

R2/D1-11

## Licensee Performance Review for Westinghouse

Assessment Period From: 2/2/1998 TO: 1/8/2000

## I. Safety Operations

## A. Chemical Safety

- **Secondary Inspection Area(s): Maintenance/Surveillance: Chemical Safety**  
The licensee carried out the preventive maintenance of the safety significant controls from the ISAs in a timely manner with no maintenance backlog. IR 99-201  
  
+ Issue Type: POSITIVE FINDING 07/02/1999
- **Secondary Inspection Area(s): Chemical Safety** The licensee's Integrated Safety Analysis (ISA) of the uranyl nitrate bulk storage tanks and chemical receipt, handling and storage systems were thorough for identifying potential hazards, their significance and preliminary recommendations for reducing the likelihood or severity of the potential hazards. The safety significant controls identified in the ISAs were properly flowed down to the plant personnel responsible for the operation and maintenance of the systems. A good practice was observed regarding the manner in which safety significant controls, associated operability, and reporting requirements were identified to the plant staff. IR 99-201  
  
+ Issue Type: POSITIVE FINDING 07/02/1999
- **Secondary Inspection Area(s): Chemical Safety** The licensee's Process Hazard Analysis on the anhydrous ammonia system was revalidated within the appropriate frequency required by 29 CFR 1910.119. All the risks associated with that system had been identified and properly risk ranked. IR 99-201  
  
+ Issue Type: POSITIVE FINDING 07/02/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Chemical Safety**  
The licensee carried out the preventive maintenance of the safety significant controls from the ISAs in a timely manner with no maintenance backlog. IR 99-201  
  
+ Issue Type: POSITIVE FINDING 07/02/1999
- **Secondary Inspection Area(s): Chemical Safety: Management Organization and Controls** The licensee tracked and addressed injury and performance incidents in a timely manner through use of their Record of Occupational Injury or Illness and "Red Book" systems. Performance incident entries were prioritized according to risk and reviewed by management. IR 99-201  
  
+ Issue Type: POSITIVE FINDING 07/02/1999
- **Secondary Inspection Area(s): Chemical Safety: Management Organization**

Information in this record was deleted  
in accordance with the Freedom of Information  
Act, exemptions 2  
FOIA 2006-0026

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**and Controls** The licensee had performed self audits of appropriate scope to the Process Safety Management program. The findings had been prioritized in accordance with the licensee's risk ranking process and were being tracked for closure. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Chemical Safety: Management Organization and Controls** The licensee had established an administrative system to ensure that the validity of the safety analysis was not adversely impacted due to process modifications. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Chemical Safety** HF leak at tank farm due to failure of a dual set point pressure switch. Follow-up at next operations inspection. One liners for 12/18/98 and IR 99-01.

+ Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) 12/17/1998

- **Secondary Inspection Area(s): Chemical Safety** 1200 gallons of nitric acid leaked from IFBA storage tank. One liners (6/4/98)

+ Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO AGING 05/28/1998

- **Secondary Inspection Area(s): Chemical Safety: Plant Operations: Radiological Controls** Small puff of UF<sub>6</sub> leaked from nitrogen heater. One liners

+ Issue Type: DESIGN ISSUES Cause: UNKNOWN 05/07/1998

B. Criticality Safety

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations**  
Engineered and administrative controls identified in the Integrated Safety Assessment (ISA) were being implemented in the uranyl nitrate (UN) bulk tank storage system. IR 99-06
  - + Issue Type: POSITIVE FINDING 12/03/1999
- **Secondary Inspection Area(s): Criticality Safety** Procedural instructions for sampling the UN bulk tanks lacked detail to ensure sample representativeness. IR 99-06
  - + Issue Type: NEGATIVE FINDING The inspector found that the procedures lacked detail for ensuring representativeness of samples taken from the tanks for uranium concentration. Such samples were being used to verify accuracy of the gamma monitors and to serve as backup uranium concentration monitoring in case of failure of the in-line gamma monitors or their power supplies. The inspector was informed by the licensee that the proper technique involved draining two to four liters of solution from the sample line prior to taking the sample. Although the procedures mentioned disposal of drained liquids, no guidance was given in the procedures as to the proper amount of liquid to be drained from a sample line prior to taking the sample in order to ensure representative results. The licensee's actions concerning providing additional detail in the procedures for sampling the UN bulk storage tanks will be tracked as IFI 99-06-02. Cause: PROCEDURES NOT COMPLETE OR ACCURATE 12/03/1999
- **Secondary Inspection Area(s): Criticality Safety** The licensee was adequately implementing process criticality safety controls for the roll compactor hopper system and to prevent the addition of unanalyzed uranium powder into non-favorable geometry containers in the bulk blending system. IR 99-04
  - + Issue Type: POSITIVE FINDING As part of the review of the process incident described in Section 2.b, the inspectors reviewed the licensee's criticality safety controls documented for the pellet area roll compactor hopper system. The inspectors observed that two parameters were being controlled to prevent a criticality accident, mass of uranium in the system and moisture/moderator. The controls on the mass of uranium in the system included one active engineered control and a set of operator procedural instructions that served as an administrative control. The active engineered control was a level probe designed to automatically stop the addition of powder to the system if the hopper became too full. The administrative control included a series of equipment checks and inspections performed by the operator to ensure the system was operating properly and that the mass of uranium remained at the proper level. The inspectors observed that the active engineered control was in place and operable. The inspectors reviewed documentation showing that the administrative controls were being performed in accordance with operating procedures when pelleting lines were in operation. The inspectors also observed that a separate process control that counted the number of powder batches entering the roll compactor hopper and the number of batches of powder removed from the end of the hopper system provided an additional margin of safety. The inspectors found that these process safety controls were being properly implemented. The inspectors reviewed the licensee's criticality safety controls documented for the bulk powder blending system. Since the bulk powder blending system was designed to handle large quantities of uranium powder in NFG containers, criticality controls were only implemented to prevent intrusion of moisture/moderator into the system. The inspectors observed that multiple engineered and administrative controls were identified for preventing moderator from being combined with uranium in the NFG containers. The inspectors reviewed the controls for preventing addition of powder that had not been analyzed for moisture content to the NFG containers. The inspectors found that the controls were adequate for preventing the addition of unanalyzed powder to the NFG

containers. 10/22/1999

- **Secondary Inspection Area(s): Training: Criticality Safety: Plant Operations: Waste Management** The licensee's training for the new process to recover uranium from wastewater sludge cake placed adequate emphasis on safety controls. IR 99-04

- + **Issue Type: POSITIVE FINDING** The inspectors attended a training session for operators of a new process to recover uranium from wastewater sludge cake. The training described the process steps and identified the safety significant controls at each step. Particular emphasis was placed on configuration management of a passive engineered control consisting of a specific hose design used for slurry recirculation. Emphasis was also placed on the administrative operating limits for uranium concentration and total uranium mass added to the system. The training also included instructions for maintenance personnel for controlling the passive engineered control and for performing functional testing of active engineered controls. Training handouts included a listing of all of the safety significant controls in the new process and information on the associated operating procedures, maintenance procedures, and functional testing requirements. The inspectors also reviewed a short test given to each of the trainees and found that it was an adequate indicator of the operators knowledge of the safety systems. 10/22/1999

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations: Management Organization and Controls** Operations for powder production and nitrate waste/recycle handling were being performed with an adequate emphasis on established safety controls. An incident concerning failure of a safety control was properly handled by the licensee staff. IR 99-04

- + **Issue Type: POSITIVE FINDING** The inspectors reviewed operations in the powder production, pelleting, UF6 vaporization, uranium recovery and Integral Fuel Burnable Absorber (IFBA) rod fabrication areas. The inspector also observed safety postings throughout the production areas. The inspector found no deviations from posted safety controls for operations. The inspectors reviewed a situation where moisture was observed in a powder processing Fitzmill enclosure by the area operator. The inspectors discussed the situation with the licensee safety engineers and found that the water came from a slow leak in a feed screw cooling water system. The inspectors found that the Integrated Safety Assessment (ISA) for that portion of the process identified the Fitzmill cooling system water-tight integrity as a passive engineered control to prevent the accumulation of moisture. This control had failed, but other controls (operator observations and enclosure drains) were in place to prevent an unsafe amount of moisture from accumulating in the enclosure. The inspectors determined that double contingency protection remained intact during the incident and the licensee properly handled the situation. 10/12/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety: Plant Operations** Water intrusion was found in the plant's compressed air system on 9/7/99 when the air drying system was not returned to service upon completion of maintenance on the plant air compressors. Water accumulations were reported in several areas of the plant, most notably in the bulk powder blending room Moderation Controlled Area. There was not enough water accumulation (about 1/2 liter) to be a criticality safety concern, but powder blending was halted for two shifts while the compressed air piping system was cleared of all water. One liners

- + **Issue Type: DESIGN ISSUES Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK CONTROL EQUIPMENT FAILURE DUE**

TO FAULTY OR LACK OF MAINTENANCE 09/09/1999

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Failure of condensate removal pump in UF6 vaporizer trench. One Liners and IR 99-04

- + Issue Type: DESIGN ISSUES A 3-inch deep accumulation of condensate occurred in the UF6 vaporizer trench due to failure of a pump. Condensate removal from the vaporizers is needed for moderation control. Moisture sensors in the trench alerted control room operators of the condition before it affected system safety. This is the 2nd occurrence of a failed condensate pump in two months. A redesigned pump system is being expedited. Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) INADEQUATE EQUIPMENT DESIGN OR SELECTION 08/16/1999

- **Secondary Inspection Area(s): Criticality Safety** A uranium powder level control probe identified as a criticality safety control failed to function as designed when a broken wire disabled the probe (see NMED item #990610). The licensee's immediate actions in response to the roll compactor feed hopper process incident were adequate to keep it from becoming a safety significant event. The licensee's corrective actions were adequate in improving the reliability of the equipment and reducing the likelihood of similar material accumulations. IR 99-04 and NMED item #9906

- + Issue Type: DESIGN ISSUES The inspectors reviewed the licensee's actions in response to an incident concerning an accumulation of uranium in a roll compactor feed hopper (Nuclear Material Event Database item No. 990610). The incident occurred when a level controller in a powder feed hopper failed to detect the presence of uranium above the process control level. Normally, powder addition to the feed hopper was automatically stopped when the level control probe sensed powder. However, due to a broken electrical connection to the probe, the controller did not detect the accumulation of powder and continued to add powder to the feed hopper. The area operator observed that powder was not flowing out of the system and investigated the problem. The operator found the accumulation of material above the normal fill level in the feed hopper and shut down the system so that no more powder could be added to the feed hopper. Since the feed hopper was previously analyzed to be non-favorable geometry (NFG), the functioning of the level control system was important to safety. The area supervisor instructed the operator to process the accumulated uranium into favorable geometry containers. Subsequent licensee investigations determined that the amount of mass that had accumulated in the NFG portion of the feed hopper was within safety limits. However, only the attentiveness of the operator prevented the amount of powder from exceeding these limits. In order to strengthen the safety controls for this system, the licensee initiated several corrective actions. The level probes were replaced with a self-checking variety so that system failures could be detected and automatically stop the addition of powder to the feed hopper. Improvements were also made in the procedure for performing operator equipment inspections and adjustments were made to material tracking process controls to help better detect the accumulation of uranium powder in the feed hopper system. Longer term corrective actions included potential redesign of the feed hopper so that it was favorable geometry. Cause: RANDOM EQUIPMENT FAILURE IMPROPER EQUIPMENT DESIGN OR SELECTION 08/05/1999

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Electrical power to process line #5 was lost on 7/27/99 when a UF6 vaporization system condensate pump motor shorted due to exposure to steam. Since control of condensate is part of the criticality safety scheme for that area, these pumps are being redesigned and/or relocated in order to improve their reliability. One liners (7/29/99) and IR 99-04.

- + Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO

**ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) 07/27/1999**

- **Secondary Inspection Area(s): Criticality Safety: Transportation** New fuel assembly design shipped in MCC-4 shipping containers without proper authorization per the CoC. 30-day report dated 8/17/99
- + **Issue Type: LICENSEE EVENT REPORTS** On or about July 23, 1999, it was determined that a Westinghouse 17x17 STD/XL fuel assembly design with a modified annular pellet blanket configuration had been shipped in Model MCC-4 shipping containers without proper authorization by the respective Certificate of Compliance, USA/9239/AF. The fuel assembly design was not included in Table 1-4.4 of the license application, as required in section 5(b) of the Certificate of Compliance. Specifically, Table 1-4.4 of Appendix 1-4 included provisions for the 17STD/XL fuel assembly with an annular blanket of 6.0 inches nominal, top and bottom. It was realized that, in March 1999, a shipment was made of 17STD/XL fuel assemblies with 7.0 inch annular blankets. **Cause: PROCEDURES NOT COMPLETE OR ACCURATE INCOMPLETE SAFETY BASIS 07/23/1999**
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Excessive rains caused water to back up in the plant floor drain system to the point where puddles were formed in the rod handling and bundle assembly areas. No SNM was adversely affected, but since this is typically a dry process area, increased attention will be focused on the preventing future occurrences. One liners dated 7/1/99
- + **Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO EXTERNAL FACTORS (E.G. WEATHER) 07/15/1999**
- **Secondary Inspection Area(s): Criticality Safety** The inspectors identified an Unresolved Item (URI) due to failure to analyze portable high efficient particulate air (HEPA) filter units prior to use in the facility. IR 99-203
- + **Issue Type: UNRESOLVED ITEM** During a walkdown of plant process areas, the inspectors observed a portable HEPA filter unit parked in a maintenance work area of the facility. The portable HEPA consists of a small pre-filter and HEPA filter unit with a blower and six inch diameter suction hose that is mounted on wheels for ease of movement. Facility staff acknowledged that the equipment was not analyzed for use in the plant and stated that operations was not allowed to use the equipment without special authorization from criticality safety. The inspectors noted that there was no sign or other indication that the equipment was not available for use. The equipment was being controlled through the radiation work permit (RWP) process whereby a user would submit an RWP which would be screened by operations to determine what safety or technical review was required for the particular application. A facility criticality safety engineer immediately placed a danger tag on the equipment to prevent use. In the early 1980's, the licensee purchased two portable HEPA filter units for the manufacturing automated process (MAP). When MAP was shutdown, the HEPAs became available for general use in the plant. The licensee indicated that the portable HEPAs are occasionally used for negative pressure ventilation such tent ventilation in low uranium contamination areas. The licensee indicated that the portable HEPAs were not used in areas where significant quantities of uranium were available and had not been reviewed by criticality safety. The licensee attempted to locate analysis for the portable HEPA filters (two are available) but could not locate any documentation other than the original MAP evaluation which mentioned that ventilation was approved. One of the two portable HEPAs has been approved for use in a non-uranium contaminated area of the Zion defabrication project. This does not pose a criticality safety concern. The other filter will remain out of service pending criticality safety evaluation. The licensee failure to evaluate the portable HEPA filter units prior to their use with fissile material violates license Section 6.2.5 which requires that, prior to use, a movable non-favorable geometry (NFG) container will undergo comprehensive analysis and have appropriate controls identified. The

inspectors determined that immediate, effective licensee corrective action to remove the portable HEPA filter unit from service and initiate analysis was sufficient to assure continued safety of operations. The inspectors also determined that the safety significance of this issue would depend upon the results of the licensee analysis. The failure to analyze the portable HEPA filter units prior to use in the facility is Unresolved Item (URI) 70-1151/99-203-01. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK PLANNING SAFETY BASIS NOT ESTABLISHED 04/23/1999

- **Secondary Inspection Area(s): Criticality Safety** The inspectors identified a program weakness in the licensee failure to review portable HEPA units during the preparation of the ventilation integrated safety analysis (ISA). IR 99-203

- + Issue Type: WEAKNESS See Record No. 146. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK PLANNING SAFETY BASIS NOT ESTABLISHED 04/23/1999

- **Secondary Inspection Area(s): Emergency Preparedness: Criticality Safety** A criticality alarm sounded in the solvent extraction area. The area was evacuated. Subsequent measurements showed it to be a false alarm. Phone call

- + Issue Type: DESIGN ISSUES Maintenance work was being performed on the criticality detection system to install low-level background sources. The system tripped as a result of the maintenance work. The exact cause is under investigation. Cause: INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 03/11/1999

- **Secondary Inspection Area(s): Criticality Safety** From IR 99-01 : "The common failure mechanism of one passive engineered moderation control with the failure of mass controls on the bulk powder feed system was not documented in the CSE." From IR 99-203 : "The inspectors determined that an overflow slot, a criticality control for the pellet room powder feed operations, will not perform as stated." IR 99-01 and IR 99-203

