



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
101 MARIETTA ST., N.W.
ATLANTA, GEORGIA 30323

MAR 03 1989

Report No.: 50-261/89-06

Licensee: Carolina Power and Light Company

Docket No.: 50-261

License No.: DPR-23

Facility Name: H. B. Robinson

Inspection Conducted: February 6-9, 1989

Inspector:

[Signature]
M. V. Lauer

3/3/89
Date Signed

Approved by:

[Signature]
J. P. Potter

3/3/89
Date Signed

SUMMARY

Scope: This routine, unannounced inspection involved review of the radiation protection program. This review specifically addressed the adequacy of procedures and activities associated with the transfer of spent fuel from the spent fuel pool to the Independent Spent Fuel Storage Installation (ISFSI) and review of specified radiological events which occurred during the recent refueling outage.

Results: The licensee's planning and preparation for the transfer of spent fuel to the ISFSI was thorough and fully adequate to protect the health and safety of the workers and the public. Investigations and planned or completed corrective actions for the radiological events reviewed were adequate. The events did not appear to be the result of a generic programmatic weakness. The investigation of a locked high radiation area control incident was thorough and candidly self-critical.

Within the scope of the inspection, one licensee identified violation (LIV) was identified as follows:

- LIV for failure to follow procedures controlling access into locked high radiation areas.

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REPORT DETAILS

1. Persons Contacted

- *D. Crocker, Supervisor, Radiation Control
- M. Crabtree, Manager, Radiation Control
- R. Dufresne, Project Manager, ISFSI
- *S. Griggs, Aide, Regulatory Compliance
- *R. Hammond, Senior ALARA Specialist, Radiation Control
- *D. Nelson, Acting Manager, Maintenance
- *R. Reynolds, Principal Quality Assurance Engineer
- *D. Sayre, Acting Director, Regulatory Compliance
- *J. Sheppard, Manager, Operations
- *R. Smith, Manager, Environmental & Radiation Control (E&RC)
- *G. Walters, Project Engineer, Onsite Nuclear Safety

Other licensee employees contacted during this inspection included engineers, technicians, operators, and office personnel.

NRC Resident Inspectors

- L. Garner, Senior Resident Inspector
- K. Jury, Resident Inspector

*Attended exit interview

2. Inspection of Dry Storage of Spent Nuclear Fuel at H. B. Robinson (TI 0110/5)

a. Background

The on-site dry storage of spent nuclear fuel at H. B. Robinson was authorized by the NRC with Special Nuclear Material License SNM-2502. Additional requirements were found in the Technical Specifications (Tech Specs) of the license and 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation". The process involved insertion of a Dry Shielded Canister (DSC) into an approved shipping cask. The shipping cask with the DSC is placed into the spent fuel pool. The DSC is loaded with seven fuel assemblies and removed, with the shipping cask, from the spent fuel pool. The DSC is then seal welded, the lid is bolted to the shipping cask and transferred to the Horizontal Storage Module (HSM). Once the shipping cask is aligned with the HSM, a hydraulic arm is used to pull the DSC out of the shipping cask and directly into the HSM.

Current plans called for a demonstration phase which would include the loading and storage of three DSCs followed by the loading and storage of five additional DSCs.

b. Planning and Preparation

The licensee prepared the following procedures to ensure compliance with the above requirements and they were reviewed by the inspector:

- Special Procedure(SP)-857, "H.B. Robinson Independent Spent Fuel Storage Installation-Operational Testing Procedures R-1 Through R-3 Radiation Monitoring of HBR ISFSI", Revision 1, dated February 1, 1989.
- Independent Spent Fuel Storage Procedure(ISFS)-002, "Loading of Fuel Into the Dry Shielded Canister", Revision 2, dated January 24, 1989.
- ISFS-003, "Preparation of Dry Shielded Canister for Loading Into the Horizontal Storage Module", Revision 2, dated January 24, 1989.
- ISFS-004, "Alignment and Loading of the Dry Shielded Canister Into the Horizontal Storage Module", Revision 3, dated January 26, 1989.

All procedures reviewed were found to contain radiation control limits and surveillances required by the Tech Specs. Appropriate sign-offs, holdpoints, and radiation control precaution statements were also verified.

Through discussions with licensee representatives the inspector determined that an adequate number of health physics(HP) technicians and supervisory personnel were to be used during all phases of the transfers. Licensee representatives stated that only senior in-house technicians would be used if possible. The HP manager overseeing the radiation control aspects of the project was qualified and fully cognizant of all phases of the transfer.

