U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-36/86003(DRSS)

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

Licensee: Combustion Engineering, Incorporated
Nuclear Power Systems
Windsor, CT 06095

Facility Name: Hematite

Inspection At: Hematite, MO

Inspection Conducted: October 27-31, 1986

Inspector: W. Snell for N. R. Williamsen, Jr. 11/18/86
Date

Approved By: W. Snell
W. Snell, Chief
Emergency Preparedness Section 11/18/86
Date

Inspection Summary

Inspection on October 27-31, 1986 (Report No. 70-36/86003(DRSS))
Areas Inspected: Special inspection of the Combustion Engineering Hematite facility emergency preparedness program in the following areas: emergency assessment and prctective actions; emergency facilities and equipment; radiological contingency plan; shift staffing and augmentation; communications and notifications. The inspection involved one NRC inspector and one contractor.
Results: No items of noncomplicance or deviations were identified. However, three areas of emergency preparedness required corrective actions and these areas are identified in the report.

DETAILS

1. Persons Contacted

Combustion Engineering, Hematite

*J. Rode, Plant Manager
*R. Fromm, Quality Assurance Q/A Manager
*R. Miller, Manager, Administration and Production Control
*A. Noack, Production Superintendent
*H. Eskridge, Nuclear Licensing, Safety and Accountability Supervisor
*R. Griscom, Engineering Supervisor
G. Boyer, HP Technician
C. Beckemeyer, Operator
R. Bess, Security Guard
B. Betlock, Shift Foreman
D. Dixon, Shift Foreman
C. Hercher, Instrument Technician
C. Lovell, Shift Foreman
R. Rode, Security Guard
R. Stokes, HP Technician
O. Young, Security Guard
N. Wilper, HP Technician

*Personnel so listed above attended the exit interview on October 31, 1986.

Offsite Agencies and Persons

Barnes Hospital, St. Louis, MO

A. Siegel, M.D., Nuclear Medicine Division
J. Eichling, Ph.D., Radiation Safety Officer
M. Haenchen, Associate Radiation Safety Officer
E. Slessinger, Radiation Oncology Physicist
M. Bothe, Head Nurse, Emergency Department (ED)
D. Rahman, Nursing Staff, ED
A. Costser, Nursing Staff, ED

Jefferson Memorial Hospital, Festus, MO

J. Dehner, M.D., Radiation Safety Chairman
W. Howard, Nuclear Medicine Technician
K. Shilly, Nursing Staff

Other Agencies and Persons (Contacted by telephone).

Nuclear Safety Branch, Department of Energy, Oak Ridge, TN
W. Buerger, Sheriff, Jefferson County
D. McFarland, Administrator, Joachim-Plattin Townships Ambulance District
Hematite Fire Protection District, Hematite, MO
Cyrstal City (Jefferson County) Police Dispatch Office

2. Radiological Contingency Plan (RCP)

Section 7.1 of the RCP states that an annual review of the Plan is preformed by the Emergency Planning Coordinator and a Review Committee. The inspector noted that the annual review for 1986 was in the process of being done and that the annual review for 1985 was completed during April, 1985, and was documented in the Nuclear Licensing, Safety, and Accountability Monthly Report with the statement, "No significant changes are required." Nonetheless, there are a number of changes that should be made to the Plan to improve its usefulness. Three such changes are listed below. The implementation of these changes will be tracked as Open Item No. 70-36/86003-01.

- The Emergency Room at Barnes Hospital has been changed and much improved for the handling of radiologically contaminated patients subsequent to the present version of the RCP (1982); hence, Section 5.7 of the Plan, "Medical Treatment," must be updated in order to be a better guide for training and retraining of personnel.

- The inspector verified that the paramedic in the ambulance will make the decision on the medical condition of the contaminated-injured person. According to the Administrator for the ambulance service, in about five percent of the cases the paramedic decides for a hospital other than the hospital that was intended for the patient. In the case of the Hematite facility, the paramedic might decide for Jefferson Memorial Hospital for a life-threatening injury of a patient, rather than Barnes Hospital. The RCP should reflect this fact in Section 5.5.2 which is referenced for Medical Transportation.

- Furthermore, in light of the above, Section 4.3, "Offsite Assistance to Facility," should be augmented to include Jefferson Memorial Hospital.

