October 21, 1998

Dr. Bruce Kaiser
Vice President, Fuel Operations
ABB Combustion Engineering, Inc.
3300 State Road P
Hematite, MO 63047

SUBJECT: NRC INSPECTION REPORT 070-00036/98004(DNMS) AND NOTICE OF VIOLATION

Dear Dr. Kaiser:

On September 18, 1998, the NRC completed a routine operational safety, radiation protection, emergency preparedness and management organization and control inspection at your Hematite facility. The purpose of the inspection was to determine whether activities authorized by your license were conducted safely and in accordance with NRC requirements.

Based upon the results of the inspection, the NRC has determined that one violation of NRC requirements occurred. The violation is cited with seven examples in the enclosed Notice of Violation (Notice) and the circumstances surrounding the violation and examples are described in detail in the enclosed report.

The violation is of concern because the examples indicate a weakness in your implementation of a management program for the performance of certain operations, maintenance, and radiological safety activities. In addition, a review of the lapel air sampling program appears to be warranted to reconcile the validity of internal dose exposure results due to the discovery of non-operating lapel air sampling equipment worn by several plant staff during uranium handling operations.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures and your response will be placed in the NRC Public Document Room.

L-125

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

Original Signed by

Patrick L. Hiland, Acting Deputy Director
Division of Nuclear Material and Safety

Docket No. 070-00036
License No. SNM-33

Enclosures: 1. Notice of Violation
2. Inspection Report 070-00036/98004(DNMS)

cc w/encls: R. W. Sharkey, Regulatory
Compliance Manager
R. A. Kucera, Director, Missouri
Department of Natural Resources

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NOTICE OF VIOLATION

ABB Combustion Engineering, Inc.
Hematite, Missouri

Docket No. 070-00036
License No. SNM-33

During an NRC inspection conducted from September 14 through 18,1998, one violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," (Enforcement Policy) NUREG-1600, Rev. 1, the violation is listed below:

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto.

Chapter 2, Section 2.6, "Operating Procedures," of the supplement, dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures.

a. Operation Safety Procedure No. 1725, "Erbia Master Blend Makeup," paragraph 2.3.6. stated, in part, that all containers of master blend material must be tagged with a "Moisture OK" tag before storage on a conveyor in the Erbia Plant.

b. Quality Control Procedure No. 5002.04, Revision 2, "Change Control Management," dated March 27, 1998, paragraph 5.6, stated, in part, that each change control package is to be evaluated for license compliance, industrial safety and radiological safety considerations. In addition, paragraph 6.1, stated, in part, that the change control documentation (change control package) shall be thoroughly described and documented along with system or component drawings, process and instrumentation diagrams, and operating procedures. Attachment A stated that required cognizant directors must sign and approve the change control package prior to release.

c. Nuclear Industrial Safety Procedure No. 219, "Control of Hazardous Energy," dated March 15, 1996, Section 6.2 stated, in part, that a tagout shall be used to remove equipment for any condition, other than what may be reasonably expected, that adversely affects the safety of affected personnel. In addition, Section 6.3 stated, in part, that a lockout shall be used to remove equipment when work to be performed can result in an exposure to electrical energy while maintenance is being performed.

d. Health Physics Procedure No. 326, "Respiratory Selection, Use, Inspection, and Maintenance," dated November 5, 1996, paragraph 5.3, required the respirator user to verify the ability to maintain a facial seal when a respirator is issued and before each use.

e. Operation Safety Procedure No. 202, "Health Physics Controls," paragraph 2.2 stated, in part, that all visible surface contamination, outside of a hood or process equipment, must be cleaned up immediately.

f. Health Physics Procedure No. 330, "Radiation Work Permit," paragraph 3.0, stated in part, that radiation work permits are required for activities that involve potential for

significant intake of, or exposure to, radiological material. In addition, paragraph 5.1.5 stated, in part, that any work requiring the breaking of a system or pipe containing radioactive material or that may be potentially contaminated requires a radiation work permit.

g. Operation Safety Procedure No. 202, "Health Physics Controls," paragraph 2.1 stated, in part, that lapel air samplers shall be worn (turned on) for breathing zone sampling. Health Physics Procedure No. 303, "Lapel Air Sampling," paragraph 2.0 stated, in part, that lapel samplers were used where uranium handling operations were pursued and improper operation or suspected malfunction of a lapel air sampler shall be reported to the HP staff.

