

**ENCLOSURE 2**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket Nos.: 50-498  
50-499

License Nos.: NPF-76  
NPF-80

Report No.: 50-498/98-20  
50-499/98-20

Licensee: STP Nuclear Operating Company

Facility: South Texas Project Electric Generating Station, Units 1 and 2

Location: FM 521 - 8 miles west of Wadsworth  
Wadsworth, Texas

Dates: November 2-5, 1998

Inspector(s): Michael C. Hay, Radiation Specialist

Approved By: Blaine Murray, Chief, Plant Support Branch

Attachment: Supplemental Information

## EXECUTIVE SUMMARY

South Texas Project Electric Generating Station, Units 1 and 2  
NRC Inspection Report 50-498/98-20; 50-499/98-20

### Plant Support

- Overall, the internal and external exposure control programs were effectively implemented. Workers were knowledgeable of work area radiological conditions and controls. Calibration and response checks for portable radiation detection instruments and whole body counters were properly conducted. Housekeeping throughout the radiological controlled area was good (Section R1.1 and R1.2).
- A violation of 10 CFR 20.1501 was identified involving the failure to survey, resulting in a radiation area not being properly posted. No response to this violation is required (Section R1.1).
- Survey documentation not accurately reflecting an area surveyed was identified by the NRC. The licensee had also identified examples where surveys were not meeting management expectations (Section R1.1).
- Overall, an effective quality assurance program was implemented. Quality assurance surveillances and a radiation protection department self assessment provided management with a good assessment of program performance. No negative trends were identified during the review of radiological condition reports written since January 15, 1998 (Section R7.1).

## Report Details

### IV. Plant Support

#### **R1 Radiological Protection and Chemistry Controls**

##### R1.1 Exposure Controls

###### a. Inspection Scope (83750)

The inspector interviewed radiation protection personnel and reviewed the following:

- Radiological controlled area access controls
- Radiation work permits
- Radiological Surveys
- Pre-job health physics briefings
- Control of high and locked high radiation areas
- Radiological posting
- Personnel dosimetry use

###### b. Observations and Findings

The inspector observed activities at the radiological controlled area access/egress control point and noted that station workers used the personnel contamination monitoring and computerized log-in/out equipment properly. Radiation protection personnel were available to provide timely response and direction to station workers who alarmed the personnel contamination monitors or who needed assistance gaining access to the radiological controlled area. The inspector determined that the access and egress process functioned properly and was easy for the radiation workers to use.

The inspector determined that the radiation work permits provided accurate radiological data and proper radiological controls to protect and inform the worker. All radiation workers questioned by the inspector were knowledgeable of their radiation work permit requirements and knew to contact health physics personnel if their electronic dosimeter alarmed.

The inspector attended a health physics pre-job briefing performed prior to the transfer of spent resin to a high integrity container. Good communications were noted between the participants. The expected radiological conditions and controls to maintain doses ALARA, along with the actions to take for unexpected conditions, were discussed. Overall, the inspector determined that the pre-job briefing was effective.

During tours of the radiological controlled area, the inspector observed that high radiation areas were properly posted and controlled. All high and locked high radiation doors observed were locked or properly controlled.

During a tour of the Unit 2 fuel handling building on November 2, 1998, the inspector measured radiation exposure rates between two storage containers on the 68-foot elevation of approximately 26 millirem per hour. The area was not conspicuously posted as a radiation area. The inspector notified health physics personnel who verified radiation exposure rates. The licensee documented the survey results and properly posted the area as a radiation area.

The inspector was informed by the licensee that between October 29 and November 2, 1998, steam generator nozzle dams were placed in the storage containers. The nozzle dams created the radiation levels which required posting the area as a radiation area. The inspector determined that the licensee failed to survey the area to evaluate the extent of radiation levels and the potential radiological hazards that could be present following placement of the steam generator nozzle dams into the storage containers. The failure to survey resulted in the area not being identified as a radiation area.

10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present. Pursuant to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

The licensee did not make surveys to ensure compliance with 10 CFR 20.1902 which requires the posting of each radiation area with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA." 10 CFR Part 20 defines a radiation area as, "an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates." The failure to survey an area to ensure compliance with 10 CFR 20.1902 is identified as a violation of 10 CFR 20.1501 (50-499/98020-01).

The inspector noted that immediate corrective actions consisted of properly posting the identified unposted radiation area, informing all plant health physics personnel of the problem, and performing a radiological survey of the entire radiological controlled area to ensure that all areas were properly posted and controlled. The licensee initiated Condition Report 98-17892 to evaluate the apparent cause of the event and determine the associated corrective actions needed to prevent a recurrence.

The inspector performed additional independent radiation surveys of selected areas and confirmed that survey data was accurate. During review of survey documentation, the inspector noted that Survey 2-98-10-1152 performed on October 18, 1998, failed to indicate that the reactor head stand area was posted as a high radiation area although radiation levels in this area required such postings. The licensee stated that, although survey No. 2-98-10-1152 did not indicate that the reactor head stand was posted as a high radiation area, the health physics log recorded that the area was posted as a high radiation area on October 18, 1998. The inspector verified that the log entry was made

and determined that the proper radiological controls were established. Through review of condition reports and audits, the inspector noted that the licensee had also identified several examples where surveys were not completed in accordance with management expectations. The inspector discussed with the licensee that improvement was needed to ensure that surveys were properly performed and survey maps accurately reflected the radiological conditions and postings. The licensee acknowledged the inspector's comment.

