

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 70-1100/88-02

Docket No. 70-1100

License No. SNM-1067

Priority C

Category ULFF

Licensee: Combustion Engineering, Inc.  
1000 Prospect Hill Road  
Windsor, Connecticut

Facility Name: CE-Nuclear Fuel Manufacturing

Inspection At: Windsor, Connecticut

Inspection Conducted: January 25-29, 1988

Inspectors:

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3/9/88  
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Inspection Summary: Inspection on January 25-29, 1988 (Inspection Report No. 70-1100/88-02).

Areas Inspected: Routine, unannounced inspection to review the licensee's commitments to correct Pellet Shop contamination levels and establish an approved Respiratory Protection Program, as identified in Confirmatory Action Letter No. 70-1100/87-14, dated October 27, 1987. A review of the status of other previously identified Radiation Protection Program deficiencies was also conducted during this inspection.

Results: No new or additional violations were identified during this review. However, weaknesses were noted in the air sampling program and the technical depth of the radiation protection staff.

## Details

### 1.0 Personnel Contacted

- \*P. L. McGill, Vice President, Nuclear Fuel, CE
- \*F. M. Stern, Vice President, Quality Systems, CE
- \*G. H. Chalder, Plant Manager, NFM-Windsor, CE
- \*A. E. Scherer, Director, Nuclear Licensing, CE
- \*R. E. Sheeran, Manager, NLSA&S, NFM-Windsor, CE
- \*P. R. Rosenthal, Manager, Radiological Protection Services, Power Systems, CE

\*Denotes attendance at the exit meeting on January 29, 1988

Other licensee and consultant personnel were contacted or interviewed during this inspection.

### 2.0 Purpose

This Health Physics (HP) inspection was conducted to review two areas:

1. Licensee actions in response to requirements outlined in NRC Confirmatory Action Letter (CAL) No. 70-1100/87-14, dated October 27, 1987.
2. Status of licensee upgrades to their Radiation Protection Program.

Two allegations were also received during this inspection.

### 3.0 Response to Confirmatory Action Letter

An NRC Inspection conducted in October, 1987 (NRC Report No. 70-1100/87-05) identified significant programmatic breakdowns and deficiencies in the Radiation Protection program. NRC Confirmatory Action Letter (CAL) 70-1100/87-14, issued to the licensee on October 27, 1987, required immediate remedial action in two specific areas of the Radiation Protection program. These were:

1. Immediately reduce contamination levels in the Pellet Shop to below the limits specified in the license (i.e., less than 10,000 dpm/100 cm<sup>2</sup>), and establish appropriate management controls to prevent contamination levels from exceeding the license limits again; and
2. Establish a respiratory protection program in accordance with requirements in 10 CFR 20.103(c) in order to take protection factors for respirator use.

The inspector evaluated licensee completion of the above actions by the following methods:

- observations made during tour of the Pellet Shop,
- review of survey records of the Pellet Shop from November, 1987 to the present,
- independent radiological measurements made of selected areas within the Pellet Shop,
- review of interoffice correspondence on Contamination Control,
- review of "General Instructions for Contamination Control" posted at all work stations,
- review of the following documents related to the Respiratory Protection Program:
  - o Interoffice correspondence on "Management Policy Regarding Respiratory Protection Program" from G. H. Chalder, dated November 13, 1987
  - o "Report and Recommendations on the Respiratory Protection, Air Sampling, and Bioassay Programs," by Radiation Safety Associates, Inc.
  - o Interoffice memo from P. L. McGill to G. H. Chalder, concerning use of respirators, dated November 10, 1987
  - o Radiation Safety Manual, Section 5.0, "Respiratory Protection Procedures", dated November, 14, 1987
  - o Training manual entitled "Respiratory Protection for the Nuclear Industry", by Radiation Safety Associates, Inc.
  - o Training certificates for the Supervisor, Health and Safety, and the acting Radiation Specialist
  - o Training records of Pellet Shop workers required to periodically wear respiratory protective devices
  - o draft independent audits of the Respiratory Protection Program performed in January, 1988
- discussions with licensee and contractor personnel.

Within the scope of this review, no violations were identified.

### 3.1 Contamination Control

The licensee instituted an aggressive program for reducing shop contamination levels. A decontamination supervisor with two crews of three people each were hired to monitor Pellet Shop contamination levels and decontaminate equipment and areas of the Pellet Shop on a 24 hour basis.

