

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-285/90-44

Operating License: DPR-40

Docket: 50-285

Licensee: Omaha Public Power District (OPPD)  
444 South 16th Street Mall  
Main Stop 8E/EP4  
Omaha, Nebraska 68102-2247

Facility Name: Fort Calhoun Station

Inspection At: Blaine, Nebraska

Inspection Conducted: November 27-30, 1990

Insp:

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Radiological Protection and Emergency  
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1-14-91  
Date

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1/14/91  
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Inspection Summary

Inspection Conducted November 27-30, 1990 (Report 50-285/90-44)

Areas Inspected: Routine announced inspection of the licensee's performance and capabilities during an annual exercise of the emergency plan and procedures. The inspection team observed activities in the control room (CR), technical support center (TSC), the emergency operations facility (EOF), and the operations support center (OSC) during the exercise.

Results: Within the areas inspected one violation and four exercise weaknesses were identified. The violation was for failure to correct exercise deficiencies and weaknesses identified in the TSC during the 1988 and 1989

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emergency exercises (paragraph 7). Exercise weaknesses included untimely response to a fire (paragraph 6), inadequate plant access control (paragraph 5), poor information flow from the control room (paragraph 4), and problems identified with the scenario (paragraph 11).

Generally, the licensee's response during the course of the exercise was adequate to protect the health and safety of the public.

DETAILS

1. Persons Contacted

OP&D

- \*T. C. Matthews, Station Licensing Engineer
- \*S. K. Gambhir, Division Manager, Production Engineering
- \*S. W. Gebers, Supervisor, Radiological Services
- \*F. F. Franco, Manager, Radiological Services
- \*R. L. Andrews, Division Manager, Nuclear Services
- \*O. J. Clayton, Supervisor, Emergency Preparedness
- \*H. J. Sefick, Manager, Security Services
- \*J. W. Chase, Manager, Nuclear Licensing
- \*W. W. Orr, Manager, Quality Assurance/Quality Control
- T. L. Patterson, Manager, Fort Calhoun Station
- \*L. T. Kusek, Manager, Nuclear Safety Review Group

\*Denotes those present at the exit interview.

The inspection team also held discussions with other station and corporate personnel in the areas of security, health physics, operations, training, and emergency response.

2. Followup on Previous Inspection Findings (92702)

(Closed) Deficiency (285/8820-07): This item consisted of six examples of TSC staff ineffectiveness in evaluating plant conditions and providing technical support. During the 1990 exercise, problems were once again observed with the TSC staff evaluating plant conditions and providing technical support. This issue is closed for record purposes and is included in Violation 285/9044-01 (see paragraph 7).

(Closed) Exercise Weakness (285/8929-02): This weakness was identified during the 1989 exercise for 12 observations which, together, indicated poor coordination, direction, and technical support provided by the TSC staff. During the 1990 exercise, problems were once again observed with the TSC staff in evaluating plant conditions and providing technical support. This issue is closed for record purposes and is included in Violation 285/9044-01 (see paragraph 7).

(Closed) Exercise Weakness (285/8929-01): This weakness was identified during the 1989 exercise for failure to establish a necessary radiological control point at the entrance to the control room. During the 1990 exercise, a radiological control point was established at the entrance to the control room and control room habitability was frequently verified and maintained.

(Closed) Exercise Weakness (285/8929-03): This weakness was identified during the 1989 exercise for several observations indicating poor coordination activities by the OSC staff. During the 1990 exercise, OSC staff activities were observed to be coordinated and no recurrences of the specific observations in the OSC from the previous exercise were noted.

(Closed) Exercise Weakness (285/8929-04): This weakness was identified during the 1989 exercise for failure of the emergency medical team to demonstrate proper radiological and contamination control practices in responding to a contaminated injury victim. During the 1990 exercise, adequate radiological and contamination control practices were observed to be exercised by the medical rescue team in responding to a contaminated injury victim.

(Closed) Exercise Weakness (285/8929-05): This 1989 exercise finding was an observation, repeated from the 1988 exercise, that personnel accountability during site evacuation was not accomplished within 30 minutes as required by the emergency plan or in accordance with NUREG 0654. During the 1990 exercise, the inspectors noted that accountability of personnel onsite at the time of the evacuation announcement was completed within 30 minutes.

