

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-458/94-09

License: NPF-47

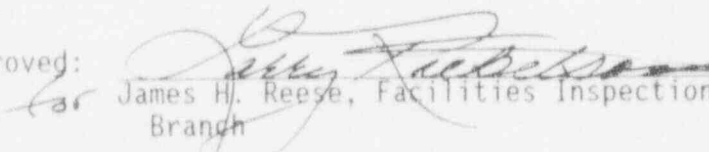
Licensee: Entergy Operations, Inc.
P.O. Box 220
St. Francisville, Louisiana

Facility Name: River Bend Station

Inspection At: St. Francisville, Louisiana

Inspection Conducted: April 25-29 and May 16, 1994

Inspectors: R. K. Brewer, Radiation Specialist
M. Cillis, Senior Radiation Specialist

Approved: 
for James H. Reese, Facilities Inspection Programs
Branch

6-10-94
Date

Inspection Summary

Areas Inspected: Routine, announced inspection of the radiation protection program, including audits and appraisals; changes; planning and preparation; training and qualifications of personnel; external exposure control; internal exposure control; control of radioactive materials and contamination, surveys, and monitoring; and maintaining occupational exposure ALARA.

Results:

- Good quality assurance surveillances were performed by qualified individuals (Section 1.1).
- Outage management performed an adequate job of preparing for and defining the scope of the Refueling Outage RF-5 (Section 1.3).
- Contract radiation protection technicians (RPTs) were adequately qualified to perform their assigned duties (Section 1.4).
- External radiation exposure controls were generally good. However, three violations were identified involving high radiation area posting and control and adherence to radiation work permit (RWP)

requirements for local leak rate test (LLRT) work in the annulus steam tunnel (AST) (Section 1.5).

- Good internal exposure controls were implemented (Section 1.6).
- Respirator use was significantly reduced (Section 1.6).
- A good decontamination effort was performed at the start of the outage as evidenced by the minor radiological significance of a broken airline on the refueling floor which resuspended loose radioactive contamination in containment (Section 1.6).
- A weakness in the licensee's access control was identified regarding the workers' use of available survey data upon access into the radiological control area (RCA) (Section 1.7).
- Controls of radioactive materials and contamination, surveys, and monitoring were generally good (Section 1.7).
- Adequate ALARA planning and preparation were performed for Refueling Outage RF-5. A good ALARA incentive program was implemented by the licensee (Section 1.8).

Summary of Inspection Findings.

- Violation 458/9409-01 was opened (Section 1.5).
- Violation 458/9409-02 was opened (Section 1.5).
- Violation 458/9409-03 was closed (Section 1.5).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 OCCUPATIONAL RADIATION EXPOSURE (83750 and 83729)

The licensee's radiation protection program was inspected to determine compliance with applicable Technical Specifications and the requirements of 10 CFR Part 20.

1.1 Audits and Appraisals

The inspectors noted that no audit was scheduled or had been performed since the previous inspection of this area. There had been numerous surveillances performed since the last inspection. The inspectors reviewed a select number of surveillances and noted the surveillances to be adequate in identifying program strengths and deficiencies. The surveillances reviewed were performed by qualified personnel.

The inspectors also reviewed Radiological Deficiency Reports (RDR) and Condition Reports (CR) for adequacy in identifying radiological concerns. The inspectors noted the licensee's RDRs and CRs to be effective in self-identifying concerns and adequate in tracking resolution of the concerns.

1.2 Changes

There had been no changes in the radiation protection organization or program since the previous inspection of this area.

1.3 Planning and Preparation

The licensee supplemented the permanent radiation protection staff with approximately 65 senior RPTs and 10 junior RPTs for the Refueling Outage RF-5. The contract technicians were brought in early in order to complete onsite training. The contract force included a number of persons who had worked previous outages at River Bend Station.

The inspectors determined that the licensee had ample supplies of temporary shielding, radiation detection instrumentation, air monitoring equipment, portable ventilation, and protective clothing to support outage activities.

Outage management performed an adequate job of planning for the Refueling Outage RF-5. The scope of Refueling Outage RF-5 was defined approximately 15 weeks prior to the start of the outage which allowed minimal time for an adequate review by all departments, especially ALARA. Also, emergent work was continually being added to the outage scope even after the outage had begun.

1.4 Training and Qualifications of Personnel

The licensee had established adequate procedural guidance for assessing the experience of contract personnel. The inspectors reviewed selected resumes of contract RPTs and determined that they met the necessary qualification requirements.

