



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23T85  
ATLANTA, GEORGIA 30303-8931**

June 15, 2001

Westinghouse Electric Company  
ATTN: Mr. R. Monley, Manager  
Columbia Plant  
Commercial Nuclear Fuel Division  
Drawer R  
Columbia, SC 29250

**SUBJECT: NRC INSPECTION REPORT NO. 70-1151/2001-03 AND NOTICE OF VIOLATION**

Dear Mr. Monley:

This refers to the inspection conducted on May 7-11 and May 14-18, 2001, at the Columbia Plant. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Based on the results of this inspection, the NRC has determined that violations of NRC requirements occurred. The violations are cited in the enclosed Notice of Violation (Notice) and involves three examples of failing to follow the criticality safety posting for the uranium powder mixing hoods and failing to provide Radiation Safety training and collecting baseline or termination bioassay samples for two (2) individuals performing work under a Radiation Chemical Work Permit. The violations are of concern because they are both repetitive of violations documented in earlier inspection reports (70-1151/2001-02 and 70-1151/1998-06 respectively).

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements. Also, prior to this inspection, the NRC received your response dated April 30, 2001, to Violation 70-1151/2001-02-01. We have evaluated your response and determined that it meets the requirements of 10 CFR 2.201. Implementation of your corrective actions for the violation were examined during this inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

Should you have any questions concerning this letter, please contact us.

Sincerely,

**/RA/**

Edward J. McAlpine, Chief  
Fuel Facilities Branch  
Division of Nuclear Materials Safety

Docket No. 70-1151  
License No. SNM-1107

Enclosures: 1. Notice of Violation  
2. NRC Inspection Report

cc w/encls:

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NAME	AGooden	DAyres	ABoland
DATE	6/15/2001	6/15/2001	6/15/2001
COPY?	YES NO	YES NO	YES NO

## NOTICE OF VIOLATION

Westinghouse Electric Company, LLC  
Columbia, SC

Docket No. 70-1151  
License No. SNM-1107

During an NRC inspection conducted on May 7-11 and May 14-18, 2001, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

- A. Safety Condition No. S-1 of Special Nuclear Material License No. 1107, requires that material be used in accordance with statements, representations, and conditions in the License Application dated April 30, 1995, and supplements thereto.

Section 3.4.1 of the License Application requires that operations to assure safe, compliant activities involving nuclear material will be conducted in accordance with approved procedures.

Section 6.1.1 of the License Application states, in part, that procedures impacting nuclear criticality safety are made available through posting of limits.

Contrary to the above, on May 8, 2001, licensee personnel failed to maintain container spacing in the uranium powder mixing hoods at a minimum of 12 inches in accordance with the posted criticality safety limits.

This is a Severity Level IV violation (Supplement VI).

- B. Safety Condition No. S-1 of Special Nuclear Material License No. 1107, requires that material be used in accordance with statements, representations, and conditions in the License Application dated April 30, 1995, and supplements thereto.

Section 3.4.2.(a) of the License Application states that "All new employees will receive training in emergency response policies and guidelines, and general safety and regulatory practices." Sections 5.7.1 (Invitro Bioassay) and 5.7.2 (Invivo Bioassay) of the License Application states that "Baseline measurements (urinalysis measurements and lung burden evaluations) will be performed for individuals required to be monitored for internal exposure prior to initial work activities that involve exposure to radioactive material. Termination measurements will be performed, when practical, if an individual is no longer subject to the bioassay program due to changes in the individual's employment status (such as termination of employment or changes in the individual's assigned duties)."

Section 2.0 of Environment, Health and Safety Health Physics Procedure RA-214 requires all employees working in or frequenting any portion of a restricted area to be instructed in the health risks associated with exposure to radioactive material or radiation; precautions or procedures to minimize exposure; responses to emergency warning signals; and nuclear criticality safety requirements. Environment, Health, and Safety Health Physics Procedure RA-204, Section 6.1.4 requires that chemical area supervision assure that all new employees and transferees from the clean areas submit urine samples and receive invivo counts prior to beginning work in the chemical area; and Section 7.3 states that each new employee who will be working in the chemical area should submit an initial urine sample and receive an invivo count prior to beginning work in the chemical area."