- + Issue Type: NEGATIVE FINDING From IR 99-01 : "The inspectors questioned the ability of one of the Passive Engineered Controls (PECs) to perform its intended function. The PEC in question was a slot cut into the containment system for collection of spilled uranium powder from the pelleting feed system. The slot was one of six controls identified in the CSE for protecting against the accumulation of water (for assuring moderation control) in the powder collection system. The observed slot was only about 1/16 inch wide and partially plugged with powder. The inspectors observed that the slot's ability to drain water from the system would be negated by the presence of an accumulation of powder. In effect, the failure of any mass control that limited the accumulation of powder in the collection system also caused the failure of the moisture drainage slots. Thus, the inspectors found that a common cause failure mode existed between the moisture drainage slots and each of the mass controls on the system. The inspectors observed that this common failure mode was not discussed in the CSE as were other common failure scenarios. The inspectors discussed the potential ineffectiveness of the slots with the licensee. The licensee's criticality safety staff indicated that the situation would be reviewed for potential modification. The inspectors concluded that other sufficient controls were in place to assure double contingency protection. Since this issue potentially deals with the adequacy of the CSE, it has been referred to the NRC Fuel Cycle Operations Branch and tracked as Inspector Follow-up Item (IFI) 99-01-01." From IR 99-203 : "During inspection 70-1151/99-01, Region II inspectors noted a slot at the top of the bulk powder handling enclosure feed chute. The slot was determined to be safety significant in that it is intended to prevent the accumulation of water in the chute. The regional inspector observed that wet powder would most likely not go through the slot which was already partially blocked with powder. The inspectors noted that this safety feature (the slot) would only function as intended if

water alone was present. The water would not flow through the slot as intended if powder was present in the chute. The licensee stated that two controls remain on the chute even if the slot fails because there is a level probe on the chute which will detect water level and moderator is prevented from entering the chute by barriers and moisture sampling of material up stream. The inspectors determined that the slot will not behave entirely in the fashion anticipated by the flowchart in the analysis although criticality safety of the equipment is assured by the level probe and moderator controls. Licensee management agreed to modify the criticality safety analysis for the equipment to recognize that the overflow slot was not as effective a control as the level probe and moderator controls. Licensee action to revise the criticality safety analysis will be tracked as IFI 70-1151/99-203-02." Cause: INADEQUATE AUDIT OR ASSESSMENT INCOMPLETE SAFETY BASIS 02/05/1999

- **Secondary Inspection Area(s): Criticality Safety** Administrative controls identified in the Criticality Safety Evaluation were not always implemented through the use of operating procedures. IR 99-01

- + Issue Type: NEGATIVE FINDING The inspectors observed that the primary administrative controls were not always found in the operating procedures referenced on the fault trees. The most notable example of this was the administrative control for operators detecting accumulations of water in powder processing equipment. Although the inspectors found that operators were trained to recognize hazardous accumulations of water in powder processing areas, there were no instructions in the operating procedures to implement this administrative control. Also, the inspector found that the licensee's administrative procedure CA-200, "Management Control of Safety Significant Structures, Systems and Components," stated that all safety related controls were listed in appropriate area operating procedures. The licensee agreed that all safety related controls should be included in procedures and would ensure that such controls were identified in future procedure revisions. Cause: PROCEDURES NOT COMPLETE OR ACCURATE INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS 02/05/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety** Assumptions made and conclusions reached for the sintering furnace portion of the Criticality Safety Evaluation would not be valid during certain maintenance activities. IR 99-01 and IR 99-203

- + Issue Type: SER ISSUES From IR 99-01 : "Some processes covered by the pelleting area CSE did not include fault trees and identification of nuclear criticality safety controls. The assumptions made for these areas were that the accumulation of mass and moderator in quantities to make a criticality possible was incredible. In one such area, the inspectors observed that the evaluation of the sintering furnaces stated that criticality was not credible, and thus double contingency was not required. This conclusion was reached although the internal furnace chamber was of non-favorable dimensions, pellets were known to spill into the furnace during normal operations, and many areas of the furnace were water-cooled. The CSE also states that there is no credible source of moderator available to the furnace chamber when pellets are in the chamber in the assumption that the furnace is at production temperatures. Furnace temperatures during normal operations would keep any moderator in the vapor phase. This assumption would not be valid when the furnace was cooled and disassembled due to a major pellet spill inside the furnace. Water was being used to cool various parts of the furnace including the exit chamber, heating element electrical connections, and optical pyrometer mounting hardware. Water was also used to humidify the furnace atmosphere. In some cases, water lines must be disassembled and/or moved in order to access the interior furnace chamber. Since controls did not exist for assuring all pellets from a spill were removed prior to cooling the furnace, the possibility existed for water to enter the furnace while pellets were in the chamber. The adequacy of the assumptions made and conclusions reached in the sintering furnace portion of the CSE will be referred to the Fuel Cycle Operations Branch for further review and tracked as IFI 99-01-02." From IR 99-203 : "During inspections 70-1151/98-10 and 70-1151/99-01, Region II inspectors questioned



the safety basis of the sintering furnace. The licensee has determined that criticality in the furnace is not credible due to the heat of the furnace when uranium pellets are present. The regional inspectors determined that removal of spilled uranium pellets from the furnace, a maintenance operation, is performed when the furnace is cooled down. The licensee indicated that maintenance operations are analyzed separately prior to performing the work. Licensee analysis indicates that pellets occasionally fall out of boats while inside the furnace so that they can accumulate in the furnace. The licensee believes that a significant accumulation of pellets in the furnace due to routine operation is not credible. The licensee arrived at this conclusion through the use of handbook data for an infinite slab of pellets. The inspectors determined that an accumulation of pellets in a furnace that would be a criticality concern was not credible since this would require a depth of pellets through the furnace that is greater than the height of the boats. The inspectors determined that it was not credible that water could accumulate around enough pellets in the furnace to be a criticality concern due to the design of the furnace, a level tunnel open at the ends." 02/05/1999

- **Secondary Inspection Area(s): Criticality Safety** The engineered process safety controls identified in the pellet area Criticality Safety Evaluation (CSE) were being adequately implemented. IR 99-01

+ Issue Type: POSITIVE FINDING 02/05/1999

- **Secondary Inspection Area(s): Criticality Safety** On December 18, 1998, at 2:15 pm we received a call from W. Goodwin with regard to a problem identified in the line 5 process cooling water heat exchanger. Earlier in the day, an operator noticed that the cooling water return from the sintering furnace was discolored. After an investigation, the licensee determined the presence of uranium in the process cooling water. The sources of the uranium was from the heat exchanger from conversion line 5 calciner scrubber recirculation loop (a closed loop). The licensee observed small pinholes in the heat exchanger. Line 5 is used to process ash, which apparently tends to be an abrasive material and may have caused the damage to the heat exchanger. Line 5 is currently down and will remain down until the heat exchanger unit is replaced. The licensee checked and pressure tested the other 4 lines and identified no other problems. Cooling tower samples indicated a total uranium concentration of 45-60 ppm. Phone call

+ Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) EQUIPMENT FAILURE DUE TO AGING 12/18/1998

- **Secondary Inspection Area(s): Criticality Safety** The requirements of COP-822522 were not followed in that on three different occasions the inspectors observed cracked sintering boats being used for nuclear material processing. IR 98-10 and IR 99-203 and IR 99-04

+ Issue Type: NOTICE OF VIOLATION From IR 98-10 : "During the inspection the inspectors observed significant cracks in several pellet sintering boats containing uranium oxide pellets. These boats were used to contain these pellets as they were processed through a high temperature sintering furnace. The analysis stated, however, that the boats are inspected regularly for integrity and serviceability. This requirement was implemented through Chemical Operating Procedure (COP)-822522, Rev. 3, Repair of Pellet Sintering Boats. This procedure required, in part, that boats that will not pass through boat measuring gauges or cracked/broken boats be identified and collected for repair. On three different occasions, the inspectors observed several boats with significant cracks along welded areas being used to contain uranium oxide pellets as they

were being processed through the furnace. In addition, two operators interviewed on separate occasions indicated that boats with cracks were routinely used. The safety significance of this inspector identified observation involved the lack of implementation of procedural requirements required by a nuclear criticality safety analysis to ensure a favorable geometry operating configuration. The fact that no immediate criticality safety hazard existed was fortuitous. The failure to follow COP-822522 by not removing cracked pellet sintering boats from service is identified as VIO 98-10-03." From IR 99-203 : "During inspections 70-1151/98-10 and 70-1151/99-01, Region II inspectors questioned the safety basis of the sintering furnace. The licensee has determined that criticality in the furnace is not credible due to the heat of the furnace when uranium pellets are present. The regional inspectors determined that removal of spilled uranium pellets from the furnace, a maintenance operation, is performed when the furnace is cooled down. The licensee indicated that maintenance operations are analyzed separately prior to performing the work. Licensee analysis indicates that pellets occasionally fall out of boats while inside the furnace so that they can accumulate in the furnace. The licensee believes that a significant accumulation of pellets in the furnace due to routine operation is not credible. The licensee arrived at this conclusion through the use of handbook data for an infinite slab of pellets. The inspectors determined that an accumulation of pellets in a furnace that would be a criticality concern was not credible since this would require a depth of pellets through the furnace that is greater than the height of the boats. The inspectors determined that it was not credible that water could accumulate around enough pellets in the furnace to be a criticality concern due to the design of the furnace, a level tunnel open at the ends." Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON; MANAGEMENT EXPECTATIONS NOT ENFORCED 12/11/1998

- **Secondary Inspection Area(s): Criticality Safety** Engineered and administrative (procedural) controls were used and safety related equipment was calibrated as identified in the CSE License Annex for the UF6 cylinder wash process. IR 98-09

+ Issue Type: POSITIVE FINDING 11/13/1998

- **Secondary Inspection Area(s): Maintenance/Surveillance: Emergency Preparedness: Criticality Safety: Radiological Controls** False criticality alarm in the solvent extraction area. Phone call & IR 98-10

+ Issue Type: MISCELLANEOUS The false alarm occurred after calibration of the system was done during a time of relatively high activity in the area (high background). When activity decreased on midnight shift, the background radiation subsided such that the criticality detectors sensed a low signal. This triggered the failure alarm circuit which triggered the evacuation alarm. This is the 2nd occurrence of this type of failure in the past 12 months, the other one being in the rod loading area. There are two problems to be investigated here: 1) a change in the calibration technique may be warranted to eliminate false alarms due to low signals, and 2) a change in the circuitry such that a low signal on one detector does not trigger the evacuation alarm. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK PLANNING INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 09/30/1998

- **Secondary Inspection Area(s): Training: Criticality Safety: Management Organization and Controls** Inspectors observed what appeared to be operations involving nuclear material not being conducted in accordance with approved procedures in that uranium oxide sample containers were routinely stored on an engineered storage rack without being authorized by area operating procedures or nuclear criticality safety posting. After an NOV was issued, the licensee discovered that this practice was covered by an approved procedure. The NOV was withdrawn but still raises questions about the adequacy of training and knowledge of their procedure contents. IR 98-10 and IR 99-203

- + Issue Type: **NEGATIVE FINDING** From IR 99-10 : "During the inspection the inspector observed several covered plastic cups containing about 100 gram each of uranium oxide being stored on shelves in a "polypack" storage rack located at a uranium scrap processing operation. Storage of these cups was neither authorized by the nuclear criticality safety (NCS) posting attached to the storage rack (NCS Posting No. CONV01, Rev. 0) nor the operating procedures for the area. Subsequent to the observation the inspector interviewed an operator in the area and verified that storage of the samples cups on the rack was not addressed by any operating procedures. The inspector reviewed and discussed the nuclear criticality safety analysis for the storage racks with the cognizant nuclear criticality safety engineer and determined that the assumptions used in analysis were very conservative therefore no immediate criticality safety hazards existed. Prior to the end of the inspection the licensee replaced the posting with one that allowed the storage of sample cups on the rack (NCS Posting No. CONV33, Rev. 0) and provided a copy of the posting to the inspector. Since the authorization of sample storage was performed without additional calculations being performed, a more thorough review of the analysis by an NRC Criticality Safety Specialist is warranted to assure that the storage is within the bounds of the original analysis. The performance of that follow-up review by NRC will be tracked as Inspector Followup Item (IFI) 98-10-01. The safety significance of this inspector identified observation involved the handling and storage of nuclear materials without an approved procedure or NCS posting as required by the License Application, along with the lack of understanding by the operator of this requirement. The failure to conduct operations involving nuclear material without an approved procedure or proper nuclear criticality posting is identified as Violation (VIO) 98-10-02." The licensee's reply to the NOV stated, "These sample cups in the rack were not specifically addressed by the respective criticality postings. During the inspection, the inspectors were incorrectly told that placing the cups with 10 gram samples into the storage racks was not covered by procedure. Subsequent to the close of the inspection, however, it was determined that there is an operating procedure (COP-815002, Revision 23, 8/1/97) that specifically addresses this." Based on this new information, NRC withdrew the violation. The follow-up review of the adequacy of the sample storage by NRC criticality safety specialists was documented in IR 99-203. That inspection report states, "During inspection 70-1151/98-10, a Region II inspector questioned the practice of storing sample containers in the same rack as filled polypacks. The rack in question holds stacks of two polypacks separated by one foot spacing. Up to four filled sample containers were stored in the open spaces of the rack. The inspectors reviewed the analytical model and determined that storage of the filled sample bottles as done by the licensee with four bottles at each location does not affect the safety basis of the rack due to a conservative boundary model. The rack was analyzed and controls were based upon four polypacks in each location, and in practice, only three can be in a position in the rack." Cause: **ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING PROCEDURES NOT COMPLETE OR ACCURATE** 12/11/1998

**Secondary Inspection Area(s): Criticality Safety: Management**

**Organization and Controls** Loss of double contingency protection for collection of pellets under the pellet grinder bowl feeder. Event resulted in NCV 98-09-02 and IFI 98-09-01. EN #34662 & IR 98-09

- + Issue Type: **NON-CITED VIOLATIONS** At 1030 on 8/19/98, while performing an enrichment cleanout at the grinder bowl feeder on pellet line #3, an unusual accumulation of pellets was noted in the favorable geometry poly pack (8 inch diameter x 7.5 inches high) and the chute above it. The pack is in a ventilated enclosure (approximately 14 inches x 14 inches x 14 inches) and is designed to collect any pellets that may fall from the bowl feeder. 56.8 kg of sintered, ceramic UO<sub>2</sub> pellets, enrichment 4.4 wt% U-235, were removed from the poly pack and chute. Double contingency protection for the collection of pellets under the bowl feeder consists of mass control (a maximum of 22 kg of UO<sub>2</sub> material accumulates in a favorable geometry) and moderator control (pellets remain dry). For this configuration, an appropriate, conservation limit for UO<sub>2</sub> mass is 41 lb (18.6 kg), which is the maximum permissible value for 5.0 wt% U-235, administrative mass limit of UO<sub>2</sub> pellets in an unfavorable geometry. The excessive material was immediately removed from line #3 to restore double contingency protection and all other

operating pellet lines were inspected to verify no excessive material accumulation.

**Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING  
MANAGEMENT EXPECTATIONS NOT ENFORCED INADEQUATE EQUIPMENT  
DESIGN OR SELECTION 08/19/1998**

- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety**  
A 24-hr NRC reportable event was discovered when, during maintenance checks, the line #3 UF6 vaporizer steam chest condensate drain line was found to be clogged. Event Notice # 34533 and IR 98-06.
  - + **Issue Type: LICENSEE EVENT REPORTS** Double contingency protection for the steam chest consists of mass control (to ensure that no SNM accumulates from the UF6 cylinder) and moderator control (to ensure that the condensate drains freely from the steam chest. Condensate typically drains from the steam chest to a collection tank. The collection tank is subsequently pumped to a holding tank and then on to the contaminated sump. The collection tank contains two level probes designed to notify the operators of a condensate pump failure and automatically shut off steam to the steam chest. During a 30-day operator maintenance check of these level probes, water is poured into the empty steam chest to drain to and fill up the collection tank. This event was reported when it was noticed that the water did not drain well into the collection tank. Subsequent inspection of the drain system revealed significant clogging. Although there was no SNM in the steam chest at the time of this discovery, the condensate removal system could not be clearly demonstrated as being operable. Since the removal of the condensate from the steam chest is one of the two contingencies protecting against criticality, the event was reported under Bulletin 91-01. **Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) INADEQUATE EQUIPMENT DESIGN OR SELECTION 07/16/1998**
- **Secondary Inspection Area(s): Criticality Safety** Criticality safety calculations documented in CALCNOTES were not being independently verified as required by section 6.4.2(c.2) of the License Application. IR 98-203
  - + **Issue Type: NOTICE OF VIOLATION Cause: PROCEDURES NOT COMPLETE OR ACCURATE MANAGEMENT EXPECTATIONS NOT ESTABLISHED 06/26/1998**
- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** In-process changes not controlled and final installation not reviewed by responsible safety staff. IR 98-203
  - + **Issue Type: NEGATIVE FINDING Cause: PROCEDURES NOT COMPLETE OR ACCURATE 06/26/1998**
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations: Radiological Controls** About 40 kg of U3O8 powder spilled due to a failed clamp on a material "add-back" line at the pelleting system. Event Notice # 34460 and IR 98-06.
  - + **Issue Type: LICENSEE EVENT REPORTS** Approximately 40 kg U3O8 powder spill was discovered in pelleting manufacturing area line #3. The event was detected by operators at 0300 hrs on June 30, 1998. The spill resulted from a failure of an end-cap clamp on a favorable geometry (2 inch diameter) powder add-back feed line, which rate feeds material into the main powder stream as part of the powder prep process. Add-back material is reprocessed scrap/recycle powder that is blended in with virgin U3O8 powder. Since the spill involved material leaking from favorable geometry containment onto a mezzanine floor in a non-moderation controlled area, and no specific controls were in place to ensure that the material would remain in a favorable slab, double contingency protection could not be demonstrated. Upon discovery, the affected portion of the process was shut down, and the spill was cleaned up immediately. **Cause: RESERVED RANDOM EQUIPMENT FAILURE 06/30/1998**

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** Several deficiencies were identified with the licensee's efforts to implement corrective actions identified in IR 97-205. IR 98-202
  - + Issue Type: NEGATIVE FINDING Incorporation of License Application Section 6.0 requirements were flawed and incomplete. Licensee technical staff apparently did not fully understand the commitments made at the pre-enforcement conference and had planned to include the technical requirements for criticality safety as part of longer term corrective actions. The inspectors believe these findings are the lingering results of the management deficiencies identified by IR 97-205 and acknowledged by the licensee at the enforcement conference, in that, management systems to ensure that corrective actions were adequately implemented were still immature. Cause: MANAGEMENT EXPECTATIONS NOT COMMUNICATED OR UNDERSTOOD 05/01/1998
- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** Weaknesses were identified in the licensee's implementation of its Safety Margin Improvement Program (SMIP). IR 97-202
  - + Issue Type: NEGATIVE FINDING The weaknesses included: 1) lack of ownership for review and closure of self-identified weaknesses, 2) weak interim measures for identification and control of NCS controls and safety-related devices, 3) weak management oversight and control measures to ensure full integration of SMIP initiatives, completion of SMIP items, and resource allocation management to ensure successful completion of committed tasks at an acceptable quality level. Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 05/01/1998
- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** The 1008 ammonia scrubber was operated from May 1997 to April 1998 with an inoperable criticality safety control. IR 98-202
  - + Issue Type: NOTICE OF VIOLATION The two differential pressure gauges on the 1008 ammonia scrubber used for NCS control were both found reading below the zero mark. When NRC inspectors questioned this, the licensee investigated and found that the gauges had been removed from service on May 8, 1997, following modifications to the equipment, but that the NCS evaluation was not revised and approved for this change. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS SAFETY BASIS NOT ESTABLISHED 05/01/1998
- **Secondary Inspection Area(s): Criticality Safety** The low flow alarm on a UNH tank recirculation loop used for concentration verification was found to be inoperable upon recovery from a power outage. IR 98-03
  - + Issue Type: DESIGN ISSUES Cause: INADEQUATE EQUIPMENT DESIGN OR SELECTION 04/09/1998

C. Plant Operations

- **Secondary Inspection Area(s): Plant Operations** The potential effect of a level control system failure (at the bulk uranyl nitrate bulk storage tanks) could reduce the reliability of two identified safety controls. IR 99-06
  - + **Issue Type: NEGATIVE FINDING** The inspector found that when the tank level monitors indicated that the tank was empty (zero level), the solution recirculation system and the gamma monitor alarms were automatically disabled. The disabling of these systems was intended to protect the recirculation pumps from damage and to prevent spurious false alarms from the gamma monitors when a tank was empty. The inspector determined, through interviews with the licensee's staff, that the tank level monitoring system could fail low and thus defeat these two safety controls. Such a failure could result from something as simple as a broken wire, as occurred on a powder level control system identified in a previous inspection (see inspection report 70-1151/99-04). The inspector found that the operators performed system overchecks twice per shift that could detect a problem with the level monitors. This would help prevent a long term loss of solution recirculation and/or increase of the uranium concentration. The licensee's actions concerning correcting potential problems associated with this failure mode will be tracked as inspector follow-up item (IFI) 99-06-01. **Cause: IMPROPER EQUIPMENT DESIGN OR SELECTION** 12/03/1999
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Engineered and administrative controls identified in the Integrated Safety Assessment (ISA) were being implemented in the uranyl nitrate (UN) bulk tank storage system. IR 99-06
  - + **Issue Type: POSITIVE FINDING** 12/03/1999
- **Secondary Inspection Area(s): Criticality Safety** The licensee was adequately implementing process criticality safety controls for the roll compactor hopper system and to prevent the addition of unanalyzed uranium powder into non-favorable geometry containers in the bulk blending system. IR 99-04
  - + **Issue Type: POSITIVE FINDING** As part of the review of the process incident described in Section 2.b, the inspectors reviewed the licensee's criticality safety controls documented for the pellet area roll compactor hopper system. The inspectors observed that two parameters were being controlled to prevent a criticality accident, mass of uranium in the system and moisture/moderator. The controls on the mass of uranium in the system included one active engineered control and a set of operator procedural instructions that served as an administrative control. The active engineered control was a level probe designed to automatically stop the addition of powder to the system if the hopper became too full. The administrative control included a series of equipment checks and inspections performed by the operator to ensure the system was operating properly and that the mass of uranium remained at the proper level. The inspectors observed that the active engineered control was in place and operable. The inspectors reviewed documentation showing that the administrative controls were being performed in accordance with operating procedures when pelleting lines were in operation. The inspectors also observed that a separate process control that counted the number of powder batches entering the roll compactor hopper and the number of batches of powder removed from the end of the hopper system provided an additional margin of safety. The inspectors found that these process safety controls were being properly implemented. The inspectors reviewed the licensee's criticality safety controls documented for the bulk powder blending system. Since the bulk powder blending system was designed to handle large quantities of uranium powder in NFG containers, criticality controls were only implemented to prevent intrusion of moisture/moderator into the system. The inspectors observed that multiple engineered and administrative controls were identified for preventing moderator from being combined with uranium in the NFG containers. The

inspectors reviewed the controls for preventing addition of powder that had not been analyzed for moisture content to the NFG containers. The inspectors found that the controls were adequate for preventing the addition of unanalyzed powder to the NFG containers. 10/22/1999

- **Secondary Inspection Area(s): Training: Criticality Safety: Plant Operations: Waste Management** The licensee's training for the new process to recover uranium from wastewater sludge cake placed adequate emphasis on safety controls. IR 99-04

- + **Issue Type: POSITIVE FINDING** The inspectors attended a training session for operators of a new process to recover uranium from wastewater sludge cake. The training described the process steps and identified the safety significant controls at each step. Particular emphasis was placed on configuration management of a passive engineered control consisting of a specific hose design used for slurry recirculation. Emphasis was also placed on the administrative operating limits for uranium concentration and total uranium mass added to the system. The training also included instructions for maintenance personnel for controlling the passive engineered control and for performing functional testing of active engineered controls. Training handouts included a listing of all of the safety significant controls in the new process and information on the associated operating procedures, maintenance procedures, and functional testing requirements. The inspectors also reviewed a short test given to each of the trainees and found that it was an adequate indicator of the operators knowledge of the safety systems. 10/22/1999

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations: Management Organization and Controls** Operations for powder production and nitrate waste/recycle handling were being performed with an adequate emphasis on established safety controls. An incident concerning failure of a safety control was properly handled by the licensee staff. IR 99-04

- + **Issue Type: POSITIVE FINDING** The inspectors reviewed operations in the powder production, pelleting, UF6 vaporization, uranium recovery and Integral Fuel Burnable Absorber (IFBA) rod fabrication areas. The inspector also observed safety postings throughout the production areas. The inspector found no deviations from posted safety controls for operations. The inspectors reviewed a situation where moisture was observed in a powder processing Fitzmill enclosure by the area operator. The inspectors discussed the situation with the licensee safety engineers and found that the water came from a slow leak in a feed screw cooling water system. The inspectors found that the Integrated Safety Assessment (ISA) for that portion of the process identified the Fitzmill cooling system water-tight integrity as a passive engineered control to prevent the accumulation of moisture. This control had failed, but other controls (operator observations and enclosure drains) were in place to prevent an unsafe amount of moisture from accumulating in the enclosure. The inspectors determined that double contingency protection remained intact during the incident and the licensee properly handled the situation. 10/12/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety: Plant Operations** Water intrusion was found in the plant's compressed air system on 9/7/99 when the air drying system was not returned to service upon completion of maintenance on the plant air compressors. Water accumulations were reported in several areas of the plant, most notably in the bulk powder blending room Moderation Controlled Area. There was not enough water accumulation (about ½ liter) to be a criticality safety concern, but powder blending was halted for two shifts while the compressed air piping system was cleared of all water. One liners

- + Issue Type: DESIGN ISSUES Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK CONTROL EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE 09/09/1999
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Failure of condensate removal pump in UF6 vaporizer trench. One Liners and IR 99-04
  - + Issue Type: DESIGN ISSUES A 3-inch deep accumulation of condensate occurred in the UF6 vaporizer trench due to failure of a pump. Condensate removal from the vaporizers is needed for moderation control. Moisture sensors in the trench alerted control room operators of the condition before it affected system safety. This is the 2nd occurrence of a failed condensate pump in two months. A redesigned pump system is being expedited. Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) INADEQUATE EQUIPMENT DESIGN OR SELECTION 08/16/1999
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Electrical power to process line #5 was lost on 7/27/99 when a UF6 vaporization system condensate pump motor shorted due to exposure to steam. Since control of condensate is part of the criticality safety scheme for that area, these pumps are being redesigned and/or relocated in order to improve their reliability. One liners (7/29/99) and IR 99-04.
  - + Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) 07/27/1999
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations** Excessive rains caused water to back up in the plant floor drain system to the point where puddles were formed in the rod handling and bundle assembly areas. No SNM was adversely affected, but since this is typically a dry process area, increased attention will be focused on the preventing future occurrences. One liners dated 7/1/99
  - + Issue Type: DESIGN ISSUES Cause: EQUIPMENT FAILURE DUE TO EXTERNAL FACTORS (E.G. WEATHER) 07/15/1999
- **Secondary Inspection Area(s): Plant Operations: Fire Safety Housekeeping** was enforced in many areas and, yet, was lacking in others. IR 99-02
  - + Issue Type: NEGATIVE FINDING The inspectors observed that the overall control of combustibles was adequately maintained for the activities performed during the plant shutdown. Egress routes were maintained clear of obstructions throughout the chemical and mechanical manufacturing areas. However, the inspectors identified two locations in the chemical manufacturing areas, where the accumulation of plastic type combustibles presented potential high fire loading concern. The conditions observed are described below:
    - Approximately sixteen, 55-gallon, empty, plastic drum liners were accumulated in a pile that was approximately 16-18 feet from UF6 cylinder staging area in the UF6 Bay. The UF6 Bay was protected by an automatic wet sprinkler system which minimized the potential risk for fire exposure to the UF6 cylinders. However, the accumulation of empty plastic drum liners presented significant fuel loading that could increase the fire severity in the UF6 Bay.
    - The inspectors observed a large pile of scrap computer equipment stored approximately 18-20 feet from dry ash powder storage racks and empty bulk material containers in the South-East Expansion area of the plant. This location was designated a moderation controlled area and automatic sprinkler system protection was not provided. The accumulation of plastic combustibles presented increased fuel loading, and the observed condition was not consistent with requirements



of plant procedure SYP-300, Housekeeping (i.e., minimize combustibles storage in moderation controlled areas). However, a sufficient separation distance existed between the pile of combustibles and dry ash powder storage racks and emptied powder storage containers. The lack of obvious ignition sources also minimized the potential of a fire exposure and reduced the overall risk significance of the conditions observed by the inspectors. The licensee acknowledged the concern for fire prevention and relocated the drum liners to a designated sprinkler protected storage location, away from the UF6 cylinders, prior to the NRC Exit Meeting. The licensee committed to relocating the pile of scrap computer equipment to a designated sprinkler protected storage location upon return of the full work force and to determining what additional actions were required to prevent future occurrences. The licensee indicated that the actions would be completed by April 30, 1999. The completion of these actions and the licensee's determination of additional required actions to prevent recurrence will be tracked as IFI 70-1151/ 99-02-02. Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 04/08/1999

- **Secondary Inspection Area(s): Plant Operations: Fire Safety** A plastic "polypack" container caught fire when heated LLW presscake was placed inside it. 30 day report dated 2/2/99 and IR 99-01.

- + Issue Type: LICENSEE EVENT REPORTS At approximately 10:45 am on 1/12/99, a URRS operator noticed a small fire in a polypack located in a ventilated hood which services an oven which is used to dry press cake. The press cake contained 2 to 3 % uranium at approximately 4% enrichment. The fire was caused by the operator not allowing the press cake to cool thoroughly before placing it in the polypack. The fire was extinguished quickly with water. No damage to the hood or ventilation system occurred. No significant air activity, personnel exposure, or environmental releases occurred. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON 01/12/1999

- **Secondary Inspection Area(s): Plant Operations: Radiological Controls** Several examples of poor housekeeping were observed. IR 98-10

- + Issue Type: NEGATIVE FINDING During several facility tours the inspector noted numerous examples of poor housekeeping. Examples included respirators not being returned to designated receptacles for used respirators, used gloves and shoe covers not being placed in the appropriate receptacles, and contaminated equipment within the controlled area not being properly contained. In addition, the inspectors noted an unsecured compressed gas cylinder with no cap over exposed valving. The licensee took immediate actions in response to the inspectors observations and comments regarding housekeeping. Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 12/11/1998

- **Secondary Inspection Area(s): Plant Operations: Radiological Controls** Elbow on ventilation duct serving ADU wet end processing came loose due to failure of clamping mechanism. Follow-up at next operations inspection. One liners for 12/18/98

- + Issue Type: DESIGN ISSUES Cause: UNKNOWN 12/11/1998

- **Secondary Inspection Area(s): Criticality Safety: Plant Operations: Radiological Controls** About 40 kg of U3O8 powder spilled due to a failed clamp on a material "add-back" line at the pelleting system. Event Notice # 34460 and IR 98-06.