1.5 External Exposure Control

Prior to arriving on site on April 25, 1994, the inspectors were informed by the Resident Inspector of an event involving a high radiation area which had been identified in the licensee's Investigation Report CR 94-0424.

On April 17, 1994, the day shift radiation protection foreman briefed two RPTs (RPT No. 1 and RPT No. 2) regarding the removal of the AST floor plug. The day shift radiation protection foreman discussed the expected radiological conditions in the AST and the posting requirements once the floor plug was removed. The RPTs were instructed to post the AST plug opening as a high radiation area based on the day shift RP Foreman's knowledge of past radiological conditions within the AST.

On April 17, 1994, at approximately 4:30 p.m., the floor plug for the 141-foot elevation AST was removed. RPT No. 1 was present for the floor plug removal but did not post the floor plug entrance to the AST as a high radiation area, as directed by the day shift RP Foreman. RPT No. 1 and the day shift RP Foreman later agreed that the AST was inaccessible since there was no ladder installed for a person to make the 40 to 50-foot descent into the AST and determined that radiological posting of the plug entrance was not necessary at the time.

At approximately 5:30 a.m. on April 18, 1994, the scaffold handrails and gate were installed at the AST plug entrance by a crew of carpenters. No ladder was installed in the AST, and the area remained unposted as a high radiation area.

At approximately 2:30 p.m. on April 18, 1994, carpenters installed a ladder for access into the AST. Shortly thereafter, an oxygen test was conducted to test the habitability of the AST, after which two RPTs (RPT No. 2 and RPT No. 3) entered the AST to perform a radiation survey of the area. The RPTs measured 60 millirem per hour (mrem/hr) general area dose rates in the AST. However, the dose rates on the reactor water clean-up (RWCU) line, which passed through the AST, measured 375 mrem/hr on contact and 150 mrem/hr at 12 inches. When the RPTs completed their survey of the AST, they left the area without posting the AST as a high radiation area. The ladder remained in the AST from this time forward, allowing access to an unposted and uncontrolled high radiation area for approximately 9 hrs.

Technical Specification 6.12.1 requires, in part, that in lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) [20.1601(a)] of 10 CFR Part 20, each high radiation area in which the intensity of radiation is greater than 100 mrem/hr but less than 1000 mrem/hr shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a RWP. The failure to post the AST as a high radiation area is a violation of Technical Specification 6.12.1 (458/9409-01).

Between the hours of 2:30 and 5 p.m. on April 18, 1994, RPT No. 2 gave two members of the dayshift LLRT crew a brief description of the dose rates in the AST; however, RPT No. 2 did not use the term "High Radiation Area" in the

discussion with the workers. RPT No. 2 also told the LLRT crew members to report to RP prior to entering the AST because it was not posted. RPT No. 2 did not give a turnover regarding the AST dose rates to the dayshift RP lead technician. The dayshift LLRT crew subsequently reported to the dayshift RP lead technician for a briefing on the radiological conditions of the AST, as instructed by RPT No. 2. Because the dayshift RP lead technician did not have any knowledge of the AST survey results, the dayshift LLRT crew reported their turnover from RPT No. 2 to the RP lead technician, but again the term "High Radiation Area" was not specifically mentioned. RPT No. 2 then documented the AST survey as a "one-liner" (Survey No. S-BP-18-APR-94), not using a survey map to illustrate the locations of the various dose rate measurements. RPT No. 2 went off shift for the day. The AST remained unposted. The inspectors identified several serious breakdowns in communication at this point in the event. First, the failure of RPT No. 2 to give turn over to the dayshift RP lead technician and to document a thorough survey. Second, the failure of the dayshift RP lead technician to verify the information provided to the LLRT crew by RPT No. 2 and to question the LLRT crew as to when they were to begin work in the AST. Third, the failure of everyone involved to recognize the need for high radiation area controls when dose rates greater than 100 mrem/hr were discussed.

At approximately 6 p.m. on April 18, 1994, the LLRT crew self-accessed themselves into the RCA on RWP 94-6119-17, based upon their briefing with the dayshift RP lead technician. The LLRT crew then made the first entry into the AST without alarming dosimetry or positive control by a qualified RPT to perform an LLRT of the bellows. The AST remained unposted. The dayshift RP lead technician gave turn over to the nightshift RP lead technician discussing the need to post the AST as an high radiation area or a locked high radiation area, based on knowledge of how the AST had been posted in the past but did not mention that RP had already authorized LLRT work in the AST or that the AST was even accessible at the time. However, the RP turnover log, which was initialed by the nightshift RP lead technician acknowledging turnover of the previous shift log entries indicated that at 2:30 p.m. on April 18, 1994, a crew of carpenters entered the RCA to install the ladder at the AST.

