

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-498/91-09 Operating Licenses: NPF-76
50-499/91-09 NPF-80

Dockets: 50-498
50-499


Licensee: Houston Lighting & Power Company (HL&P)
P. O. Box 1700
Houston, Texas 77251

Facility Name: South Texas Project Electric Generating Station (STPEGS)

Inspection At: STPEGS Site, Bay City, Matagorda County, Texas

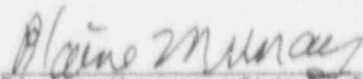
Inspection Conducted: March 18-22, 1991

Inspector:


L. T. Ricketson, P.E., Senior Radiation
Specialist, Radiological Protection and
Emergency Preparedness Section

4-10-91
Date

Approved:


Blaine Murray, Chief, Radiological
Protection and Emergency Preparedness
Section

4/10/91
Date

Inspection Summary

Inspection Conducted March 18-22, 1991 (Report 50-498/91-09; 50-499/91-09)

Areas Inspected: Routine, unannounced inspection of portions of the licensee's radiation protection program, including organization and management controls, training and qualifications, external exposure controls, internal exposure controls, control of radioactive materials and contamination, program for maintaining occupational radiation exposures as low as reasonably achievable (ALARA), solid waste management, transportation of radioactive materials, and confirmatory measurements.

Results: Within the areas inspected, the inspector identified one violation that involved a failure to control personnel entry into a high radiation area (see paragraph 6). No deviations were identified.

The turnover rate for the health physics (HP) division for the last year was about 20 percent. The licensee had increased corporate oversight of HP through the use of contractor assessments and had created a corporate level position for an assessor. The licensee used management controls such as management tours of the facility and radiological reporting procedures effectively.

HP technicians received specific training on radiological problems associated with the various plant systems. The licensee had a low percentage of personnel registered by the National Registry of Radiation Protection Technologist (NRRPT), but was working to encourage individuals to seek registration in the upcoming year.

The licensee had adopted lower administrative limits for radiation exposure. The licensee appeared to rely too heavily on HP technicians' general knowledge of the contamination level within systems when writing special instructions for radiation work permits (RWPs). Posting and controls within the radiological restricted area (RRA) were generally good; however, the inspector identified an apparent violation involving an individual entering a high radiation area under an RWP not valid for the area.

The licensee was developing a source term reduction program and had been very successful in keeping person-rem exposures and the number of personnel contamination events low.

The licensee had a well organized program for preparing radioactive waste for shipment.

DETAILS

1. Persons Contacted

HL&P

- *M. R. Wisenburg, Plant Manager
- P. Adams, HP Supervisor
- R. Aguilera, HP Supervisor
- J. Ambrose, HP Supervisor
- L. Archer, HP Supervisor
- *C. A. Ayala, Supervising Engineer, Licensing
- *H. W. Bergendahl, HP Manager
- *J. P. Bleau, HP General Supervisor, Unit 1
- *M. K. Chakravorty, Nuclear Safety Review Board Director
- *R. A. Cook, Auditor, Nuclear Assurance
- E. Jarvela, HP Instructor
- R. Logan, Supervisor, ALARA
- S. Lonchar, Lead HP Instructor
- *J. R. Lovell, Manager, Technical Services
- T. Powell, General Supervisor, HP Operations Support
- J. Simms, Supervisor, Radioactive Waste and Shipping
- T. Tesmer, Training Coordinator
- S. Torrey, Supervisor, Outage Planning/ALARA
- D. Wood, HP General Supervisor, Unit 2

NRC

- *C. Paulk, Resident Inspector
- *J. Tapia, Senior Resident Inspector

*Denotes those present at the exit meeting on March 22, 1991.

The inspector also interviewed other plant personnel during the course of the inspection.

2. Organization and Management Controls (83722)

The inspector reviewed the licensee's organization and management controls with respect to the radiation protection program to determine compliance with Technical Specifications (TS) 6.2 and 6.5; commitments in Chapter 13 of the Updated Final Safety Analysis Report (UFSAR); and agreement with Regulatory Guide (RG) 1.33.