Contrary to the above, operations which affected licensed material were not conducted in accordance with approved written procedures in the following examples, respectively:

a. On September 16, 1998, licensee staff failed to post a "Moisture OK" control tag on an "Erbia Master Blend Makeup" container before storage on a conveyor in the Erbia Plant.

b. On September 15, 1998, plant management failed to ensure that UF_6 detector system documentation received the cognizant directors review and documented authorization. In addition, the change control documentation (change control package) was not described and documented along with system or component drawings, process and instrumentation diagrams, and operating procedures.

c. On September 15, 1998, plant management failed to establish an electrical lockout or install a danger tag on equipment removed from service during maintenance activities. Specifically, no tagout (danger tag) or a lockout was established on the electrical power supply panel during UF_6 detector system installation activities.

d. On September 14 and 15, 1998, several maintenance staff failed to verify the ability to maintain a facial seal (by conducting either the positive or 10-second negative pressure fit check) when donning respirators prior to conducting work activities.

e. On September 16, 1998, plant management failed to ensure that immediate cleanup was conducted for visible surface contamination on the floor near work stations.

f. On September 15, 1998, plant management failed to ensure that a radiation work permit was written prior to conducting contaminated heat exchanger work activities.

g. On September 17, 1998, plant management failed to ensure that operations staff had lapel air samplers turned on (for breathing zone sampling) while uranium handling operations were in progress.

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

Pursuant to the provisions of 10 CFR 2.201, ABB Combustion Engineering, Inc., is hereby required to submit a written statement or explanation to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, with a copy to the Regional Administrator, Region III, 801 Warrenville Road, Lisle, Illinois 60532-4351, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the Notice of Violation corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your Notice of Violation response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

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

Dated this 21st day of October 1998

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	070-00036
License No:	SNM-33
Report No:	070-00036/98004(DNMS)
Licensee:	ABB Combustion Engineering, Inc.
Facility:	Hematite Nuclear Fuel Manufacturing Facility
Location:	Hematite, MO 63047
Dates:	September 14 -18, 1998
Inspector:	Timothy Reidinger, Senior Fuel Cycle Safety Inspector
Approved by:	Patrick L. Hiland Acting Deputy Director Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

ABB Combustion Engineering, Inc.
Nuclear Fuel Manufacturing Facility
NRC Inspection Report 070-00036/98004(DNMS)

This routine announced inspection included aspects of licensee operation, radiation protection, emergency preparedness, and management organization and control.

Plant Operations

- The inspector concluded that operations observed and reviewed were generally conducted safely and in accordance with the applicable procedures and nuclear criticality safety requirements. However, one example of a procedure violation was identified for the storage of special nuclear material on the Erbia Plant conveyor. Housekeeping in the Pellet and Erbia Plants was deficient. (Section O1.1)

- The inspector identified another example of a procedural violation of the Quality Assurance Program, "Change Management Request," that significantly contributed to problems encountered during installation of an Oxide Building uranium hexafluoride (UF_6) detector. The problems included undocumented identification of design assumptions, undocumented installation work package, and undocumented description and review of the installation procedure as a part of the design drawings. As a result of the unreviewed and undocumented change request, an unplanned momentary challenge of the emergency alarm system occurred. (Section O1.2)

Maintenance and Surveillance Activities

- The inspector identified another example of a procedural violation in which maintenance activities to install an UF_6 detector were initiated without a proper lockout and tagout of the UF_6 detector system electrical power supply during the installation of the UF_6 detector. (Section M1.1)

Plant Support

- The licensee demonstrated a weakness in the implementation of the radiation protection program. The inspector identified four examples of procedural violations associated with the licensee's radiation protection program in the areas of contamination control, respiratory protection requirements, lapel monitoring and radiation work permits. Non-operating lapel air sampling equipment was discovered on several plant staff during uranium handling operations which could potentially affect internal dose exposure results. (Sections R1.1, R1.2, R1.3, R1.4, R1.5)

Report Details

I. Operations

O1 Conduct of Operations

O1.1 Facility Tours and General Operations

a. Inspection Scope (88020)

The inspector toured the plant areas with cognizant licensee personnel and observed the general status of facility operations, implementation of nuclear criticality safety requirements, and site housekeeping.

b. Observation and Findings

The inspector toured and reviewed the operations of the Oxide Building vaporizer room, and Oxide Building. The inspector observed that housekeeping in these areas was poor and had generally deteriorated from previous inspections. Daily operations were conducted in accordance with approved procedures.

The inspector observed the hydrofluoric acid (HF) absorber and associated operations. The inspector noted that operations staff demonstrated the required knowledge of the chemical hazards by wearing the appropriate chemical protection clothing during sampling operations for the HF absorber system. The operations staff also followed the required procedural steps while obtaining HF samples.

The Erbia and Pelletizing Plants, recycle-recovery area, and incineration areas were also toured. Several concerns were identified with day-to-day operations in these areas regarding the effective implementation of appropriate health physics (HP) procedures (see Sections R1.1, R1.2, R1.3 and R1.4). In addition, the inspector noted that housekeeping in these areas was poor and had also deteriorated. Plant management acknowledged that general housekeeping deficiencies would be addressed in the future by augmenting the cleanup staff. The inspector observed the location and accuracy of emergency egress routes, pressure differentials across the high efficiency particulate absolute filters, and the lighting intensity throughout the plant and noted no concerns.

