

Licensee Performance Review for Westinghouse
Assessment Period From: 01/09/2000 TO: 12/29/2001

I. Safety Operations

A Chemical Safety

- 208 The review of operations in the chemical manufacturing areas revealed that improvements were needed in the bracing and labeling of hydrofluoric acid piping. IR 00-02

**** NEGATIVE FINDING** During a review of a contamination event involving uranyl nitrate (see section 2.c) the inspector observed a section of unlabeled piping that was vibrating significantly due to inadequate bracing. The area operator pointed out that the piping contained hydrofluoric acid being pumped from bulk storage to a process station. The inspector found that this was a chemical safety concern due to the risk of a pipe failure and no clear indication as to the hazardous nature of the pipe's contents. The inspector notified licensee management who took quick action to brace the piping. The licensee was investigating additional improvements in the labeling and bracing of the piping.

MANAGEMENT EXPECTATIONS NOT ESTABLISHED
INADEQUATE CONSTRUCTION
INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 210 The uranyl nitrate piping system was not adequately being maintained per the plant configuration control program and was identified as Violation (VIO) 00-02-02. IR 00-02

**** NOTICE OF VIOLATION** The inspector reviewed the licensee's procedure for configuration control in the manufacturing plant. The inspector observed various areas of the licensee's uranyl nitrate piping system, including the area involved in a recent contamination event (see Section 2.c). The licensee indicated that the contamination event was due to the failure of a piece of threaded pipe on a uranyl nitrate sample port. The inspector reviewed the drawing referenced by the system's Integrated Safety Assessment (ISA) and noted that the drawing was last updated in April 1998. The drawing indicated a piping specification of welded construction, with the provision that threaded connections could be used when adequate work space was not available for welding, or when adapting to threaded instrumentation or equipment. Neither of these provisions applied to the failed piping that led to the contamination event. The inspector also found that drawing included a piping manifold with six valves that had been removed from the manufacturing area without being reviewed and approved through the configuration control program. Although the removed valves were no longer being used, this rendered the process information referenced by the ISA inaccurate. The inspector also observed the uranyl nitrate piping in several other areas of the plant and found places where threaded fittings had been used instead of the specified welded fittings. All of these findings are examples of failure to maintain safety-related operations per the plant configuration management program and are identified as Violation (VIO) 00-02-02.

MANAGEMENT EXPECTATIONS NOT ENFORCED
EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN)
INADEQUATE CONSTRUCTION
IMPROPER EQUIPMENT DESIGN OR SELECTION

- 221 The licensee's standard operating procedures, in respect to the Ammonium Diuranate and Uranium Recovery processes, were adequate for safe operations. IR 2000-202

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address the operating procedures.

The inspectors selected SOPs from the ADU and Uranium Recovery areas to ensure pertinent process safety information and phases of the operation were adequately addressed. The inspectors reviewed the following chemical operating procedures (COP): ADU Precipitation (COP-810501, Rev. 26, 10-07-99), Handling, Processing, and Disposing Low Level Recovery System (COP-831001, Rev. 32, 04-02-00), and Ammonia Recovery (COP-830404, Rev. 9, 09-30-99). The SOPs reviewed contained the appropriate information required for safe operations. The SOPs contained the pertinent elements for operation: safety, startup, normal operation, temporary operations, and shutdown. The licensee currently has an outside consultant making improvements to the SOPs for the facility. It was a self-imposed enhancement to strengthen human factors within the SOPs.

The inspectors walked down the ADU and Uranium Recovery processes and interviewed responsible process operators in the respective areas. The operators had access to computerized SOPs and hard copies in the control room when needed. The inspectors selected portions of the SOPs with the operators. The SOPs appeared to be easily understood by the operators. The operators were aware of the chemical safety requirements and risks involved in their respective process areas.

R2/D1-16
contains
MC+A results
& security

inspection
results

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Act, exemptions 2
FOIA-2006-0026

G-15

05/04/2000

- 222 The licensee implemented the maintenance of the safety significant controls in a timely manner with no backlog. The operators were knowledgeable about the active engineered controls in their respective areas. *IR 2000-202*

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address preventative maintenance.

The inspectors reviewed the licensee's maintenance and inspection program. The safety significant interlock frequency and testing was established by an approved procedure. The regulatory engineer approved the frequency. The licensee utilized a computerized maintenance tracking system that generates work orders and notifies the responsible process areas of their safety significant controls maintenance schedule.

The inspectors selected safety significant controls in the Uranium Recovery and the ADU processes to ensure availability and reliability. The licensee identified the safety significant controls for the respective areas in the Chemical Operating Procedure Sketch, URRS area (Sketch no. 836038-1, Rev. 4, April 27, 2000) and the Safety Significant Interlocks, Alarms and Passive Engineered Controls Verification form, Conversion Line 2 (Form no. CF-81-933, Rev. 26, March 9, 2000).

The licensee identified ten AECs, six administrative controls, and one passive engineered control for the URRS areas. The AECs consisted of functions that prevent: failure of the incinerator scrubber system; solution entry to the process scrubber system, and overcharging with the waterglass drum cake. (Waterglass drum cake is the solid left over from the uranium recovery process). The periodic functional testing was verified for the AECs after review of the maintenance records. The inspectors reviewed the results of the functional testing. The results reviewed had no failures and were conducted within the allotted schedule. The licensee explained that if a safety significant control failed it was kept out of service until it was functional. After maintenance was completed, the control was tested to ensure operability.

The maintenance of the safety significant controls for the Precipitation area was also reviewed. One safety significant control was identified. The interlock was a differential pressure orifice plate flow transmitter that prevented very corrosive and soluble uranium-bearing material from entrance to specified tanks. The control was identified as a criticality control that undergoes annual functional testing. The maintenance records reviewed indicated the control had received periodic functional testing.

No maintenance backlog existed for safety significant items at the time of the inspection. The status of maintenance items were reviewed on a weekly frequency by facility personnel to prevent backlog.

The inspectors walked down the process areas and verified that AECs were available in the Uranium Recovery and Precipitation areas. The respective operators were able to identify the AECs in their area. The inspectors also verified the administrative controls were utilized. The operators had an understanding of the importance and functions of the safety significant controls.

05/04/2000

- 223 The licensee tracked and addressed injury and abnormal performance incidents in a timely manner to prevent reoccurrence. *IR 2000-202*

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address incident investigation.

The inspectors reviewed the licensee's incident investigation program that utilized the "Redbook" system. The Redbook was a record of unusual occurrence reports. The inspectors followed-up on a Redbook item that identified a shortage of full face respirators in the chemical area (Date of report: February 24, 2000). The licensee utilizes cartridge respirators that require a new respirator after removal. The licensee had a backlog in the cleaning of the respirators due to the number of respirators being utilized on this specific day for maintenance activities. The licensee's corrective action consisted of purchasing an additional 400 respirators and use of a backup washing machine. The inspectors reviewed the site emergency plan to ensure the licensee was prepared to respond to an emergency situation with the proper breathing apparatus. The inspectors verified the self contained breathing apparatus were accessible and in the locations identified in the emergency plan. The inspectors concluded the licensee properly addressed this issue to prevent reoccurrence and to ensure safe process activities.

In the review of the licensee's Records of Occupational Injury or Illness, the inspectors recognized a trend of nitric acid burns in the chemical area. The inspectors discussed the observation with licensee management and determined that the licensee had self-identified this trend. Most instances reflected the affected personnel were not wearing the appropriate personal protective equipment (PPE). Some of the chemical operations/activities did not require an acid suit to be worn in activities within the vicinity of nitric acid. The licensee conducted

3

team meetings with the plant staff to be aware of such activities. At the time of the inspection, a meeting was to take place to include in the revised SOPs the requirement of additional PPE in such activities involving nitric acid. The inspectors concluded the licensee addressed the trend appropriately.
05/04/2000

- 306 The licensee is conducting appropriate ISAs for all high risk plant areas and processes. The ISAs are being maintained and revalidated on an appropriate frequency. *IR 01-201*

**** POSITIVE FINDING** A total of six (6) ISAs have been completed: (1) Ventilation, (2) Uranyl Nitrate (UN) Bulk Storage, (3) Ammonium Diuranate (ADU) Conversion, (4) Uranium Recovery Recycling Systems (URRS) Safe Geometry Dissolver, (5) ADU Bulk Blending, and (6) Bulk Chemical Storage, Receipt, and Handling. Discussions with the licensee staff confirmed that the ISAs were maintained through the plant configuration control (Management of Change) process and a re-validation process is performed for each ISA on a five-year frequency. The remaining ISAs are scheduled to be completed before the date required by the new Part 70.

The inspector examined "Columbia Manufacturing Plant Configuration Control," procedure TA-500, Revision 10, dated September 10, 1998, including forms RAF-104-2, "Action Item Summary," and RAF-104-7, "Design Verification Checklist," to ensure that the management of change program is sufficient to evaluate any not-in-kind changes that can affect the risk-significant operations with highly hazardous chemicals at the facility.

Because the Management of Change (configuration management) process represents the primary management control for maintaining the ISA, the inspector reviewed and evaluated the documentation for two high consequence items: engineering packages for planned upgrades to the Hydrogen Fluoride (HF) storage tank area (docket 01-004) and Nitric Acid storage tank area (docket 01-005). A concern was noted because the bulk chemical ISA was not identified on the HF upgrade package. The licensee immediately corrected this omission, and reviewed other recent packages to verify that others had not been overlooked.

The inspector reviewed a number of configuration management packages in other plant areas:

- Install a bypass filter at pellet grinder for test only (docket 00-41)
- UF6 line leak check engineered control (software change) (docket 00-065)
- Modify ADU line 5 for UF6 gas (docket 00-101)
- Hydrolysis column pressure interlock (docket 00-158)
- Upgrade Safety Significant powder level switches (docket 00-194)

It was noted that although the ISA for the pellet area has not been completed, the configuration management package will carry references to the changes to be included therein.

The licensee explained the flow of information from the Area sketches, which identify the Passive Controls, Automatic Engineered Controls (AECs), and Administrative Controls (ADM).

04/06/2001

- 307 Controls necessary to limit risks to an acceptable level were in place. The licensee's SSC development and verification is characterized as a program strength. The material conditions of safety significant control are adequate. *IR 01-201*

**** POSITIVE FINDING** A "vertical slice" of passive and active safety-significant controls and management measures applied to high-risk operations in bulk chemical receipt, handling and storage, and the Conversion Process were selected for review from Chemical Operating Procedure Sketch 836038-1, Rev. 8, dated March 29, 2001. The inspector noted that each "sketch" of SSCs clearly identified the safeguards (e.g., controls) for all "important" (level B) and "safety margin improvement systems" (level C) levels of risks. There were no "crucial" (level A) SSCs listed. Other SSCs were reviewed in the Low Level Radioactive Waste (LLRW) area, draft sketch dated April 4, 2001. Once they are developed, the licensee maintains the "sketches" as current through the configuration control program.

The licensee stated that safety-significant interlocks are tested and verified to ensure that the hardware and software associated with automatic engineered controls function as described. Training is conducted for area personnel to ensure that they understand the operation of the safety significant equipment.

The inspector conducted system walkdowns of the highest risk areas: Hydrofluoric Acid (HF) storage tank(s), Anhydrous Ammonia tanks, Aqueous Ammonia tanks, and Nitric Acid storage tank and pump, including the newly-constructed Nitric Acid storage and pumping system.

04/06/2001

- 308 The licensee is implementing an adequate maintenance and functional testing program to assure the availability and reliability of risk-significant safety controls for preventing or mitigating the consequences of fire or chemical releases. Personnel responsible for the implementation and monitoring of these programs were knowledgeable of their current status and there was no backlog for safety-significant items. *IR 01-201*

**** POSITIVE FINDING** The inspector reviewed the status of preventive maintenance (PMs) performed to ensure that the safety significant controls are functioning satisfactorily. The licensee discussed the current 1-2 week backlog of maintenance activities and described the work planned for the upcoming inventory outage. Because functional tests represent a primary management method for ensuring that active engineered controls are capable, available, and reliable, the licensee's procedure for handling incomplete or failed tests includes an escalating scale of management involvement. There were no late or incomplete tests.

The inspector reviewed the MAPCON (Maintenance Planning and Control) list of tasks scheduled for the upcoming inventory outage. There were no functional tests planned during the outage.

The inspector reviewed a number of in-process work orders. They were flagged for Safety Significant equipment where appropriate. Cautions for HF, UF6, live steam, and electrical hazards were noted. There were turnover/turnback steps to coordinate the work between Operations and Maintenance and a post-maintenance verification step. No safety concerns were identified.

The inspector interviewed maintenance planning and Conversion control room personnel regarding work in progress. Adequate coordination of work activities was in evidence.

04/06/2001

- 309 Observed plant operations were conducted in a safe manner. Operators were appropriately trained and knowledgeable of the risk-significant process safety controls. *IR 01-201*

**** POSITIVE FINDING** The inspector examined the tank farm, conversion, incinerator, vaporizers, solvent extraction, ceramic (furnaces and pellet grinders), and manufacturing areas. Housekeeping and fire protection in these areas, postings, use of procedures, logbooks and data sheets, lock & tag practices, and industrial safety were satisfactory. Safety showers and eyewash stations were in good condition, with all tests current.

The inspector interviewed operations personnel and examined procedures for ongoing activities. Compliance with procedures is expected. The licensee has undertaken a major effort to revise procedures to increase the responsibility and accountability of operations personnel. Approximately 800 out of 1200 procedures have been completely re-written.

The inspector interviewed operators regarding powder handling, tank farm operations, conversion operations, solvent exchange, ceramic (furnace) operations, and low level radioactive waste handling, as well as some contractor personnel. The operators and contractors demonstrated an appropriate working knowledge of the risk-significant hazards and dominant safety controls for those hazards. No safety concerns were identified.

The inspector attended the daily plan-of-the day meeting with production, engineering, and maintenance groups.

As part of the initial badging process, the inspector viewed the site general employee safety training and took the multi-media computerized test that accompanied it. The inspector determined that the training provided an adequate introduction to chemical hazards on-site, and that the test was a good method for reinforcing the knowledge gained from the training module.

04/06/2001

- 5
- 310 The licensee has taken steps to maintain appropriate controls on bulk chemical storage facilities on-site. *IR 01-201*

**** POSITIVE FINDING** The inspector reviewed the licensee's consequence analysis report (JBFA, November, 1998) regarding the highest risk bulk chemical storage equipment, practices and operations, and examined those outdoor areas.

The inspector examined chemical storage areas for Hydrogen Fluoride (HF) Anhydrous Ammonia, Sodium Hydroxide, Aqueous Ammonia, Nitric Acid, and Uranyl Nitrate. Housekeeping, postings, and fence/gate controls were observed to be generally satisfactory in these areas.

It was noted that the NFPA "diamonds" at the HF storage area were posted on three (3) different signs: one designating the personnel protective equipment (PPE), one listing general hazards, and one on the storage tanks themselves. Only one sign listed the correct level for "Health Hazard." The licensee stated that the signs are being updated as part of a plant-wide effort, and will be part of a major upgrade of the HF storage tank area.

04/06/2001

- 311 The licensee has established a program to prioritize, analyze, and track potential safety and safeguards-significant issues. However, the licensee has not demonstrated the effectiveness of the program. Therefore, VIO-2000-204-01 and IFI-2000-204-02 will remain open. *IR 01-201*

**** NEUTRAL** The licensee began the plantwide implementation of the Corrective Actions Program (CAPs) on April 1, 2001. CAPs is currently available online to limited employees who have access to a computer. CAPs will replace the licensee's existing Commitment Tracking System (CTS) and the licensee does not plan to include legacy issues in CAPs. The program encourages employees to identify issues and concerns and enter them into CAPs. The CAPs process includes the following steps: (1) issue prioritization based on significance level; (2) weekly review of issues; (3) assigning issue owners; (4) apparent or root cause analysis and identification of corrective actions; and (5) implementation of corrective actions. The inspector determined that satisfactory implementation of CAPs should address the concerns raised by VIO-2000-204-01 and IFI-2000-204-02 regarding the timeliness of completing corrective actions and a robust commitment tracking system.

The licensee discussed the current status of the CTS and backlog. There is one overdue item, which has a very low safety significance. The licensee has included this in an upgrade project for the solvent extraction area.

The inspector reviewed 2 event "data packs," including RAF-111-1, for an incident wherein a change was made to procedure COP-831019, adding HEPA filters to the filter disassembly process without undergoing a review by a criticality safety engineer. Appropriate root causes were listed in the data pack. The inspector verified that 3 of the 4 root causes had been addressed with proper corrective actions, and that the licensee

04/06/2001

- 312 The licensee is in the process of training all members of the onsite emergency response brigade. The licensee identified several issues related to communications. These issues will be tracked as Inspector Follow-up Item IFI-1151/2001-201-01. *IR 01-201*

**** NEUTRAL** The scenario for this exercise involved a discharge from a relief valve on an Anhydrous Ammonia storage tank with an injured individual nearby. Offsite support from the local fire department observed the exercise. A request for offsite emergency medical support was simulated. Notifications of offsite agencies (NRC and EPA) were simulated.

The inspector considered the training session to be well conducted. Participants were candid in bringing up issues and concerns during the post-exercise debriefing. The licensee identified both strengths and weaknesses in the emergency response area.

The licensee identified several lessons-learned from the training session. Three major issues identified were: (1) clear responsibilities for each responder, (2) clear line of authority, and (3) communication. The licensee indicated that more training sessions will be conducted to address these issues. Further evaluation is also necessary to correct communication problems such as radio communication between responders and telephone communications for offsite responders and agencies.

04/06/2001

6

B Criticality Safety

- 206 NOV issued for violation of procedural requirements for controlling SNM in the bulk blending room when an operator willfully stored containers without acceptable moisture analysis results. *EA-00-035*

**** NOTICE OF VIOLATION** This was in reference to the investigations conducted by the Nuclear Regulatory Commission (NRC) Office of Investigations (OI) on April 29, 1999, and November 30, 1999, at the Westinghouse Columbia Plant. The purpose of the OI investigations was to determine whether a Westinghouse employee willfully violated NRC requirements. The results of the OI investigation were reviewed by NRC inspection and enforcement staff for disposition.

Based on the results of the OI investigations, the NRC determined that violations of NRC requirements occurred. The violation cited in the Notice of Violation involves the failure of a worker to follow operating procedures that impacted a safety control. The violation is of concern because it was determined to be a willful violation and indicates weaknesses in the communication of safety controls to your workers through training and procedures.

The NRC has concluded that information regarding the reason for the violations and the corrective actions taken and planned to correct the violations and prevent recurrence documented during the OI investigation on April 29, 1999 was adequate. The actions included suspension of the offending employee without pay and retraining of the employee on all applicable procedures. It is also noted that other actions are in progress involving revisions to plant operating procedures to more clearly indicate safety controls.

POTENTIAL WRONGDOING 03/10/2000

- 230 Operating procedure for handling and shredding contaminated HEPA filters instructed workers contrary to the approved Criticality Safety Evaluation. *EN#37189*

**** LICENSEE EVENT REPORTS** The licensee discovered an inadequate procedure during a routine audit when it was found that an administrative safety control identified in a Criticality Safety Evaluation (CSE) was not properly proceduralized. The inadequacy occurred in the method for handling and disposing of used HEPA filters. Typically, used HEPA filters are scanned upon removal from process. If the scan value is less than 5 grams U235 per 10 liters, the filter media is removed from the filter frame, shredded, and sent to an incinerator. According to the CSE, if the scan value is greater than 5 grams U235 per 10 liters, the filter media is to be bagged and sent directly to the incinerator without shredding. The shredding process evidently aids in the combustion of the filters. Filters that have a high scan value are not to be processed through the shredding system because the shredder hopper and receiving barrel are of unfavorable geometry. The procedure for processing filter media with high scan values instructed the operators to "place paper filter media into a 30-gal paper bag for shredding", which is contrary to the CSE assumptions that high scan media is not to be shredded. This operation was being performed per the approved operating procedure, and high scan media was being shredded prior to incineration. The CSE documented the prevention of shredding the high scan filter media as an administrative criticality safety mass control. Thus when it was discovered that the operating procedure instructed operators to shred the high scan filter media, the licensee determined that this constituted a loss of one criticality control.

PROCEDURES NOT COMPLETE OR ACCURATE 07/26/2000

- 245 The licensee criticality safety function adequately determined risk-significant controls. Assumptions in licensee integrated safety assessment (ISA), criticality calculations, and criticality safety analysis (CSAs) supporting risk significant operations were in place and provided an adequate assurance of safety. (Section 3.a) *IR 70-1151/2000-05*

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 248 Loss of moderation controls for a UF6 vaporizer was reported when the condensate level alarm system was disabled. *EN# 37441*

**** LICENSEE EVENT REPORTS** The condensate level alarm system could not perform its intended function due to blocking of the system by loose debris. Investigation determined that paint flaked from the recently processed cylinder and collected in the bottom of the vaporizer. However, the debris did not block the main condensate removal drain which allowed condensate to be removed from the vaporizer, so there was no condensate accumulation in the vaporizer. The vaporizer was cleaned out and the level alarm system was successfully tested before allowing the vaporizer to restart.

ERROR BY KNOWLEDGEABLE PERSON FOR 10/18/2000
UNKNOWN REASON

- 262 Engineered safety controls for the "wet" portion of the Ammonium Diuranate process were available and operable. *IR 00-06*

**** POSITIVE FINDING** The inspector reviewed the engineered process safety controls identified in the licensee's Integrated Safety Assessment (ISA) for the portion of the ADU process where uranium solutions and sludges were processed. The inspector observed that the controls were available and operable.

11/17/2000

- 263 Revisions to safety requirements for storage of waste drums were not posted in a timely manner. *IR 00-06*

**** NEGATIVE FINDING** The inspector observed the storage of licensed material throughout the facility. The inspector observed that waste drums were being stored in arrays and racks in the southwest expansion area of the facility. The inspector observed three different criticality safety postings in the area, each with differing (and sometimes conflicting) requirements for the same storage containers. The inspector discussed the inconsistencies with the area safety engineer and found that the postings had been recently revised to accommodate storage of containers moved from the southeast expansion area to make space for the BAES project (see Section 2.a). However, the licensee had not completed replacing the postings prior to relocating the containers. The inspector found that the containers were being stored in accordance with the revised posting. The licensee completed replacing the postings before the end of this inspection.

INADEQUATE COORDINATION BETWEEN
ORGANIZATIONAL UNITS

11/17/2000

- 266 The licensee's investigation and corrective actions in response to NRC Licensee Event Report No. 37441 adequately addressed immediate and long-term concerns to prevent recurrence. *IR 00-06 & EN#37441*

**** POSITIVE FINDING** The inspector reviewed the licensee's investigation of the loss of criticality safety controls identified in NRC Licensee Event Report No. 37441. This event involved the potential loss of steam condensate level controls that are used to limit the amount of moderator available in a non-favorable geometry UF6 vaporizer. These controls became plugged when paint chips flaked off of a UF6 cylinder that was being processed in the vaporizer. The control failure was identified by the licensee during a functional test of the controls performed after processing the cylinder. The licensee's investigation indicated that the actual failure of the controls likely occurred during the functional testing and not during the processing of the cylinder.

The inspector observed the cylinder and noted paint was peeling over its entire surface and appeared scorched. The licensee's investigation found that the UF6 supplier had used the wrong paint on the problem cylinder. The licensee also found that the method used to functionally test the controls may have contributed to the failure by flushing the paint chips into the level control system. The inspector noted that the licensee's corrective actions to prevent recurrence of this event included working with the UF6 vendor to ensure the proper paint would be used in future shipments, and revising the functional testing procedure to prevent flushing debris into the level control system. The inspector noted that the licensee was implementing immediate corrective actions by instituting a more frequent check of the condensate handling system to more quickly detect problems in the removal of condensate from the vaporizers. The inspector also noted that the licensee was investigating a long-term corrective action by designing a volume-limiting insert for the bottom of each vaporizer to eliminate the need for moderation control on the vaporizers for criticality safety.

11/17/2000

- 271 A violation was identified for the licensee's failure to complete corrective actions from the 1998 vaporizer level probe event and for the failure to conduct an adequate root cause analysis of the 2000 vaporizer level probe event. *IR 00-204*

**** NOTICE OF VIOLATION** The licensee removes UF6 from cylinders by heating the cylinders with steam in one of three vaporizers. The vaporizer has a space between the cylinder and the vaporizer inner wall that is large enough to be a criticality concern if steam condensate accumulates and is subsequently mixed with released UF6 from the cylinder. Control of condensate through drainage is assured by a level probe which is in a pot connected by a separate and smaller drain line from the vaporizer. On October 18, 2000, the line to the level probe became blocked by paint from a cylinder so that the probe could not read the condensate level thereby compromising the NCS control even though the primary vaporizer condensate drain still worked. The event was reported to the NRC in accordance with licensee commitments under NRC Bulletin 91-01.

The licensee investigated the vaporizer event and determined that it was similar to an event that occurred in July of 1998 when paint from a UF6 cylinder blocked the drain to the level probe well. Due to the similarity to the 1998 event, the

licensee elected not to perform a complete root cause analysis. Instead, the licensee reviewed the conclusions of the previous root cause analysis and determined that completion of previously suggested corrective actions would be sufficient. The inspector reviewed the licensee's incident investigation reports for both the 2000 event and the 1998 event and determined that both events occurred in the same vaporizer which is one of three vaporizers that the licensee uses to feed the Ammonium Di-urate (ADU) conversion process. Subsequent to the 1998 event, the licensee's root cause analysis recommended and the Incident Review Committee approved, the corrective action of design and installation of modified screens in the vaporizer to prevent paint chips from blocking the level probe line and this corrective action was eventually combined with an earlier initiative to install a spacer to reduce the vaporizer volume. The licensee did not impose any interim compensatory measures on vaporizer operations subsequent to the 1998 event.

The inspector determined that the corrective actions for the 1998 event had never been completed. The licensee indicated that the incomplete corrective actions were repeatedly deferred due to competing demands. The inspector determined that there was no immediate safety concern because the licensee had imposed two interim compensatory measures subsequent to the 2000 event to assure criticality safety. The interim compensatory measures were to conduct special inspections of UF6 cylinders to detect suspect paint prior to placing them into the vaporizers and reducing the vaporizer blow-down interval from once per shift to once every two hours to assure that condensate could not accumulate in an amount posing a criticality safety hazard. The licensee committed to assign a higher priority to the screen and spacer installation corrective actions to ensure timely completion. The inspector determined that failure to complete the assigned corrective action did not comply with license section 3.7 or licensee procedure RA-111. Failure to complete a corrective action identified by a root cause evaluation of a 1998 event and approved by the Incident Review Committee is an example of Violation (VIO) 70-1151/2000-204-01. The inspector noted that the licensee's investigation report for the October 2000 event consisted of a one and one-half page memorandum which was inserted into the front of the data pack for the 1998 event. The inspector observed that the brief investigation report had failed to recognize that the corrective actions from the first event had not been completed and, therefore, did not recommend their completion. The inspector also questioned the fact that the 2000 event had occurred in the same vaporizer as the 1998 event which might not necessarily be a coincidence. Discussion with licensee staff indicated that the repeat failure of the same level probe was reviewed by attempting to find any difference between the subject vaporizer and the other vaporizers. The licensee found no difference between any of the vaporizers and level pots and determined the multiple failure in the same piece of equipment to be a coincidence but did not discuss the evaluation in the memorandum. The inspector noted that this was an aspect of the event that could not have been covered by the previous root cause analysis and therefore should have been documented. The inspector determined that the licensee had not made an adequate specific cause determination and promptly identify that corrective actions from a previous event in the same vaporizer were not yet complete. As a result of the inadequate specific cause determination, the licensee failed to present adequate results to the committee for approval in accordance with license section 3.7 or licensee procedure RA-111. The failure to make an adequate specific cause determination, promptly identify that corrective actions from a previous event in the same vaporizer were not yet complete, and present adequate results to the committee for approval is a second example of VIO 70-1151/2000-204-01.

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS 12/08/2000
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 272 The licensee's identification, resolution, and correction of safety related problems failed to prevent recurrence of a risk significant event. IR 00-204

**** WEAKNESS** The inspector observed that the licensee does not have a uniform method for developing, assigning, and tracking corrective actions. The inspector determined that corrective actions are assigned in accordance with licensee procedure RA-111 to a manager or supervisor who is then responsible for identifying what corrective actions are required, assigning the actions to staff, and seeing that actions are completed. The informality of the licensee's corrective action system and the assignment of corrective actions by a lower level manager or supervisor is a weakness in the licensee's program which contributed to the preceding violations. The licensee acknowledged this concern and indicated that the concern would be reviewed with respect to implementation of a new and more robust commitment tracking system. The licensee's actions to clarify corrective action responsibilities and implement a new and more robust commitment tracking system will be tracked as Inspection Follow-up Item (IFI) 70-1151/2000-204-02.

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS 12/08/2000
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 273 The licensee has improved the determination and documentation of safety margin resulting from computer calculations. IR 00-204

**** POSITIVE FINDING** The inspector was asked by NRC licensing staff to review a pending Westinghouse license amendment that contains a complete revision of Chapter 6 of the license application covering criticality safety. The inspector noted that the amendment request contained substantial changes to requirements for validating criticality safety computer codes. The most significant change in the requested amendment was a commitment to use a specific upper safety limit method for validation. The inspector noted that the licensee has recently been required to correct problems in these areas. Based on these observations, the inspector reviewed the licensee's NCS computer code validation and use.

9

The inspector determined that the licensee recently switched to SCALE 4.4 as the primary criticality safety calculation tool. The licensee previously used a stand-alone version of KENO on a remote, UNIX based computer. SCALE 4.4 will also be used on the same remote computer. The inspector determined, based on review of example calculations, that the clarity of results will be improved through the use of SCALE. The licensee validated the new computer code using the previously mentioned upper safety limit method that produces a value for bias plus uncertainty which can be incorporated into a calculated result to demonstrate that the required safety limit has been met.

The inspector reviewed a sample calculation performed subsequent to adaptation of the new validation method and determined that incorporation of the bias into the calculated result improved the clarity of the resulting safety margin discussion. The inspector determined that use of SCALE 4.4 for NCS calculations along with the new validation methodology meets the requirements of the pending license application as well as the current license and is a significant improvement in clarifying safety margin resulting from computer calculations.

12/08/2000

- 274 The licensee's ISA accurately described the process operation under review. Risk controls were operable (capable, available, and reliable) to perform their safety function. IR 00-204

**** POSITIVE FINDING** The licensee processes scrap uranium material through a calciner or furnace to convert to U3O8 powder. The U3O8 powder is then further processed through three safe geometry dissolvers which combine powder with nitric acid to produce uranyl nitrate which is then either passed on to solvent extraction or stored in bulk UNH storage tanks.

The safe geometry dissolvers consist of a feed glovebox, a dissolver vessel, and a solid discharge chute. The inspector noted that the ISA description of the operation was concise and accurate.

The inspector determined that all NCS controls were available as described in the ISA with one exception. The ISA described a "weep hole" as a hole intended to prevent moderator accumulation in the feeder glovebox. The licensee was actually relying on drain holes to limit the upset condition of moderator accumulation in the feed screw enclosure. Use of the term "weep hole" implies the continuous presence of liquid which must be drained away ("weep hole" is a term normally associated with structures such as retaining walls). The continuous presence of liquid would directly contradict analytical assumptions and the current description of the control as a "weep hole" might lead operators to conclude that liquid is normal in the enclosure. Licensee staff agreed to correct the definition in the Process Hazard Assessment (PHA) to accurately reflect analytical assumptions. Review and correction of PHA control definitions will be tracked as IFI 70-1151/2000-204-03.

12/08/2000

- 275 The licensee's ISA does not identify unmitigated risk associated with NCS controls and therefore does not provide sufficient risk information about these controls. IR 00-204

**** NEGATIVE FINDING** The licensee's ISA did not characterize the initial or unmitigated risk of credible hazards. Since the mitigated risk of NCS controls is the same for every control, the ISA cannot be used to risk inform NCS inspection activities.

INCOMPLETE SAFETY BASIS 12/08/2000

- 276 The licensee's configuration management program was adequate. The licensee committed to strengthen the change control program which is required by a license commitment for controlling design changes. IR 00-204

**** NEUTRAL** Section 3.1 of the license requires that the licensee assure that design changes do not affect the safety and health of workers and the public or the environment. In the case of proposed changes to equipment and equipment arrangement, the licensee has a procedure, TA-500 Configuration Control, requiring compliance with a rigid process that assures comprehensive review of the changes prior to their implementation. The inspector reviewed a sample change package with the responsible project engineer and determined that all requirements were adequately implemented.

During plant walkdowns, the inspector questioned licensee staff members and operators regarding potential changes. Licensee staff uniformly indicated that equipment changes, even minor changes, could only be accomplished subsequent to a thorough review. The inspector determined that the existing licensee configuration control program was effectively implemented to assure safety related to configuration of equipment and equipment arrangement.