The licensee instituted a shop contamination status board with color coding to readily identify areas in the shop requiring attention.

A yellow area on the shop contamination level status board signified that contamination levels were greater than  $5,000 \text{ dpm}/100 \text{ cm}^2$ . The licensee instituted a decontamination schedule in these areas to be cleaned up before the shift was finished. Red colored areas on the shop contamination level status board signified that contamination levels were greater than  $10,000 \text{ dpm}/100 \text{ cm}^2$ . These areas were immediately shut-down and decontaminated prior to resuming work. An area designated green on the shop status board indicated that contamination levels in that area were less than  $5,000 \text{ dpm}/100 \text{ cm}^2$ . This technique and the management support for the program appeared to be effective in maintaining shop contamination levels well below  $5000 \text{ dpm}/100 \text{ cm}^2$  for the areas in the Pellet Shop.

The licensee had completed some major equipment modifications with respect to conveyor tables and pellet boat storage areas by covering all of these areas with easy to decontaminate stainless steel sheet metal surfaces. The licensee also tiled the concrete floor and installed additional lighting to improve decontamination efforts in the Pellet Shop.

The licensee has plans to continue to upgrade and modify Pellet Shop equipment to reduce the potential of powder leaking from the equipment and provide easy to clean surfaces. Some modifications include:

- construction of sheet metal containments behind the pellet presses to contain and confine loose  $\text{UO}_2$  powder,
- installation of new containment hoods with glove box fronts to confine the loose powder in the powder preparation hoods,
- replacement of the current plastic powder buckets and cone heads with containers which will provide greater reliability against falling apart in the process of powder preparation,
- modifying the batch make-up hood to make it a glove box.

Additionally, a new person was hired to establish a preventative maintenance program for Pellet Shop equipment to eliminate the potential for future equipment failures such as those experienced in August, 1987 (see NRC Inspection Report No. 70-1100/87-05 for details).

### 3.2 Respiratory Protection Program

The licensee established all key elements of the Respiratory Protection Program that had been missing and were specifically identified in CAL No. 87-14. The Vice President issued a policy statement to the Plant Manager to provide the required written policy statement for the use of respiratory protection. Training was provided to the members of the Health Physics staff on the

requirements of the respiratory protection program. Additionally, the consultant who provided the training to the Health Physics staff also evaluated the licensee's equipment, which resulted in the purchase of a new supply of respirators.

Training lesson plans for radiation workers and procedures for the implementation of the Respiratory Protection Program were developed by a consultant. Additionally, the consultant assisted the licensee in establishing a contamination smear survey of the respirator internal surfaces for a more effective assessment of protection afforded by the respirators.

An independent assessment was performed on the licensee's newly instituted Respiratory Protection program. The assessment identified numerous deficiencies that needed licensee attention. The acting Radiation Specialist, also functioning as the Respiratory Protection Program Administrator had corrected many of these identified weaknesses prior to the inspection.

The inspector discussed the following general weaknesses with the Respiratory Protection Program Administrator:

- The procedures (revision 0) provide a good foundation for the Respiratory Protection Program. However, the procedures did not describe the Respiratory Protection program as it applies to this facility. The current procedures are generic in nature, and some steps of the procedures do not apply to this program.
- There were numerous typographical errors and omissions of references in the procedures.
- The title of "Respiratory Program Administrator" is not officially assigned to any Health Physics staff member. The acting Radiation Specialist administers this program, but his position description does not include this responsibility.

The inspector stated that these weaknesses will be reviewed again in a future inspection.

#### 4.0 Radiological Control Program Upgrade

Subsequent to the identification of the deficiencies documented in NRC Inspection Report No. 70-1100/87-05, the licensee retained a Health Physics consultant to assist them in the Radiation Protection program upgrades. The status of some areas were reviewed during this inspection and are discussed below.

##### 4.1 Health Physics Staffing and Organization

There have been no changes to the Radiation Protection organization. The Manager, Nuclear Licensing, Safety Accountability and Security



continued to administer the Radiation Protection program. Further, the Supervisor, Health and Safety is still administering both the Radiation Protection program and the Industrial Safety program. However, the licensee has retained a consultant to assist with the technical aspects of the program development.