Posting of criticality limits and controls appeared consistent with Section 4.1.5, "Posting of Limits and Control," and Section 2.4, "Criticality Safety Limits and Signs," of the license application and with Nuclear Industrial Safety (NIS) Procedure No. 201, "Nuclear Safety Manual." During inspections and tours of the Hematite facility, the implementation of nuclear criticality safety requirements appeared effective with one exception. The inspector identified that a can of master blend material on the conveyor did not possess the required moisture tag in the Erbia Plant.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures.

Operation Safety (OS) Procedure No. 1725, "Erbia Master Blend Makeup," paragraph 2.3.6. stated, in part, that all containers of the master blend material must be tagged with a "Moisture OK" tag before storage on a conveyor in the Erbia Plant. In addition, a criticality control posting, located near the conveyor, stated, in part, that a "Moisture OK" tag was required on all powder cans containing less than one percent moisture by weight. The licensee stated that the Erbia Plant operator transferred some material to the Erbia recycle hopper and neglected to post the original moisture tag on the can after the transfer. The inspector reviewed the Erbia Plant computer logs that indicated the moisture content of the can was less than one percent by weight. The licensee immediately posted a moisture tag on the can after verifying the moisture content. The failure to post a moisture tag on the can of master blend material is an **example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01a)**

c. Conclusions

Except as noted in Section O1.2, the inspector concluded that operations observed and reviewed were generally conducted safely and in accordance with the applicable procedures and nuclear criticality safety requirements. Plant management acknowledged that general housekeeping deficiencies would be addressed in the future by augmenting the cleanup staff. One example of a procedural violation was identified in that a nuclear criticality safety required moisture tag was not posted on a can of master blend material.

O1.2 Oxide Building Emergency Alarm Actuation

a. Inspection Scope (88020, 88005)

The inspector reviewed the circumstances surrounding the inadvertent actuation of the emergency alarm system after a field installation of a uranium hexafluoride (UF_6) detector in the Oxide Building vaporizer area. The inspector discussed the event with cognizant maintenance staff and reviewed the following:

1.0 Nuclear Industrial Safety (NIS) Procedure, No. 219, Revision 0, "Control of Hazardous Energy," dated March 15, 1996;

2.0 Operation Safety (OS) Procedure No. 203, Revision 0, "Industrial Safety," dated August 8, 1994;

3.0 Quality Control (QC) Procedure No. 5002.04, Revision 02, "Change Control Management," dated March 27, 1998; and

4.0 Health Physics (HP) Procedure No. 326, Revision 2, "Respiratory Selection, Use, Inspection, and Maintenance," dated November 5, 1998.

b. Observation and Findings

On September 15, 1998, the plant emergency staff responded to a site-wide emergency alarm actuation. The emergency alarm occurred while the maintenance staff were restoring the configuration of a UF_6 detector installed in the Oxide Building vaporizer area. The UF_6 detector system is installed to provide a means of monitoring UF_6 leaks

from the vaporizers. The newly installed, uncalibrated UF_6 detector actuated the emergency alarm (as designed) when maintenance staff unblocked the output signal of the UF_6 detector. The maintenance staff failed to recognize that the UF_6 detector output signal was in an alarmed state as shipped by the vendor. The maintenance staff astutely recognized the situation, immediately blocked the output signal of the new UF_6 detector and quickly notified the emergency director of the actual cause of the emergency alarm in order to allow the emergency alarm system to be reset.

Following the event, the inspector reviewed the change request documentation associated with the UF_6 detector installation and discussed the sequence of events with the maintenance staff who performed the UF_6 detector installation work. The inspector determined that the change request documentation was inconsistent with current quality and work process requirements, in that, the modification activity did not have the level of review and oversight of procedures and instructions used to direct the work efforts. The modification package did not identify the design input and output signals for the UF_6 detector and did not identify the critical functional interfaces associated with the UF_6 installation. Specifically, the documentation did not identify any operational limitations or special operational modes required for the installation of the modification. The documentation did not describe the modification activities associated with the UF_6 detector system and did not contain drawings of the modified components. The change request documentation also failed to specify the version of the modification drawing to be used for the work, along with process and instrumentation diagrams, to the extent necessary to prevent an inadvertent emergency alarm actuation.