Contrary to the above, two (2) individuals performed work under RCWP 99-001 but were not provided Radiation Safety training, and no baseline or termination bioassay samples were collected during the period of December 1998 through December 1999.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Westinghouse Electric Corporation is hereby required to submit a written statement or explanation for Violation A to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

The NRC has concluded that information regarding Violation B, the corrective actions taken to correct the violation is already adequately addressed on the docket in this Inspection Report. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," and send it to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice.

Your response(s) will be made publicly available. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 15<sup>th</sup> day of June 2001

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-1151

License No.: SNM-1107

Report No.: 70-1151/2001-03

Licensee: Westinghouse Electric Company

Facility: Commercial Fuel Fabrication Facility  
Columbia, SC 29250

Inspection Conducted: May 7-11 and May 14-18, 2001

Inspectors: D. Ayres, Senior Fuel Facility Inspector, RII  
A. Gooden, Health Physics Inspector, RII

Approved by: E. McAlpine, Chief, Fuel Facilities Branch  
Division of Nuclear Materials Safety

## EXECUTIVE SUMMARY

The focus of this routine, unannounced inspection was the observation and evaluation of the licensee's programs for operational safety, fire safety, and radiation protection. The inspection also included evaluations of the licensee's response to a previously identified issue. The report includes inspection efforts of two regional inspectors. An NRC license reviewer was also on site during the first week of the inspection. The inspection identified the following aspects of the licensee programs as outlined below:

### **Plant Operations**

- Container spacing in the uranium powder mixing hoods was not adequate to meet criticality safety requirements and was identified as VIO 01-03-01. (Section 2.a)
- The configuration control program showed weaknesses in the documentation and control of obsolete equipment connected to process piping, and in ensuring that process changes did not affect the safety bases of previously approved configuration changes. (Section 2.b)
- Housekeeping was adequate to ensure emergency egress pathways were clear of debris. (Section 2.c)
- Long term corrective actions to prevent recurrence of Violation 01-02-01 were not yet complete. This item remained open. (Section 2.d)

### **Fire Safety**

- The manufacturing processes, equipment, and material storage areas reviewed were being operated in accordance with fire safety requirements. (Section 3.a)
- Fire extinguishers and fire doors throughout the plant were being adequately maintained to ensure proper condition for their operation. (Section 3.b)
- The Pre-Fire Plan included the minimum required information but portions needed to be updated and clarified. (Section 3.c)

### **Radiation Protection**

- The exposure results for calendar year (CY) 2000 when compared with CY 99 results disclosed three (3) individuals exceeded the licensee's administrative limit of four (4) rem total effective dose equivalent (TEDE), and the maximum assigned TEDE in CY 2000 (4.18 rem) was the highest since CY 96 (3.41 rem). The site collective exposure for CY 2000 increased more than 80 percent over CY 99, but no regulatory or license limits were exceeded. (Section 4.a)

- The invivo counting system upgrade enhanced the licensee's capability for isotopic identification in critical organs. (Section 4.b)
- Licensee attention is warranted based on the negative trend in exposures as evidenced by the increase in the maximum assigned committed effective dose equivalent (CEDE) in CY 99 (8 percent) and 2000 (28 percent), and the site collective TEDE increase. (Section 4.b)
- With one exception, radiation chemical work permits (RCWPs) appeared to provide requirements for adequate radiation protection and chemical safety of workers. The one exception was RCWP 2000-23, dated December 11, 2000, did not provide adequate guidance to personnel regarding requirements for gloves. A violation was identified for failure to provide two (2) workers with radiological protection training and monitoring for internal exposure. (Section 4.c)
- The contamination survey program was appropriately implemented to protect workers, and identify potential work areas posing a radiation hazard to workers. The contamination survey data revealed that material used in the southeast expansion building floor resurfacing project was free of smearable contamination and/or elevated direct radiation readings. Plant tours disclosed housekeeping improvements were needed as evidenced by visual gross contamination in areas. (Section 4.d)
- Notification and reporting of exposure data to workers was in accordance with requirements in the license and 10 CFR 19.13. (Section 4.e)
- Management controls for tracking and trending of radiation exposures were in place to provide management with details for review and taking actions as appropriate to ensure compliance with license commitment and regulations. (Section 4.f)

Attachment:

Partial List of Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed, and Discussed

Acronyms

## REPORT DETAILS

### **1. Summary of Plant Status**

This report covered a two week period. Powder, pellet, and fuel assembly production proceeded at normal rates. The construction of the erbia product line in the Burnable Absorber Expansion System (BAES) was underway. There were no unusual plant operational occurrences during the onsite inspection.