Several Radiation Work Permits(RWP) were written to control the transfer. The RWPs contained appropriate instructions, dose margins, and ALARA considerations. Numerous radiation surveys including smearable contamination, airborne contamination, and alpha, beta, gamma, and neutron assessments were planned to an extent greater than that required by the procedures. Personnel monitoring for those individuals performing the DSC seal welds included extremity dosimetry.

c. Attempted Transfer

The licensee began preparations for the transfer the week of January 30, 1989. The fuel was loaded into the DSC on February 2, 1989. The lead plug was inserted into the DSC and the DSC with the

shipping cask was removed from the spent fuel pool to the cask decon area. After deconning the exterior of the cask and the top of the DSC lead plug, two problems were identified.

The Safety Assessment Report, developed to support the tech specs, calculated probable dose rates at the center line of the DSC lead plug of approximately 37 millirem per hour (mrem/hour). However, center line dose rates were observed to be approximately 274 mrem/hour. Contact dose rates on the exterior of the shipping cask were within the expected range of two to eight mrem/hour. Also, the licensee determined that it would be highly unlikely that Tech Spec contamination limits for the outside of the DSC could be met. Tech Spec 2.4 requires that removable contamination on the DSC be less than 220,000 disintegrations per minute per 100 cm² (dpm/100cm²). Samples taken of the water located in the annulus area between the outside of the DSC and the inside of the shipping cask showed maximum activity levels of 2.24E-03 microCuries per ml. This was approximately equal to one half the activity of the spent fuel pool water and would have resulted in contamination levels grossly exceeding the limit. Before the DSC and cask were initially loaded into the pool this annulus area was filled with de-ionized water. An O-ring around the outside top of the DSC was to prevent spent fuel pool water from entering the annulus area. However, the licensee believes that this O-ring was ineffective and requires redesign.

As a result of the above unexpected conditions, the licensee decided to off load the fuel back into the spent fuel pool on February 4, 1989. Licensee representatives stated that the fuel transfer will be delayed until the unexpected dose rates are investigated and the above referenced O-ring is redesigned. Procedure ISFS-008, "Removal of Fuel From Weld Sealed Dry Shielded Canister", Revision 0, dated January 15, 1989 was revised to remove the steps associated with weld removal because no welding was performed. The inspector verified that the revised procedure was properly approved and that a safety analysis of the changes had been performed.

For the transfer activities performed, a pre-job ALARA review and a pre/post job coverage review was conducted and reviewed by the inspector. Selected air samples, smear surveys, general/contact dose rates, and personnel exposures for the job were also reviewed and found to be adequate.

No violations or deviations were identified.

3. Occupational Exposure, Shipping, and Transportation (83750)

a. Locked High Radiation Area Control Event

Section 6.11 of the Tech Specs for License DRP-23 states that procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be

approved, maintained and adhered to for all operations involving personnel radiation exposure.

Administrative Procedure AP-031, "Administrative Controls for Locked High Radiation Areas", Revision 7, dated April 14, 1988 requires continuous HP technician (HP tech) coverage for workers entering locked high radiation areas (LHRA). It further requires that upon completion of the job and exit of all personnel from the area, the job coverage technician shall verify that the access point(s) are closed and locked or physically manned.

On December 31, 1988, while in a refueling outage, contract decontamination technicians were performing decon activities in the reactor cavity. RWP #88-0680, Revision 02 was used to control the work. Surveys in support of the RWP indicated maximum 18 inch dose rates of one to four Roentgen per hour (R/hour). The area was controlled as a LHRA and required continuous HP tech coverage. A contract HP tech was assigned to provide continuous coverage for this work. Approximately two hours after the decon work began, another HP tech and work crew entered the reactor cavity to perform work in the transfer canal area, not associated with the decon work. By this time the decon crew had come out of the cavity and was working on the refuel floor, not a LHRA. The decon HP tech unlocked the LHRA for the transfer canal HP tech and his crew. The decon HP tech had made previous plans with an HP foreman to leave the site prior to the end of shift to attend a New Year's Eve function. He assumed that the transfer canal HP tech was his relief and left his post. There is some uncertainty whether the decon HP tech conveyed his assumption to the transfer canal HP tech. Before exiting containment the decon HP tech had another LHRA key assigned to the transfer canal tech and placed the key in the lock, located on the top of the reactor cavity ladder. Soon after the decon HP tech left containment, the decon crew re-entered the reactor cavity.

