ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-498/95-26
50-499/95-26

Licenses: NPF-76
NPF-80

Licensee: Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas

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

Inspection At: Wadsworth, Texas

Inspection Conducted: October 2-5, 1995

Inspector: Thomas H. Andrews, Radiation Specialist
Facilities Inspection Programs Branch

Approved: for Blaine Murray, Chief
Facilities Inspection Programs Branch

11/7/95
Date

Inspection Summary

Areas Inspected (Units 1 and 2): Routine, announced inspection of the radiation protection program with emphasis on changes resulting from the revision of 10 CFR Part 20. The inspection module used for this inspection was TI 2515/123.

Results (Units 1 and 2):

- The licensee implemented a very good training program regarding work activities in high and very high radiation areas. Workers and technicians demonstrated good working knowledge of requirements and precautions to be taken while working in these areas (Section 2.1.1).
- The licensee's procedures provided guidance for technicians and workers regarding posting and access controls for high and very high radiation areas (Section 2.1.2).
- Management was very active in oversight of activities related to radiation protection. Assessments were thorough and corrective actions were aggressively addressed (Section 2.1.3).

- The licensee's declared pregnant worker program was well implemented. Substantially reduced dose limits were discussed with workers to maximize the protection to the embryo/fetus. The licensee's dose assessment process was very thorough (Section 2.2).

- The licensee implemented a good respiratory protection evaluation process. Worker doses were maintained as low as is reasonably achievable (ALARA) while reducing the number of respirators issued. Workers demonstrated a good understanding regarding the need to maintain worker doses ALARA (Section 2.3).

- The licensee had developed a procedure to cover planned special exposure, but does not envision using it (Section 2.4).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

During the inspection period, both units operated at 100 percent power. Unit 2 was making preparations for a plant shutdown on the following weekend for refueling of the reactor core.

2 IMPLEMENTATION OF REVISED 10 CFR PART 20 (2515/123)

This inspection was conducted to evaluate the licensee's radiological controls for implementing the revised 10 CFR Part 20 to ensure that they have established programmatic controls that were effective with respect to high radiation areas, very high radiation areas, dose to the embryo/fetus, maintaining total effective dose equivalent ALARA while working in airborne radioactivity areas, and planned special exposures.

The revised 10 CFR Part 20 became mandatory for all licensees on January 1, 1994. The revised regulation differed in many ways from the "old" 10 CFR Part 20. This included changes in 10 CFR Part 20 philosophy and requirements, which emphasized the importance of controlling access to high and very high radiation areas and recognized the importance that some licensees have placed on the use of respiratory protection equipment.

2.1 High and Very High Radiation Areas

2.1.1 Training of Radiation Workers and Radiation Protection Technicians

The inspector reviewed the licensee's general employee training program to determine if it covered high radiation area and very high radiation area hazards, access procedures, postings, proper work practices, and radiation workers' responsibilities with respect to such areas. Definitions of high radiation area and very high radiation area were consistent with those provided in the revised 10 CFR Part 20.

Industry events were used to emphasize the importance of identifying and complying with postings associated with these areas. Information related to ALARA concepts was presented to aid the worker in minimizing doses in high and very high radiation areas. Radiation protection retraining was performed every 15 months in order to maintain radiation worker access requirements.

The inspector noted that the general employee training materials did not specifically address additional dosimetry requirements in high and very high radiation areas. The licensee stated that dosimetry requirements were provided in the radiation work permits and were reviewed with workers by radiation protection staff prior to entry into a high or very high radiation area. A review of radiological incident reports indicated that no problems had been identified associated with wearing improper dosimetry. The inspector determined that worker performance indicated that the licensee's process was working.

During an interview with a radiation worker, the inspector questioned how the electronic dosimetry worked in high radiation areas and high noise areas. The worker indicated that due to a hearing impairment, he had difficulty hearing high frequency sounds even in low noise areas, so he always observed his dosimeter on a frequent basis to ensure that it was not in alarm. The worker was then asked if he had informed radiation protection personnel of his impaired hearing. The worker replied that he had not. The worker stated that he would inform radiation protection personnel of his hearing deficiency.