In addition, the change request documentation did not have the required written quality and industrial safety evaluations and approvals, prior to the modification activity. As a result of the failure to specify the required functional interfaces for the UF_6 detector installation, the negative impact the installation process had on the inservice emergency alarm system was not identified until the system was momentarily challenged by the maintenance staff unblocking the uncalibrated UF_6 detector output signal. No precautions were included to indicate the potential impact the modification activity could have on other operating or safety-related systems. Finally, the inspector reviewed the informal design drawings which outlined the wiring necessary for the UF_6 installation and determined that the drawings did not include sufficient information by which to identify where the existing system ended and the modification began.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures. QC Procedure No. 5002.04, paragraph 5.6, stated, in part, that each change control package was to be evaluated for license compliance, industrial safety and radiological safety considerations. In addition, QC Procedure No. 5002.04, paragraph 6.1, stated, in part, that the change control documentation (change control package) shall be thoroughly described and documented along with system or component drawings, process and instrumentation diagrams, and operating procedures if applicable. Attachment A stated that required cognizant directors must sign and approve the change control package prior to release. On September 15, 1998, plant management failed to ensure that the change management process controls for modifications in the

plant was in accordance with QC Procedure No. 5002.04. Specifically, the documentation did not receive the cognizant directors review and documented authorization for the UF_6 detector modification that involved nuclear or radiological safety, and the change control documentation (change control package) was not described and documented along with the appropriate system or component drawings, process and instrumentation diagrams, and operating procedures. The failure to ensure that the change management process, which controls modifications in the plant prior to installation, was in accordance with QC Procedure No. 5002.04 is **another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01b)**

c. Conclusions

The inspector concluded that change control documentation was inconsistent with current quality and work process requirements. In addition, the modification activity did not have the level of review and oversight of procedures and instructions used to direct the work efforts. One example of a procedural violation was identified in that the change management process for the installation of a UF_6 detector was not performed and documented in accordance with the QC procedure.

II. Maintenance and Surveillance

M1 Maintenance and Surveillance Activities

M1.1 Uranium Hexafluoride Detector Installation (88025)

a. Inspection Scope

The inspector reviewed the modification activities performed by maintenance staff associated with the installation of the new UF_6 detector in the Oxide Building. The inspection consisted of interviews with various maintenance and engineering staff, a review of the applicable approved procedures, and reviews of appropriate documentation.

b. Observation and Findings

Discussions with the maintenance staff identified numerous shortcomings in the rigor of coordination and oversight of the UF_6 detector modification activity. Nuclear Industrial Safety Procedure 219, "Control of Hazardous Energy," paragraph 5.2 stated, in part, that live parts exposed for an electrical installation shall be de-energized before work starts unless the parts operate less than 50 volts to ground or de-energizing the parts causes an additional or increased hazard. In addition, paragraphs 6.2 and 6.3 stated, in part, that a tagout shall be used to remove equipment from service before initiating equipment modifications, and a lockout shall be used to remove equipment from service if work to be performed could result in exposure to electrical energy. On September 15 the inspector reviewed the modification documentation to determine the implementation of the required electrical isolation process (tagout and lockout). The review indicated that the electrical panel power supply was not tagged out with a white "Do Not Operate" tag nor was the breaker "locked out" to prevent energizing downstream components during maintenance activities. During a walkdown of the installed modification, the inspector observed a "Do Not Operate" tag on the switch that only blocked the

uncalibrated output signal of the UF_6 detector; the detector remained energized. The maintenance staff informed the inspector that the tag was hung to prevent a "false"alarm from the UF_6 detector after the emergency alarm actuation had occurred.

The inspector questioned the maintenance staff whether the electrical tagouts and lockouts associated with the UF_6 detector modification were available for review. The inspector was informed that no electrical tagout or lockouts were installed prior to conducting the UF_6 detector installation. Maintenance staff indicated that efforts to determine the location of the electrical panel that contained the electrical breaker to de-energize the power supply to the UF_6 detector system were unsuccessful. As a result, the maintenance staff elected to cut the "hot" service power supply wiring to the existing UF_6 detector. The maintenance staff then spliced the UF_6 detector modification wiring to the "hot" service power wiring to energize the new detector. The inspector noted that the maintenance staff used insulated equipment to cut the "hot" wire.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures. On September 15, 1998, plant management failed to ensure that the electrical installation of the UF_6 detector was performed in accordance with NIS Procedure 219, "Control of Hazardous Energy." Specifically, the failure to establish an electrical lockout and install a tagout to control any unexpected energizing (greater than 50 volts) of plant equipment **is another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01c)**

c. Conclusions

The inspector determined that the rigor of coordination and oversight of the UF_6 detector modification activity was ineffective. The failure to ensure that an electrical tagout or lockout was installed prior to electrical modification activities in accordance with plant procedures was identified as an additional example of a procedural violation.

