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OCT 19 1989

Docket No. 70-36

Combustion Engineering, Inc.
Nuclear Power Systems
ATTN: Dr. P. L. McGill
Vice President,
Nuclear Fuel
Manufacturing
Windsor, CT 06095

License No. SNM-33

Gentlemen:

This refers to the augmented team inspection conducted by Messrs. D. J. Sreniawski, G. M. France, III, and F. C. Sturz of the Nuclear Regulatory Commission on August 30, 31, and September 1, 7, 8, 22, and 23, 1989, of events related to an unplanned uranium release at your Hematite facility on August 28, 1989, and to the discussion of our findings with Mr. J. A. Rode and others at the conclusion of the inspection.

The enclosed copy of our inspection report identified areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, independent measurements, and interviews with personnel.

The team's efforts were directed towards determining what had occurred, why it happened, the safety significance of the release to workers and to offsite residents and the corrective actions to protect the public health and safety. The regulatory aspects of the incident are not addressed in this report. Should any enforcement action be warranted, it will be covered in future correspondence.

The report also documents the meeting in Region III on September 19, 1989, between Combustion Engineering and the NRC to address Combustion Engineering's evaluation of the release, its causes, and the corrective actions which were being implemented prior to restart of the plant.

On September 1, 1989, I issued a Confirmatory Action Letter (CAL) which documented our understanding of actions your staff planned to take in evaluating the unplanned release and its causes, correcting the problems identified, and informing the NRC of your evaluations and planned actions. Based on the September 19, 1989, meeting, receipt of your written report on September 28, 1989, and our onsite review of your corrective actions and observations of plant restart, we consider the matters identified in the CAL to be closed.

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In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC Public Document Room.

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

Sincerely,

A. Bert Davis
Regional Administrator

Enclosure: Inspection Report
No. 70-36/89003(DRSS)

cc w/enclosure:

- J. A. Rode, Plant Manager,
Hematite Fuel Manufacturing
- A. E. Scherer, Director,
Nuclear Licensing
- C. R. Waterman, Vice President and
General Manager,
Nuclear Fuel Manufacturing
DCD/DCB (RIDS)

RIII
DMG in New
France/gd
10/18/89

Y40
NMSS
Bsm for
Stutz
via telecon.
to trans. France and
Stutz. 10/19/89

Y40
RIII
Bsm for
Sreniawski
10/18/89

Y40
RIII
Bsm
Mallett
10/18/89

RIII
DMG
Norelius
10/18/89

Y40
NMSS
Bsm for
Rouse
via telecon
on 10/17/89

RIII
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Davis
Paperjello
C/P 10/19/89

EXECUTIVE SUMMARY

On August 29, 1989, the NRC Region III office was notified of an apparent unplanned release of enriched uranium from the licensee's Hematite facility on August 28, 1989. In response to this notification and because the licensee at the time did not know the cause of the release and was uncertain of the quantity and chemical form of uranium released, the NRC formed an Augmented Inspection Team (AIT). The AIT was dispatched to the site to review the event, to determine the cause of the event, to evaluate the licensee's corrective actions, and to determine corrective actions needed prior to restart. The team consisted of a section chief and a project inspector from the Region III office and a health physicist from the NRC's Office of Nuclear Material Safety and Safeguards. Also, a Confirmatory Action Letter (CAL) (see Attachment F) was written to the licensee on September 1, 1989. This letter confirmed the licensee's plans to evaluate the event, and to take corrective actions and inform the NRC management of causes and corrective actions prior to restart of the plant.

The Combustion Engineering plant at Hematite receives uranium in the form of solid uranium hexafluoride and converts the vaporized uranium hexafluoride into uranium oxide in a series of fluidized bed conversion reactors (i.e., chemical, not nuclear reactor). The uranium oxide in powdered form is normally shipped to another CE facility for conversion into pellets for fuel for nuclear power reactors. On occasion, the pellets are manufactured at the Hematite plant.