At 6:20 p.m. on April 18, 1994, the dayshift LLRT crew turned over to the nightshift LLRT crew, indicating that RP had authorized work activities in the AST and briefly discussed the radiological conditions in the AST.

At 7:30 p.m. on April 18, 1994, the nightshift LLRT crew self-accessed into the RCA on RWP 94-6119-17 and made the second entry into the AST without alarming dosimetry or positive control by a qualified RPT with a survey meter. The nightshift LLRT crew did not verify survey data for the AST prior to entry nor did they discuss the radiological conditions with RP to verify that conditions had not changed. The AST remained unposted by RP.02).

Technical Specification 6.12.1 requires, in part, that in lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) [20.1601(a)] of 10 CFR Part 20, each high radiation area in which the intensity of radiation is greater than 100 mrem/hr but less than 1000 mrem/hr shall be barricaded and conspicuously posted as a high radiation area and, entrance thereto, shall be controlled by requiring issuance of a RWP. 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 indicates the radiation dose rate in the area.
- 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 personnel have been made knowledgeable of them.
- An individual qualified in radiation protection procedures with a radiation dose rate monitoring device, who is responsible for providing positive control over activities within the area and who shall perform periodic radiation surveillance at the frequency specified in the RWP by the health physicist.

The survey data of the AST available on April 18, 1994, indicated dose rates of 150 mrem/hr at 12 inches without specifying the radiation source within the AST. Thus, the two entries into the AST by LLRT crews on April 18, 1994, without having alarming dosimetry or positive control by a qualified RPT is a violation of Technical Specification 6.12.1 (458/9409-02).

Technical Specification 6.8.1.a requires, in part, that written procedures be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Regulatory Guide 1.33 states, in part, that RWPs be covered by written procedures. Section 4.9 of Licensee Procedure RBNP-024, Revision 4, "Radiation Protection Plan," states, in part, that radiation workers shall adhere to RWP requirements knowing that repeated or willful violation is cause for discipline up to and including termination. RWP 94-6119-17 states, in part, that all workers are to make themselves aware of current radiological conditions by: reviewing survey data, observing local postings, or by direct communication with radiation protection. The failure of the nightshift LLRT crew to adhere to RWP 94-6119-17 by contacting RP regarding the radiological conditions within the AST prior to entry, since survey data for the AST was not readily available to the LLRT crew and the AST was not posted is a violation of Technical Specification 6.8.1.a (458/9409-03).

At approximately 9:10 p.m. on April 18, 1994, the nightshift RP lead technician briefed RPT No. 4 on posting the AST.

At approximately 11:20 p.m. on April 18, 1994, the nightshift LLRT crew exited the AST. The LLRT crew was intercepted by RPT No. 4 and were told to contact RP prior to reentering the AST. RPT No. 4 then posted the AST plug entrance as a locked high radiation area.

At approximately 12:30 a.m. on April 19, 1994, the nightshift RP lead technician stopped the nightshift LLRT crew from entering on RWP 94-6119-17 for LLRT work in the annulus. The RP lead technician was under the assumption

that a prejob survey had not yet been performed and that access to the AST needed to be established. The LLRT crew then informed the lead technician that they had already been working in the AST for the first part of their shift and that a ladder was in place for accessing the AST. RP stopped LLRT activities in the AST and ordered a detailed survey of the AST.

At approximately 2:30 a.m. on April 19, 1994, the nightshift RP Foreman and RPT No. 5 performed a followup survey of the AST. The survey results were documented on a survey map which showed an appropriate level of detail to communicate the radiological conditions in the AST. The results of the followup survey indicated a general area dose rate of 20 to 40 mrem/hr. The dose rates on the RWCU line indicated approximately 350 mrem/hr on contact and 95 to 100 mrem/hr at 12 inches. The licensee attributed the decreased dose rates in the AST to the RWCU demineralizer resin beds lowering the source term of the reactor coolant system. Radiation protection personnel down posted the entrance to the AST from locked high radiation area to high radiation area. Radiation protection personnel generated Condition Report 94-0424 and began an investigation into the event. The licensee was still investigating the event at the time of this inspection.