The inspector reviewed an organizational chart of the HP division and noted the high number of degreed personnel. The inspector noted at least 10 individuals with bachelors' degrees, six with masters' degrees, one with a doctorate's degree, and numerous associates' degrees.

The licensee's HP organization was essentially the same as during the previous reviews. The licensee established position descriptions for HP technicians and supervisors. The inspector reviewed the position descriptions for on-shift, instrumentation, work control center, and ALARA technicians and noted that they were detailed in their listing of duties and responsibilities.

The inspector reviewed the turnover rate for HP technicians. Between January 1990 and March 1991, 7 of approximately 46 HP technicians left the licensee's employment. An additional four technicians took positions with the training, quality assurance, and emergency preparedness departments. HP representatives stated that they hoped their entry level HP technician training program will aid in reducing the turnover rate. Part of this program involves the hiring of local workers for training as apprentice HP technicians.

As a means of increasing corporate oversight, the licensee employed an independent consultant to evaluate the HP operations and report the findings to corporate management. In answer to one of the consultant's recommendations, the licensee created a corporate level position for a radiological assessor and was actively recruiting to fill the position. The assessor will be part of the planning and assessment group which reports to the group vice president.

The HP group conducted internal assessments by using professionals within the group to perform assessments of portions of the program for which they were not directly responsible. The licensee handled significant findings of the assessments through its normal radiological occurrence reporting system. The inspector reviewed assessments and noted that they included recommendations for program improvements.

The inspector reviewed the results of management tours performed by HP supervisors in accordance with the licensee's Standing Order 31. The tours, conducted within the RRA, focused on evaluating the condition of housekeeping, postings, locked high radiation doors, worker compliance to procedures, HP performance, contamination control, and accuracy of RRA status board information. The inspector determined by reviewing the comment section of the results that the licensee's personnel demonstrated the ability to be self-critical and evaluated conditions objectively.

The licensee used radiological occurrence reports (RORs) and radiological conditions deficiency reports (RCDRs), for items of greater significance, for documenting events ranging from personnel contaminations to violations of HP procedures. The reports documented the facts of the occurrence, immediate actions taken, the root cause analysis, and actions needed to resolve the problems. The HP division provided the plant manager a quarterly summary of the documented events. The summary discussed the causes of the events and gave a breakdown of the number of events by departments. Licensee representatives stated that they were revising the

ROR/RCDR procedures to provide more choices in selecting the root cause of an event and evaluating ways to improve their trending of the root causes.

The inspector determined by interview that the licensee's program to rewrite and reorganize radiation protection procedures was approximately 70 percent complete. The goal of the program was to provide more guidance in the procedures and to make the procedures easier to locate and use.

No violations or deviations were identified.

3. Training and Qualifications (83723)

The inspector interviewed members of the training organization and reviewed portions of the training program for radiation protection workers and RP technicians to determine compliance with TS 6.4 and 10 CFR 19.12; agreement with commitments in Chapter 13 of the UFSAR; and the agreement with RGs 8.10, 8.13, 8.15, 8.27, and 8.29.

The inspector met with HP instructors and reviewed lesson plans for HP technician training. HP training includes a course entitled, "Power Plant Fundamentals," and "Pressurized Water Reactor Familiarization." The inspector noted that specific training dealing with radiological hazards associated with various reactor systems was given to the HP technicians as part of Lesson Plan 202.001, in "Operational ALARA," training. The lesson plan addressed hazards associated with the reactor coolant system, such as during pump seal replacement and steam generator maintenance; chemical volume and control system; spent fuel cooling and cleanup system; residual heat removal system; and incore instrumentation. Licensee representatives stated that this training was also supplemented with on-going "current events" training in which industry events were discussed and information from the NRC and industry was reviewed. HP personnel stated that the training was helpful and expressed a desire for more in-depth training concerning plant systems.

The inspector reviewed an outline of supplemental training given to HP personnel by the supervisors of the division. The topics included: communicating risks, developing a self-critical attitude, source term calculations, unidentified peak analysis, thermoluminescent dosimeter placement pitfalls and use of special dosimetry, maximum permissible concentrations and air sampling, dosimetry program review, pool-side events, radwaste program, environmental surveillance requirements, ALARA overview, radiation work permits, and liability and litigation.