12/08/2000

- 279 Container spacing in the uranium recovery dissolver area elevator was not adequate to meet criticality safety requirements and was identified as Violation 01-02-01. IR 01-02

10

**** NOTICE OF VIOLATION** On February 27, the inspectors observed the improper spacing of containers in the uranium recovery dissolver area elevator. The elevator's criticality safety posting required that containers (or stacks of containers) be spaced at least 12 inches apart. The inspectors found that the spacing was easily achievable by placing containers in each corner of the elevator. The inspectors observed that one container placed in the center of the elevator was within six to eight inches of containers stored in the corners of the elevator. Although the container in the center of the elevator was found to be empty, the criticality control for that area relied on container spacing, so that mass controls were not necessary. The inspectors discussed this situation with licensee management for corrective action. On March 1, 2001, the inspectors observed similar improper container spacing in the uranium recovery dissolver area elevator. This time, two containers had been placed in the center of the elevator, but the spacing between containers was only about two inches and the containers in the center of the elevator were not empty. These two examples of the failure to follow posted safety requirements were identified as Violation (VIO) 01-02-01.

ERROR BY KNOWLEDGEABLE PERSON FOR 03/02/2001
UNKNOWN REASON
INADEQUATE CORRECTION OF IDENTIFIED
PROBLEMS
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 292 Several safety controls associated with the ADU conversion process were found to be incapable of performing their intended function upon fault conditions from the programmable logic controllers. EN # 38020

**** LICENSEE EVENT REPORTS** At approximately 0759 the decanter tripped off line on conversion line 4. Subsequently line 4 was shutdown at 0805. An error in the display program was initially suspected. With conversion line 4 shut down, instrument technicians were called. The technicians attempted to correct the problem with the display program to no avail. An instrumentation and controls (I/C) engineer was called and tracked the problem to the line 4 PLC. Since it was determined that the PLC processor for line 4 had faulted, the processor was reset and tested. The test was satisfactory.

Line 4 was restarted at approximately 1000. At approximately 1030 line 4 was shut down due to a plugged duplex valve at the inlet of the calciner. During this shutdown, a process engineer was informed about the earlier events. The process engineer became concerned about the status of the safety significant controls on line 4 and contacted a nuclear criticality safety (NCS) engineer at approximately 1130. The NCS engineer was present in the control room at approximately 1140.

A time-line of events was reconstructed. The NCS engineer reviewed the sequence of events with the I/C engineer. It was determined that an output fault in an I/O card caused the processor to go into fault mode but all outputs did not go to their correct (OFF) state.

The NCS engineer determined that in the time period from 0759 until line 4 was secured at approximately 0805, the active engineered safety significant controls (SSCs) on line 4 were unavailable, and less than double contingency protection existed in the vaporization system during that time period. The SSCs are considered to have been in place for the 1000 startup and remained in place until the shutdown at 1030, although the cause of the initial failure had not been determined. Conversion operators on line 4 were instructed by the NCS engineer to not restart line 4 until the cause of the PLC failure was determined and corrected. Line 4 remains shutdown pending further investigation.

Justification for Continuing Operations on Lines 1, 2, 3 and 5:

Line 4 utilizes a unique Numalogic PLC system while Lines 1, 2, 3, and 5 utilize a different programmable logic system. There is no reason to believe the Numalogic error is possible on the other lines. The manufacturer of the other programmable logic system (utilized on Lines 1,2,3 and 5) was contacted and stated that their cards cannot fail into any state other than all OFF. Conversion Lines 1, 2, 3 and 5 remain in operation.

Double Contingency Protection

Double contingency protection for the vaporizer is based upon control of mass (prevent/detect a UF6 leak) and geometry (prevent/detect accumulation of moderator in a non-favorable configuration in the bottom of the vaporizer). Double contingency protection on the cylinder (in vaporizer) is based upon moderation control (prevent back-flow of moderator from the hydrolysis column into the cylinder). It was determined that less than double contingency protection remain for these systems and greater than a safe mass was involved. In accordance with Westinghouse Operating License (SNM-1107), paragraph 37.3 (c.5), this event meets the criteria for a 24 hour notification because it constitutes a "nuclear criticality safety incident, in an analyzed system, for which less than previously documented double contingency protection remains . . and: greater than a safe mass is involved, but a sufficient number of the controls that were lost are restored within four (4) hours such that double contingency protection is restored."

As Found Condition

See "Reason for Notification" above.

Summary of Activity

11

An unknown PLC failure led to the shutdown of conversion line 4. It was determined that less than double contingency protection existed on the line 4 from 0759 to 0805. Therefore, the NCS engineer directed that line 4 could not be restarted until the cause of the failure was determined and corrected.

Conclusions

Loss of double contingency protection occurred. At no time was there any risk to the health or safety of any employee or member of the public. No exposure to hazardous material was involved. This notification is the result of equipment failure, not a deficient NCS analysis. 05/21/2001

INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 293 Six apparent violations were identified as part of a Special Team Inspection to investigate the common mode failure of multiple criticality safety controls in the ADU process lines due to errors in the configuration of a system of programmable logic controllers. This inspection was a follow-up to PIM item #292. IR 01-202 & PIM Item #292

**** ESCALATED ENFORCEMENT ISSUE** The team's findings are summarized as follows:

- Licensee operators initial response to the event involving manually shutting down ADU Conversion Line #4 was adequate.
- An apparent violation was identified due to licensee action to restart ADU Conversion Line #4 without identifying and correcting the underlying deficiency.
- An apparent violation was identified due to inadequate licensee criticality safety review of the criticality safety controls for the ADU Conversion lines including the failure to review possible common modes associated with Programmable Logic Controllers (PLCs).
- A apparent violation was identified due to the complete loss of credited criticality safety controls against a credible criticality accident scenario on ADU Conversion Line #4.
- An apparent violation was identified due to the failure of the licensee functional verification program to identify and correct weaknesses associated with PLCs in the ADU Conversion lines.
- A training program weakness was identified due to the failure of multiple licensee employees to recognize the failure of multiple criticality safety controls during an operational upset.
- Licensee immediate corrective actions to assure safety of the ADU Conversion lines subsequent to their restart were adequate.
- An apparent violation was identified due to the failure of licensee operators and technicians to immediately report a safety significant event involving a process upset to licensee Regulatory Affairs during the initial response to an operational event.
- An apparent violation was identified due to the licensee Failure to report to the NRC within four hours an event involving an unanalyzed or unanticipated criticality safety incident for which the severity and remedy were not readily determined. 05/30/2001

ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS EQUIPMENT FAILURE DUE TO AGING INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT INADEQUATE EQUIPMENT DESIGN OR SELECTION

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

**** NOTICE OF VIOLATION** 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.

MANAGEMENT EXPECTATIONS NOT ENFORCED 05/18/2001

- 341 The licensee's design and construction of the erbia process adequately implemented the engineered safety controls as approved in the NRC licensing review. The proposed engineered controls provided adequate protection against the failure mechanisms analyzed in the NRC Safety Evaluation Report. *IR 01-07*

**** POSITIVE FINDING** The normal operating conditions for the orbital screw blender included powder transfers from unfavorable geometry bulk containers into the blender. Because sufficient fissionable material would be available, loss of moderation control (i.e., introduction of more than 20 liters of water or more than 32 kg of pore former) was the dominant criticality safety risk associated with the operation.

The inspectors observed that the licensee identified the integrity of the bulk containers, the integrity of the blender, powder dumping interlocks, and criticality safety postings as specific items relied on for moderation control. Following an observation of the process area, the inspectors concluded that bulk container/blender integrity was an effective barrier to accidental introduction of moderator. To ensure the continued reliability and availability of container/blender integrity as a criticality safety barrier, the inspectors noted that the licensee implemented specific container/blender integrity verification requirements in the area operating procedures. These requirements included steps to immediately stop operations in the event that damaged, cracked, or broken vessel walls were identified.

According to the ISA and fault tree, the dumping interlock was used to prevent introduction of more than a programmed quantity of pore former by utilizing a computerized inventory tracking system called the Chemical Area Manufacturing Process System (ChAMPS). The inspectors attended a table top demonstration of the ChAMPS system in which the computer simulated interlock system response (i.e., would not permit material transfer) in conjunction with attempts to introduce unauthorized batches (e.g., batches which exceed the programmed limit) into the blender. Based on that demonstration, the inspectors concluded that ChAMPS, provided substantial margin of criticality safety for blending activities involving pore former.

During observations of the blender room, the inspectors noted the presence of a manway cover on top of the blender which was not described in either the ISA or the licensee's fault tree. The inspectors determined that the uncontrolled presence of such a cover posed significant challenges to criticality safety given the availability of mop water in the area (the mop water pouring station is located in an adjacent room). However, the inspectors determined that administrative controls (postings) were established by the licensee to restrict the volume of moderating liquids permitted in the blending room to a safe volume (i.e., less than 5 gallons). Following queries from the inspectors to the licensee staff, the inspectors noted that the licensee installed a chain and lock on the manway cover with the key controlled by the process supervisor. Although the chain and lock (including supervisory oversight of the key) are not identified as items relied on for safety, the inspectors observed that additional administrative controls which were identified as items relied on for safety prevented the blender or bulk container from being open when unattended. The inspectors concluded that controls were in place to ensure the presence of the manway cover did not present an undue risk to workers or the public.

The inspectors reviewed the licensee process and instrumentation drawings (P&IDs) to verify that the safety controls approved as described in the SER were included in the design of the erbia blending process. The inspectors reviewed P&IDs of the blending equipment, ventilation systems, and flammable gas piping systems. The drawings contained adequate detail of engineered controls installed in these systems. The inspectors found that engineered controls for criticality safety and radiological safety were adequate to meet the requirements of the license amendment approval and the descriptions in the SER. However, the inspectors found that two engineered controls mentioned in the SER for fire protection were not part of the system designs. The SER had discussed the installation of an oxygen monitor within the erbia orbital screw blender and the installation of fire dampers in the process ventilation system. An oxygen monitor in the blender would be used to prevent rapid oxidation of the uranium powder that could create significant heat generation and lead to "burnback" of the powder. Fire dampers in the ventilation system would be used to prevent the spread of fires to/from other process areas through the ventilation systems. The inspectors brought these issues to the attention of the NRC licensing function. Discussions between the licensee and the NRC licensing reviewers led to the decision that the licensee already had adequate protection against significant oxidation of the powder through nitrogen purging of the equipment prior to and during operation of the blender, and temperature sensors in the blender. The licensee was also deemed to provide adequate protection against the spread of fire to/from other areas through the use of fire dampers in the ventilation for processes adjacent to the erbia process. The inspectors observed the installed safety controls in the process area to verify the configuration of the process was as depicted in the licensee's drawings. By the end of the inspection, installation of all safety controls depicted in the licensee's P&IDs had been adequately completed. Thus, the inspectors found that the

licensee's design and construction of the erbia process adequately implemented the engineered safety controls as identified in the license amendment and SER.

10/12/2001

- 342 The modifications to the facility did not significantly affect the ability of the Criticality Accident Alarm System to detect a criticality. *IR 01-07*

**** POSITIVE FINDING** The inspectors determined that CAAS coverage was not affected by the modifications supporting the burnable absorber expansion system. The inspectors reviewed the licensee's coverage documentation which was based on free-air line of sight calculations. Given the small footprint of the actual process areas and the materials of construction used, the inspectors concluded that the modifications to the facility did not significantly affect the ability of the CAAS to detect a design basis minimum accident of concern. 10/12/2001

14

C Plant Operations

- 195 On February 7, 2000, a spill of uranyl nitrate solution occurred in the UF6 bay near the HF Spiking Station. The solution seeped through a wall around piping penetrations and onto an outdoor concrete pad. Initial surveys of the pad showed contamination levels below reportable limits. However, a layer of soil was removed from the top of the pad during the cleanup operation, and subsequent surveys on 2/25/00 revealed a more significant amount of contamination in the concrete. Contamination levels averaged 133 dpm/100 cm² alpha removable and 6,000 dpm/100 cm² fixed alpha in the concrete. The licensee determined that the fixed contamination was reportable per 10 CFR 70.50(b)(1). EN #36727 & IR 00-02

** LICENSEE EVENT REPORTS

EQUIPMENT FAILURE DUE TO AGING 02/25/2000
INADEQUATE CONSTRUCTION

- 202 Airborne effluent sampling lines (flow rotometer) for the calciner exhaust stacks were observed to contain condensate which affected the acquisition of representative samples. Licensee equipment modifications were being implemented to correct this problem. IR 00-01

** DESIGN ISSUES The inspector also observed the acquisition of airborne effluent particulate samples at several of the exhaust stack sampling stations. The inspector noted that the sample lines and flow rotometers from the calciner exhaust stacks had an accumulation of condensate which resulted in reduced/erratic flow through the particulate filter which could compromise sample representativeness (non-isokinetic/reduced flow) during upset conditions. The licensee stated that this problem would be investigated and corrected. This will be tracked as Inspector Followup Item (IFT) 00-01-01.

02/04/2000

INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 204 The licensee made substantial progress in LLRW processing operations and in the reduction of LLRW disposal volumes. IR 00-01

** POSITIVE FINDING The inspector also noted that the licensee had made significant progress in reducing the disposal volume of LLRW (currently 500 cubic feet per year) and that further improvements were being accomplished in the waste processing area such as an improved sponge honing system to increase the efficiency of metallic scrap decontamination and to decrease operator exposure. 02/04/2000

- 206 NOV issued for violation of procedural requirements for controlling SNM in the bulk blending room when an operator willfully stored containers without acceptable moisture analysis results. EA-00-035

** NOTICE OF VIOLATION This was in reference to the investigations conducted by the Nuclear Regulatory Commission (NRC) Office of Investigations (OI) on April 29, 1999, and November 30, 1999, at the Westinghouse Columbia Plant. The purpose of the OI investigations was to determine whether a Westinghouse employee willfully violated NRC requirements. The results of the OI investigation were reviewed by NRC inspection and enforcement staff for disposition.

Based on the results of the OI investigations, the NRC determined that violations of NRC requirements occurred. The violation cited in the Notice of Violation involves the failure of a worker to follow operating procedures that impacted a safety control. The violation is of concern because it was determined to be a willful violation and indicates weaknesses in the communication of safety controls to your workers through training and procedures.

The NRC has concluded that information regarding the reason for the violations and the corrective actions taken and planned to correct the violations and prevent recurrence documented during the OI investigation on April 29, 1999 was adequate. The actions included suspension of the offending employee without pay and retraining of the employee on all applicable procedures. It is also noted that other actions are in progress involving revisions to plant operating procedures to more clearly indicate safety controls.

POTENTIAL WRONGDOING 03/10/2000

- 208 The review of operations in the chemical manufacturing areas revealed that improvements were

needed in the bracing and labeling of hydrofluoric acid piping. *IR 00-02*

**** NEGATIVE FINDING** During a review of a contamination event involving uranyl nitrate (see section 2.c) the inspector observed a section of unlabeled piping that was vibrating significantly due to inadequate bracing. The area operator pointed out that the piping contained hydrofluoric acid being pumped from bulk storage to a process station. The inspector found that this was a chemical safety concern due to the risk of a pipe failure and no clear indication as to the hazardous nature of the pipe's contents. The inspector notified licensee management who took quick action to brace the piping. The licensee was investigating additional improvements in the labeling and bracing of the piping.
03/31/2000

**MANAGEMENT EXPECTATIONS NOT ESTABLISHED
INADEQUATE CONSTRUCTION
INADEQUATE EQUIPMENT DESIGN OR SELECTION**

- 210 The uranyl nitrate piping system was not adequately being maintained per the plant configuration control program and was identified as Violation (VIO) 00-02-02. *IR 00-02*

**** NOTICE OF VIOLATION** The inspector reviewed the licensee's procedure for configuration control in the manufacturing plant. The inspector observed various areas of the licensee's uranyl nitrate piping system, including the area involved in a recent contamination event (see Section 2.c). The licensee indicated that the contamination event was due to the failure of a piece of threaded pipe on a uranyl nitrate sample port. The inspector reviewed the drawing referenced by the system's Integrated Safety Assessment (ISA) and noted that the drawing was last updated in April 1998. The drawing indicated a piping specification of welded construction, with the provision that threaded connections could be used when adequate work space was not available for welding, or when adapting to threaded instrumentation or equipment. Neither of these provisions applied to the failed piping that led to the contamination event. The inspector also found that drawing included a piping manifold with six valves that had been removed from the manufacturing area without being reviewed and approved through the configuration control program. Although the removed valves were no longer being used, this rendered the process information referenced by the ISA inaccurate. The inspector also observed the uranyl nitrate piping in several other areas of the plant and found places where threaded fittings had been used instead of the specified welded fittings. All of these findings are examples of failure to maintain safety-related operations per the plant configuration management program and are identified as Violation (VIO) 00-02-02.

**MANAGEMENT EXPECTATIONS NOT ENFORCED 03/31/2000
EQUIPMENT FAILURE DUE TO ENVIRONMENTAL
FACTORS (E.G., CHEM, THERM, MECHAN)
INADEQUATE CONSTRUCTION
IMPROPER EQUIPMENT DESIGN OR SELECTION**

- 221 The licensee's standard operating procedures, in respect to the Ammonium Diuranate and Uranium Recovery processes, were adequate for safe operations. *IR 2000-202*

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address the operating procedures.

The inspectors selected SOPs from the ADU and Uranium Recovery areas to ensure pertinent process safety information and phases of the operation were adequately addressed. The inspectors reviewed the following chemical operating procedures (COP): ADU Precipitation (COP-810501, Rev. 26, 10-07-99), Handling, Processing, and Disposing Low Level Recovery System (COP-831001, Rev. 32, 04-02-00), and Ammonia Recovery (COP-830404, Rev. 9, 09-30-99). The SOPs reviewed contained the appropriate information required for safe operations. The SOPs contained the pertinent elements for operation: safety, startup, normal operation, temporary operations, and shutdown. The licensee currently has an outside consultant making improvements to the SOPs for the facility. It was a self-imposed enhancement to strengthen human factors within the SOPs.

The inspectors walked down the ADU and Uranium Recovery processes and interviewed responsible process operators in the respective areas. The operators had access to computerized SOPs and hard copies in the control room when needed. The inspectors selected portions of the SOPs with the operators. The SOPs appeared to be

- 227 A violation of Section 3.4.1 of the License Application occurred for the failure to conduct radioactive materials package unloading activities in accordance with the requirements of chemical operating procedure COP-836041. The licensee's root cause determination and corrective actions to prevent recurrence were acceptable.

IR 00-03

**** NOTICE OF VIOLATION** On May 2, 2000, the inspector observed the licensee perform incoming receipt surveys of 71 drums containing UNH crystals. The UNH crystals were received from the BWXT facility located in Lynchburg, VA on May 1, 2000, at approximately 10:45 p.m. Upon receipt, the licensee performed both direct radiation surveys and

surface contamination surveys of the transport trailer containing the 71 drums of UNH crystals. The trailer was secured with a tamper safe seal which was not removed until May 2 at approximately 1:00 p.m. when the licensee began to perform individual surveys of the 71 drums containing the UNH crystals. The inspector observed the licensee perform direct surveys for alpha and beta/gamma radiation and surveys for removable surface contamination of five drums in accordance with regulatory operations procedure ROP-02-008, Surveys of Incoming Shipment of Radioactive Materials, Rev. 7, dated March 2, 2000. The licensee used appropriate instrumentation and survey techniques. Sufficient smears and measurements were taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. From a review of the records, none of the receipt survey results indicated that the limits specified in 49 CFR 173.441 or 173.443 were exceeded.

On May 3, 2000, the inspector observed licensee operators perform the opening of the package and removal of the UNH crystals from the inner packaging. This process was controlled by chemical operating procedure COP-836041, Receipt of Uranium Scrap Shipments from Outside Sources, Rev. 1, dated February 22, 2000. The inspector noted that an operator did not follow step 8 of COP-836041, which required placing the pail of UNH crystals on a clean piece of paper inside the UNH crystal enclosure hood. The purpose of placing the material inside the hood was to reduce the potential airborne radioactivity concentrations in the work area and contamination control. Instead, the operator opened the pail on the floor outside of the UNH crystal enclosure hood, removed the opened plastic bag of UNH crystals, and then placed the opened plastic bag of UNH crystals in the enclosure. The inspector noted that the COP-836041 was not available at the job location. Upon discovery of the procedural violation, a licensee representative immediately notified the area supervisor who temporarily ceased operations until corrective actions could be implemented. During the licensee's review, it appeared that not all of the operators were aware of Step 8 requirements.

After a review of the problem, the licensee determined that the primary root cause was that the processing of incoming scrap material was not a continuous operation. The operation was performed as the material was received. The receipt of this material had been discontinued for several weeks due to the plant being shutdown for maintenance and inventory. Although the operator initially reviewed the chemical operating procedure, the operator did not review the procedure after the several weeks of not performing the operation. Part of the corrective action taken was counseling the operator about his actions and the necessity of following the procedures. In addition, all of the URRS operators were retrained on the procedure and on the importance of following all procedures. A secondary cause was the procedure had some sections which could be confusing. To prevent recurrence, the licensee had initiated the revision of COP-836041 so that the requirements for opening the packages were delineated in a clearer manner. All procedures are currently being revised by an outside professional procedure writing group. This procedure has been given a priority status for revision. The inspector determined that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence was adequately addressed. The inspector discussed the event with licensee representatives, and indicated that a violation of Section 3.4.1 of the License Application occurred (VIO: 70-1151/00-03-01: Failure to conduct radioactive materials package unloading activities in accordance with the requirements of COP-836041). 05/04/2000.

**ERROR BY KNOWLEDGEABLE PERSON ON FIRST WORKING DAY AFTER TIME OFF
CONFUSING OR OVERLY COMPLEX PROCEDURES**

- 286 A container of contaminated incinerator ash was improperly stored and posed a potential for airborne contamination. IR 01-02

**** NEGATIVE FINDING** the inspector toured the LLRW processing and storage facilities (Southwest Expansion Area/Drum Storage Area) and observed a polypak container (number A90238) on a carrier (number 117) in the upright condition which appeared to be partially open. The licensee investigated this condition and noted that the polypak contained incinerator ash with approximately 19 grams U-235 content. In addition, the licensee stated that the incinerator ash was contained in plastic wrapping material. The inspector noted that the improper storage of this radiological material was not consistent with good radiological control practices which the licensee acknowledged and issued an Unusual Occurrence Report (Redbook Item). The polypak contents were then properly dispositioned. 02/16/2001

ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON

- 319 The Uranyl Nitrate crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The radioactive material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. IR 01-05

**** POSITIVE FINDING** On June 6, 2001, the inspector observed the licensee perform incoming receipt surveys of drums containing uranyl nitrate (UNH) crystals received from the Babcock and Wilcox Technology (BWXT) facility located in Lynchburg, Virginia. The inspector also observed that the UNH crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The inspector observed that the material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. The operators were knowledgeable of their procedures. Radiation and contamination surveys were conducted appropriately. 06/07/2001

- 209 Instrumentation was needed to warn workers of potential airborne activity due to excessive

ventilation in process glove boxes. IR 00-02

**** NEGATIVE FINDING** The inspector reviewed the operation of the uranium recovery dissolver system. This system had been involved in three recent work restrictions due to high airborne radioactivity. The inspector reviewed the licensee's investigation of the high airborne activity and concluded that the cause was excessive ventilation on the three glove boxes used to introduce scrap materials to the dissolvers. Excessive ventilation can cause turbulence in the air flow through glove boxes that lowers the system's effectiveness. The inspector found that the excessive ventilation occurred for several days after modifications had been made to the ventilation system serving that area of the plant. The inspector observed that the glove boxes each had instrumentation that would indicate when there was too little ventilation, but not when there was too much ventilation. The inspector determined that instrumentation showing when excessive ventilation was present on the glove boxes could have alerted operators to the situation, minimized the airborne activity, and prevented the work restrictions. The installation of such instrumentation would be consistent with the As Low As Reasonably Achievable (ALARA) concept and will be tracked as Inspector Follow-up Item (IFI) 00-02-01. 03/31/2000

INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 211 The licensee's reaction to the uranyl nitrate spill appropriately addressed existing outdoor areas of contamination on and adjacent to the chemical process building. IR 00-02

**** POSITIVE FINDING** The inspector observed the area where the spill occurred and the pathway for contamination to reach the outdoor concrete pad. The uranyl nitrate piping ran from a set of bulk storage tanks, passed over a concrete pad in a non-controlled area, entered the process building at below the floor level, turned upward and penetrated through the floor to the indoor process area. The uranyl nitrate had been spilled inside the indoor process area, seeped through the floor around the pipe penetrations, and flowed out of the building onto the concrete pad. Although the contamination reached the outdoor area, the inspector observed that piping and equipment created obstacles such that the outdoor contaminated area was not easily accessible to workers. The inspector observed that the area had been thoroughly cleaned, but some fixed contamination remained in isolated spots. It was not clear whether these isolated areas of fixed contamination were due to the reported event, or due to previous small leaks. The licensee continued to investigate options for either removing or sealing the contaminated concrete. The licensee recognized that any remaining fixed contamination was required to be addressed in the facility decommissioning plan. 03/31/2000

- 227 A violation of Section 3.4.1 of the License Application occurred for the failure to conduct radioactive materials package unloading activities in accordance with the requirements of chemical operating procedure COP-836041. The licensee's root cause determination and corrective actions to prevent recurrence were acceptable. IR 00-03

**** NOTICE OF VIOLATION** On May 2, 2000, the inspector observed the licensee perform incoming receipt surveys of 71 drums containing UNH crystals. The UNH crystals were received from the BWXT facility located in Lynchburg, VA on May 1, 2000, at approximately 10:45 p.m. Upon receipt, the licensee performed both direct radiation surveys and surface contamination surveys of the transport trailer containing the 71 drums of UNH crystals. The trailer was secured with a tamper safe seal which was not removed until May 2 at approximately 1:00 p.m. when the licensee began to perform individual surveys of the 71 drums containing the UNH crystals. The inspector observed the licensee perform direct surveys for alpha and beta/gamma radiation and surveys for removable surface contamination of five drums in accordance with regulatory operations procedure ROP-02-008, Surveys of Incoming Shipment of Radioactive Materials, Rev. 7, dated March 2, 2000. The licensee used appropriate instrumentation and survey techniques. Sufficient smears and measurements were taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. From a review of the records, none of the receipt survey results indicated that the limits specified in 49 CFR 173.441 or 173.443 were exceeded.

On May 3, 2000, the inspector observed licensee operators perform the opening of the package and removal of the UNH crystals from the inner packaging. This process was controlled by chemical operating procedure COP-836041, Receipt of Uranium Scrap Shipments from Outside Sources, Rev. 1, dated February 22, 2000. The inspector noted that an operator did not follow step 8 of COP-836041, which required placing the pail of UNH crystals on a clean piece of paper inside the UNH crystal enclosure hood. The purpose of placing the material inside the hood was to reduce the potential airborne radioactivity concentrations in the work area and contamination control. Instead, the operator opened the pail on the floor outside of the UNH crystal enclosure hood, removed the opened plastic bag of UNH crystals, and then placed the opened plastic bag of UNH crystals in the enclosure. The inspector noted that the COP-836041 was not available at the job location. Upon discovery of the procedural violation, a licensee representative immediately notified the area supervisor who temporarily ceased operations until corrective actions could be implemented. During the licensee's review, it appeared that not all of the operators were aware of Step 8 requirements.

After a review of the problem, the licensee determined that the primary root cause was that the processing of incoming scrap material was not a continuous operation. The operation was performed as the material was received. The receipt of this material had been discontinued for several weeks due to the plant being shutdown

for maintenance and inventory. Although the operator initially reviewed the chemical operating procedure, the operator did not review the procedure after the several weeks of not performing the operation. Part of the corrective action taken was counseling the operator about his actions and the necessity of following the procedures. In addition, all of the URRS operators were retrained on the procedure and on the importance of following all procedures. A secondary cause was the procedure had some sections which could be confusing. To prevent recurrence, the licensee had initiated the revision of COP-836041 so that the requirements for opening the packages were delineated in a clearer manner. All procedures are currently being revised by an outside professional procedure writing group. This procedure has been given a priority status for revision. The inspector determined that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence was adequately addressed. The inspector discussed the event with licensee representatives, and indicated that a violation of Section 3.4.1 of the License Application occurred (VIO: 70-1151/00-03-01: Failure to conduct radioactive materials package unloading activities in accordance with the requirements of COP-836041). 05/04/2000

**ERROR BY KNOWLEDGEABLE PERSON ON FIRST WORKING DAY AFTER TIME OFF
CONFUSING OR OVERLY COMPLEX PROCEDURES**

- 240 The facility was operated safely and in accordance with regulatory and license requirements through approved operating procedures and posted safety practices. (Section 2.a)
IR 70-1151/2000-05

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 241 The documented engineered safety controls identified for the uranium hexafluoride (UF₆) vaporization system were available and operational. Administrative controls were adequately documented in approved procedures and being properly implemented. (Section 2.b).
IR 70-1151/2000-05

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 242 The safety controls for storage of uranium powder in polypaks were adequately implemented in accordance with the documented safety analysis. (Section 2.c) *IR 70-1151/2000-05*

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 243 Housekeeping at the facility was adequate to ensure emergency egress pathways were clear of debris. Storage of some contaminated equipment and containers in the chemical process area were a potential for the spread of contamination. Flammables at the outdoor low level waste (LLW) drum packaging area were not being stored in the proper storage cabinets. (Section 2.d)
IR 70-1151/2000-05

**** NEGATIVE FINDING** The inspectors observed housekeeping conditions throughout the facility. 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. The inspectors observed other areas where improper storage of contaminated equipment and containers could contribute to the potential spread of contamination. The inspectors also found that flammable solvents in the outdoor LLW drum packaging area were not being stored in the flammable storage cabinets provided in the area. The inspectors identified these items to licensee management who quickly addressed the housekeeping problems.

RESERVED 09/19/2000

- 244 The licensee's internal audit program was effective in identifying an inconsistency between the safety analysis and the procedure for handling contaminated high efficiency particulate air (HEPA) filters. The licensee properly categorized the situation as a notifiable event. The licensee's root cause evaluation adequately identified causes and proposed appropriate corrective actions. (Section 2.e) *IR 70-1151/2000-05*

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 248 Loss of moderation controls for a UF6 vaporizer was reported when the condensate level alarm system was disabled. *EN# 37441*

**** LICENSEE EVENT REPORTS** The condensate level alarm system could not perform its intended function due to blocking of the system by loose debris. Investigation determined that paint flaked from the recently processed cylinder and collected in the bottom of the vaporizer. However, the debris did not block the main condensate removal drain which allowed condensate to be removed from the vaporizer, so there was no condensate accumulation in the vaporizer. The vaporizer was cleaned out and the level alarm system was successfully tested before allowing the vaporizer to restart.

ERROR BY KNOWLEDGEABLE PERSON FOR 10/18/2000

- 259 Process operations were being conducted safely and in accordance with approved plant procedures. *IR 00-06*

**** POSITIVE FINDING** The inspector observed operations in the chemical process areas and the low level waste (LLW) handling areas. The inspector also observed the outdoor activities supporting the fuel manufacturing process. The inspector observed that the southeast expansion area of the facility had been cleared of stored containers and construction activities had begun for the BAES. As a result, storage areas for empty containers were scattered in various areas of the facility. Overall, the inspector observed that process operations were conducted safely and in accordance with approved plant procedures. Discussions with operations personnel revealed an understanding of the procedural requirements. 11/17/2000

- 260 The Incinerator Ash Screening Hood was in poor condition and susceptible to producing airborne activity problems. *IR 00-06*

**** NEGATIVE FINDING** The inspector observed that the Incinerator Ash Screening Hood was in poor condition, with its plexiglas window being held in place with duct tape. A note had been taped to the hood warning operators to keep the box clean because of past problems with airborne activity associated with that station. Although the airborne activity had recently been lowered due to improvements in ventilation, the licensee's management examined the hood, agreed that repairs were needed to the station, and initiated corrective action. 11/17/2000

**EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE
INADEQUATE EQUIPMENT DESIGN OR SELECTION**

- 261 Delays in updating documentation after process modifications was a weakness in the licensee's configuration management system. *IR 00-06*

**** WEAKNESS** The inspector reviewed several selected files for facility change requests, focusing on projects that involved significant process changes to chemical area process equipment. The inspector noted that appropriate approvals were being obtained for process changes and that records were being adequately kept. The inspector observed that there was considerable variation in the way the change request forms were being filled out. The inspector found that specific documents needing to be updated as a result of the proposed changes were not always listed on the Change Control Form as specified on the form. Other times, certain selections on the form would indicate the initiator to check "yes" or "no", but would be left blank. The inspector also reviewed the close-out of projects that had been authorized for start-up and operation. The inspector found that the actual updating of documentation (particularly as-built drawings) sometimes was delayed over a year after start-up of the changed equipment. The inspector observed that the licensee's configuration control procedure allowed for system start-up before completion of revised documentation and gave no time frame for completing documentation revisions. In the interim, marked-up or red-line drawings could be used for process documentation. The licensee indicated that drafting services were being expedited to reduce the backlog of as-built drawing revisions. 11/17/2000

**INADEQUATE TASK PLANNING
MANAGEMENT EXPECTATIONS NOT ESTABLISHED**

- 262 Engineered safety controls for the "wet" portion of the Ammonium Diuranate process were available and operable. *IR 00-06*

**** POSITIVE FINDING** The inspector reviewed the engineered process safety controls identified in the licensee's Integrated Safety Assessment (ISA) for the portion of the ADU process where uranium solutions and sludges were processed. The inspector observed that the controls were available and operable.