The inspectors noted the licensee's immediate corrective actions (i.e., stopping work, resurveying the area, and appropriately controlling the area after identifying the problem) to be good. The inspectors noted poor RP shift turnover, similar to that identified in NRC Inspection Report 50-458/92-33 to be a weakness which contributed to this event. The licensee determined from self-reading dosimeter information that the highest dose received by an individual who entered the AST during the time period in question to be 15 mrem.

The licensee's completed investigation report dated May 13, 1994, was received in the NRC Region IV office on May 13, 1994. On May 16, 1994, the inspectors conducted an in-office review of the licensee's investigation report. The inspectors noted the licensee's investigation to be thorough and probing. However, the licensee's investigation failed to recognize the violations associated with dosimetry requirements for entry into a high radiation area and adherence to RWP requirements. The inspectors concluded that the licensee's investigation adequately identified the root cause and contributing causal factors of the event.

In addition to the radiological issues, the inspectors raised concerns regarding the industrial safety hazard of having an unposted and unbarricaded open hole which could result in serious injury to an individual who may fall in to it, and these conditions remained until April 26, 1994, when the inspectors notified the licensee's safety manager of the concern. The safety manager acknowledged the inspectors' concern stating that it was normal practice to post or leave a person present until the hazard could be barricaded.

1.6 Internal Exposure Control

The licensee used portable ventilation units with high efficiency particulate filters where practical as a means of reducing airborne contamination. The inspectors noted that the licensee had reduced the use of respirators during the outage. The licensee had reduced respirator use from approximately 2745 respirators issued in 1992 to approximately 200 respirators issued in 1993. To date the licensee had issued only six respirators in 1994.

The inspectors reviewed the licensee's action level for identifying individuals requiring whole-body counts to determine if internal contamination resulted. Though the licensee did not routinely whole-body count individuals that had been identified with facial contamination, they did routinely whole-body count persons that alarmed the Gamma-10 portal monitors at the RCA exit. The inspectors reviewed a licensee position paper which documented the capability of their Gamma-10 portal monitors to detect one percent of an annual limit on intake (ALI). The inspectors noted the licensee's method for assessing potential intakes of radioactive material to be adequate.

1.7 Controls of Radioactive Materials and Contamination, Surveys, and Monitoring

The inspectors observed entrance and exit access controls at the radiological controlled area and found them to be adequate with the exception of the workers' use of survey information prior to accessing the RCA. The inspectors observed multiple instances where workers would walk past the available survey data staged at the control point without stopping to verify radiological conditions in their work location. The inspectors discussed this weakness with the licensee.

Housekeeping within the radiological controlled area was adequate. Individuals exiting the radiological controlled area were required to pass through both gamma and beta sensitive personnel contamination monitors. RP personnel surveyed handheld items for contamination prior to release from the RCA.

Confirmatory survey measurements performed by the inspectors were in good agreement with the licensee's postings. The licensee had a good supply of performance tested and calibrated radiation survey meters. The inspectors reviewed selected survey meter calibration records and noted that the meters had been calibrated at the proper frequency.

At the time of this inspection, the licensee had identified approximately 34 personnel contaminations in 1994. Of those 34 personnel contaminations, 23 were identified as recordable under the licensee's tracking system. Recordable personnel contaminations are those with levels greater than 10,000 disintegrations per minute (dpm). Ten of the 34 personnel contaminations were identified as being discrete particles. None of the personnel contaminations reviewed by the inspectors resulted in significant radiation exposure to the individuals involved.

The licensee performed a good decontamination effort at the start of the Refueling Outage RF-5 as evidenced by the contamination event involving a broken airline on the refueling floor on April 20, 1994, during an attempt to loosen a stuck reactor vessel head-bolt. When the airline broke, the air rushing from the broken end of the hose resuspended loose surface contamination on the refueling floor and in the upper pool cavity creating an airborne radioactivity cloud in the containment atmosphere. As a result, 15 individuals in the immediate vicinity were contaminated, 10 with skin contamination of approximately 8000 dpm, 5 with clothing contamination only. One of the 10 individuals with skin contamination was identified with nasal contamination as well. All individuals involved were whole-body counted for possible internal contamination. Of the 10 individuals with skin contamination, only the individual with nasal contamination was identified by whole-body count as having an intake of radioactive material. The results of the licensee's whole-body count and subsequent dose evaluation of this individual indicated 0.2 percent ALI of cobalt-60 intake. The resulting committed effective dose equivalent from this intake was determined to be 12 mrem. General area contamination surveys indicated approximately 1000 to 5000 dpm in containment after this event. The inspectors concluded that this event was properly handled by the licensee's RP department and that there was little radiological significance to the event. No unmonitored release of radioactive material occurred, and all individuals involved were properly evaluated. The inspectors turned this issue over to the Senior Resident Inspector for further followup regarding operational concerns.