The Radiological Contingency Plan covers Letters of Agreement with offsite agencies. Section 4.3 of the RCP, "Offsite Assistance to Facility" states that agreements have been reached with various private and civil organizations to provide assistance as required. The inspector verified that the licensee has copies of written agreements with all the offsite agencies listed in the RCP. However, Section 7.0, "Maintenance of Radiological Contingency Preparedness Capability," states that all written agreements are to be reviewed and updated at least every two years. As indicated by past NRC inspection reports, the updates had been approved as being done verbally. NRC guidance specifies that updates should be in writing. The licensee committed to sending out a request for the written update of these agreements within two weeks from the closing date of the inspection. In addition, there must be an initial letter of agreement with Jefferson Memorial Hospital, since the ambulance paramedic has the proper authority to take a contaminated-injured person from the Hematite facility to Jefferson Memorial Hospital, instead of Barnes. The obtaining of letters of agreement will be tracked as Open Item No. 70-36/86003-02.

The requirement for implementing procedures is covered in both the Materials License and the RCP. The Materials License for the Hematite facility states in Section 21 that the licensee shall maintain implementing procedures for the radiological Contingency Plan so as to implement the Plan. Furthermore, the Plan in Section 4.4, "Coordination with Participating Government Agencies," states that the various agencies are to be listed in the Emergency Procedures Manual, together with their areas of interest. Among other changes that would improve the Emergency Procedures Manual, the accomplishing of the following changes will be tracked as Open Item No. 70-36/86003-03.

- Add a phone number and brief description for the Oak Ridge "Radiological Assistance Team."

- According to the RCP, a HP staff member will either accompany the injured-contaminated person in the ambulance or else meet the ambulance at the hospital. One of the HP technicians interviewed had never been to Barnes Hospital and the technician described two routes to Barnes, only one of which was correct. Therefore, add a brief description of the location of the hospital, such as "North of the intersection of Route No. 40 and Kingshighway." Also, mention the capabilities of Barnes and Jefferson Memorial Hospitals as a guide to the emergency response personnel.

- The Procedure should identify how the HP person can obtain both the alpha and the GM survey meters which are called for in the RCP, when meeting the ambulance at the hospital.

3. Assessment and Protection Actions

Section 3.2 of the Radiological Contingency Plan (RCP) outlines the criteria for emergency classifications. Based upon evaluation of the nature of the Hematite operation, it had been previously found that accidents that have the potential for serious radiological consequences to the public health and safety (i.e., criticality and UF_6 release) were found not to be credible (NRC Environmental Impact Appraisal, March 1977). Consequently, the most severe accidents in the licensee's RCP are the "Plant Emergency" and the "Site Emergency." These two emergencies require notification of the NRC and other offsite organizations.

Small releases of UF_6 from the vaporizer system would result in shutdown of the system and initiation of protective actions against release to the site environment as described in Section 4. In addition, the postulated major release of UF_6 (Site Emergency) would result in only 30% for the 8-hour Threshold Limit Value (TLV) at the closest site boundary adjacent to Highway P. Therefore, assistance to the offsite public (e.g., evacuation warning) has not been included in the licensee's RCP. However, the Sheriff's Department has stated that they are willing and have the capability to initiate an evacuation in a timely fashion (see Section 7).

For the above reasons, the licensee's assessment and protective actions focus on site personnel protection and site protection. Based upon the licensee's past record and the rigorous analyses and NRC reviews that have shown no significant threat to the health and safety of the public, this portion of the program is adequate.

4. Facilities/Equipment

The licensee receives uranium hexafluoride (UF_6) in a 2.5 ton cylinder from the Department of Energy in a DOT-approved shipping package. Since the uranium portion of the UF_6 contains up to 4.1% U-235, it is an accountability practice to weigh the cylinders and check the weight against the attendant labels and shipping papers. Then the cylinders are placed in designated locations on the storage pad. Analysis in the licensee's NRC-approved Safety Evaluation Report shows that a minimum of 63 cylinders are required to initiate a nuclear criticality under full water-moderated and -reflected array conditions. Since the largest outside cylinder storage pad is physically limited to 54 cylinders and since there is no known way for flooding with water, a criticality incident was determined to be not probable (previous reference, March 1977).

The UF_6 is received as a solid in the cylinder and the licensee must place the cylinder into one of two vaporizers in order to convert the UF_6 to a gas which is used in the process system. The cylinders are checked previous to this to assure that no cylinder overfill has occurred. Consequently, overpressurization of the cylinder and rupture of the cylinder walls from such a cause is not probable. The cylinder is placed into the vaporizer and then connected to the valved-off process line. Then the connections to the line are soap-tested with nitrogen to insure that no leak will occur. The vaporizer uses steam to heat the solid UF_6 to a gas for use in the process to convert to UO_2. Only one cylinder at a time feeds the process system and the cylinder normally lasts from 32 to 36 hours. The cylinder-to-process-line valving arrangement prevents interconnections between the two cylinders. While the full cylinder is being heated in the vaporizer and during its subsequent use for making UO_2, conductivity sensors would detect any minor UF_6 leaks. Upon sensing a leak, the conductivity cell triggers the following automatic actions: 1) steam shutoff, 2) shutoff of the roof ventilator, and 3) initiation of a vacuum draw through the scrubber system. In addition, the licensee is currently enclosing the remaining two walls around the vaporizer station.