### **2. Plant Operations (O3) (IP 88020)**

#### a. Conduct of Operations (O3.01)

##### (1) Inspection Scope

Operations in the fuel production and uranium recovery areas were reviewed to verify adherence to safety requirements and conduct of safe practices.

##### (2) Observations and Findings

The inspector observed operations in the fuel processing areas and the uranium recovery areas. The inspector also observed the outdoor activities supporting the fuel manufacturing process. The inspector observed that specific operations were typically being performed safely and in accordance with approved plant procedures and postings. However, on May 8, the inspector observed the improper spacing of containers in the uranium powder mixing hoods. The criticality safety postings for these hoods required that containers with more than a 4.5 inch depth be spaced at least 12 inches from any other container. The inspector observed that in three of the five process lines, polypaks containing Special Nuclear Material (SNM) were being stored in a configuration that was less than 12 inches from the nearest container of SNM. The inspector observed that the licensee's nuclear criticality safety analysis was based on mass and moderation control, and not on container spacing. However, the mass limit was implemented through the spacing requirements such that, if followed, an unsafe mass could not be accumulated in the hoods. The actual amount of material involved in any of the spacing violations did not approach the mass limits of the station, but the failure to follow the spacing limits created the potential for mass limits to be exceeded. These examples of the failure to follow posted safety requirements were identified as Violation (VIO) 01-03-01. This violation is similar to a violation cited in NRC Inspection Report 70-1151/2001-02. For that violation the licensee took short-term corrective actions described in a letter to the NRC dated April 30, 2001 that should have been adequate to prevent recurrence. The corrective action, however, was not adequate to prevent recurrence in that the current violation occurred. A notice of violation is therefore being issued for this violation. See section 2.d for long-term corrective actions being taken for the previous violation.

During tours of the facility, the inspectors noted radiological signs, postings, and procedures were properly posted or readily available. The inspector observed conditions and determined that equipment and devices used to confine and contain radioactive contamination and airborne radioactivity in fuel processing and other

material access areas were adequate for the operations that were taking place or planned and were in proper working condition.

(3) Conclusion

Container spacing in the uranium powder mixing hoods was not adequate to meet criticality safety requirements and was identified as VIO 01-03-01.

b. Facility Modifications and Configuration Controls (O3.02)

(1) Inspection Scope

The licensee's powder production and solvent extraction systems were reviewed to verify that the licensee's configuration controls for facility modifications were in accordance with approved specifications and procedures for ensuring safety. The licensee's overall configuration control system was reviewed to verify that facility modifications were in accordance with approved specifications and procedures for ensuring safety.

(2) Observations and Findings

The inspector performed a preliminary review of the construction of the erbia product line. This involved the conversion of an old storage area into a process line for manufacturing fuel pellets from a blend of uranium and erbia powders as part of the Burnable Absorber Expansion System (BAES). The inspector reviewed the basic layout of the process area and observed its orientation with the existing process areas. The inspector found that the construction activities did not significantly affect the safety of the existing process operations.

The inspector reviewed plant drawings for the licensee's powder production and solvent extraction systems. The inspector observed that safety-related controls and process features depicted in the design drawings were in place and functional. Conversely, the inspector also noted that all safety-related equipment being used was included in the drawings. However, the inspector observed that certain pieces of old process equipment that were not included in the drawings were still in place on the process line but no longer being used. Much of this obsolete equipment (pumps, gauges, etc.) was still connected to the process piping system and isolated from the process with valves. Additionally, these isolation valves were not tagged out to identify them as not to be used. The inspector discussed potential problems associated with not maintaining or controlling obsolete equipment, including possible leaks of SNM into the work area due to the failure or inadvertent opening of the isolation valves. The licensee indicated that an effort to remove obsolete equipment had been started and would continue to work toward removing all obsoleted equipment.

The inspector reviewed the change control system files and found that changes to the process equipment were reviewed and approved in accordance with licensee's procedures and license requirements. The inspector observed that some proposed changes had been approved for up to three years but the actual implementation of the changes had been delayed. In the meantime, other changes had been requested,

approved, and implemented to the same process area. This meant that the original configuration (under which the delayed change was approved) was no longer valid. The inspector found that the licensee's configuration control program did not have a method for ensuring that modifications to the plant made after approval but before implementation of a configuration change would not affect the safety basis upon which the delayed change was approved. The inspector considered this a weakness in the configuration control program that needed to be addressed by the licensee. The licensee acknowledged this as a potential problem and planned to revise the configuration control program accordingly.