11/17/2000

263 Revisions to safety requirements for storage of waste drums were not posted in a timely manner.
IR 00-06

**** NEGATIVE FINDING** The inspector observed the storage of licensed material throughout the facility. The inspector observed that waste drums were being stored in arrays and racks in the southwest expansion area of the facility. The inspector observed three different criticality safety postings in the area, each with differing (and sometimes conflicting) requirements for the same storage containers. The inspector discussed the inconsistencies with the area safety engineer and found that the postings had been recently revised to accommodate storage of containers moved from the southeast expansion area to make space for the BAES project (see Section 2.a). However, the licensee had not completed replacing the postings prior to relocating the containers. The inspector found that the containers were being stored in accordance with the revised posting. The licensee completed replacing the postings before the end of this inspection.

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS 11/17/2000

264 A potential conflict with the license requirements concerning the processing and storage of unencapsulated material was identified. IR 00-06

**** NEGATIVE FINDING** The inspector observed a new storage area outside the Contamination Controlled Area (CCA) for packaged pellets being prepared for shipment. Previously, pellets being prepared for shipment were stored inside the CCA. This new storage area was established to make space for the BAES project. The inspector observed workers transporting the packaged pellets from the CCA to the new storage area. The techniques and equipment used to transport the packaged pellets appeared adequate to maintain criticality and radiological safety. However, the inspector noted that license requirements indicate that the processing and storage of unencapsulated radioactive materials was to be performed in CCAs. Encapsulated radioactive material is generally considered to be material sealed in a capsule that can be opened only by destroying the capsule. Although this new storage area appeared to be contradictory to the license requirements, no definition of unencapsulated (or encapsulated) existed in the license or in NRC regulations. This potential for conflicting views on the definition of unencapsulated material and the requirements for CCAs was to be forwarded to NRC licensing staff for resolution.

UNKNOWN 11/17/2000

- 265 Housekeeping was adequate to ensure emergency egress pathways were clear of debris. Process area cleanliness showed improvement. *IR 00-06*

**** POSITIVE FINDING** The inspector observed housekeeping conditions throughout the facility. Despite the relocation of numerous bulk containers 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. The inspector also noted an improvement in cleanliness of the ADU process areas.
11/17/2000

- 266 The licensee's investigation and corrective actions in response to NRC Licensee Event Report No. 37441 adequately addressed immediate and long-term concerns to prevent recurrence.
IR 00-06 & EN#37441

**** POSITIVE FINDING** The inspector reviewed the licensee's investigation of the loss of criticality safety controls identified in NRC Licensee Event Report No. 37441. This event involved the potential loss of steam condensate level controls that are used to limit the amount of moderator available in a non-favorable geometry UF6 vaporizer. These controls became plugged when paint chips flaked off of a UF6 cylinder that was being processed in the vaporizer. The control failure was identified by the licensee during a functional test of the controls performed after processing the cylinder. The licensee's investigation indicated that the actual failure of the controls likely occurred during the functional testing and not during the processing of the cylinder.

The inspector observed the cylinder and noted paint was peeling over its entire surface and appeared scorched. The licensee's investigation found that the UF6 supplier had used the wrong paint on the problem cylinder. The licensee also found that the method used to functionally test the controls may have contributed to the failure by flushing the paint chips into the level control system. The inspector noted that the licensee's corrective actions to prevent recurrence of this event included working with the UF6 vendor to ensure the proper paint would be used in future shipments, and revising the functional testing procedure to prevent flushing debris into the level control system. The inspector noted that the licensee was implementing immediate corrective actions by instituting a more frequent check of the condensate handling system to more quickly detect problems in the removal of condensate from the vaporizers. The inspector also noted that the licensee was investigating a long-term corrective action by designing a volume-limiting insert for the bottom of each vaporizer to eliminate the need for moderation control on the vaporizers for criticality safety.

11/17/2000

- 267 Corrective actions to Violation 00-02-02 were not completed by the date committed to NRC.
IR 00-06, VIO 00-02-02

**** NEGATIVE FINDING** The inspector reviewed the licensee's actions in response to violation (VIO) 00-02-02 concerning inadequate configuration management of uranyl nitrate piping system. In a letter dated May 25, 2000, the licensee had committed to completing certain corrective actions by June 30, 2000 in response to the violation. However, the inspector found that the corrective actions had not been completed as committed. The licensee indicated that upon further study, the original corrective actions were not feasible and the response to the violation would be revised. The revised response was received by the inspector on December 6, 2000, with a revised completion date of December 31, 2000. Thus VIO 00-02-02 remained open. 11/17/2000

MANAGEMENT EXPECTATIONS NOT ENFORCED

- 279 Container spacing in the uranium recovery dissolver area elevator was not adequate to meet criticality safety requirements and was identified as Violation 01-02-01. *IR 01-02*

**** NOTICE OF VIOLATION** On February 27, the inspectors observed the improper spacing of containers in the uranium recovery dissolver area elevator. The elevator's criticality safety posting required that containers (or stacks of containers) be spaced at least 12 inches apart. The inspectors found that the spacing was easily achievable by placing containers in each corner of the elevator. The inspectors observed that one container placed in the center of the elevator was within six to eight inches of containers stored in the corners of the elevator. Although the container in the center of the elevator was found to be empty, the criticality control for that area relied on container spacing, so that mass controls were not necessary. The inspectors discussed this situation with licensee management for corrective action. On March 1, 2001, the inspectors observed similar improper container spacing in the uranium recovery dissolver area elevator. This time, two containers had been placed in the center of the elevator, but the spacing between containers was only about two inches and the containers in the center of the elevator were not empty. These two examples of the failure to follow posted safety requirements were identified as Violation (VIO) 01-02-01.

ERROR BY KNOWLEDGEABLE PERSON FOR 03/02/2001
UNKNOWN REASON
INADEQUATE CORRECTION OF IDENTIFIED
PROBLEMS
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 292 Several safety controls associated with the ADU conversion process were found to be incapable of performing their intended function upon fault conditions from the programmable logic controllers. EN # 38020

**** LICENSEE EVENT REPORTS** At approximately 0759 the decanter tripped off line on conversion line 4. Subsequently line 4 was shutdown at 0805. An error in the display program was initially suspected. With conversion line 4 shut down, instrument technicians were called. The technicians attempted to correct the problem with the display program to no avail. An instrumentation and controls (I/C) engineer was called and tracked the problem to the line 4 PLC. Since it was determined that the PLC processor for line 4 had faulted, the processor was reset and tested. The test was satisfactory.

Line 4 was restarted at approximately 1000. At approximately 1030 line 4 was shut down due to a plugged duplex valve at the inlet of the calciner. During this shutdown, a process engineer was informed about the earlier events. The process engineer became concerned about the status of the safety significant controls on line 4 and contacted a nuclear criticality safety (NCS) engineer at approximately 1130. The NCS engineer was present in the control room at approximately 1140.

A time-line of events was reconstructed. The NCS engineer reviewed the sequence of events with the I/C engineer. It was determined that an output fault in an I/O card caused the processor to go into fault mode but all outputs did not go to their correct (OFF) state.

The NCS engineer determined that in the time period from 0759 until line 4 was secured at approximately 0805, the active engineered safety significant controls (SSCs) on line 4 were unavailable, and less than double contingency protection existed in the vaporization system during that time period. The SSCs are considered to have been in place for the 1000 startup and remained in place until the shutdown at 1030, although the cause of the initial failure had not been determined. Conversion operators on line 4 were instructed by the NCS engineer to not restart line 4 until the cause of the PLC failure was determined and corrected. Line 4 remains shutdown pending further investigation.

Justification for Continuing Operations on Lines 1, 2, 3 and 5:

Line 4 utilizes a unique Numalogic PLC system while Lines 1, 2, 3, and 5 utilize a different programmable logic system. There is no reason to believe the Numalogic error is possible on the other lines. The manufacturer of the other programmable logic system (utilized on Lines 1, 2, 3 and 5) was contacted and stated that their cards cannot fail into any state other than all OFF. Conversion Lines 1, 2, 3 and 5 remain in operation.

Double Contingency Protection

Double contingency protection for the vaporizer is based upon control of mass (prevent/detect a UF₆ leak) and geometry (prevent/detect accumulation of moderator in a non-favorable configuration in the bottom of the vaporizer). Double contingency protection on the cylinder (in vaporizer) is based upon moderation control (prevent back-flow of moderator from the hydrolysis column into the cylinder). It was determined that less than double contingency protection remain for these systems and greater than a safe mass was involved. In accordance with Westinghouse Operating License (SNM-1107), paragraph 37.3 (c.5), this event meets the criteria for a 24 hour notification because it constitutes a "nuclear criticality safety incident, in an analyzed system, for which less than previously documented double contingency protection remains . . . and: greater than a safe mass is involved, but a sufficient number of the controls that were lost are restored within four (4) hours such that double contingency protection is restored."

As Found Condition

See "Reason for Notification" above.

Summary of Activity

An unknown PLC failure led to the shutdown of conversion line 4. It was determined that less than double contingency protection existed on the line 4 from 0759 to 0805. Therefore, the NCS engineer directed that line 4 could not be restarted until the cause of the failure was determined and corrected.

Conclusions

Loss of double contingency protection occurred. At no time was there any risk to the health or safety of any employee or member of the public. No exposure to hazardous material was involved. This notification is the result of equipment failure, not a deficient NCS analysis. 05/21/2001

**INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT
INADEQUATE EQUIPMENT DESIGN OR SELECTION**

- 293 Six apparent violations were identified as part of a Special Team Inspection to investigate the common mode failure of multiple criticality safety controls in the ADU process lines due to errors

in the configuration of a system of programmable logic controllers. This inspection was a follow-up to PIM item #292. *IR 01-202 & PIM Item #292*

**** ESCALATED ENFORCEMENT ISSUE** The team's findings are summarized as follows:

- Licensee operators initial response to the event involving manually shutting down ADU Conversion Line #4 was adequate.
- An apparent violation was identified due to licensee action to restart ADU Conversion Line #4 without identifying and correcting the underlying deficiency.
- An apparent violation was identified due to inadequate license criticality safety review of the criticality safety controls for the ADU Conversion lines including the failure to review possible common modes associated with Programmable Logic Controllers (PLCs).
- A apparent violation was identified due to the complete loss of credited criticality safety controls against a credible criticality accident scenario on ADU Conversion Line #4.
- An apparent violation was identified due to the failure of the licensee functional verification program to identify and correct weaknesses associated with PLCs in the ADU Conversion lines.
- A training program weakness was identified due to the failure of multiple licensee employees to recognize the failure of multiple criticality safety controls during an operational upset.
- Licensee immediate corrective actions to assure safety of the ADU Conversion lines subsequent to their restart were adequate.
- An apparent violation was identified due to the failure of licensee operators and technicians to immediately report a safety significant event involving a process upset to licensee Regulatory Affairs during the initial response to an operational event.
- An apparent violation was identified due to the licensee Failure to report to the NRC within four hours an event involving an unanalyzed or unanticipated criticality safety incident for which the severity and remedy were not readily determined. 05/30/2001

**ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON
INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS
EQUIPMENT FAILURE DUE TO AGING
INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT
INADEQUATE EQUIPMENT DESIGN OR SELECTION**

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

**** NOTICE OF VIOLATION** 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.

MANAGEMENT EXPECTATIONS NOT ENFORCED 05/18/2001

295 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.

IR 01-03

**** WEAKNESS** 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.

PROCEDURES NOT COMPLETE OR ACCURATE 05/18/2001

296 Housekeeping was adequate to ensure emergency egress pathways were clear of debris. IR 01-03

**** POSITIVE FINDING** 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. 05/18/2001

309 Observed plant operations were conducted in a safe manner. Operators were appropriately trained and knowledgeable of the risk-significant process safety controls. IR 01-201

**** POSITIVE FINDING** The inspector examined the tank farm, conversion, incinerator, vaporizers, solvent extraction, ceramic (furnaces and pellet grinders), and manufacturing areas. Housekeeping and fire protection in these areas, postings, use of procedures, logbooks and data sheets, lock & tag practices, and industrial safety were satisfactory. Safety showers and eyewash stations were in good condition, with all tests current.

The inspector interviewed operations personnel and examined procedures for ongoing activities. Compliance with procedures is expected. The licensee has undertaken a major effort to revise procedures to increase the responsibility and accountability of operations personnel. Approximately 800 out of 1200 procedures have been completely re-written.

The inspector interviewed operators regarding powder handling, tank farm operations, conversion operations, solvent exchange, ceramic (furnace) operations, and low level radioactive waste handling, as well as some contractor personnel. The operators and contractors demonstrated an appropriate working knowledge of the risk-significant hazards and dominant safety controls for those hazards. No safety concerns were identified.

The inspector attended the daily plan-of-the day meeting with production, engineering, and maintenance groups.

As part of the initial badging process, the inspector viewed the site general employee safety training and took the multi-media computerized test that accompanied it. The inspector determined that the training provided an adequate introduction to chemical hazards on-site, and that the test was a good method for reinforcing the knowledge gained from the training module.

04/06/2001

319 The Uranyl Nitrate crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The radioactive material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. IR 01-05

**** POSITIVE FINDING** On June 6, 2001, the inspector observed the licensee perform incoming receipt surveys

of drums containing uranyl nitrate (UNH) crystals received from the Babcock and Wilcox Technology (BWXT) facility located in Lynchburg, Virginia. The inspector also observed that the UNH crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The inspector observed that the material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. The operators were knowledgeable of their procedures. Radiation and contamination surveys were conducted appropriately.
06/07/2001

- 336 A 50 gallon spill of uranyl nitrate solution occurred into a diked area at the HF spiking station on October 29th. Before area operators could clean up the spill, it had seeped through a hole in the dike down into the concrete subflooring. The licensee plans to repair the dike and continue using the spiking station until an alternate spiking station can be brought on line at the end of November. The licensee will then remediate the concrete subflooring and any contaminated soil below it.
One liners for 11/1/01

**** LICENSEE EVENT REPORTS 10/30/2001**

**EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN)
EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE
EQUIPMENT FAILURE DUE TO AGING**

- 343 The licensee's operating procedures provided adequate guidance to workers for the safe operation of the erbia process. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's procedures for operating the erbia/uranium powder blending process. The inspectors found that the procedures described steps for the system operators to take during normal operations, but found several occasions where the operating procedures did not inform operators of what to do if the system did not respond as expected. The inspectors also found some instances where specific details that were needed to ensure the safe operation of the process had been omitted from the procedures. The licensee adequately corrected these procedural deficiencies prior to the end of the inspection. 10/12/2001

- 344 The licensee's process support procedures adequately covered the steps to take during off-normal conditions or loss of utilities. However, the procedures for sampling recycled material from the erbia process for moisture was not consistent with the licensee's safety analyses. The inspectors informed the licensee that prior to introducing uranium recycle material generated from the erbia process to the blender, this discrepancy must be corrected. *IR 01-07*

**** NEGATIVE FINDING** The inspectors reviewed the licensee's general support procedures for the erbia process operations. This included procedures for safety significant laboratory analyses, operation of utility systems, and performing functional verifications of safety controls. The inspectors also reviewed procedures for the operation of nearby equipment that used flammable gases. The inspectors found that the procedures for utilities adequately covered the steps to take during off-normal conditions or loss of utilities. The inspectors found that the procedures for performing functional verifications of safety provided adequate instructions for testing the functionality of safety controls, and that all engineered safety controls identified in the licensee's safety analyses were covered by the procedures. The inspectors observed portions of the functional tests being performed and found them to be well planned and adequate to verify the functionality of the safety controls.

Since moderation control in the unfavorable geometry blender was the sole method for ensuring criticality safety of the blender, the inspectors reviewed the procedures for sampling and analyzing materials added to the blender. This included procedures for sampling recycled uranium oxide powder from the erbia process that did not previously meet specification. The inspectors found that the procedures for sampling this recycled material was not consistent with the licensee's safety analyses. The inspectors found that the ISA used to approve the license amendment required that all powder added to the blender be confirmed to be less than a prescribed moisture limit by two independent laboratory analyses. However, the sampling procedures involved performing composite sampling of multiple containers of recycle material for the first analysis, and randomly sampling a small number of these containers for the second moisture overcheck analyses. The inspectors pointed out that these sampling methods were not adequate to confirm that all powder added to the blender was less than the moisture limit. The inspectors discussed the situation with the NRC license reviewer and subsequently informed the licensee that prior to introducing uranium recycle material generated from the erbia process to the blender, this discrepancy must be corrected. This would involve either changing the sampling procedure to match the safety analysis or revising the safety analysis and obtaining approval of the revision from the NRC licensing function. The licensee stated that the erbia blending process would have to be operated a considerable time before it generated enough recycle material to add back to the process. Thus, the correction of this discrepancy did not affect the initial start-up of the blending process.
10/12/2001

**INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS
INCOMPLETE SAFETY BASIS**

- 346 The digital control system was adequate to maintain the functionality of safety systems and enhanced the operator's access to safety-significant process information. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's use of digital control systems for implementing process and safety controls throughout the erbia process. The inspectors observed that the digital controls for the erbia process were a significant improvement over the control systems used in other areas of the facility. The inspectors observed that a graphical display of operating parameters was available to operators at nearly every process station. Process alarms were easily identifiable and many safety alarms annunciated both at the station and in the facility's central control room. The inspectors also observed that separate watchdog timers monitored the system for fault conditions to identify potential problems in the digital control system. The inspectors also reviewed the digital control system qualification report that described the methods used to functionally verify the functionality of the control system. The inspectors observed some of the qualification tests being performed on the digital control system and found them to be properly coordinated and well planned. The inspectors found the licensee's digital control system, and methods for its functional verification, to be adequate to maintain the functionality of safety systems and enhanced operator access to safety-significant process information. 10/12/2001

- 347 Functional testing was well planned and adequate to verify the functionality of the safety controls prior to operation. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's general support procedures for the erbia process operations. This included procedures for safety significant laboratory analyses, operation of utility systems, and performing functional verifications of safety controls. The inspectors also reviewed procedures for the operation of nearby equipment that used flammable gases. The inspectors found that the procedures for utilities adequately covered the steps to take during off-normal conditions or loss of utilities. The inspectors found that the procedures for performing functional verifications of safety provided adequate instructions for testing the functionality of safety controls, and that all engineered safety controls identified in the licensee's safety analyses were covered by the procedures. The inspectors observed portions of the functional tests being performed and found them to be well planned and adequate to verify the functionality of the safety controls. 10/12/2001

- 348 The level, frequency, and type of periodic maintenance identified to be performed on each control appropriately corresponded to the control's safety significance and was adequate to maintain the control's availability and reliability. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's program for maintaining the availability and reliability of safety controls. This program included a system of procedures for periodic maintenance, calibrations, inspections, and functional testing instructions. The inspectors noticed that all controls identified in the safety analyses were included in the program. The inspectors also noted that the level, frequency, and type of maintenance to be performed on each control appropriately corresponded to the control's safety significance. 10/12/2001

- 349 Planned staffing of the erbia process used an appropriate mix of experienced and newer workers. Training of the workers covered all pertinent safety disciplines and testing adequately reflected the operator's knowledge of the area safety requirements. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the staffing and training of the workers designated to operate the erbia process. The inspectors observed that the blending process would be available for operation two shifts per day. The inspectors observed that the blending process would not be operated during the third shift each day, but that workers would be in the area to address any unusual occurrence that may affect the blending operation. The inspectors observed that each shift used a combination of highly experienced operators along with newer workers to maximize the knowledge base of the work force while providing a good environment for on-the-job training. The inspectors reviewed the formal training and testing of the designated workers and found that the training covered all pertinent safety disciplines and the testing adequately reflected the operator's knowledge of the area safety requirements. 10/12/2001

- 350 The licensee's management was premature in arranging for the original readiness review inspection as evidenced by the unfinished condition of the process construction and management support structure. *IR 01-07*

**** NEGATIVE FINDING** Although the inspectors ultimately found the licensee's programs adequate for start-up of the erbia process, the licensee was not adequately prepared when they originally made arrangements for this readiness review inspection. During the first portion of the inspection (September 17-20, 2001), much of the preparations for start-up of the erbia process was unfinished. For example, most of the procedures were found to be incomplete and still in the licensee's review and approval process. Some of the process equipment, including engineered safety controls, were still being installed. Functional verifications of the operability of safety controls had not begun. Operating staff had not yet been chosen, and thus training had not been started. All of these items had been adequately completed by the conclusion of the

inspection October 10-12, 2001. However, licensee management was premature in arranging for the original readiness review inspection. 10/12/2001

D Fire Safety

- 215 The licensee had adequately maintained plant conditions within the original design bases of automatic sprinkler systems and fire barrier systems and has limited combustible loading below the levels that could result in a significant fire that could challenge performance of engineered protection systems. *IR 2000-202*

**** POSITIVE FINDING** The inspectors performed a walkdown inspection of sprinkler-protected areas (i.e., warehouse, maintenance shop, waste incinerator, solvent extraction, compressor and hot oil room) to ensure that plant conditions were within the original design bases of automatic sprinkler suppression systems. The inspectors noted that the potential fire hazards under the sprinkler-protected areas were within their design bases and would not challenge the effectiveness or the capability of automatic sprinkler systems to contain or suppress a fire. The inspectors also determined that the plant water supply systems were adequate and reliable for meeting automatic sprinkler systems and manual fire suppression requirements.

The inspectors also performed walkdown inspections of process areas that were adjacent to sprinkler-protected areas (e.g., ammonium diuranate (ADU) conversion, powder blending, ADU pelleting, rod and final assembly, etc.). The as-found combustible loading within these areas was maintained at levels that minimized the potential for a significant fire, which could propagate into the sprinkler-protected areas and challenge the performance capabilities of existing automatic sprinkler systems. Also, the transient combustibles within the compressor and hot oil room and the waste incinerator room were minimal and were within the performance capability of fire barriers engineered to contain a fire. 05/04/2000

- 216 The preventive maintenance established for key fire protection systems and process equipment was adequately implemented to ensure availability and reliability for the performance of their intended fire safety functions. *IR 2000-202*

**** POSITIVE FINDING** Process Equipment Important to Safety

On the basis of random samples of the licensee's PM records and walkdown examinations of process equipment, the inspectors determined that the overall PM for the following key process safety equipment (e.g., flame sensors, thermocouples, temperature controllers, pressure switches, or automatic gas shut-off valves) and testing of safety interlock functions (e.g., automatic shut-off of hydrogen or natural gas supply, shut-down of electric power, or initiation of a nitrogen purge) were performed in accordance with plant procedures:

- calciner No. 2 and No. 4
- sintering furnaces No. 1 through 4
- hot oil systems No. 3 and No. 4
- waste incinerator

The licensee had performed calibration of equipment to ensure accuracy of process setpoints for initiating safety interlocks. The inspectors noted no obvious deficiencies in the material condition of selected process equipment examined during walkdown inspections. Process equipment was available to minimize the potential fire or explosion hazards associated with the operation of processes.

Fire Protection Systems and Equipment

The inspectors randomly sampled the licensee's PM records, walkdown inspections, and observed functional tests for selected fire protection systems and equipment. The inspectors determined that the overall PM for the following fire protection systems or equipment was performed in accordance with plant procedures to ensure availability and reliability:

- plant fire alarm system
- heat and smoke detectors
- manual fire alarm pull stations
- automatic sprinkler systems
- fire hose houses and monitor nozzles
- fire hydrants and control valves
- plant fire pumps
- water storage tanks
- fire barriers, fire doors, and fire dampers
- fire extinguishers (including Met-L-X and 150-pound dry portable extinguishers)

Accompanied by the licensee, the inspectors randomly chose several pieces of the fire protection equipment for operability testing (i.e., a manual pull station, sprinkler flow switches, fire alarm indicating devices). The inspectors also selected two high-noise locations (i.e., the incinerator room and the penthouse) to verify audibility of the plant fire alarm system. The specific alarm locations and descriptions of fire alarm initiating devices (i.e., manual pull stations, sprinkler flow alarms, and smoke detectors) were received and documented at the plant's main fire alarm control panel. The fire alarm could be heard at the inspector-selected locations and throughout the main process areas. The inspectors noted no obvious

deficiencies in the material conditions during walkdown inspections or concerns about the functional tests of selected equipment. 05/04/2000

- 217 A weakness was identified in the lack of periodic internal examination of plant water storage tanks in accordance with the industry standard. IR 2000-202

**** WEAKNESS.** However, the inspectors found that the licensee had not included all applicable industry requirements (i.e., National Fire Protection Association (NFPA) 25) in the PM for the plant's water storage tanks. The requirement to periodically examine (i.e., every 5 years) the internal condition of water storage tanks to ensure detection (and correction) of potential conditions adverse to the reliability and availability of the water supply had not been incorporated into the plant PM program. The plant water storage tank No. 1 was installed in 1968, followed by water storage tank No. 2 in 1987. The licensee last examined water storage tank No. 1 in 1991. The licensee found and documented no concerns related to corrosion or buildup of sediment within the tank that could affect reliability of the plant water supply for fire protection. The licensee attributed the lack of corrosion to the cathodic protection system maintained to minimize corrosion and the availability of fully treated portable water supplied by the City of Columbia. The licensee indicated that applicable PM in accordance with NFPA 25 would be incorporated into the plant's PM program. The licensee planned to complete PM for the plant water storage tank Nos. 1 and 2 within 90 days of May 4, 2000. On the basis of interviews and review of available documentation from the licensee's inspection of water storage tank No. 1, the availability of corrosion protection and the quality of water, and the availability of two water storage tanks, the inspectors determined that the reliability of the water supply for fire protection was not significantly reduced. The licensee's plan of action was considered acceptable. 05/04/2000

MANAGEMENT EXPECTATIONS NOT ESTABLISHED

- 218 Combustibles were adequately controlled within the process building to minimize potential fire severity and fire propagation. Combustibles were adequately controlled to minimize potential exposure fire hazards to the main process building, uranium hexafluoride cylinders, the chemical bulk storage farm, and hydrogen and hydrofluoric acid storage tanks. IR 2000-202

**** POSITIVE FINDING Control of Combustibles Within the Process Building**

The inspectors examined combustibles throughout the plant process areas (e.g., ADU conversion, integrated dry route (IDR) conversion, powder blending, ADU pelleting, rods, final assembly, UF6 cylinder washing, uranium recovery and recycling system (URRS), dissolver and scrap processing, solvent extraction, fuel assembly storage) and observed that they were adequately controlled. Flammable gases used for manufacturing processes were piped in from outside. Flammable and combustible liquids were appropriately stored using storage cabinet suitable for flammable liquids. The amount of combustible material noted during the inspectors' walkthrough was generally below that required to cause a fire that could lead to a flashover (i.e., ignition of all combustibles) in the process building.

The inspectors noted that the licensee's practice established for loading final fuel assemblies for shipment minimized the introduction of a vehicle containing fuel inside the process building. The inspectors also observed that the Type B transportation containers for shipment of fuel assemblies were of noncombustible material and minimized the potential of ignition and contribution in the event of a fire.

The inspectors also performed a walkthrough inspection of process areas no longer in use (i.e., manufacturing automation project) and noted that the licensee had provided appropriate isolation of flammable gases and electrical power to equipment. The combustibles in the areas were kept to a minimum with no significant accumulations, thus minimizing the potential for a severe fire. The smoke detectors within the abandoned process areas were maintained operable to detect a fire.

Control of Combustibles Outside the Process Building and Plant Area

The inspectors performed walkdown inspections of plant areas surrounding the process building. The inspectors noted that the areas surrounding the process building were kept free of a significant amount of combustibles that could present a fire exposure hazard.

The inspectors also reviewed the control of combustibles to minimize the potential fire exposure hazards to radiological or hazardous chemical material (i.e., UF6 cylinders, the chemical bulk storage farm, and the hydrogen and hydrofluoric acid (HF) storage tanks). 05/04/2000

- 219 The plant's hot-work permit system for minimizing potential ignition sources and preventing fires was adequately implemented in accordance with plant procedures. IR 2000-202

**** POSITIVE FINDING Control of Hot-Work Activities**

The licensee had established a permit system to minimize the potential of a fire resulting from hot-work (e.g., cutting, welding, etc.) activities. The inspectors reviewed records for hot work permits for the past 5 months and interviewed plant employees authorized to issue hot-work permits. No hot-work activities were underway during the inspection for observation. As a result, the inspectors also reviewed two insurer audits of the facility operations and overall risk from 1999. The insurer reported favorably on the licensee oversight of hot-work activities, along with the integration of fire safety into plant operations. The inspectors determined that hot-work permits were issued in accordance with plant procedures and the individuals issuing the hot-work permits were knowledgeable of procedure requirements.
05/04/2000

- 220 The licensee had provided, through the combination of an onsite emergency response team and offsite fire department assistance, reasonable assurance of an adequate emergency response for suppression of a major fire at the plant. *IR 2000-202*

**** POSITIVE FINDING Emergency Response Team**

The licensee had established an onsite ERT for responding to small fires and relied on off-site fire departments to assist in major firefighting operations. At the time of the inspection, the ERT had a total of 61 members, 40 of whom had completed and maintained the required training to be designated as fully qualified. The licensee maintained 12 to 14 ERT members on each shift to initially respond to a fire.

The inspectors noted that annual training of the ERT members was provided during the recent plant shutdown, and the training addressed fire ground operations, search and rescue, hazardous material decontamination, the use of fire extinguishers and self-contained breathing apparatus, and emergency plans. An emergency drill consisting of a simulated compressed gas cylinder leak was also performed during the annual training. The licensee had provided training commensurate with the expected performance of the ERT.

Off-site Fire Department Assistance

Mutual Aid and the Letter of Agreement: The inspectors reviewed mutual aid and the letter of agreement between the licensee and the City of Columbia Fire Department and the Richland County Department of Emergency Services, respectively, and noted that formal agreements for off-site emergency response assistance were maintained.

Pre-Fire Plans: The inspectors reviewed the Pre-Fire Plans for a fire at the plant. The inspectors noted that the plans contained information identifying the presence of radioactive, fire, and chemical hazards; location of safety equipment; building construction and support features; a detailed layout of the facility; and nuclear criticality safety concerns. The inspectors noted that the Pre-Fire Plans appeared to be user friendly and contained emergency response data needed for firefighting operations. Following the plant shutdown, two days of training, which included familiarization with radiological, chemical, and fire hazards; available firefighting equipment at the plant; and the plant's pre-fire plans, was provided to members of the off-site fire departments.

