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Report No.: 70-824/91-02

Licensee: Babcock and Wilcox Company
Lynchburg Research Center
Lynchburg, VA 24505

Docket No.: 70-824 License No.: SNM-778

Facility Name: Lynchburg Research Center

Inspection Conducted: April 15-19, 1991

Inspector: G. B. Kuzo 13 May 1991
G. B. Kuzo Date Signed

Accompanied by: E. B. Pharr

Approved by: 5/14/91
J. P. Potter, Chief Date Signed
Facilities Radiation Protection Section
Radiological Protection and Emergency
Preparedness Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection involved review of licensee radiation protection (RP) program activities including staffing and organization, training, radiological controls, internal and external exposure assessments, and audits; radioactive waste characterization, classification, and management; transportation activities; and review of NRC Information Notices (INs) and previously identified enforcement items.

Results:

Radiation Protection (RP) staff changes met License Application organization and experience requirements, and staffing levels were sufficient to provide proper health physics (HP) coverage and to conduct surveillances for current activities. Worker RP training and respiratory protection program training and medical qualifications were implemented in accordance with applicable procedural and 10 CFR Part 20 requirements. Excluding audits required for the radioactive waste (radwaste) classification quality control (QC) program, other License Application and procedural audit activities were implemented as

required. All internal and external exposures were within 10 CFR Part 20 limits. Radwaste classification and transportation activities were conducted appropriately. A licensee initiative to reduce the amount of outside storage area radwaste was noted. Identified program weaknesses included an unresolved item for internal exposure control regarding the lack of in vivo instrument sensitivity to meet License Application minimum action limits; and two non-cited violations (NCVs) of radwaste program controls regarding the failure to follow procedures for completing radwaste drum card packaging information, and the failure to conduct audits in accordance with 10 CFR 20.311(d)(3) requirements. Licensee actions regarding previous enforcement issues were adequate. In general, RP program activities were considered adequate to protect worker health and safety.

Within the areas inspected, the following NCVs were identified.

- Failure to follow RP program procedures for completing packaging information on radwaste drum cards. NCV of License Condition No. 9 with licensee corrective actions initiated prior to the end of the onsite inspection.

- Failure to conduct required QC program audits for verifying radwaste is classified in accordance with 10 CFR 61.55 and 10 CFR 61.56 requirements. NCV of 10 CFR 20.311(d)(3) requirements with licensee committing to incorporate required audits into the applicable RP program area.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Bennett, Manager, Safety and Licensing, Navy Nuclear Fuel Division Research Laboratory (NNFD-RL)
*C. Boyd, Licensing and Compliance Officer
*T. Grochowski, Health Physicist
*S. Schilthem, Manager, Radiation Protection, NNFD
*D. Spangler, Supervisor, Health Physics
W. Stagg, Manager, Radiological Analytical Chemistry
*L. Trent, Manager of Safety and Safeguards
*C. Yates, Health Physicist

Other licensee employees contacted included technicians, operators, and office personnel.

*Attended exit interview

2. Radiation Control Organization and Staffing (83822)

The inspector reviewed the current organization, selected staff qualifications, and staffing levels for the onsite Health Physics (HP) group with respect to criteria detailed in Section 2 of the License Application for Special Nuclear Material License Number 778 (SNM-778). In particular, recent HP group personnel changes were reviewed.

a. Organization and HP Staff Qualifications

Figure 2-1 and Section 2.2 of the License Application detail the site organization, and position responsibilities and authorities.

The inspector discussed with cognizant licensee representatives current HP group organization and position responsibilities. The inspector verified that the HP supervisor position responsibilities met conditions specified in the License Application and that the supervisor reported directly to the B&W NNFD-RL, Safety and Licensing, Manager on a day-to-day basis. No concerns were noted for organization and assigned responsibilities of the HP group.

No violations or deviations were identified.

b. Staff Qualifications

Section 2.5.6 of the License Application details the education and experience requirements for the HP supervisor position.

The recently appointed HP supervisor's educational background and work experience were reviewed against the applicable License Application criteria. The inspector noted that the current supervisor met the established criteria having an appropriate technical degree and approximately nine years experience in RP programs, including 6 years at power reactor and 3 years at fuel fabrication facilities.

No violations or deviations were identified.

c. Staffing

The current health physicist and HP technician staffs were reviewed during the onsite inspection. Licensee representatives informed the inspector that since the previous NRC inspection of RP program activities conducted July 23 - August 30, 1990, and documented in Inspection Report (IR) 70-824/90-01, dated September 19, 1990, the site health physicist staff was reduced to two individuals as a result of the appointment of one staff member to the HP supervisor position vacated in March 1991. At the time of the onsite inspection, licensee representatives stated that no replacement for the vacated health physicist position was planned. The decision to reduce the health physicist staff resulted from a decreased number of projects and the completion of RP program and procedure formalization. Since the previous NRC inspection, the number of HP technicians remained at four individuals with no changes anticipated. From discussions with selected health physicists and HP technicians, the inspector noted that the staff was knowledgeable of their assigned program area responsibilities and all activities were conducted in a competent and timely manner. The HP program staffing was considered sufficient to meet RP program requirements.

No violations or deviations were identified.

3. Notices to Workers

10 CFR 19.11(a) and (b) require, in part, that the licensee post current copies of Part 19, Part 20, the license, license conditions, documents incorporated into the license, license amendments and operating procedures, or that a licensee post a notice describing these documents and where they may be examined.

