APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-445/90-44
50-446/90-44

Operating License: NPF-87
Construction Permit: CPPR-127

Dockets: 50-445
50-446

Licensee: TU Electric
Skyway Tower
400 North Olive Street, L.B. 81
Dallas, Texas 75201

Facility Name: Comanche Peak Steam Electric Station (CPSES)

Inspection At: Glen Rose, Texas

Inspection Conducted: November 12-15, 1990

Inspector: Blaine Murray for 12/26/90
Nemen M. Terc, Emergency Preparedness Analyst (NRC Team Leader) Date

Accompanying Personnel:
K. Kennedy, License Examiner, NRC
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Approved: Blaine Murray 12/26/90
Blaine Murray, Chief, Radiological Protection and Emergency Preparedness Section Date

Inspection Summary

Inspection Conducted November 12-15, 1990 (Report 50-445/90-44; 50-446/90-44)

Areas Inspected: Routine, announced team 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), operational support center (OSC), and the emergency operations facility (EOF) during the exercise.

Results: Within the areas inspected, no violations or deviations were identified. Six exercise weaknesses were identified by the inspection team (paragraphs 5-9).

The performance of the licensee during the 1990 exercise was good. The licensee demonstrated ability to protect the health and safety of emergency workers and the public by effectively detecting, identifying, and classifying accident conditions, making accurate and timely notifications to offsite officials, taking adequate protective actions onsite, making timely and conservative protective action recommendations to the states, performing adequate technical reviews to mitigate accident consequences, and determining the magnitude of site releases. Improvements from previous exercises were noted.

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

TU Electric

*W. Cahill, Jr., Executive Vice President
*A. Scott, Vice President, Nuclear Operations
*G. Bell, Senior Engineer, Licensing
*J. Salsman, Emergency Planning Manager
*D. Pendleton, Assistant Project Manager
*J. Scott, Executive Assistant
*C. Terry, Director, Quality Assurance
*J. Kelley, Plant Manager
*D. Moore, Work Control Manager
*M. Blevins, Manager, Nuclear Operations Support

Others

*W. Johnson, Senior Resident Inspector, NRC
*E. Ottney, Project Manager (CASE)

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

*Denotes those present at the exit interview.

2. Followup on Previous Inspection Findings (92701)

(Closed) Open Item (445/8958-01): Poor Coordination in the CR - This item refers to some instances during the 1989 exercise when the proficiency of emergency responders did not result in a well coordinated and efficient response. As a result, accident mitigation actions were unnecessarily delayed. During the 1990 exercise, the inspection team noted that coordination and direction from the CR was coordinated and efficient and that no unnecessary delays were caused by inadequate performance of the CR staff.

(Closed) Open Item (445/8958-02): Inadequate Coordination in the TSC - This item refers to the lack of proper coordination of technical support of critical emergency repair actions by the TSC which resulted in unnecessary delays in critical emergency repairs observed during the 1989 exercise. During the 1990 exercise, the technical support staff was observed to efficiently support the carrying out of critical emergency repairs.

(Closed) Open Item (445/8958-04): Inadequate Account of Emergency Repair Personnel - This item refers to poor OSC staff displays and accounting of emergency repair teams. During the 1990 exercise, the inspection team

noted that new status boards providing information on repair teams were used to effectively account for emergency repair teams.

(Closed) Open Item (445/8958-05): Failure to Follow OSC Activation Procedure - This item refers to several instances during the 1989 exercise when the OSC staff did not follow Procedure EPP-205, "Activation and Operation of the OSC." During the 1990 exercise, the inspection team noted that the OSC staff adhered to written procedures.

(Closed) Open Item (445/8958-06): Weak Coordination of Emergency Repair Teams - During the 1989 exercise, the inspection team noted that the CR staff did not effectively coordinate and did not provide adequate information feedback necessary to protect emergency repair teams from hazards. During the 1990 exercise, the inspection team observed that the CR staff properly coordinate information feedback to repair teams. However, there were isolated instances of inadequate radiological practices by persons exiting the controlled area. This separate weakness is discussed further in paragraph 8.

3. Program Areas Reviewed

The inspection team observed licensee activities in the CR, TSC, OSC, and EOF during the exercise. The inspection team also observed emergency response organization staffing; facility activation; detection, classification, and operational assessment; notifications of licensee personnel; notifications of offsite agencies; formulation of protective action recommendations; offsite dose assessment; in-plant corrective actions; security/accountability activities; and recovery operations.