The inspector discussed the use of electronic dosimetry in high noise areas and by people with a pronounced hearing loss with the licensee. Of special interest to the inspector was how the licensee complied with Technical Specification 6.12.b which states:

> Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following: . . . A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate levels in the area have been established and individuals have been made knowledgeable of them; or . . . .

According to Health Physics Position 328:

> Alarming dosimeters should not be used in high noise areas, when a user has a pronounced hearing loss, or when the alarming dosimeter would be muffled by heavy clothing (e.g., protective clothing). When alarming dosimeters are used in high noise areas, workers should be instructed to frequently check their alarming dosimeters visually (similar to reading a pocket ion chamber) or be equipped with a warning device (e.g., remote ear-piece or visual flashing light).

The type of electronic dosimeters used as an alarming dosimeter by the licensee did not have a remote ear-piece or visual flashing light as stated in the Health Physics Position. The licensee informed the inspector that there had been one instance where people had been in a high noise area where the dosimeters went into alarm but were not heard. There were no administrative limits exceeded as a result of this event. The licensee had taken corrective actions to ensure that personnel were instructed to frequently check their alarming dosimeters visually. This instruction was included in the general employee training and in the routine briefing provided by radiation protection personnel during pre-job briefings. The inspector confirmed this through discussions with training personnel, radiologically controlled area access point personnel, and worker interviews.

The licensee also stated that for entries into areas where additional monitoring was required by technical specifications, multiple monitoring methods were used. Typically, alarming dosimeters were used by workers

accompanied by a radiation protection technician who used a dose rate meter; either of which satisfied the requirements of Technical Specification 6.12.b.

The new requirements brought about by the revisions to 10 CFR Part 20 were incorporated into the licensee's general employee training program and radiation protection technician training program. All workers and radiation protection technicians interviewed were familiar with high radiation area and very high radiation area hazards, access controls and procedures, postings, proper work practices, and individual responsibilities with respect to such areas.

The inspector reviewed the licensee's training and continuing training programs for radiation protection technicians, focusing on lesson plans and lectures covering those areas of the plant that exhibit high or very high radiation dose rates during normal operations and/or outages, and those areas of the plant where radiological conditions may change rapidly. Technicians identified common evolutions that resulted in a need for posting changes. They also indicated familiarity with industry events associated with incidents involving changed or unexpected radiological conditions.

The licensee employed contractor radiation protection technicians for outage support. Technicians were required to have passed the Northeast Utilities examination since January 1994 (reflecting the changes to 10 CFR Part 20). A minimum score of 80 percent was required to be considered for employment. Once satisfying this screening requirement as well as meeting experience requirements, contractors were trained on site-specific procedures and must demonstrate their skills at identifying, posting, and documenting surveys. They were required to demonstrate proficiency with the use of equipment. This was documented on qualification cards.

Licensee procedures discussed job coverage requirements and responsibilities. This included job coverage responsibilities for work to be performed in high radiation areas and very high radiation areas. Discussions with technicians demonstrated that they held a good working knowledge of these requirements.

The inspector discussed stop work responsibilities with respect to departures from the radiological conditions or the work scope described in pre-job briefings, work packages, and radiation work permits with workers, technicians, management, and training personnel. Discussions with management confirmed that they endorsed and supported technicians if they had to stop work. Training personnel provided information showing where workers and technicians were instructed to follow the directions of radiation protection personnel while working in the radiologically controlled area. Technicians discussed various times where stop work authority had been used, demonstrating their knowledge and experience in this area. When presented with "what if" scenarios, workers indicated a good understanding of the need to stop work as well as actions that should be taken.