10 CFR 19.11(d) requires that a licensee post Form NRC-3, Notice to Employees. Sufficient copies of the required forms are to be posted to permit licensee workers to observe them on the way to or from licensed activity locations.

During tours of the separate facility buildings, the inspector verified that Form NRC-3 and notices referencing the appropriate 10 CFR Part 19 and Part 20 and licensee documents were posted in accordance with the applicable regulation. Forms were posted at Buildings B and C personnel

monitoring badge storage areas in view of all employees entering the restricted areas.

No violations or deviations were identified.

4. Training and Qualifications

10 CFR 19.12 requires the licensee to instruct all individuals working or frequenting any portions of the restricted areas in the health protection aspects associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purpose and function of protection devices employed, applicable provisions of the Commission Regulations, responsibilities of individuals, and the availability of radiation exposure data.

Research Laboratory Technical Procedure (RL-TP) 249, Radiation Protection Training Program 1, Revision (Rev.) 0, dated August 8 1988, outlines the training program presented annually to site and non-site workers granted unescorted access to the Restricted Area but not granted unescorted access to Controlled Areas.

RL-TP-250, Radiation Protection Training Program 2, Rev. 0, dated August 9, 1988 is presented annually to site and non-site workers granted unescorted access to restricted and controlled areas but not permitted to work with radioactive materials without supervision.

RL-TP-251, Radiation Protection Training Program 3, Rev. 0, dated August 10, 1988 is presented annually to site and non-site workers granted unescorted access to restricted and controlled areas and will be permitted to work with radioactive materials and supervise such work.

From review of these training procedures and course outlines, the inspector determined that the RP program training provided for workers potentially exposed to or required to handle radioactive materials met the provisions of 10 CFR 19.12. The inspector also reviewed selected training records for workers signed on Radiation Work Permits (RWPs) recently issued in association with activities in a "Hot Cell" isolation room and in the ceramic forming area. For those individual workers reviewed all RP training was current.

No violations or deviations were identified.

5. Respiratory Protection Program (83822)

10 CFR 20.103(c)(2) permits the licensee to maintain and to implement a respiratory protection program that includes, at a minimum: air sampling to identify the hazard; surveys and bioassays to evaluate the actual exposures; written procedures to select, fit, and maintain respirators; written procedures regarding supervision and training of personnel and issuance of records; and determination by a physician prior to use of

respirators, that the individual user is physically able to use respiratory protective equipment.

a. Program Guidance

RL-TP-95 Respiratory Protection Program, Rev. 9, dated October 21, 1988, details requirements for respiratory protective equipment use by personnel and includes provisions for annual training/retraining, establishment of medical qualifications, documentation of training and qualifications, and provision of a policy statement regarding the use of respiratory protective equipment. In addition, licensee representatives informed the inspector that subsequent to the previous NRC inspection of RP activities conducted July 23 - August 30, 1990, Grade D air verification requirements were changed from an annual to a biennial frequency. The inspector noted that the current program guidance met the provisions of 10 CFR 20.101(c)(2).

No violations or deviations were identified.

b. Program Implementation

The inspector reviewed implementation of the respiratory protection program at the facility. A review of records for selected workers conducting work in the ceramic forming area and for workers making an isolation room entry associated with RWP 3852, verified that these workers were trained and medically qualified to use respiratory protective equipment in accordance with procedural and 10 CFR 20.101(a)(2) requirements.

No violations or deviations were identified.

6. Administrative Radiological Controls (83822)

License Condition No. 9 requires the licensee to use licensed material in accordance with the statements, representations, and conditions of Chapters 1 through 8 of the License Application dated November 26, 1985 and supplements dated thereto.

a. Safety Audit Subcommittee (SAS) Audits

Section 2.3.3.2 of the License Application requires the SAS to audit facilities, procedures, records, and operations for compliance with written requirements and the exercise of acceptable safety practices.

Section 2.8.3.1 states that the SAS performs audits of general safety and compliance. Audits are to be conducted three times annually and distributed over a twelve month period. The SAS also is required to include audits of HP and industrial safety functions at least once annually.

RL-TP-587, Performance and Reporting Guidance for the Safety Audit Subcommittee Audits, Rev. 0, dated 2/11/91, was developed to outline the minimum requirements for SAS audits of activities at NNFD-RL. The procedure describes the reporting requirements for audit findings and observations, the responsibilities for corrective action, and requires the SAS to perform at least three audits annually with successive audits separated by two months.

The inspector discussed with licensee representatives the current implementation of the SAS audit program. Licensee representatives stated that RL-TP-587 was developed in response to a violation identified during the previous NRC inspection of RP activities detailed in IR 70-824/90-01, dated September 19, 1990. The inspector verified that the procedure provides formal written guidance to the SAS for conducting audits as required by the License Application.

The inspector reviewed the SAS audits conducted during 1990. In accordance with the License Application and RL-TP-587 procedure, three audits were conducted, each separated by at least two months. The inspector verified that the October-November 1990 audit was conducted according to the new procedure in accordance with the licensee's reply to the Notice of Violation (NOV) dated October 19, 1990. Areas inspected by the SAS included current work and facility operations, instrument calibrations, proper postings and labelings, high radiation area controls, general hygiene and orderliness of the areas. In accordance with the new procedure, checklists were used which identified the areas audited, personnel contacts for particular areas, procedures and records reviewed, any findings and/or observations, the auditor's signature and the date performed. The inspector verified that the audits were conducted in compliance with the License Application.