According to the HP organizational chart, three people have been registered by the NRRPT. Licensee representatives stated that 33 people (in various departments) were eligible for registration and the licensee was hoping to have the examination offered on site, November 2, 1991. As an incentive to the personnel, the licensee will be offering a course to prepare for the examination.

The inspector attended a briefing given prior to the transfer of a high integrity container from the on-site shield to the transportation shield and noted that the information given to the individuals involved was consistent with 10 CFR 19.12 which requires, in part, that individuals be instructed, commensurate with the potential radiological health protection problems in the restricted area. The HP representative giving the briefing discussed information on radiation dose rates, administrative exposure limits, protective clothing, use of shielding and other ALARA techniques, dosimetry and instrumentation required, communication methods, and special assignments. The briefing was well presented.

The inspector reviewed selected resumes of contract HP technicians and determined that the individuals met qualification requirements.

No violations or deviations were identified.

4. External Exposure Control (83750)

The inspector reviewed the licensee's external control program to determine compliance with TS 6.11 and the requirements of 10 CFR 20.101, 20.102, 20.105, 20.202, and 20.401; and agreement with the commitments of Chapter 12.5 of the UFSAR.

The inspector noted that the licensee had reduced their administrative radiation exposure limits. As of January 1, 1991, the new limits were: 2000 millirem for an annual limit (formerly 4000 millirem per year) and a lifetime whole body limit equal to N rems, where N equals the individual's age in years (except when this value would exceed the old limit of five times [N-18]).

The inspector interviewed cognizant licensee personnel and determined that the electronic alarming dosimeters had been reliable and gave close agreement with the thermoluminescent dosimeters.

No violations or deviations were identified.

5. Internal Exposure Control (83750)

The inspector reviewed the licensee's program for control of internal radiation exposure to determine compliance with TS 6.11 and the requirements of 10 CFR 20.103, 20.201, and 20.401; and agreement with the commitments in Chapter 12.5 of the UFSAR and the recommendations of RG 8.15, NUREG-0041, Industry Standards ANSI Z88.2-1980 and ANSI/GCA G-7.1-1989.

The inspector observed HP representatives perform respirator fit testing and noted that the licensee used tabletop quantitative testing units. Only one of three units was working properly at the time of the inspection and a licensee representative stated that two of the units would be returned to the manufacturer for repair.

The inspector reviewed selected respirator issue records and determined that individuals were issued the proper size masks and had been given medical evaluations, fit tests, and respiratory protection training within the previous year.

No violations or deviations were identified.

6. Control of Radioactive Material and Contamination, Surveys, and Monitoring (83750)

The inspector reviewed the licensee's program for surveying/monitoring and controlling radioactive materials to determine compliance with TS 6.11 and 6.12 and the requirements of 10 CFR 20.201, 20.203, 20.205, 20.207, 20.301, and 20.401; and agreement with the commitments in Chapter 12.5 of the UFSAR.

On March 13, 1991, one of the resident inspectors observed two instruments and controls technicians performing a calibration on a flow transmitter on the boron thermal regeneration system (BTRS). The individuals were working in the RRA under a general RWP and were not required to wear protective clothing or have specific HP coverage while working. As part of the calibration process, the individuals had to breach the BTRS. A small amount of water leaked from a valve on the BTRS, prompting the inspector to ask if the water in the system carried radioactive contamination and whether HP required the individuals to take specific precautions to guard against the spread of such contamination. The individuals responded that their RWP required no specific precautions. The resident inspector observed a HP technician in the area and questioned him concerning the matter. The HP technician responded that the BTRS system was not contaminated and hence special procedures and HP coverage were not required. However, as a precaution, the HP technician took a smear sample where the water had leaked from the system and determined that the contamination level caused by the leaking water was less than 1000 disintegration per 100 square centimeters of surface area, and thus the water carried little if any radioactive contamination.