Expected Response Time: The licensee indicated that the response time from the notification of the nearest offsite fire department until arrival of firefighting vehicles and firefighters at the plant's gate was within 10 - 12 minutes. The inspectors determined that the response time of the offsite fire departments would be reasonable for mitigating a major fire at the plant.
05/04/2000

- 297 The manufacturing processes, equipment, and material storage areas reviewed were being operated in accordance with fire safety requirements. *IR 01-03*

**** POSITIVE FINDING** 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.
05/18/2001

- 298 Fire extinguishers and fire doors throughout the plant were being adequately maintained to ensure proper condition for their operation. *IR 01-03*

**** POSITIVE FINDING** 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. 05/18/2001

- 299 The Pre-Fire Plan included the minimum required information but portions needed to be updated and clarified. IR 01-03

**** NEGATIVE FINDING** 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.

PROCEDURES NOT COMPLETE OR ACCURATE 05/18/2001

E Management Organization and Controls

- 198 Audits performed for the environmental program were sufficient to ensure the quality of the environmental program.
IR 00-01

**** POSITIVE FINDING** The inspector also reviewed the licensee's 1998 annual internal audit of the environmental program and the 1998 biennial audit of vendor analytical laboratories. The inspector observed that these audits were thorough, well documented, and that appropriate technical and quality assurance issues were addressed.
02/04/2000

- 200 Radiological activity in liquid effluents had increased approximately 21 percent during the first half of 1999 versus last half of 1998 levels. The licensee had formulated an action plan and had implemented corrective actions in order to reduce radioactivity in liquid effluents. Preliminary data indicated that activity concentrations had been reduced to acceptable levels by implementation of the licensee's corrective actions.
IR 00-01

**** DESIGN ISSUES** The total activity released during the first half of 1999 had increased approximately 21 percent over last half of 1998 totals. In addition, the inspector noted that liquid effluent concentrations during the first three quarters of 1999 had averaged approximately $5.0 \text{ E-}07 \text{ } (\mu\text{Ci/ml})$ in comparison to the unrestricted release limit goal of $3.0 \text{ E-}07 \text{ } \mu\text{Ci/ml}$. The licensee stated that one major reason suspected for this increase in liquid effluent concentrations was increased solubility of uranium in effluents due to acidic conditions in the East Pond. The licensee had formulated an action plan to minimize uranium activity in liquid effluents and had instituted corrective actions. The inspector noted that the October liquid effluent activity concentration had decreased to approximately $2.6 \text{ E-}07 \text{ } \mu\text{Ci/ml}$ after completion of the licensee's corrective action of neutralization of acidic drainage to the East Pond from the de-Ionized WTF cation regeneration process.
02/04/2000

- 207 Weld repairs to MCC-3 shipping containers were made by Westinghouse employees that had been trained by a contractor that was not on the Westinghouse Qualified Supplier List.
30 day report dtd 4/7/2000 & IR 00-03

**** LICENSEE EVENT REPORTS** In October 1999, it was determined that several Model MCC-3 shipping containers had an incorrect weld pattern on the top shell. At that time all containers with this weld pattern were taken out of service and a plan was developed to add welds to meet the licensed drawing requirement. The plan involved using Westinghouse welders who were certified to the requirements for welding safety related parts on shipping containers. However, the welders had received their training and certification from the same supplier that was already under contract to provide general welding services. This supplier was not on the Westinghouse Qualified Supplier List (QSL). Westinghouse issued a blanket purchase order to the supplier to provide the ASME code welding certification services. Blanket purchase orders with existing suppliers for maintenance services are not generally routed through Product Assurance. Had a separate purchase order been issued for shipping container welding, the Purchasing Department would have routed the requisition to Product Assurance

for approval. Product Assurance would have denied the requisition because the requested supplier was not on the Westinghouse QSL. 03/13/2000

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS

- 211 The licensee's reaction to the uranyl nitrate spill appropriately addressed existing outdoor areas of contamination on and adjacent to the chemical process building. *IR 00-02*

**** POSITIVE FINDING** The inspector observed the area where the spill occurred and the pathway for contamination to reach the outdoor concrete pad. The uranyl nitrate piping ran from a set of bulk storage tanks, passed over a concrete pad in a non-controlled area, entered the process building at below the floor level, turned upward and penetrated through the floor to the indoor process area. The uranyl nitrate had been spilled inside the indoor process area, seeped through the floor around the pipe penetrations, and flowed out of the building onto the concrete pad. Although the contamination reached the outdoor area, the inspector observed that piping and equipment created obstacles such that the outdoor contaminated area was not easily accessible to workers. The inspector observed that the area had been thoroughly cleaned, but some fixed contamination remained in isolated spots. It was not clear whether these isolated areas of fixed contamination were due to the reported event, or due to previous small leaks. The licensee continued to investigate options for either removing or sealing the contaminated concrete. The licensee recognized that any remaining fixed contamination was required to be addressed in the facility decommissioning plan. 03/31/2000

- 212 The licensee's system for performing internal reviews and audits adequately addressed the cause(s) of high air activity. The Health Physics Unusual Incident Investigation Form was a useful tool for determining the cause(s) of high airborne radioactivity. *IR 00-02*

**** POSITIVE FINDING** The inspector reviewed the licensee's system for investigating occurrences of high airborne radioactivity in the process areas. The inspector observed that upon discovery of a high airborne reading, the area operators were required to complete a Health Physics Unusual Incident Investigation Form. On this form, the area operator communicated the potential cause(s) of the high airborne activity to the health physics (HP) group based on observed operational problems. The inspector found this to be a good tool for determining the cause of airborne activity problems. 03/31/2000

- 213 Information provided on the Health Physics Unusual Incident Investigation Form pertinent to other safety disciplines was not always passed along to the appropriate safety personnel. *IR 00-02*

**** NEGATIVE FINDING** The inspector noted that during investigations at the uranium dissolvers, several observations of red smoke coming from the dissolvers were made by the operators. Red smoke is indicative of nitrogen oxide (NOx), a significant chemical hazard. The inspector found that although the operators' exposure to NOx fumes was minimal, the presence of red smoke was not recognized as a potential hazard by the HP group, and thus was not properly reported to the responsible chemical safety engineer. The inspector discussed this with the HP manager and the chemical safety engineer who indicated that better communication of potential hazards between the safety disciplines would be developed. 03/31/2000

- 223 The licensee tracked and addressed injury and abnormal performance incidents in a timely manner to prevent reoccurrence. *IR 2000-202*

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address incident investigation.

The inspectors reviewed the licensee's incident investigation program that utilized the "Redbook" system. The Redbook was a record of unusual occurrence reports. The inspectors followed-up on a Redbook item that identified a shortage of full face respirators in the chemical area (Date of report: February 24, 2000). The licensee utilizes cartridge respirators that require a new respirator after removal. The licensee had a backlog in the cleaning of the respirators due to the number of respirators being utilized on this specific day for maintenance activities. The licensee's corrective action consisted of purchasing an additional 400 respirators and use of a backup washing machine. The inspectors reviewed the site emergency plan to ensure the licensee was prepared to respond to an emergency situation with the proper breathing apparatus. The inspectors verified the self-contained breathing apparatus were accessible and in the locations identified in the emergency plan. The inspectors concluded the licensee properly addressed this issue to prevent reoccurrence and to ensure safe process activities.

In the review of the licensee's Records of Occupational Injury or Illness, the inspectors recognized a trend of nitric acid burns in the chemical area. The inspectors discussed the observation with licensee management and determined that the licensee had self-identified this trend. Most instances reflected the affected personnel were

not wearing the appropriate personal protective equipment (PPE). Some of the chemical operations/activities did not require an acid suit to be worn in activities within the vicinity of nitric acid. The licensee conducted team meetings with the plant staff to be aware of such activities. At the time of the inspection, a meeting was to take place to include in the revised SOPs the requirement of additional PPE in such activities involving nitric acid. The inspectors concluded the licensee addressed the trend appropriately.
05/04/2000

- 225 The maintenance activities and procedures associated with the refurbishment of the MCC fuel assembly shipping containers were acceptable.

IR 00-03

**** POSITIVE FINDING** In addition to the requirements specified in the NRC Certificate of Compliance (CoC) No. 9239 for fuel shipping containers, the requirements for routine determinations specified in 10 CFR 71.87 and 49 CFR 173.475 were applicable.

For reusable NRC-certified packagings for fuel assemblies, the inspector examined the licensee's procedures and records for refurbishment and maintenance and verified that before re-use, all of the periodic maintenance required by the CoC had been incorporated into the procedures and had been performed, except as noted in Section 2.f of this report. During the inspection, the inspector observed maintenance and refurbishment activities on four Model MCC fuel shipping containers, including the gasket replacement on one of the shipping containers. The operators used the checklist in form CF-75B-002, Fuel Assembly Shipping Container Inspection Checklist to ensure that the required maintenance was performed.
05/04/2000

- 229 The licensee identified two violations involving the package effectiveness for fuel assembly shipping containers during April 2000. The corrective actions for the administrative problem appeared to be adequate to prevent recurrence. However, a violation for the failure to assure prompt correction of identified shipping container non-conformances was identified.

IR 00-03

**** NOTICE OF VIOLATION** The inspector reviewed two reduction in package effectiveness reports submitted on April 7 and April 25, 2000, in accordance with the requirements specified in 10 CFR 71.95(a).

The 10 CFR 71.95(a) report, dated April 7, 2000, pertained to a violation that Westinghouse welders, who were performing safety-related welds on the Model MCC-3 fuel shipping containers were certified by a company that was ASME code certified, but was not on the Westinghouse Qualified Supplier List (QSL). The Westinghouse welders had received their training and certification from the same supplier that was already under contract to provide general welding services. However, the supplier was not on the Westinghouse QSL. The licensee had issued a blanket purchase order to the supplier to provide the ASME code welding certification services. Blanket purchase orders with existing suppliers were normally not routed through Product Assurance. Had a separate purchase order been issued for the shipping container welding, the Purchasing Department would have routed the requisition to the Product Assurance Department for approval. After reviewing the issue, the inspector noted that the violation was an administrative quality compliance issue. Immediate corrective actions included the issuance of a Corrective Action Report (CAR 00-0149); suspension of the welding until the CAR finding was resolved; and removing the affected containers identified in October 1999 out of service. To prevent recurrence, the licensee audited the supplier on April 4, 2000; ensuring that any material, items, or services for qualification of welders are provided by Westinghouse or procured from a supplier listed on the QSL; perform an annual audit of this supplier; and hold a pre-award meeting prior to the placement of an order for welder qualifications to assure compliance with order requirements.

The 10 CFR 71.95(a) report, dated April 25, 2000, pertained to a violation that occurred on or about March 24, 2000 when the licensee discovered that one Model MCC-3 shipping container (Serial Number M178) had been used for fuel shipments which did not reflect the minimum weld pattern on the container shell as described in License Drawing MCCL-301. The license drawing was part of the NRC CoC 9239, Rev. 10, USA/9239/AF, Model Nos. MCC-3, MCC-4, and MCC-5. Specifically, MCCL-301 specifies that skip welds are to be made in 16 locations on the external rollover angle bars on the bottom half of the container shells. Two licensee employees were assigned to inspect all shipping containers, specifically verifying that all safety-related parts comply with License requirements. This action was taken in response to similar violations that occurred in April 1997 and October 1999 and documented as a 10 CFR 71.95(a) reports dated May 22, 1997 and November 23, 1999, respectively. During the March 24, 2000 inspection, it was discovered that container M178 had the skip welds in only 12 locations.

This problem originally became apparent in April 1997, when it was determined that several Model MCC-3 shipping containers had an incorrect weld pattern on the bottom half of the container shells. At that time, all containers with the out of specification weld pattern were taken out of service. A plan was developed to add welds to meet the license drawing requirement. In addition, a procedure was implemented to verify the proper weld patterns during container refurbishment so that the containers that were off-site at the time of the violation would be inspected and corrected prior to next use. During that time, approximately 200 containers were inspected, with 79 containers identified as having the incorrect weld patterns. However, container M178 was

not identified. The licensee determined that M178 was in Taiwan at the time of the discovery of the weld deficiencies and was not segregated upon return to the Columbia Plant. On October 25, 1999, it was discovered that certain Model MCC-3 shipping containers had been used for fuel shipments which did not reflect the weld pattern on the upper container shell as specified in license drawing MCCL-301. Specifically, the licensee discovered that some of the MCC-3 containers in use had skip weld patterns which exceeded the 10-inch center-to-center requirement specified in drawing MCCL-301.

During interviews with the licensee, the inspector determined that shipping container M178 had been used twice to ship fuel assemblies during the months of January and February 2000. After reviewing this issue, the inspector identified this problem as a violation of 10 CFR 71.133 requirements (VIO: 70-1151/00-03-02: Failure to assure that shipping container non-compliances were promptly corrected). The licensee's immediate corrective actions included the removal of M178 from service and resuming the inspection of all containers. To prevent recurrence, the licensee assigned two employees to inspect safety-related parts for all containers and to develop a plan for further training. Given the circumstances regarding the location of the M178 container when this problem was initially discovered in 1997, the inspector determined that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence was adequately addressed. 05/04/2000

**INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS
INADEQUATE TASK CONTROL**

- 230 Operating procedure for handling and shredding contaminated HEPA filters instructed workers contrary to the approved Criticality Safety Evaluation. *EN#37189*

**** LICENSEE EVENT REPORTS** The licensee discovered an inadequate procedure during a routine audit when it was found that an administrative safety control identified in a Criticality Safety Evaluation (CSE) was not properly proceduralized. The inadequacy occurred in the method for handling and disposing of used HEPA filters. Typically, used HEPA filters are scanned upon removal from process. If the scan value is less than 5 grams U235 per 10 liters, the filter media is removed from the filter frame, shredded, and sent to an incinerator. According to the CSE, if the scan value is greater than 5 grams U235 per 10 liters, the filter media is to be bagged and sent directly to the incinerator without shredding. The shredding process evidently aids in the combustion of the filters. Filters that have a high scan value are not to be processed through the shredding system because the shredder hopper and receiving barrel are of unfavorable geometry. The procedure for processing filter media with high scan values instructed the operators to "place paper filter media into a 30-gal paper bag for shredding", which is contrary to the CSE assumptions that high scan media is not to be shredded. This operation was being performed per the approved operating procedure, and high scan media was being shredded prior to incineration. The CSE documented the prevention of shredding the high scan filter media as an administrative criticality safety mass control. Thus when it was discovered that the operating procedure instructed operators to shred the high scan filter media, the licensee determined that this constituted a loss of one criticality control.

PROCEDURES NOT COMPLETE OR ACCURATE 07/26/2000

- 233 The Site Emergency Plan (SEP) and the Emergency Procedure governing evacuation and accountability were inconsistent regarding the location for evacuees to assemble.
IR 00-04

**** NEGATIVE FINDING** Section 7.0 and Figure I of Emergency Procedure A-03 entitled "Evacuation and Accountability" was determined to be inconsistent with Section 5.4.1.2 and Figure 5.1 of the SEP. The inconsistency was associated with the assembly location following a plant evacuation. The referenced sections of the SEP reflected two locations (south gate near the guard shack, and the flagpole near administration building) whereas the procedure included only the flag pole. The licensee contact indicated that the procedure was correct and the SEP required a revision for consistency with the procedure and general employee training material. The inspector conducted interviews regarding evacuation and assembly locations with randomly selected employees and discovered that procedures and training discussed a single location (flag pole) and the SEP required updating as indicated by the licensee contact. The inspector informed the licensee of bulletin board locations where the evacuation diagram posted was identical to the diagram in the SEP (showing two assembly points). In response the licensee expressed plans to conduct a site wide inspection to replace evacuation diagrams with the correct information and update the SEP information. Additional procedural reviews identified incorrect references that were discussed during a previous inspection but had not been resolved. Consequently, the inspector informed plant management during the exit interview that lack of attention may have resulted in repeat errors and management attention may be necessary to resolve the errors.

PROCEDURES NOT COMPLETE OR ACCURATE 06/30/2000

- 235 Results from accountability/evacuation drills conducted during August 1999, and April 2000, disclosed problems with equipment, concept of operations, procedures, and human errors.

IR 00-04

**** WEAKNESS** The last biennial exercise was conducted on September 21, 1999, and involved participation by Richland County Emergency Medical Services and the local hospital. Participation by other offsite agencies was limited to notifications only. The next scheduled exercise to fulfill the biennial requirements in Section 7.4 of the Plan would be held in calendar year (CY) 2001. During the review of training details, the inspector noted that tabletop scenarios were presented to ERO personnel to assess the effectiveness of training for participants. The inspector discussed and reviewed documentation associated with the fire/criticality alarm system familiarization sounding and periodic evacuation drills. The results disclosed a frequency for conducting periodic evacuation drills had not been established procedurally nor was required by the license. According to the licensee, prior to August 1999, the last such drill was conducted in 1994. As a program improvement item, the licensee expressed a commitment to conduct evacuation drills at least annually if not semiannually. Results from the recent drills conducted during August 1999, and April 2000, disclosed problems with equipment, concept of operations, procedures, and human errors. In response to drill results, the licensee indicated that the following actions were being considered: 1) replacement of the criticality warning system; 2) determine if additional card readers are needed; 3) revise procedures to include Evacuation Coordinators and assign assembly areas based on work unit or department; and 4) training. The licensee indicated that a remedial evacuation drill will be held following the implementation of corrective actions. The inspector determined that the licensee's procedures for conducting accountability of personnel following an evacuation were minimally acceptable, but improvements were necessary to ensure accountability was both timely and complete. The inspector informed the licensee that the corrective actions to ensure timely and complete accountability of personnel was considered an inspector follow up item (IFI 70-1151/2000-04-02). 06/30/2000

- 261 Delays in updating documentation after process modifications was a weakness in the licensee's configuration management system. IR 00-06

**** WEAKNESS** The inspector reviewed several selected files for facility change requests, focusing on projects that involved significant process changes to chemical area process equipment. The inspector noted that appropriate approvals were being obtained for process changes and that records were being adequately kept. The inspector observed that there was considerable variation in the way the change request forms were being filled out. The inspector found that specific documents needing to be updated as a result of the proposed changes were not always listed on the Change Control Form as specified on the form. Other times, certain selections on the form would indicate the initiator to check "yes" or "no", but would be left blank. The inspector also reviewed the close-out of projects that had been authorized for start-up and operation. The inspector found that the actual updating of documentation (particularly as-built drawings) sometimes was delayed over a year after start-up of the changed equipment. The inspector observed that the licensee's configuration control procedure allowed for system start-up before completion of revised documentation and gave no time frame for completing documentation revisions. In the interim, marked-up or red-line drawings could be used for process documentation. The licensee indicated that drafting services were being expedited to reduce the backlog of as-built drawing revisions. 11/17/2000

- 263 Revisions to safety requirements for storage of waste drums were not posted in a timely manner. IR 00-06

**** NEGATIVE FINDING** The inspector observed the storage of licensed material throughout the facility. The inspector observed that waste drums were being stored in arrays and racks in the southwest expansion area of the facility. The inspector observed three different criticality safety postings in the area, each with differing (and sometimes conflicting) requirements for the same storage containers. The inspector discussed the inconsistencies with the area safety engineer and found that the postings had been recently revised to accommodate storage of containers moved from the southeast expansion area to make space for the BAES project (see Section 2.a). However, the licensee had not completed replacing the postings prior to relocating the containers. The inspector found that the containers were being stored in accordance with the revised posting. The licensee completed replacing the postings before the end of this inspection.

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS 11/17/2000

- 267 Corrective actions to Violation 00-02-02 were not completed by the date committed to NRC. IR 00-06, VIO 00-02-02

**** NEGATIVE FINDING** The inspector reviewed the licensee's actions in response to violation (VIO) 00-02-02 concerning inadequate configuration management of uranyl nitrate piping system. In a letter dated May 25, 2000, the licensee had committed to completing certain corrective actions by June 30, 2000 in response to the violation. However, the inspector found that the corrective actions had not been completed as committed. The licensee indicated that upon further study, the original corrective actions were not feasible and the response to the violation would be revised. The revised response was received by the inspector on December 6, 2000, with a revised completion date of December 31, 2000. Thus VIO 00-02-02 remained open. 11/17/2000

MANAGEMENT EXPECTATIONS NOT ENFORCED

- 269 The bottom nozzle holddown assemblies for the MCC-5 shipping containers were found to not have been fabricated by a qualified vendor as required by the licensee's QA program.

ADAMS ML003780786

**** LICENSEE EVENT REPORTS** The bottom nozzle holddown assembly is used exclusively with the MCC-5 shipping container, to help secure the VVER- 1000 fuel assembly in the container. Neither the MCC-3 or MCC-4 containers are involved.

All bottom nozzle holddown assemblies for these containers were fabricated by the same supplier in 1995. Fabrication records indicate that the assemblies were correctly manufactured in accordance with requirements for safety-related items. Westinghouse Product Assurance verified that the assemblies were manufactured in strict accordance to drawings and specifications. The criteria for Category A safety-related items and Category B safety-related items are essentially the same, a primary difference being that it is not necessary that Category B items be manufactured by a qualified supplier. 11/28/2000

ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON

- 270 The bottom nozzle holddown assembly for the NCC-5 shipping containers was found to not be included on the MCCL501 series License Drawing. (Configuration Control Problem)

ADAMS ML003780786

**** LICENSEE EVENT REPORTS** In the process of investigating why the Category A safety-related item was not manufactured by a qualified supplier, it was discovered that the bottom nozzle holddown assembly was not identified on the MCCL501 series License drawing as a safety-related item. The holddown assemblies were fabricated several years after the containers were made and it is believed that failure to add them to the License drawing was merely an administrative oversight. The holddown assembly is correctly identified in the specifications and the equipment drawing as safety-related.

UNKNOWN 11/28/2000

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS

- 271 A violation was identified for the licensee's failure to complete corrective actions from the 1998 vaporizer level probe event and for the failure to conduct an adequate root cause analysis of the 2000 vaporizer level probe event. IR 00-204

**** NOTICE OF VIOLATION** The licensee removes UF6 from cylinders by heating the cylinders with steam in one of three vaporizers. The vaporizer has a space between the cylinder and the vaporizer inner wall that is large enough to be a criticality concern if steam condensate accumulates and is subsequently mixed with released UF6 from the cylinder. Control of condensate through drainage is assured by a level probe which is in a pot connected by a separate and smaller drain line from the vaporizer. On October 18, 2000, the line to the level probe became blocked by paint from a cylinder so that the probe could not read the condensate level thereby compromising the NCS control even though the primary vaporizer condensate drain still worked. The event was reported to the NRC in accordance with licensee commitments under NRC Bulletin 91-01.

The licensee investigated the vaporizer event and determined that it was similar to an event that occurred in July of 1998 when paint from a UF6 cylinder blocked the drain to the level probe well. Due to the similarity to the 1998 event, the licensee elected not to perform a complete root cause analysis. Instead, the licensee reviewed the conclusions of the previous root cause analysis and determined that completion of previously suggested corrective actions would be sufficient. The inspector reviewed the licensee's incident investigation reports for both the 2000 event and the 1998 event and determined that both events occurred in the same vaporizer which is one of three vaporizers that the licensee uses to feed the Ammonium Di-urate (ADU) conversion process. Subsequent to the 1998 event, the licensee's root cause analysis recommended and the Incident Review Committee approved, the corrective action of design and installation of modified screens in the vaporizer to prevent paint chips from blocking the level probe line and this corrective action was eventually combined with an earlier initiative to install a spacer to reduce the vaporizer volume. The licensee did not impose any interim compensatory measures on vaporizer operations subsequent to the 1998 event.

The inspector determined that the corrective actions for the 1998 event had never been completed. The licensee indicated that the incomplete corrective actions were repeatedly deferred due to competing demands. The inspector determined that there was no immediate safety concern because the licensee had imposed two interim compensatory measures subsequent to

the 2000 event to assure criticality safety. The interim compensatory measures were to conduct special inspections of UF6 cylinders to detect suspect paint prior to placing them into the vaporizers and reducing the vaporizer blow-down interval from once per shift to once every two hours to assure that condensate could not accumulate in an amount posing a criticality safety hazard. The licensee committed to assign a higher priority to the screen and spacer installation corrective actions to ensure timely completion. The inspector determined that failure to complete the assigned corrective action did not comply with license section 3.7 or licensee procedure RA-111. Failure to complete a corrective action identified by a root cause evaluation of a 1998 event and approved by the Incident Review Committee is an example of Violation (VIO) 70-1151/2000-204-01. The inspector noted that the licensee's investigation report for the October 2000 event consisted of a one and one-half page memorandum which was inserted into the front of the data pack for the 1998 event. The inspector observed that the brief investigation report had failed to recognize that the corrective actions from the first event had not been completed and, therefore, did not recommend their completion. The inspector also questioned the fact that the 2000 event had occurred in the same vaporizer as the 1998 event which might not necessarily be a coincidence. Discussion with licensee staff indicated that the repeat failure of the same level probe was reviewed by attempting to find any difference between the subject vaporizer and the other vaporizers. The licensee found no difference between any of the vaporizers and level pots and determined the multiple failure in the same piece of equipment to be a coincidence but did not discuss the evaluation in the memorandum. The inspector noted that this was an aspect of the event that could not have been covered by the previous root cause analysis and therefore should have been documented. The inspector determined that the licensee had not made an adequate specific cause determination and promptly identify that corrective actions from a previous event in the same vaporizer were not yet complete. As a result of the inadequate specific cause determination, the licensee failed to present adequate results to the committee for approval in accordance with license section 3.7 or licensee procedure RA-111. The failure to make an adequate specific cause determination, promptly identify that corrective actions from a previous event in the same vaporizer were not yet complete, and present adequate results to the committee for approval is a second example of VIO 70-1151/2000-204-01.

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS
12/08/2000
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 272 The licensee's identification, resolution, and correction of safety related problems failed to prevent recurrence of a risk significant event. *IR 00-204*

**** WEAKNESS** The inspector observed that the licensee does not have a uniform method for developing, assigning, and tracking corrective actions. The inspector determined that corrective actions are assigned in accordance with licensee procedure RA-111 to a manager or supervisor who is then responsible for identifying what corrective actions are required, assigning the actions to staff, and seeing that actions are completed. The informality of the licensee's corrective action system and the assignment of corrective actions by a lower level manager or supervisor is a weakness in the licensee's program which contributed to the preceding violations. The licensee acknowledged this concern and indicated that the concern would be reviewed with respect to implementation of a new and more robust commitment tracking system. The licensee's actions to clarify corrective action responsibilities and implement a new and more robust commitment tracking system will be tracked as Inspection Follow-up Item (IFI) 70-1151/2000-204-02.

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS
12/08/2000
MANAGEMENT EXPECTATIONS NOT ENFORCED

- 276 The licensee's configuration management program was adequate. The licensee committed to strengthen the change control program which is required by a license commitment for controlling design changes. *IR 00-204*

**** NEUTRAL** Section 3.1 of the license requires that the licensee assure that design changes do not affect the safety and health of workers and the public or the environment. In the case of proposed changes to equipment and equipment arrangement, the licensee has a procedure, TA-500 Configuration Control, requiring compliance with a rigid process that assures comprehensive review of the changes prior to their implementation. The inspector reviewed a sample change package with the responsible project engineer and determined that all requirements were adequately implemented.

During plant walkdowns, the inspector questioned licensee staff members and operators regarding potential changes. Licensee staff uniformly indicated that equipment changes, even minor changes, could only be accomplished subsequent to a thorough review. The inspector determined that the existing licensee configuration control program was effectively implemented to assure safety related to configuration of equipment and equipment arrangement.
12/08/2000

- 295 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. *IR 01-03*

**** WEAKNESS** 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.

PROCEDURES NOT COMPLETE OR ACCURATE 05/18/2001

- 305 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.

IR 01-03

**** POSITIVE FINDING** The inspector reviewed documentation to show that issues were tracked via a plant-wide system known 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.

05/11/2001

- 306 The licensee is conducting appropriate ISAs for all high risk plant areas and processes. The ISAs are being maintained and revalidated on an appropriate frequency. *IR 01-201*

**** POSITIVE FINDING** A total of six (6) ISAs have been completed: (1) Ventilation, (2) Uranyl Nitrate (UN) Bulk Storage, (3) Ammonium Diuranate (ADU) Conversion, (4) Uranium Recovery Recycling Systems (URRS) Safe Geometry Dissolver, (5) ADU Bulk Blending, and (6) Bulk Chemical Storage, Receipt, and Handling. Discussions with the licensee staff confirmed that the ISAs were maintained through the plant configuration control (Management of Change) process and a re-validation process is performed for each ISA on a five-year frequency. The remaining ISAs are scheduled to be completed before the date required by the new Part 70.

The inspector examined "Columbia Manufacturing Plant Configuration Control," procedure TA-500, Revision 10, dated September 10, 1998, including forms RAF-104-2, "Action Item Summary," and RAF-104-7, "Design Verification Checklist," to ensure that the management of change program is sufficient to evaluate any not-in-kind changes that can affect the risk-significant operations with highly hazardous chemicals at the facility.

Because the Management of Change (configuration management) process represents the primary management control for maintaining the ISA, the inspector reviewed and evaluated the documentation for two high consequence items: engineering packages for planned upgrades to the Hydrogen Fluoride (HF) storage tank area (docket 01-004) and Nitric Acid storage tank area (docket 01-005). A concern was noted because the bulk chemical ISA was not identified on the HF upgrade package. The licensee immediately corrected this omission, and reviewed other recent packages to verify that others had not been overlooked.

The inspector reviewed a number of configuration management packages in other plant areas:

- Install a bypass filter at pellet grinder for test only (docket 00-41)
- UF6 line leak check engineered control (software change) (docket 00-065)
- Modify ADU line 5 for UF6 gas (docket 00-101)
- Hydrolysis column pressure interlock (docket 00-158)
- Upgrade Safety Significant powder level switches (docket 00-194)

It was noted that although the ISA for the pellet area has not been completed, the configuration management

package will carry references to the changes to be included therein.

The licensee explained the flow of information from the Area sketches, which identify the Passive Controls, Automatic Engineered Controls (AECs), and Administrative Controls (ADM).

04/06/2001

- 307 Controls necessary to limit risks to an acceptable level were in place. The licensee's SSC development and verification is characterized as a program strength. The material conditions of safety significant control are adequate. *IR 01-201*

**** POSITIVE FINDING** A "vertical slice" of passive and active safety-significant controls and management measures applied to high-risk operations in bulk chemical receipt, handling and storage, and the Conversion Process were selected for review from Chemical Operating Procedure Sketch 836038-1, Rev. 8, dated March 29, 2001. The inspector noted that each "sketch" of SSCs clearly identified the safeguards (e.g., controls) for all "important" (level B) and "safety margin improvement systems" (level C) levels of risks. There were no "crucial" (level A) SSCs listed. Other SSCs were reviewed in the Low Level Radioactive Waste (LLRW) area, draft sketch dated April 4, 2001. Once they are developed, the licensee maintains the "sketches" as current through the configuration control program.

The licensee stated that safety-significant interlocks are tested and verified to ensure that the hardware and software associated with automatic engineered controls function as described. Training is conducted for area personnel to ensure that they understand the operation of the safety significant equipment.

The inspector conducted system walkdowns of the highest risk areas: Hydrofluoric Acid (HF) storage tank(s), Anhydrous Ammonia tanks, Aqueous Ammonia tanks, and Nitric Acid storage tank and pump, including the newly-constructed Nitric Acid storage and pumping system.

04/06/2001

- 311 The licensee has established a program to prioritize, analyze, and track potential safety and safeguards-significant issues. However, the licensee has not demonstrated the effectiveness of the program. Therefore, VIO-2000-204-01 and IFI-2000-204-02 will remain open. *IR 01-201*

**** NEUTRAL** The licensee began the plantwide implementation of the Corrective Actions Program (CAPs) on April 1, 2001. CAPs is currently available online to limited employees who have access to a computer. CAPs will replace the licensee's existing Commitment Tracking System (CTS) and the licensee does not plan to include legacy issues in CAPs. The program encourages employees to identify issues and concerns and enter them into CAPs. The CAPs process includes the following steps: (1) issue prioritization based on significance level; (2) weekly review of issues; (3) assigning issue owners; (4) apparent or root cause analysis and identification of corrective actions; and (5) implementation of corrective actions. The inspector determined that satisfactory implementation of CAPs should address the concerns raised by VIO-2000-204-01 and IFI-2000-204-02 regarding the timeliness of completing corrective actions and a robust commitment tracking system.

The licensee discussed the current status of the CTS and backlog. There is one overdue item, which has a very low safety significance. The licensee has included this in an upgrade project for the solvent extraction area.

The inspector reviewed 2 event "data packs," including RAF-111-1, for an incident wherein a change was made to procedure COP-831019, adding HEPA filters to the filter disassembly process without undergoing a review by a criticality safety engineer. Appropriate root causes were listed in the data pack. The inspector verified that 3 of the 4 root causes had been addressed with proper corrective actions, and that the licensee

04/06/2001

- 313 The changes to the shipping and transportation organization enhanced the program in that managers, technical, and engineering staff were not assigned collateral duties in other departments. The managers met the minimum education and experience requirements specified in the license application. *IR 01-05*

**** POSITIVE FINDING** The inspector discussed with the licensee the organizational changes and changes in personnel responsibilities and functions that occurred since the last inspection of the shipping and transportation program. The organizational structure changed in November 2000. The new organization included engineers and technical staff that no longer had collateral duties in other departments. The licensing and logistical function, which included nuclear criticality safety and container design management, of the shipping program

reported directly to the Nuclear Fuel Transport Manager of British Nuclear Fuels Limited (BNFL). The Nuclear Fuel Transport Manager for Columbia Operations also reported to the BNFL Nuclear Fuel Transport Manager. Shipping, receiving, hazardous materials, and container engineering reported to the Nuclear Fuel Transport Manager for Columbia Operations. At present, the BNFL Nuclear Fuel Transport Manager reported directly to the Vice President (VP) of European Fuel and indirectly to the VP of US Manufacturing.

The solid waste management function reported directly to the Chemical Process Engineering Manager, who in turn reported to the Technical Services Manager.

