	Failure to follow procedural requirements with regard to the conditional release of radioactive material

LIST OF DOCUMENTS REVIEWED

Procedures

AP 25A-200	"Access to Locked High or Very High Radiation Areas," Revision 9
RPP 01-405	"I:P Instrument Program," Revision 11
RPP 02-205	"Radiological Survey Frequency Requirements," Revision 9
RPP 02-215	"Posting of Radiological Controlled Areas," Revision 12
RPP 02-305	"Personnel Surveys/Decontamination," Revision 10
RPP 02-605	"Control and Inventory of Radioactive Sources," Revision 9
RPP 03-106	"Use of Special Dosimetry," Revision 11
RPP 03-121	"Neutron Dose Calculations," Revision 4
RPP 03-205	"DAC-Hour Tracking," Revision 9
RPP 03-305	"Issuance of Respiratory Protective Equipment," Revision 13
RPP 03-310	"Maintenance of Respiratory Protection Equipment," Revision 10
RPP 05-705	"ND Whole-Body Counter Operation," Revision 8
RPP 06-7C5	"ND Whole-Body Counter Calibration," Revision 5