The resident inspector later questioned the shift supervisor as to the condition of the system and the shift supervisor stated that even though the system had not been put into use, it was considered potentially contaminated, because of the possibility of leakage through the interface with the chemical and volume control system. At the outset of this inspection, the resident inspector informed the radiation specialist inspector of the events and asked him to pursue the matter with HP (see NRC Inspection Report 50-498/91-08; 50-499/91-08.)

The inspector discussed with HP representatives the procedure for writing RWPs and determined that one of the questions on the RWP request forms is whether or not work is to be performed on a contaminated system. According to HP representatives, the answer to that question is often

supplied by work planners who may not have an in-depth knowledge of the systems, so HP personnel writing RWPs do not rely entirely on this information, but rather on their own knowledge of the status of the various systems. In this specific case, there was general knowledge that the system had not been put into use and was, therefore, not considered to be contaminated. The inspector expressed the concern that, while the licensee's evaluation of the radiation hazard in this specific situation was adequate, the reliance on general information may lead to a failure to adequately survey hazards associated with other systems. The licensee's representatives stated that they plan to evaluate the methodology used to establish special precautions on RWPs when systems are breached. This item is considered an open item pending further review by the inspector (498/9109-02; 499/9109-02).

The inspector reviewed access controls to the RRA and noted that the duration for which RWPs are valid had been shortened. Specific RWPs were valid for 7 days and general RWPs were valid 3 months. Formerly, they were good for the duration of the work. Licensee representatives stated that this was done, in part, so that more frequent reviews of the work would be performed to ensure that the special instructions and precautions continued to suit the scope and nature of the work.

The inspector reviewed selected radiation survey information and noted that the licensee had developed a new filing system which made the retrieval of survey information easier.

The inspector toured the RRA and observed posting and controls including the work areas inside the containment building, and determined that they were in accordance with the requirements of 10 CFR 20.203.

The inspector observed operations within controlled areas and noted that work practices were conducted in accordance with good HP practice; however, after watching the transfer of a high integrity container from an on-site storage container to a shipping cask in the radioactive waste truck bay on April 20, 1991, the inspector observed a security guard entering the truck bay through a door from the mechanical auxiliary building. In the process, the security guard passed under a rope barrier and a "high radiation area" warning sign. Transfer of the container of radioactive waste had been completed before the security guard entered and there was no actual exposure; however, the timing was the result of good fortune rather than good planning. When interviewed, the security guard stated that he was responding to an alarm received from the truck bay door and had contacted HP for instructions prior to entering the area. The licensee conducted an immediate investigation of the occurrence and took statements from the security guard and HP personnel involved. HP representatives confirmed that the security guard contacted HP, but stated that he was instructed to knock on the door and gain permission to enter. The security guard's statement did not indicate that he had been given such instructions and personnel inside the truck bay, including the inspector, did not hear a knock on the door. HP made no attempt to

contact personnel in the truck bay by phone to check on the status of the work.

TS 6.12.1 states that pursuant to paragraph 20.203(c)(5) of 10 CFR Part 20, in lieu of the control device" or "alarm signal" required by paragraph 20.203(c), each high radiation area, as defined in 10 CFR Part 20, in which the intensity of radiation is equal to or less than 1000 millirem per hour at 45 centimeters (18 inches) from the radiation source or from any surface which the radiation penetrates shall be barricaded and conspicuously posted as a high radiation area and entrances thereto shall be controlled by requiring issuance of a RWP. The security guard worked under RWP 91-1-0035. The inspector reviewed the RWP and noted that the special instructions prohibited entry into high radiation areas. The entry of the security guard into a high radiation area is an apparent violation of TS 6.12.1, (498/9109-01; 449/9109-01).

The inspector observed similar operations conducted in the same area the next day and noted that the licensee took adequate corrective actions to prevent recurrence. The actions taken by the licensee were: HP technicians with radio communication sets monitored the radiation area perimeter, the posting on the door of the truck bay included the number of the telephone inside, HP stationed an individual at the truck bay door to warn individuals not to enter the area, security was informed that no entry into the area would be permitted until notice was given by the HP supervisor coordinating the work, and an announcement was made over the plant paging system to notify personnel that the work was in progress.