(3) Conclusion

The configuration control program showed weaknesses in the documentation and control of obsolete equipment connected to process piping, and in ensuring that process changes did not affect the safety bases of previously approved configuration changes.

c. Housekeeping (O3.06)

(1) Inspection Scope

Conditions throughout the facility were reviewed to verify that housekeeping did not adversely affect the radiological safety or emergency egress of the facility.

(2) Observations and Findings

The inspector observed housekeeping conditions throughout the facility. Despite the relocation of numerous bulk containers and construction activity due to the BAES project (see Section 2.a), the site was generally free of clutter except in the staging area for decontamination of non-combustible trash. The auxiliary emergency exit for that area was adequately free from clutter.

(3) Conclusion

Housekeeping was adequate to ensure emergency egress pathways were clear of debris.

d. Follow-up on Previously Identified Issues (O3.08)

(1) Inspection Scope

The licensee's actions to address previously identified issues were reviewed to determine completion to closure.

(2) Observations and Findings

The inspector reviewed the licensee's progress in investigating the root causes and determining long-term corrective actions for VIO 01-02-01 concerning two examples of failure to follow criticality safety posting in uranium recovery dissolver elevator. Short-term corrective actions had already been taken to achieve full compliance with NRC

regulations. The inspector observed that the licensee's proposed actions to prevent recurrence included a Corrective Action Process (CAP) report to investigate the need for additional actions such as the installation of physical barriers to prevent unauthorized spacing of polypacks in the elevator. At the time of this inspection, the CAP report had been drafted and was under management review.

(3) Conclusion

Long-term corrective actions to prevent recurrence of VIO 01-02-01 were not yet completed. This item remained open.

**3. Fire Safety (O4) (IP 88055)**

a. Fire Safety of Processes, Equipment, and Storage Areas (O4.04)

(1) Inspection Scope

The manufacturing processes, equipment, and material storage areas were reviewed to verify they were being operated in accordance with fire safety requirements.

(2) Observations and Findings

The inspector viewed the operation of the sintering furnaces using hydrogen gas. The inspector observed that the fire safety systems on each furnace was properly operating and flame sensors were properly positioned in each hydrogen burn-off stack. The inspector observed that natural gas usage through the process areas was being adequately controlled. The inspector observed that combustible liquids were being adequately stored throughout the plant site. The inspector observed that bulk chemical storage areas and other fire-sensitive areas had no significant accumulations of combustible materials. The inspector also observed that welding and cutting operations in the uranium powder bulk blending room was being performed in accordance with hot work permit requirements.

(3) Conclusion

The manufacturing processes, equipment, and material storage areas reviewed were being operated in accordance with fire safety requirements.

b. Fire Protection Systems (O4.05)

(1) Inspection Scope

Certain fire protection systems were examined to verify they were being maintained in proper condition for use.

(2) Observations and Findings

The inspector observed numerous portable fire extinguishers throughout the plant site. The inspector found that all fire extinguishers observed had been tested within the proper frequency. The inspector found a fire extinguisher inspection tag outdoors on the ground where it had evidently fallen off of an extinguisher mounted on a fork lift. The inspector returned the tag to licensee safety management to affix it back on the appropriate extinguisher. The inspector also reviewed NRC Information Notice (IN) 2001-04 with the licensee concerning the explosion of a fire extinguisher in the Netherlands that resulted in a fatality. The licensee indicated that no known extinguishers were stored such that corrosion could develop to cause a failure of the extinguisher integrity. The inspector observed no storage of fire extinguishers that would result in the failure mode of the incident described in the IN. The inspector also observed fire doors throughout the facility and found them clear from debris and in proper working order.

(3) Conclusion

Fire extinguishers and fire doors throughout the plant were being adequately maintained to ensure proper condition for their operation.

c. Pre-Fire Plan (O4.07)

(1) Inspection Scope

The Pre-Fire Plan was reviewed to verify the completeness and accuracy of information provided to off-site responders.

(2) Observations and Findings

The inspector reviewed the licensee's Pre-Fire Plan and observed that although the plan included the minimum amount of information required by license requirements, much of the information was outdated or nondescript. The inspector found that the last update of the Pre-Fire Plan was early in 1999 and that several management changes had occurred since then that affected the lists of management contacts included in the plan. The inspector also found that the sketches showing response team assembly points, etc., were not always clearly marked. The licensee indicated that the plan would be updated with current pertinent information and improved clarity where needed.