Although the shipping and transportation functions were not specifically detailed in Chapter 2, Management Organization, of the license application, the managers met the minimum education and experience requirements specified in the license application. 06/07/2001

- 314 Internal Audits that pertained to shipping and transportation were acceptable and there was a system in place for tracking corrective actions to completion. IR 01-05
06/07/2001

- 315 The quality assurance program did not ensure that licensee audits would focus on compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 61.56
IR 01-05

**** NEGATIVE FINDING** The inspector reviewed internal audit WEC-01-02, dated March 2001 and two low level radioactive waste (LLRW) audits conducted in 1999 and 2000. The LLRW audit addressed waste generation, segregation, decontamination, sorting, packaging, surveying, labeling, shipping, and record keeping. The inspector discussed with the licensee the need for the Westinghouse Quality Assurance (QA) program to ensure compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 61.56. The nature and scope of the QA program will vary depending on the changes and complexity of the waste stream. The licensee acknowledged the inspector's comments and indicated that this area would be focused on during subsequent audits. 06/07/2001

MANAGEMENT EXPECTATIONS NOT ESTABLISHED

- 316 Management approved procedures were acceptable to ensure that the MCC fuel shipping packages would be properly loaded in accordance with the NRC Certificate of Compliance (CoC).
IR 01-05f

**** POSITIVE FINDING** The inspector verified that the licensee had procedures for the preparation of shipping packages and delivery of the model MCC packages to the carrier for the shipment of unirradiated fuel assemblies. The inspector reviewed selected portions of the following procedures:

Maintenance Operating Procedure (MOP) -730703, Prepare Container for Loading Fuel Assemblies, Rev. 29, dated May 17, 2001

MOP-730713, Load Fuel Assembly into Model MCC Shipping Containers, Rev. 63, dated May 17, 2001

The procedures incorporated check-off lists to ensure certain loading operations were performed in the appropriate sequence and in accordance with the Certificate of Compliance (CoC).
06/07/2001

- 324 The independent audit did not provide a candid assessment of the maintenance of key programmatic areas of the emergency preparedness program and management committed to take corrective action.
IR 01-06

**** NEGATIVE FINDING** The independent audit report had not been issued. The inspector conducted a telephonic interview with the audit team leader regarding the independent audit. Based on interviews, the annual independent audit was not done in calendar year 2000, but met the licensee's definition for annual as defined in Section 1.4 of the license application in that the audit was conducted (February 19-20, 2001) within 15 months from the previous audit (December 1999). Based on interviews and issues identified in this report (e.g., periodic review and updating of plan/procedures, emergency brigade training, and outdated control documents), the inspector determined that the independent audit lacked appropriate depth and did not provide a candid assessment regarding the status of emergency preparedness. The licensee was informed that this was an area requiring corrective actions to demonstrate an effective program was in place for the identification of problems to ensure the appropriate level of preparedness was being maintained. In response to the inspector's comments, the licensee discussed during the exit meeting as corrective actions to explore the execution of a long term contract with a reputable audit group. The licensee's corrective actions for the independent audit are being

tracked as an inspector follow up item (IFI 70-1151/2001-06-02).

- 325 Four examples were found where control documents were not maintained current and up-to-date. A formal procedure delineating the responsibility and required actions governing the formal review and approval of changes to the SEP and Emergency Procedures (EPs) did not exist.
IR 01-06

**** NEGATIVE FINDING** No procedure changes were made since the last inspection. The licensee discussed during the inspection intentions to completely rewrite the procedures after Plan changes were approved. Control copies of procedures were checked at several different locations and four examples were noted where a procedure may have been revised, but had not been replaced. The licensee took immediate action to replace any superceded copy with the current version. Regarding the administrative system for the review and approval of changes to the SEP and EPs, the inspector was informed that a procedure delineating responsibility and required actions governing the formal review and approval of the SEP and EP's did not exist. The licensee acknowledged the need for such procedure and committed to the development and implementation of a procedure governing the review and approval of changes to the SEP and EPs. 07/13/2001

**PROCEDURES NOT ESTABLISHED
INADEQUATE TASK CONTROL**

- 333 The licensee's root cause investigation report was of good quality and detailed. The implemented corrective actions were thorough and on target.
IR 01-08

**** POSITIVE FINDING** The root cause report described the methodology, root causes, provided recommendations, time lines, and causal factors. The inspectors' analysis of the root cause report indicated that it was of good quality and detailed. The corrective actions were thorough and on target. At the conclusion of this inspection, approximately 82% of the 33 corrective actions were completed. The remainder of the corrective actions were scheduled to be completed by the end of September or October 2001. The licensee determined the root cause to be that the inner container was not removed from the outer container when the shipment was received and unpacked. The licensee identified several causal factors, including not identifying the presence of the inner container when the spacer was put back into the outer container, contractor personnel hurrying to complete the job, and documentation of inconsistent data that indicated that the inner container had been processed. The inspectors determined that a management structure that has clear responsibility for SNM receipt and independence from possible production conflicts would have provided assurance that material control and accounting (MC&A) functions are appropriately implemented. Through interviews and document review, the inspectors determined that contractor staff, not Westinghouse personnel, performed actual job assignments and provided supervisory oversight related to the activities associated with this event. During discussions with Westinghouse staff, they explained that contractor staff had been used because they thought the receipt of UNH crystals would not be a long-term activity and that also contractor staff were more readily available to staff these job responsibilities. The inspectors noted in the licensee's apparent cause analysis report that factors that contributed to this event included contractor personnel hurrying to complete the job and that an employee apparently falsified entries on a weight verification checklist and a contamination smear document. Based on the comments listed in the apparent cause analysis report, the inspectors expressed concern that contractor personnel, not under the direct control of licensee supervision, were involved in the receipt of SNM. After these discussions, licensee management decided to implement a plan, that had been under consideration, that will result in SNM receipts being performed and supervised by Westinghouse personnel.

Since appropriately conducted training would provide assurance that personnel were aware of their safeguards duties, the inspectors reviewed training for personnel assigned to this SNM receipt area. The inspectors determined that documentation existed that indicated that contractor personnel in the area had reviewed and discussed the procedures that controlled their job duties. However, the inspectors noted that contractor staff had documented this activity in paper records instead of the on-line system used by Westinghouse personnel. Contractor and Westinghouse management had already noted this difference and were re-instructing personnel in procedural requirements and requiring procedural sign-offs in the on-line Westinghouse system.

The inspectors also reviewed revisions to the Chemical Operating Procedure (COP) 836041, "Receipt and Initial Processing of Uranium Shipments From Outside Sources," Revision 7, September 6, 2001. Westinghouse and contractor management toured the receipt area with the inspectors and walked through the normal SNM receipt process. The inspectors noted that scales used to weigh UNH crystal material appeared to be in working order and were currently calibrated. The inspectors also observed area personnel transferring UNH crystal material from the three gallon shipping containers to polypacks. During discussions with area personnel they indicated that they had been encouraged to develop a questioning attitude and felt empowered to not perform assigned duties until future discrepancies had been resolved. No additional issues were noted.
09/13/2001

- 343 The licensee's operating procedures provided adequate guidance to workers for the safe operation of the erbia process. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's procedures for operating the erbia/uranium powder blending process. The inspectors found that the procedures described steps for the system operators to take during normal operations, but found several occasions where the operating procedures did not inform operators of what to do if the system did not respond as expected. The inspectors also found some instances where specific details that were needed to ensure the safe operation of the process had been omitted from the procedures. The licensee adequately corrected these procedural deficiencies prior to the end of the inspection. 10/12/2001

- 344 The licensee's process support procedures adequately covered the steps to take during off-normal conditions or loss of utilities. However, the procedures for sampling recycled material from the erbia process for moisture was not consistent with the licensee's safety analyses. The inspectors informed the licensee that prior to introducing uranium recycle material generated from the erbia process to the blender, this discrepancy must be corrected. *IR 01-07*

**** NEGATIVE FINDING** The inspectors reviewed the licensee's general support procedures for the erbia process operations. This included procedures for safety significant laboratory analyses, operation of utility systems, and performing functional verifications of safety controls. The inspectors also reviewed procedures for the operation of nearby equipment that used flammable gases. The inspectors found that the procedures for utilities adequately covered the steps to take during off-normal conditions or loss of utilities. The inspectors found that the procedures for performing functional verifications of safety provided adequate instructions for testing the functionality of safety controls, and that all engineered safety controls identified in the licensee's safety analyses were covered by the procedures. The inspectors observed portions of the functional tests being performed and found them to be well planned and adequate to verify the functionality of the safety controls.

Since moderation control in the unfavorable geometry blender was the sole method for ensuring criticality safety of the blender, the inspectors reviewed the procedures for sampling and analyzing materials added to the blender. This included procedures for sampling recycled uranium oxide powder from the erbia process that did not previously meet specification. The inspectors found that the procedures for sampling this recycled material was not consistent with the licensee's safety analyses. The inspectors found that the ISA used to approve the license amendment required that all powder added to the blender be confirmed to be less than a prescribed moisture limit by two independent laboratory analyses. However, the sampling procedures involved performing composite sampling of multiple containers of recycle material for the first analysis, and randomly sampling a small number of these containers for the second moisture overcheck analyses. The inspectors pointed out that these sampling methods were not adequate to confirm that all powder added to the blender was less than the moisture limit. The inspectors discussed the situation with the NRC license reviewer and subsequently informed the licensee that prior to introducing uranium recycle material generated from the erbia process to the blender, this discrepancy must be corrected. This would involve either changing the sampling procedure to match the safety analysis or revising the safety analysis and obtaining approval of the revision from the NRC licensing function. The licensee stated that the erbia blending process would have to be operated a considerable time before it generated enough recycle material to add back to the process. Thus, the correction of this discrepancy did not affect the initial start-up of the blending process. 10/12/2001

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INCOMPLETE SAFETY BASIS

- 346 The digital control system was adequate to maintain the functionality of safety systems and enhanced the operator's access to safety-significant process information. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's use of digital control systems for implementing process and safety controls throughout the erbia process. The inspectors observed that the digital controls for the erbia process were a significant improvement over the control systems used in other areas of the facility. The inspectors observed that a graphical display of operating parameters was available to operators at nearly every process station. Process alarms were easily identifiable and many safety alarms annunciated both at the station and in the facility's central control room. The inspectors also observed that separate watchdog timers monitored the system for fault conditions to identify potential problems in the digital control system. The inspectors also reviewed the digital control system qualification report that described the methods used to functionally verify the functionality of the control system. The inspectors observed some of the qualification tests being performed on the digital control system and found them to be properly coordinated and well planned. The inspectors found the licensee's digital control system, and methods for its functional verification, to be adequate to maintain the functionality of safety systems and enhanced operator access to safety-significant process information. 10/12/2001

- 350 The licensee's management was premature in arranging for the original readiness review inspection as evidenced by the unfinished condition of the process construction and management support structure. *IR 01-07*

**** NEGATIVE FINDING** Although the inspectors ultimately found the licensee's programs adequate for start-up of the erbia process, the licensee was not adequately prepared when they originally made arrangements for this readiness review inspection. During the first portion of the inspection (September 17-20, 2001), much of the preparations for start-up of the erbia process was unfinished. For example, most of the procedures were found to be incomplete and still in the licensee's review and approval process. Some of the process equipment, including engineered safety controls, were still being installed. Functional verifications of the operability of safety controls had not begun. Operating staff had not yet been chosen, and thus training had not been started. All of these items had been adequately completed by the conclusion of the inspection October 10-12, 2001. However, licensee management was premature in arranging for the original readiness review inspection. 10/12/2001

8 pgs withheld
in entirety

Ex. 2

Ex.
2

III. Radiological Controls

A. Radiation Protection

- 195 On February 7, 2000, a spill of uranyl nitrate solution occurred in the UF6 bay near the HF Spiking Station. The solution seeped through a wall around piping penetrations and onto an outdoor concrete pad. Initial surveys of the pad showed contamination levels below reportable limits. However, a layer of soil was removed from the top of the pad during the cleanup operation, and subsequent surveys on 2/25/00 revealed a more significant amount of contamination in the concrete. Contamination levels averaged 133 dpm/100 cm² alpha removable and 6,000 dpm/100 cm² fixed alpha in the concrete. The licensee determined that the fixed contamination was reportable per 10 CFR 70.50(b)(1). EN #36727 & IR 00-02

**** LICENSEE EVENT REPORTS**

EQUIPMENT FAILURE DUE TO AGING 02/25/2000
INADEQUATE CONSTRUCTION

- 209 Instrumentation was needed to warn workers of potential airborne activity due to excessive ventilation in process glove boxes. IR 00-02

**** NEGATIVE FINDING** The inspector reviewed the operation of the uranium recovery dissolver system. This system had been involved in three recent work restrictions due to high airborne radioactivity. The inspector reviewed the licensee's investigation of the high airborne activity and concluded that the cause was excessive ventilation on the three glove boxes used to introduce scrap materials to the dissolvers. Excessive ventilation can cause turbulence in the air flow through glove boxes that lowers the system's effectiveness. The inspector found that the excessive ventilation occurred for several days after modifications had been made to the ventilation system serving that area of the plant. The inspector observed that the glove boxes each had instrumentation that would indicate when there was too little ventilation, but not when there was too much ventilation. The inspector determined that instrumentation showing when excessive ventilation was present on the glove boxes could have alerted operators to the situation, minimized the airborne activity, and prevented the work restrictions. The installation of such instrumentation would be consistent with the As Low As Reasonably Achievable (ALARA) concept and will be tracked as Inspector Follow-up Item (IFI) 00-02-01. 03/31/2000

INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 210 The uranyl nitrate piping system was not adequately being maintained per the plant configuration control program and was identified as Violation (VIO) 00-02-02. IR 00-02

**** NOTICE OF VIOLATION** The inspector reviewed the licensee's procedure for configuration control in the manufacturing plant. The inspector observed various areas of the licensee's uranyl nitrate piping system, including the area involved in a recent contamination event (see Section 2.c). The licensee indicated that the contamination event was due to the failure of a piece of threaded pipe on a uranyl nitrate sample port. The inspector reviewed the drawing referenced by the system's Integrated Safety Assessment (ISA) and noted that the drawing was last updated in April 1998. The drawing indicated a piping specification of welded construction, with the provision that threaded connections could be used when adequate work space was not available for welding, or when adapting to threaded instrumentation or equipment. Neither of these provisions applied to the failed piping that led to the contamination event. The inspector also found that drawing included a piping manifold with six valves that had been removed from the manufacturing area without being reviewed and

approved through the configuration control program. Although the removed valves were no longer being used, this rendered the process information referenced by the ISA inaccurate. The inspector also observed the uranyl nitrate piping in several other areas of the plant and found places where threaded fittings had been used instead of the specified welded fittings. All of these findings are examples of failure to maintain safety-related operations per the plant configuration management program and are identified as Violation (VIO) 00-02-02.

MANAGEMENT EXPECTATIONS NOT ENFORCED 03/31/2000
EQUIPMENT FAILURE DUE TO ENVIRONMENTAL
FACTORS (E.G., CHEM, THERM, MECHAN)
INADEQUATE CONSTRUCTION
IMPROPER EQUIPMENT DESIGN OR SELECTION

- 211 The licensee's reaction to the uranyl nitrate spill appropriately addressed existing outdoor areas of contamination on and adjacent to the chemical process building. IR 00-02

**** POSITIVE FINDING** The inspector observed the area where the spill occurred and the pathway for contamination to reach the outdoor concrete pad. The uranyl nitrate piping ran from a set of bulk storage tanks, passed over a concrete pad in a non-controlled area, entered the process building at below the floor level, turned upward and penetrated through the floor to the indoor process area. The uranyl nitrate had been spilled inside the indoor process area, seeped through the floor around the pipe penetrations, and flowed out of the building onto the concrete pad. Although the contamination reached the outdoor area, the inspector observed that piping and equipment created obstacles such that the outdoor contaminated area was not easily accessible to workers. The inspector observed that the area had been thoroughly cleaned, but some fixed contamination remained in isolated spots. It was not clear whether these isolated areas of fixed contamination were due to the reported event, or due to previous small leaks. The licensee continued to investigate options for either removing or sealing the contaminated concrete. The licensee recognized that any remaining fixed contamination was required to be addressed in the facility decommissioning plan. 03/31/2000

- 227 A violation of Section 3.4.1 of the License Application occurred for the failure to conduct radioactive materials package unloading activities in accordance with the requirements of chemical operating procedure COP-836041. The licensee's root cause determination and corrective actions to prevent recurrence were acceptable. IR 00-03

**** NOTICE OF VIOLATION** On May 2, 2000, the inspector observed the licensee perform incoming receipt surveys of 71 drums containing UNH crystals. The UNH crystals were received from the BWXT facility located in Lynchburg, VA on May 1, 2000, at approximately 10:45 p.m. Upon receipt, the licensee performed both direct radiation surveys and surface contamination surveys of the transport trailer containing the 71 drums of UNH crystals. The trailer was secured with a tamper safe seal which was not removed until May 2 at approximately 1:00 p.m. when the licensee began to perform individual surveys of the 71 drums containing the UNH crystals. The inspector observed the licensee perform direct surveys for alpha and beta/gamma radiation and surveys for removable surface contamination of five drums in accordance with regulatory operations procedure ROP-02-008, Surveys of Incoming Shipment of Radioactive Materials, Rev. 7, dated March 2, 2000. The licensee used appropriate instrumentation and survey techniques. Sufficient smears and measurements were taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. From a review of the records, none of the receipt survey results indicated that the limits specified in 49 CFR 173.441 or 173.443 were exceeded.

On May 3, 2000, the inspector observed licensee operators perform the opening of the package and removal of the UNH crystals from the inner packaging. This process was controlled by chemical operating procedure COP-836041, Receipt of Uranium Scrap Shipments from Outside Sources, Rev. 1, dated February 22, 2000. The inspector noted that an operator did not follow step 8 of COP-836041, which required placing the pail of UNH crystals on a clean piece of paper inside the UNH crystal enclosure hood. The purpose of placing the material inside the hood was to reduce the potential airborne radioactivity concentrations in the work area and contamination control. Instead, the operator opened the pail on the floor outside of the UNH crystal enclosure hood, removed the opened plastic bag of UNH crystals, and then placed the opened plastic bag of UNH crystals in the enclosure. The inspector noted that the COP-836041 was not available at the job location. Upon discovery of the procedural violation, a licensee representative immediately notified the area supervisor who temporarily ceased operations until corrective actions could be implemented. During the licensee's review, it appeared that not all of the operators were aware of Step 8 requirements.

After a review of the problem, the licensee determined that the primary root cause was that the processing of incoming scrap material was not a continuous operation. The operation was performed as the material was received. The receipt of this material had been discontinued for several weeks due to the plant being shutdown for maintenance and inventory. Although the operator initially reviewed the chemical operating procedure, the operator did not review the procedure after the several weeks of not performing the operation. Part of the corrective action taken was counseling the operator about his actions and the necessity of following the procedures. In addition, all of the URRS operators were retrained on the procedure and on the importance of following all procedures. A secondary cause was the procedure had some sections which could be confusing.

To prevent recurrence, the licensee had initiated the revision of COP-836041 so that the requirements for opening the packages were delineated in a clearer manner. All procedures are currently being revised by an outside professional procedure writing group. This procedure has been given a priority status for revision. The inspector determined that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence was adequately addressed. The inspector discussed the event with licensee representatives, and indicated that a violation of Section 3.4.1 of the License Application occurred (VIO: 70-1151/00-03-01: Failure to conduct radioactive materials package unloading activities in accordance with the requirements of COP-836041). 05/04/2000

**ERROR BY KNOWLEDGEABLE PERSON ON FIRST WORKING DAY AFTER TIME OFF
CONFUSING OR OVERLY COMPLEX PROCEDURES**

- 237 With the exception of the reduction in the maximally assigned extremity exposure, exposures increased from 1998 to 1999. As of June 2000, the maximum estimated committed effective dose equivalent (CEDE) assigned (2.85 rem) exceeds the maximum assigned annual CEDE dose for 1999. The anticipated increase in material throughput to meet production demands poses significant challenges to controlling the airborne exposure as evidenced by the increases noted in CY 99 and the trend thus far in CY 2000.

IR 00-04

**** NEGATIVE FINDING** Based on procedural reviews, and interviews with plant personnel observed inside radiation control areas, the licensee's monitoring program was consistent with requirements in 10 CFR Part 20.

Procedures contained administrative action limits, and ALARA dose goals were established to maintain exposures less than limits in 10 CFR 20. Exposure results for CY 99 were reviewed and compared with CY 98, and results thus far in CY 2000. With the exception of the reduction in the maximally assigned extremity exposure (approximately 52 percent), the results (see Table 1) disclosed an increase of approximately 48 percent in the site collective exposure from CY 98 to CY 99; eleven (11) percent increase in the maximally assigned total effective dose equivalent (TEDE); and the Deep Dose Equivalent (DDE) for CY 99 increased approximately one percent over CY 98. Based on air sampling data, first quarter thermoluminescent dosimeter (TLD) results, and estimated TLD results for second quarter, exposure results as of June 2000 were trending higher than CY 99 as evidenced by the maximally assigned TEDE for CY 2000 exceeding the maximally assigned for CY 99 after only six months. The licensee attributed the exposure increases to material throughput increases (approximately 15 percent increase from CY 98 to 99); major maintenance and upgrade projects inside the chemical area; unusual incidents involving airborne releases; and overtime work on weekends to meet production demands. Exposures were frequently reviewed to determine if administrative limits were met so that appropriate actions were taken to preclude exceeding limits in 10 CFR Part 20. During CY 99, no worker exceeded the licensee's administrative limit (4 rem). Although, based on estimates for CY 2000, four workers were projected to exceed the administrative limits prior to the end of CY. The licensee was effectively tracking and trending occupational exposures as evidenced by the recent transfer of a worker from conversion and pellets to a low potential exposure area. The maximum assigned CEDE for CY 99 was 2.69 rem, an approximately eight percent increase from CY 98, and was assigned to an uranium pellet worker. Thus far in CY 2000 (as of June) the maximum estimated CEDE was 2.85 rem which exceeded the maximum annual exposure for CY 99. 07/21/2000

- 238 No engineered controls were in place to prevent unauthorized users from donning respirators. The licensee's program for respiratory use was dependent on an honor system rather than strict administrative or physical controls.

IR 00-04

**** NEUTRAL** The inspector interviewed personnel performing maintenance and/or cartridge certification, in addition to respirator users observed in the conversion area, regarding the use of equipment. Interviewees were cognizant of respiratory protection training, medical requirements, and the frequency for completing the training. No problems were noted with respiratory protection certification reviewed for randomly selected individuals assigned to the chemical conversion area. The inspector was informed by the licensee that respirator use increased approximately 16 percent in CY 99 when compared to CY 98. The licensee attributed a large percentage of the use to various projects associated with the air handling system and containment. Based on interviews and observations of maintenance activities in progress, the inspector determined that respirators were being properly maintained and was available for normal and emergency use. Regarding respirator issuance, no engineered controls were in place to prevent unauthorized users from donning respirators. The licensee's program for respiratory use was dependent on an honor system rather than strict administrative or physical controls. Respirator use increased approximately 16 percent from CY 98 to 99. 07/21/2000

- 239 Contamination survey results disclosed where efforts were inadequate to ensure timely and effective decontamination to acceptable levels.

IR 00-04

**** NEGATIVE FINDING** Based on observations of survey personnel and a review of recent survey data, it appeared that the surveys were adequate in the identification of potentially contaminated areas. However, actions to decontaminate areas appeared to be inadequate in that examples were noted where decontamination to acceptable levels required three to seven days. In response to this finding, the licensee indicated that corrective actions would be taken to improve the decontamination efforts. The inspector informed the licensee that the corrective actions to ensure effective and timely decontamination would be tracked as an IFI (IFI 70-1151/2000-04-03).

Recent results from leak testing of radioactive sources were reviewed and no contamination was detected with any of the sources requiring leak test.

INADEQUATE TASK CONTROL 07/21/2000

- 260 The Incinerator Ash Screening Hood was in poor condition and susceptible to producing airborne activity problems. IR 00-06

**** NEGATIVE FINDING** The inspector observed that the Incinerator Ash Screening Hood was in poor condition, with its plexiglas window being held in place with duct tape. A note had been taped to the hood warning operators to keep the box clean because of past problems with airborne activity associated with that station. Although the airborne activity had recently been lowered due to improvements in ventilation, the licensee's management examined the hood, agreed that repairs were needed to the station, and initiated corrective action. 11/17/2000

EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE
INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 300 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.

IR 01-03

**** NEUTRAL** 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.

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.

05/11/2001

- 301 The invivo counting system upgrade enhanced the licensee's capability for isotopic identification in critical organs.

IR 01-03

**** POSITIVE FINDING** 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.

05/11/2001

- 302 A violation was identified for failure to provide two (2) workers with radiological protection training and monitoring for internal exposure.

IR 01-03

**** NOTICE OF VIOLATION** 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. 05/11/2001

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS
INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS

- 303 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.

IR 01-03

**** POSITIVE FINDING** 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.
05/11/2001

- 304 Notification and reporting of exposure data to workers was in accordance with requirements in the license and 10 CFR 19.13.

IR 01-03

**** POSITIVE FINDING** 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.
05/11/2001

- 305 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.

IR 01-03

**** POSITIVE FINDING** The inspector reviewed documentation to show that issues were tracked via a plant-wide system known 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.
05/11/2001

- 319 The Uranyl Nitrate crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The radioactive material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity.

IR 01-05

**** POSITIVE FINDING** On June 6, 2001, the inspector observed the licensee perform incoming receipt surveys of drums containing uranyl nitrate (UNH) crystals received from the Babcock and Wilcox Technology (BWXT) facility located in Lynchburg, Virginia. The inspector also observed that the UNH crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The inspector observed that the material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. The operators were knowledgeable of their procedures. Radiation and contamination surveys were conducted appropriately.
06/07/2001

B Environmental Protection

- 196 The licensee's environmental monitoring program was implemented in accordance with the requirements of License SNM-1107. No significant radiological contamination was observed in environmental media.

IR 00-01

**** POSITIVE FINDING** The inspector reviewed the gross alpha, gross beta, and uranium isotopic results for annual sediment and fish samples and observed that the total uranium activities reported for the fish (0.198 picocuries/gram (Ci/g)) and sediment (1.30 Ci/g) samples were below the licensee action level of 10 Ci/g. In addition, semi-annual soil and vegetation sample analyses indicated that the uranium activity levels were

consistently lower than the licensee's action level of 10 Ci/g for all four sampling locations. The inspector also noted that 1999 gross alpha activities for monthly and quarterly surface water and Congaree River samples were below the licensee's action level of 300 pCi/l. In addition, environmental air station sampling data showed that weekly activity concentrations were consistently less than the licensee's action level of 5.00E-15 microcurie per milliliter ($\mu\text{Ci/ml}$).
02/04/2000

- 197 Technetium activity levels in groundwater monitoring wells (7, 10, 15, and 32) for 1999 had subsided from the levels experienced in 1998. No further down gradient migration of the technetium contaminated groundwater plume was observed.

IR 00-01

**** MISCELLANEOUS** The inspector reviewed the licensee's 1999 quarterly (first three quarters) groundwater sampling results and observed that the gross beta activity levels in monitoring wells 7, 10, 15, 30, and 32 had exceeded the licensee's action level of 50 picocuries per liter (pCi/l) due to a suspected technetium source term originating from the vicinity of the cylinder recertification building (CRB). As noted in a previous inspection, the licensee had performed corrective actions (CRB equipment modifications) in order to eliminate suspected leakage of solutions containing technetium from the CRB. The inspector did note that 1999 gross beta activity levels in wells 7 (571 Ci/l), 10 (109 Ci/l), 15 (244 Ci/l), and 32 (1045 pCi/l) were below the average gross beta values seen in 1998. In addition, per additional groundwater data reviewed for available downgradient groundwater monitoring wells (26 and 3A), the inspector observed that the data did not indicate continued downgradient migration of the technetium contaminated groundwater plume as the beta activity levels were below the licensee action level for the monitored downgradient wells. The inspector also noted that gross alpha and gross beta activity levels in groundwater monitoring well 30 (in the vicinity of the water treatment facilities (WTFs)) had exceeded the licensee action levels of 15 Ci/l (57 Ci/l average alpha) and 50 Ci/l (79 Ci/l average beta) during the first three quarters of 1999. Well 30 has had historical contamination problems as observed in previous inspections due to leakages from the water treatment processing area.
02/04/2000

- 198 Audits performed for the environmental program were sufficient to ensure the quality of the environmental program.

IR 00-01

**** POSITIVE FINDING** The inspector also reviewed the licensee's 1998 annual internal audit of the environmental program and the 1998 biennial audit of vendor analytical laboratories. The inspector observed that these audits were thorough, well documented, and that appropriate technical and quality assurance issues were addressed.
02/04/2000

- 280 Implementation of the environmental monitoring program was in accordance with the requirements of License SNM-1107. No significant radiological contamination was observed in environmental media.

IR 01-02

**** NEUTRAL** The inspector observed that semiannual soil and vegetation sample analyses indicated that the total isotopic uranium activity levels were consistently lower than the licensee's action levels of 10 picocuries/gram (pCi/g) (for soil) and 15 pCi/g (for vegetation) for all four sampling locations. In addition, gross alpha and uranium isotopic results for annual sediment and fish samples were below the licensee action level of 10 pCi/g. The inspector also noted that 2000 gross alpha and gross beta activities for quarterly surface water and Congaree River samples were below the licensee's action levels of 300 picocuries per liter (pCi/l) (alpha) and 600 pCi/l (beta), and environmental air station sampling data consistently showed that weekly activity concentrations were less than the licensee's action level of 5.00E-15 microcurie per milliliter ($\mu\text{Ci/ml}$).
02/16/2001

- 281 Technetium activity levels in groundwater monitoring wells were stabilized. No further significant down-gradient migration of the technetium contaminated groundwater plume was evident.

IR 01-02

**** NEUTRAL** The inspector reviewed the licensee's 2000 quarterly (first three quarters) groundwater sampling results and observed that the average gross beta activity levels for monitoring wells 7, 10, 15, and 32 exceeded the licensee's action level of 50 pCi/l with results of 403, 75, 155, and 1424 pCi/l respectively. Previous inspections (see reports 70-1151/98-01, 99-01, and 2000-01) identified that elevated activity in these wells was due to a technetium source term originating from the vicinity of the cylinder recertification building (CRB). The results from 2000 showed that the activity had stabilized, indicating that the licensee's corrective actions (i.e. sealing of cracks in CRB floor trenches, etc.) had effectively neutralized the technetium source term. In addition, the inspector noted that the average 2000 gross beta activity levels for down-gradient groundwater

monitoring wells 26 and 3A were approximately <2 pCi/l and 28 pCi/l respectively, which was consistent with 1999 data, indicating minimal down-gradient migration of the technetium-99 contaminated groundwater plume. The inspector also noted that average gross alpha and gross beta activity levels in groundwater monitoring well 30 (in the vicinity of the water treatment facilities (WTFs)) had exceeded the licensee action levels of 15 pCi/l (72 pCi/l gross alpha) and 50 pCi/l (110 pCi/l gross beta) during the first three quarters of 2000. Well 30 had historical contamination problems as observed in previous inspections (see reports 70-1151/98-01, 99-01, and 2000-01) due to leakages from the water treatment processing area. The inspector also observed the acquisition of surface water and environmental air samples and noted that representative samples were being obtained.
02/16/2001

- 336 A 50 gallon spill of uranyl nitrate solution occurred into a diked area at the HF spiking station on October 29th. Before area operators could clean up the spill, it had seeped through a hole in the dike down into the concrete subflooring. The licensee plans to repair the dike and continue using the spiking station until an alternate spiking station can be brought on line at the end of November. The licensee will then remediate the concrete subflooring and any contaminated soil below it.
One liners for 11/1/01

**** LICENSEE EVENT REPORTS** 10/30/2001

EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN)
EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE
EQUIPMENT FAILURE DUE TO AGING

C Waste Management

- 189 Waste measurements and procedures were adequate to sufficiently prevent using the waste streams as diversion paths.
IR 00-201

**** POSITIVE FINDING** The inspectors reviewed the gamma instruments used for the assay of combustible and non-combustible waste. The calibration of these waste counters and training qualifications were discussed. However, since waste is a potential path of loss and diversion, the main focus was to determine how material might be lost or diverted through the waste assay process. Therefore, inspectors reviewed the sorting, packaging, measurement, the burning of combustible waste, and repackaging of ash. Questions were posed to the operator about the probability of detecting shielded containers, self-shielded packages, and the possibility of a single person removing a package before or after the assay. All inspected waste procedures were performed in a manner that would make the loss or diversion of a significant quantity of SNM highly unlikely.
01/14/2000

- 199 The licensee met the performance and release criteria for liquid effluents in 10 CFR Part 20 and SNM-1107.
IR 00-01

**** POSITIVE FINDING** The inspector also noted that calculated offsite doses as a result of radioactivity in liquid effluents was very low (0.002 millirem/year (mRem/yr)).
02/04/2000

- 200 Radiological activity in liquid effluents had increased approximately 21 percent during the first half of 1999 versus last half of 1998 levels. The licensee had formulated an action plan and had implemented corrective actions in order to reduce radioactivity in liquid effluents. Preliminary data indicated that activity concentrations had been reduced to acceptable levels by implementation of the licensee's corrective actions.
IR 00-01

**** DESIGN ISSUES** The total activity released during the first half of 1999 had increased approximately 21 percent over last half of 1998 totals. In addition, the inspector noted that liquid effluent concentrations during the first three quarters of 1999 had averaged approximately $5.0 \text{ E-}07$ ($\mu\text{Ci/ml}$) in comparison to the unrestricted release limit goal of $3.0 \text{ E-}07$ $\mu\text{Ci/ml}$. The licensee stated that one major reason suspected for this increase in liquid effluent concentrations was increased solubility of uranium in effluents due to acidic conditions in the East Pond. The licensee had formulated an action plan to minimize uranium activity in liquid effluents and had instituted corrective actions. The inspector noted that the October liquid effluent activity concentration had decreased to approximately $2.6 \text{ E-}07$ $\mu\text{Ci/ml}$ after completion of the licensee's corrective action of neutralization of acidic drainage to the East Pond from the de-Ionized WTF cation regeneration process.
02/04/2000

- 201 The licensee implemented the airborne effluents monitoring program in accordance with license SNM-1107 and 10 CFR Part 20 requirements. Calculated offsite doses due to airborne radiological emissions were significantly below as low as reasonably achievable (ALARA) constraint criteria in 10 CFR Part 20.