During discussions regarding stop work, the licensee indicated that a lot of the "high risk" type jobs had been identified and were discussed in

Procedure OPRP07-ZR-0009, Revision 5, "Performance of High Exposure Work." Types of jobs addressed were: filter replacement, spent resin movement, spent fuel or irradiated material transfer, and nuclear diving operations. Each of these tasks provided for a detailed job briefing, identification of abort criteria, and discussion of contingency plans.

Conclusion

The licensee implemented a very good training program regarding work activities in high and very high radiation areas. Workers and technicians demonstrated good working knowledge of requirements and precautions to be taken while working in these areas.

2.1.2 Implementing Procedures

The licensee developed implementing procedures posting and controlling access to high and very high radiation areas. The inspector specifically reviewed the following procedures:

OPGP03-ZR-0051, Revision 3, "Radiological Access and Work Controls"
OPRP07-ZR-0010, Revision 2, "Radiation Work Permits"
OPRP04-ZR-0011, Revision 1, "Radiation Protection Key Control"
OPRP04-ZR-0013, Revision 1, "Radiological Survey Program"
OPRP04-ZR-0015, Revision 2, "Radiological Posting and Warning Devices"
Standing Order 4-2, "Posting and Labelling"
Standing Order 4-6, "High Radiation Area Access Control"

The licensee's procedures described four types of high radiation areas. These were:

High Radiation Area	An area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 100 millirem in 1 hour at 30 centimeters (12") from the radiation source or from any surface that the radiation penetrates.
Locked High Radiation Area	An area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 1 rem in 1 hour at 30 centimeters (12") from the radiation source or from any surface that the radiation penetrates.
High Radiation Exclusion Area	An area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 10 rem in 1 hour at

	30 centimeters (12") from the radiation source or from any surface that the radiation penetrates.
Very High Radiation Area	An area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rad in 1 hour at 1 meter (3') from the radiation source or from any surface that the radiation penetrates.

Locked high radiation areas and high radiation exclusion areas were a subset of high radiation areas. Locked high radiation areas were specified to comply with technical specifications. High radiation exclusion areas were specified to provide additional access control requirements where overexposures could occur within a short period of time.

The inspector toured the facility to observe postings and access controls. Survey maps provided by the licensee were verified as being correct. Independent surveys of boundaries indicated that boundaries were properly posted. Boundaries were typically marked using rope and tape. Postings were clearly written/printed and accurate. Doors that were required to be locked were verified to be closed and locked.

Keys were controlled at the access point to the radiologically controlled area. Inventories of keys were performed as part of shift turnover. The inspector verified that the inventory was documented as being performed. At the time the inspector visited the access points, all keys were present and accounted for. Keys were color coded to designate the type of area. Increasing levels of management were required to go into the more significant dose areas. The radiation protection supervisor was required to authorize entry into a locked high radiation area. Entry into a high radiation exclusion area required the authorization of the health physics division manager. Entry into a very high radiation area required authorization from the health physics division manager and the plant manager prior to entry.

Conclusion

The licensee's procedures provided guidance for technicians and workers regarding posting and access controls for high and very high radiation areas.

2.1.3 Management and Supervisory Oversight

The inspector reviewed the frequency of management tours in the radiologically controlled area. While some managers made fewer tours, others made more frequent tours. Given the number of managers on site, the inspector determined that management was maintaining an adequate awareness of conditions in the plant. This was especially true of the vice president nuclear generation and the manager of health physics. Interviews with workers specifically named these individuals as being visible in the plant.

There was a good relationship between the radiation protection organization and other work groups. Workers expressed confidence and support for the radiation protection staff. They expressed the opinion that radiation protection personnel were helpful in getting jobs done and were willing to assist where possible. A review of worker satisfaction survey forms collected by the radiation protection department confirmed this.

According to 10 CFR 20.1101(c), each licensee shall periodically (at least annually) review the radiation protection program content and implementation. During a review of Procedure OPGP03-ZR-0050, Revision 0, "Radiation Protection Program," the inspector noted the following statement: "An INPO evaluation, NRC Inspection or SALP process, or Quality Assurance audit of a program area fulfills this requirement." The licensee indicated that the intent was to use findings or conclusions from these documents as reference or source documents.