(3) Conclusion

The Pre-Fire Plan included the minimum required information but portions needed to be updated and clarified.

**4. Radiation Protection (83822) (R1)**

a. External Exposure Control (R1.04)

(1) Inspection Scope

The inspector reviewed radiation protection procedures, and discussed with licensee representatives personnel exposure data to determine if exposures were in compliance with 10 CFR Part 20.1201 limits, and if controls were in place to maintain occupational doses As Low As Reasonable Achievable (ALARA).

(2) Observations and Findings

Based on procedural reviews, and interviews, the licensee's monitoring program was consistent with requirements in 10 CFR Part 20. The inspector reviewed assigned exposures for calendar year (CY) 2000 and compared the results to exposure data for CY 99. Table 1 displays the maximum assigned exposure data for CY 99 and 2000. The site collective exposure for CY 2000 was increased by more than 80 percent over CY 99, but no regulatory or license limits were exceeded. During CY 2000 three (3) individuals exceeded the licensee's administrative limit of four (4) rem total effective dose equivalent (TEDE). The maximum assigned TEDE in CY 2000 (4.18 rem) was the highest since CY 96 (3.41 rem). During CY 99, the ALARA goal of two (2) rem was exceeded but no worker exceeded the TEDE administrative limit. In contrast, during CY 2000 both the ALARA goal and administrative limit were exceeded. The maximally assigned extremity exposure (MDE) in CY 2000 (7.03 rem) was approximately 45 percent less than the CY 99 exposure (12.9 rem), and the deep dose equivalent (DDE) increased approximately 69 percent from CY 99 (1.02 rem) to CY 2000 (1.73 rem). The licensee attributed the increase in external exposure to the elevation in production levels, the significant overtime work by employees, and the increased sensitivity of dosimetry.

Table 1. Annual Exposures

Year	Deep Dose Equivalent (DDE)	Maximum Dose Extremity (MDE)	Total Effective Dose Equivalent (TEDE)	Collective TEDE (person-rem)	Committed Effective Dose Equivalent (CEDE)
1999	1.02 rem	12.9 rem	3.04 rem	305 person-rem	2.69 rem
2000	1.73 rem	7.03 rem	4.18 rem	554 person-rem	3.43 rem

In response to the elevated exposures, the licensee discussed operator training, housekeeping procedures, equipment modifications, air flow studies, and other long and short term plans under consideration to reduce the exposures. Improvements were made to the issuance, processing, and overall control of thermoluminescent dosimeters (TLDs). The licensee's program for controlling and monitoring external exposures to radiation was appropriately implemented.

(3) Conclusion

The results for CY 2000 when compared with CY 99 results disclosed three (3) individuals exceeded the licensee's administrative limit of four (4) rem TEDE, and the maximum assigned TEDE in CY 2000 (4.18 rem) was the highest since CY 96 (3.41 rem). The site collective exposure for CY 2000 increased more than 80 percent over CY 99, but no regulatory or license limits were exceeded.

b. Internal Exposure Control (R1.05)

(1) Inspection Scope

The inspector reviewed licensee procedures for assessing internal exposure to determine if controls were in place to monitor occupational doses, and verify that the administrative limits were established to control occupational dose ALARA. Exposure data based on air sampling results were reviewed to determine if exposures were in compliance with 10 CFR Part 20.1201 limits.

(2) Observations and Findings

The licensee was effectively tracking and trending occupational exposures to determine if administrative limits were met so that appropriate actions were taken to preclude exceeding limits in 10 CFR Part 20.1201. Table 1 above presents the maximum assigned exposure data for CY 99 and 2000. The maximum assigned CEDE for CY 2000 was 3.43 rem, an approximately 28 percent increase from CY 99, and was assigned to an individual in conversion. The inspector discussed with the licensee the negative trend in exposures as evidenced by the increase in the maximum assigned CEDE (8 and 28 percent in CY 99 and 2000 respectively), and the site collective TEDE (48 and 82 percent in CY 99 and 2000). Further, the inspector discussed numerous examples of poor housekeeping including visual, gross contamination that was observed during facility tours and the impact of poor housekeeping on exposures. In response, the licensee acknowledged the inspector's comments and indicated that a program and plan was being developed to aggressively reduce the airborne activity and exposures while also improving housekeeping. Details regarding the action plan were not fully developed at the time of the inspection.