There were various concerns identified during the course of the exercise; however, none of the concerns were of significance to be classified as 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 and thus needs licensee corrective action.

4. Scenario

The 1990 CPSES exercise scenario began with the reactor operating at full power. At that time, there were indications of fuel failure. A leak developed in the reactor head vent line, and later the CR lost all annunciators due to a power failure. In the course of events, the percentage of failed fuel increased and a main steam line ruptured. Another independent failure of the system involved a large primary to secondary leak in one of the steam generators, and the failure of a main steam isolation valve (MSIV) in a partially open position. This provided a release path of radioactivity to the environment which resulted in a simulated radiation hazard to the public and required protective actions offsite.

5. Control Room (82301)

The inspection team observed and evaluated the CR staff as they performed tasks in response to the exercise. These tasks included detection and classification of events, analysis of plant conditions and corrective measures, protective action decisionmaking, and notifications.

The performance of the CR staff was observed to be adequate during the exercise. However, the inspection team identified instances where CR personnel failed to demonstrate adequate proficiency in the performance of their assigned emergency response duties. On one occasion, the CR staff made a conscious decision to deviate from Emergency Operating Procedure (EOP) 3.0A without regard for the radiological hazards of doing so. On another occasion, the CR operators failed to follow the correct sequence of steps in EOP 3.0A, "Steam Generator Tube Rupture," and did not know when to implement Associate Procedure ECA 3.1A, "Steam Generator Tube Rupture With Loss of Reactor Coolant."

The inspection team noted the following:

- At 10:05 a.m. the reactor operator in the CR recommended opening the steam dumps to minimize the steam flow from the main steam line break on the No. 1 main steam line. The shift supervisor (SS) and the unit supervisor (US) directed the opening of the steam dumps. This occurred during the performance of Step 17 of EOP 3.0A which initiates the cooldown sequence of the reactor coolant system (RCS) by dumping steam at the maximum rate from the unaffected steam generator (SG). This action caused a larger decrease in pressure in the affected (ruptured) SG than if the steam dumps had remained closed. This resulted in an increase in the differential pressure between the ruptured SG and the RCS which, in turn, caused a considerable increase in the primary to secondary leak rate in the affected SG. The increase leakage of radioactive effluents into the secondary side would have a definitive effect on the radiological hazards at the locations surrounding the steam leak. However, the CR operators did not take such factors into consideration. At 10:09 a.m. the SS instructed the US to close the steam dumps.

- The US had difficulties implementing Procedures EOP 3.0A and ECA 3.1A. On Step 18, Procedure EOP 3.0A directed the operator to check whether the ruptured SG pressure was stable or increasing. The procedure directed the operator to make a transition to ECA 3.1A. The operator failed to do so. Instead, the US remained in EOP 3.0A and began depressurizing the RCS according to that procedure at 10:16 a.m. It was not until 10:34 a.m., 18 minutes later, that the SS directed the US to make the transition to Procedure ECA 3.1A as required.

- At 10:34 a.m., the US was directed by the SS to implement Procedure ECA 3.1A; however, he failed to implement the steps following the correct sequence. At 10:35 a.m., the US directed the

reactor operator (RO) to secure all pressurizer heaters according to Step 17 and incorrectly directed the RO at 10:37 a.m. to secure all but one reactor coolant pumps (RCPs) in accordance with Step 19 of ECA 3.1A. Instead of following orders, the RO questioned the validity of this directive and indicated that the procedure called for a transition to Step 25 directly from Step 16. Between 10:37 a.m. and 10:43 a.m., the SS coached the US in the intended use of ECA 3.1A.

The performance inadequacies described above constitute an exercise weakness (445/9044-01).

Further observations by the inspection team in the CR determined information flow discrepancies as follows:

- At 9:49 a.m. the CR staff recommended to the TSC staff to declare a general emergency (GE) based on existing plant conditions such as: indications of failed fuel, a faulted SG, and a SG tube rupture greater than 50 gpm. These conditions should have resulted in the declaration of a GE. However, the TSC staff incorrectly declared a site area emergency (SAE) at 9:52 a.m. It was not until about 9 minutes later (10:03 a.m.) that the GE was declared by the EOF staff. From this sequence of events, the inspection team concluded that there was poor information flow between or within one or more of the emergency response facilities (ERFs) involved in this decisionmaking process.

The above examples of poor information flow observed in the CR are considered to be an exercise weakness (445/9044-02).