(Closed) Exercise Weakness (285/8929-06): This exercise weakness was identified for multiple specific examples of scenario problems including unnecessary simulation and discrepancies observed during the conduct of the exercise on the part of players, observers, and controllers (e.g., coaching, prompting, prestaging, and excessive staffing, etc.). During the 1990 exercise, the inspectors observed no significant examples of unnecessary simulation, prompting, prestaging, or excessive staffing. Technical inadequacies of the scenario were noted and are discussed as a new exercise weakness in paragraph 11.

### 3. Program Areas Inspected

The licensee's annual emergency exercise was held on the evening of November 28, 1990, and did not include the participation of offsite authorities. The 6 p.m. starting time of the exercise qualified as an off-hours exercise in accordance with NUREG 0654.

The inspection team observed licensee activities in the CR, TSC, OSC, and EOF during the exercise and evaluated the responses to a simulated contaminated injury victim, a fire in the auxiliary building, and site evacuation and accountability. The inspection team also observed emergency response organization staffing; facility activation; detection, classification, and operational assessment; notification of licensee personnel and offsite authorities; and formulation of protective action recommendations. Inspection findings are documented in the following paragraphs.

The exercise scenario was centered upon a reactor cooling pump (RCP) shaft seizure which resulted in a pump impeller disintegration and seal failure, followed by fuel damage caused by the loose impeller parts. Coolant leakage from the lost seals caused radiation levels in containment to rise above the emergency action level for a site area emergency. The scenario did not call for a significant offsite radiological release, and was not intended to result in a general emergency classification.

The inspection team identified various concerns during the course of the exercise; however, none were of the significance of a deficiency as defined in 10 CFR 50.54(s)(2)(ii). Each of the observed concerns has been characterized as an exercise weakness according to 10 CFR 50, Appendix E.IV.F 5. An exercise weakness is a finding that a licensee's demonstrated level of preparedness could have precluded effective implementation of the emergency preparedness plan in the event of an actual emergency. It is a finding that needs licensee corrective action.

4. Control Room (82301)

The inspection team observed and evaluated the control room staff during the exercise including use and application of procedures, detection and classification of events, analysis of plant status, transfer of command and control, communications outside of the CR, and records and logkeeping. The CR portion of the exercise was conducted in the CR simulator in the static mode using controller messages and data sheets.

The inspectors noted that the CR staff properly used procedures, appropriately detected and classified events, and made notifications in a timely manner. In general, the CR staff demonstrated good technical knowledge of plant systems and operations.

The inspectors observed problems in the CR with the transfer of critical plant status information to individuals and personnel located outside of the CR, and in maintaining adequate logs. Specific examples of the problems noted are the following:

- ° Communications of critical plant status information between the CR and other Emergency Response Organization (ERO) groups were sporadic and incomplete. The CR staff did not relay sufficient information to the TSC or EOF staffs to make them aware that loose parts monitors had alarmed, a RCP impeller had disintegrated, and fuel damage had occurred. Poor and incomplete information communicated by the CR to the other ERFs delayed the response to the fire by the fire brigade.
- ° Logkeeping in the CR degenerated over the course of the exercise. No entries were made in the CR log from the time the EOF was manned at 9:35 p.m. until the fire brigade leader was dispatched to the plant at 10:37 p.m. During this time, notable events were occurring, and information was being communicated relative to the fire and explosion in the auxiliary building, recovery of component cooling water (CCW), and the status of the auxiliary building ventilation system.

Information flow from the control room was identified as an exercise weakness (285/9044-02).

No violations or deviations were identified in this program area.

5. Site Evacuation and Personnel Accountability

The inspection team observed the site evacuation and accountability from the primary access point to determine whether licensee procedures were followed and effective, and to ascertain the licensee's capabilities to perform personnel accountability as required during an emergency.

The inspector noted that personnel accountability was achieved within the 30 minutes criteria specified in the emergency plan and NUREG 0654. A problem was observed, however, with access control to the site after the time that a site evacuation had been announced at 7:58 p.m. A security officer was observed in the primary access point at 8:24 p.m. handing out site access badges to personnel entering the site. Procedure SCP-7, "Accountability and Evacuation," requires that the personnel be checked against a site emergency personnel access list and that completed emergency personnel cards be placed in the slot where the badges were removed. The inspector noted that several personnel entered the site at this time without a confirmation check of their emergency access. This problem was subsequently corrected; however, the problem existed for a sufficient length of time to allow at least five individuals to enter the site without confirmation that they were essential emergency personnel.