No violations or deviations were identified.

b. HP Audits

Section 2.8.2.1 of the License Application requires the HP Supervisor to conduct internal monthly audits in accordance with written procedures for the purpose of evaluating the health physics aspects of operations.

RL-TP-463, Performance and Reporting of the Monthly Health Physics Audit, Rev. 0, dated July 21, 1989, outlines the minimum requirements for monthly audits at the facility, reporting requirements of audit findings and observations, and responsibilities for corrective actions. The procedure also provides an audit checklist and worksheet.

The inspector reviewed and discussed with licensee representatives selected 1990 monthly audit reports. The inspector noted that the audits were conducted in accordance with the License Application

requirements. The majority of documented issues included housekeeping concerns, and enhancements to posting and labeling requirements for items in the Hot Machine Shop. Licensee actions to improve the identified issues were conducted in a timely manner and appeared adequate. The inspector had no additional concerns regarding this program area.

No violations or deviations were identified.

c. Procedural Controls

Chapter 2, Section 2.7.1.3, of the License Application requires that revisions to Area Operating Procedures (AOPs) may be used with specified approvals until the next scheduled regular meeting of the Safety Review Committee (SRC) when the revision must be approved by the SRC.

The inspector reviewed and discussed with cognizant licensee representatives minutes from SRC meetings conducted since the last onsite inspection. The inspector verified that revisions to AOPs were reviewed and tentatively approved pending required revisions, as applicable, during SRC meetings. Prior to the subsequent SRC meeting, the revised AOPs as approved by the SRC were added to the licensee's active procedures. The inspector also discussed and reviewed the Procedure Tracking System which was implemented August 15, 1990. The system utilizes routing sheets to provide an organized method for procedure revisions to be reviewed by designated individuals and comments to be consolidated.

No violations or deviations were identified.

d. Termination Reports

10 CFR 20.408(b) requires that when an individual terminates employment with the licensee, or an individual assigned to work in a licensee's facility but not employed by the licensee completes the work assignment, the licensee furnish to the NRC a report of the individual's exposure to radiation and radioactive material incurred during the period of employment or work assignment. This report is to be furnished within 30 days after the exposure has been determined by the licensee or 90 days after the date of termination, whichever is earlier.

10 CFR 19.13(d) states that when a licensee is required pursuant to 10 CFR 20.408 to report to the NRC any exposure of an individual to radiation or radioactive material the licensee also is to provide the individual a report on his exposure data included therein. This report is to be transmitted at a time not later than the transmittal to the Commission.

RL-TP-374, Occupational Exposure Termination Reports, Rev. 1, dated January 27, 1989 defines when a termination report is required and outlines a report format. The procedure states that a report should be prepared after a person is no longer engaged in licensed activities at the facility and should be furnished to workers within 30 days after the exposure of the individual has been determined. The procedure also states that at minimum the report should include the worker's name, date of birth, and external and internal exposure data. The inspector noted that the procedure met the requirements of 10 CFR Part 19 and Part 20.

The inspector reviewed records for selected employees who had terminated employment with the licensee since the last inspection report and verified that exposure reports had been issued to the NRC and employees as specified by 10 CFR 20.408(b) and 19.13(d) and RL-TP-374.

No violations or deviations were identified.

7. Applied Radiation Controls (83822, 84850, 86750)

10 CFR 20.105(b), requires, in part, that no licensee possess, use or transfer licensed material in such a manner as to create in any unrestricted area from radioactive material or other sources of radiation in his possession radiation levels which could result in an individual receiving a dose in excess of 2 millirem per hour (mrem/hr) or a dose in excess of 100 mrem in any 7 consecutive days.

10 CFR 20.201(b) requires each licensee to make or cause to be made such surveys as may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

10 CFR 20.203(e) requires each area in which licensed material is used or stored and which contains any radioactive material in an amount exceeding ten (10) times the quantity of such material specified in Appendix C of this part to be posted with a sign or signs bearing the radiation caution symbol and the words: "Caution, Radioactive Material(s)."
10 CFR 20.203(f) requires each container of licensed material to bear a durable, clearly visible label identifying the radioactive contents and shall provide sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures. The label information shall include, as appropriate, radiation levels, kinds of material, estimate of activity, date for which activity is estimated, mass enrichment, etc. Exemptions to the container labeling requirements are detailed in 10 CFR 20.203(f)(3).

a. Survey and Monitoring Equipment

American National Standards Institute (ANSI) N323-1978, Radiation Protection Instrumentation Test and Calibration, Section 4.7.1 states that calibration of radiation protection instruments will be required at least annually. Additionally, for instruments subjected to extreme operational conditions, hard usage, or corrosive environments more frequent primary calibrations should be scheduled.

Cognizant licensee representatives informed the inspector that frequency of instrument calibration was based on the operational conditions to which instruments were subjected. Portable ion chambers and geiger-mueller (G-M) counters were calibrated semiannually while stationary monitoring instruments were calibrated annually. The inspector verified that specific procedures specifying proper operation, calibration, and calibration frequency were available for each type of survey and monitoring equipment.