On August 25, 1989, while the conversion process plant was shut down, a production supervisor discovered an air leak in a solenoid which controlled the air flow to a nitrogen valve on one of the conversion reactors. The production supervisor turned off the air to the solenoid which in turn caused the nitrogen valve to fail open. Nitrogen is used to purge the reactors when the process is shut down. He entered his actions into the foreman's log and documented the need for the repair of the valve prior to restart of the process. The following Monday morning, August 28, the new shift supervisor read the log but failed to identify the entry indicating the need to fix the solenoid valve. As a result, the plant was started up with the nitrogen admission valve open. Because of the relative pressures, nitrogen rather than steam flowed into the conversion reactor. Steam is essential to the conversion process. As a result, the conversion process did not occur as planned and uranium hexafluoride gas was released through particulate filters in the reactor. Most of the uranium hexafluoride gas reacted with moisture and hydrogen in the exhaust lines and calcium carbonate in the scrubber system and was retained in these systems. Therefore, only a small amount remained in gaseous form and was released outside the facility. According to operator logs, the process was only operated for about one hour and 55 minutes during the day shift.

Upon return to the site on August 28, and after hearing of startup difficulties, the production supervisor on the afternoon shift inquired as to whether or not the valve had been repaired. He learned it had not been and took action to get it repaired. After downtime for repairs, the conversion system was reconditioned with steam for a later start up. Operations continued in a normal mode. Early on August 29, the production superintendent requested radiation surveys of the limestone being removed from the scrubber. The readings were over a

thousand times higher than normal, which indicated that there had been an unplanned release from the reactors into the scrubbers and possibly into the environment. These high readings caused the plant manager to shut down the conversion process. The licensee performed radiological surveys and collected bioassay samples to determine if workers had received any unnecessary exposure. Preliminary surveys were also made outside of the plant within the owner controlled area. Based on stack sampling analysis, the licensee later estimated a release of 274 grams (less than 10 ounces) of uranium. Although the sampler is primarily intended to provide data to quantify the amount of flouride released, it appears to have provided a reasonable estimate of uranium released.

The AIT reviewed the licensee's handling of this event in the areas of the uranium hexafluoride conversion process, inplant radiation protection and environmental monitoring. The AIT concluded that radiation exposure to the plant workers involved in this event was well within the regulatory limits.

The team observed the licensee perform direct reading radiological surveys both onsite and at one residence offsite. These surveys showed no readings above the expected normal background levels. The AIT concluded that direct reading surveys confirmed that the licensee's estimation of 274 grams released is reasonable. Detailed analysis of environmental samples are still being conducted. Based upon calculations using conservative assumptions, the maximum theoretical whole body dose to the nearest resident would be less than one millirem, well within the EPA annual whole body dose limit of 25 millirem. For comparison purposes, background radiation in the area will give an annual whole body dose of about 200 millirem.

The licensee performed a material balance for the conversion process and accounted for all but 3.1 kilograms of uranium. This value is within the normal range of process losses (due to plateout on process component surfaces) for the total amount of material processed.

The team's evaluation of the licensee's activities before and after the event identified the following weaknesses: (1) failed equipment was not properly identified and shift changeover communication did not assure that all equipment was in proper working order prior to startup of the operation. (2) the sampling system in the stack requires improvement to assure that it can properly collect uranium in particulate form, and (3) the environmental monitoring program needs to be improved. This includes the training of additional people to conduct confirmatory surveys, and the need to enhance the offsite environmental sampling to assure prompt and accurate determination of airborne releases for all wind directions.

Subsequent to the completion of the AIT's onsite inspection, the Combustion Engineering management met with the NRC in the Region III Office on September 19, 1989, and described the lessons learned and corrective actions which were being implemented prior to plant startup. The licensee also described the lessons learned and corrective actions taken in an incident report that was submitted to the Region III office on September 28, 1989 (Attachment D). These actions resolve the concerns identified above. An onsite inspection was conducted on September 22 and 23, 1989, by a Region III project inspector. The inspection confirmed that corrective actions relative to weaknesses in the conversion process were completed.