The inspectors conducted a walkthrough of the UF_6 process system. No process vessel or tank approaches the size of the UF_6 cylinders, and this was verified by the Safety Evaluation Report which states that a criticality can not occur within the geometrically safe process system.

During normal operation, the UF_6 gas leaves the cylinder through a 3/8 inch line into the Oxide Building. It passes through metering valves, picks up carrier gas, and is carried up to the third level of the Oxide Building, directly into the conversion equipment. The UF_6 control

station and associated piping are wrapped with steam-tracing line which is covered with pipe insulation. Any UF_6 leak from the process or sampling/control lines would be detected visually or by abnormal readings at the Control Panel Board. Should such a leak occur, the emergency alarm would be manually activated and the area would be evacuated. The re-entry team would don self-contained breathing apparatus and protective suits to correct the leak. Prior to evacuation, a Control Room operator would shut the UF_6 flow off from either within the control room, or outside of the vaporizer facility wall. Air sampling and decontamination activities would employ standard procedures.

The UF_6 to UO_2 conversion is accomplished in reactor vessels of no more than 12-inch diameter. The offgases from the systems are routed to limestone-packed scrubbers to remove the hydrogen fluoride (HF). The UO_2 powder product is stored in long silos with 12-inch diameters. All transfer lines are two inches or less in diameter. Since these operations are in a dry environment, they are criticality-safe for current plant uranium-235 enrichments.

The other steps in the process include: milling, blending, packaging and storage. Currently the licensee is fabricating UO_2 pellets. All of their tasks have been evaluated for assurance that they are nuclearly safe.

The inspectors also conducted walkthroughs to evaluate the equipment and supplies required for emergency preparedness. The licensee maintains the supplies and equipment specified within the Emergency Plan at several locations. All equipment/supply inventories had been inspected on an up-to-date basis. Should any airborne chemical/radiological release occur in a process area, the area would be evacuated and persons with proper protective attire would re-enter to fix the leak. The control room staff, within the Oxide Building, would shut the process down should the leak be large enough to cause any concern for onsite workers. Should a major ammonia release occur, an operator in the Oxide Building would most likely don the Scott self-contained air supply to provide time to shut the Oxide Building Operations down and to provide protection on the way to the pre-designated assembly point. While this is the likely approach, the Emergency Procedures Manual (Section IV for non-criticality emergencies) specifies that an experienced operator is to stay in the Oxide Building. Thus, either additional protection for the operator or else revision of the Emergency Procedure is required. This will be tracked as Open Item No. 70-36/86003-04.

Currently, the licensee has sufficient portable field instrumentation to detect the presence of uranium or fission product contamination on and around the site. However, the licensee, as of October 30, 1986, had only one operable portable alpha counting instrument to measure actual D/M in the field within the possible ranges that could be encountered. Should a site emergency occur and any personnel injury occur that would require hospitalization, there would be no alpha measurement instrument rapidly available for the licensee's attendant technician to take along for use at the hospital. In addition, should the current alpha measurement

instrument break down, no fully useful alpha measurement instrument would be available for required onsite/offsite measurements. This concern for added portable alpha measurement capability, will be tracked as Open Item No. 70-36/86003-05.

5. Communications and Notifications

In the event of a radiological emergency, communications and notifications to plant personnel is largely by telephone and bells and horns, although hand-held radio transceivers are also used, at times, within the plant site. The "Nuclear Alarm" is a klaxon horn which is sounded automatically if a criticality accident should take place. The nuclear alarm can not be easily triggered manually; the alarm set point is based upon the sensors receiving a momentary dose rate of 10mRem/hr. The "Non-Nuclear Alarm" is for any non-criticality emergency; it is a completely manual system, with absolutely no automatic capability. It is sounded by any person who would hit the red emergency button which is located by every exit door in the process buildings as well as by red emergency buttons in other buildings such as the office building. The non-nuclear alarm is a loud clapper-bell alarm.