During tours of the facility, the inspector verified that all surveillance and monitoring instrumentation was calibrated in accordance with the applicable procedures and in accordance with ANSI standards.

No violations or deviations were identified.

b. Restricted Area Boundary Surveys

RL-TP-87, General Radiation and Routine Area Surveys, Rev. 6, dated October 9, 1990, requires quarterly area surveys of the licensee's restricted area boundary.

The inspector verified completion of, and reviewed and discussed results for January 1989 through February 22, 1991 quarterly restricted area boundary surveys. All surveys were completed at the appropriate frequency and a maximum value of 0.7 mrem/hr measured at a radwaste outside storage area (OSA) boundary was noted for a survey conducted March 1, 1989. Licensee representatives stated that a significant effort to decrease the amount of radioactive materials/waste maintained in the OSA was completed recently. The reduction was undertaken to reduce restricted area boundary dose rates in anticipation of the new 10 CFR Part 20 requirements. During the onsite inspection, the inspector requested the licensee to conduct a restricted area boundary survey. The inspector accompanied licensee HP staff during completion of the survey and verified all boundary exposure rates were less than 10 CFR 20.105(b) limits with a maximum exposure rate of approximately 0.3 mrem/hr measured at the OSA boundary southeast of Building J.

No violations or deviations were identified.

c. Labeling and Posting

Licensee procedure B-GP-6, Labeling of Radioactive Materials, Rev. 3, dated May 25, 1990, details guidance for proper labeling of containers of radioactive materials and requires the label to clearly state known isotopes, quantities, forms and states unless the information is readily available in written form at a known location accessible to all individuals who may encounter or work with the materials or package.

Licensee representatives reviewed and discussed RP program changes for the OSA initiated in response to a container labeling violation detailed in IR 70-824/90-01, dated September 19, 1990. Corrective actions included HP approval for OSA use and HP notification of any material transfers into or out of the area. The OSA now is required to remain locked with material transfers into or out of the area entered into a OSA logbook. Further, all containers/materials are labeled in accordance with AOP B-GP-6 using weather resistant labels. During tours of the radwaste OSA the inspector reviewed and verified completion of the specified corrective actions. The inspector had no further questions regarding this issue.

AOP B-GP-2, Handling and Disposal of Radioactive Waste, Rev. 5, dated January 1, 1991, requires notification of HP to inspect waste containers in accordance with RL-TP-124. RL-TP-124, Waste Package Surveys, Rev. 0, dated October 12, 1988, details surveys to be conducted and resultant survey/packaging information to be entered on each drum card associated with a radwaste container.

During the week of April 15, 1991, the inspector noted several 55 gallon drums stored in the SNM Scanning room that were provided with labels and appropriate information in accordance with 10 CFR 20.203(f) requirements. However, the inspector noted that information for the attached drum card verifying contents and documentation by HP regarding material types, percent radwaste volume, absence of significant liquids etc, required in accordance with RL-TP-124 was not completed for all of the drums. From discussion with cognizant licensee representatives and observations of tamper-safe seals on the drums, the inspector noted that no further review of the drum contents were expected. Further review by licensee representatives regarding the drum origin and radwaste contents indicated that two of the drums were received from the Analytical and Environmental Laboratories respectively, and that drum cards were required to be completed in accordance with RL-TP-124. The inspector informed licensee representatives that the failure to follow RP procedures for completing radwaste drum cards information was a violation of license condition No. 9 (70-824/91-02-01). Immediate corrective actions by the licensee included evaluation/surveys of the radwaste materials and completion of the appropriate drum card information. Additionally the licensee committed to verify completion of drum cards for other stored

radwaste materials and to retrain appropriate personnel regarding drum card information requirements. The inspector informed licensee representatives that this NRC-identified violation was not being cited because criteria specified in 10 CFR 2, Appendix C, Section V.A. of the enforcement policy were met.

One NCV of License Condition No. 9 for failure to follow RP program procedures for completing radwaste drum packaging information was identified.

8. External Exposure (83822)

10 CFR 20.101 requires that no licensee shall possess, use or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter a total occupational dose in excess of 1.25 rems to the whole body, head and trunk, active blood forming organs, lens of the eyes, or gonads; 7.5 rems to the skin of the whole body, and 18.75 rem to the hands and forearms, feet and ankles.

10 CFR 20.202(a) requires each licensee to supply appropriate personnel monitoring equipment and requires the use of such equipment by each individual entering a restricted area under such circumstances that he receives or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in 10 CFR 20.101(a). 10 CFR 20.202(b) defines personnel monitoring equipment as devices designed to be worn or carried by an individual for the purpose of measuring the dose received.

a. Program Implementation

The inspector reviewed and discussed the 1990 whole body and extremity exposures for personnel.

From review of the licensee's annual exposure report, the inspector noted that the cumulative whole body dose for the year was 19.878 person-rem which was the lowest during the 1984-1990 tracking period. The inspector also noted that the 348 persons provided monitoring equipment during 1990 was the maximum number of individuals monitored within the same tracking period. Only 104 of the 348 individuals monitored received any measurable external exposure during the year.

During discussions with cognizant licensee representatives, the inspector was informed that a contributing factor to the 1990 exposure data resulted from a significant number of projects at the facility. The licensee representative stated that the projects required a fairly large number of contract personnel to be trained and badged but these personnel did not receive significant external exposure while working on the projects. The inspector noted that all values were within the established 10 CFR 20 external exposure limits.