Since the last inspection of the bioassay program, the licensee's capability for detecting the presence of radioactive material in critical organs was significantly improved via the replacement of the previous lung/whole body counting system. The new system's minimum detectable limit was better than the previous system resulting in greater sensitivity for isotopic identification. The inspector reviewed documentation to show that daily operational checks were performed and observed the operator perform an invivo count and analysis of the count results print-out. No problems were noted with the results from either the daily operability checks or the worker's lung count results.

(3) Conclusion

Based on interviews, performance observation, and records review, the licensee's internal exposure control program was adequate for evaluating and monitoring personnel exposures. The licensee was effectively tracking and trending occupational exposures. The invivo counting system upgrade enhanced the licensee's capability for isotopic identification in critical organs.

Licensee attention is warranted based on the negative trend in exposures as evidenced by the increase in the maximum assigned CEDE (8 and 28 percent in CY 99 and 2000 respectively), and the site collective TEDE (48 and 82 percent in CY 99 and 2000).

c. Postings, Labeling, Control (R1.07)

(1) Inspection Scope

The inspector reviewed the licensee's program for posting as required by 10 CFR 19.11 to determine if documents were posted in sufficient places to permit individuals engaged in licensed activity to observe them. Radiation Work Permits (RWPs) were reviewed to determine the adequacy of the requirements posted for worker protection and the degree to which those requirements were being implemented.

(2) Observations and Findings

Bulletin boards were posted such that workers may observe documents or obtain details as to where documents may be examined. Regarding radiation work permits which were referred to as radiation chemical work permits (RCWPs), with one exception, RCWPs appeared to provide requirements for adequate radiation protection and chemical safety of workers. The exception was RCWP 2000-23, dated December 11, 2000, entitled "Operation of the BLASTRAC Bead Blaster." The RCWP contained numerous requirements (lapel sampler, respirator, safety glasses, et.al.), but did not specify protective clothing. The RCWP Originator was interviewed and questioned regarding the unchecked boxes to denote protective clothing requirements (gloves, shoes, and coveralls). Interviewee indicated that anyone entering the chemical area is supplied appropriate protective clothing which at a minimum would include a laboratory coat and plastic shoe covers for casual tours. For hands on work involving fuel and containers or equipment, additional clothing may be indicated. The interviewee further stated that the failure to check the box(es) was an administrative oversight but recalled gloves and coveralls were worn by workers. The inspector selected names from the RCWP and reviewed the worker's exposure history and invivo count results on file and determined that no significant exposure and/or unusual situations were identified. Based on no significant exposure and/or unusual situation identified during the exposure history and invivo count review, the inspector concluded that the administrative oversight did not appear to result in an exposure. Section 7.2.3 of Procedure RA-207 (RCWP) required the Integrated Safety Engineer (RCWP Originator) to "determine Health Physics, Radiation Protection, Environmental, or Chemical Safety requirements for the job and enter on the RCWP." Therefore, the administrative oversight was a minor procedure violation with very low safety significance.