- + Issue Type: LICENSEE EVENT REPORTS Approximately 40 kg U3O8 powder spill was discovered in pelleting manufacturing area line #3. The event was detected by operators at 0300 hrs on June 30, 1998. The spill resulted from a failure of an end-cap clamp on a favorable geometry (2 inch diameter) powder add-back feed line, which rate feeds

material into the main powder stream as part of the powder prep process. Add-back material is reprocessed scrap/recycle powder that is blended in with virgin U3O8 powder. Since the spill involved material leaking from favorable geometry containment onto a mezzanine floor in a non-moderation controlled area, and no specific controls were in place to ensure that the material would remain in a favorable slab, double contingency protection could not be demonstrated. Upon discovery, the affected portion of the process was shut down, and the spill was cleaned up immediately. Cause: RESERVED  
RANDOM EQUIPMENT FAILURE 06/30/1998

- **Secondary Inspection Area(s): Chemical Safety: Plant Operations: Radiological Controls** Small puff of UF6 leaked from nitrogen heater. One liners
  - + Issue Type: DESIGN ISSUES Cause: UNKNOWN 05/07/1998
- **Secondary Inspection Area(s): Plant Operations: Radiological Controls** Boot failure at top end of bucket elevator on line #2 caused air activity levels 11 to 12 times DAC. One liners and IR 98-03
  - + Issue Type: NEGATIVE FINDING 03/03/1998

**D. Fire Safety**

- **Secondary Inspection Area(s): Fire Safety** The cutting and welding activities performed during the plant shutdown were conducted safely in accordance with plant procedure and the licensee took other appropriate precautions necessary for fire prevention during the plant shutdown. IR 99-02
  - + **Issue Type: POSITIVE FINDING** The inspectors observed and reviewed permits for performing cutting and welding activities to assure that appropriate fire prevention controls were being followed during the plant shutdown. Three cutting and welding activities were observed and reviewed (i.e., re-piping of vaporizers in the UF6 Bay, repair of metal gate in Product Store Room, and cutting operations outside of GAD Bay). The inspectors observed that appropriate fire prevention measures were taken to minimize the potential ignition of combustibles. Fire extinguishers were provided and were easily accessible, and a fire watch was provided. The inspectors concluded that the cutting and welding activities observed during the plant shutdown were conducted safely and in accordance with plant procedure No. SYP-207, Cutting, Welding, and Hot Work.  
05/10/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Fire Safety** The plant emergency lighting, fire alarm system, and fire pumps were adequately tested on backup electrical power during an intentional shutdown of plant's primary electrical power system and their safety functions were adequately demonstrated. IR 99-02
  - + **Issue Type: POSITIVE FINDING** The inspectors performed a walk-through of the Fire Pump House No. 1 and No. 2 to review the capability of the plant's diesel fire pumps to meet their intended safety function during the loss of primary electrical power. The inspectors identified that the fire pump controllers, which are critical to the automatic start-up function, were maintained operable on battery power supply independent of the plant backup electrical power system. Each of the diesel fire pumps and controllers were provided with two storage battery units (a primary and a secondary) for starting the engine and maintaining the pump controller function. The inspectors performed a walk-through of the manufacturing facility and the exterior of the plant to review the status of fire protection equipment during the plant shutdown. No obvious or apparent impairment to fire suppression systems, fire alarm system, the fire monitor nozzles, fire hydrants, standpipe systems, fire pump, post indicating valves, or water storage tanks were noted by the inspectors. The inspector conducted a "walk-down" of sprinkler line "E", verified valve line up and noted no indications of disrepair nor non-serviceability. The Inspector also reviewed the licensee's Fire System Impairment Reports, which indicated no current impairments to fire protection systems. The inspectors performed a walk-through of the mechanical manufacturing areas during a loss of plant primary electrical power, on the afternoon of April 5, 1999. The inspectors noted that ceiling lights connected to the plant backup electrical power system provided the emergency lighting for the plant. The inspectors observed that the lighting provided along the path of egress exceeded the minimum illumination of 0.1 footcandle required industry standard (i.e., National Fire Protection Association (NFPA) 101, Life Safety Code). The emergency lights operated for the duration of the loss of primary electrical power, until the afternoon of April 6, 1999. The capability of the plant backup electrical power supply exceeded the minimum emergency illumination period of 1.5 hours required by the NFPA 101.  
04/28/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Fire Safety** The licensee safely conducted maintenance activities with proper considerations of fire prevention during the plant shutdown and demonstrated an overall assurance of defense-in-depth fire protection for plant operations. IR 99-02
  - + **Issue Type: POSITIVE FINDING** The inspectors reviewed records of inspection, testing,

and maintenance (ITM) of the automatic sprinkler system, fire alarm systems, fire hydrants, fire monitor nozzles and hoses, and performed a walk-through to determine the material condition of fire protection systems and components. The appropriate implementation of ITM is necessary to assure the reliability and availability of fire protection systems to perform their intended safety functions. In general, the ITM of water-based fire suppression systems or components (e.g., fire hydrants, post-indicator valves, automatic sprinkler systems, fire hoses, etc.) and the fire alarm system (e.g., smoke detectors, heat detectors, pull stations, etc.) at the plant were found to be consistent with accepted industry standards. 04/08/1999

- **Secondary Inspection Area(s): Fire Safety** The licensee's Fire Safety Program was effective and well managed. IR 99-02

+Issue Type: POSITIVE FINDING The licensee's fire safety program is managed by a Regulatory Engineer who is assisted by several technicians for the purposes of testing and maintaining equipment. The licensee contracts with members of the Columbia Fire Department for training and also equipment inspection. The Regulatory Engineer has contracted with the South Carolina Fire Academy for additional training of the Fire Brigade. This Engineer has established effective procedures and records of routine tests. He has been responsive to the findings of the insurer and to his own compliance auditors. 04/08/1999

- **Secondary Inspection Area(s): Training: Fire Safety** The training of the Fire Brigade at the South Carolina Fire Academy was realistic and challenging, and as such, was considered to be a strength. IR 99-02

- + Issue Type: PROGRAM STRENGTH The inspectors attended the interior structural firefighting training of emergency team members to assess the adequacy of the licensee's program. The training for interior structural firefighting was provided by the South Carolina Department of Labor, Licensing and Regulation at the South Carolina Fire Academy. The classroom training included the chemistry of fire and fire behavior, protective equipment and self contained breathing apparatus (SCBA), interior fire attack, and search and rescue. The classroom training was followed by hands-on firefighting exercises inside an actual burning building at the academy burn facility, search and rescue operations inside of a multistory building, and fire ground and tactical operations exercises. The inspectors considered the training and the hands-on exercises to be very good for preparing the emergency team members to perform duties that could be expected for a real fire incident. 04/08/1999

- **Secondary Inspection Area(s): Plant Operations: Fire Safety** Housekeeping was enforced in many areas and, yet, was lacking in others. IR 99-02

- + Issue Type: NEGATIVE FINDING The inspectors observed that the overall control of combustibles was adequately maintained for the activities performed during the plant shutdown. Egress routes were maintained clear of obstructions throughout the chemical and mechanical manufacturing areas. However, the inspectors identified two locations in the chemical manufacturing areas, where the accumulation of plastic type combustibles presented potential high fire loading concern. The conditions observed are described below:
  - Approximately sixteen, 55-gallon, empty, plastic drum liners were accumulated in a pile that was approximately 16-18 feet from UF6 cylinder staging area in the UF6 Bay. The UF6 Bay was protected by an automatic wet sprinkler system which minimized the potential risk for fire exposure to the UF6 cylinders. However, the accumulation of empty plastic drum liners presented significant fuel loading that could increase the fire severity in the UF6 Bay.
  - The inspectors observed a large pile of scrap computer equipment stored approximately 18-20 feet from dry ash powder storage racks and empty bulk material containers in the South-East Expansion area of the plant. This location was designated a moderation controlled area and automatic sprinkler system protection was not provided. The accumulation of plastic combustibles presented increased fuel loading, and the observed condition was not consistent with requirements of plant procedure SYP-300, Housekeeping (i.e., minimize combustibles storage in

moderation controlled areas). However, a sufficient separation distance existed between the pile of combustibles and dry ash powder storage racks and emptied powder storage containers. The lack of obvious ignition sources also minimized the potential of a fire exposure and reduced the overall risk significance of the conditions observed by the inspectors. The licensee acknowledged the concern for fire prevention and relocated the drum liners to a designated sprinkler protected storage location, away from the UF6 cylinders, prior to the NRC Exit Meeting. The licensee committed to relocating the pile of scrap computer equipment to a designated sprinkler protected storage location upon return of the full work force and to determining what additional actions were required to prevent future occurrences. The licensee indicated that the actions would be completed by April 30, 1999. The completion of these actions and the licensee's determination of additional required actions to prevent recurrence will be tracked as IFI 70-1151/ 99-02-02. Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 04/08/1999

- **Secondary Inspection Area(s): Plant Operations: Fire Safety** A plastic "polypack" container caught fire when heated LLW presscake was placed inside it. 30 day report dated 2/2/99 and IR 99-01.

- + Issue Type: LICENSEE EVENT REPORTS At approximately 10:45 am on 1/12/99, a URRS operator noticed a small fire in a polypack located in a ventilated hood which services an oven which is used to dry press cake. The press cake contained 2 to 3 % uranium at approximately 4% enrichment. The fire was caused by the operator not allowing the press cake to cool thoroughly before placing it in the polypack. The fire was extinguished quickly with water. No damage to the hood or ventilation system occurred. No significant air activity, personnel exposure, or environmental releases occurred. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON 01/12/1999

- **Secondary Inspection Area(s): Fire Safety** Small fire in cutting room due to unauthorized combustible liquids in area. IR 99-01

- + Issue Type: NON-CITED VIOLATIONS Sparks from a plasma torch ignited combustible liquid stored in the URRS Decon Room (Cutting Room). The liquid was not detected during a check by the operator prior to performing the cutting. The fire was quickly extinguished with an ABC fire extinguisher. There was no damage to any container or equipment. There were no significant personnel exposures, elevated air samples, or releases to the environment. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK CONTROL 01/12/1999

## E. Management Controls

### - **Secondary Inspection Area(s): Management Organization and Controls**

The licensee's new regulatory policy for applying Quality Assurance (QA) program criteria to safety significant controls adequately met the requirements of the license application. IR 99-06

- + **Issue Type: POSITIVE FINDING** The inspector reviewed the licensee's regulatory policy for applying QA program criteria to safety significant controls. The inspector found that this policy had only recently been established and approved by the licensee management on November 18, 1999, to supplement the management of safety controls identified in the ISA. The inspector found that the policy was established on a graded approach such that controls designed to prevent the highest consequence events were required to implement the eighteen aspects of the licensee's QA program. The inspector observed that the eighteen aspects of the licensee's QA program were the same as those listed in the license application and in Title 10 of the Code of Federal Regulations, Part 50, Appendix B. Safety significant controls designed to prevent events of lesser consequence were still required to implement thirteen aspects of the licensee's QA program. The parts of the QA program not applicable to lesser consequence events were related to QA of procurement activities, and control of auxiliary processes and equipment. The inspector found that the licensee's QA program met applicable license requirements. The inspector reviewed the licensee's initial application of the QA program based on results of the ISA for the UN bulk storage tank system. The inspector found that safety controls were consistently categorized according to the consequences they prevented. The implementation of the QA program for other process areas had not been completed at the time of this inspection. 12/03/1999

### - **Secondary Inspection Area(s): Management Organization and Controls:**

**Transportation** The corrective actions for two licensee-identified violations of the Certificate of Compliance for shipping fuel assemblies had been completed and were adequate to prevent recurrence. See items # 130 and #166. IR 99-06

- + **Issue Type: NON-CITED VIOLATIONS** The inspector reviewed three 30-day reports issued by the licensee concerning self-identified violations of the Certificate of Compliance (CoC) requirements for fuel assembly shipping containers. The first of these reports was issued on March 9, 1999, and identified that certain fuel assemblies had been shipped between February 11 and 17, 1999, with redesigned guide tube dimensions that were not within the specifications authorized by the CoC. The licensee's corrective actions included revising the CoC to include the redesigned guide tube dimensions and to perform a root cause investigation to identify any additional corrective actions needed. The revised CoC was approved by NRC on February 22, 1999. The inspector was briefed on the licensee's root cause investigation, which revealed that the licensee's Engineering Change Notice (ECN) system had allowed changes to be made to fuel assembly designs without a review of the safety impact that such changes would have on the fuel assembly shipping containers. The licensee modified its ECN procedure (effective July 30, 1999) to ensure that certain fuel assembly design changes would be reviewed by the appropriate personnel to determine the potential safety impact associated with the fuel assembly shipping containers. The inspector found that this procedural change would likely prevent recurrence of the violation. This non-repetitive, licensee-identified and corrected violation 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 99-06-03. While performing the root cause investigation, the licensee identified that certain fuel assemblies had been shipped in March 1999 with modified annular pellet blanket configurations that were not within the specifications authorized by the CoC. A 30-day report was issued to the NRC on August 17, 1999, to document the violation. The licensee's corrective actions included revising the CoC and completing the corrective actions identified by root cause investigation performed from the previous violation of the CoC. The CoC was quickly revised and approved by NRC on August 16, 1999. The inspector found that this incident had the same root causes as the previous incident, but

occurred before corrective actions could be implemented. Thus, this violation was a second example of NCV 99-06-03. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS 12/03/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Management Organization and Controls** The licensee's maintenance procedures adequately addressed maintenance activities associated with UN bulk storage tank system safety controls identified in the ISA. The licensee's maintenance procedures were adequately reviewed by the appropriate safety management. IR 99-06
  - + Issue Type: POSITIVE FINDING The inspector reviewed the maintenance procedures for the UN bulk storage tank system. The inspector observed that the maintenance of all safety controls identified in the ISA for that system were adequately addressed in a maintenance procedure. The inspector also noted that functional testing of these controls was also adequately addressed in the maintenance procedures. During the inspector's review of the maintenance procedures for the UN bulk storage tank system, it was noted that each procedure was approved by the area process engineer and the manager of Environment, Health and Safety. 12/03/1999
- **Secondary Inspection Area(s): Management Organization and Controls** The titles in the new corporate structure differed from those in the license application, but an updated license application had been submitted to correct the discrepancy. The qualifications of the new manager of the plant safety function met license requirements. IR 99-06
  - + Issue Type: POSITIVE FINDING The inspector reviewed the recent reorganization of the licensee's corporate structure, plant management, and safety functions. The inspector observed that the various levels in the reorganized corporate structure were named differently than shown in the license application. The inspector noted however, that a request for a license amendment for these name changes had already been submitted to NRC for review. The inspector also reviewed the qualifications of the new manager of the plant's safety function and found that the qualification requirements in the approved license application were met. 12/03/1999
- **Secondary Inspection Area(s): Management Organization and Controls: Transportation** A licensee-identified violation is under review by NRC HQ transportation group to determine safety significance and adequacy of corrective actions. This is an Unresolved Item pending completion of the evaluation. 30 day report dated 11/23/99.
  - + Issue Type: UNRESOLVED ITEM The inspector reviewed the 30-day report dated November 23, 1999, that identified several MCC-3 shipping containers were constructed with a weld pattern different than that specified in the drawings referenced by the CoC. The weld specifications were intended to strengthen the top half of the container shell to ensure container integrity during accident conditions. The licensee's corrective actions included placing an immediate hold on the use of the affected containers; re-welding the affected containers to bring them within specification; and inspection of all fuel assembly shipping containers to ensure compliance with all applicable license drawing requirements. At the time of this inspection, the effect of the different weld pattern on the structural integrity of the container had not been determined. Until such a determination can be made, this situation remains an unresolved item (URI) and is identified as URI 99-06-04. Cause: INADEQUATE AUDIT OR ASSESSMENT INADEQUATE CONSTRUCTION 10/25/1999
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations:**

**Management Organization and Controls** Operations for powder production and nitrate waste/recycle handling were being performed with an adequate emphasis on established safety controls. An incident concerning failure of a safety control was properly handled by the licensee staff. IR 99-04

+ Issue Type: POSITIVE FINDING The inspectors reviewed operations in the powder production, pelleting, UF6 vaporization, uranium recovery and Integral Fuel Burnable Absorber (IFBA) rod fabrication areas. The inspector also observed safety postings throughout the production areas. The inspector found no deviations from posted safety controls for operations. The inspectors reviewed a situation where moisture was observed in a powder processing Fitzmill enclosure by the area operator. The inspectors discussed the situation with the licensee safety engineers and found that the water came from a slow leak in a feed screw cooling water system. The inspectors found that the Integrated Safety Assessment (ISA) for that portion of the process identified the Fitzmill cooling system water-tight integrity as a passive engineered control to prevent the accumulation of moisture. This control had failed, but other controls (operator observations and enclosure drains) were in place to prevent an unsafe amount of moisture from accumulating in the enclosure. The inspectors determined that double contingency protection remained intact during the incident and the licensee properly handled the situation. 10/12/1999

- **Secondary Inspection Area(s): Management Organization and Controls** Don Goldbach has been appointed manager of the Regulatory Affairs group effective 9/1/99. One liners

+ Issue Type: MISCELLANEOUS 08/30/1999

- **Secondary Inspection Area(s): Chemical Safety: Management Organization and Controls** The licensee tracked and addressed injury and performance incidents in a timely manner through use of their Record of Occupational Injury or Illness and "Red Book" systems. Performance incident entries were prioritized according to risk and reviewed by management. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Chemical Safety: Management Organization and Controls** The licensee had performed self audits of appropriate scope to the Process Safety Management program. The findings had been prioritized in accordance with the licensee's risk ranking process and were being tracked for closure. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Chemical Safety: Management Organization and Controls** The licensee had established an administrative system to ensure that the validity of the safety analysis was not adversely impacted due to process modifications. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Emergency Preparedness: Management Organization and Controls** Personnel conducting the [independent] audit [of the emergency organization] were technically qualified to perform the audit, and



the audit plan contained guidance to ensure that the audit was performed in a manner consistent with Section 7.8 of the Emergency Plan. IR 99-03

- + Issue Type: POSITIVE FINDING The independent audit was conducted during December 15-16, 1998. Personnel conducting the audit were technically qualified to perform the audit, and the areas audited were consistent with the audit plan and Section 7.8 of the SEP. No deficiencies were identified. The audit report documented what appeared to have been a detailed, compliance-oriented audit to verify that the program was maintained in a state of operational readiness. 05/14/1999

- **Secondary Inspection Area(s): Management Organization and Controls**

The sale of Westinghouse commercial business to BNFL and the sale of Westinghouse government services business to Morrison Knudsen were completed. email transmittal

- + Issue Type: MISCELLANEOUS 03/22/1999

- **Secondary Inspection Area(s): Management Organization and Controls: Waste Management** Discrepancies between licensee administrative procedures and license requirements concerning liquid effluent criteria were identified. IR 99-01