The inspector reviewed ROR/RCDR quarterly summary reports and determined that the apparent violation of the high radiation boundary appeared to be an isolated occurrence.

The inspector discussed the licensee's lack of a complete list of lighting, ventilation, and electrical outlets associated with each electrical bus. This was previously discussed in NRC Inspection Report 50-498/90-20; 50-499/90-20 (paragraph 6). Without an electrical loads list, the licensee was unable to know, specifically, what lighting, ventilation, or equipment would be affected by bus outages. A licensee representative stated that the information would be available, in phases, starting this year.

No deviations were identified.

7. Maintaining Occupational Exposure ALARA

The inspector reviewed the licensee's program to maintain occupational exposure ALARA to determine compliance with requirements of 10 CFR 20.1(c) and agreement with the commitments in Chapter 12.1 of the UFSAR and recommendations of RG 8.8 and 8.10.

The ALARA group consisted of five people and the licensee was actively recruiting a sixth individual to fill a newly approved ALARA engineer position. The inspector reviewed documentation outlining the responsibilities of each ALARA member and interviewed members concerning their duties.

The licensee had taken initial steps to develop a source term reduction program. The inspector reviewed documentation of a meeting involving licensee representatives from HP, chemistry, and engineering, who met to discuss methods of reducing out of core radiation fields. Techniques discussed included: cobalt reduction, primary water chemistry control, increased filtration, and chemical decontamination. The committee established due dates and assigned the various departments to evaluate the different methods of source term reduction. By inclusion of the different departments, the licensee hopes to have a more comprehensive ALARA program.

The licensee continued to have good results in maintaining radiation exposure ALARA. The licensee goals and results are summarized below.

	Goal (in person-rem)	Results (in person-rem)
Unit 1 (1990) Refueling Outage	100	63.7
Unit 2 (1990) Refueling Outage	137.5*	130.9*
Unit 1 (1991) Refueling Outage	100	86.5*
Annual for site (1990)	400	206

*Includes emergent work

Likewise, the licensee had very good results in controlling personnel contaminations recording 118, 85, and 58 personnel contaminations, respectively, in the last three refueling outages. In addition, the licensee employed a task force to evaluate causes and devise methods to lower the number of personnel contamination events. Also, an individual was assigned the responsibility of monitoring and investigating personnel contamination events to provide quicker corrective actions.

ALARA personnel have established detailed job files on the work performed during the outages to be used as references in preparing for similar work in the future. The inspector reviewed selected examples of the files and noted that they included prejob reviews, work guidelines, RWP recommendations, lessons learned, and information gathered from other facilities.

Licensee representatives stated that training was performed in preparation for work performed during the latest outages using licensee and vendor mock-ups. Licensee representatives acknowledged that there were differences between the steam generator mock-up and the steam generators in the plant and stated that this would be brought to the attention of the

ALARA committee along with the recommendation that more accurate mock-ups be obtained for future training.

No violations or deviations were identified.

8. Solid Radioactive Waste Management and Transportation of Radioactive Materials (86750)

The inspector reviewed the licensee's solid radioactive waste management and radioactive materials transportation program for compliance with the requirements of 10 CFR 20.311, 61.55, 61.56 and 71.5.

The inspector observed the preparation of two shipments of radioactive waste for off-site burial. The inspector reviewed waste form and waste classification procedures and determined that scaling factors were based on waste stream analysis performed by a vendor. The inspector reviewed the licensee's actions concerning: radiation and contamination surveys of packages and vehicles, shipping paper documentation, package marking and labeling, bracing and securing of shipping containers, and vehicle placarding and determined that they were in accordance with regulatory requirements. The inspector confirmed that the licensee had current copies of NRC and Department of Transportation regulations and copies of burial site permits.

No violations or deviations were identified.

9. Radiological Confirmatory Measurements (84750)

Confirmatory measurements were performed by the licensee and their contractor laboratory on two liquid radiochemistry samples prepared by the Radiological Environmental Sciences Laboratory (RESL) in Idaho Falls, Idaho. The samples were provided to the licensee for analysis in March 1991. The licensee's analytical results were compared to the known sample isotopic concentrations, and the results of the comparisons are presented in Attachment 1. Attachment 2 describes the criteria used to compare the results. The licensee's results for the 1991 RESL samples were in 100 percent agreement with the RESL certified isotopic concentrations.