The inspector noted that all radiation workers observed in the radiological controlled area wore dosimetry devices appropriately. Thermoluminescent dosimeters were verified to be processed by a National Voluntary Laboratory Accredited Program.

c. Conclusions

In general, the external exposure control program was effectively implemented. Workers were knowledgeable of the work area radiological conditions and controls. Radiation work permits provided accurate radiological data and proper radiological controls to protect and inform the worker. A violation of 10 CFR 20.1501 was identified involving the failure to survey, resulting in a radiation area not being properly posted. Survey documentation did not accurately reflect the areas surveyed.

R1.2 Control of Radioactive Material and Contamination:

a. Inspection Scope (83750)

The inspector interviewed radiation protection personnel and reviewed the following:

- Radioactive contamination controls
- Personnel contamination events
- Air sampling
- Portable survey instrument calibration
- Whole-body counter calibration
- Housekeeping within the radiological controlled area

b. Observations and Findings

The inspector noted that radiological contamination survey instruments and personnel contamination monitors were properly used by workers exiting contamination areas. Release of materials from the radiological controlled area was conducted appropriately. Personnel contamination events were properly recorded. The inspector reviewed selected skin dose evaluations and determined that they were appropriately conducted using a proper computer code. The inspector reviewed an internal uptake dose estimate and verified the estimate was performed appropriately.

Air sample records for the period of October 1 through October 31, 1998, were reviewed. The records were maintained in an orderly manner and no deficiencies were noted.

The inspector reviewed calibration and response test records for portable radiation detection instruments, small article monitors, personnel contamination monitors, and whole-body counters. All radiation detection instrumentation reviewed had been calibrated within the specified interval and properly response checked. Whole-body counters were properly calibrated using National Institute of Standards and Technology traceable sources.

The inspector noted during a tour of the radiological controlled area on November 2, 1998, several housekeeping deficiencies on the 68-foot elevation of the fuel handling building. These deficiencies included miscellaneous pieces of personnel anti-contamination clothing not properly stored in designated storage locations. The inspector informed the licensee of these observations. On subsequent tours, the inspector noted that all housekeeping discrepancies were properly addressed by the licensee, and overall housekeeping throughout the radiological controlled area was good.

c. Conclusions

Overall, control of contamination was being effectively implemented. Personnel contamination events were properly recorded, and skin dose calculations were appropriately conducted. Air samples were properly performed and recorded. Calibration and response checks for portable radiation detection instruments and whole-body counters were properly conducted. In general, housekeeping within the radiological controlled area was good.

R1.3 Maintaining Occupational Exposure As Low As is Reasonably Achievable (ALARA)

a. Inspection Scope (83750)

Radiation protection personnel involved with the ALARA program were interviewed. The following areas were reviewed:

- Outage exposure goal establishment and status
- Site exposure goal establishment and status

b. Observations and Findings

Station, department, and individual exposures were appropriately tracked and trended by the ALARA group. The inspector noted that the 79 person-rem goal for 1998 was exceeded. As of November 4, 1998, the unit average person-rem was 93. The major reason for the actual person-rem dose being higher was due to significantly higher personnel dose received during Unit 2 Outage 2RE06 than what was projected.

Projected person-rem for Outage 2RE06 was 127; however, the actual person-rem for the outage was 174. The licensee believes the difference was the significant increase in general plant radiation levels from unexpected high levels of cobalt-58. In review of radiological surveys performed in the steam generators, the inspector noted that radiation levels had increased by approximately 40 percent from the previous outage,

which accounted for the significant increase in personnel dose. The inspector was informed that the licensee was in the process of evaluating better techniques to identify and quantify the amount of corrosion product buildup so that more accurate projections of radiation exposure rates are available for future outage planning. The licensee was also evaluating a modification to the primary system chemistry control in order to reduce the production and deposition of cobalt-58.

In discussions with ALARA personnel, the inspector was informed that no major preoutage planning problems occurred. No major outage tasks required an extended scope, and no emergent work was required which resulted in significant personnel dose.

The inspector attended a health physics post outage ALARA meeting where lessons learned and performance strengths were discussed. The inspector noted that good observations and recommendations were discussed.

c. Conclusions

The person-rem goal for Unit 2 Outage 2RE06 was significantly underestimated due to radiation exposure levels being approximately 40 percent higher than expected. The licensee was evaluating techniques to improve outage radiation exposure projections along with modifications to the primary system chemistry control to reduce the production and deposition of cobalt-58.