- + Issue Type: NEGATIVE FINDING The inspector reviewed the licensee's procedures for implementation of the liquid effluents monitoring program. The inspector noted that several discrepancies existed between the procedures and the license requirements as to effluent limit concentrations. Procedure COP-811601, "On-Line Gamma Activity Monitors and Quarantine Tanks System Operation," stated that a limit of 24 parts per million (ppm) uranium (U) was used as guidance for suspension of discharges to the water treatment facility (WTF) from the main chemical processing areas. The limit of 24 ppm U (5.5E-5 uCi/ml based on four percent U-235 content) exceeded the criteria of 3.0E-5 uCi/ml as stated in license SNM-1107. In addition, procedure RA-401, "Environmental Control Requirements Mandated By 10 CFR20 and NRC License SNM-1107," stated that a setpoint of 3.6E-5 uCi/ml for the online gamma spectroscopy system was used to automatically divert flow from the WTF to diversion tanks. In discussions with personnel, the inspector determined that these procedural discrepancies were not significant issues due the resulting low offsite dose levels (i.e <0.002 millirem/year) associated with the procedural limits. The inspector also noted that procedure COP-830509, "Release of F-1165 Effluent for Processing," specified that discharges from the WTF should be less than 0.2 ppm U which exceeds the license criteria of 0.05 ppm U. The inspector discussed this with the licensee who indicated that the license requirement of 0.05 ppm U was a typographical error, and should have been 0.5 ppm U. Again, this discrepancy was not viewed as being safety significant due to the low offsite public exposures as a result of the licensee's radiological liquid effluents. However, the inconsistencies between the limits in the operating procedures and license requirements will be resolved by the licensee through modification of procedures and/or license amendment. The correction of these items will be tracked as an IFI (IFI 99-01-04). Cause: PROCEDURES NOT COMPLETE OR ACCURATE 02/05/1999

- **Secondary Inspection Area(s): Management Organization and Controls**

The licensee's Quality Assurance program for safety-significant processing equipment was adequate to ensure that such equipment would perform its desired safety function. IR 99-01

- + Issue Type: POSITIVE FINDING The inspectors reviewed the implementing procedures associated with the Quality Assurance program. The inspectors observed that the program was largely a subset of the facility's Process Safety Management program, and was implemented by a series of procedures for the various aspects of controlling the

functionality of safety equipment. The inspectors observed that procedures for configuration management and process hazard analysis helped control the quality of the design and installation of safety-significant process systems. The inspectors observed that these procedures utilized a "graded approach" system of hazard rankings so that potential process hazards with the greatest risks received the greatest attention. The inspectors also noted that the Quality Assurance program included procedures that assigned responsibilities to each of the various management functions involved in ensuring the availability and reliability of safety controls. 02/05/1999

**Secondary Inspection Area(s): Training: Criticality Safety: Management Organization and Controls** Inspectors observed what appeared to be operations involving nuclear material not being conducted in accordance with approved procedures in that uranium oxide sample containers were routinely stored on an engineered storage rack without being authorized by area operating procedures or nuclear criticality safety posting. After an NOV was issued, the licensee discovered that this practice was covered by an approved procedure. The NOV was withdrawn but still raises questions about the adequacy of training and knowledge of their procedure contents. IR 98-10 and IR 99-203

+ Issue Type: NEGATIVE FINDING From IR 99-10 : "During the inspection the inspector observed several covered plastic cups containing about 100 gram each of uranium oxide being stored on shelves in a "polypack" storage rack located at a uranium scrap processing operation. Storage of these cups was neither authorized by the nuclear criticality safety (NCS) posting attached to the storage rack (NCS Posting No. CONV01, Rev. 0) nor the operating procedures for the area. Subsequent to the observation the inspector interviewed an operator in the area and verified that storage of the samples cups on the rack was not addressed by any operating procedures. The inspector reviewed and discussed the nuclear criticality safety analysis for the storage racks with the cognizant nuclear criticality safety engineer and determined that the assumptions used in analysis were very conservative therefore no immediate criticality safety hazards existed. Prior to the end of the inspection the licensee replaced the posting with one that allowed the storage of sample cups on the rack (NCS Posting No. CONV33, Rev. 0) and provided a copy of the posting to the inspector. Since the authorization of sample storage was performed without additional calculations being performed, a more thorough review of the analysis by an NRC Criticality Safety Specialist is warranted to assure that the storage is within the bounds of the original analysis. The performance of that follow-up review by NRC will be tracked as Inspector Followup Item (IFI) 98-10-01. The safety significance of this inspector identified observation involved the handling and storage of nuclear materials without an approved procedure or NCS posting as required by the License Application, along with the lack of understanding by the operator of this requirement. The failure to conduct operations involving nuclear material without an approved procedure or proper nuclear criticality posting is identified as Violation (VIO) 98-10-02." The licensee's reply to the NOV stated, "These sample cups in the rack were not specifically addressed by the respective criticality postings. During the inspection, the inspectors were incorrectly told that placing the cups with 10 gram samples into the storage racks was not covered by procedure. Subsequent to the close of the inspection, however, it was determined that there is an operating procedure (COP-815002, Revision 23, 8/1/97) that specifically addresses this." Based on this new information, NRC withdrew the violation. The follow-up review of the adequacy of the sample storage by NRC criticality safety specialists was documented in IR 99-203. That inspection report states, "During inspection 70-1151/98-10, a Region II inspector questioned the practice of storing sample containers in the same rack as filled polypacks. The rack in question holds stacks of two polypacks separated by one foot spacing. Up to four filled sample containers were stored in the open spaces of the rack. The inspectors reviewed the analytical model and determined that storage of the filled sample bottles as done by the licensee with four bottles at each location does not affect the safety basis of the rack due to a conservative boundary model. The rack was analyzed and controls were based upon four polypacks in each location, and in practice, only three can be in a position in the rack." Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING PROCEDURES NOT COMPLETE OR ACCURATE 12/11/1998

- **Secondary Inspection Area(s): Emergency Preparedness: Management Organization and Controls** The independent emergency preparedness audit lacked details to demonstrate that the program assessment included procedures, training, equipment, and drills/exercise observations. IR 98-07

- + **Issue Type: NEGATIVE FINDING** Documentation for the annual independent audit was reviewed and an interview was conducted with the auditor to determine the adequacy of the audit in meeting Section 7.8 of the SEP. Based on the documentation, the inspector determined that the audit was a very detailed review of the SEP to determine if the SEP was consistent with guidance in Regulatory Guide (RG) 3.67 (Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities) and requirements in 10 CFR 70.22. However, the audit documentation lacked details to show critical program elements such as emergency response training, facilities, equipment, or offsite support agency interface were reviewed. Thus, the inspector questioned the auditor regarding what additional aspects of the program were reviewed. The interviewee indicated that although the primary focus of the audit was the SEP, the audit also included observation of the biennial exercise, a check of the emergency vehicle and supplies, training records, and surveillance records for emergency equipment and supplies were reviewed. The interviewee acknowledged that the documentation to support such areas audited was lacking from the report. Based on the interview and audit documentation, the inspector emphasized the importance of the development and implementation of an audit plan and checklist to ensure the audit was performed in a manner consistent with the SEP requirement. This aspect of the audit program was previously discussed in an NRC Inspection Report (70-1151/97-05). The auditor's current position involved emergency planning and the development of Plans and procedures for the Emergency Management Team at the Westinghouse Energy Systems Business Unit (ESBU) site. Audit findings requiring corrective actions were assigned in the licensee's commitment tracking system (CTS) for followup. **Cause: INADEQUATE AUDIT OR ASSESSMENT 09/25/1998**

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** Loss of double contingency protection for collection of pellets under the pellet grinder bowl feeder. Event resulted in NCV 98-09-02 and IFI 98-09-01. EN #34662 & IR 98-09

- + **Issue Type: NON-CITED VIOLATIONS** At 1030 on 8/19/98, while performing an enrichment cleanout at the grinder bowl feeder on pellet line #3, an unusual accumulation of pellets was noted in the favorable geometry poly pack (8 inch diameter x 7.5 inches high) and the chute above it. The pack is in a ventilated enclosure (approximately 14 inches x 14 inches x 14 inches) and is designed to collect any pellets that may fall from the bowl feeder. 56.8 kg of sintered, ceramic UO<sub>2</sub> pellets, enrichment 4.4 wt% U-235, were removed from the poly pack and chute. Double contingency protection for the collection of pellets under the bowl feeder consists of mass control (a maximum of 22 kg of UO<sub>2</sub> material accumulates in a favorable geometry) and moderator control (pellets remain dry). For this configuration, an appropriate, conservation limit for UO<sub>2</sub> mass is 41 lb (18.6 kg), which is the maximum permissible value for 5.0 wt% U-235, administrative mass limit of UO<sub>2</sub> pellets in an unfavorable geometry. The excessive material was immediately removed from line #3 to restore double contingency protection and all other operating pellet lines were inspected to verify no excessive material accumulation. **Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING MANAGEMENT EXPECTATIONS NOT ENFORCED INADEQUATE EQUIPMENT DESIGN OR SELECTION 08/19/1998**

- **Secondary Inspection Area(s): Training: Management Organization and Controls** General employee training program failed to provide required training/instructions to all applicable workers. IR 98-06 and IR 99-04

- + **Issue Type: NOTICE OF VIOLATION** The inspectors determined that personnel working in the manufacturing area of the facility could change jobs and move into positions in the

encapsulated fuel portion of the manufacturing area, and not receive the training required by 10 CFR 19.12 (i.e., they viewed only one of the two videos). This meant that these workers (three examples were identified by the licensee as a result of the inspectors' inquiries) did not receive all the basic information needed to deal with potential radiological health protection problems that might occur in the workplace. The inspectors' primary concern was that the training program for new employees (or employees changing job positions) was not structured to ensure the employees received necessary training. This failure to instruct the workers is identified as a violation (VIO 70-1151/98-06-01). FROM IR 99-04: The inspectors reviewed the licensee's corrective actions for VIO 98-06-01 concerning lack of safety training for three workers. The inspectors found that the licensee had taken actions to improve the tracking of employees returning from disability or being transferred from other work areas to ensure that they were fully qualified. The licensee had initiated a system to place qualification requirements in an employee's medical file when placed on disability. Added emphasis was given area supervisors to verify that workers being transferred from other areas had fully received all necessary training before working in their new assignment area. The licensee also reviewed their general employee training to verify effective communication of safety requirements. Cause: INADEQUATE TASK CONTROL MANAGEMENT EXPECTATIONS NOT ENFORCED 08/07/1998

- **Secondary Inspection Area(s): Management Organization and Controls**

The implementation of computerized tracking for revised drawings was a Configuration Management system improvement. IR 98-06

- + Issue Type: POSITIVE FINDING The inspector observed the operation of a recently implemented computerized tracking system for the completion of facility drawings. The inspector found that this facility drawing tracking system helped ensure that engineering projects were not closed before the drawings had been revised. 08/07/1998

- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** Employees failed to follow procedures associated with the issuance, storage, and collection of TLDs IR 98-05

- + Issue Type: NEGATIVE FINDING The inspector noted during the review of documentation (TLD log book, TLD summary report) additional procedural non-compliances associated with the issuance, collection, and return of TLD badges during CY 1997 and continued during the second quarter of CY 1998. Many of the non-compliances were also previously identified during an internal audit by the licensee. In response to previous findings, the licensee's corrective actions were effective in reducing the number of missing badges or badges that were not returned for processing. During facility tours, the inspector found no examples where personnel failed to wear TLDs while working in an area with the potential for exposure to radiation. In response to the procedural non-compliances involving the issuance, proper storage, and failure to report lost or misplaced TLDs, the licensee discussed the following items as possible corrective actions to prevent similar or recurring non-conformance: review and revise the procedure governing the issuance of TLDs to incorporate information recording and retention requirements; all Regulatory Engineering and Operations (REO) personnel be required to perform a detailed review of assigned procedures specific to assigned tasks to ensure procedural adherence; REO personnel be periodically tested on procedure requirements for assigned tasks; increase the audit frequency of badge storage areas; and disciplinary actions where warranted for repeat procedure violations. The inspector indicated that the corrective actions to resolve the procedural non-compliances associated with TLD issuance, collection, and storage will be tracked as an Inspector Followup Item (IFI) (IFI 98-05-01). Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 07/31/1998

- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** the licensee's role in ensuring ALARA practices in all aspects of plant operations was clearly communicated. The ALARA program

was considered a program strength as evidenced by the continued downward trend in airborne activity. IR 98-05

+ Issue Type: PROGRAM STRENGTH 07/31/1998

- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** Corrective actions were untimely. IR 98-05

+ Issue Type: NEGATIVE FINDING Open items from audits were tracked and adequately trended. However, the timeliness of resolution appears to require management attention as evidenced by items remaining open for more than two years. Examples were as follows: The development of a Health Physics Technician training package was assigned on January 19, 1995, but corrective actions closure was not until March 9, 1998. Actions to revise and update the respirator training video tape was assigned on April 28, 1995, and remained open as of July 98. Cause: INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS MANAGEMENT EXPECTATIONS NOT ENFORCED 07/31/1998

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** In-process changes not controlled and final installation not reviewed by responsible safety staff. IR 98-203

+ Issue Type: NEGATIVE FINDING Cause: PROCEDURES NOT COMPLETE OR ACCURATE 06/26/1998

- **Secondary Inspection Area(s): Management Organization and Controls: Material Control and Accounting** Inspectors identified that a pellet tray located in IFBA area was listed in the Item Control System (ICS) as containing pellets approximately 10 kg of pellets, but was found to be empty. IR 98-201

+ Issue Type: NEGATIVE FINDING The licensee subsequently confirmed that an operator scanning error had occurred. Once a tray of pellets is scanned into the ICS database, the tray contents would be identified by the ICS as being consumed by the pellet coater and the tray as being empty. The operator missed scanning the discrepant tray and double scanned another tray in its place. Also, the ICS did not identify the double scanning error. The inspectors identified (and the licensee confirmed) that an ICS double scan protection feature previously existed but had been removed in order to allow for faster ICS recording and processing of pellet trays. Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK CONTROL EXCESSIVE RELIANCE ON ADMINISTRATIVE CONTROLS 5/8/98

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** The 1008 ammonia scrubber was operated from May 1997 to April 1998 with an inoperable criticality safety control. IR 98-202

+ Issue Type: NOTICE OF VIOLATION The two differential pressure gauges on the 1008 ammonia scrubber used for NCS control were both found reading below the zero mark. When NRC inspectors questioned this, the licensee investigated and found that the gauges had been removed from service on May 8, 1997, following modifications to the equipment, but that the NCS evaluation was not revised and approved for this change. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS SAFETY BASIS NOT ESTABLISHED 05/01/1998

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** Several deficiencies were identified with the licensee's efforts to implement corrective actions identified in IR 97-205. IR

98-202

- + Issue Type: **NEGATIVE FINDING** Incorporation of License Application Section 6.0 requirements were flawed and incomplete. Licensee technical staff apparently did not fully understand the commitments made at the pre-enforcement conference and had planned to include the technical requirements for criticality safety as part of longer term corrective actions. The inspectors believe these findings are the lingering results of the management deficiencies identified by IR 97-205 and acknowledged by the licensee at the enforcement conference, in that, management systems to ensure that corrective actions were adequately implemented were still immature. **Cause: MANAGEMENT EXPECTATIONS NOT COMMUNICATED OR UNDERSTOOD 05/01/1998**

- **Secondary Inspection Area(s): Criticality Safety: Management Organization and Controls** Weaknesses were identified in the licensee's implementation of its Safety Margin Improvement Program (SMIP). IR 97-202