Communications and notifications offsite is basically by telephone thru two exchanges. There is a St. Louis phone number as well as a Festus phone number, both of which go thru the plant switching circuitry. Power failure is unlikely, since the office building which houses the telephone power supply is fed by a separate line from the nearby substation. However, in case of a power failure there is an emergency generator which will automatically start and pick up the vital loads, including the telephone switchboard, the plant steam boiler, and some lighting. In addition, there are two other phone lines which enter the plant site independently of the lines which go to the switchboard. These lines are regular Festus phone lines which are powered by the telephone company. One goes to the Red Barn and one goes to a handset near the foreman's office in the Pellet Plant.

The licensee has adequate emergency phone access for use in possible emergencies. However, in discussions with the Emergency Director and his alternates and through evaluation of the Emergency Procedure Manual and the Radiological Contingency Plan, it was determined that consideration had not been given to multiple public inquiries that could arise should the Sheriff be required to block Highway P to prevent through traffic, or should Fire, ambulance, and Sheriff sirens and flashing lights alert residents along Highway P that a plant accident had occurred. Therefore the following improvements item is recommended:

- A designated person (perhaps from the licensee's Call-In Staff) be assigned the responsibility to develop canned short writeups about the emergency status of the plant so that the information is rapidly available to whomever answers the public inquiries.

The Emergency Call-In List gives the emergency phone numbers for all the required onsite and offsite personnel and agencies. This list is updated whenever onsite personnel and/or functions change. The inspector made a spot check of the Call-In list dated March 1986 (Revision 10) and the phone numbers so tested were all correct.

Additionally, the Sheriff of Jefferson County had said that he could respond to an emergency at the Hematite plant within five to ten minutes; his patrol cars all have two-way radios which could be used for emergency communications.

Based on the above findings, this portion of the licensee's program is acceptable.

6. Shift Staffing and Augumentation

The onsite radiological contingency response organization has nine positions/functions. All positions/functions have designated staff members and aternates except the Fact Finding Committee. This committee would be named by the emergency director, depending upon both need and staff availability. The committee chairman would not have had any other emergency function.

The plant is normally operated for three shifts per day five days per week. The production superintendent would act as the emergency director during day shift, or else the day shift foreman would assume that role should the production superintendent not be available. On offshifts, the shift foreman assumes the role of emergency director. Augmentation would be initiated either by the emergency director or the security guard, by calling senior staff until one is reached. The emergency director and/or the security guard would use the emergency call-in list to reach the designated senior staff member, and would explain the nature of the event such that the senior staff member could both decide who else should be called, and then make the augmentation calls, or request these to be made.

The emergency call-in list is updated whenever personnel changes occur, and is reviewed once each year along with the emergency plans and procedures.

Based on the above review, this portion of the licensee's program is adequate.

7. Offsite Organizations

The inspector visited Barnes hospital which is the primary care facility for contaminated-injured personnel from the Hemtite facility. The Barnes procedure for handling potentially contaminated patients was updated in September 1986, and was very thorough. Barnes hospital participated in a city-wide radiological disaster drill in October 1986, and did a walk-through of their procedure. Barnes is a "magnet" hospital and has helicopter service from other hospitals, including the hospital local to Hematite, Jefferson Memorial. The new Emergency Room (ER) has two rooms specifically equipped for handling radiologically contaminated patients. Although at present the shower drains from these rooms are not monitored, a portable "decontamination tub" is being ordered which would allow for saving the drains for later analysis. There is an outside door directly into these two rooms. Overflow patients would be taken to the autopsy rooms in the West Building for decontamination. There was an inservice

day for ER nursing staff in January 1986, which included simulated patients with urainum-colored pottery hidden on them to give the staff the opportunity for hands-on use of survey meters. The inspector interviewed two of the nursing staff who had attended this training and concluded it was well done. There is not any present plan to ensure that there is always one member of the nursing staff on each shift who has had radiological training; however, since 20 to 25 staff members attended, (a) most shifts in the ER will have one or more personnel with such training, and (b) their procedure calls for the services of a Radiation Safety Officer from Barnes (called "Radiation Safety Representative" in the licensee's RCP) who will direct the nursing staff. There are three primary Radiation Saftey Representatives (two of whom have beepers) plus two more semi-trained persons for backup. The inspector did a walk-through with the Head Nurse of the Emergency Department and concluded that Barnes could provide professional medical services to a contaminated-injured person.

The inspector visited the local hospital, Jefferson Memorial in Festus Missouri, and did a walk-through with the Radiology Department Medical Director/Radiation Safety Officer, based upon their Emergency Procedure updated on February 27, 1985. Jefferson Memorial Hospital participated in a radiological emergency drill on March 24, 1983. Similar to Barnes Hospital, the Jefferson procedure stipulates calling a Radiation Safety Officer as soon as the potential of radioactive contamination is recognized. The hospital has three survey meters available, one of which is stored in the Emergency room, the location of which is known to the ER staff. Jefferson Memorial seems suitable equipped both with personnel and equipment to give medical services to a contaminated-injured person.