Approximately 30 minutes later the transfer canal crew and HP tech exited the reactor cavity leaving the decon crew without coverage. The transfer canal HP tech did not see the LHRA key in the lock. It should be noted that the decontamination workers were in possession of one or more dose rate meters and were trained in the use of such radiation detection instruments in General Employee Training (GET). The transfer canal HP tech stated that as he exited the cavity he observed a roving HP tech constructing a shield wall near the cavity and assumed that this individual was providing coverage for the decon workers in the cavity. Forty-five minutes to one hour after the transfer canal HP tech and crew exited the reactor cavity a contract decon foreman observed an individual in the cavity with no HP coverage. At about the same time a separate discovery was made by a CP&L QA Inspector who observed the cavity ladder open and a decon tech in the cavity without coverage. Both individuals immediately contacted separate HP technicians. The single individual discovered in the reactor cavity possessed a survey instrument.

Immediately following the event an Incident Investigation Team was formed by management which included Corporate Health Physics personnel. The Team issued Noncompliance Report No. 88/135, Investigation of Locked High Radiation Area Control Incident In the Reactor Cavity, dated January 18, 1989, which was reviewed and approved by the Plant Nuclear Safety Committee. A review of personnel exposure data by the inspector, specifically multibadge results from the contract decontamination workers, verified that no excessive exposure concerns existed as a result of this event.

Several procedural non-compliances were determined to have lead to the most severe procedure violation of lack of HP coverage for individuals in a LHRA. Based on the findings of the Team it appears that adherence to Procedure AP-031 would have prevented this event. Licensee representatives stated that the major cause for failure to follow procedures was personnel lack of attention to detail and the taking of "short cuts" to complete work. A secondary cause was determined to be lack of procedural knowledge by contract personnel. The large scope of the investigation also revealed additional root causes of lack of proper planning and poor information dissemination to the workers prior to start of work. Specifically, the reactor cavity decontamination spanned 24 hours in which inadequate shift turnover occurred. In candid fashion, the Investigation Team stated that the latter root causes were a result of inadequate E&RC management control for the cavity decontamination work.

Numerous weaknesses were also identified, which included inadequate HP staffing level for the work scope as a result of end-of-year RWP and TLD change-outs and below normal shift complement. Also identified, was the fact that HP roving technicians were spending too much time assisting on specific jobs instead covering their entire area and checking on all jobs being performed.

The inspector reviewed immediate and long-term corrective action completed by the licensee. This included additional HP supervisory personnel assigned per shift, LHRA Procedure (AP-031) review with all HP foreman, the retraining of all HP technicians on LHRA control procedures, and the temporary assignment of independent radiation control assessor to each shift, six days per week. These assessors reported directly to the E&RC Manager. Also, the E&RC Manager discussed the lack of coordination and planning and the procedural non-compliances with his HP supervisors and HP foreman in order to heighten their sensitivity in this area. HP supervisors also discussed the importance of communication and attention to detail and procedural requirements with HP technicians.

The inspector informed licensee personnel that failure follow procedures for locked high radiation area control was identified as an apparent violation of Technical Specification 6.11. However,

pursuant to 10 CFR 2, Appendix C.V.G., this issue was considered a licensee identified violation and a Notice of Violation would not be issued due to the violation being (1) licensee identified, (2) of severity level IV or V, (3) not reportable, (4) corrected, and (5) not expected to have been preventable by corrective action for a previous violation (LIV 50-261/89-06-01).

b. Discrete Radioactive Particle Event

On December 2, 1988 a contract electrician was performing electrical routing work, specifically the pulling of wedge anchors on conduit baseplates, in the containment vessel (CV). After approximately two hours the individual exited containment, doffed his protective clothing, which included hood and skull cap, at the personnel hatch step-off pad and performed a whole body frisk at the CV frisker station. At that time the individual detected contamination on the back of his neck at the hair line. The individual was escorted to the personnel decontamination area, where a radioactive particle was removed, and released.

An analysis determined the particle to be a 0.6 microCurie Cobalt-60 activation product. The licensee determined a conservative residence time of 2.33 hours. Varskin methodology, over 1 square centimeter of skin, calculated a skin dose of 5.8 rem. This was added to the individual's accumulated quarter dose of 0.293 rem for a total quarter skin dose of 6.093 rem, which does not exceed the 10 CFR 20.101 limit of 7.5 rem. The licensee's time-motion, work activity, and area smear investigations did not determine the source of the particle.

The inspector reviewed the licensee investigation/evaluation which included a facility and process audit of the offsite laundry vendor. The licensee's discrete radioactive particle identification and control program was also reviewed by the inspector. No concerns were identified.

No violations or deviations were identified

4. Exit Interview

The inspection scope and findings were summarized on February 9, 1989, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection finding listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection. Dissenting comments were not received from the licensee.

Item NumberDescription and Reference

50-261/89-06-01

LIV - Failure to follow to procedures for locked
high radiation area control.

This item is considered closed.