**R5 Staff Training and Qualifications**

a. Inspection Scope (83750)

The inspector reviewed the qualifications of the new health physics division manager.

b. Observations and Findings

Due to a recent staff change, a new individual was designated to fill the health physics division manager (radiation protection manager) position. Updated Final Safety Analysis Report (FSAR), Section 13.1.3.1, states, in part, that supervisory personnel will meet or exceed the guidance given on personnel qualifications contained in USNRC Regulatory Guide 1.8. From a review of the new health physics division manager's resume, the inspector determined that this individual satisfied FSAR commitments.

c. Conclusions

The new health physics division manager satisfied FSAR commitments.

## **R7 Quality Assurance in Radiation Protection Activities**

### **R7.1 Quality Assurance Surveillances, Radiation Protection Self Assessments, and Radiological Condition Reports**

#### **a. Inspection Scope (83750)**

Quality assurance surveillances, radiation protection self assessments, and radiological condition reports from January 16 to November 2, 1998, were reviewed.

#### **b. Observations and Findings**

Quality Assurance Surveillance Q8.2.7 was reviewed. This surveillance assessed the effectiveness and implementation of the health physics program in compliance with the requirement of 10 CFR 20.1101(c). A radiation protection audit performed during Unit 2 outage and a radiation protection self assessment were also reviewed. Overall, the inspector determined that all were probing and comprehensive and provided management with a good assessment of the radiation protection program. The inspector noted that findings were captured in the licensee's corrective action program for evaluation.

The inspector reviewed selected radiological condition reports written since January 15, 1998, and noted that the station identified items at a proper threshold to provide management with a good overview of radiological program areas. Corrective actions to prevent a recurrence appeared to be effective and, in general, condition reports were closed in a timely manner. The inspector identified no negative trends during this review.

#### **c. Conclusions**

Overall, an effective quality assurance program was being implemented. Two quality assurance surveillances and a radiation protection program self assessment were completed since January 15, 1998, providing management with a good assessment of the areas reviewed. No negative trends were identified during the review of radiological condition reports written since January 15, 1998.

## **R8 Miscellaneous Radiological Protection and Chemistry Issues**

### **R8.1 (Closed) Inspection Follow-up Item 50-498;-499/97006-09: Review the Implications of Contaminated Tools Being Released**

This item involved miscellaneous tools which were transported from South Texas Project to a vendor and discovered by the vendor to have low levels of fixed contamination. The inspector reviewed the actions taken by the licensee's assessment team and determined the problem was properly evaluated and corrective actions were appropriate to prevent a recurrence. The inspector identified no similar issues.

R8.2 (Closed) Violation 50-498;-499/98002-01: Failure to Inform Workers of a Change in Radiological Conditions

The inspector verified the corrective actions described in the licensee's response letter dated March 16, 1998, were implemented.

R8.3 (Closed) Violation 50-498;-499/98002-02: Failure to Survey

The inspector verified the corrective actions described in the licensee's response letter dated March 16, 1998, were implemented.

R8.4 (Closed) Violation 50-498;-499/98002-04: Failure to Post an Airborne Radioactivity Area

The inspector verified the corrective actions described in the licensee's response letter dated March 16, 1998, were implemented.

**V. Management Meetings**

**X1 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at an exit meeting on November 5, 1998. The licensee acknowledged the findings presented. No proprietary information was identified.

## ATTACHMENT

### Supplemental Information

#### PARTIAL LIST OF PERSONS CONTACTED

##### Licensee

P. Arrington, Licensing  
D. Bryant, Chemistry Supervisor  
W. Bullard, Health Physics Supervisor  
L. Earls, Consulting Engineer  
J. Groth, Vice President, Nuclear Engineering  
S. Head, Licensing  
S. Horak, Quality Assurance Auditor/Specialist  
B. Mackenzie, Manager, Engineering and Technical Support  
G. Powell, Health Physics Division Manager  
P. Serra, Manager, Emergency Response  
J. Sherwood, Radiation Protection Supervisor  
J. Simmons, Health Physics Supervisor

##### NRC

C. O'Keefe, Senior Resident Inspector

#### INSPECTION PROCEDURE USED

83750 Occupational Radiation Exposure

#### LIST OF ITEMS OPENED AND CLOSED

##### Closed

50-498;-499/97006-09	IFI	Review the Implications of Contaminated Tools Being Released
50-498;-499/98002-01	VIO	Failure to Inform Workers of a Change in Radiological Conditions
50-498;-499/98002-02	VIO	Failure to Survey
50-498;-499/98002-04	V!O	Failure to Post an Airborne Radioactivity Area

##### Opened

50-499/98020-01	VIO	Failure to Survey
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LIST OF DOCUMENTS REVIEWED

Procedure 0PGP03ZR0050, "Radiation Protection Program," Revision 2

Procedure 0PRP02ZR0007, "Evaluation of Intakes," Revision 3

Procedure 0PRP04ZR0013, "Radiological Survey Program," Revision 5

Procedure 0PRP07ZR0010, "Radiation Work Permits," Revision 6

Procedure 0PGP03ZR0051, "Radiological Access and Work Controls," Revision 9

Procedure 0PRP04ZR0011, "Radiation Protection Key Control," Revision 3

Procedure 0PRP04ZR0016, "Radiological Air Sample Analysis," Revision 5