Review of the licensee's 1990 extremity dose data revealed that 368 extremity dosimeters were assigned to facility workers. Cognizant licensee representatives informed the inspector that significant extremity exposures mainly resulted from workers handling Failure Analysis and/or Reactor Vessel Surveillance Program (RVSP) specimens. The maximum individual worker extremity dose assigned for the year was 13.72 rem. The inspector noted that all values were within the established 10 CFR Part 20 external exposure limits.

No violations or deviations were identified.

b. Form NRC-5

10 CFR 20.401(a) requires each licensee to maintain records in accordance with the instructions contained in Form NRC-5, showing the radiation exposures of all individuals for whom personnel monitoring is required under 10 CFR 20.202(a). The doses entered on the form are to be for periods of time not exceeding one calendar quarter.

The inspector reviewed selected individual's records for the existence of Form NRC-5 as applicable. Specifically, records of workers signed in on an RWP associated with a high dose rate task, an isolation room entry, and assigned multiple dosimetry were reviewed. The inspector noted that a Form-5 was on file for all selected individuals and that monthly updates were made to the forms.

No violations or deviations were identified.

c. April 8, 1991 Isolation Room Entry

The inspector reviewed a special entry made by multibadged workers into the licensee's isolation room under RWP No. 3852. The entry was conducted to remove highly contaminated material from the Hot Cell doorway into the isolation room in preparation for repair of the Programmed and Remote (PaR) manipulator. The maximum contact dose rate recorded on one of the three drum liners to be removed measured 30 rem per hour (rem/hr). At 18 inches the maximum dose rates of 20 rem/hr and 16 rem/hr, combined beta/gamma and gamma only readings, respectively, were measured.

The inspector noted that RWP No. 3852 required protective clothing, respiratory protective equipment, and multiple dosimetry to be worn by the workers entering the isolation room. Also workers were required to use a j-hook to maximize their distance from the liners during the movement. Review of preliminary exposure reports regarding the task detailed maximum doses of 430 mrem to the whole body, 570 mrem to the skin, and 446 mrem to the extremity. The inspector noted that the licensee's use of radiological controls to reduce external exposure during the isolation cell entry was adequate.

No violations or deviations were identified.

9. Internal Exposure (83822)

10 CFR 20.103(a)(1) states that no licensee shall possess, use, or transfer licensed material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive material in air specified in Appendix B, Table 1, Column 1.

10 CFR 20.103(a)(3) requires for purposes of determining compliance with the requirements of this section, the licensee use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas and in addition, as appropriate, use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for the timely detection and assessment of individual intakes of radioactivity by exposed individuals.

During the onsite inspection, the inspector reviewed selected aspects of the licensee's internal exposure monitoring program including the lower limit of detection (LLD) for air sampling instrumentation and analysis methodology, airborne radioactive material concentration results, bioassay analysis sensitivities, and assessment of routine and special internal exposures for employees working with licensed material.

a. Air Sampling

During observations of selected facility areas and from discussion with licensee representatives the inspector noted that both lapel, breathing zone (BZ), and stationary continuous alpha air monitors were utilized to monitor/assess workers'internal exposures during selected tasks involving the handling of licensed material. The inspector reviewed and verified licensee calculations which indicated that the LLD for each air sampling method was, at a minimum, two orders of magnitude less than the maximum permissible airborne concentration (MPCa) listed in 10 CFR 20, Appendix B, Table 1, for either mixed fission product (MFP) or uranium radionuclides.

The inspector reviewed and discussed with cognizant licensee representatives the current air sampling program implementation and results for both ceramic forming laboratory (CFL) area and resin changeout activities. During tours of CFL, the inspector verified the operability of the recently installed continuous alpha monitors. Further, the inspector verified that all measured airborne uranium concentrations were less than values requiring internal exposure assessments for personnel working in the area. Additionally, the inspector reviewed and discussed in detail the MPCa-hrs assigned to personnel conducting ion exchange resin changeouts. For all resin

changeouts conducted by personnel without respiratory protective equipment, the inspector noted that measured MPCas were less than 25 percent of the applicable values listed in 10 CFR 20, Appendix B, Table 1.

The inspector reviewed the 1990 general area airborne concentration data summary. For the nine areas routinely monitored, average airborne concentrations were less than 0.06 percent and 0.02 percent of MFP and uranium materials MPCas, respectively. Maximum values reported, that is 3.41 percent and 2.46 percent of MFP and uranium MPCas, respectively, were identified for the cask handling area. Licensee representatives stated that no significant incidents regarding elevated airborne radionuclide concentrations were identified during 1990. The inspector had no further questions regarding this internal exposure program area.

No violations or deviations were identified.

b. Bioassay Program Implementation

Section 3.2.4.3 of the License Application, details, in part, action levels and resultant actions to be taken for the fission product and uranium bioassay programs. For the uranium bioassay program, actions are specified for in vivo results equal to or exceeding 30 micrograms of uranium-235 (ug/U-235) and urinalysis results exceeding 9 ug uranium per liter (ug/l).

During the onsite inspection, the inspector reviewed the licensee's bioassay programs for evaluating internal exposure to MFP and uranium materials.