The inspection team learned after the exercise that a security check point had been set up at the access road to the plant at the time of the site evacuation. Such actions, however, would not have prevented nonessential personnel in either the training center or the trailers outside of the protected area fence from inadvertently entering the protected area during the emergency after nonessential personnel had been evacuated. Failure to maintain positive site access control of nonessential personnel following a site evacuation was identified as an exercise weakness (285/9044-03).

No violations or deviations were noted in this program area.

6. Fire Brigade Response

The inspection team observed the response of the fire brigade during the exercise to verify that objectives were satisfactorily met in this area. The fire brigade was dispatched in response to an explosion and fire in the auxiliary building.

The inspectors noted that the initial report of fire and explosion in the auxiliary building was received at 9:30 p.m. The CR staff verified the reports by finding fire alarms indicated on the fire alarm panel and indication of fire pumps running. After discussions among the CR staff concerning the validity of the fire alarms, a decision was made at 9:43 p.m. to dispatch an auxiliary operator and health physics technician

to investigate. At 10:01 p.m. the CR received a report that the team was dispatched to the fire. The team entered the radiological controlled area (RCA) at 10:29 p.m. A status report was received from the team by the OSC at 10:45 p.m. The fire brigade was subsequently dispatched and was observed entering the auxiliary building at 11 p.m., over 1 1/2 hours following the initial indications of a fire. Untimely response to indications of a fire potentially threatening safety systems is considered an exercise weakness (285/9044-04).

No violations or deviations were identified in this program area.

7. Technical Support Center (82301)

The inspection team observed and evaluated the TSC staff as they performed tasks in response to the exercise. These tasks included activation of the TSC, accident assessment and classification, notification, dose assessment, and technical support to the CR. The inspector specifically observed TSC activities relating to two previous exercise findings which remained open.

During the June 1988 annual exercise, a deficiency was identified for several examples of ineffectiveness of the TSC staff in their evaluation of plant conditions and in providing technical support to operations (285/8820-07). In the response letter dated August 24, 1988, the licensee pointed to examples where TSC support functions were effectively demonstrated, but acknowledged that a deficiency in the TSC arose as a result of (1) lack of prepared guidance material needed to evaluate primary coolant leak rates, and (2) incomplete and inconsistent information provided by the scenario. The licensee committed to certain actions to correct the deficiency including the evaluation of TSC staff positions and experience levels, development of guidance materials on leak pathways, and providing an independent review of the scenario for technical consistency. This deficiency was not closed during the following annual exercise conducted in July 1989 because of poor licensee performance by the TSC staff.

During the July 1989 annual exercise, a weakness was identified due to several instances of poor coordination, direction, and technical support by the TSC staff (285/8929-02). In the response letters dated December 15, 1989, and January 12, 1990, the licensee acknowledged this weakness and identified as contributing causes the insufficient guidance used by key TSC staff to define their responsibilities for coordinating and directing the control room staff, and the fact that telephone lines between the CR and TSC were not sole use. The licensee committed to certain actions to correct the weakness including: (1) a review of site director responsibilities and delegation to others in the TSC those responsibilities which hinder command and control functions within the TSC; (2) improving the information management system within and between the CR, OSC, and TSC; (3) increase the operational experience and training for TSC staff; (4) provide scenario information accurately and completely

to exercise players; and (5) reduce overcrowding, confusion, noise, and nonessential verbal communications within the TSC.

The weak areas making up these previous findings within the TSC are interrelated and collectively could all be considered command and control problems. During the 1990 exercise evaluation, the inspector evaluated the TSC activities to determine whether the programmatic deficiencies had been corrected.

Based upon activities observed in the TSC, and consultation with inspectors evaluating the other ERFs, the inspection team concluded that programmatic deficiencies continue to exist in each of the major areas making up the previous items. Examples are provided in the subsections that follow:

#### Coordination

Both in the turnover of emergency director (site director) responsibilities from the CR to the TSC, and throughout the exercise, the status of plant systems and operations was poorly communicated to the TSC (see also CR exercise weakness 285/9044-02). The TSC personnel did not have an accurate understanding of many important plant equipment line-ups until near the end of the exercise, including:

- ° TSC operations did not understand that the plant cooldown was being conducted via the steam generator atmospheric dump valves until about 9:25 p.m. Operations shifted to the dump valves about an hour earlier at 8:30 p.m. As late as 9:20 p.m., TSC operations personnel thought there might be a rupture in the auxiliary feedwater (AFW) pump discharge piping because they saw the AFW flow data, but no steaming path.
- ° Similar to the above observation, it appeared to take operations personnel in the TSC about 30-45 minutes to understand that all reactor coolant pumps (RCPs) had been tripped and that the plant was in a natural circulation cooldown.
- ° The TSC did not find out that the two remaining auxiliary building ventilation fans (VA-40B and VA-40C) had failed at 8 p.m. until about 85 minutes later at 9:25 p.m.
- ° Notification to the NRC of the site area emergency was made by both the CR and the TSC. Following the exercise, the licensee's representatives stated that emergency notifications to the NRC should always be from the CR.