IR 00-01

**** POSITIVE FINDING** The inspector observed that the licensee had experienced a 30 percent decrease in activity quantities in airborne effluents reported for the first half of 1999 (200.7 μ Ci) in comparison with total uranium (gross alpha) values reported for the last half of 1998 (292.5 μ Ci). The inspector reviewed the airborne effluent concentration values reported for the third quarter of 1999 in relation to the values reported during the first half of 1999 and observed consistent trending in exhaust stack concentrations. Several instances were observed where the action level concentration (approximately 3×10^{-12} μ Ci/ml) were exceeded. In each case, the licensee made appropriate corrective actions (High Efficiency Particulate Air (HEPA) filter change, etc.) in order that the concentration was adequately reduced to a small percentage (typically less than 20 percent) of the action level concentration. Doses to offsite receptors (taken at site boundary) from radiological emissions in airborne effluents were calculated to be approximately 0.01 mRem/yr for the first half of 1999 using the EPA COMPLY code. This is significantly below ALARA constraint criteria in 10 CFR 20.1101 (10 mRem/yr).

02/04/2000

- 202 Airborne effluent sampling lines (flow rotometer) for the calciner exhaust stacks were observed to contain condensate which affected the acquisition of representative samples. Licensee equipment modifications were being implemented to correct this problem. IR 00-01

**** DESIGN ISSUES** The inspector also observed the acquisition of airborne effluent particulate samples at several of the exhaust stack sampling stations. The inspector noted that the sample lines and flow rotometers from the calciner exhaust stacks had an accumulation of condensate which resulted in reduced/erratic flow through the particulate filter which could compromise sample representativeness (non-isokinetic/reduced flow) during upset conditions. The licensee stated that this problem would be investigated and corrected. This will be tracked as Inspector Followup Item (IFI) 00-01-01.

02/04/2000

- 203 Low Level Radioactive Waste (LLRW) shipments were performed in accordance with the requirements of 10 CFR Part 20, Appendix G, and 10 CFR Part 61.

IR 00-01

**** POSITIVE FINDING** The inspector reviewed three recent LLRW shipping manifests and noted that the shipping manifests contained the appropriate information and that wastes were properly classified in accordance with 10 CFR Part 20, Appendix G, and 10 CFR Part 61 requirements. The inspector did note that the annual audit of the LLRW program had identified that an initial error had been made in the installation of the plant uranium isotopic activity ratio (based on enrichment factor) into the Low Trac program used in the generation of waste shipping manifests. The licensee had corrected this minor error which did not impact waste shipment classification. The inspector also observed that the licensee had performed and received the appropriate notifications of shipment and receipt per LLRW shipment tracking regulatory requirements. In addition, the inspector toured the LLRW processing and storage facilities and observed that waste storage and operations were orderly and that waste inventories had been significantly reduced. The inspector observed that waste containers were appropriately labeled and no significant degradation was observed. In addition, the waste containers were stored in an acceptable environmentally controlled area and waste containers were stored in a stable configuration to prevent inadvertent breakage.

02/04/2000

- 204 The licensee made substantial progress in LLRW processing operations and in the reduction of LLRW disposal volumes. IR 00-01

**** POSITIVE FINDING** The inspector also noted that the licensee had made significant progress in reducing the disposal volume of LLRW (currently 500 cubic feet per year) and that further improvements were being accomplished in the waste processing area such as an improved sponge honing system to increase the efficiency of metallic scrap decontamination and to decrease operator exposure. 02/04/2000

- 205 LLRW storage was orderly and performed in a manner as to prevent liquid ingress or area contamination.

IR 00-01

**** POSITIVE FINDING** The inspector also reviewed the licensee's LLRW processing and disposal procedures and noted that the procedures contained appropriate instructions for the handling, processing, disposing and

shipping of LLRW.
02/04/2000

- 230 Operating procedure for handling and shredding contaminated HEPA filters instructed workers contrary to the approved Criticality Safety Evaluation. *EN#37189*

**** LICENSEE EVENT REPORTS** The licensee discovered an inadequate procedure during a routine audit when it was found that an administrative safety control identified in a Criticality Safety Evaluation (CSE) was not properly proceduralized. The inadequacy occurred in the method for handling and disposing of used HEPA filters. Typically, used HEPA filters are scanned upon removal from process. If the scan value is less than 5 grams U235 per 10 liters, the filter media is removed from the filter frame, shredded, and sent to an incinerator. According to the CSE, if the scan value is greater than 5 grams U235 per 10 liters, the filter media is to be bagged and sent directly to the incinerator without shredding. The shredding process evidently aids in the combustion of the filters. Filters that have a high scan value are not to be processed through the shredding system because the shredder hopper and receiving barrel are of unfavorable geometry. The procedure for processing filter media with high scan values instructed the operators to "place paper filter media into a 30-gal paper bag for shredding", which is contrary to the CSE assumptions that high scan media is not to be shredded. This operation was being performed per the approved operating procedure, and high scan media was being shredded prior to incineration. The CSE documented the prevention of shredding the high scan filter media as an administrative criticality safety mass control. Thus when it was discovered that the operating procedure instructed operators to shred the high scan filter media, the licensee determined that this constituted a loss of one criticality control.

PROCEDURES NOT COMPLETE OR ACCURATE 07/26/2000

- 282 The licensee met the performance and release criteria requirements for liquid effluents in 10 CFR Part 20 and SNM-1107. Calculated offsite dose as a result of radioactivity in liquid effluents was significantly below 10 CFR Part 20 criteria.

IR 01-02

**** POSITIVE FINDING** The inspector noted that although the liquid effluent radiological discharge had increased during 2000 from 1999 levels, the calculated offsite doses as a result of radioactivity in liquid effluents was <0.002 millirem/year (mRem/yr) (due to substantial river dilution) which was significantly below 10 CFR Part 20 criteria of 50 mRem/yr attributable to liquid effluents.

04/10/2001

- 283 Total radiological activity in liquid effluents had increased approximately 243 percent during 2000 as compared to 1999 levels.

IR 01-02

**** NEGATIVE FINDING** The total activity released during 2000 (124.0 mCi) had substantially increased (approximately 243 percent) over the total activity levels observed during 1999 (51 mCi). The licensee indicated that this increase had predominantly occurred due to increases in the waste streams from plant inputs such as showers, sinks, drains, uranyl nitrate tank pad, etc., which were processed through holding tank 1187 prior to release to the east lagoon. The inspector observed that the licensee's procedure (COP-831201, Revision 21), stated that if the tank solution radiological activity exceeded 3.0E-06 uCi/ml (gross alpha), tank 1187 contents were to be treated with caustic (sodium hydroxide) to induce uranium precipitates which would then be removed by recirculation through a filtration unit. The process was to be repeated if additional sampling indicated that the radiological activity was still in excess of 3.0E-06 uCi/ml. The inspector reviewed data for several tank batches and observed that the first treatments did not sufficiently reduce the gross alpha activity concentration to less than 3.0E-06 uCi/ml. The inspector observed that there were no redundant tanks (or excess volume capability) and that if tank 1187 was filled close to the overflow level, the tank was released to the east lagoon even if the radioactivity level was still above the 3.0E-06 uCi/ml administrative limit. The inspector noted that for the first three quarters of calendar year 2000, these releases above the administrative limit had caused several monthly effluent averages (process stream and miscellaneous stream (tank 1187 pathway)) to show an increase in gross alpha activity above the levels normally observed (approximately 5.0 E-07 uCi/ml in comparison to the unrestricted release limit goal of 3.0 E-07 uCi/ml). The licensee had investigated the increase in radioactivity in liquid effluents and had formulated administrative actions to reduce radioactivity contributions to final liquid effluents via the miscellaneous (i.e. showers, etc.) stream pathways feeding tank 1187. The inspector observed that the administrative corrective actions instituted by the licensee had resulted in a reduction in liquid effluents to levels consistent with and below the unrestricted release limit goal of 3.0 E-07 uCi/ml during the last quarter of calendar year 2000.

02/16/2001

- 284 The licensee had implemented the airborne effluent monitoring program in accordance with license SNM-1107. Calculated offsite doses due to airborne radiological emissions were within As Low As Reasonably Achievable constraint criteria in 10 CFR Part 20.

IR 01-02

**** POSITIVE FINDING** The inspector observed that the licensee had experienced a 11 percent increase in airborne effluent activity reported for 2000 (501 uCi) in comparison with total uranium (gross alpha) values reported for 1999 (453 uCi). This increase was attributable to an increase in processing operations. Several instances were observed where the action level concentration (3 E-12 uCi/ml) was exceeded. In each case, the licensee took appropriate corrective actions (High Efficiency Particulate Air (HEPA) filter change, etc.) such that the concentration was subsequently reduced to a small percentage (typically less than 20 percent) of the action level concentration. Doses to offsite receptors (taken at site boundary) from radiological emissions in airborne effluents were approximated to be <0.40 mRem/yr based on the available 2000 airborne effluent data, which is below the As Low As Reasonably Achievable (ALARA) constraint criteria in 10 CFR 20.1101 (10 mRem/yr). The inspector also observed the acquisition of airborne effluent particulate samples at several of the exhaust stack sampling stations and noted no items which would compromise sample integrity.
02/16/2001

- 285 The low level radioactive waste shipment and tracking program was being conducted in accordance with the requirements of 10 CFR Part 20, Appendix G, and 10 CFR Part 61.

IR 01-02

**** POSITIVE FINDING** The inspector reviewed three recent LLRW shipping manifests and noted that they contained the appropriate information and that wastes were properly classified in accordance with 10 CFR Part 20, Appendix G, and 10 CFR Part 61 requirements. The inspector also observed that the licensee had performed and received the appropriate notifications of shipment and receipt per LLRW shipment tracking regulatory requirements.
02/16/2001

- 286 A container of contaminated incinerator ash was improperly stored and posed a potential for airborne contamination.

IR 01-02

**** NEGATIVE FINDING** the inspector toured the LLRW processing and storage facilities (Southwest Expansion Area/Drum Storage Area) and observed a polypak container (number A90238) on a carrier (number 117) in the upright condition which appeared to be partially open. The licensee investigated this condition and noted that the polypak contained incinerator ash with approximately 19 grams U-235 content. In addition, the licensee stated that the incinerator ash was contained in plastic wrapping material. The inspector noted that the improper storage of this radiological material was not consistent with good radiological control practices which the licensee acknowledged and issued an Unusual Occurrence Report (Redbook Item). The polypak contents were then properly dispositioned. 02/16/2001

- 287 Contaminated material was being stored in corroded drums on an outside storage pad susceptible to possible water intrusion.

IR 01-02

**** NEGATIVE FINDING** The inspector noted that the licensee had stored uranium contaminated material (used in a proprietary process) on an outside storage pad (southeastern quadrant of the plant) until equipment modifications were made to recover the uranium. The inspector observed that the contaminated material storage drums showed significant corrosion and, in several locations, plastic which had been placed over the drums to further protect the drums from water intrusion was significantly degraded. Other drums contained labels which were not legible as to drum contents. The inspector also noted drums which contained as much as 450 grams of uranium-235 and had apparently been stored since 1997. The inspector was informed that the material contaminated with low enriched uranium did not present a criticality concern due to the homogenous nature of the material and the low hydrogenous content and that the drums were lined with plastic to prevent material leakage. The inspector discussed these problems with the licensee and was informed that tentative plans had been made to resume process treatment of the material for uranium recovery during the first quarter of 2001. However, in the event of long term process delays, severely degraded drums would be transferred to environmentally acceptable storage locations.
02/16/2001

EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN)

- 321 The licensee was effectively reducing the volume of LLRW being sent for offsite disposal.

IR 01-05

**** POSITIVE FINDING** The inspector toured the LLRW storage and staging areas throughout the facility. With the exception of the dry active waste that could not be incinerated, the remainder of the LLRW was being staged for reprocessing so that the uranium could be recycled.

63

The inspector reviewed the licensee's performance in the volume reduction efforts for the disposal of LLRW. Since 1985, there has been a statistically significant reduction in the volume of LLRW generated for disposal. To illustrate this, in 1985, 23.5 E+03 ft³ of LLRW was generated for disposal compared to approximately 1.0 E+03 ft³ of LLRW generated in 2000. The licensee expects to generate approximately 0.4 E+03 ft³ of LLRW in 2001. The inspector noted that the licensee has an aggressive program to reduce the volume of LLRW. These efforts can be attributed to controlling waste generated at the source and a combination of incineration of combustible wastes, recycling, cleaning of noncombustible wastes (metallic items) for possible free release, and compaction.

06/07/2001

- 322 Solid waste streams were appropriately classified as Class A waste in stable form and the waste met the applicable minimum waste characterization requirements specified in 10 CFR 61.56(a).
IR 01-05

**** POSITIVE FINDING** The requirements for waste classification and characterization are specified in 10 CFR 61.55 and 61.56, respectively. The licensee may rely on any of four methods to classify waste: (1) materials accountability; (2) classification by source; (3) gross radioactivity measurements; and (4) direct measurement of individual nuclides.

Westinghouse relied primarily on either of the first two methods to classify waste. The licensee's waste stream contained radionuclides of uranium and its decay products. Uranium and its decay products were not listed in either Tables 1 or 2 of 10 CFR 61.55. The classification by sources method stipulates that the waste generated is classified and characterized through knowledge and control of the source of the waste. The source of the waste at Westinghouse was limited to the radionuclides of the uranium and actinium series. Therefore, all wastes generated by the fuel manufacturing process were designated as Class A. The inspector noted, however, that the licensee lacked a program document to ensure that LLRW would be properly classified and characterized

06/07/2001

D Transportation

- 203 Low Level Radioactive Waste (LLRW) shipments were performed in accordance with the requirements of 10 CFR Part 20, Appendix G, and 10 CFR Part 61.
IR 00-01

**** POSITIVE FINDING** The inspector reviewed three recent LLRW shipping manifests and noted that the shipping manifests contained the appropriate information and that wastes were properly classified in accordance with 10 CFR Part 20, Appendix G, and 10 CFR Part 61 requirements. The inspector did note that the annual audit of the LLRW program had identified that an initial error had been made in the installation of the plant uranium isotopic activity ratio (based on enrichment factor) into the Low Trac program used in the generation of waste shipping manifests. The licensee had corrected this minor error which did not impact waste shipment classification. The inspector also observed that the licensee had performed and received the appropriate notifications of shipment and receipt per LLRW shipment tracking regulatory requirements. In addition, the inspector toured the LLRW processing and storage facilities and observed that waste storage and operations were orderly and that waste inventories had been significantly reduced. The inspector observed that waste containers were appropriately labeled and no significant degradation was observed. In addition, the waste containers were stored in an acceptable environmentally controlled area and waste containers were stored in a stable configuration to prevent inadvertent breakage.

02/04/2000

- 207 Weld repairs to MCC-3 shipping containers were made by Westinghouse employees that had been trained by a contractor that was not on the Westinghouse Qualified Supplier List.
30 day report dtd 4/7/2000 & IR 00-03

**** LICENSEE EVENT REPORTS** In October 1999, it was determined that several Model MCC-3 shipping containers had an incorrect weld pattern on the top shell. At that time all containers with this weld pattern were taken out of service and a plan was developed to add welds to meet the licensed drawing requirement. The plan involved using Westinghouse welders who were certified to the requirements for welding safety related parts on shipping containers. However, the welders had received their training and certification from the same supplier that was already under contract to provide general welding services. This supplier was not on the Westinghouse Qualified Supplier List (QSL). Westinghouse issued a blanket purchase order to the supplier to provide the ASME code welding certification services. Blanket purchase orders with existing suppliers for maintenance services are not generally routed through Product Assurance. Had a separate purchase order been issued for shipping container welding, the Purchasing Department would have routed the requisition to Product Assurance for approval. Product Assurance would have denied the requisition because the requested supplier was not on the Westinghouse QSL. 03/13/2000

INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS

- 224 MCC fuel assembly shipping packages were acceptably prepared for delivery by properly loading the package in accordance with management approved procedures; properly marking and labeling the packages in accordance with the applicable requirements in 49 CFR 172; and ensuring that the packages met the external radiation and removable surface contamination limits specified in 10 CFR 71 and 49 CFR 173.

IR 00-03

**** POSITIVE FINDING** The inspector verified that the licensee had procedures for the preparation of shipping packages and delivery of the packages to the carrier for the shipment of unirradiated fuel assemblies. The inspector reviewed selected portions of the following procedures:

MOP-730703, Prepare Container for Loading Fuel Assemblies, Revision (Rev.) 25, dated September 30, 1999

MOP-730713, Load Fuel Assembly into Model MCC Shipping Containers, Rev. 58, dated April 25, 2000

The inspector verified that the operators were using the procedures during fuel assembly loading operations. The procedures incorporated check-off lists to ensure certain loading operations were performed. The inspector observed that the operators made good use of the procedure check-offs.

In addition, the inspector observed shipping specialists perform appropriate radiation surveys in order to determine the transport index (TI) on six Model MCC-3 shipping containers. A radiation specialist acceptably performed the required contamination and radiation surveys on the MCC shipping casks and radiation surveys of the cab location to ensure that the packages met the external radiation and removable surface contamination limits specified in 10 CFR 71.87(i) and (j); 49 CFR 173.441, and 49 CFR 173.443. The inspector also verified that the MCC shipping containers were marked and labeled in accordance with the applicable requirements specified in 49 CFR 172.300-310 and 49 CFR 172, Subpart E.

05/04/2000

- 225 The maintenance activities and procedures associated with the refurbishment of the MCC fuel assembly shipping containers were acceptable.

IR 00-03

**** POSITIVE FINDING** In addition to the requirements specified in the NRC Certificate of Compliance (CoC) No. 9239 for fuel shipping containers, the requirements for routine determinations specified in 10 CFR 71.87 and 49 CFR 173.475 were applicable.

For reusable NRC-certified packagings for fuel assemblies, the inspector examined the licensee's procedures and records for refurbishment and maintenance and verified that before re-use, all of the periodic maintenance required by the CoC had been incorporated into the procedures and had been performed, except as noted in Section 2.f of this report. During the inspection, the inspector observed maintenance and refurbishment activities on four Model MCC fuel shipping containers, including the gasket replacement on one of the shipping containers. The operators used the checklist in form CF-75B-002, Fuel Assembly Shipping Container Inspection Checklist to ensure that the required maintenance was performed.

05/04/2000

- 226 The licensee adequately maintained the Certificates of Compliance for the NRC approved shipping containers used to ship radioactive materials.

IR 00-03

**** POSITIVE FINDING** The inspector verified that the licensee had copies of the following three NRC CoCs for packages used by the licensee to ship licensed material:

NRC CoC 9239, Rev. 10, USA/9239/AF, Model Nos. MCC-3, MCC-4, and MCC-5

NRC CoC 9196, Rev. 16, USA/9196/AF, Model No. UX-30

NRC CoC 9203, Rev. 10, USA/9203/AF, Model DHTF

The inspector also verified that the licensee had registered with the NRC as a user of the NRC certified packages. The licensee's record maintenance system for the CoC's was acceptable.

05/04/2000

- 228 The hazmat training program was acceptable and for the individuals receiving the function-specific training, exceeded the minimum requirements specified 49 CFR 172.704.
IR 00-03

**** POSITIVE FINDING** The inspector reviewed the training records of selected hazmat employees. A hazmat employee is defined in 49 CFR 171.8. The hazmat training included general awareness/familiarization training, function-specific training, and safety training. The type of work the hazmat employee performed would dictate which of three hazmat training elements the employee would receive. The licensee provided general awareness and safety training during March 1998 and September 1999 to a total of 85 attendees. The licensee's training program was set up to provide the hazmat training once per three years in accordance with the requirements of 49 CFR 172.704(c)(2). However, each area supervisor was responsible for making the determination as to who would be a hazmat employee. The inspector noted that one Health Physics Technician had not received the hazmat training in March 1998 or September 1999. However, this individual was performing radiation survey over checks and was not involved with shipping package labeling or the determination of the transport index. The inspector reviewed the general awareness and safety training course material and exams and determined that the hazmat training was acceptable and satisfied the requirements specified 49 CFR 172.704.

The inspector also verified that function-specific training was provided in accordance with the requirements specified in 49 CFR 172.704 to four individuals of the shipping and traffic office who were directly responsible for the safety of transporting hazardous materials and involved with the preparation of hazardous materials for transportation. The licensee had elected to provide this training on an annual basis even though it is required once per three years.

05/04/2000

- 229 The licensee identified two violations involving the package effectiveness for fuel assembly shipping containers during April 2000. The corrective actions for the administrative problem appeared to be adequate to prevent recurrence. However, a violation for the failure to assure prompt correction of identified shipping container non-conformances was identified.
IR 00-03

**** NOTICE OF VIOLATION** The inspector reviewed two reduction in package effectiveness reports submitted on April 7 and April 25, 2000, in accordance with the requirements specified in 10 CFR 71.95(a).

The 10 CFR 71.95(a) report, dated April 7, 2000, pertained to a violation that Westinghouse welders, who were performing safety-related welds on the Model MCC-3 fuel shipping containers were certified by a company that was ASME code certified, but was not on the Westinghouse Qualified Supplier List (QSL). The Westinghouse welders had received their training and certification from the same supplier that was already under contract to provide general welding services. However, the supplier was not on the Westinghouse QSL. The licensee had issued a blanket purchase order to the supplier to provide the ASME code welding certification services. Blanket purchase orders with existing suppliers were normally not routed through Product Assurance. Had a separate purchase order been issued for the shipping container welding, the Purchasing Department would have routed the requisition to the Product Assurance Department for approval. After reviewing the issue, the inspector noted that the violation was an administrative quality compliance issue. Immediate corrective actions included the issuance of a Corrective Action Report (CAR 00-0149); suspension of the welding until the CAR finding was resolved; and removing the affected containers identified in October 1999 out of service. To prevent recurrence, the licensee audited the supplier on April 4, 2000; ensuring that any material, items, or services for qualification of welders are provided by Westinghouse or procured from a supplier listed on the QSL; perform an annual audit of this supplier; and hold a pre-award meeting prior to the placement of an order for welder qualifications to assure compliance with order requirements.

The 10 CFR 71.95(a) report, dated April 25, 2000, pertained to a violation that occurred on or about March 24, 2000 when the licensee discovered that one Model MCC-3 shipping container (Serial Number M178) had been used for fuel shipments which did not reflect the minimum weld pattern on the container shell as described in License Drawing MCCL-301. The license drawing was part of the NRC CoC 9239, Rev. 10, USA/9239/AF, Model Nos. MCC-3, MCC-4, and MCC-5. Specifically, MCCL-301 specifies that skip welds are to be made in 16 locations on the external rollover angle bars on the bottom half of the container shells. Two licensee employees were assigned to inspect all shipping containers, specifically verifying that all safety-related parts comply with License requirements. This action was taken in response to similar violations that occurred in April 1997 and October 1999 and documented as a 10 CFR 71.95(a) reports dated May 22, 1997 and November 23, 1999, respectively. During the March 24, 2000 inspection, it was discovered that container M178 had the skip welds in only 12 locations.

This problem originally became apparent in April 1997, when it was determined that several Model MCC-3 shipping containers had an incorrect weld pattern on the bottom half of the container shells. At that time, all containers with the out of specification weld pattern were taken out of service. A plan was developed to add welds to meet the license drawing requirement. In addition, a procedure was implemented to verify the proper

weld patterns during container refurbishment so that the containers that were off-site at the time of the violation would be inspected and corrected prior to next use. During that time, approximately 200 containers were inspected, with 79 containers identified as having the incorrect weld patterns. However, container M178 was not identified. The licensee determined that M178 was in Taiwan at the time of the discovery of the weld deficiencies and was not segregated upon return to the Columbia Plant. On October 25, 1999, it was discovered that certain Model MCC-3 shipping containers had been used for fuel shipments which did not reflect the weld pattern on the upper container shell as specified in license drawing MCCL-301. Specifically, the licensee discovered that some of the MCC-3 containers in use had skip weld patterns which exceeded the 10-inch center-to-center requirement specified in drawing MCCL-301.

During interviews with the licensee, the inspector determined that shipping container M178 had been used twice to ship fuel assemblies during the months of January and February 2000. After reviewing this issue, the inspector identified this problem as a violation of 10 CFR 71.133 requirements (VIO: 70-1151/00-03-02: Failure to assure that shipping container non-compliances were promptly corrected). The licensee's immediate corrective actions included the removal of M178 from service and resuming the inspection of all containers. To prevent recurrence, the licensee assigned two employees to inspect safety-related parts for all containers and to develop a plan for further training. Given the circumstances regarding the location of the M178 container when this problem was initially discovered in 1997, the inspector determined that the information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence was adequately addressed. 05/04/2000

INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS INADEQUATE TASK CONTROL

231 Bolts missing from packages containing fissile material shipments (pellets) contrary to Certificate of Compliance.

30 day report dtd 8/7/00

**** LICENSEE EVENT REPORTS** On or about July 9, 2000, it was determined that two Model DHTF packages that had been used for fissile material shipments from the Westinghouse Columbia facility to the Westinghouse Hematite facility did not meet the package description requirements contained in the NRC Certificate of Compliance Number USA/9203/AF. The certificate calls for eight bolts to be used to secure the lid to the containment vessel. While unloading the DHTF packages at the Westinghouse Hematite facility, it was discovered that drum 0108 and drum 0519 were missing two bolts adjacent to each other. In addition drum 0519 was missing a third bolt. It was subsequently determined that several DHTF packages that had been used for fissile material shipments between the Westinghouse Columbia facility and the General Electric, Wilmington NC, facility were also missing bolts.

PROCEDURES NOT COMPLETE OR ACCURATE 07/09/2000

258 PORTSMOUTH EVENT REPORT #37580 : DISCOVERY OF SURFACE RADIATION READINGS IN EXCESS OF TRANSPORTATION LIMITS ON 3 OF 30 CYLINDERS SHIPPED FROM WESTINGHOUSE ELECTRIC COMPANY IN COLUMBIA, SOUTH CAROLINA

LER #37580

**** LICENSEE EVENT REPORTS** Three UF6 cylinders shipped by Westinghouse Columbia Plant to Portsmouth Gaseous Diffusion Plant (PGDP), were surveyed by PGDP personnel and determined to have external radiation readings in excess of limits for non-exclusive use transport. Readings ranged from 225 to 250 mrem/hr. According to interview with Westinghouse contact (Jim Heath) and survey documentation, the maximum readings measured using RO-3 Survey instruments by two different Rad Technicians ranged from 30 to 60 mrem/hr.

The licensee contact attributed the discrepancy in readings to potential warming of residual (heel) material during transport resulting in the heel slushing around and slopping down to the bottom of the cylinder. On December 12, 2000, a Health Physics Engineer and Technician from Westinghouse was deployed to the Portsmouth site for performing confirmatory surveys. The confirmatory surveys by Westinghouse personnel at Portsmouth resulted in the same readings as obtained at Westinghouse prior to shipment. The discrepancy in results were attributed to Portsmouth personnel using an instrument that allowed them to get readings closer to the bottom of the cylinder. It was also discovered that the Portsmouth instrument calibration was done different from Westinghouse instrument which could affect the reading. Identification of potential corrective actions is ongoing.

UNKNOWN 12/19/2000

268 Fresh fuel packages for shipment to the Czech Republic were properly labeled.

IR 00-06

**** POSITIVE FINDING** The inspector observed a fresh fuel shipment that was prepared for transport to the Czech Republic. The inspector measured the radioactivity at the surface of and at one meter from selected packages in the shipment. Based on these measurements, the inspector determined that the appropriate labels (radioactive yellow II) were placed on the packages.

11/17/2000

277 A violation was identified for shipment of three uranium hexafluoride (UF6) cylinders on December 7, 2000, with radiation levels in excess of the limits in 10 CFR Part 71.47 and 49 CFR Part 173.441

IR 01-01

**** NOTICE OF VIOLATION** The inspector reviewed procedures, shipping documentation, instrument calibration data, and conducted a walk-through with personnel involved in the December 7, 2000 shipment (UF6 cylinders), to assess familiarity and performance in pre-loading inspections, radiation surveys, labeling, and container markings. Based on interviews and documentation, the inspector determined that with two exceptions, the licensee's performance in container labeling, loading, contamination surveys, markings, and shipping paper documentation was appropriate. The two exceptions involved the shipping paper documentation and radiation surveys. Regarding radiation surveys, all instrumentation used by Westinghouse personnel was within calibration and based on interviews and documentation, the inspector noted that surveys were performed in accordance with procedures. However, receipt surveys performed by personnel at United States Enrichment Corporation's Portsmouth Gaseous Diffusion Plant (PGDP) on December 8, 2000, disclosed that three of the thirty cylinders were in excess of NRC and DOT external surface contact limits of 2 millisievert/hour (mSv/h). PGDP reported readings to NRC of 2.3 mSv/h, 2.5 mSv/h, and 2.3 mSv/h. In response to the elevated readings, Westinghouse dispatched personnel to PGDP with calibrated radiation survey instruments on December 12, 2000, to investigate the elevated readings, and perform resurveys along with PGDP personnel of the three cylinders. The instruments used during the initial and resurvey by PGDP was a Geiger-Mueller (G-M) detector referred to as a Teletector, and Westinghouse utilized an ionization detector Model RO-3. Subsequent to the December 12, 2000 surveys at PGDP, the licensee performed a comparative study to evaluate the discrepancy between the RO-3 ionization detector and a G-M detector (similar to the Teletector) known as the Telescan. Based on the comparative results from actual cylinder surveys, the inspector concluded that the difference in contact readings between the Teletector/Telescan and RO-3 (G-M and ionization) may be attributed to geometry, the probe size difference, and the inability to locate the RO-3 probe equidistant to the surface contact as the Teletector probe. The limited study performed by Westinghouse illustrated that when detector probe centers were equidistant, there was little difference in readings between the detectors in the energy range of the material suspected as the major contributor to the cylinder's external radiation levels. Consequently, the elevated contact radiation levels may have been missed due to the RO-3 geometry, probe size, and distance to the source of radiation. In response, the licensee submitted a purchase order for two Teletector probes similar to detectors used at PGDP for use during future shipments, and as an interim measure, all cylinders are over checked using the Telescan detector to prevent a recurrence. Based on the technical aspects of this issue, the licensee's corrective actions were prompt and appeared to be adequate for preventing a recurrence. The regulatory significance of this incident was considered minor in that the survey procedures were adequate and properly followed; instruments were properly calibrated; and personnel performing surveys were trained. The risk and safety significance was considered lessened based on the size (approximately four by two inch area) and location of the elevated readings. The readings were located in an area inaccessible to the whole body, and although unlikely, the potential may have existed such that an individual could make contact with their hands or fingers on the cylinder surface. However, the estimated stay time for incurring an extremity exposure in excess of NRC limits would be approximately 20 hours. The total estimated transit time from the shipper to receiver facility was approximately nine hours. The exceedance of external radiation levels, resulted in the failure to offer for transportation three metal cylinders containing licensed material, such that radiation levels did not exceed 2 mSv/h at any point on the external surface of the package and was considered a violation (VIO 70-1151/2001-01-01) of 10 CFR 71.47(b) and 49 CFR 173.441(b)(1).

INADEQUATE TASK PLANNING 01/19/2001

269 The bottom nozzle holddown assemblies for the MCC-5 shipping containers were found to not have been fabricated by a qualified vendor as required by the licensee's QA program.

ADAMS ML003780786

**** LICENSEE EVENT REPORTS** The bottom nozzle holddown assembly is used exclusively with the MCC-5 shipping container, to help secure the VVER-1000 fuel assembly in the container. Neither the MCC-3 or MCC-4 containers are involved.