It was noted in the CR that Form EPP-203-8, "Notification Message Form," was not complete at times in that the names of individuals contacted from the offsite agencies were not recorded on the form at the time of notification. This was observed to occur on three different occasions. In addition, the inspection team noted that the communicator in the CR was not always accurate in sending the message as written. When message No. 2 was generated, the statement "No fuel damage exists," was added to Block 6 of the notification form. However, the communicator told offsite agencies that there was no change from Message 1. Finally, the clock of the telefax machine indicated daylight savings time instead of standard time.

The above inaccuracies in notification procedures are considered to be an exercise weakness (445/9044-03).

No violations or deviations were identified in this program area.

6. 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, dose assessment, protective action decisionmaking, notifications, and technical support to the CR.

The inspectors noted that the staff performed well during the exercise. However, the NRC team observed some instances of inadequate information flow within and between ERFs. In particular, information flow inadequacies were identified within the TSC which resulted in delays in classification, uncertain interpretation of plant conditions, and uncertainties pertaining to the significance and extent of core damage. Other information flow inadequacies between the CR and the TSC resulted in unnecessary delay of repair activities. The following are examples of inadequate information flow:

- Different emergency responders in the TSC showed a different understanding of certain events indicating poor information flow within the TSC. For example, during the 9 a.m. briefing in the TSC a staff member stated that a source range channel calibration was in progress. The TSC advisor stated that it was only a verification of a prior calibration, but at 9:15 a.m. the maintenance coordinator indicated that an actual calibration of the source range channel was taking place. This points to an apparent lack of proper information flow between the TSC, CR staffs, and the repair groups.

- At 10:39 a.m. the TSC staff refused to support the CR request to sample the ruptured SG. Apparently, the TSC staff was not aware that sampling the SG was required by Step 28 of Procedure ECA 3.1A as part of the shutdown margin determination.

- The 25 percent clad damage assessment was not correlated to a specific RCS sample. As a consequence, the core damage assessment could not be related to a particular set of plant conditions at a specified time, and the TSC staff was unable to determine when the 25 percent core damage first occurred.

- The emergency coordinator (EC) requested an RCS sample prior to leaving the CR at approximately 8:40 a.m. due to a reactor power decrease. However, at 9:10 a.m. the onsite radiation assessment coordinator (ONRAC) in the TSC believed that instead, a post accident sample (PASS) had been requested by the EC.

- At 9:23 a.m. the CR reported a steam leak to the TSC staff but did not identify the exact location of the leak. At 9:28 a.m. the TSC staff received a report that the steam leak was in the feedwater isolation valve (FWIV) inside the safeguards building. At 9:29 a.m. the CR room announced that there was a steam leak in main steam line No. 1 on the roof of the electrical and control building. At 9:53 a.m. the EC in the TSC was still uncertain about the actual location of the leak. It was not until 9:58 a.m. when the TSC staff called the CR to confirm the exact location of the steam leak

- At 9:49 a.m. the CR and TSC staffs knew that plant conditions existed that warranted the declaration of a GE. However, this information was not conveyed at that time to the TSC manager or to the EC in the EOF. At 9:53 a.m. the EC in the EOF announced an SAE. This caused the CR to alert the TSC manager to the fact that a GE was warranted. At 9:54 a.m. the TSC manager, in turn, passed on the information to the EC staff in the EOF. A GE was declared by the EC at 10:02 a.m. Although this situation did not result in a major delay, it shows another instance when poor information flow resulted in an unnecessary delay of 9 minutes in declaring the appropriate emergency class.

- At 10:10 a.m. the last entry on the radiological status board indicated that it was made at 9:09 a.m. This information indicated that a potential for radioactive release was present but was not taking place and that no protective action recommendations were in effect. In contradiction, the status board also indicated that sheltering was required in Sector 2.A. At 9:47 a.m. a release was actually in progress due to the combined effects of the fuel failure, steam leak, and the failure of the MSIV to shut. The status board was not updated again until 10:15 a.m.

  At approximately 1:10 p.m., the operations status board indicated that the temperature in RCS Cold Loop 1 was higher than the temperature in the hot leg. However, RCS Loops 2 through 4 were indicating hot leg temperatures higher than the respective cold leg temperatures. The TSC staff apparently did not question the validity of the data nor demanded an explanation for this discrepancy. When prompted by the observer, the TSC staff could provide no explanation for this indication.

The above instances of poor information flow observed in the TSC constitute a weakness (445/9044-04).

No violations or deviations were identified in this program area.

7. 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 and classification, offsite dose assessment, protective action decisionmaking, notifications, implementation of protective actions, preparations for entering the recovery phase, and interaction with state and local officials.