The implementation aspects of RCWP 99-001, dated January 31, 1999, entitled "Painting Walls for Chemical Area," was reviewed by the inspector. The qualifications for personnel performing work under the RCWP were reviewed and a violation was identified for failure to provide individuals Radiation Safety training and failure to perform baseline and/or termination bioassays. Section 3.4.2.(a) of the License Application states that "All new employees will receive training in emergency response policies and guidelines, and general safety and regulatory practices." Section 2.0 of Environment, Health and Safety Health Physics Procedure RA-214 implemented the license requirement. RA-214 required "All employees working in or frequenting any portion of a restricted area shall be instructed in the following: (1) Health risks associated with exposure to radioactive material or radiation; (2) Precautions or procedures to minimize exposure; (3) Responses to emergency warning signals; and (4) Nuclear criticality safety requirements." Sections 5.7.1 (Invitro Bioassay) and 5.7.2 (Invivo Bioassay) of the License Application stated that "Baseline measurements (urinalysis measurements and lung burden evaluations) will be performed for individuals required to be monitored for internal exposure prior to initial work activities that involve exposure to radioactive material. Termination measurements will be performed, when practical, if an individual is no longer subject to the bioassay program due to changes in the individual's employment status (such as termination of employment or changes in the individual's assigned duties)." Environment, Health, and Safety Health Physics Procedure RA-204, required the following: (1) Section 6.1.4 states that "Chemical area supervision assure that all new employees and transferees from the clean areas submit urine samples and receive invivo counts prior to beginning work in the chemical area;" and (2) Section 7.3, states that "Each new employee who will be working in the chemical area should submit an initial urine sample and receive an invivo count prior to beginning work in the chemical area." Contrary to the aforementioned requirements, two (2) individuals performed work under RCWP 99-001, but the licensee failed to provide Radiation Safety training and no baseline or termination bioassay samples were collected during the period December 1998 to December 1999. The licensee's current procedures for new employees included an orientation check-list containing all the training requirements (radiological protection, criticality, emergency response, etc.) which must be completed prior to the issuance of a security photo badge. Incoming employees and/or contractors were escorted by security or other plant personnel using checklist to assure that dosimetry requirements, training, and other plant indoctrinations (security/regulatory) are completed prior to issuing a photo badge. Based on the licensee's checklist used for granting site access to visitors, new employees, and contractors, the inspector determined that this was an effective tool for preventing a recurrence. Although there existed a potential for radiation exposure, a review of exposure data covering the period the RCWP was in effect did not reveal any exposures in excess of occupational limits in 10 CFR 20.1201. Consequently, the risk and safety significance was reduced. At the time of the inspection, the licensee had not determined the root cause for the violation and/or assigned a final exposure to workers for record-keeping and reporting purposes. Failure to provide workers radiological protection training, and monitoring workers for internal exposure (bioassay program) in accordance with license requirements was considered a violation (VIO 70-1151/2001-03-02). The licensee's assessment actions to determine the cause, and assign an estimated exposure to workers will be tracked via the licensee's CAP as action item number 01-001026.

(3) Conclusion

With one exception, RCWPs appeared to provide requirements for adequate radiation protection and chemical safety of workers. The one exception was RCWP 2000-23, dated December 11, 2000, did not provide adequate guidance to personnel regarding requirements for gloves. A violation was identified for failure to provide two (2) workers radiological protection training and monitoring for internal exposure (bioassay program) in accordance with license requirements.

d. Surveys (R1.08)

(1) Inspection Scope

The contamination control survey program was reviewed to determine if surveys were effective in the identification of contamination and performed in accordance with procedures.

(2) Observations and Findings

The inspector accompanied personnel during the performance of contamination surveys and observed both the collection and analysis of smear samples. In addition, contamination survey data for select locations covering the period September to December 2000 was reviewed. The results disclosed that the surveys were effective in the identification of potentially contaminated areas and decontamination was both timely and effective. Since the last review of this area, the licensee had replaced the flooring in various locations within the control area. The inspector reviewed the contamination survey data for flooring material, paint brushes, rollers, metal beams, and other material used in the southeast expansion building floor resurfacing project. The survey data disclosed materials were free of smearable contamination and/or elevated direct radiation readings.

During plant tours, the inspector noted several examples of poor housekeeping as evidenced by visual gross contamination requiring cleanup, fuel pellets on the floor, used respirators improperly stored, rags potentially contaminated with oil, used gloves requiring disposal, and bags of trash left in the control area.

(3) Conclusion

The contamination survey program was appropriately implemented to protect workers, and identify potential work areas posing a radiation hazard to workers. The survey data disclosed material used in the southeast expansion building floor resurfacing project was free of smearable contamination and/or elevated direct radiation readings. Plant tours disclosed housekeeping improvements were needed as evidenced by visual gross contamination in areas.

e. Notifications and Reports (R1.09)(1) Inspection Scope

The licensee's Red Book file was reviewed for determining the reportability of events to NRC and workers. The availability of worker's exposure data was reviewed.

(2) Observations and Findings

Randomly selected incidents did not require notification to NRC. Appropriate followup actions were taken in response to each event reviewed. For incidents which required worker notification to ensure that personnel were aware of the potential for exposure, the licensee provided followup in the event the employee required work restrictions. Several workers in the conversion and pellet areas were questioned regarding the availability and/or provision of exposure data by the licensee. In response, interviewees indicated that at least once a year the info was provided and although no request were made for data, each interviewee believed the data would be available on request if needed. The availability of exposure reports to employees was further corroborated by observing the performance of the lung counter operator in performing counts and reviewing the data with a contractor employee.