RL-TP-247, Implementation and Quality Assurance of the NNFD-RL Bioassay Program, Rev. 0, dated November 20, 1987, establishes the personnel to be monitored, frequency and types of bioassay analyses, action levels and required documentation. Licensee representatives stated that the procedure's in vivo uranium analysis frequencies, semiannual analyses, me. the requirements of Regulatory Guide 8.11. However, cognizant licensee representatives stated that for personnel potentially exposed to airborne uranium material concentrations, current in vivo analyses were conducted on a quarterly schedule using an approved vendor.

The inspector verified that in vivo MFP analysis senstivities and urinalyses sensitivities met license requirements. However, from details provided by cognizant licensee representatives regarding the vendor's in vivo detection limits for uranium material, the inspector noted that reported uranium analysis sensitivities, ranging from 40 to 60 ug U-235, did not meet the License Application minimum action level, 30 ug U-235, which require initial review of area surveys to support the analysis result. The inspector noted that for this minimum action level no additional reanalyses of, or restrictions for

individuals were required. Further, the vendor's in vivo analysis sensitivity was adequate to measure lung burdens at action levels greater than 120 ug U-235 which required reanalysis and potential restriction of individuals. Licensee representatives stated that the minimum analysis sensitivity required by the License Application was based on conducting the in vivo analyses semiannually and that as a result of the current quarterly sampling frequency the minimum action level could be increased. The inspector informed licensee representatives that the requirement for the in vivo uranium analysis sensitivity to meet the License Application minimum action level would be considered an unresolved item (URI) pending licensee evaluation and subsequent review by NRC Nuclear Material and Safety Safeguards licensing personnel regarding the current analysis frequency and the bases for the in vivo uranium requirements (70-824/91-02-02).

The inspector reviewed and discussed the 1990 in vivo MFP and urinalysis results. All results were less than License Application action levels requiring reanalysis and restriction. For in vivo MFP analyses, the maximum measured internal measured value, approximately 0.5 percent of the maximum permissible body burden (MPBB), was less than action limits detailed in the License Application. For in vivo uranium material analyses, all verified results were less than the vendor's detection limits.

One URI was identified regarding requirements for vendor in vivo analysis sensitivity to meet License Application minimum action level requirements for uranium relative to current analysis frequency.

c. February 14, 1991, Internal Contamination Event

During the onsite inspection, licensee representatives provided the inspector with an evaluation of a February 14, 1991 internal contamination event for a worker associated with hot/isolation cell activities. The cell entry was conducted under RWP No. 3840 which required appropriate protective clothing and respiratory protective equipment, and constant HP coverage. Licensee representatives stated that no initial concerns were noted subsequent to completion of the task and exit from the cell. All protective clothing utilized for the cell entry was new and respiratory protective equipment was determined to be clean. Internal contamination was detected during routine radiologically controlled area (RCA) exit surveys. The licensee initiated in vivo and in vitro, both urine and fecal samples, MFP analyses for the worker.

The licensee provided analysis data regarding activities and the location of the material through time indicating the material was ingested by the worker subsequent to hot/isolation cell activities. Vendor in vivo analyses indicated approximately 200 nanocuries (nCi) of total activity (^{60}Co-60) in the worker on February 15, 1991. A subsequent in vivo analysis conducted following fecal voiding on

February 18 measured approximately 2 nCi remaining in the worker. A second fecal sample was provided on February 22, 1991. Subsequent vendor in vitro analyses of the fecal material listed 281 picocuries (pCi) Co-60 in the first sample and 90 pCi Cobalt-60 and 60 pCi Cesium-137 in the second sample. The differences between the in vivo analyses and the vendor fecal analyses were believed to have resulted from the failure to collect soiled tissue used during voiding. Further, the in vivo results indicated peak activity corresponding with movement from the upper to the lower abdomen. No activity was measured in the pulmonary tract. The licensee evaluation indicated that the intake occurred during removal of the respirator or protective clothing. Licensee representatives stated that other individuals involved in the February 14, 1991, hot/isolation cell work did not have any measurable internal or external exposure.

Licensee representatives stated that the worker's intake was assessed based on the ingestion limits in 10 CFR Part 20, Appendix B, Table 1, Column 2. Based on the ingestion limits a total of 1.52 MPC-hrs was assessed to the individual for the incident based on the in vivo measurements for the individual. The inspector had no further questions regarding this issue.

No violations or deviations were identified.

10. Sealed Source Control (83822)

10 CFR 30.51(a)(1) requires each person who receives byproduct material to keep records showing the receipt of byproduct material as long as the material is possessed and for three years following transfer or disposal of the material.

License Condition No. 11 requires the licensee to perform leak tests on all sealed sources containing licensed material with a half-life greater than 30 days. Sealed sources that are stored and not being used are excepted from this test but are to be tested prior to any use or transfer unless they have been leak tested within 6 months prior to the date of use or transfer. Records of leak test results are to be kept in units of microcuries (uCi) and maintained for inspection by the Commission.

During the onsite inspection, the inspector reviewed licensee corrective actions regarding violations regarding failure to perform sealed source leak tests and failure to maintain receipt records for byproduct material received under NRC License No. SNM-778 identified during the previous NRC inspection conducted July 23 - August 30, 1990, and documented in IR 70-824/90-01-01, dated September 19, 1990.