III. Plant Support

R1 Radiation Protection Activities

R1.1 Respiratory Protection

a. Inspection Scope (83822)

The inspector observed the implementation of the respiratory protection program through direct observation of maintenance activities requiring respiratory protection, interviews with staff who frequently use respiratory protection equipment, and a selective review of certain aspects of the respiratory training program.

b. Observations and Findings

During plant tours, the inspector noted numerous examples of incorrect implementation of the site specific respiratory protection program. On several occasions, plant staff were observed donning respirators without conducting a positive or 10-second negative pressure fit check, to verify the ability of the respirator to maintain a facial seal, as required by HP Procedure No. 326, "Respiratory Selection, Use, Inspection, and Maintenance." During the observations of maintenance and inspection activities on September 14 and 15, associated with the roof mounted incinerator flue gas air-to-air heat exchanger and incinerator cleanout activities, the inspector observed that the plant staff failed to perform the required positive or negative pressure fit checks during donning activities. The inspector determined that plant staff were not aware of the time requirements for the negative pressure fit check associated with the proper donning of respiratory protection equipment. Consequently, any cursory fit checks the maintenance staff may have performed were insufficient to ensure the adequacy of the facial seal. The respiratory protection equipment being used would have allowed the fit checks to be performed. The maintenance staff were cognizant that respirator use required the user to be clean shaven, and an annual quantitative fit test, physical examination and respiratory protection refresher training. The inspector noted that these requirements were in effect.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures. On September 14 and 15 plant management failed to ensure that respiratory protection requirements were implemented in accordance with HP Procedure No. 326, "Respiratory Selection, Use, Inspection, and Maintenance." Specifically, the failure to conduct the required positive or 10-second negative pressure fit check to verify the ability of the respirator to maintain a facial seal was identified as **another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01d)**

Discussions with the health physics manager (HPM), health physics supervisor (HPS) and health physics technicians (HPT) indicated that maintenance and operations staff, and supervisors received training instructions on safe work practices, safety and health, and chemical hazards (including UF_6) through the plant respiratory protection training. Qualification and training requirements for HPTs, and operations and maintenance staff were outlined in the plant license and procedures. The inspector compared the qualification and training requirements with the current training records for selected supervisors, HP staff and maintenance staff and determined that the training and documentation was consistent with the respective license requirements.

The HP staff highlighted that the training modules were subject specific teaching aids used by HP staff trainers. The modules were developed from procedures or regulatory guides by trainers or subject matter experts. Respirator training module, "Respiratory Protection," was reviewed for content. The inspector also reviewed the training module guidance associated with the proper donning of respirators that was given to plant staff. The module training contained sufficient detail to evaluate the staff's understanding of

the subject material. Specifically, the respirator training module provided clear directions in performing the required positive or 10-second negative pressure fit check.

As a follow-up to the inspector observations, the HPM and HPS indicated that further reviews and spot evaluations would be conducted of other related training areas to improve training effectiveness. In addition, the affected maintenance staff were de-certified by plant management from performing work activities involving respiratory protection until respiratory refresher training was completed.

c. Conclusions

A violation was identified regarding several examples of the failure to implement specific time requirements for pressure fit checks prior to respirator use. Although respiratory protection training modules covered the time requirements for pressure fit checks, the inspector identified that plant staff were generally unaware of the specific time requirements.

R1.2 Contamination Control Program

a. Inspection Scope (83822)

The inspector reviewed selected daily, weekly and monthly contamination smear survey records and observed HPTs conduct routine activities related to contamination surveys.

Specific procedures and documents reviewed were:

- Health Physics Procedure No. 307, "Performing Smear Surveys," Rev. 3, dated December 23, 1996;
- Health Physics Procedure No. 324, "Airborne Release," Rev. 2, dated December 23, 1996; and
- Operation Safety Procedure No. 202, Health Physics Controls," Rev. 0, dated February 15, 1987.

b. Observations and Findings

Radiological survey instrumentation for exiting the plant restricted area was located in the employee's change room. Survey instrumentation used for exit monitoring satisfied the required calibration frequency. Observations of employee practices for performing self-monitoring indicated that radiological training appeared adequate in the use of radiation detection equipment. Interviews with several employees at the exit station in the change room indicated that they were familiar with the appropriate actions and procedure to contact HPM in the event of a contamination event.

The inspector observed various routine facility alpha contamination smear surveys in the plant during the course of the inspection and noted that contamination surveys were performed in accordance with the frequency and action levels specified in Chapter 3.2.6.2, "Routine Surveillance," of the license. Contamination surveys were conducted for the purposes of evaluating the control of surface contamination and to

minimize airborne radioactivity and material release in restricted and clear areas of the plant. The inspector reviewed HP Procedure No. 307, "Performing Smear Surveys," and accompanied HPTs during weekly alpha contamination surveys. Health physics technicians satisfactorily analyzed smears taken on the surveys and appropriately explained smear results generated by the instrument. Health physics technicians highlighted that smears above the administrative and license limits were immediately scheduled for decontamination and subsequently resurveyed.