The EOF staff performed well during the exercise. No weaknesses were identified.

No violations or deviations were identified in this program area.

8. Operational Support Center (82301)

The inspection team observed and evaluated the OSC staff's performance during the exercise. Items observed included activation of the OSC, personnel staffing, and support to the control room, technical support center, and emergency operations facility.

The inspection team noted that the activation of the OSC was performed quickly and orderly. The overall performance of the OSC staff appeared to be good.

Improvements were noted in the licensee's tracking of emergency repair and damage control teams. Information concerning the team number, member names, dispatch time, work location, and return times were posted on a status board in the OSC.

Even though improvements were noted in the licensee's performance in the OSC, the following items were observed during the exercise:

- An auxiliary operator (AO), sent to main steam isolation valve room, did not wait for the radiation protection (RP) technician who was to accompany him. This was a failure to adequately communicate instructions to the AO which resulted in a radiation survey not being taken, and also in an individual entering an area posing an unknown radiation hazard.

- It was known at 9:48 a.m. that there was perhaps a leakage from the primary system to the secondary system; however, an air sampling was not performed in the MSIV room until 11:45 a.m. This was after Team 6 had already performed work in the room without respiratory protection equipment, a situation which could have resulted in exposure to airborne radioactive hazards.

- The RP technician providing coverage for Team 6 made only initial radiation measurements in the MSIV room even though the team was in the room for approximately 40 minutes. Calculations of radiation exposures was based only on these initial survey results. The lack of additional surveys could have resulted in the failure to identify rising radiation levels.

The lack of adequate radiological controls observed above constitutes an exercise weakness (445/9044-05).

9. Scenario Problems

For the most part, the scenario was good. The technical and logistical aspects of the scenario were coherent and provided enough challenge and information to the players to exercise the emergency functions falling within the scope of the exercise objectives.

However, several observations made in different ERFs indicated that controllers' actions were not always appropriate to the conduct of the exercise and that more training of controllers may be needed prior to the next annual exercise. Some of the controllers' actions could possibly be remedied by more careful planning and anticipation by scenario developers. For example, controllers were not observed to be adequately sensitized to prevent actions on their part that could result in inadvertent or involuntary prompting of players. Simulation announcement messages were not prepared beforehand to prevent confusion and delays. In addition, in some instances exercise controllers fed emergency responders incorrect data or incomplete information such as: expected radiation readings in plant areas like the residual heat removal (RHR) pump room, and lack of written initiating conditions for control room players. The following are some specific examples:

- At 9:57 a.m. the TSC manager was observed to lack a simulated message instructing him on how to make an announcement to evacuate nonessential personnel without causing at the same time the unwanted evacuation of workers who were performing needed repairs within the protected area. This situation could have been avoided by better planning of scenario simulated messages.

- A TSC controller inadvertently kept interfering with the line of vision of the TSC manager forcing the TSC manager to walk away from his normal location in the TSC in order to keep himself abreast of information updates posted in the status boards. Prior to the emergency exercise, controllers could be sensitized in order to prevent interferences with emergency responder's actions.

- The inspection team noted that at 1:05 p.m. the RHR pump was running in the refueling water storage tank (RWST) recirculation mode. This, in fact, would preclude any significant radiation increase in the RHR pump room. However, contrary to any reasonable expectation, at 1:05 p.m. the TSC staff received information indicating that the area radiation monitor in the RHR pump room indicated 41 R/hr.

- The CR staff, and in particular, the SS were not given written messages indicating that there were minor indications of failed fuel when initial conditions were given to them. As a consequence, the SS did not take into consideration failed fuel indications.

- The scenario did not anticipate the CR staff would stop the annunciator maintenance work once the plant shutdown began. At 7:25 a.m. the US directed the RO to tell the electrician to stop pulling fuses for annunciator maintenance.

The above examples of scenario-related problems constitute an exercise weakness (445/9044-06).

10. Licensee Self-Critique

The inspectors observed and evaluated the licensee's self-critique for the exercise and determined that the process of self-critique involved adequate staffing and resources and involved the participation of higher management. The inspectors noted that the licensee was able to properly identify and characterize exercise weaknesses and that they, for the most part, coincided with findings by the inspectors.

No violations or deviations were identified in this program area.

11. Exit Interview

The inspection team met with the resident inspectors and licensee representatives indicated in paragraph 1 on November 15, 1990, and summarized the scope and findings of the inspection as presented in this report. The licensee acknowledged their understanding of weaknesses and agreed to examine them to find root causes in order to take adequate corrective measures. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspectors during the inspection.