The inspector questioned the use of NRC inspections and SALP process in lieu of licensee self-assessments. The inspector informed the licensee that NRC inspections and SALP process did not satisfy the "self-assessment" requirements and did not relieve the licensee from performing these self-assessments. As a result, the licensee stated that they would revise the procedure to remove this statement.

The inspector reviewed the licensee's self-assessments of the radiation protection program. The licensee had a very good assessment program. Program content and implementation were addressed on a frequent basis. These assessments included radiation protection supervisory reviews, quality assurance audits, as well as employing peer audits from other utilities. When the need for corrective actions arose, the conditions were aggressively addressed.

The licensee implemented changes regarding work planning to achieve better results on reducing occupational exposures. One of the more significant changes was the practice of performing work inside the reactor building while at power instead of waiting for an outage. Because these systems were used during an outage but not during routine operation, doses were much higher with the system operating. The inspector interviewed some of the workers involved with these types of tasks and determined that they were familiar with potential hazards, additional monitoring requirements, etc. Because the concept of performing "routine" work in the reactor building while at power was "new" to workers, there was some anxiety expressed by workers. This information was given to the licensee for follow up.

Management encouraged personnel to become certified or registered in the field of health physics. This was obvious when the number of personnel meeting these requirements were listed. The list included 12 health physicists certified by the American Board of Health Physics and 45 individuals who were registered (certified) by the National Registry of Radiation Protection Technologists.

Conclusion

Management was very active in oversight of activities related to radiation protection. Assessments were thorough and corrective actions were aggressively addressed.

2.2 Declared Pregnant Women and Embryo/Fetus Doses

The licensee has developed procedures and polices for implementing the requirements of 10 CFR 20.1208, "Dose to an Embryo/Fetus." The licensee's procedures described the process for a woman to declare herself pregnant. This process was also discussed in general employee training. Interviews with licensee personnel revealed that workers were familiar with the policy and that declaration was voluntary.

According to the licensee's procedure, when a woman declared herself pregnant, the licensee reviewed the situation with the worker. If her job was such that she did not need to enter the radiologically controlled area, her dose margin was set to 0 millirem for the duration of the pregnancy. Otherwise, her dose margin was set well below the 10 CFR Part 20 limits for exposure to the embryo/fetus.

The inspector reviewed records of dose assessments of selected declared pregnant women. These records were consistent with regulatory guidance. The inspector questioned how assessments were performed for women who had worked in areas where "derived air concentration" (DAC) hours had been tracked before declaring her pregnancy. The licensee demonstrated that the capability existed to identify this condition and stated that if the number of DAC hours indicated a potential exposure concern, they would evaluate the dose to the embryo/fetus as needed. As part of the declaration process, the licensee typically required whole-body counting to ensure that there was not a "deposition" dose to the embryo/fetus that needed to be accounted for.

Conclusion

The licensee's declared pregnant worker program was well implemented. Substantially reduced dose limits were discussed with workers to maximize the protection to the embryo/fetus. The licensee's dose assessment process was very thorough.

2.3 Total Effective Dose Equivalent/ALARA and Respiratory Protection

The new requirement for justifying the use of respiratory protection devices as part of a program to ensure that each individual's total effective dose equivalent was maintained ALARA represented a major change in the radiation protection philosophy as embodied in the old 10 CFR Part 20. As a result, the licensee has reduced the number of respiratory devices issued for radiological purposes through the use of engineering controls, procedures, and other approved methods. A large percentage of respiratory devices were issued based on industrial concerns rather than radiological concerns.

During tours of the plant, the inspector noted that the plant was very clean. The licensee indicated that maintaining fuel integrity and keeping the plant clean substantially reduced worker exposures. Because the amount of contamination that could potentially become airborne was reduced, the need for respiratory protection was substantially reduced. As an example of plant cleanliness, the licensee stated that some work performed inside the reactor building (containment) had been performed in street clothing with minimal protective clothing requirements (typically shoe covers), further increasing worker efficiency.