The inspector questioned several operations staff on different shifts concerning contamination control responsibilities. In general, the response was that for the most part, the operations staff were not inclined to conduct an immediate shift cleanup on the work stations or on the floor adjacent to the work station in the event of a visible powder spill due to what the operations staff described as a high production work load. The operations staff informed the inspector that visible powder spills at various work stations were cleaned up at the end of shift. A review of selected August and September smear survey records taken in the Erbia and Pellet Plants indicated that approximately 85 percent of the smear results were greater then the administrative limit of 2,500 disintegrations per minute per 100 square centimeters (dpm/100cm^2) and approximately 49 percent of the smear results were greater than the license limit of 5,000 disintegrations per minute per 100 square centimeters dpm/100cm^2 for floors and exposed surfaces of production process equipment. The inspector noted on two occasions during September that the pellet plant smear survey records indicated that 20 out of 24 (83 percent) survey points were greater than the license limit. HPTs were knowledgeable of process hazards when performing surveys, and activities observed by the inspector were done in accordance with written procedures.

On September 16, a HPT obtained and counted selected smears from seven floor locations decided by the inspector in the Erbia and Pellet Plants. The locations were selected due to the various amounts of visible uranium dioxide powder on the floor. No operations staff were present at these work stations. Four out of seven smear results (57 percent) were greater than the license limit and ranged from approximately 9,000 to 62,000 dpm/100cm^2.

Operation Safety Procedure No. 202, "Health Physics Controls," paragraph 2.2 stated, in part, that all visible surface contamination, outside of a hood or process equipment, must be cleaned up immediately. The inspector notified the shift foreperson of the various locations of visible uranium powder and the affected areas were cleaned up and decontaminated in an immediate manner. The inspector was informed that operations staff throughout the day and at various work stations were conducting evolutions that possibly resulted in a spill of powder on the floor. Licensee management informed the inspector that operations staff are trained to observe work rules to avoid generating airborne contamination, spread of contamination and breathing or ingestion of radioactive material and that good housekeeping practices must be followed to avoid exposure.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures. On

September 16 plant management failed to ensure that immediate cleanup requirements were implemented in accordance with OS Procedure No. 202, "Health Physics Controls." Specifically, the failure to conduct an immediate cleanup of visible surface contamination on the floor, outside of a hood or process equipment, was identified as **another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01e)**

c. Conclusions

The inspector determined that implementation of the contamination control program was ineffective. One example of a procedural violation was identified, in that immediate cleanup was not conducted when visible powder was evident at various work stations. Health physics technicians were knowledgeable of current plant operating conditions and conducted surveys and sample analyses according to site procedures

R1.3 Radiation Work Permit Program

a. Inspection Scope (83822)

The inspector reviewed selected radiation work permits and observed HPT routine activities relating to posting of radioactive areas. Specific procedures and documents reviewed were:

- Health Physics Procedure No. 330, "Radiation Work Permit (RWP)," Rev. 1, dated August 11,1997; and
- Health Physics Procedure No. 330, "Radiation Work Permit (RWP)," Rev. 2, dated September 17, 1998.

b. Observation and Findings

During the first week of August 1998 the licensee discovered an unexpected accumulation of uranium-laden ash in the roof-mounted heat exchangers supporting the plant trash incinerator which was not in accordance with applicable nuclear criticality safety approval requirements (See NRC Inspection Report 070-00036/98-203). Later in August the heat exchanger unit was removed intact from the roof and transferred inside the facility for clean-out to ensure moderation control and health protection. After cleanout, the unit was subsequently returned to the roof. Clean out yielded approximately 33 kilograms of uranium bearing ash containing approximately 70 grams uranium-235 (U-235) which was well below the system limit of 800 grams U-235. During facility tours and accompaniments with HPTs, the inspector noted that areas requiring postings for airborne radioactivity were properly posted prior to the start of work which required the use of respiratory protection with one exception.

On September 15 the licensee was conducting additional followup inspections of the heat exchanger unit to develop better baseline radiation data to detect uranium-laden accumulation buildup. During the incinerator heat exchangers inspection, which included maintenance staff removing the heat exchangers inspection flanges on the inlet and outlet ducts, the inspector noted that an RWP was not posted. The plant HPM, HPS and HPT were monitoring and directing the maintenance staff work activities. The inspector questioned whether an RWP was required to be written and posted prior to the

maintenance staff initiating work activities (maintenance staff were issued respirators). The HP staff responded that an RWP was not required because the HPT was providing constant surveillance of the maintenance staff activities and radiological conditions. The inspector noted that the HP staff provided adequate radiological coverage and provided guidance to the maintenance staff on several occasions during the work activities.