- + Issue Type: **NEGATIVE FINDING** The weaknesses included: 1) lack of ownership for review and closure of self-identified weaknesses, 2) weak interim measures for identification and control of NCS controls and safety-related devices, 3) weak management oversight and control measures to ensure full integration of SMIP initiatives, completion of SMIP items, and resource allocation management to ensure successful completion of committed tasks at an acceptable quality level. **Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 05/01/1998**

exempt 2

II. Safeguards

7 pgs withheld  
in entirety

### III. Radiological Controls

#### A. Radiological Controls

- **Secondary Inspection Area(s): Radiological Controls** 1998 exposures were reduced with the exception of the maximum assigned extremity which increased 61 percent, and the collective exposure increased approximately ten percent. IR 99-03
  - + Issue Type: NEGATIVE FINDING Based on exposure data for 1998, the occupational dose to plant workers continue to be maintained well below the limits in 10 CFR Part 20.1201. With two exceptions, calendar year (CY) 1998 exposures were reduced approximately seven to eight percent when compared to CY 97 data. The two exceptions were the maximum assigned extremity exposure which increased 61 percent in CY 98 (27.1 rem) over CY 97 (16.8 rem); and the site collective dose increased approximately ten percent (206 person-rem) in CY 98 over CY 97 (188 person-rem). The licensee attributed the increase in extremity exposure to an increase in production. The maximum assigned deep dose equivalent (DDE) of 1.70 rem was investigated and considered an aberration based on exposure historical data and the associated exposures for area workers. 05/14/1999
- **Secondary Inspection Area(s): Radiological Controls** 1) Based on the records review and interviews, the inspector concluded that the licensee's external exposure control program was adequate for evaluating and monitoring personnel exposures. 2) When compared to the 1997 maximum assigned committed effective dose equivalent (CEDE) of 2.73 rem, the maximum exposure for 1998 (2.50 rem) resulted in an eight percent reduction. 3) Administrative dose limits were established and all assigned exposures were well below the regulatory limits. 4) The periodic survey (direct radiation, air, and smears) program provided the mechanism for revising control area postings as a function of changing radiation levels. IR 99-03
  - + Issue Type: POSITIVE FINDING 05/14/1999
- **Secondary Inspection Area(s): Radiological Controls** The contamination control program was effectively implemented to identify removable contamination and assure prompt cleanup. IR 98-10
  - + Issue Type: POSITIVE FINDING Documentation was reviewed to show all water fountains were included in the periodic surveys for controlling contamination. Results showed that on occasion, smear results exceeded action levels requiring decontamination. During facility tours, the inspector collected smears from four (4) different locations within the control area for analysis. No action levels were met or exceeded. 12/11/1998
- **Secondary Inspection Area(s): Plant Operations: Radiological Controls** Several examples of poor housekeeping were observed. IR 98-10
  - + Issue Type: NEGATIVE FINDING During several facility tours the inspector noted numerous examples of poor housekeeping. Examples included respirators not being returned to designated receptacles for used respirators, used gloves and shoe covers not being placed in the appropriate receptacles, and contaminated equipment within the controlled area not being properly contained. In addition, the inspectors noted an unsecured compressed gas cylinder with no cap over exposed valving. The licensee took immediate actions in response to the inspectors observations and comments regarding



housekeeping. Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED  
12/11/1998

- **Secondary Inspection Area(s): Plant Operations: Radiological Controls**  
Elbow on ventilation duct serving ADU wet end processing came loose due to failure of clamping mechanism. Follow-up at next operations inspection. One liners for 12/18/98
- + Issue Type: DESIGN ISSUES Cause: UNKNOWN 12/11/1998
- **Secondary Inspection Area(s): Radiological Controls** Mini ALARA reviews provided licensee management data for tracking personnel exposures to maintain occupational dose ALARA. IR 98-10
- + Issue Type: POSITIVE 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 action limits and ALARA dose goals. The inspector reviewed the 1997 ALARA Report, thermoluminescent dosimeter (TLD) data, and discussed with a licensee representative personnel exposures for calendar years (CY) 1997 and 1998. The licensee indicated that based on exposure historical data and associated work area averages, the CY 98 maximum assigned external whole body dose (DDE) was considered an anomaly. An investigation was unsuccessful in determining the cause and the assigned exposure was attributed to a potentially contaminated TLD badge. 12/11/1998
- **Secondary Inspection Area(s): Maintenance/Surveillance: Emergency Preparedness: Criticality Safety: Radiological Controls** False criticality alarm in the solvent extraction area. Phone call & IR 98-10
- + Issue Type: MISCELLANEOUS The false alarm occurred after calibration of the system was done during a time of relatively high activity in the area (high background). When activity decreased on midnight shift, the background radiation subsided such that the criticality detectors sensed a low signal. This triggered the failure alarm circuit which triggered the evacuation alarm. This is the 2nd occurrence of this type of failure in the past 12 months, the other one being in the rod loading area. There are two problems to be investigated here: 1) a change in the calibration technique may be warranted to eliminate false alarms due to low signals, and 2) a change in the circuitry such that a low signal on one detector does not trigger the evacuation alarm. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK PLANNING INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 09/30/1998
- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** Employees failed to follow procedures associated with the issuance, storage, and collection of TLDs IR 98-05
- + Issue Type: NEGATIVE FINDING The inspector noted during the review of documentation (TLD log book, TLD summary report) additional procedural non-compliances associated with the issuance, collection, and return of TLD badges during CY 1997 and continued during the second quarter of CY 1998. Many of the non-compliances were also previously identified during an internal audit by the licensee. In response to previous findings, the licensee's corrective actions were effective in reducing the number of missing badges or badges that were not returned for processing. During facility tours, the inspector found no examples where personnel failed to wear TLDs while working in an area with the potential for exposure to radiation. In response to the procedural non-compliances involving the issuance, proper storage, and failure to report lost or misplaced TLDs, the licensee discussed the following items as possible corrective actions to prevent similar or recurring non-conformance: review and revise the

procedure governing the issuance of TLDs to incorporate information recording and retention requirements; all Regulatory Engineering and Operations (REO) personnel be required to perform a detailed review of assigned procedures specific to assigned tasks to ensure procedural adherence; REO personnel be periodically tested on procedure requirements for assigned tasks; increase the audit frequency of badge storage areas; and disciplinary actions where warranted for repeat procedure violations. The inspector indicated that the corrective actions to resolve the procedural non-compliances associated with TLD issuance, collection, and storage will be tracked as an Inspector Followup Item (IFI) (IFI 98-05-01). Cause: MANAGEMENT EXPECTATIONS NOT ENFORCED 07/31/1998

- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** the licensee's role in ensuring ALARA practices in all aspects of plant operations was clearly communicated. The ALARA program was considered a program strength as evidenced by the continued downward trend in airborne activity. IR 98-05
  - + Issue Type: PROGRAM STRENGTH 07/31/1998
- **Secondary Inspection Area(s): Management Organization and Controls: Radiological Controls** Corrective actions were untimely. IR 98-05
  - + Issue Type: NEGATIVE FINDING Open items from audits were tracked and adequately trended. However, the timeliness of resolution appears to require management attention as evidenced by items remaining open for more than two years. Examples were as follows: The development of a Health Physics Technician training package was assigned on January 19, 1995, but corrective actions closure was not until March 9, 1998. Actions to revise and update the respirator training video tape was assigned on April 28, 1995, and remained open as of July 98. Cause: INADEQUATE CORRECTION OF IDENTIFIED PROBLEMS MANAGEMENT EXPECTATIONS NOT ENFORCED 07/31/1998
- **Secondary Inspection Area(s): Criticality Safety: Plant Operations: Radiological Controls** About 40 kg of U3O8 powder spilled due to a failed clamp on a material "add-back" line at the pelleting system. Event Notice # 34460 and IR 98-06.
  - + Issue Type: LICENSEE EVENT REPORTS Approximately 40 kg U3O8 powder spill was discovered in pelleting manufacturing area line #3. The event was detected by operators at 0300 hrs on June 30, 1998. The spill resulted from a failure of an end-cap clamp on a favorable geometry (2 inch diameter) powder add-back feed line, which rate feeds material into the main powder stream as part of the powder prep process. Add-back material is reprocessed scrap/recycle powder that is blended in with virgin U3O8 powder. Since the spill involved material leaking from favorable geometry containment onto a mezzanine floor in a non-moderation controlled area, and no specific controls were in place to ensure that the material would remain in a favorable slab, double contingency protection could not be demonstrated. Upon discovery, the affected portion of the process was shut down, and the spill was cleaned up immediately. Cause: RESERVED RANDOM EQUIPMENT FAILURE 06/30/1998
- **Secondary Inspection Area(s): Plant Operations: Radiological Controls** Boot failure at top end of bucket elevator on line #2 caused air activity levels 11 to 12 times DAC. One liners and IR 98-03
  - + Issue Type: NEGATIVE FINDING 03/03/1998
- **Secondary Inspection Area(s): Maintenance/Surveillance: Radiological**

**Controls** Small puff of UF6 leaked from line #3 valve stem during pressure testing system after extended maintenance work. No significant contamination detected. One liners

+ Issue Type: NEGATIVE FINDING Cause: ERROR BY KNOWLEDGEABLE PERSON  
FOR UNKNOWN REASON 02/02/1998

**B. Environmental Protection**

- **Secondary Inspection Area(s): Environmental Protection** Report sent to the South Carolina Department of Health and Environmental Control regarding an exceedance in the licensee's NPDES Permit where the daily maximum and monthly average 5-day BOD samples for the month of October 1999 were outside the limits of the state permit. 30 day report dated 11/24/99
  - + Issue Type: LICENSEE EVENT REPORTS Cause: UNKNOWN 10/31/1999
- **Secondary Inspection Area(s): Environmental Protection** The licensee's environmental monitoring program was effectively implemented to monitor radioactivity released to the environment. IR 99-01
  - + Issue Type: POSITIVE FINDING 02/05/1999

C. Waste Management

- **Secondary Inspection Area(s): Training: Criticality Safety: Plant Operations: Waste Management** The licensee's training for the new process to recover uranium from wastewater sludge cake placed adequate emphasis on safety controls. IR 99-04

- + **Issue Type: POSITIVE FINDING** The inspectors attended a training session for operators of a new process to recover uranium from wastewater sludge cake. The training described the process steps and identified the safety significant controls at each step. Particular emphasis was placed on configuration management of a passive engineered control consisting of a specific hose design used for slurry recirculation. Emphasis was also placed on the administrative operating limits for uranium concentration and total uranium mass added to the system. The training also included instructions for maintenance personnel for controlling the passive engineered control and for performing functional testing of active engineered controls. Training handouts included a listing of all of the safety significant controls in the new process and information on the associated operating procedures, maintenance procedures, and functional testing requirements. The inspectors also reviewed a short test given to each of the trainees and found that it was an adequate indicator of the operators knowledge of the safety systems. 10/22/1999

- **Secondary Inspection Area(s): Management Organization and Controls: Waste Management** Discrepancies between licensee administrative procedures and license requirements concerning liquid effluent criteria were identified. IR 99-01

- + **Issue Type: NEGATIVE FINDING** The inspector reviewed the licensee's procedures for implementation of the liquid effluents monitoring program. The inspector noted that several discrepancies existed between the procedures and the license requirements as to effluent limit concentrations. Procedure COP-811601, "On-Line Gamma Activity Monitors and Quarantine Tanks System Operation," stated that a limit of 24 parts per million (ppm) uranium (U) was used as guidance for suspension of discharges to the water treatment facility (WTF) from the main chemical processing areas. The limit of 24 ppm U (5.5E-5 uCi/ml based on four percent U-235 content) exceeded the criteria of 3.0E-5 uCi/ml as stated in license SNM-1107. In addition, procedure RA-401, "Environmental Control Requirements Mandated By 10 CFR20 and NRC License SNM-1107," stated that a setpoint of 3.6E-5 uCi/ml for the online gamma spectroscopy system was used to automatically divert flow from the WTF to diversion tanks. In discussions with personnel, the inspector determined that these procedural discrepancies were not significant issues due the resulting low offsite dose levels (i.e. <0.002 millirem/year) associated with the procedural limits. The inspector also noted that procedure COP-830509, "Release of F-1165 Effluent for Processing," specified that discharges from the WTF should be less than 0.2 ppm U which exceeds the license criteria of 0.05 ppm U. The inspector discussed this with the licensee who indicated that the license requirement of 0.05 ppm U was a typographical error, and should have been 0.5 ppm U. Again, this discrepancy was not viewed as being safety significant due to the low offsite public exposures as a result of the licensee's radiological liquid effluents. However, the inconsistencies between the limits in the operating procedures and license requirements will be resolved by the licensee through modification of procedures and/or license amendment. The correction of these items will be tracked as an IFI (IFI 99-01-04). Cause: PROCEDURES NOT COMPLETE OR ACCURATE 02/05/1999

- **Secondary Inspection Area(s): Waste Management: Transportation** A 55 gallon drum of contaminated aluminum filter media waste was sent to Barnwell where the receiver found a gash in the side of the drum. IR 98-10

- + **Issue Type: NOTICE OF VIOLATION** Surveys showed no leakage of contamination from the drum. The drum contained 10.4 grams U-235. Plastic was placed around the

drum at Barnwell prior to burial. The South Carolina DHEC was notified. On October 14, 1998, the licensee notified NRC Region II that a 55 gallon drum of contaminated aluminum filter wastes that had been part of a shipment to the Barnwell LLRW facility was discovered to have a hole on the surface of the drum, with folds and crevices in the package. This drum was part of a larger shipment (L.S.A, n.o.s). This discovery was made by South Carolina Department of Health and Environmental Control (DHEC) personnel at the Barnwell facility on October 15, 1998 (Radioactive Waste Shipment No. 1098-8638). By letter dated November, 4, 1998, DHEC notified the licensee that requirements of 49CFR part 173, South Carolina Radioactive Material License No. 97, and South Carolina Regulation 61-83 had been violated. This letter was a warning communication with no response required from the licensee, but directing an investigation and corrective measures. The licensee did, however, voluntarily respond by letter dated November 16, 1998. The requirements in 10 CFR part 71 state that the licensee shall comply with requirements in 49 CFR parts 170 through 189. In turn, 49 CFR Part 173.475 (b) states that before each shipment of Class 7 (radioactive) materials package, the offeror must ensure, by examination or appropriate tests, that packaging is in unimpaired physical condition, except for superficial marks. The shipment of this drum containing a hole did not meet the requirements of this part and is identified as VIO 98-10-04. The inspector reviewed the results of the licensee's investigation into the cause of the punctured shipping drum and the corrective actions implemented to prevent a future recurrence. The investigation included a review of shipping practices and a trip to the burial site by key licensee personnel involved in these type shipments. The licensee concluded that the drum was most likely punctured during final loading operations into the transport truck. The corrective actions included the following:

1. Study all handling and loading techniques.
2. Visiting the burial site for observations.
3. Modification of shipping check sheet CF-83-134 to include an additional inspection of the containers after they are loaded onto the truck.
4. Re-instructing all affected operators on proper handling techniques.
5. Instructing health physics technicians to be observant for shipping container deficiencies during final surveying activities (surveys are required by CF-83-134).
6. Raising visual standards of acceptable shipping containers.

The inspector discussed the above corrective actions with cognizant licensee personnel and selectively verified that these corrective actions had been completed including revision of CF-83-134 to include the additional inspection requirements. The corrective actions appear adequate to prevent future recurrence.  
Cause: UNKNOWN 10/14/1998

#### D. Transportation

- **Secondary Inspection Area(s): Management Organization and Controls: Transportation** The corrective actions for two licensee-identified violations of the Certificate of Compliance for shipping fuel assemblies had been completed and were adequate to prevent recurrence. See items # 130 and #166. IR 99-06
- + **Issue Type: NON-CITED VIOLATIONS** The inspector reviewed three 30-day reports issued by the licensee concerning self-identified violations of the Certificate of Compliance (CoC) requirements for fuel assembly shipping containers. The first of these reports was issued on March 9, 1999, and identified that certain fuel assemblies had been shipped between February 11 and 17, 1999, with redesigned guide tube dimensions that were not within the specifications authorized by the CoC. The licensee's corrective actions included revising the CoC to include the redesigned guide tube dimensions and to perform a root cause investigation to identify any additional corrective actions needed. The revised CoC was approved by NRC on February 22, 1999. The inspector was briefed on the licensee's root cause investigation, which revealed that the licensee's Engineering Change Notice (ECN) system had allowed changes to be made to fuel assembly designs without a review of the safety impact that such changes would have on the fuel assembly shipping containers. The licensee modified its ECN procedure (effective July 30, 1999) to ensure that certain fuel assembly design changes would be reviewed by the appropriate personnel to determine the potential safety impact associated with the fuel assembly shipping containers. The inspector found that this procedural change would likely prevent recurrence of the violation. This non-repetitive, licensee-identified and corrected violation 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 99-06-03. While performing the root cause investigation, the licensee identified that certain fuel assemblies had been shipped in March 1999 with modified annular pellet blanket configurations that were not within the specifications authorized by the CoC. A 30-day report was issued to the NRC on August 17, 1999, to document the violation. The licensee's corrective actions included revising the CoC and completing the corrective actions identified by root cause investigation performed from the previous violation of the CoC. The CoC was quickly revised and approved by NRC on August 16, 1999. The inspector found that this incident had the same root causes as the previous incident, but occurred before corrective actions could be implemented. Thus, this violation was a second example of NCV 99-06-03. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS 12/03/1999
- **Secondary Inspection Area(s): Management Organization and Controls: Transportation** A licensee-identified violation is under review by NRC HQ transportation group to determine safety significance and adequacy of corrective actions. This is an Unresolved Item pending completion of the evaluation. 30 day report dated 11/23/99.
- + **Issue Type: UNRESOLVED ITEM** The inspector reviewed the 30-day report dated November 23, 1999, that identified several MCC-3 shipping containers were constructed with a weld pattern different than that specified in the drawings referenced by the CoC. The weld specifications were intended to strengthen the top half of the container shell to ensure container integrity during accident conditions. The licensee's corrective actions included placing an immediate hold on the use of the affected containers; re-welding the affected containers to bring them within specification; and inspection of all fuel assembly shipping containers to ensure compliance with all applicable license drawing requirements. At the time of this inspection, the effect of the different weld pattern on the structural integrity of the container had not been determined. Until such a determination can be made, this situation remains an unresolved item (URI) and is identified as URI 99-06-04. Cause: INADEQUATE AUDIT OR ASSESSMENT INADEQUATE CONSTRUCTION 10/25/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Transportation** Failure to perform required periodic (five-year) re-inspections of the gadolinium

absorber plates on five shipping containers. 30-day report to NMSS dated 9/11/98 and IR 98-10.