(3) Conclusion

Based on licensee performance, interviews, and documentation, the inspector determined that notification and reporting was being done in accordance with requirements in the license and 10 CFR 19.13.

f. Management Oversight of Program (R1.11)(1) Inspection Scope

The inspector reviewed the adequacy of management controls for tracking and trending issues in addition to the trending and reporting of exposures.

(2) Observations and Findings

The inspector reviewed documentation to show that issues were tracked via a plant-wide system know as the CAP and the commitment tracking system (CTS). A weekly printout of issues tracked via CAP was provided to plant management for review to ensure the appropriate priority was being assigned to items. Regarding exposure tracking and trending, personnel assigned responsibility was interviewed and the computer generated reporting formats were reviewed and determined to provide a quick and effective assessment of the real-time and/or projected exposure data.

(3) Conclusion

Management controls for tracking and trending were in place to provide management with details for review and taking actions as appropriate to ensure compliance with license commitment and regulations.

g. Followup on Previously Identified Issues (R1.12)

(1) Inspection Scope

The inspector reviewed the actions taken by the licensee to correct a previous issue to verify that the corrective actions were adequate and had been completed.

(2) Observations and Findings

(Closed) IFI 70-1151/2000-04-03: Verify corrective actions to ensure effective and timely decontamination.

The inspector discussed with licensee personnel the corrective actions taken since the inspection and reviewed contamination survey documentation for the period September to December 20, 2000. In the event area action limits for removable contamination were exceeded, areas were decontaminated and resurveyed within twenty-four hours to acceptable limits.

(3) Conclusion

Based on the review of contamination survey results, the surveys were effective in the identification of potentially contaminated areas and decontamination was both timely and effective. Based on the licensee's timely and effective decontamination, this item was considered closed.

**5. Exit Meetings**

The inspection scope and results were summarized on May 11 and May 18, 2001, with those persons indicated in the Attachment. The inspectors described the areas inspected and discussed in detail the inspection results. Although proprietary documents and processes were reviewed during this inspection, the proprietary nature of these documents or processes is not included in this report. No dissenting comments were received from the licensee.

## ATTACHMENT

### **PARTIAL LIST OF PERSONS CONTACTED**

#### Licensee Personnel

- \*R. Flake, Team Manager, Chemical Operations
- \*H. Green, Technician, Health Physics Operations
- \*\*J. Heath, Manager, Integrated Safety Engineering
- #J. Hooper, Integrated Safety Engineering
- \*R. Likes, Regulatory Engineer
- J. McCormick, Principal Engineer
- \*\*S. McDonald, Manager, Environmental Health and Safety
- \*\*R. Monley, Plant Manager
- \*B. Newmyer, Nuclear Criticality Safety Engineer
- \*J. Rankar, Regulatory Engineer
- T. Rankin, Plant System Engineer
- \*D. Williams, Nuclear Criticality Safety Engineer
- \*\*R. Williams, Advisory Engineer

Other licensee employees contacted included engineers, technicians, production staff, security, and office personnel.

#Attended exit meeting on May 11, 2001

\*Attended exit meeting on May 18, 2001

### **INSPECTION PROCEDURES USED**

IP 83822	Radiation Protection
IP 88020	Regional Nuclear Criticality Safety Inspection Program
IP 88055	Fire Protection

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

- |          |     |  |
|----------|-----|--|
| 01-03-01 | VIO | Three examples of failure to follow criticality safety posting in the uranium powder mixing hoods. (Section 2.a)   |
| 01-03-02 | VIO | Failure to provide two (2) workers radiological protection training and monitoring for internal exposure (bioassay program) in accordance with license requirements. (Section 4.c) |

Closed

00-04-03	IFI	Verify corrective actions to ensure effective and timely decontamination. (Section 4.g)
01-03-02	VIO	Failure to provide two (2) workers radiological protection training and monitoring for internal exposure (bioassay program) in accordance with license requirements. (Section 4.c)

Discussed

01-02-01	VIO	Two examples of failure to follow criticality safety posting in uranium recovery dissolver elevator. (Section 2.d)
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**ACRONYMS**

ALARA	As Low As Reasonable Achievable
BAES	Burnable Absorber Expansion System
CAP	Corrective Action Process
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulation
CTS	Commitment Tracking System
CY	Calendar Year
DDE	Deep Dose Equivalent
IFI	Inspector Follow up Item
IN	Information Notice
IP	Inspection Procedure
MDE	Maximum Dose Extremity
RCWP	Radiation Chemical Work Permit
SNM	Special Nuclear Material
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
VIO	Violation