The inspector determined, after the review of the HP Procedure No. 330, that an RWP was required for the heat exchanger work activities. Health Physics Procedure No. 330, "Radiation Work Permit (RWP)," paragraph 3.0, stated, in part, that RWPs were required for activities that involve potential for significant intake of, or exposure to radiological material. In addition, paragraph 5.1.5 states, in part, that any work requiring the breaking of a system or pipe containing radioactive material or that may be potentially contaminated requires an RWP.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect licensed material shall be conducted in accordance with approved procedures. On September 15, 1998, plant management failed to ensure that RWP requirements were implemented in accordance with HP Procedure No. 330, "RWP." Specifically, the failure to ensure that an RWP was developed prior to conducting heat exchanger work activities was identified as **another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01f)**

Based on the inspector's review, plant management identified several actions to be completed prior to re-establishing the practice of HPT providing radiological coverage in lieu of an RWP posting. These actions included a review of the HP administrative controls, revisions to HP Procedure No. 330 as warranted and providing appropriate training to plant staff. These actions were completed during the inspection week.

c. Conclusions

During facility tours and accompaniments with HPTs, the inspector noted that areas requiring postings for airborne radioactivity were properly posted prior to the start of work with one exception. One example of a procedural violation was identified in that an RWP was not developed prior to conducting contaminated heat exchanger work activities.

R1.4 Lapel Air Sampling Program

a. Inspection Scope (83822)

The inspector reviewed the lapel air sampling program and observed and interviewed operations staff at various work stations to evaluate the effectiveness of the lapel air monitoring activities in the restricted areas of the plant.

Specific procedures and documents reviewed were:

- Health Physics Procedure No. 303, "Lapel Air Sampling," Rev. 3, dated August 12, 1998;

- Health Physics Procedure No. 323, "Preparation of High Sample Followup Reports," Rev. 6, dated July 21, 1998;

- Health Physics Procedure No. 324, "Airborne Release," Rev. 2, dated December 23, 1996; and.

- Operation Safety Procedure No. 202, Health Physics Controls," Rev. 0, dated February 15, 1987.

b. Observation and Findings

The main exposure pathway at the plant was through the inhalation of airborne uranium, primarily Class Y uranium oxide powder or dust. The licensee monitored worker intakes by using lapel air samplers for all plant staff and contractors who worked in the contamination control area. Lapel air samplers worn to assign intake were considered representative of the breathing zone. The licensee assigned doses to such workers by utilizing the air sample results to calculate the Derived Air Concentration-Hours (DAC-Hours) for each worker on a shift basis. Conversion to a dose in millirem was done by multiplying the DAC-Hours result by 2.5. The licensee then added the external dose results, obtained from the worker's film badge, to these internal results to obtain the total effective dose equivalents for each worker.

During the inspection, the inspector observed that operations staff were properly wearing the lapel air monitors per HP Procedure No.303, "Lapel Air Sampling." The sample head of the lapel air sampler was clipped to the worker's lapel on the outside of the smock or coveralls and properly positioned in the breathing zone. On September 17 the inspector randomly questioned numerous operations staff in the Erbia and Pellet Plants as to whether the assigned lapel air samplers were functioning correctly (turned on). The first five of eight operations staff questioned withdrew the battery pack from the coveralls to check whether the lapel air sampler was turned on and responded that the air samplers were turned off. When asked why the lapel air samplers were turned off, the operations staff generally responded that they forgot to turn the air samplers on after returning from a work break. The inspector noted that at least one of the first five operations staff conducted work activities at a work station for approximately one hour after returning from a break without the lapel air sampler turned on.

Operation Safety Procedure No. 202, "Health Physics Controls," paragraph 2.1 stated, in part, that lapel air samplers shall be worn (turned on) for breathing zone sampling. Health Physics Procedure No. 303, "Lapel Air Sampling," paragraph 2.0 stated, in part, that lapel samplers were used where uranium handling operations were pursued and improper operation or suspected malfunction of a lapel air sampler shall be reported to the HP staff.

Safety Condition S-1, of Special Nuclear Materials License, SNM-33, authorizes the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 8 of the application dated October 29, 1993, and supplements and revisions thereto. Chapter 2, Section 2.6, "Operating Procedures," of the supplement dated August 8, 1997, requires, in part, that all operations which affect

licensed material shall be conducted in accordance with approved procedures. On September 17, 1998, plant management failed to ensure that the lapel air sampling program requirements were implemented in accordance with OS Procedure No. 202, "Health Physics Controls." Specifically, the failure to ensure that operations staff had lapel air samplers turned on (worn for breathing zone sampling) while uranium handling operations were in progress was identified as **another example of a procedural Violation of Safety Condition S-1 of the License Conditions. (VIO 070-00036/98004-01g)**

c. Conclusions

The inspector concluded that operations staff were properly wearing the lapel air monitors per procedure; however, several operations staff failed to ensure the lapel air samplers were turned on while uranium handling operations were in progress. One example of a procedure violation was identified.

R1.5 Exposure Data

a. Inspection Scope (83822)

The inspector reviewed the As-Low-As-Reasonable-Achievable (ALARA) program, and observed and interviewed operations staff at various work stations to evaluate the effectiveness of the ALARA program in the restricted areas of the plant.

Specific procedures and documents reviewed were:

- Hematite Fuel Operations ALARA Plan,1998;
- Health Physics Procedure No. 323, "Preparation of High Sample Followup Reports," Rev. 6, dated July 21, 1998; and
- Health Physics Procedure No. 324, "Airborne Release," Rev. 2, dated December 23, 1996.

b. Observation and Findings

High sample followup reports (HSFR) were generated when either the daily fixed air samplers had a concentration equal to or greater than the DAC for Class Y uranium or an operator's lapel air sampler (LAS) results indicated an intake of greater than 8 DAC-Hours during a shift. In addition, bioassay sampling was conducted when an operator's LAS had a suspected intake greater than approximately 40 DAC-Hours or the operator had a potential ingestion of a radionuclide in an insoluble form during one shift.

The inspector reviewed the HSFR tracking system which provided an analysis of the number of HSFRs generated from specific process areas, i.e., Pellet Plant, Oxide Building, Erbia Plant, etc. The tracking system also trended the different root cause categories of the HSFRs, i.e., engineering controls, operator errors, unknowns, etc.. The inspector noted that of the 414 HSFRs generated in the first eight months of 1998, approximately 52 percent of the HSFRs (216) occurred in the Erbia and Pellet Plants. Upon further review of the HSFR trends, the inspector noted that approximately 20 percent of the HSFRs (84) were as a result of operator errors.

Approximately 538 HSFRs were generated in 1997. The licensee indicated that the 1997 corrective action plans for reducing HSFRs were responsible for the decreasing trend in the number of HSFRs generated in 1998. Some of the corrective actions included the scheduling of additional operator training sessions to help eliminate operator errors and the elimination of the "unknowns" category by conducting better root cause investigations of the HSFRs.

The inspector reviewed the licensee's exposure data for the first eight months of 1998 comparing the radiation exposures in average DAC-Hours per worker per month to both kilograms of uranium dioxide material produced and hours worked. While the exposure documentation indicated a fair correlation between resulting exposures and bases of product and work hours on a monthly basis when averaged over a four month interval, the average exposure was less on a per product and work hour bases than experienced in the latter four months of the year. The average exposures over a four month interval were as follows:

Exposure basis	January - April 1998	May - August 1998
Average DAC-Hours/worker/ kilogram produced	26.4	31.7
Average DAC-Hours/worker/per hour worked	23.9	30.8

The inspector determined that neither kilograms produced nor hours worked could explain the slight increase in average DAC-Hours per worker. Poor implementation of contamination control practices (Section R1.2) by the operations staff could potentially have contributed to the increase in DAC-Hours per worker.

c. Conclusions

The inspector concluded that the HSFR tracking system provided an adequate analysis of the number of HSFRs generated from specific process areas and also trended the different root cause categories of the HSFRs. The increased DAC-Hours exposures in the four months following April 1998 could be attributed to poor contamination control practices as neither kilograms produced nor hours worked could adequately explain the increase in average DAC-Hours per worker. The ability to generalize and predict plant staff internal exposures from lapel air sampler results may be limited by non-operating lapel air sampling equipment which were discovered on several plant staff during uranium handling operations.

V. Management Meetings

X1 Exit Meeting Summary

The inspector met with plant management and other staff throughout the inspection and on September 18, 1998, for the exit meeting. The inspector summarized the observations and findings of the inspection. The licensee did not identify any of the information discussed at the meetings as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Alkier, Engineer
M. Eastburn, Nuclear Criticality Specialist
H. Eskridge, Senior Consultant Regulatory Affairs
K. Funke, Supervisor Health Physics
K. Hayes, Safety Engineer
E. Jordan, Cell Leader
V. Mavis, Human Resource Manager
A. Noack, Maintenance Manager
G. Page, Director of Uranium Operations
B. Sharkey, Director of Regulatory Affairs
D. Underwood, Engineering Manager
P. Weaver, Production Manager

INSPECTION PROCEDURES USED

IP 83822:	Radiation Protection
IP 88005:	Management Organization and Controls
IP 88020:	Operations Review/Regional Criticality Safety
IP 88025:	Maintenance and Surveillance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

070-00036/98004-01a,b,c,d,e,f,g	VIO	Seven examples of procedural violations related to operations and maintenance

Closed

None

Discussed

None

LIST OF ACRONYMS USED

ALARA	As-Low-As-Reasonably-Achievable
CFR	Code of Federal Regulations
DAC-Hours	derived air concentration hours
DNMS	Division of Nuclear Materials Safety
dpm/100cm^2	disintegrations per minute per 100 square centimeters
HF	hydrofluoric acid
HP	health physics
HPM	health physics manager
HPS	health physics supervisor
HPT	Health Physics Technician
HSFR	high sample followup report
LAS	lapel air sampler
NIS	Nuclear Industrial Safety
NRC	Nuclear Regulatory Commission
OS	Operation Safety
PDR	Public Document Room
QCP	Quality Control Procedure
RWP	radiation work permit
UF_6	uranium hexafluoride
VIO	Violation