To improve control of sealed source leak tests, RL-TP-241, Leak Testing of Radioactive Sealed Sources, Rev. 2, dated March 11, 1991, was revised to require that the Source Inventory and Smear Data Worksheet are routed to the appropriate HP engineer for review. The surveys are reviewed and forwarded to HP Records Center for storage. The inspector reviewed sealed

source leak test records for August 1990. The inspector noted that RL-TP-241, Rev. 2 Worksheets were not yet being used but that Rev. 1 Worksheets were reviewed by HP and forwarded to records as prescribed by the revised procedure.

Area Operating Procedure B-GP-3, Receipt of Radioactive Materials, Rev. 4, dated March 20, 1991, describes the licensee's program for receiving and opening packages containing radioactive materials to comply with the requirements of 10 CFR 20.205. The procedure was revised to emphasize the review of all equipment brought on site, whether new or used, to determine if sealed sources of radioactive materials are present. In addition, the procedure revision requires Shipping and Receiving to provide a monthly copy of the Freight Log Sheets, a listing of the packages received, to the Licensing and Compliance Officer for review. This review is to provide added effort to control the receipt of sealed sources into the facility. The inspector verified that the Licensing and Compliance Officer was receiving copies of the Freight Log Sheets monthly from Shipping and Receiving as required by procedure.

No violations or deviations were identified.

11. Radioactive Waste Management Activities and Transportation (84850, 86740)

10 CFR 20.311(d)(1) requires any generating licensee who transfers radioactive waste to a land disposal facility or a licensed waste collector shall prepare all wastes so that the waste is classified according to 10 CFR 61.55 and meets the waste characteristics requirements in 10 CFR 61.56.

10 CFR 71.5 requires that each licensee who transports licensed material outside the confines of its plant or other place of use, shall comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation (DOT) in 49 CFR Parts 170-189.

a. Training and Qualification of Personnel

The inspector reviewed the qualifications, training, and experience of selected personnel responsible for the processing, storage, and shipping of radioactive materials and waste. The inspector noted that the employees received periodic training in DOT/NRC regulations, waste license burial requirements, and operating procedures for the transfer, packaging, and transport of radioactive material. The last training workshop was provided by a waste processing contractor in August 1990.

No violations or deviations were identified.

b. Waste Classification Program Implementation

10 CFR 20.311(d)(3) requires, in part, any licensee who transfers radioactive waste to a land disposal facility or a licensed waste collector to conduct a QC program which includes management evaluation of audits to assure compliance with 61.55 and 61.46.

RL-TP-218, Radioactive Waste Classification by Gross Radioactivity, Rev. 0, dated October 19, 1988, and RL-TP-407, Sampling and Characterization of Waste Streams, Rev. 0, dated December 8, 1988, provide guidance for analyzing and characterizing waste prior to shipment for disposal.

The inspector reviewed the sampling schedules and quantitative radionuclide results for waste shipments made since an NRC inspection of radwaste activities conducted July 23 - August 30, 1990, and documented in Inspection Report (IR) 70-824/90-01, dated September 19, 1990. Sampling frequency and the analyses met the NRC Branch Technical Position (BTP) guidance dated April 11, 1983.

From review of licensee audits and discussion with licensee representatives, the inspector noted that QC audits of the radwaste program were not conducted. The inspector informed licensee representatives that the failure to conduct required QC program audits for verifying waste is classified in accordance with 10 CFR 61.55 and 10 CFR 61.56 was a violation of 10 CFR 20.311(d)(3) requirements (70-824/91-02-03). Prior to the end of the onsite inspection, licensee representatives committed to incorporate required QC audits into the RP program. The inspector informed licensee representatives this NRC-identified violation was not being cited because criteria specified in 10 CFR 2, Appendix C, Section V.A. of the enforcement policy were met.

A NCV of 10 CFR 20.311(d)(3) requirements for failure to conduct required QC program audits for verifying waste is classified in accordance with 10 CFR 61.55 and 10 CFR 61.56 was identified.

c. Waste Shipments

49 CFR 172.200 requires each person who offers a hazardous material for transportation shall describe the hazardous material on the shipping paper in the manner described by this subpart.

RL-TP-238, Rev 1, dated July 11, 1990, Shipping Radioactive Waste to Chem Nuclear at Barnwell, SC, describes the licensees procedures for classifying, packaging, marking, labeling, and shipping radioactive waste for near surface disposal. RL-TP-409, Rev. 3, dated January 21, 1991, General Procedure for Shipment of Non-fissile Radioactive Materials, describes the licensees procedures for packaging, marking, labeling, and shipping of non-fissile radioactive materials to other licensees for use or disposal. The inspector

noted that the licensee's procedures provided sufficient guidance for the preparation and shipment of radwaste to offsite process or burial facilities.

From review of the licensee's annual report, the inspector noted that the licensee's 1990 waste volume had decreased to approximately 2.2 thousand cubic feet and was the lowest amount since 1986. From discussions with licensee representatives and tours of the facilities, the inspector noted the significant licensee effort to prepare and ship stored radwaste materials to reduce the radwaste volume. The reduction of radwaste volume stored onsite was identified as a RP program enhancement.