- + Issue Type: **NEGATIVE FINDING** On August 13, 1998, it was determined that five model MCC shipping containers had been used for fuel shipments which had not received a periodic (every five years) detailed re-inspection within the allotted time, as required by Shipping Container Certificate of Compliance USA/9239/AF. The Certificate requires that, every five years, each shipping container be subjected to a detailed re-inspection, including verification of the existing configuration to drawing requirements, and a detailed inspection of the gadolinium absorber plates. All inspections had been performed except for the gadolinium absorber plates. Shipments were made with these five containers with the re-inspections one to ten months overdue. The licensee explained that the violation occurred because 1) QC inspection failed to perform the detailed gadolinium inspection and issue new verification forms, and 2) Manufacturing operating procedures do not require a QC inspection for containers sent out empty. **Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING PROCEDURES NOT COMPLETE OR ACCURATE INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK CONTROL 8/13/99**

- **Secondary Inspection Area(s): Criticality Safety: Transportation** New fuel assembly design shipped in MCC-4 shipping containers without proper authorization per the CoC. 30-day report dated 8/17/99

- + Issue Type: **LICENSEE EVENT REPORTS** On or about July 23, 1999, it was determined that a Westinghouse 17x17 STD/XL fuel assembly design with a modified annular pellet blanket configuration had been shipped in Model MCC-4 shipping containers without proper authorization by the respective Certificate of Compliance, USA/9239/AF. The fuel assembly design was not included in Table 1-4.4 of the license application, as required in section 5(b) of the Certificate of Compliance. Specifically, Table 1-4.4 of Appendix 1-4 included provisions for the 17STD/XL fuel assembly with an annular blanket of 6.0 inches nominal, top and bottom. It was realized that, in March 1999, a shipment was made of 17STD/XL fuel assemblies with 7.0 inch annular blankets. **Cause: PROCEDURES NOT COMPLETE OR ACCURATE INCOMPLETE SAFETY BASIS 07/23/1999**

- **Secondary Inspection Area(s): Transportation** Two Westinghouse fuel assembly designs were shipped in the MCC shipping containers without proper authorization by the CoC. 30 day report dated 3/9/99

- + Issue Type: **LICENSEE EVENT REPORTS** Between February 11 and 17, 1999, it was determined that two Westinghouse 17x17 STD fuel assembly designs with modified guide tube dimensions had been shipped in the Model MCC shipping containers without proper authorization by the respective Certificate of Compliance. These assembly designs were not listed on Table 1-4.4 of the license application, as required by Shipping Container Certificate of Compliance USA/9239/AF Part 5(b)(1). The results of the NCS analysis for the bounding fuel assembly design were not challenged. The event occurred because Westinghouse engineering procedures, which require multi-discipline reviews of fuel assembly design changes, did not specifically designate the notification of MCC shipping container licensing personnel regarding changes to the dimensions of non-fuel bearing guide tubes and instrument tubes. Immediate actions taken were the suspension of shipments of fuel assembly designs not authorized by the CoC until the CoC could be revised and approved by NRC. Actions to prevent future occurrences included cross referencing all Westinghouse fuel assembly designs to Tables 1-4.1 through 1-4.5. A root cause investigation is being undertaken which will identify additional corrective actions. **Cause: PROCEDURES NOT COMPLETE OR ACCURATE 02/11/1999**

- **Secondary Inspection Area(s): Waste Management: Transportation** A 55 gallon drum of contaminated aluminum filter media waste was sent to Barnwell where the receiver found a gash in the side of the drum. IR 98-10



+ Issue Type: NOTICE OF VIOLATION Surveys showed no leakage of contamination from the drum. The drum contained 10.4 grams U-235. Plastic was placed around the drum at Barnwell prior to burial. The South Carolina DHEC was notified. On October 14, 1998, the licensee notified NRC Region II that a 55 gallon drum of contaminated aluminum filter wastes that had been part of a shipment to the Barnwell LLRW facility was discovered to have a hole on the surface of the drum, with folds and crevices in the package. This drum was part of a larger shipment (L.S.A. n.o.s). This discovery was made by South Carolina Department of Health and Environmental Control (DHEC) personnel at the Barnwell facility on October 15, 1998 (Radioactive Waste Shipment No. 1098-8638). By letter dated November, 4, 1998, DHEC notified the licensee that requirements of 49CFR part 173, South Carolina Radioactive Material License No. 97, and South Carolina Regulation 61-83 had been violated. This letter was a warning communication with no response required from the licensee, but directing an investigation and corrective measures. The licensee did, however, voluntarily respond by letter dated November 16, 1998. The requirements in 10 CFR part 71 state that the licensee shall comply with requirements in 49 CFR parts 170 through 189. In turn, 49 CFR Part 173.475 (b) states that before each shipment of Class 7 (radioactive) materials package, the offeror must ensure, by examination or appropriate tests, that packaging is in unimpaired physical condition, except for superficial marks. The shipment of this drum containing a hole did not meet the requirements of this part and is identified as VIO 98-10-04. The inspector reviewed the results of the licensee's investigation into the cause of the punctured shipping drum and the corrective actions implemented to prevent a future recurrence. The investigation included a review of shipping practices and a trip to the burial site by key licensee personnel involved in these type shipments. The licensee concluded that the drum was most likely punctured during final loading operations into the transport truck. The corrective actions included the following: 1. Study all handling and loading techniques. 2. Visiting the burial site for observations. 3. Modification of shipping check sheet CF-83-134 to include an additional inspection of the containers after they are loaded onto the truck. 4. Re-instructing all affected operators on proper handling techniques. 5. Instructing health physics technicians to be observant for shipping container deficiencies during final surveying activities (surveys are required by CF-83-134). 6. Raising visual standards of acceptable shipping containers. The inspector discussed the above corrective actions with cognizant licensee personnel and selectively verified that these corrective actions had been completed including revision of CF-83-134 to include the additional inspection requirements. The corrective actions appear adequate to prevent future recurrence.

Cause: UNKNOWN 10/14/1998

#### IV. Facility Support

##### A. Maintenance and Surveillance

- **Secondary Inspection Area(s): Maintenance/Surveillance** The licensee's periodic maintenance on the UN bulk storage tanks was being performed in accordance with frequencies established in the ISA and QA program. Functional testing of safety equipment was being adequately performed in the UN bulk storage tank and line No. 3 calciner areas. IR 99-06
  - + **Issue Type: POSITIVE FINDING** The inspector reviewed maintenance records for the safety controls identified in the ISA and the QA program for the uranyl nitrate bulk storage tanks. The inspector observed that the maintenance was being performed at the frequencies established in the licensee's preventive maintenance program, and that functional testing was being performed when required. The inspector also observed functional testing of process controls associated with the line No. 3 calciner prior to returning it to service after extended maintenance activities. The inspector noted that the methods used to perform these functional tests appeared adequate to assure functionality of the controls. 12/03/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance** The licensee's calibration of the in-line gamma detectors used to measure the uranium concentration in the UN bulk storage tanks was adequately performed and controlled. IR 99-06
  - + **Issue Type: POSITIVE FINDING** The inspector reviewed the procedure for calibrating the in-line concentration monitors for the UN bulk storage tank system. Calibration was performed by exposing the gamma detectors to three different UN solutions at varying uranium concentrations. The inspector noted that the procedure required the annual replacement of the calibration standards. The inspector found that this was accomplished through the licensee's preventive maintenance (PM) program such that a PM work order was issued at one year intervals. The inspector observed the calibration of one of the detectors in the process area. The inspector found that the technique and equipment used to perform the calibration was adequate to provide an accurate measurement of the UN solutions in the bulk storage tank piping. 12/03/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Management Organization and Controls** The licensee's maintenance procedures adequately addressed maintenance activities associated with UN bulk storage tank system safety controls identified in the ISA. The licensee's maintenance procedures were adequately reviewed by the appropriate safety management. IR 99-06
  - + **Issue Type: POSITIVE FINDING** The inspector reviewed the maintenance procedures for the UN bulk storage tank system. The inspector observed that the maintenance of all safety controls identified in the ISA for that system were adequately addressed in a maintenance procedure. The inspector also noted that functional testing of these controls was also adequately addressed in the maintenance procedures. During the inspector's review of the maintenance procedures for the UN bulk storage tank system, it was noted that each procedure was approved by the area process engineer and the manager of Environment, Health and Safety. 12/03/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety: Plant Operations** Water intrusion was found in the plant's compressed air system on 9/7/99 when the air drying system was not returned to service

upon completion of maintenance on the plant air compressors. Water accumulations were reported in several areas of the plant, most notably in the bulk powder blending room Moderation Controlled Area. There was not enough water accumulation (about ½ liter) to be a criticality safety concern, but powder blending was halted for two shifts while the compressed air piping system was cleared of all water. One liners

+ Issue Type: DESIGN ISSUES Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON INADEQUATE TASK CONTROL EQUIPMENT FAILURE DUE TO FAULTY OR LACK OF MAINTENANCE 09/09/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Transportation**  
Failure to perform required periodic (five-year) re-inspections of the gadolinium absorber plates on five shipping containers. 30-day report to NMSS dated 9/11/98 and IR 98-10.

+ Issue Type: NEGATIVE FINDING On August 13, 1998, it was determined that five model MCC shipping containers had been used for fuel shipments which had not received a periodic (every five years) detailed re-inspection within the allotted time, as required by Shipping Container Certificate of Compliance USA/9239/AF. The Certificate requires that, every five years, each shipping container be subjected to a detailed re-inspection, including verification of the existing configuration to drawing requirements, and a detailed inspection of the gadolinium absorber plates. All inspections had been performed except for the gadolinium absorber plates. Shipments were made with these five containers with the re-inspections one to ten months overdue. The licensee explained that the violation occurred because 1) QC inspection failed to perform the detailed gadolinium inspection and issue new verification forms, and 2) Manufacturing operating procedures do not require a QC inspection for containers sent out empty. Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING PROCEDURES NOT COMPLETE OR ACCURATE INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK CONTROL 8/13/99

- **Secondary Inspection Area(s): Maintenance/Surveillance: Chemical Safety**  
The licensee carried out the preventive maintenance of the safety significant controls from the ISAs in a timely manner with no maintenance backlog. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Chemical Safety**  
The licensee carried out the preventive maintenance of the safety significant controls from the ISAs in a timely manner with no maintenance backlog. IR 99-201

+ Issue Type: POSITIVE FINDING 07/02/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Fire Safety** The plant emergency lighting, fire alarm system, and fire pumps were adequately tested on backup electrical power during an intentional shutdown of plant's primary electrical power system and their safety functions were adequately demonstrated. IR 99-02

+ Issue Type: POSITIVE FINDING The inspectors performed a walk-through of the Fire Pump House No. 1 and No. 2 to review the capability of the plant's diesel fire pumps to meet their intended safety function during the loss of primary electrical power. The inspectors identified that the fire pump controllers, which are critical to the automatic

start-up function, were maintained operable on battery power supply independent of the plant backup electrical power system. Each of the diesel fire pumps and controllers were provided with two storage battery units (a primary and a secondary) for starting the engine and maintaining the pump controller function. The inspectors performed a walk-through of the manufacturing facility and the exterior of the plant to review the status of fire protection equipment during the plant shutdown. No obvious or apparent impairment to fire suppression systems, fire alarm system, the fire monitor nozzles, fire hydrants, standpipe systems, fire pump, post indicating valves, or water storage tanks were noted by the inspectors. The inspector conducted a "walk-down" of sprinkler line "E", verified valve line up and noted no indications of disrepair nor non-serviceability. The inspector also reviewed the licensee's Fire System Impairment Reports, which indicated no current impairments to fire protection systems. The inspectors performed a walk-through of the mechanical manufacturing areas during a loss of plant primary electrical power, on the afternoon of April 5, 1999. The inspectors noted that ceiling lights connected to the plant backup electrical power system provided the emergency lighting for the plant. The inspectors observed that the lighting provided along the path of egress exceeded the minimum illumination of 0.1 footcandle required industry standard (i.e., National Fire Protection Association (NFPA) 101, Life Safety Code). The emergency lights operated for the duration of the loss of primary electrical power, until the afternoon of April 6, 1999. The capability of the plant backup electrical power supply exceeded the minimum emergency illumination period of 1.5 hours required by the NFPA 101.

04/28/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Fire Safety** The licensee safely conducted maintenance activities with proper considerations of fire prevention during the plant shutdown and demonstrated an overall assurance of defense-in-depth fire protection for plant operations. IR 99-02
  - + **Issue Type: POSITIVE FINDING** The inspectors reviewed records of inspection, testing, and maintenance (ITM) of the automatic sprinkler system, fire alarm systems, fire hydrants, fire monitor nozzles and hoses, and performed a walk-through to determine the material condition of fire protection systems and components. The appropriate implementation of ITM is necessary to assure the reliability and availability of fire protection systems to perform their intended safety functions. In general, the ITM of water-based fire suppression systems or components (e.g., fire hydrants, post-indicator valves, automatic sprinkler systems, fire hoses, etc.) and the fire alarm system (e.g., smoke detectors, heat detectors, pull stations, etc.) at the plant were found to be consistent with accepted industry standards. 04/08/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance** NOV 98-02 issued for multiple failures of operational and maintenance work controls. IR 98-02, IR 98-09
  - + **Issue Type: NOTICE OF VIOLATION Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK CONTROL MANAGEMENT EXPECTATIONS NOT ENFORCED INADEQUATE OR FAULTY FUNCTIONAL TESTING OF Equipment**
- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety** Assumptions made and conclusions reached for the sintering furnace portion of the Criticality Safety Evaluation would not be valid during certain maintenance activities. IR 99-01 and IR 99-203
  - + **Issue Type: SER ISSUES** From IR 99-01 : "Some processes covered by the pelleting area CSE did not include fault trees and identification of nuclear criticality safety controls. The assumptions made for these areas were that the accumulation of mass and moderator in quantities to make a criticality possible was incredible. In one such area, the inspectors observed that the evaluation of the sintering furnaces stated that criticality

was not credible, and thus double contingency was not required. This conclusion was reached although the internal furnace chamber was of non-favorable dimensions, pellets were known to spill into the furnace during normal operations, and many areas of the furnace were water-cooled. The CSE also states that there is no credible source of moderator available to the furnace chamber when pellets are in the chamber in the assumption that the furnace is at production temperatures. Furnace temperatures during normal operations would keep any moderator in the vapor phase. This assumption would not be valid when the furnace was cooled and disassembled due to a major pellet spill inside the furnace. Water was being used to cool various parts of the furnace including the exit chamber, heating element electrical connections, and optical pyrometer mounting hardware. Water was also used to humidify the furnace atmosphere. In some cases, water lines must be disassembled and/or moved in order to access the interior furnace chamber. Since controls did not exist for assuring all pellets from a spill were removed prior to cooling the furnace, the possibility existed for water to enter the furnace while pellets were in the chamber. The adequacy of the assumptions made and conclusions reached in the sintering furnace portion of the CSE will be referred to the Fuel Cycle Operations Branch for further review and tracked as IFI 99-01-02." From IR 99-203 : "During inspections 70-1151/98-10 and 70-1151/99-01, Region II inspectors questioned the safety basis of the sintering furnace. The licensee has determined that criticality in the furnace is not credible due to the heat of the furnace when uranium pellets are present. The regional inspectors determined that removal of spilled uranium pellets from the furnace, a maintenance operation, is performed when the furnace is cooled down. The licensee indicated that maintenance operations are analyzed separately prior to performing the work. Licensee analysis indicates that pellets occasionally fall out of boats while inside the furnace so that they can accumulate in the furnace. The licensee believes that a significant accumulation of pellets in the furnace due to routine operation is not credible. The licensee arrived at this conclusion through the use of handbook data for an infinite slab of pellets. The inspectors determined that an accumulation of pellets in a furnace that would be a criticality concern was not credible since this would require a depth of pellets through the furnace that is greater than the height of the boats. The inspectors determined that it was not credible that water could accumulate around enough pellets in the furnace to be a criticality concern due to the design of the furnace, a level tunnel open at the ends." 02/05/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance** The safety-related interlocks associated with the pellet area process active engineered controls received functional testing as specified by the Criticality Safety Evaluation and license requirements. IR 99-01
- + Issue Type: POSITIVE FINDING 02/05/1999
- **Secondary Inspection Area(s): Maintenance/Surveillance: Emergency Preparedness: Criticality Safety: Radiological Controls** False criticality alarm in the solvent extraction area. Phone call & IR 98-10
- + Issue Type: MISCELLANEOUS The false alarm occurred after calibration of the system was done during a time of relatively high activity in the area (high background). When activity decreased on midnight shift, the background radiation subsided such that the criticality detectors sensed a low signal. This triggered the failure alarm circuit which triggered the evacuation alarm. This is the 2nd occurrence of this type of failure in the past 12 months, the other one being in the rod loading area. There are two problems to be investigated here: 1) a change in the calibration technique may be warranted to eliminate false alarms due to low signals, and 2) a change in the circuitry such that a low signal on one detector does not trigger the evacuation alarm. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK PLANNING INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 09/30/1998
- **Secondary Inspection Area(s): Maintenance/Surveillance: Criticality Safety** A 24-hr NRC reportable event was discovered when, during maintenance checks, the line #3 UF6 vaporizer steam chest condensate drain line was found

to be clogged. Event Notice # 34533 and IR 98-06.