10. Exit Meeting

The inspector met with the resident inspector and the licensee's representatives denoted in paragraph 1 at the conclusion of the inspection on March 22, 1991, and summarized the scope and findings of the inspection as presented in this report. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspector during the inspection.

ATTACHMENT 1

Radiological Confirmatory Measurement Results

South Texas Project Units 1 & 2

NRC Inspection Report: 50-498/91-09 & 50-499/91-09

1

1. RESL Unknown Liquid Samples (Analyzed by Unit 1)
(Standardized: 12:00, MST, October 1, 1990)

<u>Nuclide</u>	<u>STP Results</u> <u>(uCi/ml)</u>	<u>NRC Results</u> <u>(uCi/ml)</u>	<u>STP/NRC</u> <u>Ratio</u>	<u>Comparison</u> <u>Decision</u>
Mn-54	2.44±0.24E-05	2.28±0.07E-05	1.07	Agreement
Co-60	1.40±0.14E-05	1.27±0.04E-05	1.10	Agreement
Cs-137	1.49±0.15E-05	1.27±0.04E-05	1.17	Agreement
Fe-55	5.50±0.30E-05	4.32±0.13E-05	1.27	Agreement
Sr-89	1.90±0.10E-04	2.40±0.07E-04	0.79	Agreement
Sr-90	7.40±0.40E-06	8.12±0.32E-06	0.91	Agreement
H-3	1.69±0.03E-04	1.66±0.05E-04	0.99	Agreement

2. RESL Unknown Liquid Samples (Analyzed by Unit 2)
(Standardized: 12:00, MST, October 1, 1990)

<u>Nuclide</u>	<u>STP Results</u> <u>(uCi/ml)</u>	<u>NRC Results</u> <u>(uCi/ml)</u>	<u>STP/NRC</u> <u>Ratio</u>	<u>Comparison</u> <u>Decision</u>
Mn-54	2.50±0.25E-05	2.28±0.07E-05	1.10	Agreement
Co-60	1.39±0.14E-05	1.27±0.04E-05	1.09	Agreement
Cs-137	1.46±0.15E-05	1.27±0.04E-05	1.15	Agreement
Fe-55	5.50±0.30E-05	4.32±0.13E-05	1.27	Agreement
Sr-89	1.90±0.10E-04	2.40±0.07E-04	0.79	Agreement
Sr-90	7.40±0.40E-06	8.12±0.32E-06	0.91	Agreement
H-3	1.65±0.03E-04	1.66±0.05E-04	0.99	Agreement

NRC results were taken from the standard certification supplied to the NRC Region IV office as prepared by RESL and traceable to the National Institute of Standards and Technology.

ATTACHMENT 2

CRITERIA FOR COMPARING RADIOCHEMISTRY ANALYTICAL MEASUREMENTS

The following are the criteria used in comparing the results of capability tests and verification measurements. The criteria are based on an empirical relationship established through prior experience and this program's analytical requirements.

In these criteria, the judgement limits vary in relation to the comparison of the resolution.

$$\text{Resolution} = \frac{\text{NRC VALUE}}{\text{NRC UNCERTAINTY}}$$

$$\text{Ratio} = \frac{\text{LICENSEE VALUE}}{\text{NRC VALUE}}$$

Comparisons are made by first determining the resolution and then reading across the same line to the corresponding ratio. The following table shows the acceptance values.

RESOLUTION	AGREEMENT RATIO
<4	0.40 - 2.50
4 - 7	0.50 - 2.00
8 - 15	0.60 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
>200	0.85 - 1.18

The above criteria are applied to the following analyses:

- (1) Gamma Spectrometry
- (2) Tritium in liquid samples
- (3) Iodine on adsorbers
- (4) ^{89}Sr and ^{90}Sr determinations
- (5) Gross Beta where samples are counted on the same date using the same reference nuclide.