In general, surveys, monitoring, and control of radioactive material at the licensee's facility appeared good.

1.8 Maintaining Occupational Exposure ALARA

The inspectors noted that adequate ALARA planning and preparation was performed for the work scheduled for Refueling Outage RF-5. The inspectors reviewed selected ALARA packages for jobs being performed during the Refueling Outage RF-5 and noted that they were of good quality and included adequate checklists, estimates of projected man-hours, radiation survey information, radiation exposure projections, and lessons learned from previously accomplished, similar work.

An ALARA goal of 500 person-rem was set for Refueling Outage RF-5. Some techniques employed to reduce exposure included: mock-up training, the use of telemetric dosimetry and video cameras to remotely monitor high dose work, the use of temporary shielding to reduce radiation levels where practical, the decreased use of respirators, and the use of "ALARA zone" signs to alert personnel to low dose rate areas while standing idle in a work area.

The licensee had instituted a new ALARA incentive program for the Refueling Outage RF-5. The program was designed to heighten worker awareness to ALARA practices in the field. In discussions with licensee personnel, and during field observations, the inspectors noted the workers to be aware of the ALARA incentive program.

1.9 Conclusions

Good radiological control surveillances were performed by qualified individuals. No personnel changes were noted since the last inspection of this area.

The licensee adequately prepared for the Refueling Outage RF-5 by supplementing its radiation protection staff with qualified contract personnel and ensuring that sufficient quantities of equipment used by the radiation protection organization were available. Outage management performed an adequate job of preparing for and defining the scope of the outage.

External radiation exposure controls were generally good. However, three violations were identified, because radiation protection failed to post a high radiation area where workers subsequently performed work in violation of Technical Specifications and licensee procedures. Once RP supervision became aware of the problem the licensee took prompt and effective corrective actions.

Good internal radiation exposure controls in the form of respiratory protection, air monitoring, and whole-body counting were implemented. A good job of reducing respirator use was performed.

A weakness in the licensee's access control was identified regarding the workers use of available survey data upon access into the RCA.

A good decontamination effort was performed at the start of Refueling Outage RF-5. Controls of radioactive materials and contamination, surveys, and monitoring were generally good.

Adequate ALARA planning and preparation were performed for Refueling Outage RF-5. A good ALARA incentive program was implemented by the licensee.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

J. Anderson, Foreman, Radiation Protection
R. L. Biggs, Supervisor, Operations Quality Control
*O. P. Bulich, Manager, Nuclear Licensing
*W. L. Curran, Site Representative, Cajun Electric
*W. S. Day, Site Representative, Cajun Electric
*C. L. Fantacci, Supervisor Radiological Engineering
J. J. Fisicaro, Director, Nuclear Safety
*W. C. Hardy, Supervisor, Radiation Protection
J. Kearny, Technician (Contract), Radiation Protection
*P. LeForte, Supervisor, Technical Training
*D. N. Lorfing, Supervisor, Nuclear Licensing
*I. M. Malik, Supervisor, Operations Quality Assurance
*W. H. O'Dell, Director Radiological Programs
J. Onorato, Foreman, Radiation Protection
*J. P. Schippert, Technical Assistant to Director, Engineering
*M. B. Sellman, Plant Manager
J. E. Venable, Manager, Operations
M. Vierra, ALARA Coordinator
A. Wells, Technician, Radiation Protection
*A. D. Wells, Radiological Health Supervisor
*G. Zinke, Technical Coordinator, Nuclear Safety

1.2 NRC Personnel

*B. Murray, Chief, Facilities Inspection Program Branch
*W. F. Smith, Senior Resident Inspector, River Bend Station

*Denotes personnel that attended the April 29, 1994, exit meeting. In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on April 29, 1994. During this meeting, the inspectors reviewed the scope and findings of the report. The inspectors stated that the inspection would also include a review of Investigation Report CR-94-0424 once the investigation was completed. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary, any of the materials provided to, or reviewed by the inspectors during the inspection.