#### Direction

The poor flow of plant equipment and operations status to the TSC from the CR was compounded by the observation that rigorous communications protocol between the two facilities was not established. Individual groups within



the TSC were allowed to obtain data and information from the CR and not post or share it with other TSC personnel. Throughout the exercise, the following activities were not corrected or modified to improve TSC personnel understanding of the overall sequence of events:

- ° TSC site director briefings were extremely short, contained typically two or three basic equipment status statements, did not set priorities for TSC working groups, and were not preceded by a systematic solicitation of status from each of the TSC working groups.
- ° Key TSC managers did not compare their understanding of plant status, priorities, projected problem areas, or successful accomplishments in any formalized manner (i.e., periodic meetings with TSC managers in a separate conference room, or stand-up managers briefings in the TSC to receive brief reports and to immediately provide required direction).
- ° Directions provided to one group were often not heard or understood by an associated group. As an example, in trying to determine if a fire main rupture had occurred, the maintenance liaison person was quietly asked in the back of the TSC to have OSC personnel search for the leak. Meanwhile, the security liaison was directing guards to search outside of the plant. The remainder of the TSC was not made aware that this was a top priority, or that two separate groups had been assigned the search task.

#### Technical Support to Operations

The operations group in the TSC was continuously faced with a lack of plant status information and resorted in some cases to guessing what operations were in progress. Had a method been achieved to obtain and display plant status, the TSC would have been free to provide support, rather than spending the majority of their time trying to sort out confusing and conflicting data and system status.

The TSC did not adequately set priorities for accomplishment of investigations and repair activities of OSC teams.

#### Evaluation of Plant Conditions

The prompt drop in containment pressure of 1/2 psig between 8:30 p.m. and 8:45 p.m. was noted in the TSC, but did not result in evaluation of the consequences of containment leakage rates higher than design values or most recent integrated leak rate test data.

The problems noted with command and control by the TSC staff was identified as a repeat exercise weakness. Because this finding has remained programmatically uncorrected from the 1988 and 1989 exercises, the failure to correct exercise deficiencies and weaknesses in this area

was identified as a violation of 10 CFR Part 50, Appendix E.IV.F.5 (285/9044-01).

One violation of NRC requirements was identified in this program area.

8. Operational Support Center (82301)

The inspection team observed and evaluated the OSC staff as they performed tasks in response to the exercise. The tasks included activation of the OSC, personnel staffing, and support to the CR, TSC, and EOF.

In general, the OSC provided good support to operations in the performance of plant investigation and repair activities. Activation was timely; however, staffing was lacking in health physics (HP) support and electricians. The inspector observed that a short delay of about 10 minutes occurred in sending out the third "B Team" because at the time, there was no HP support available. The CR also found that no one was readily available in the OSC to deenergize the motor control centers required to kill the power to the cable trays involved in the fire.

Following the exercise, the licensee representatives stated that a conscious decision was made to send certain ERO staff home after responding to the emergency in order to maintain these persons fresh for continued normal plant operations. Because of this, the inspectors acknowledged that the same lack of personnel observed during the exercise would not likely have occurred during a real emergency under the same conditions.

No violations or deviations were identified in this program area.

9. Medical Response Team

The inspection team observed and evaluated the licensee's response to a simulated contaminated injury victim in the auxiliary building to determine whether appropriate procedures were used and followed, whether adequate contamination control practices were used, and whether the response was timely and efficient. The inspectors noted minor controller problems with the radiation monitoring when a technician was observed using the incorrect instrument scale for the radiation levels being given to him. The medical team responded quickly and worked efficiently in caring for the victim. Contamination control practices were deemed to be adequate.

No violations or deviations were identified in this program area.

10. Emergency Operations Facility (82301)

The inspection team observed and evaluated the EOF staff as they performed tasks in response to the exercise. These tasks included activation of the EOF, accident assessment, offsite dose assessment, and protective action decisionmaking.