All bottom nozzle holddown assemblies for these containers were fabricated by the same supplier in 1995. Fabrication records indicate that the assemblies were correctly manufactured in accordance with requirements for safety-related items. Westinghouse Product Assurance verified that the assemblies were manufactured in strict accordance to drawings and specifications. The criteria for Category A safety-related items and Category B

safety-related items are essentially the same, a primary difference being that it is not necessary that Category B items be manufactured by a qualified supplier. 11/28/2000

ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON

- 270 The bottom nozzle holddown assembly for the NCC-5 shipping containers was found to not be included on the MCCL501 series License Drawing. (Configuration Control Problem)
ADAMS ML003780786

**** LICENSEE EVENT REPORTS** In the process of investigating why the Category A safety-related item was not manufactured by a qualified supplier, it was discovered that the bottom nozzle holddown assembly was not identified on the MCCL501 series License drawing as a safety-related item. The holddown assemblies were fabricated several years after the containers were made and it is believed that failure to add them to the License drawing was merely an administrative oversight. The holddown assembly is correctly identified in the specifications and the equipment drawing as safety-related.

UNKNOWN 11/28/2000

- 278 A violation was identified for failure to include specific instructions with the Bill of Lading in accordance with 10 CFR Part 71.47(c) regarding exclusive use shipments (Paragraph 2.a).
IR 01-01

**** NOTICE OF VIOLATION** The inspector's review of the shipping documentation disclosed an inconsistency with the licensee's mode of transport. The licensee indicated that the shipment was considered an "Exclusive Use Open Transport" mode. However, the Bill of Lading did not indicate mode of transport, nor were the required instructions for an exclusive use shipment included with the shipping paper information. The licensee indicated that the carrier considered all shipments originating from Westinghouse as "Exclusive Use" and therefore, the carrier was providing instructions. The inspector questioned the licensee if periodic audits were performed of the carrier to verify that the instructions were adequate and being provided to drivers. The licensee had not performed audits and in response to the inspector's inquiry, the licensee obtained documentation from the carrier indicating that all drivers and dispatchers were trained to abide by the provisions of the exclusive use definition in 49 CFR 173.403 regardless of whether a shipper provided such instructions. In response to this finding, the licensee took the appropriate actions to ensure that future shipments as exclusive use would be appropriately identified on the Bill of Lading, and specific instructions provided to the driver along with the Bill of Lading. The regulatory and safety significance of this finding was lessened in light of the carrier's training program associated with exclusive use shipments. The inspector verified via training documentation that the driver for the before-mentioned shipment was trained and aware of the exclusive use requirements. The inspector acknowledged the licensee's comments and indicated that the December 7, 2000, shipment did not appear to meet the intent of 10 CFR 71.47(c), and 49 CFR 173.441(c) and was a violation (VIO 70-1151/2001-01-02).

MANAGEMENT EXPECTATIONS NOT ENFORCED 02/20/2001

- 313 The changes to the shipping and transportation organization enhanced the program in that managers, technical, and engineering staff were not assigned collateral duties in other departments. The managers met the minimum education and experience requirements specified in the license application. IR 01-05

**** POSITIVE FINDING** The inspector discussed with the licensee the organizational changes and changes in personnel responsibilities and functions that occurred since the last inspection of the shipping and transportation program. The organizational structure changed in November 2000. The new organization included engineers and technical staff that no longer had collateral duties in other departments. The licensing and logistical function, which included nuclear criticality safety and container design management, of the shipping program reported directly to the Nuclear Fuel Transport Manager of British Nuclear Fuels Limited (BNFL). The Nuclear Fuel Transport Manager for Columbia Operations also reported to the BNFL Nuclear Fuel Transport Manager. Shipping, receiving, hazardous materials, and container engineering reported to the Nuclear Fuel Transport Manager for Columbia Operations. At present, the BNFL Nuclear Fuel Transport Manager reported directly to the Vice President (VP) of European Fuel and indirectly to the VP of US Manufacturing.

The solid waste management function reported directly to the Chemical Process Engineering Manager, who in turn reported to the Technical Services Manager.

Although the shipping and transportation functions were not specifically detailed in Chapter 2, Management Organization, of the license application, the managers met the minimum education and experience requirements specified in the license application. 06/07/2001

- 314 Internal Audits that pertained to shipping and transportation were acceptable and there was a system in place for tracking corrective actions to completion. *IR 01-05*
06/07/2001

- 315 The quality assurance program did not ensure that licensee audits would focus on compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 61.56
IR 01-05

**** NEGATIVE FINDING** The inspector reviewed internal audit WEC-01-02, dated March 2001 and two low level radioactive waste (LLRW) audits conducted in 1999 and 2000. The LLRW audit addressed waste generation, segregation, decontamination, sorting, packaging, surveying, labeling, shipping, and record keeping. The inspector discussed with the licensee the need for the Westinghouse Quality Assurance (QA) program to ensure compliance with the waste classification and characterization requirements of 10 CFR 61.55 and 61.56. The nature and scope of the QA program will vary depending on the changes and complexity of the waste stream. The licensee acknowledged the inspector's comments and indicated that this area would be focused on during subsequent audits. 06/07/2001

MANAGEMENT EXPECTATIONS NOT ESTABLISHED

- 316 Management approved procedures were acceptable to ensure that the MCC fuel shipping packages would be properly loaded in accordance with the NRC Certificate of Compliance (CoC).
IR 01-05f

**** POSITIVE FINDING** The inspector verified that the licensee had procedures for the preparation of shipping packages and delivery of the model MCC packages to the carrier for the shipment of unirradiated fuel assemblies. The inspector reviewed selected portions of the following procedures:

Maintenance Operating Procedure (MOP) -730703, Prepare Container for Loading Fuel Assemblies, Rev. 29, dated May 17, 2001

MOP-730713, Load Fuel Assembly into Model MCC Shipping Containers, Rev. 63, dated May 17, 2001

The procedures incorporated check-off lists to ensure certain loading operations were performed in the appropriate sequence and in accordance with the Certificate of Compliance (CoC).
06/07/2001

- 317 The maintenance activities and procedures associated with the refurbishment of the MCC fuel assembly shipping containers were acceptable. The package refurbishment area was clean, orderly, and the operators were knowledgeable of their procedures and craft.
IR 01-05

**** POSITIVE FINDING** Chapter 8 of the license application for the MCC shipping container specified the acceptance tests, maintenance program, and re-certification program. In addition to the requirements specified in the NRC CoC No. 9239 for fuel shipping containers, the requirements for routine determinations specified in 10 CFR 71.87 and 49 CFR 173.475 were applicable.

The inspector verified that the licensee had procedures for the periodic maintenance of the model MCC shipping packages. The inspector reviewed selected portions of the following procedure:

MOP-755707, Refurbishing Shipping Container, Revision 42, May 17, 2001

For reusable NRC-certified packagings for fuel assemblies, the inspector examined the licensee's procedures and records for refurbishment and maintenance and verified that before re-use, all of the periodic maintenance required by the CoC (and Chapter 8 of the application) had been incorporated into the procedures and had been performed. During the inspection, the inspector observed maintenance and refurbishment activities on four Model MCC fuel shipping containers, including the gasket inspection. The operators used the checklist in form CF-75B-002, Fuel Assembly Shipping Container Inspection Checklist to ensure that the required maintenance was performed. During this inspection, there were no MCC package re-certifications occurring. The inspector
06/07/2001

- 318 The CoC for the NRC approved shipping containers used to ship radioactive materials were well organized. The waste shipping manifests were complete and provided an acceptable level of information in the shipping papers to determine the quantities of individual radionuclides shipped.

Shipping records for radioactive material shipments were complete and the information supplied on the shipping papers was appropriate

IR 01-05

**** POSITIVE FINDING** The inspector verified that the licensee had copies of the following NRC CoCs for packages used by the licensee to ship licensed material:

NRC CoC 9239, Rev. 11, USA/9239/AF, Model Nos. MCC-3, MCC-4, and MCC-5

NRC CoC 9203, Rev. 11, USA/9203/AF, Model DHTF

The inspector also verified that the licensee had registered with the NRC as a user of the NRC certified packages. The licensee's record maintenance system for the CoC's as well as the transport package Safety Analysis Reports was well organized.

The inspector noted that the licensee had requested that NRC CoC 6078 for shipping package model Nos. 927A1 and 927C1 be transferred from CE Nuclear Power LLC to Westinghouse Electric Company. The licensee received the authorization to transfer the CoC on October 10, 2000. The licensee accepted the responsibility for the maintenance of the certificates, the safety analyses for package designs, and the quality assurance records in accordance with the requirements of 10 CFR 71.91(c). The licensee plans to use the 927A1 and 927C1 shipping containers to ship Combustion Engineering fuel assemblies later in 2001. At the time of this inspection, the licensee was in the process of developing operating procedures, maintenance procedures and an operator training program before first use of the shipping containers.

The inspector also reviewed selected records for radioactive materials and waste shipments for the period March through May 2001. The inspector reviewed manifest records of selected shipments of radioactive waste. The manifests were complete and met the applicable requirements of Appendix G to 10 CFR Part 20. The inspector also verified that the licensee had a procedure and program in place to track waste. The inspector also reviewed licensee transportation activities regarding shipments of unirradiated fuel, uranium dioxide (UO₂) powder, and UO₂ pellets. Selected records covering the period noted above for those consignments were reviewed in detail. The inspector reviewed and discussed the documentation used, and subsequently maintained in the licensee's records for each radioactive material shipment, including, the Bill of Lading, Radioactive Material Shipment Record, Vehicle Inspection Report, Receipt and Loading Verification Checklist, Packing List (Fuel Assemblies/Component Assemblies), Fuel Shipment Information Form, Container Log Sheet, and Health Physics Survey Forms. The inspector noted that the shipping records were complete and the information supplied on the shipping papers was appropriate.

06/07/2001

- 319 The Uranyl Nitrate crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The radioactive material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity.

IR 01-05

**** POSITIVE FINDING** On June 6, 2001, the inspector observed the licensee perform incoming receipt surveys of drums containing uranyl nitrate (UNH) crystals received from the Babcock and Wilcox Technology (BWXT) facility located in Lynchburg, Virginia. The inspector also observed that the UNH crystal package receipt, opening, material transfer, and container survey process was conducted efficiently, safely, and in accordance with established procedures. The inspector observed that the material unloading work area was well laid out and included ventilated enclosures to control airborne radioactivity. The operators were knowledgeable of their procedures. Radiation and contamination surveys were conducted appropriately.

06/07/2001

- 320 One violation of minor safety significance involving the package effectiveness for the MCC-5 fuel assembly shipping containers' bottom hold down assembly was identified by the licensee. Two non-cited violations were identified for the failure to comply with the terms and conditions of Certificate of Compliance No. 9239 for the MCC-5 shipping container and the failure to properly install and secure the closure device of a packaging containing fissile material.

IR 01-05

**** NON-CITED VIOLATIONS** The inspector reviewed two reduction in package effectiveness reports submitted on August 7 and December 5, 2000, in accordance with the requirements specified in 10 CFR 71.95.

The 10 CFR 71.95 report, dated December 5, 2000, pertained to the following two issues related to the MCC-5 shipping container (NRC CoC 9239): (1) In 1995, the bottom nozzle hold down assembly for the

MCC-5 shipping container, which was classified as Category A safety-related part in the specifications, and identified as safety related on the equipment drawing, was fabricated in accordance with the requirements for a Category B safety related part. This problem was identified on or about November 28, 2000; and (2) It was also determined that the bottom hold down assembly was not included in the MCCL 501 series license drawing. The licensee initiated both immediate and long term corrective actions as noted in the licensee's December 5, 2000 letter to the NRC. The inspector verified that the corrective actions had been completed. The inspector in conjunction with the NRC's Spent Fuel Project Office, concluded that the licensee's report did not identify generic design or certificate issues, that the licensee's corrective actions were adequate, and that the safety significance was low. Based on the safety significance, problem (2) above was considered to be a minor violation. The non-repetitive, licensee-identified and corrected violation (problem (1)) pertaining to the fabrication of the bottom hold down assembly in accordance with the requirements of a Category B safety related part instead of a Category A safety related part is being treated as a non-cited violation (NCV), consistent with Section VII.B.1 of the NRC Enforcement Policy, and is identified as NCV 70-1151/2001-05-01: Failure to comply with the terms and conditions of Certificate of Compliance No. 9239 for the MCC-5 shipping container.

The 10 CFR 71.95 report, dated August 7, 2000, pertained to two DHTF containers that were used to ship fissile materials that had lid closure device bolts missing. The inspector verified that the corrective actions to prevent recurrence were completed. The safety significance for this problem was considered to be moderate due to several factors. First, the closure bolts were necessary to maintain the proper geometry of the containment contents following any impact to the package. Proper geometry is important for criticality control. Second, the extent of the condition was a concern. According to the 10 CFR 71.95 report to the NRC, the licensee reported that several packages in addition to the two that were discussed may have been shipped without some of the bolts, with as many as three out of eight bolts missing. In addition, 10 CFR 71.87(c) requires that each closure device of the packing, including any required gasket, be properly installed, secure, and free of defects. The cause was identified by Westinghouse as an improper translation of the CoC requirements and conditions into an operating procedure. However, based on the information provided in the 10 CFR 71.95 report, it appears that a questioning attitude by the operators could have found this discrepancy, even with out specific procedural guidance. The inspector concluded that the corrective actions as specified in the 10 CFR 71.95 report would prevent recurrence of the violation. Thus, this non-repetitive, licensee-identified and corrected violation is being treated as a NCV, consistent with Section VII.B.1 of the NRC Enforcement Policy, and is identified as NCV 70-1151/2001-05-02: Failure to properly install and secure the closure device of a packaging containing fissile material.

PROCEDURES NOT COMPLETE OR ACCURATE 06/07/2001

- 331 On or about August 16, 2001, Westinghouse Electric Co. was notified by Framatome ANP, Richland, Washington, that typographical errors were discovered in License drawings for the powder/pellet package ANF-250, Docket #71-9217, and that the USNRC Certificate of Compliance for that package, USA/9217/AF Revision 11, was being withdrawn immediately
Letter dtd 9/12/01

**** LICENSEE EVENT REPORTS** All ANF-250 shipments were immediately suspended. Westinghouse had been using the ANF-250 container to make material shipments from Vasteras, Sweden, to the Hematite plant, and from Hematite to the Columbia Plant.

ERROR BY KNOWLEDGEABLE PERSON FOR 08/16/2001
UNKNOWN REASON

- 332 The licensee inadvertently returned UNH crystals to BWXT in a container labeled as "empty".
Event # 38177

**** LICENSEE EVENT REPORTS** On July 30 at 14:45, Westinghouse Electric Company received a telephone call from BWXT stating they had received one- 3 gallon container of uranyl nitrate crystals from Westinghouse in SNM shipping container labeled as empty. Westinghouse notified the NRC Operations Center on 07/30/01 at 17:52.

This container was originally shipped from BWXT to Westinghouse on 07/17/01 for processing and was documented by a NRC 741 form. Ninety-six containers were indicated on Form 741, but one was inadvertently left in the outer shipping container or put back into the shipping container and returned to BWXT for the next shipment. BWXT stated that the original inner container Tamper Indicating Device was still on the container and intact.

After discussion and clarification of the incident with BWXT personnel, Westinghouse Electric Company personnel determined at 1700 hours that this incident was reportable to the Operation Center.

Type of container: Outer Shipping container : 55 gallon 1A-2
Inner shipping container: 3-gallon 7A package

Inner Container Gross Weight :	16.207 Kilograms
Element Weight:	6,844 Kilograms
Isotope:	0.278 Kilograms
Enrichment:	4.057 % U235
Outer shipping container Dose Rate:	0.3 mr/hr (30 cm)
	1.2 mr/hr (contact)

All shipping containers were returned to BWXT as usual. When they receive the empty 1A-2 containers they are opened and surveyed by Radiation Control personnel. The inner container is removed and also checked for contamination. When the inner container was removed the operator noticed it was heavy and that the tamper indicating device was still intact. This was reported to BWXT management who promptly notified the shipper, Westinghouse.

Actual Safety Significance

Low - Loss of control of radioactive material (SNM); however, the SNM was received by an authorized recipient (BWXT); the quantity of SNM material was low; the container surface dose rates were low; there was no offsite or onsite release of radioactive materials; there were no onsite or offsite radiation exposures. The SNM was still contained in the original (inner) container with the tamper safe seal still intact when it was received by BWXT.

Potential Safety Significance

Moderate- The noncompliance with labeling, placarding, shipping paper, packaging, loading, or other requirements for the package in question could have resulted in (1) a significant failure to identify the type, quantity, or form of material and/or (2) a failure of the carrier or recipient to exercise adequate controls.

Licensee's Actions

- (1) Licensee stopped all shipments of "empty" containers on 07/30/01.
- (2) Licensee will double verify the weights of the empty shipping container using two individuals.
- (3) Licensee management will verify, review, and authorize shipments of empty containers.
- (4) Licensee initiated a root cause analysis.

ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON 07/29/2001

- 333 The licensee's root cause investigation report was of good quality and detailed. The implemented corrective actions were thorough and on target.

IR 01-08

**** POSITIVE FINDING** The root cause report described the methodology, root causes, provided recommendations, time lines, and causal factors. The inspectors' analysis of the root cause report indicated that it was of good quality and detailed. The corrective actions were thorough and on target. At the conclusion of this inspection, approximately 82% of the 33 corrective actions were completed. The remainder of the corrective actions were scheduled to be completed by the end of September or October 2001. The licensee determined the root cause to be that the inner container was not removed from the outer container when the shipment was received and unpacked. The licensee identified several causal factors, including not identifying the presence of the inner container when the spacer was put back into the outer container, contractor personnel hurrying to complete the job, and documentation of inconsistent data that indicated that the inner container had been processed. The inspectors determined that a management structure that has clear responsibility for SNM receipt and independence from possible production conflicts would have provided assurance that material control and accounting (MC&A) functions are appropriately implemented. Through interviews and document review, the inspectors determined that contractor staff, not Westinghouse personnel, performed actual job assignments and provided supervisory oversight related to the activities associated with this event. During discussions with Westinghouse staff, they explained that contractor staff had been used because they thought the receipt of UNH crystals would not be a long-term activity and that also contractor staff were more readily available to staff these job responsibilities. The inspectors noted in the licensee's apparent cause analysis report that factors that contributed to this event included contractor personnel hurrying to complete the job and that an employee apparently falsified entries on a weight verification checklist and a contamination smear document. Based on the comments listed in the apparent cause analysis report, the inspectors expressed concern that contractor personnel, not under the direct control of licensee supervision, were involved in the receipt of SNM. After these discussions, licensee management decided to implement a plan, that had been under consideration, that will result in SNM receipts being performed and supervised by Westinghouse personnel.

Since appropriately conducted training would provide assurance that personnel were aware of their safeguards duties, the inspectors reviewed training for personnel assigned to this SNM receipt area. The inspectors determined that documentation existed that indicated that contractor personnel in the area had reviewed and discussed the procedures that controlled their job duties. However, the inspectors noted that contractor staff had documented this activity in paper records instead of the on-line system used by Westinghouse personnel. Contractor and Westinghouse management had already noted this difference and were re-instructing personnel in procedural requirements and requiring procedural sign-offs in the on-line Westinghouse system.

The inspectors also reviewed revisions to the Chemical Operating Procedure (COP) 836041, "Receipt and Initial Processing of Uranium Shipments From Outside Sources," Revision 7, September 6, 2001. Westinghouse and contractor management toured the receipt area with the inspectors and walked through the normal SNM receipt process. The inspectors noted that scales used to weigh UNH crystal material appeared to be in working order and were currently calibrated. The inspectors also observed area personnel transferring UNH crystal material from the three gallon shipping containers to polypacks. During discussions with area personnel they indicated that they had been encouraged to develop a questioning attitude and felt empowered to not perform assigned duties until future discrepancies had been resolved. No additional issues were noted.
09/13/2001

- 335 The failure to comply with hazard communication requirements, including those for shipping papers, shipper's certification, and package labeling; radiation survey requirements, licensed material control and storage requirements; and the package documentation requirements of 49 CFR 173.415(a) was identified as an apparent violation of 10 CFR 71.5; 49 CFR 170 through 189; and 10 CFR 20. These items were identified as apparent violation (VIO) 70-1151/01-08-02 pending further NRC review.

IR 01-08

**** NEGATIVE FINDING** The inspectors reviewed the circumstances surrounding the shipment of UNH crystals to the BWXT facility in Lynchburg, VA. On July 25, 2001, a shipment of empty containers was sent by Westinghouse in Columbia, South Carolina to BWXT in Lynchburg, VA, which inadvertently included one inner container of UNH crystals. This container was not removed from the original shipment to the Columbia Fuel Fabrication Facility. As a result, none of the regulations for shipping radioactive material were followed. The shipment was not classified as hazardous material. No radiation or contamination surveys were performed on the shipping container. Although shipping papers were completed for the shipment of empty containers, the paperwork did not contain any references to radioactive material (i.e., the UNH crystals) that was present, and the licensee did not certify that the package was in proper condition for transportation according to the applicable regulations of the DOT. Also, the package (55 gallon 1A-2 outer container and a 3-gallon Specification 7A inner container) was not labeled in any way to reflect the fact that it contained radioactive material. In addition, while the trailer of empty packages was placed in a staging area before being shipped back to BWXT, the licensed material packaged in inner container TID# 287840 was not properly stored or controlled in accordance with 10 CFR 20.1801 and 20.1802.

In addition, the inspectors observed that the licensee did not maintain complete documentation of tests and engineering evaluations or comparative data, showing that the construction methods, packaging design, and materials of construction comply with the requirements for the inner 3-gallon container which was a DOT Specification 7A package.

The inspectors discussed the issues noted above with the licensee and concluded that the failure to comply with the transportation, survey, and storage requirements for the shipment of licensed material were apparent violations of the requirements specified in 10 CFR 71.5; 49 CFR Parts 170 through 189; and 10 CFR Part 20. These issues were identified as apparent violations pending further NRC review (VIO: 70-1151/01-08-02: Failure to comply with the transportation, survey, and storage requirements for the shipment of licensed material). The specific violations were summarized below:

- (1) The shipment of transport inner container (TID# 287840) was classified as non-hazardous; however, one DOT Specification 7A 3-gallon inner container which contained hazardous material was present (49 CFR 171.2(a)).
- (2) The licensee failed to comply with several DOT hazard communication requirements during the shipment of transport inner container (TID# 287840), including those for shipping papers in that the appropriate hazardous material descriptions and the proper certification was not included on the shipping papers indicating that the DOT rules had been followed (49 CFR 172.200-172.204); and labeling requirements in that Radioactive Yellow II labels were omitted (49 CFR 172.403(a)).
- (3) The licensee failed to maintain complete documentation of tests and engineering evaluations or comparative data, showing that the construction methods, packaging design, and materials of construction complies with the requirements for the inner 3-gallon container (TID# 287840) which was a DOT Specification 7A package (49 CFR 173.415(a)).

74

(4) The licensee failed to perform appropriate radiation surveys for the package containing the hazardous material (10 CFR 20.1501).

(5) The licensed material contained in inner container TID# 287840 was not properly stored or controlled (10 CFR 20.1801 and 20.1802). 09/13/2001

**POTENTIAL WRONGDOING
INADEQUATE TASK CONTROL**

356 The inadvertent shipment of a fuel rod as part of a fuel assembly was determined to be a non-cited violation (NCV).
IR 01-203

**** NON-CITED VIOLATIONS** The inspectors and facility staff discussed an item control event involving the inadvertent shipment of a gadolinia-bearing fuel rod as part of an assembly sent to Saint Lucie Unit 2 on October 8, 2001. On October 16, 2001, Columbia staff discovered that a fuel rod, identified as part of a fuel assembly shipped to Saint Lucie, was still on the site. Based on rod identifications supplied by Saint Lucie staff, Columbia staff was able to confirm another gadolinia-bearing rod with very similar attributes was actually placed in the assembly instead of the intended rod. A licensee investigation of the shipment determined that the misidentification of the rod and the subsequent shipment of the wrong rod occurred because the fuel rod identification could not be "read" by the present bar code reader system. As a result, an operator manually reading a similar rod identification failed to recognize the identity discrepancy.

Licensee corrective action included updating the Columbia inventory/item database to reflect the shipment of the actual rod sent to the Saint Lucie facility. Additional corrective action, listed in a revision to Manual Operating Procedure 730601, now requires two people review and agree on rod identification numbers before they are manually entered into the system. Also facility staff will upgrade the bar code reader system in the assembly area to decrease the number of rods identities that have to be manually reviewed.

The inspectors determined this inadvertent shipment of a fuel rod was a licensee self-identified Severity Level IV violation to the Fundamental Nuclear Material Control Plan (FNMCP), Section 6, item control commitments to maintain knowledge of discrete items of SNM and to assign a disposition date when the item was shipped. Based on a review of the licensee investigation, interviews of employees presently performing the work, and observation of related work activities, the inspectors concluded the licensee had resolved the issue. The inadvertent shipment of a fuel rod as part of an assembly was identified as Non-Cited Violation (NCV) No. 70-1151/2001-203-01. 11/09/2001

**ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON
PROCEDURES NOT COMPLETE OR ACCURATE**

IV. Facility Support

A Maintenance/Surveillance

216 The preventive maintenance established for key fire protection systems and process equipment was adequately implemented to ensure availability and reliability for the performance of their intended fire safety functions. IR 2000-202

**** POSITIVE FINDING** Process Equipment Important to Safety

On the basis of random samples of the licensee's PM records and walkdown examinations of process equipment, the inspectors determined that the overall PM for the following key process safety equipment (e.g., flame sensors, thermocouples, temperature controllers, pressure switches, or automatic gas shut-off valves) and testing of safety interlock functions (e.g., automatic shut-off of hydrogen or natural gas supply, shut-down of electric power, or initiation of a nitrogen purge) were performed in accordance with plant procedures:

- calciner No. 2 and No. 4
- sintering furnaces No. 1 through 4
- hot oil systems No. 3 and No. 4
- waste incinerator

The licensee had performed calibration of equipment to ensure accuracy of process setpoints for initiating safety interlocks. The inspectors noted no obvious deficiencies in the material condition of selected process equipment examined during

walkdown inspections. Process equipment was available to minimize the potential fire or explosion hazards associated with the operation of processes.

Fire Protection Systems and Equipment

The inspectors randomly sampled the licensee's PM records, walkdown inspections, and observed functional tests for selected fire protection systems and equipment. The inspectors determined that the overall PM for the following fire protection systems or equipment was performed in accordance with plant procedures to ensure availability and reliability:

- plant fire alarm system
- heat and smoke detectors
- manual fire alarm pull stations
- automatic sprinkler systems
- fire hose houses and monitor nozzles
- fire hydrants and control valves
- plant fire pumps
- water storage tanks
- fire barriers, fire doors, and fire dampers
- fire extinguishers (including Met-L-X and 150-pound dry portable extinguishers)

Accompanied by the licensee, the inspectors randomly chose several pieces of the fire protection equipment for operability testing (i.e., a manual pull station, sprinkler flow switches, fire alarm indicating devices). The inspectors also selected two high-noise locations (i.e., the incinerator room and the penthouse) to verify audibility of the plant fire alarm system. The specific alarm locations and descriptions of fire alarm initiating devices (i.e., manual pull stations, sprinkler flow alarms, and smoke detectors) were received and documented at the plant's main fire alarm control panel. The fire alarm could be heard at the inspector-selected locations and throughout the main process areas. The inspectors noted no obvious deficiencies in the material conditions during walkdown inspections or concerns about the functional tests of selected equipment. 05/04/2000

- 217 A weakness was identified in the lack of periodic internal examination of plant water storage tanks in accordance with the industry standard. IR 2000-202

**** WEAKNESS** However, the inspectors found that the licensee had not included all applicable industry requirements (i.e., National Fire Protection Association (NFPA) 25) in the PM for the plant's water storage tanks. The requirement to periodically examine (i.e., every 5 years) the internal condition of water storage tanks to ensure detection (and correction) of potential conditions adverse to the reliability and availability of the water supply had not been incorporated into the plant PM program. The plant water storage tank No. 1 was installed in 1968, followed by water storage tank No. 2 in 1987. The licensee last examined water storage tank No. 1 in 1991. The licensee found and documented no concerns related to corrosion or buildup of sediment within the tank that could affect reliability of the plant water supply for fire protection. The licensee attributed the lack of corrosion to the cathodic protection system maintained to minimize corrosion and the availability of fully treated portable water supplied by the City of Columbia. The licensee indicated that applicable PM in accordance with NFPA 25 would be incorporated into the plant's PM program. The licensee planned to complete PM for the plant water storage tank Nos. 1 and 2 within 90 days of May 4, 2000. On the basis of interviews and review of available documentation from the licensee's inspection of water storage tank No. 1, the availability of corrosion protection and the quality of water, and the availability of two water storage tanks, the inspectors determined that the reliability of the water supply for fire protection was not significantly reduced. The licensee's plan of action was considered acceptable. 05/04/2000

- 219 The plant's hot-work permit system for minimizing potential ignition sources and preventing fires was adequately implemented in accordance with plant procedures. IR 2000-202

**** POSITIVE FINDING** Control of Hot-Work Activities

The licensee had established a permit system to minimize the potential of a fire resulting from hot-work (e.g., cutting, welding, etc.) activities. The inspectors reviewed records for hot work permits for the past 5 months and interviewed plant employees authorized to issue hot-work permits. No hot-work activities were underway during the inspection for observation. As a result, the inspectors also reviewed two insurer audits of the facility operations and overall risk from 1999. The insurer reported favorably on the licensee oversight of hot-work activities, along with the integration of fire safety into plant operations. The inspectors determined that hot-work permits were issued in accordance with plant procedures and the individuals issuing the hot-work permits were knowledgeable of procedure requirements. 05/04/2000

- 222 The licensee implemented the maintenance of the safety significant controls in a timely manner with no backlog. The operators were knowledgeable about the active engineered controls in their respective areas. IR 2000-202

**** POSITIVE FINDING** License Application Chapter 7, Chemical Safety, addresses the chemical safety program requirements. Among the program elements is a requirement to address preventative maintenance.

The inspectors reviewed the licensee's maintenance and inspection program. The safety significant interlock frequency and testing was established by an approved procedure. The regulatory engineer approved the frequency. The licensee utilized a computerized maintenance tracking system that generates work orders and notifies the responsible process areas of their safety significant controls maintenance schedule.

The inspectors selected safety significant controls in the Uranium Recovery and the ADU processes to ensure availability and reliability. The licensee identified the safety significant controls for the respective areas in the Chemical Operating Procedure Sketch, URRS area (Sketch no. 836038-1, Rev. 4, April 27, 2000) and the Safety Significant Interlocks, Alarms and Passive Engineered Controls Verification form, Conversion Line 2 (Form no. CF-81-933, Rev. 26, March 9, 2000).

The licensee identified ten AECs, six administrative controls, and one passive engineered control for the URRS areas. The AECs consisted of functions that prevent: failure of the incinerator scrubber system; solution entry to the process scrubber system, and overcharging with the waterglass drum cake. (Waterglass drum cake is the solid left over from the uranium recovery process). The periodic functional testing was verified for the AECs after review of the maintenance records. The inspectors reviewed the results of the functional testing. The results reviewed had no failures and were conducted within the allotted schedule. The licensee explained that if a safety significant control failed it was kept out of service until it was functional. After maintenance was completed, the control was tested to ensure operability.

The maintenance of the safety significant controls for the Precipitation area was also reviewed. One safety significant control was identified. The interlock was a differential pressure orifice plate flow transmitter that prevented very corrosive and soluble uranium-bearing material from entrance to specified tanks. The control was identified as a criticality control that undergoes annual functional testing. The maintenance records reviewed indicated the control had received periodic functional testing.

No maintenance backlog existed for safety significant items at the time of the inspection. The status of maintenance items were reviewed on a weekly frequency by facility personnel to prevent backlog.

The inspectors walked down the process areas and verified that AECs were available in the Uranium Recovery and Precipitation areas. The respective operators were able to identify the AECs in their area. The inspectors also verified the administrative controls were utilized. The operators had an understanding of the importance and functions of the safety significant controls. 05/04/2000

- 225 The maintenance activities and procedures associated with the refurbishment of the MCC fuel assembly shipping containers were acceptable.

IR 00-03

**** POSITIVE FINDING** In addition to the requirements specified in the NRC Certificate of Compliance (CoC) No. 9239 for fuel shipping containers, the requirements for routine determinations specified in 10 CFR 71.87 and 49 CFR 173.475 were applicable.

For reusable NRC-certified packagings for fuel assemblies, the inspector examined the licensee's procedures and records for refurbishment and maintenance and verified that before re-use, all of the periodic maintenance required by the CoC had been incorporated into the procedures and had been performed, except as noted in Section 2.f of this report. During the inspection, the inspector observed maintenance and refurbishment activities on four Model MCC fuel shipping containers, including the gasket replacement on one of the shipping containers. The operators used the checklist in form CF-75B-002, Fuel Assembly Shipping Container Inspection Checklist to ensure that the required maintenance was performed. 05/04/2000

- 246 Periodic maintenance and testing of active engineered controls in the UF6 vaporizer area were adequate to ensure their availability and reliability. (Section 4.a)

IR 70-1151/2000-05

**** POSITIVE FINDING**
RESERVED 09/19/2000

- 288 The conduct of maintenance on process safety controls was being adequately performed to ensure their availability and reliability.