The inspector reviewed selected records of radioactive material and waste shipments performed since the last onsite inspection conducted June 18-22, 1990. The shipping manifests examined were consistent with the 49 CFR requirements. The radiation and contamination survey results were within the limits specified for the mode of transport and shipment classification. Shipping documents were completed and maintained as required. The inspector concluded from records reviewed that the licensee had complied with all regulatory and procedural requirements.

No violations or deviations were identified.

12. Followup Items (92701)

The following NRC Information Notices (INs) were reviewed and discussed with cognizant licensee representatives.

a. Information Notices

The inspector verified that the following INs were received by the licensee, reviewed for applicability, distributed to appropriate personnel and that action, as appropriate, was taken or planned.

- IN 90-47: Unplanned Radiation Exposures to Personnel Extremities Due to Improper Handling of Potentially Highly Radioactive Sources
- IN 90-48: Enforcement Policy for Hot Particle Exposures
- IN 90-56: Inadvertent Shipment of a Radioactive Source in a Container Thought to be Empty
- IN 90-63: Management Attention to the Establishment and Maintenance of a Nuclear Criticality Safety Program
- IN 90-66: Incomplete Draining and Drying of Shipping Casks

- IN 90-75: Denial of Access to Current Low-Level Radioactive Waste Disposal Facilities
- IN 90-81: Fitness-For-Duty
- IN 90-82: Requirements for Use of NRC Approved Transport Packages for Shipment of Type A Quantities of Radioactive Material

13. Licensee Action on Previous Enforcement Issues (92702)

The following enforcement issues were identified during an inspection conducted June 18-22, and August 30, 1990, and documented in IR 70-824/90-01, dated September 19,1990.

a. (Closed) Violation (VIO) 70-824/90-01-03: Failure to complete health and safety audits in accordance with written guidance as required by Section 2.3.8 of the license application. Violation of License Condition No. 9.

The inspector reviewed and verified implementation of corrective actions stated in Babcock and Wilcox Company, NNFD-RL response dated October 22, 1990. Results of the inspector's review are documented in Paragraph 6.a of this report.

The inspector informed the licensee that this item would be considered closed based on completion of the corrective actions and current program implementation.

b. (Closed) VIO 70-824/90-01-04: Failure to follow procedures for completing Safety Review Committee (SRC) review of revised Area Operation Procedures (AOPs). Violation of License Condition No. 9.

The inspector reviewed and verified implementation of corrective actions stated in Babcock and Wilcox Company, NNFD-RL response dated October 22, 1990. Results of the inspector's review are documented in Paragraph 6.c of this report.

The inspector informed the licensee that this item would be considered closed based on current program implementation.

c. (Closed) VIO 70-824/90-01-05: Failure to label containers of radioactive waste adequately to identify the hazards present. Violation of 10 CFR 20.203(f) requirements.

The inspector reviewed and verified implementation of corrective actions stated in Babcock and Wilcox Company, NNFD-RL response dated October 22, 1990. Results of the inspector's review are documented in Paragraph 7.c of this report. Based on current program implementation the inspector informed licensee representatives that this item would be considered closed.

d. (Closed) VIO 70-824/90-01-07: Failure to perform sealed source leak tests as required by License Condition No. 11. Violation of License Condition No. 11.

The inspector reviewed and verified implementation of corrective actions stated in Babcock and Wilcox Company, NNFD-RL response dated October 22, 1990. Results of the inspector's review are documented in Paragraph 10 of this report.

Based on revisions to procedure No. RL-TP-241 and current program implementation, the inspector informed the licensee that this item would be considered closed.

e. (Closed) VIO 70-824/90-01-08: Failure to maintain receipt records for byproduct material received under NRC License No. SNM-778. Violation of 10 CFR 30.51(a)(1) requirements.

The inspector reviewed and verified implementation of corrective actions stated in Babcock and Wilcox Company, NNFD-RL response dated October 22, 1990. Results of the inspector's review are documented in Paragraph 10 of this report.

Based on revisions to procedure No. B-GP-3 and current program implementation, the inspector informed the licensee that this item would be considered closed.

14. Exit Interview (83822, 84850, 86750)

The inspection scope and results were summarized on April 19, 1991, with those individuals indicated in Paragraph 1. The NCVs listed below regarding radioactive waste program areas were reviewed in detail. In addition, an unresolved item regarding in vivo analysis sensitivity to meet the License Application minimum action level requirements was reviewed in detail. The inspector informed licensee representatives that the enforcement actions listed in Paragraph 13 were reviewed and would be considered closed pending NRC RII management review.

Licensee representatives acknowledged the inspector's comments. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

Item Number	Description and Reference
70-824/91-02-01	NCV for failure to follow RP procedures for completing packaging information on radwaste drum cards (Paragraph 7.c). Violation (VIO) of License Condition No. 9 with licensee corrective actions completed prior to end of the onsite inspection.

70-824/91-02-02	URI regarding requirement of vendor in vivo analysis sensitivity to meet License Application minimum action level for uranium relative to current analysis frequency (Paragraph 9.b). Pending licensee's evaluation and NRC NMSS review of proposed changes to License Application in vivo analysis action levels. Potential for violation of License Condition No. 9.
70-824/91-02-03	NCV for failure to conduct required QC program audits for verifying waste is classified in accordance with 10 CFR 61.55 and 10 CFR 61.56 requirements (Paragraph 11.b). NCV of 10 CFR 20.311(d)(3) requirements with licensee committing to incorporate required audits into applicable RP program area.