EOF staffing was good and activation was within the timeliness criteria of NUREG 0654. The inspector found that emergency response members reporting to the EOF cannot gain prompt access to the facility before the arrival of one of the assigned emergency directors (EDs) who carry the keys to the facility. A shift supervisor at the fossil power plant where the EOF is located can open the facility, however, to do so would delay access to the first arriving ERO members. The inspector concluded that several EOF staff could arrive earlier than the EDs and that if they had immediate access to the facility, activities such as establishing communication links and powering up computers and data terminals could reduce activation time. The inspectors recommend as an improvement item, consideration of methods to permit immediate access to the EOF by ERO staff assigned to the facility.

The inspector observed that the EOF staff was efficient, coordinated, and all members knew their respective responsibilities. Despite the scenario not calling for an offsite release, the EOF was active in assessing potential releases.

No violations or deviations were identified in this program area.

#### 11. Scenario

The inspection team evaluated the exercise scenario both before the exercise and during the course of the exercise to determine whether it was sufficiently challenging, technically accurate, and well thought out. The inspection team attended a scenario briefing on November 27, 1990, given by the scenario development team and lead controllers. In part, because of questions raised by the inspection team, the scenario was rewritten to correct several technical inaccuracies. Examples of the inaccuracies noted by the inspection team in the original scenario are the following:

- The original scenario assumed that operators would trip one RCP in the unaffected loop following shaft seizure and impeller degradation on the RC-3C RCP. The original data then assumed a forced cooldown for the remainder of the scenario with one RCP running in each loop. During the scenario briefing, inspectors questioned whether vendor guidance might require tripping the second pump in the affected loop. Following the briefing, scenario developers changed the entire scenario to a post-trip natural circulation cooldown.
- The original scenario showed no safety injection actuation signal (SIAS) with a 300-400 gpm RCP seal leak and two charging pumps injecting about 80 gpm. During the scenario briefing, the inspectors questioned how the pressurizer would stay full in this situation with loss of coolant and thermal shrink far exceeding makeup. Following the briefing, the scenario developers rewrote the data to include SIAS.
- The original scenario showed containment wide range sump level decreasing following 10:30 p.m. with no sump pumps operating and high

pressure safety injection not in the containment sump recirculation mode. Following inspectors' questions on this data during the briefing, scenario developers rewrote the data to show continuously increasing containment sump level.

- ° The original scenario showed feed flow and steam flow going to 0, and no auxiliary or main feed pumps in operation following the reactor trip, and throughout the cooldown (i.e., no obvious heat sink). Following the scenario briefing, the data was corrected to show auxiliary feedwater in operation for the cooldown.

Despite the scenario data being significantly rewritten only one day before the exercise, several scenario problems continued to exist and effect exercise realism as follows:

- ° The emergency response facility computer system (ERFCS) data sheets showed all four reactor coolant pumps running for the duration of the exercise while the scenario called for one to be tripped at 7:30 p.m., and the other three were assumed manually tripped by the operators at about 8:30 p.m.
- ° The ERFCS data sheets showed containment normal range area, gaseous, and particulate monitors at 0 as containment radiation levels increased to over 10,000 Roentgen per hour (R/h).
- ° The scenario data showed containment pressure and temperature continuing to decrease after failure of all CCW pumps (the cooling medium for the containment coolers).

The above examples of scenario-related problems constitute an exercise weakness (285/9044-06).

## 12. Licensee Self-Critique

The inspectors observed and evaluated the licensee's self-critique for the exercise and determined that the process involved adequate staffing and resources and involved the participation of higher management. Due to the short period of time between the exercise and the critique, player input had not been integrated in the findings and consequently the critique was offered as a preliminary draft. The licensee identified five weaknesses as summarized below:

- ° Delays of over 1 hour in assessing a fire in the auxiliary building.
- ° Poor communication practices including transfer of plant status information from the CR to the TSC.
- ° Poor record keeping practices in the ERFs.
- ° Security access control to the EOF could have allowed nonemergency response personnel to gain access to the facility.

- Unauthorized simulation by exercise participants.

The inspectors noted that the licensee was able to properly identify and characterize a number of exercise weaknesses and that several coincide with findings by the inspection team.

No violations or deviations were identified in this program area.

13. Exit Interview

The inspection team met with the licensee representatives indicated in paragraph 1 on November 30, 1990, and summarized the scope and findings of the inspection as presented in this report. A conference call was subsequently held between licensee and NRC staffs on December 4, 1990, for the purpose of providing additional information to the inspection team. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspectors during the inspection.