IR 01-02

**** POSITIVE FINDING** The inspectors reviewed maintenance records for work performed on safety controls associated with the bulk powder blending system and the uranium recovery system. The inspectors noted that required periodic maintenance was being performed at the needed intervals. The inspectors also noted that details of the execution of work orders were being recorded and fed back to the engineering staff for consideration of system design improvements. The inspectors also verified that functional testing was being performed prior to returning designated components to operational status.
03/02/2001

- 289 The procedures for Preventive Maintenance and Operator Maintenance for the bulk powder blending and uranium recovery areas were properly approved by licensee management and included adequate instructions.

IR 01-02

**** POSITIVE FINDING** The inspectors reviewed several procedures for Preventive Maintenance (PM) and Operator Maintenance (OM) for the bulk powder blending and uranium recovery areas. The inspectors observed that the procedures included adequate descriptions of the work to be performed and included minimal instructions for functional testing the equipment where appropriate. The inspectors also observed that these procedures were approved by the cognizant engineer for each respective area.
03/02/2001

- 290 Surveillance testing of the bulk powder containers was adequate to ensure the availability and reliability of the engineered safety controls. Calibrations for electronic controls were being performed in accordance with established frequencies.

IR 01-02

**** POSITIVE FINDING** The inspectors reviewed the records of surveillance tests performed on the large, unfavorable geometry bulk powder containers. The inspectors observed that a series of tests were scheduled for each of these containers to ensure the integrity of specific welds and bolts that prevent powder from leaking out of the containers and prevent moisture intrusion. The inspectors found that the surveillance tests were being performed at the designated intervals. The inspectors also observed several of the bulk powder containers and found that the features covered by the surveillance tests were in adequate condition to prevent leakage into or out of the containers. The inspectors observed the calibration tags for various electronic controls used for criticality safety or material control. The inspectors found no overdue or expired calibrations.
03/02/2001

- 291 The conduct of maintenance on process safety controls was being adequately performed to ensure their availability and reliability.

IR 01-02

**** POSITIVE FINDING** The inspectors reviewed the general employee interactive training software, portions of
03/02/2001

- 292 Several safety controls associated with the ADU conversion process were found to be incapable of performing their intended function upon fault conditions from the programmable logic controllers. *EN # 38020*

**** LICENSEE EVENT REPORTS** At approximately 0759 the decanter tripped off line on conversion line 4. Subsequently line 4 was shutdown at 0805. An error in the display program was initially suspected. With conversion line 4 shut down, instrument technicians were called. The technicians attempted to correct the problem with the display program to no avail. An instrumentation and controls (I/C) engineer was called and tracked the problem to the line 4 PLC. Since it was determined that the PLC processor for line 4 had faulted, the processor was reset and tested. The test was satisfactory.

Line 4 was restarted at approximately 1000. At approximately 1030 line 4 was shut down due to a plugged duplex valve at the inlet of the calciner. During this shutdown, a process engineer was informed about the earlier events. The process engineer became concerned about the status of the safety significant controls on line 4 and contacted a nuclear criticality safety (NCS) engineer at approximately 1130. The NCS engineer was present in the control room at approximately 1140.

A time-line of events was reconstructed. The NCS engineer reviewed the sequence of events with the I/C engineer. It was determined that an output fault in an I/O card caused the processor to go into fault mode but all outputs did not go to their correct (OFF) state.

The NCS engineer determined that in the time period from 0759 until line 4 was secured at approximately 0805, the active engineered safety significant controls (SSCs) on line 4 were unavailable, and less than double contingency protection existed in the vaporization system during that time period. The SSCs are considered to have been in place for the 1000

startup and remained in place until the shutdown at 1030, although the cause of the initial failure had not been determined. Conversion operators on line 4 were instructed by the NCS engineer to not restart line 4 until the cause of the PLC failure was determined and corrected. Line 4 remains shutdown pending further investigation.

Justification for Continuing Operations on Lines 1, 2, 3 and 5:

Line 4 utilizes a unique Numalogic PLC system while Lines 1, 2, 3, and 5 utilize a different programmable logic system. There is no reason to believe the Numalogic error is possible on the other lines. The manufacturer of the other programmable logic system (utilized on Lines 1,2,3 and 5) was contacted and stated that their cards cannot fail into any state other than all OFF. Conversion Lines 1, 2, 3 and 5 remain in operation.

Double Contingency Protection

Double contingency protection for the vaporizer is based upon control of mass (prevent/detect a UF6 leak) and geometry (prevent/detect accumulation of moderator in a non-favorable configuration in the bottom of the vaporizer). Double contingency protection on the cylinder (in vaporizer) is based upon moderation control (prevent back-flow of moderator from the hydrolysis column into the cylinder). It was determined that less than double contingency protection remain for these systems and greater than a safe mass was involved. In accordance with Westinghouse Operating License (SNM-1107), paragraph 37.3 (c.5), this event meets the criteria for a 24 hour notification because it constitutes a "nuclear criticality safety incident, in an analyzed system, for which less than previously documented double contingency protection remains . . . and: greater than a safe mass is involved, but a sufficient number of the controls that were lost are restored within four (4) hours such that double contingency protection is restored."

As Found Condition

See "Reason for Notification" above.

Summary of Activity

An unknown PLC failure led to the shutdown of conversion line 4. It was determined that less than double contingency protection existed on the line 4 from 0759 to 0805. Therefore, the NCS engineer directed that line 4 could not be restarted until the cause of the failure was determined and corrected.

Conclusions

Loss of double contingency protection occurred. At no time was there any risk to the health or safety of any employee or member of the public. No exposure to hazardous material was involved. This notification is the result of equipment failure, not a deficient NCS analysis. 05/21/2001

INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT INADEQUATE EQUIPMENT DESIGN OR SELECTION

- 324 The independent audit did not provide a candid assessment of the maintenance of key programmatic areas of the emergency preparedness program and management committed to take corrective action.

IR 01-06

**** NEGATIVE FINDING** The independent audit report had not been issued. The inspector conducted a telephonic interview with the audit team leader regarding the independent audit. Based on interviews, the annual independent audit was not done in calendar year 2000, but met the licensee's definition for annual as defined in Section 1.4 of the license application in that the audit was conducted (February 19-20, 2001) within 15 months from the previous audit (December 1999). Based on interviews and issues identified in this report (e.g., periodic review and updating of plan/procedures, emergency brigade training, and outdated control documents), the inspector determined that the independent audit lacked appropriate depth and did not provide a candid assessment regarding the status of emergency preparedness. The licensee was informed that this was an area requiring corrective actions to demonstrate an effective program was in place for the identification of problems to ensure the appropriate level of preparedness was being maintained. In response to the inspector's comments, the licensee discussed during the exit meeting as corrective actions to explore the execution of a long term contract with a reputable audit group. The licensee's corrective actions for the independent audit are being tracked as an inspector follow up item (IFI 70-1151/2001-06-02).

- 347 Functional testing was well planned and adequate to verify the functionality of the safety controls prior to operation. IR 01-07

**** POSITIVE FINDING** The inspectors reviewed the licensee's general support procedures for the erbia process operations. This included procedures for safety significant laboratory analyses, operation of utility systems, and performing functional verifications of safety controls. The inspectors also reviewed procedures for the operation of nearby equipment that used flammable gases. The inspectors found that the procedures for utilities adequately covered the steps to take during off-normal conditions or loss of utilities. The inspectors found that the procedures for performing functional verifications of

safety provided adequate instructions for testing the functionality of safety controls, and that all engineered safety controls identified in the licensee's safety analyses were covered by the procedures. The inspectors observed portions of the functional tests being performed and found them to be well planned and adequate to verify the functionality of the safety controls. 10/12/2001

INADEQUATE AUDIT OR ASSESSMENT 07/13/2001

- 348 The level, frequency, and type of periodic maintenance identified to be performed on each control appropriately corresponded to the control's safety significance and was adequate to maintain the control's availability and reliability. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the licensee's program for maintaining the availability and reliability of safety controls. This program included a system of procedures for periodic maintenance, calibrations, inspections, and functional testing instructions. The inspectors noticed that all controls identified in the safety analyses were included in the program. The inspectors also noted that the level, frequency, and type of maintenance to be performed on each control appropriately corresponded to the control's safety significance. 10/12/2001

B Training

- 206 NOV issued for violation of procedural requirements for controlling SNM in the bulk blending room when an operator willfully stored containers without acceptable moisture analysis results. *EA-00-035*

**** NOTICE OF VIOLATION** This was in reference to the investigations conducted by the Nuclear Regulatory Commission (NRC) Office of Investigations (OI) on April 29, 1999, and November 30, 1999, at the Westinghouse Columbia Plant. The purpose of the OI investigations was to determine whether a Westinghouse employee willfully violated NRC requirements. The results of the OI investigation were reviewed by NRC inspection and enforcement staff for disposition.

Based on the results of the OI investigations, the NRC determined that violations of NRC requirements occurred. The violation cited in the Notice of Violation involves the failure of a worker to follow operating procedures that impacted a safety control. The violation is of concern because it was determined to be a willful violation and indicates weaknesses in the communication of safety controls to your workers through training and procedures.

The NRC has concluded that information regarding the reason for the violations and the corrective actions taken and planned to correct the violations and prevent recurrence documented during the OI investigation on April 29, 1999 was adequate. The actions included suspension of the offending employee without pay and retraining of the employee on all applicable procedures. It is also noted that other actions are in progress involving revisions to plant operating procedures to more clearly indicate safety controls.

POTENTIAL WRONGDOING 03/10/2000

- 228 The hazmat training program was acceptable and for the individuals receiving the function-specific training, exceeded the minimum requirements specified 49 CFR 172.704. *IR 00-03*

**** POSITIVE FINDING** The inspector reviewed the training records of selected hazmat employees. A hazmat employee is defined in 49 CFR 171.8. The hazmat training included general awareness/familiarization training, function-specific training, and safety training. The type of work the hazmat employee performed would dictate which of three hazmat training elements the employee would receive. The licensee provided general awareness and safety training during March 1998 and September 1999 to a total of 85 attendees. The licensee's training program was set up to provide the hazmat training once per three years in accordance with the requirements of 49 CFR 172.704(c)(2). However, each area supervisor was responsible for making the determination as to who would be a hazmat employee. The inspector noted that one Health Physics Technician had not received the hazmat training in March 1998 or September 1999. However, this individual was performing radiation survey over checks and was not involved with shipping package labeling or the determination of the transport index. The inspector reviewed the general awareness and safety training course material and exams and determined that the hazmat training was acceptable and satisfied the requirements specified 49 CFR 172.704.

The inspector also verified that function-specific training was provided in accordance with the requirements specified in 49 CFR 172.704 to four individuals of the shipping and traffic office who were directly responsible for the safety of transporting hazardous materials and involved with the preparation of hazardous materials for transportation. The licensee had elected to provide this training on an annual basis even though it is required once per three years.

05/04/2000

- 234 The number of brigade members with expired first aid and cardiopulmonary resuscitation (CPR) certification resulted in the inability to meet requirements for a minimum of six fully qualified brigade members on all shifts as discussed in Section 6.3 of Emergency Procedure A-02. Personnel assigned as alternates to the Emergency Director, and personnel assigned to the Emergency Brigade failed to maintain qualifications current in accordance with the SEP and Emergency Procedure.

IR 00-04

**** NOTICE OF VIOLATION** The inspector reviewed training documentation for several individuals assigned to key positions in the current Emergency Telephone Directory, and the Emergency Brigade training summary. Based on the training attendance sheets, training status printout, and an interview with personnel responsible for tracking training, examples were noted where individuals assigned as alternates to the Emergency Director had failed to attend training in accordance with the SEP and EP. Additionally, the inspector determined from the Emergency Brigade training summary matrix that several members failed to maintain current qualifications in first aid and cardiopulmonary resuscitation (CPR). The number of brigade members with expired first aid and CPR certification resulted in the inability to meet requirements for a minimum of six fully qualified brigade members on all shifts as discussed in Section 6.3 of Emergency Procedure A-02. The inspector was informed that the assignment of the Emergency Director alternates was an administrative oversight. In response to the findings, immediate notification was sent to the Emergency Director and others informing that personnel were not qualified to perform as Emergency Director or Alternate until training was completed. An updated listing of alternates were provided and training was scheduled. Regarding the Emergency Brigade, the licensee stated that Brigade members will be trained in CPR and first aid during the third quarter of 2000. As corrective actions to prevent a recurrence, the licensee indicated that the Emergency Brigade Training Coordinator will on a monthly basis verify brigade member's qualifications and schedule training as needed to meet SEP and procedural requirements. Based on the licensee's corrective actions, the inspector concluded that the corrective actions were prompt and appeared to be adequate for preventing a recurrence. The failure to provide training to alternate Emergency Directors and the Emergency Brigade in accordance with Section 7.2 of the SEP and Section 6.3 of Emergency Procedure A-02 was a violation of license condition S-3 (VIO 70-1151/ 2000-04-01).

MANAGEMENT EXPECTATIONS NOT ENFORCED 06/30/2000

- 235 Results from accountability/evacuation drills conducted during August 1999, and April 2000, disclosed problems with equipment, concept of operations, procedures, and human errors.

IR 00-04

**** WEAKNESS** The last biennial exercise was conducted on September 21, 1999, and involved participation by Richland County Emergency Medical Services and the local hospital. Participation by other offsite agencies was limited to notifications only. The next scheduled exercise to fulfill the biennial requirements in Section 7.4 of the Plan would be held in calendar year (CY) 2001. During the review of training details, the inspector noted that tabletop scenarios were presented to ERO personnel to assess the effectiveness of training for participants. The inspector discussed and reviewed documentation associated with the fire/criticality alarm system familiarization sounding and periodic evacuation drills. The results disclosed a frequency for conducting periodic evacuation drills had not been established procedurally nor was required by the license. According to the licensee, prior to August 1999, the last such drill was conducted in 1994. As a program improvement item, the licensee expressed a commitment to conduct evacuation drills at least annually if not semiannually. Results from the recent drills conducted during August 1999, and April 2000, disclosed problems with equipment, concept of operations, procedures, and human errors. In response to drill results, the licensee indicated that the following actions were being considered: 1) replacement of the criticality warning system; 2) determine if additional card readers are needed; 3) revise procedures to include Evacuation Coordinators and assign assembly areas based on work unit or department; and 4) training. The licensee indicated that a remedial evacuation drill will be held following the implementation of corrective actions. The inspector determined that the licensee's procedures for conducting accountability of personnel following an evacuation were minimally acceptable, but improvements were necessary to ensure accountability was both timely and complete. The inspector informed the licensee that the corrective actions to ensure timely and complete accountability of personnel was considered an inspector follow up item (IFI 70-1151/2000-04-02). 06/30/2000

**PROCEDURES NOT COMPLETE OR ACCURATE
INADEQUATE EQUIPMENT DESIGN OR SELECTION**

- 247 The licensee's nuclear criticality safety (NCS) training program adequately addressed the fundamentals of criticality safety. The examination had been improved from previous versions to include more questions about NCS. (Section 5.a)

IR 70-1151/2000-05

**** POSITIVE FINDING**

RESERVED 09/19/2000

- 249 Inspector Followup Item (IFI) No. 70-1151/2000-203-01 was opened to track the upgrading of electronic training records for SNM operators.

IR 00-203

**** NEGATIVE FINDING** During the item control performance test, the MC&A training records for 12 employees were selected for auditing. The inspectors could not verify that specific MC&A-related job capabilities, required by the operators' job descriptions, corresponded to the training records in the Electronic Training and Procedure System (ETAPS). ETAPS data also does not correspond to the hardcopy training records. Due to the inconsistent and confusing status of the licensee's electronic training records, operators could possibly miss required MC&A training. The associated risk is that untrained operators may incorrectly measure SNM or inaccurately record MC&A data, which could contribute to or mask an SNM loss. 10/20/2000

**INADEQUATE TASK PLANNING
MANAGEMENT EXPECTATIONS NOT ESTABLISHED**

- 251 IFI No. 70-1151/2000-203-02 was opened to track the conducting of required measurement control training by year's end, and the associated upgrade from written measurement control tests to computer-based training.

IR 00-203

**** NEGATIVE FINDING** With regard to plant-wide measurement control training, the inspectors found that this has not been conducted since early 1999, although in Section 4.2.7(c) of the FNMCP the licensee has committed to conducting this training annually. Thus, it appears that at least 200 plant personnel may not have been trained in measurement control procedures and requirements for over 18 months. The delay is due to the licensee is moving from paper-based training to computer-based training on the internal website. This has not progressed according to plan. The licensee stated to the inspectors that measurement control training will therefore be conducted using written tests by the end of calendar year 2000. The inspectors opened IFI No. 70-1151/2000-203-02 to track this commitment. The associated risk is that new or transferred employees may fail to perform required standards measurements or otherwise incorrectly perform and/or record such measurements. There is also a risk that out-of-control standards measurements may not be investigated and resolved on a timely basis. This could adversely affect the variance components used to calculate the standard error of the inventory difference (SEID), a key performance indicator. 10/20/2000

- 302 A violation was identified for failure to provide two (2) workers with radiological protection training and monitoring for internal exposure.

IR 01-03

**** NOTICE OF VIOLATION** 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. 05/11/2001

**INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS
INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS**

- 309 Observed plant operations were conducted in a safe manner. Operators were appropriately trained and knowledgeable of the risk-significant process safety controls. IR 01-201

**** POSITIVE FINDING** The inspector examined the tank farm, conversion, incinerator, vaporizers, solvent extraction, ceramic (furnaces and pellet grinders), and manufacturing areas. Housekeeping and fire protection in these areas, postings, use of procedures, logbooks and data sheets, lock & tag practices, and industrial safety were satisfactory. Safety showers and eyewash stations were in good condition, with all tests current.

The inspector interviewed operations personnel and examined procedures for ongoing activities. Compliance with procedures is expected. The licensee has undertaken a major effort to revise procedures to increase the responsibility and accountability of operations personnel. Approximately 800 out of 1200 procedures have been completely re-written.

The inspector interviewed operators regarding powder handling, tank farm operations, conversion operations, solvent exchange, ceramic (furnace) operations, and low level radioactive waste handling, as well as some contractor personnel. The operators and contractors demonstrated an appropriate working knowledge of the risk-significant hazards and dominant safety controls for those hazards. No safety concerns were identified.

The inspector attended the daily plan-of-the day meeting with production, engineering, and maintenance groups.

As part of the initial badging process, the inspector viewed the site general employee safety training and took the multi-media computerized test that accompanied it. The inspector determined that the training provided an adequate introduction to chemical hazards on-site, and that the test was a good method for reinforcing the knowledge gained from the training module.

04/06/2001

Ex.
2

Ex. 2

INADEQUATE TASK CONTROL 07/13/2001

- 329 The drill and exercise program was considered a program strength in light of the kinds of scenarios postulated and the frequency at which drills were being conducted.

IR 01-06

**** PROGRAM STRENGTH** Since the last inspection, the licensee had conducted numerous drills (both table-top and actual field exercises). Drill documentation and interviews with Emergency Brigade members disclosed numerous unannounced hands-on drills were conducted and provided participants with a sense of confidence in performing their assigned duties that previously did not exist. Non-required drills were held at least once a month and scenario details were not provided to participants in advance of the exercise. Scenarios presented the organization with sufficient challenges to test the adequacy of training. Periodically offsite support groups participated with the licensee.
07/13/2001

- 349 Planned staffing of the erbia process used an appropriate mix of experienced and newer workers. Training of the workers covered all pertinent safety disciplines and testing adequately reflected the operator's knowledge of the area safety requirements. *IR 01-07*

**** POSITIVE FINDING** The inspectors reviewed the staffing and training of the workers designated to operate the erbia process. The inspectors observed that the blending process would be available for operation two shifts per day. The inspectors observed that the blending process would not be operated during the third shift each day, but that workers would be in the area to address any unusual occurrence that may affect the blending operation. The inspectors observed that each shift used a combination of highly experienced operators along with newer workers to maximize the knowledge base of the work force while providing a good environment for on-the-job training. The inspectors reviewed the formal training and testing of the designated workers and found that the training covered all pertinent safety disciplines and the testing adequately reflected the operator's knowledge of the area safety requirements. 10/12/2001

- 351 Licensee personnel received adequate training related to significant MC&A duties.

IR 01-203

**** POSITIVE FINDING** Due to the concerns noted in previous inspection reports with activities associated with SNM item control, the inspectors reviewed the formalized training of selected facility personnel who perform SNM item control functions. Training was determined to be an important assurance that facility personnel were knowledgeable of assigned responsibilities related to the handling of SNM in item form. Interviews and a subsequent review of records for selected personnel found that training was performed adequately. Additionally, the inspectors confirmed a review of other MC&A topics had been presented during the annual safety training meetings. No discrepancies were noted.
11/09/2001

- 220 The licensee had provided, through the combination of an onsite emergency response team and offsite fire department assistance, reasonable assurance of an adequate emergency response for suppression of a major fire at the plant. *IR 2000-202*

**** POSITIVE FINDING Emergency Response Team**

The licensee had established an onsite ERT for responding to small fires and relied on off-site fire departments to assist in major firefighting operations. At the time of the inspection, the ERT had a total of 61 members, 40 of whom had completed and maintained the required training to be designated as fully qualified. The licensee maintained 12 to 14 ERT members on each shift to initially respond to a fire.

The inspectors noted that annual training of the ERT members was provided during the recent plant shutdown, and the training addressed fire ground operations, search and rescue, hazardous material decontamination, the use of fire extinguishers and self-contained breathing apparatus, and emergency plans. An emergency drill consisting of a simulated compressed gas cylinder leak was also performed during the annual training. The licensee had provided training commensurate with the expected performance of the ERT.

Off-site Fire Department Assistance

Mutual Aid and the Letter of Agreement: The inspectors reviewed mutual aid and the letter of agreement between the licensee and the City of Columbia Fire Department and the Richland County Department of Emergency Services, respectively, and noted that formal agreements for off-site emergency response assistance were maintained.

Pre-Fire Plans: The inspectors reviewed the Pre-Fire Plans for a fire at the plant. The inspectors noted that the plans contained information identifying the presence of radioactive, fire, and chemical hazards; location of safety equipment; building construction and support features; a detailed layout of the facility; and nuclear criticality safety concerns. The inspectors noted that the Pre-Fire Plans appeared to be user friendly and contained emergency response data needed for firefighting operations. Following the plant shutdown, two days of training, which included familiarization with radiological, chemical, and fire hazards; available firefighting equipment at the plant; and the plant's pre-fire plans, was provided to members of the off-site fire departments.

Expected Response Time: The licensee indicated that the response time from the notification of the nearest offsite fire department until arrival of firefighting vehicles and firefighters at the plant's gate was within 10 - 12 minutes. The inspectors determined that the response time of the offsite fire departments would be reasonable for mitigating a major fire at the plant. *05/04/2000*

- 232 Under the Incident Command System (ICS), although various position titles were changed to reflect the organizational concept, areas of responsibility previously assigned during an emergency were clearly assigned within the ICS organization.

IR 00-04

**** POSITIVE FINDING** Key management changes were made to the emergency organization resulting in the assignment of newly appointed individuals to the Emergency Staff as alternate Emergency Directors. The organizational changes had no impact on the effectiveness of the emergency preparedness program. The most significant change since the last inspection involved the implementation of the "Incident Command" concept of operation in response to an emergency. Based on interview, drill results, and training documentation associated with the new concept of operation, it does not appear that the change resulted in a reduction in the effectiveness of the program. Under the Incident Command System (ICS), although various position titles were changed to reflect the organizational concept, areas of responsibility previously assigned during an emergency were clearly assigned within the ICS organization. Changes to the SEP and Emergency Procedures reflecting the ICS implementation were under site review at the time of the inspection. *06/30/2000*

- 233 The Site Emergency Plan (SEP) and the Emergency Procedure governing evacuation and accountability were inconsistent regarding the location for evacuees to assemble.

IR 00-04

**** NEGATIVE FINDING** Section 7.0 and Figure I of Emergency Procedure A-03 entitled "Evacuation and Accountability" was determined to be inconsistent with Section 5.4.1.2 and Figure 5.1 of the SEP. The inconsistency was associated with the assembly location following a plant evacuation. The referenced sections of the SEP reflected two locations (south gate near the guard shack, and the flagpole near administration building) whereas the procedure included only the flag pole. The licensee contact indicated that the procedure was correct

and the SEP required a revision for consistency with the procedure and general employee training material. The inspector conducted interviews regarding evacuation and assembly locations with randomly selected employees and discovered that procedures and training discussed a single location (flag pole) and the SEP required updating as indicated by the licensee contact. The inspector informed the licensee of bulletin board locations where the evacuation diagram posted was identical to the diagram in the SEP (showing two assembly points). In response the licensee expressed plans to conduct a site wide inspection to replace evacuation diagrams with the correct information and update the SEP information. Additional procedural reviews identified incorrect references that were discussed during a previous inspection but had not been resolved. Consequently, the inspector informed plant management during the exit interview that lack of attention may have resulted in repeat errors and management attention may be necessary to resolve the errors.

PROCEDURES NOT COMPLETE OR ACCURATE 06/30/2000

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an inspector follow up item (IFI 70-1151/2000-04-02).

06/30/2000

86
Ex. 2

- 236 The dedicated emergency facility for housing Emergency Brigade equipment, training, and functioning as an alternate Emergency Operations Center (EOC) was a program enhancement.
IR 00-04

**** POSITIVE FINDING** The inspector observed an inventory and operability check of emergency equipment and found all equipment operated in accordance with the intended function. No problems were noted. A review of the periodic surveillance and maintenance documentation disclosed that selected equipment was being maintained in a state of readiness. The inspector noted as a program enhancement, the construction of a facility dedicated to the Emergency Brigade for storage of equipment, brigade training, and function as an alternate EOC in the event the primary EOC was uninhabitable. The licensee's anticipated date for completion was late July or early August 2000.
06/30/2000

Ex.
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04/06/2001

- 323 The Site Emergency Plan (SEP) did not reflect the current state of emergency preparedness at the facility and required major changes and updates. A violation was identified for failure to review and maintain the Plan in accordance with Section 7.5 of the SEP.
IR 01-06

**** NOTICE OF VIOLATION** Key management changes were made since the last inspection resulting in the assignment of newly appointed individuals to the Emergency Staff as alternate Emergency Directors. The changes did not appear to reduce the effectiveness of the emergency organization in that personnel were provided position specific training in addition to participating in drills and tabletop exercises which provided familiarity with other emergency organization positions. The inspector determined that the licensee had not made changes to the SEP since November 6, 1997, in spite of the numerous changes associated with the facility layout, the Incident Command System (ICS) concept of operations during an emergency, and organizational changes. Section 7.5 of the SEP required that a formal review and update be performed annually. The review was to include changes based on lessons learned during events, drills/exercises, facility changes, organizational changes, etc. In response to the finding, the licensee indicated that a lack of administrative oversight, and competing plant priorities resulted in the failure to properly update the SEP and distribute to control copy holders. The licensee indicated that a complete rewrite of the SEP incorporating the ICS concept and other changes to reflect the current state of emergency preparedness would be completed and the revised SEP distributed to copy holders by July 31, 2001. As corrective actions to prevent a recurrence, the licensee included the formal review and updating of the SEP as an action item in the Electronic Training and Process System (ETAPS) used for tracking purposes. Based on the licensee's corrective actions taken and planned, the inspector considered the corrective actions appropriate and adequate for preventing a recurrence.

INADEQUATE TASK PLANNING 07/13/2001

- 324 The independent audit did not provide a candid assessment of the maintenance of key programmatic areas of the emergency preparedness program and management committed to take corrective action.
IR 01-06

**** NEGATIVE FINDING** The independent audit report had not been issued. The inspector conducted a telephonic interview with the audit team leader regarding the independent audit. Based on interviews, the annual independent audit was not done in calendar year 2000, but met the licensee's definition for annual as defined in Section 1.4 of the license application in that the audit was conducted (February 19-20, 2001) within 15 months from the previous audit (December 1999). Based on interviews and issues identified in this report (e.g., periodic review and updating of plan/procedures, emergency brigade training, and outdated control documents), the inspector determined that the independent audit lacked appropriate depth and did not provide a candid assessment regarding the status of emergency preparedness. The licensee was informed that this was an area requiring corrective actions to demonstrate an effective program was in place for the identification of problems to ensure the appropriate level of preparedness was being maintained. In response to the inspector's comments, the licensee discussed during the exit meeting as corrective actions to explore the execution of a long term contract with a reputable audit group. The licensee's corrective actions for the independent audit are being tracked as an inspector follow up item (IFI 70-1151/2001-06-02).

- 325 Four examples were found where control documents were not maintained current and up-to-date. A formal procedure delineating the responsibility and required actions governing the formal review and approval of changes to the SEP and Emergency Procedures (EPs) did not exist.
IR 01-06

**** NEGATIVE FINDING** No procedure changes were made since the last inspection. The licensee discussed during the inspection intentions to completely rewrite the procedures after Plan changes were approved. Control copies of procedures were checked at several different locations and four examples were noted where a procedure may have been revised, but had not been replaced. The licensee took immediate action to replace any superceded copy with the current version. Regarding the administrative system for the review and approval of changes to the SEP and EPs, the inspector was informed that a procedure delineating responsibility and required actions governing the formal review and approval of the SEP and EP's did not exist. The licensee acknowledged the need for such procedure and committed to the development and implementation of a procedure governing the review and approval of changes to the SEP and EPs. 07/13/2001

**PROCEDURES NOT ESTABLISHED
INADEQUATE TASK CONTROL**

- 326 The performance based training was considered a program strength.
IR 01-06

**** PROGRAM STRENGTH** The inspector reviewed training documentation for personnel assigned as members of the Emergency Operations Center (EOC) staff, and personnel assigned to the Emergency Brigade. The inspector determined from interviews and a review of records that both the quantity and quality of the hands-on emergency response training were significantly improved. The inspector informed the licensee that the performance based training was considered a program strength.
07/13/2001

Ex. 2

INADEQUATE TASK CONTROL 07/13/2001

- 328 The offsite interface was properly maintained.
IR 01-06

**** POSITIVE FINDING** The inspector reviewed documentation and discussed with the licensee drills conducted with the offsite fire and medical support groups. Drill critiques appeared to be candid and open discussions of ways to improve the response. On April 24, 2001, a site tour was provided to members of the offsite fire support groups. According to the licensee, offsite groups are being invited to participate in the biennial exercise scheduled for October 2001.
07/13/2001

- 329 The drill and exercise program was considered a program strength in light of the kinds of scenarios postulated and the frequency at which drills were being conducted.
IR 01-06

**** PROGRAM STRENGTH** Since the last inspection, the licensee had conducted numerous drills (both table-top and actual field exercises). Drill documentation and interviews with Emergency Brigade members disclosed numerous unannounced hands-on drills were conducted and provided participants with a sense of confidence in performing their assigned duties that previously did not exist. Non-required drills were held at least once a month and scenario details were not provided to participants in advance of the exercise. Scenarios presented the organization with sufficient challenges to test the adequacy of training. Periodically offsite support groups participated with the licensee.
07/13/2001

- 330 Two program enhancements were the installation of the wind measuring system on a tower, and the dedicated Emergency Brigade facility. The provision of backup power to the Emergency Operations Center (EOC) via the uninterruptible power supply (UPS) circuitry was considered a facility program strength.
IR 01-06

**** PROGRAM STRENGTH** The license was properly maintaining equipment, supplies, and facilities. Documentation reviewed covering the period January 2000 to present showed that emergency equipment and supplies were being inventoried and operationally checked on a monthly basis.

The inspector observed two program enhancements since the last inspection involving equipment and facilities: the installation of the wind measuring system on a tower to provide more representative data; and
07/13/2001

- 339 In response to the simulated emergency, the emergency organization implemented the Emergency Plan and Procedures, and correctly classified the emergency and completed the offsite notifications in a timely manner.
IR 01-09

**** POSITIVE FINDING** The licensee submitted for NRC review the information on the scope, objectives, and scenario in advance of the exercise date. Minor problems were identified and resolved in advance of the exercise. The exercise scenario simulated a terrorists act which resulted in an explosion, fire, and the rupture of three cylinders containing uranium hexafluoride (UF₆), which resulted in the release of UF₆. Several workers in the area were postulated as contaminated and unconscious. The scenario presented responders with numerous challenges, and the associated messages were adequate and provided exercise participants with conditions to demonstrate various aspects of the emergency response program. The exercise duration was more than two (2) hours.

Exercise participants included the Richland County Emergency Medical Services (EMS), Columbia Fire Department, South Carolina Department of Health and Environmental Control, and the Richland County Sheriff's Office. In response to the simulated emergency, the emergency organization implemented the Plan and Emergency Procedures, and correctly classified the emergency and completed the offsite notifications in a timely manner.
10/10/2001

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Ex.
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PROCEDURES NOT COMPLETE OR ACCURATE
INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS
INADEQUATE TASK PLANNING

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