- + Issue Type: LICENSEE EVENT REPORTS Double contingency protection for the steam chest consists of mass control (to ensure that no SNM accumulates from the UF6 cylinder) and moderator control (to ensure that the condensate drains freely from the steam chest. Condensate typically drains from the steam chest to a collection tank. The collection tank is subsequently pumped to a holding tank and then on to the contaminated sump. The collection tank contains two level probes designed to notify the operators of a condensate pump failure and automatically shut off steam to the steam chest. During a 30-day operator maintenance check of these level probes, water is poured into the empty steam chest to drain to and fill up the collection tank. This event was reported when it was noticed that the water did not drain well into the collection tank. Subsequent inspection of the drain system revealed significant clogging. Although there was no SNM in the steam chest at the time of this discovery, the condensate removal system could not be clearly demonstrated as being operable. Since the removal of the condensate from the steam chest is one of the two contingencies protecting against criticality, the event was reported under Bulletin 91-01. Cause: EQUIPMENT FAILURE DUE TO ENVIRONMENTAL FACTORS (E.G., CHEM, THERM, MECHAN) INADEQUATE EQUIPMENT DESIGN OR SELECTION 07/16/1998

- **Secondary Inspection Area(s): Maintenance/Surveillance: Radiological Controls** Small puff of UF6 leaked from line #3 valve stem during pressure testing system after extended maintenance work. No significant contamination detected. One liners

- + Issue Type: NEGATIVE FINDING Cause: ERROR BY KNOWLEDGEABLE PERSON FOR UNKNOWN REASON 02/02/1998

B. Training

- **Secondary Inspection Area(s): Training: Criticality Safety: Plant Operations: Waste Management** The licensee's training for the new process to recover uranium from wastewater sludge cake placed adequate emphasis on safety controls. IR 99-04

- + Issue Type: POSITIVE FINDING The inspectors attended a training session for operators of a new process to recover uranium from wastewater sludge cake. The training described the process steps and identified the safety significant controls at each step. Particular emphasis was placed on configuration management of a passive engineered control consisting of a specific hose design used for slurry recirculation. Emphasis was also placed on the administrative operating limits for uranium concentration and total uranium mass added to the system. The training also included instructions for maintenance personnel for controlling the passive engineered control and for performing functional testing of active engineered controls. Training handouts included a listing of all of the safety significant controls in the new process and information on the associated operating procedures, maintenance procedures, and functional testing requirements. The inspectors also reviewed a short test given to each of the trainees and found that it was an adequate indicator of the operators knowledge of the safety systems. 10/22/1999

- **Secondary Inspection Area(s): Training: Criticality Safety: Management Organization and Controls** Inspectors observed what appeared to be operations involving nuclear material not being conducted in accordance with approved procedures in that uranium oxide sample containers were routinely stored on an engineered storage rack without being authorized by area operating procedures or nuclear criticality safety posting. After an NOV was issued, the licensee discovered that this practice was covered by an approved procedure. The NOV was withdrawn but still raises questions about the adequacy of training and knowledge of their procedure contents. IR 98-10 and IR 99-203

- + Issue Type: NEGATIVE FINDING From IR 99-10 : "During the inspection the inspector observed several covered plastic cups containing about 100 gram each of uranium oxide being stored on shelves in a "polypack" storage rack located at a uranium scrap processing operation. Storage of these cups was neither authorized by the nuclear criticality safety (NCS) posting attached to the storage rack (NCS Posting No. CONV01, Rev. 0) nor the operating procedures for the area. Subsequent to the observation the inspector interviewed an operator in the area and verified that storage of the samples cups on the rack was not addressed by any operating procedures. The inspector reviewed and discussed the nuclear criticality safety analysis for the storage racks with the cognizant nuclear criticality safety engineer and determined that the assumptions used in analysis were very conservative therefore no immediate criticality safety hazards existed. Prior to the end of the inspection the licensee replaced the posting with one that allowed the storage of sample cups on the rack (NCS Posting No. CONV33, Rev. 0) and provided a copy of the posting to the inspector. Since the authorization of sample storage was performed without additional calculations being performed, a more thorough review of the analysis by an NRC Criticality Safety Specialist is warranted to assure that the storage is within the bounds of the original analysis. The performance of that follow-up review by NRC will be tracked as Inspector Followup Item (IFI) 98-10-01. The safety significance of this inspector identified observation involved the handling and storage of nuclear materials without an approved procedure or NCS posting as required by the License Application, along with the lack of understanding by the operator of this requirement. The failure to conduct operations involving nuclear material without an approved procedure or proper nuclear criticality posting is identified as Violation (VIO) 98-10-02." The licensee's reply to the NOV stated, "These sample cups in the rack were not specifically addressed by the respective criticality postings. During the inspection, the inspectors were incorrectly told that placing the cups with 10 gram samples into the

storage racks was not covered by procedure. Subsequent to the close of the inspection, however, it was determined that there is an operating procedure (COP-815002, Revision 23, 8/1/97) that specifically addresses this." Based on this new information, NRC withdrew the violation. The follow-up review of the adequacy of the sample storage by NRC criticality safety specialists was documented in IR 99-203. That inspection report states, "During inspection 70-1151/98-10, a Region II inspector questioned the practice of storing sample containers in the same rack as filled polypacks. The rack in question holds stacks of two polypacks separated by one foot spacing. Up to four filled sample containers were stored in the open spaces of the rack. The inspectors reviewed the analytical model and determined that storage of the filled sample bottles as done by the licensee with four bottles at each location does not affect the safety basis of the rack due to a conservative boundary model. The rack was analyzed and controls were based upon four polypacks in each location, and in practice, only three can be in a position in the rack." Cause: ERROR BY PERSON DUE TO INADEQUATE OR LACK OF TRAINING PROCEDURES NOT COMPLETE OR ACCURATE 12/11/1998

- **Secondary Inspection Area(s): Training: Emergency Preparedness**

- Non-required table-top drills provided an enhancement to emergency response training program. IR 98-07

- + Issue Type: POSITIVE FINDING the licensee implemented a program of non-required quarterly table-top drills to maintain the proficiency of ERO personnel. During an interview with the Site Emergency Director, the inspector was informed that the table-top scenarios and walkthroughs had provided good training and a better understanding of the various roles. 09/25/1998

- **Secondary Inspection Area(s): Training: Management Organization and Controls** General employee training program failed to provide required training/instructions to all applicable workers. IR 98-06 and IR 99-04

- + Issue Type: NOTICE OF VIOLATION The inspectors determined that personnel working in the manufacturing area of the facility could change jobs and move into positions in the encapsulated fuel portion of the manufacturing area, and not receive the training required by 10 CFR 19.12 (i.e., they viewed only one of the two videos). This meant that these workers (three examples were identified by the licensee as a result of the inspectors' inquiries) did not receive all the basic information needed to deal with potential radiological health protection problems that might occur in the workplace. The inspectors' primary concern was that the training program for new employees (or employees changing job positions) was not structured to ensure the employees received necessary training. This failure to instruct the workers is identified as a violation (VIO 70-1151/98-06-01). FROM IR 99-04: The inspectors reviewed the licensee's corrective actions for VIO 98-06-01 concerning lack of safety training for three workers. The inspectors found that the licensee had taken actions to improve the tracking of employees returning from disability or being transferred from other work areas to ensure that they were fully qualified. The licensee had initiated a system to place qualification requirements in an employee's medical file when placed on disability. Added emphasis was given area supervisors to verify that workers being transferred from other areas had fully received all necessary training before working in their new assignment area. The licensee also reviewed their general employee training to verify effective communication of safety requirements. Cause: INADEQUATE TASK CONTROL MANAGEMENT EXPECTATIONS NOT ENFORCED 08/07/1998

C. **Emergency Preparedness**

- **Secondary Inspection Area(s): Emergency Preparedness** The licensee's response to the postulated accident was considered a successful demonstration



of the licensee's response capability to protect the health and safety of plant workers and the public. Based on the exercise and critique observations, interviews, and documentation, the licensee was conducting drills and exercises in accordance with Section 7.4 of the Plan. The scenario details provided an adequate test of the onsite response capability. IR 99-05

+ Issue Type: POSITIVE FINDING 09/21/1999

- **Secondary Inspection Area(s): Emergency Preparedness** Emergency procedures were organized and written in a checklist format for ease of use. However, the hazardous weather emergency action level (EAL) required clarification and guidance to ensure consistency in the emergency classification by procedure users. IR 99-03

+ Issue Type: NEGATIVE FINDING The inspector reviewed the SEP and Emergency Procedures C-07 (Hazardous Weather) and A-04 (Emergency Classification) for consistency in addressing emergency action levels associated with severe weather. The inspector determined that the hazardous weather event emergency classification in the SEP and procedures was consistent. However, the procedures did not provide sufficient guidance to users regarding conditions that constituted strong or severe winds (e.g. speed) so that the appropriate classification would be made. The lack of guidance was further demonstrated during walkthroughs postulating onsite wind speeds of more than 70 miles per hour (mph). Two of three interviewees incorrectly classified the postulated accident as a local emergency rather than an Alert. The basis for the Alert was Hurricane force winds (>70 mph) experienced on site. The implementing procedures lacked guidance for wind speed and/or criteria for strong winds. Cause: CONFUSING OR OVERLY COMPLEX PROCEDURES 05/14/1999

- **Secondary Inspection Area(s): Emergency Preparedness** The licensee's use of pre-planned scenarios, with the details provided to participants in advance of the practice drills, would not appear to provide an adequate test or challenge to response personnel. IR 99-03

+ Issue Type: NEGATIVE FINDING The last full scale exercise conducted in fulfillment of the requirements in the SEP was conducted September 1997. The licensee indicated that the next biennial exercise was scheduled for September 1999. The inspector determined from interviews that the licensee's program for conducting practice drills involved the use of pre-planned scenarios with details provided to participants in advance of the drill. The practice of providing scenario details in advance would not appear to test or challenge response personnel regarding their role and responsibility. The inspector discussed this approach with the licensee as potentially inadequate for ensuring a very high level of proficiency among response personnel. All primary and alternates to the ERO had participated in a drill. Cause: INADEQUATE TASK PLANNING 05/14/1999

- **Secondary Inspection Area(s): Emergency Preparedness** The onsite system for measuring wind speed and direction was no longer serviceable and the licensee was investigating a replacement system. IR 99-03

+ Issue Type: NEGATIVE FINDING The inspector verified the operability of equipment during a facility tour, and determined via review of periodic maintenance documentation that with one exception, selected equipment was calibrated and operated in accordance with the design and intended use. The one exception was the onsite system for measuring wind speed and direction (anemometer). The anemometer was no longer serviceable and the licensee was investigating a replacement system. The licensee indicated that the onsite capability for measuring wind speed and direction would be restored by July 1, 1999. Cause: EQUIPMENT FAILURE DUE TO AGING 05/14/1999

- **Secondary Inspection Area(s): Emergency Preparedness: Management Organization and Controls** Personnel conducting the [independent] audit [of the emergency organization] were technically qualified to perform the audit, and the audit plan contained guidance to ensure that the audit was performed in a manner consistent with Section 7.8 of the Emergency Plan. IR 99-03

- + Issue Type: POSITIVE FINDING The independent audit was conducted during December 15-16, 1998. Personnel conducting the audit were technically qualified to perform the audit, and the areas audited were consistent with the audit plan and Section 7.8 of the SEP. No deficiencies were identified. The audit report documented what appeared to have been a detailed, compliance-oriented audit to verify that the program was maintained in a state of operational readiness. 05/14/1999

- **Secondary Inspection Area(s): Emergency Preparedness** A plant-wide power outage occurred on 4/27/99 due to a fallen tree. The automatic switch from the main power feed to emergency power failed to actuate. The emergency response team was activated and the unencapsulated SNM handling areas had to be evacuated. The automatic had just been successfully tested at the inventory shutdown the week of 4/5/99 and was successfully retested after restoration of power on 4/27/99. The cause for the failure to switch is under investigation. One liners

- + Issue Type: DESIGN ISSUES 04/27/1999

- **Secondary Inspection Area(s): Emergency Preparedness: Criticality Safety** A criticality alarm sounded in the solvent extraction area. The area was evacuated. Subsequent measurements showed it to be a false alarm. Phone call

- + Issue Type: DESIGN ISSUES Maintenance work was being performed on the criticality detection system to install low-level background sources. The system tripped as a result of the maintenance work. The exact cause is under investigation. Cause: INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 03/11/1999

- **Secondary Inspection Area(s): Maintenance/Surveillance: Emergency Preparedness: Criticality Safety: Radiological Controls** False criticality alarm in the solvent extraction area. Phone call & IR 98-10

- + Issue Type: MISCELLANEOUS The false alarm occurred after calibration of the system was done during a time of relatively high activity in the area (high background). When activity decreased on midnight shift, the background radiation subsided such that the criticality detectors sensed a low signal. This triggered the failure alarm circuit which triggered the evacuation alarm. This is the 2nd occurrence of this type of failure in the past 12 months, the other one being in the rod loading area. There are two problems to be investigated here: 1) a change in the calibration technique may be warranted to eliminate false alarms due to low signals, and 2) a change in the circuitry such that a low signal on one detector does not trigger the evacuation alarm. Cause: INADEQUATE COORDINATION BETWEEN ORGANIZATIONAL UNITS INADEQUATE TASK PLANNING INADEQUATE OR FAULTY FUNCTIONAL TESTING OF EQUIPMENT 09/30/1998

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- **Secondary Inspection Area(s): Training: Emergency Preparedness**  
Non-required table-top drills provided an enhancement to emergency response training program. IR 98-07
  - + Issue Type: POSITIVE FINDING the licensee implemented a program of non-required quarterly table-top drills to maintain the proficiency of ERO personnel. During an interview with the Site Emergency Director, the Inspector was informed that the table-top scenarios and walkthroughs had provided good training and a better understanding of the various roles. 09/25/1998
- **Secondary Inspection Area(s): Emergency Preparedness: Management Organization and Controls** The independent emergency preparedness audit lacked details to demonstrate that the program assessment included procedures, training, equipment, and drills/exercise observations. IR 98-07
  - + Issue Type: NEGATIVE FINDING Documentation for the annual independent audit was reviewed and an interview was conducted with the auditor to determine the adequacy of the audit in meeting Section 7.8 of the SEP. Based on the documentation, the Inspector determined that the audit was a very detailed review of the SEP to determine if the SEP was consistent with guidance in Regulatory Guide (RG) 3.67 (Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities) and requirements in 10 CFR 70.22. However, the audit documentation lacked details to show critical program elements such as emergency response training, facilities, equipment, or offsite support agency interface were reviewed. Thus, the Inspector questioned the auditor regarding what additional aspects of the program were reviewed. The interviewee indicated that although the primary focus of the audit was the SEP, the audit also included observation of the biennial exercise, a check of the emergency vehicle and supplies, training records, and surveillance records for emergency equipment and supplies were reviewed. The interviewee acknowledged that the documentation to support such areas audited was lacking from the report. Based on the interview and audit documentation, the Inspector emphasized the importance of the development and implementation of an audit plan and checklist to ensure the audit was performed in a manner consistent with the SEP requirement. This aspect of the audit program was previously discussed in an NRC Inspection Report (70-1151/97-05). The auditor's current position involved emergency planning and the development of Plans and procedures for the Emergency Management

Team at the Westinghouse Energy Systems Business Unit (ESBU) site. Audit findings requiring corrective actions were assigned in the licensee's commitment tracking system (CTS) for followup. Cause: INADEQUATE AUDIT OR ASSESSMENT 09/25/1998

## V. Other

A. Licensing

B. FNMC Plan

C. Physical Security Plan

D. Other

- **Secondary Inspection Area(s): Other** Licensee Performance Review meeting at the Columbia Plant. LPR report dated 4/2/98, IR 98-03.

- + Issue Type: MISCELLANEOUS 04/16/1998