The Sheriff of Jefferson County was interviewed by telephone. He is completely willing to block off State Highway "P" that runs past the C-E Hematite facility, if such action is recommended in order to protect the health and safety of the public. However, since the most severe credible accident is a Site Emergency, such should never have to done. Similarly, the Sheriff is willing to take the protective action of evacuation of the public near the site, if the licensee so recommends. He stated that non-emergency communication with the Hematite facility is good, since he talks to people at the facility several times a year on the average. The Civil Defense Director of Jefferson County had resigned recently, but the Sheriff said he will handle all of those duties in the interim while the County Commissioners are looking for a replacement.

The Joachim-Plattin townships Ambulance District's administrator was interviewed by telephone. The drivers, who have an average of 8-1/2 years with the District, have not had any radiological training but they will respond to any call from the Hematite facility. If an emergency would still be in progress, they would park upwind of any emission at Hematite and await the licensee's personnel bringing out the injured person on a stretcher, if necessary. The Ambulances have "dial" radio-phones on board which can communicate to almost every hospital in the greater St. Louis area, specifically including Barnes and Jefferson Memorial.

The Hematite Fire Protection District was contacted by telephone. They will responde to an emergency at the Hematite facility.

Based on the above findings, this portion of the licensee's program is acceptable.

8. Training/Drills

The inspector reviewed the Radiological Contingency Plan (RCP) training/drills requirements, the training lesson plans, and the conducted training records. In addition, a review of planned training for the remainder of 1986 and the first quarter of 1987 was made, and discussions about training with all shift foreman and the operations superintendent were held.

Appropriate training and drills were found to be conducted as per requirements. Additional drills (2) and one additional training session are planned for 1986. First aid training is planned for the first quarter of 1987. The walk-through discussions indicated that plant personnel believed that the training/drills were helpful and adequate, and that the forthcoming first aid refresher training will be helpful. In addition, it was determined that, although infrequent, false alarms were very useful; the licensee stated that plant personnel followed the emergency procedures very quickly.

Finally, discussions with the shift foreman pointed out that time had been devoted during on-the-job training by the production superintendent on the responsibilities and actions specified in the Radiological Contingency Plan and Emergency Procedures. As a result of this training, minor word changes were made to clarify the intent.

Based upon the above findings, this portion of the licensee's program is adequate.

9. Accident Investigation Report Evaluation

The inspector reviewed all of the personnel injury and property damage accident investigation reports from October of 1974 through October 1986. The investigations of each event was made and the results documented by the responsible supervisor. None of these events were of the magnitude that would initiate review/revision of the emergency plan (RCP) or procedures.

Based upon the results of this review, this portion of the licensee's program is adequate.

10. Interviews

Interviews were conducted with twelve members of the emergency preparedness organization, including the: 1) Emergency Director and three of his alternates; 2) Security Officer and three of his security staff; 3) Radiological and Safety Advisor; 4) three of the Nuclear and Industrial Safety Staff, and 5) the Fire Marshalls who also act as alternate Emergency Directors.

All of the interviews showed that the staff was knowledgeable on their responsibilities and on the responsibilities of others. Good judgment was shown in the development of how they would act under a wide variety of conditions.

Based upon the above findings, this portion of the licensee's program is adequate.

11. Access Control

As shown in Figure 1-4 of the Radiological Contingency Plan, the licensee has a secured fence around the process facilities. Routine access of personnel is through the manned security guard station. This station is manned 24-hours a day, seven days a week. During off-hour shifts and on weekends when the process is not operating, the security guards periodically inspect the designated plant locations. When such inspections occur, the guards lock the doors that allow access to the process area prior to making their rounds, and unlock them when they return.

Three locked gates are used for vehicular movements to transport radioactive wastes, UF_6 tanks, chemicals, etc., on- or offsite. Such vehicular movement into the process area, requires that the drivers have an escort that is named in the controlled security log book in the guard station, and the visitor(s) must sign in and out in the same log book. The security guard unlocks or locks the gate when the vehicle is ready to move in or out, respectively.

Based upon the above findings, this portion of the licensee's program is adequate.

12. Exit Interview

The inspectors held an exit interview on October 31, 1986, with the licensee representatives denoted in Section 1. The NRC Team Leader discussed the probable scope and findings of the inspection. The Team Leader also asked if any of the information discussed during the exit was proprietary. The licensee responded that none of the information should be proprietary.