As part of the process of evaluating the external and internal exposure risks, the licensee assumed some loss of worker efficiency when wearing a respirator. This assumed loss of efficiency was documented using information from industry experience, military, etc. The documentation addressed such concerns as environmental conditions, type of respirator, level of work (effort), work duration, type of work, individual worker differences, etc., and determined that an estimated loss of 20 percent was reasonable.

The licensee stated that they maintained a large pool of workers who were qualified respirator workers. This included the physical examination, retraining, and respirator fit testing. Given the significant reduction in the need for respirator usage, the licensee stated that it may be possible to scale down the training in this area and provide training on an as-needed basis.

The inspector examined a selected sample of documented total effective dose equivalent/ALARA evaluations associated with respirator usage. The process was in accordance with station procedures. A review of dosimetry records indicated no committed dose calculations were necessary, indicating that the evaluation process was working to keep worker doses ALARA.

Through interviews, the inspector concluded that workers were very knowledgeable regarding the potential benefits of not using respiratory protection. As part of the general employee training, an example showing how an evaluation comparing doses with and without respirators was provided.

Conclusion

The licensee implemented a good respiratory protection evaluation process. Worker doses were maintained ALARA while reducing the number of respirators issued. Workers demonstrated a good understanding regarding the need to maintain worker doses ALARA.

2.4 Planned Special Exposures

Historically, many reactor licensees have utilized some method for granting "dose extensions"; i.e., allowing individuals to exceed the licensee's own administrative dose limit (well below the 10 CFR Part 20 limit). The revised 10 CFR Part 20 allows the licensee to authorize doses to individuals in

addition to their "routine" annual dose limit under very strict criteria. This process was referred to as a "planned special exposure."

Although the licensees indicated that it was not likely that they would use this option under the regulation, they have not excluded the possible future use of planned special exposures. As a result, the licensee established procedures to be used in the event that the licensee authorized a planned special exposure. The inspector reviewed OPGP03-ZR-0049, Revision 0, "Planned Special Exposure," to ensure compliance with regulatory requirements.

The licensee procedures for approval of planned special exposures included provisions for ensuring that planned special exposures were used only in exceptional situations as stated in 10 CFR 20.1206. The procedure stated that an officer of the company was responsible for authorizing a planned special exposure in writing. There were provisions for informing and instructing the individuals involved in accordance with 10 CFR 20.1206(c).

Guidance was provided to ensure that dose history information requirements were met for individuals who were to be permitted to participate in planned special exposures. The procedure established planned special exposure limits that were consistent with 10 CFR 20.1206(e).

The procedure stated that the records of planned special exposures were to be maintained 75 years beyond the life of the plant, which exceeds the requirements in 10 CFR Part 20. Written reports were required to be submitted to the NRC and to the individuals involved in the planned special exposure in accordance with 10 CFR Part 20.

Conclusion

The licensee has developed a procedure to cover planned special exposure, but does not envision using it.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

J. Groth, Vice President, Nuclear Generation
S. Head, Compliance Supervisor, Licensing
R. Masse, Plant Manager, Unit-2
L. Martin, General Manager Nuclear Assurance And Licensing
W. Moran, Manager Metrology and Radiological Laboratories Division
B. Kruse, Senior Quality Assurance Specialist
J. Inman, ALARA Specialist
L. Earles, Consulting Health Physicist
M. McBurnett, Licensing Manager
R. Logan, Manager Health Physics Division
D. Schulker, Licensing Engineer

1.2 NRC Personnel

W. C. Sifre, Resident Inspector

The above individuals attended the exit meeting on October 5, 1995. In addition to the personnel listed above, the inspector met and held discussions with other personnel of the licensee's staff during the inspection.

2 EXIT MEETING

An exit meeting was conducted on October 5, 1995. During this meeting, the inspector reviewed the scope and findings of the inspection. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspectors.