U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-36/91002(DRSS)

Docket No. 70-36 License No. SNM-33

Licensee: Combustion Engineering, Inc.
Nuclear Power Systems
Windsor, CT 06095

Facility Name: Hematite Nuclear Fuel Manufacturing Facility

Inspection At: Hematite, Missouri

Inspection Conducted: January 28-31, and February 1, 1991

Inspector: James Foster James Foster 2/14/91
Date

Approved By: William Snell, Chief
Radiological Controls and
Emergency Preparedness Section
William Snell 2/19/91
Date

Inspection Summary

Inspection on January 28-31, and February 1, 1991 (Report No. 70-36/91002(DRSS));
Areas Inspected: Special, announced inspection of the following areas of the Hematite Nuclear Fuel Manufacturing Facility emergency preparedness program: followup on actual emergency plan activations (IP 92700); and fuel cycle emergency preparedness program (IP 88050). The inspection involved one NRC inspector.
Results: One apparent violation, regarding classification of emergency conditions, was identified during this inspection. Actions taken during the December 18, 1990 accidental release of uranium hexaflorride were generally found to be proper, and an adequate followup of corrective actions was underway. The Hematite Nuclear Fuel Manufacturing Facility Emergency Preparedness program was adequately maintained and several upgrades to the program had been made based on the experience gained during the September 1990 exercise and lessons learned from the December 18, 1990 emergency.

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DETAILS

1. Persons Contacted

ASEA Brown Boveri/Combustion Engineering, Inc.

*J. Rode, Plant Manager
*H. Eskridge, Manager, Nuclear Licensing, Safety & Accountability
*L. Grossman, Director, Manufacturing Technology
C. Molnau, Materials Licensing
*E. Criddle, Health Physics Supervisor
*R. Griscom, Engineering Manager
*L. Duel, Manufacturing Engineer
*R. Miller, Manager, Administration & Production Control
*A. Noack, Production Superintendent

Others

D. McFarland, Administrator, Joachim-Plattin Township Ambulance District

*The above personnel attended the January 31, 1991 exit interview.

The inspector also contacted other members of the licensee's staff during the course of the inspection.

3. Emergency Plan Activation on December 18, 1990 (IP 92700)

a. Synopsis

This special inspection was performed to review the regulatory aspects of the licensee's response to a uranium hexaflouride leak on the evening of December 18, 1990. The following is a brief synopsis of events at the Hematite Nuclear Fuel Manufacturing facility on that evening. A more detailed description of activities which took place is included in NRC Inspection Report No. 070-00036/90006(DRSS), issued January 24, 1991.

On the evening of December 18, 1990, two licensee personnel were obtaining a sample from a heated cylinder for the purpose of isotopic determination. At approximately 1900 hours, one of the operators made an error, and removed the filled sample flask without first ensuring that the valve to the cylinder was closed. This resulted in the release of uranium hexaflouride gas (UF_6) into the immediate area for between five to fifteen seconds, until the valve could be closed. The operators then exited the cylinder dock area, and entered the plant. The two operators then proceeded to a plant exit and went outside without initiating an alarm.

Two supervisors, nearing the area, sighted the "smoke" typical of a uranium hexaflouride release. One supervisor, fearful that individuals might remain in the cylinder unloading area, opened the door, encountered difficulty breathing, exited, obtained self

Contingency

Licensee personnel notified outside [illegible] regarding the emergency. Some problems in [illegible] telephone were experienced. Teams were sent into the buffer verify that the cylinder valve was no longer open and check on the status of the UF6 cloud.

The local Sheriff blocked access to the road near the facility, at the licensee's request. The fire department was apparently notified by the Sheriff, and independently determined that evacuation of downwind nearby residents was justified, based on information available at the time (it was still being verified that the cylinder valve was closed). This decision was considered within the prerogative of the fire department and was not reviewed during this inspection.

Cleanup efforts were initiated, including introducing water spray into the cylinder area to remove the UF6 cloud. Actions were taken to ensure that resulting wastes were contained within the facility.

b. Licensee Post-Incident Review

Emergency Procedure 1, Section C.2, calls for a Fact Finding Committee to be established to determine the cause and effect of an emergency. The committee is tasked with developing information related to an accident, and preparing a final report to the plant manager. The final fact-finding committee report was issued December 18, 1990, and provided the background of the incident, and a detailed review of the equipment-related aspects of the emergency. The fact-finding report did not address the response of plant personnel or emergency preparedness or related issues such as why the alarm was not sounded by the involved operators.

Currently, plant procedures do not require a post-incident review to determine if the requirements of the radiological Contingency Plan have been met, or develop items for improvement (or corrective action). It is recommended that such a procedure be developed, assigning responsibility for the review, the basic scope and format for the review, and providing for tracking of resultant items.

In response to a request from NRC Region III, the licensee performed a review of the incident, including review of emergency preparedness items, and presented their findings during a meeting held with the NRC on January 13, 1990.

contained breathing equipment, and re-entered the cylinder area. At approximately 1910 hours, the supervisor initiated the non-nuclear alarm and encountered the two operators who had been working in the cylinder area.

The supervisor ensured that the approximately 15-17 personnel in the plant evacuated the plant and directed personnel to relocate to the Tile Barn, consistent with the directions in the plant Radiological Contingency Plan (RCP).

Licensee personnel notified outside agencies, including the NRC, regarding the emergency. Some problems in communicating via telephone were experienced. Teams were sent into the building to verify that the cylinder valve was no longer open and check on the status of the UF6 cloud.

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b. Licensee Post-Incident Review

Emergency Procedure I, Section C.2, calls for a Fact Finding Committee to be established to determine the cause and effect of an emergency. The committee is tasked with developing information related to an accident, and preparing a final report to the plant manager. The final fact-finding committee report was issued December 18, 1990, and provided the background of the incident, and a detailed review of the equipment-related aspects of the emergency. The fact-finding report did not address the response of plant personnel or emergency preparedness or related issues such as why the alarm was not sounded by the involved operators.

Currently, plant procedures do not require a post-incident review to determine if the requirements of the radiological Contingency Plan have been met, or develop items for improvement (or corrective action). It is recommended that such a procedure be developed, assigning responsibility for the review, the basic scope and format for the review, and providing for tracking of resultant items.

In response to a request from NRC Region III, the licensee performed a review of the incident, including review of emergency preparedness items, and presented their findings during a meeting held with the NRC on January 13, 1990.

The licensee had reviewed the actions taken during the incident, identifying problems experienced, and generally proposing corrective action for identified items. Several problems related to emergency preparedness were experienced during the response to the release, including the following:

(1) The two involved operators did not initiate an emergency alarm as they left the area. When the alarm was initiated, it was the non-nuclear alarm (no evacuation required) rather than the nuclear alarm (evacuation required), causing minor confusion.

(2) Telephone difficulties were experienced in the Tile Barn. Some calls were interrupted, and one line had difficulties in making long distance calls.

(3) The ambulance team was reluctant to treat the operator who suffered a minor UF6 burn to the wrist.

(4) Additional emergency supplies were needed at the Tile Barn.

c. Classification of Emergency

Classification of the emergency was not identified by the licensee as a problem area, but was reviewed as a part of the overall licensee response to the accident.

By the RCP and Emergency Procedures, the Shift Supervisor became the Emergency Director on discovery of the emergency situation. When more senior management arrived on site, they assumed the duties of Emergency Director, as provided for by the RCP and Emergency Procedures.

The current Radiological Contingency Plan for the Hematite Nuclear Fuel Manufacturing Facility, Revision 3, dated August 23, 1990, states in Section 3.2 that a responsibility of the Emergency Director is to classify a facility emergency according to the classification scheme contained in the RCP.

Both of the individuals who held the position of Emergency Director were interviewed by the inspector during this inspection.

Notifications were made to the NRC Headquarters Operations Officer (HOO) per the established procedure. By NRC procedure, all calls made to the NRC Headquarters Duty Officer are recorded, and a copy of the tape was obtained by the inspector and reviewed on February 1, 1991. During the two recorded calls between the site and the licensee, no emergency classification was provided by the licensee.

Interviews of individuals who held the position of Emergency Director and a detailed review of the recording made of notification calls to the NRC Headquarters Duty Officer indicate that neither licensee Emergency Director classified the emergency as required. During the initial notification call, the HOO neglected to ask the

initial Emergency Director for an emergency classification. The HOO called back and asked if the licensee was classifying the emergency in accordance with 10 CFR. The response was "I don't know what you're talking about....10 CFR."

Also during the second call, the Emergency Director indicated that "our NRC people are coming to the plant." This was apparently meant to indicate that the licensee representatives who routinely deal with the NRC were reporting to the site. The HOO interpreted the remark to mean that there were NRC inspectors in the vicinity (perhaps on a routine inspection) and they were reporting to the plant in response to the emergency. This erroneous information was subsequently passed on to several other federal agencies. This was considered an inadvertent error, but highlights the need for clear communication during an emergency situation.

A review of notes by the NRC Region III Duty Officer (RDO) indicates that adequate information was provided as to conditions at the facility. Later conversations between NRC RIII and licensee management personnel (not in the Emergency Director position) indicated that it was felt that the emergency classification was either Site Emergency or Alert, but no formal classification was made. Failure to classify the accident per the requirements of the Radiological Contingency Plan is an apparent violation of NRC requirements in that the Plan is required pursuant to the licensee's license, SNM-33.

Other aspects of communication with the NRC and local agencies were acceptable. The licensee accurately passed on current information as to the length and seriousness of the release, the likely offsite consequences of the release, and current information on injured personnel. It was originally thought that there were no injuries, but one of the operators began to notice a burning sensation on his wrist, was given first aid for UF6 burns, and was transported to the local hospital for examination.

d. Plant Alarms

The plant has two alarms, a non-nuclear (fire) alarm, and a nuclear (criticality) alarm. Push buttons for initiation of the non-nuclear alarm are installed in various locations throughout the facility, near exits. The nuclear alarm is initiated automatically by any of the several criticality detectors located at strategic locations, or manually by the plant guard.

By licensee procedure, initiation of the non-nuclear alarm does not require evacuation of the facility, while initiation of the nuclear alarm does require evacuation.

The RCP provides that the non-nuclear alarm can be initiated by any person cognizant of the emergency situation, but does not provide requirements or guidance on when the alarm is to be sounded. Alarm soundings are not tied to emergency classifications.

Neither of the two operators who were sampling the heated cylinder initiated a plant emergency alarm. Interviews of the operators indicated that their personal judgement was that the release had been sufficiently small that they could cope with it without additional assistance or emergency aid.

The supervisor who sighted the "cloud" in the cylinder room sounded the non-nuclear alarm, based on his judgement that the incident required additional attention. He did not request the plant guard to sound the nuclear alarm.

Discussions with plant personnel indicated that the best judgement probably would have been for the operators to sound the non-nuclear alarm, and subsequently have a supervisor request the initiation of the nuclear alarm.

Discussions with licensee personnel and review of training documents indicated that the plant alarms and when they should be initiated are covered in recurrent employee training. It was indicated that these subjects would receive increased emphasis in future training.

e. Local Ambulance /Hospital Resp

Per discussions with licensee personnel, the ambulance driver was initially called to "stand by" only, and a driver not routinely dispatched to the plant site was sent in response. When requested to transport the individual suffering minor wrist UF6 burns, the ambulance driver displayed some reluctance to accept the operator as a patient. The driver inquired as to whether the individual was contaminated. As the operator was still in his plant clothing (always assumed to be contaminated with very low levels of uranium) the operator returned to the Tile Barn and changed into an unused coverall. A licensee technician, with survey meter, accompanied the operator to the hospital with the ambulance. The driver displayed reluctance to release the operator to the hospital until he was surveyed and found to be uncontaminated. The technician's survey instrument (alpha detecting PAC-4G) needed a new supply of gas, which delayed the survey for some minutes.

On December 26, 1990, the Ambulance District Administrator contacted NRC personnel in the Division of Industrial and Medical Safety, Nuclear Materials Safety & Security. The Administrator called to express his concerns, and the concerns of his drivers, in transporting radioactively contaminated individuals from the Hematite facility. This call was returned by cognizant personnel on December 28, 1990. The type and degree of hazard posed by contamination from facilities such as Hematite were discussed, as well as simple decontamination methods.

During the inspection, the inspectors met with the ambulance district administrator, discussed their functions as NRC inspectors, the responsibilities of the licensee, and the type and degree of radiation hazards encountered at fuel facilities such as Hematite. Decontamination methods were also discussed. The administrator

indicated that his concerns had been answered. Subsequent to the interview, the licensee provided the administrator with a facility tour.

The licensee received a letter from the Chief Executive Officer of the Jefferson Memorial Hospital on January 25, 1991. The hospital indicated that it had appropriate protocols for treatment of patients contaminated by radioactive materials, and was prepared and willing to accept patients from the Hematite facility at any time. The hospital indicated that it would treat or stabilize for transfer any patients contaminated with radioactive material.

e. Telephone Performance

Licensee personnel reported that the telephones located in the Tile Barn had been a problem during the December 18, 1990 response. Telephone calls on some lines would suddenly be cut off, and attempting to place a long distance call on one line resulted in a message providing a number to be called for long distance access.

A review was made to verify that required equipment checks and inventories had been performed as required. Inventories/equipment checks in the Tile Barn are made on a weekly basis, except during periods when the plant is closed. A review was made of documentation for the period October 4, 1990 through January 24, 1991. Changes were made to the inventory form in October 1990 to better reflect equipment on hand, and that four telephones were now available in the Tile Barn.

Records reviewed were complete and adequate, indicating that equipment, including telephones and survey equipment had been inventoried, tested and repaired as necessary. A record of telephone checks made during the inventory performed on December 13, 1990, five days prior to the December 18, release, did not indicate any problems. A check performed on December 20, 1990, also did not indicate any problems.

Discussion with licensee personnel indicated that contacts with the telephone company were made immediately following the December 18, release. A telephone company representative verified that the telephones were working properly. It was found that SouthWest Bell had switched the long-distance telephone circuits (most likely between December 13, 1990 and December 18, 1990. The telephone company was advised that this was incorrect, and a note was posted adjacent to the telephone advising of the code now necessary for AT&T line access and that the telephone company had been requested to rectify the problem.

For two other telephones in the Tile Barn, there are switches at the guard office and in the Tile Barn which both have to be thrown to place exclusive use of the lines in the Tile Barn. It was not definitely known if the guard had not switched his switch, or individuals at the Tile Barn had not switched their switches, but it was surmised that the guard had not switched his switch. Plant

Emergency Procedures, Procedure VI, "Nuclear Alarm Procedure" and Procedure VII "Non-nuclear Alarm Procedure", both provide guard force instructions, but neither addresses switching the telephones to the Tile Barn during emergencies. Guards were expected to be knowledgeable of the need to switch the phone lines, but this was not provided for by the above procedures.

Emergency Procedure III, "Activation of the Emergency Organization", page 2, consists of a diagram of the Tile Barn and a listing of the four telephones at the Tile Barn. A note at the bottom of the page indicates that two telephone lines "will have switches at the switch board and at each phone in the barn. During an evacuation the guard will open the switch at the switch board. This will allow for exclusive use of the two lines from the barn after the switches of both phones in the barn have been closed."

Interviews of involved licensee personnel indicated that telephone conversations would be broken off after they had begun. This suggests that the switch at the guard office had not been thrown, and that someone was utilizing the telephone at the guard office.

One apparent violation was identified relative to emergency classification.

3. Emergency Preparedness Program (IP 88050)

a. Emergency Plans, Procedures, Facilities , and Equipment

The inspector verified that current copies of the Emergency Plan and Emergency Procedures were available in appropriate onsite Emergency Response Facilities.

The Radiological Contingency Plan (RCP), Revision 3, dated April 30, 1990, provides for accident classification in section 3.2. Section 3.3 of the RCP provides an overview of the emergency classes and the spectrum of accidents analyzed in the Environmental Impact Appraisal. Four classifications were defined by the licensee, with equivalent power reactor event classifications in parenthesis:

Personnel Emergency
Emergency Alert
Plant Emergency (Notification of Unusual Event)
Site Emergency (Alert)

Several portions of the RCP specifically refer to these classifications, exactly as referenced above, including the classifications in parenthesis. The above classifications are not consistent with the NRC classification scheme utilized for nuclear power reactors as published in NUREG-0654.

The inspector's review indicated that the licensee Personnel Emergency and Emergency Alert classifications were generally consistent with the NRC definition of a Notification of Unusual Event. The Plant Emergency was generally consistent with the NRC

Alert, and the Site Emergency was generally consistent with the NRC definition of a Site Area Emergency, except that the licensees classifications pertained to chemical releases rather than radiological hazards.

NRC Licensing activities for fuel facilities, including review and approval of Radiological Contingency or Emergency Plans, are accomplished by the NRC Nuclear Materials, Security and Safeguards Branch (NMSS). A new rule regarding the content of emergency plans for fuel facilities, revising portions of 10 CFR parts 30, 40, and 70, has been implemented, with an effective date of April 7, 1990. This rule provides requirements on the provisions for inclusion in emergency plans, and standardizes the emergency classifications for affected facilities. Two fuel facility emergency classes, Alert and Site Area Emergency, are provided for by the new rule.

The overall facility license, SNM-33, expired on December 31, 1989 and operations are continuing under a "timely renewal" which was submitted on November 22, 1989 and accepted by the NRC on December 18, 1989.

By letter of August 23, 1990, the licensee submitted changes to the Radiological Contingency Plan (RCP) for the Hematite Nuclear fuel Manufacturing Facility. This submittal primarily reflected changes to the facility, minor changes to the organizational structure, and minor updates to the text. The transmittal letter notes that personnel from the NRC Office of Nuclear Material Safety and Safeguards, Fuel Cycle Safety Branch, had advised the licensee that the revisions to emergency plan regulations that became effective April 7, 1990 did not apply to the Hematite facility until the next license renewal.

As such, the submittal did not conform to the requirements of the new rule regarding emergency plans for fuel facilities, including changes to the emergency classification scheme. The emergency classification scheme contained in Revision 2 of the RCP dated July 1987, and continued in Revision 3, remained unchanged.

Based on the experiences of December 18, 1990, the emergency classification scheme currently contained in the facility Radiological Contingency Plan has the potential for confusion of offsite personnel, and is not conducive to quickly classifying a plant emergency. It was also indicated that while a revised classification scheme was mandated by recent regulatory changes, revision of the RCP classification scheme should not await the next license submittal.

Discussion with licensee personnel indicated that they had not received a copy of Draft (issued for comment) Regulatory Guide DG-3005, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities, issued September 1990. A copy was provided by the inspector.

An Emergency Procedures Manual was developed and approved on August 30, 1990. The manual currently consists of ten procedures:

I. Site Emergency Plan
II. Emergency Call-in List
III. Activation of Emergency Organization
IV. Personnel Emergency
V. Emergency Alert
VI. Nuclear Alarm Procedure
VII. Non-nuclear Alarm Procedure
VIII. Bomb Threat Procedure
IX. Civil Disobedience and Disorder
X. Emergency Preparedness

Procedure review indicated that while Personnel Emergency and Emergency Alert classifications were covered by procedures IV and V, no procedures defined the Plant Emergency or Site Emergency.

No violations or deviations were identified.

b. Emergency Kits, Communications, Rendezvous Facilities , Equipment, and Onsite Medical Facilities

The onsite emergency facilities (Tile Barn, assembly point) were toured and were as described in the Emergency Plan and relevant Emergency Procedures. All facilities appeared to be in an acceptable state of operational readiness. Inspection of a small, representative sample of essential equipment, instrumentation and supplies did not reveal any problem areas.

Based on the findings of the review of problems associated with the December 18, 1990 incident, the quantity of some supplies in the Tile Barn had been upgraded. The inventories contained in the Emergency Procedures had been appropriately revised to coincide with the new quantities.

During the manufacturing plant tour it was noted that the emergency alarm button boxes had been painted in several areas (alarm buttons and alarm signs had not been painted), so that alarm boxes varied in color from red, dark green, and gray. It was recommended that these alarm button boxes be painted some standard, highly visible color such as bright orange.

A selective review of completed checklists for the period October 1990 through January 1991 indicated that the licensee had completed all procedurally required periodic communications equipment checks, first aid supplies inventories, and inventories of Health Physics and office supplies reserved for use by emergency responders. Checklists specified minimum quantities of items and required verification of the supplies' locations and completeness.

The facility does not utilize any computer program to schedule periodic emergency preparedness activities such as equipment inventories. Likewise, there is no provision for automated tracking of pending one-time emergency preparedness items. Appropriate inventory checklists addressed periodic replacement of perishable items, verification of the current calibration of survey instruments

and air samplers, and functional tests of battery powered equipment. Inventory procedures included provisions for conducting inventories after use of the supplies or following discovery of an unsealed supply container, in addition to the periodic inventory requirement.

Records reviewed indicated that problems identified during inventories and communications equipment checks had been corrected in a timely manner.

No violations or deviations were identified.

c. Organization and Management Control

Overall organization and management control of the Emergency Preparedness program is unchanged from the last routine inspection. No major changes have been made in the responsibilities, authorities and staffing of key emergency response personnel, or interfaces and coordination between onsite, offsite, and corporate organizations.

The informal corrective action tracking systems in place during the previous inspection remained in use during 1991.

No violations or deviations were identified.

d. Training

The inspector reviewed the 1990 Hematite Nuclear Fuel Manufacturing Facility Emergency Preparedness Exercise, Synopsis of Critique comments/Recommendations". The report was detailed and complete, containing critique items. A number of recommendations for improvement were made in the report, but it was not clear which recommendations had been selected as worthy of implementation or how their completion would be tracked.

The Operator Training and Indoctrination Program was reviewed. The training manual provides a course overview which is expanded upon by the instructor, and relevant quizes. Training plans and quizes associated with emergency procedures were adequate as long as the instructor correctly expands on the material provided in the course outline. One of the quiz questions reviewed specifically addressed the emergency procedure actions to be taken in the event of a UF6 leak being detected in the cylinder loading dock area.

No violations or deviations were identified.

5. Exit Interview

On January 31, 1991, the inspector met with those licensee representatives identified in Section 1 to present the preliminary inspection findings.

Actions taken during the December 18, 1990 emergency were generally found to be proper, and an adequate followup of corrective actions was underway.

The licensee was advised that there was no evidence that licensee personnel holding the position of Emergency Director during the December 18, 1990, emergency had provided the NRC with an event classification as required.

During the exit interview, the inspector indicated that the emergency classification scheme currently contained in the facility Radiological Contingency Plan (RCP) has the potential for confusion of offsite personnel, and is not conducive to quickly classifying a plant emergency. It was also indicated that while a revised classification scheme was mandated by recent regulatory changes, revision of the RCP classification scheme should not await the next license submittal. The licensee committed to perform a review and revision of the classification scheme.

The inspector provided his evaluation that reviewed aspects of the Hematite Nuclear Fuel Manufacturing Facility emergency preparedness program general maintenance was adequate, and several upgrades to the program had been made based on the experience gained during the September 1990 exercise and lessons learned from the December 18, 1990 emergency.

The licensee indicated that none of the matters discussed during the exit interview were proprietary.