Health Physics technician staffing has been augmented. Prior to NRC Inspection No. 70-1100/87-05, the licensee had three HP technicians to monitor three shifts, seven days a week. After losing two permanent HP technicians, the licensee hired four new full-time HP technicians. The technician staff currently numbers five permanent HP technicians. Three contractor technicians were hired to augment the in-house HP technician staff. Additionally, the licensee is considering hiring additional permanent HP technicians in order to effectively implement the planned Radiation Protection program upgrades.

#### 4.2 Audits

As required by SNM-1067, the licensee's Nuclear Safety Committee (NSC) completed their annual audit of the Radiation Protection Program in January, 1988. The new chairman of the Nuclear Safety Committee retained a professional Health Physicist within Combustion Engineering, but independent of the Nuclear Fuels Manufacturing facility, to provide the technical review of the program. The chairman, NSC, stated that significant programmatic deficiencies were identified by the audit, which would be addressed and corrected. The written report of the audit was not available at the time of the inspection. This will be reviewed in a future inspection.

#### 4.3 Training of Personnel

The licensee's program for training of plant workers and health physics technicians was reviewed with respect to criteria contained in:

- SNM License No. 1067, Part 1, Section 2.6, "Training."

The adequacy of the licensee's program related to the above criteria was determined by:

- review of training given to plant workers;
- review of the Qualification Manual for the Health Physics technicians;
- discussions with the Health Physics staff and plant workers; and
- discussions with Radiation Safety Associates, Inc.

##### 4.3.1 General Employee Training

A formal written General Employee Training (GET) protocol

for all radiation workers has been assigned to Radiation Safety Associates, Inc. Discussions with the Radiation Safety Associates company president indicated that lesson plans and formal class content were in preparation. Projected finish dates were estimated to be March 31, 1988. In the interim, all new employees (radiation workers) will continue to spend two hours of initial training with the acting Radiation Specialist. The inspector reviewed annual training and retraining lesson plans and records for all personnel. All retraining had been documented with all individuals accounted for to meet the annual retraining requirements.

#### 4.3.2 Health Physics Technician Training

The inspector reviewed the Health Physics technician training program. The training program consisted of a topical outline of various subjects of importance at the facility and sign-off sheets for lessons completed. However, there was no lesson plan to detail each topic and what information was given. During the past year there had been a large turnover of Health Physics technicians with only one fully qualified health physics technician remaining on the staff. Additional technicians have been hired during the past year. Discussions were held with each of the new technicians and it was determined that all are well qualified to function as Health Physics technicians by virtue of past training and experience.

Radiation Safety Associates has prepared a training course for Health Physics Technicians, but it has not been presented to all of the recently hired technicians. Present plans are to complete the technician training by March 31, 1988.

#### 4.4 Procedures

A consultant has been retained in order to write Radiation Protection Program procedures. At the time of the inspection, the only Radiation Protection procedures that had been officially reviewed and approved were those for the Respiratory Protection program. The licensee plans to have all procedures finished by June, 1988.

#### 4.5 Internal Exposure Controls Program

##### 4.5.1 Air Sampling Program

The inspector reviewed the licensee's air sampling program by observations of work during tours of the Pellet Shop, review of various air sample measurements comparing newly

purchased breathing zone air samples to the station fixed air samples, and discussions with licensee personnel.

Within the scope of this review, the following was identified:

- The licensee, in an effort to verify the representativeness of station fixed air sampling equipment, purchased 40 new breathing zone air sample pumps and sample heads. Preliminary measurements made in the comparison indicated that the new breathing zone air samplers were measuring an average of 66% higher air sample concentrations than the fixed air samplers. However, insufficient data had been collected, and the results were poorly documented. The licensee stated that more measurements would be taken.
- During a tour of the Pellet Shop on January 26, 1988, the inspector observed a Pellet Shop worker at a Powder Preparation hood on the mezzanine performing a routine blender operation. The worker emptied loose powder from the blender onto the floor of the powder preparation hood, and hand fed the powder into a screen leading to a closed conveyor belt. The powder was wetted and clumped, requiring the workers to hammer out the large clumps in order to feed the powder through the screen. The worker's face was approximately one foot from the loose powder. A fixed air sampler was present in the vicinity, approximately twelve feet away from the worker's face.

Although the operation was performed under negative pressure, the inspector stated that there was sufficient potential for loose powder to be forced into the worker's breathing zone. The inspector further stated that if ventilation were to fail, a significant intake of radioactive materials would occur, without appropriate measurement of the concentration of radioactive material taken. The inspector stated that this was an additional example of failure to take suitable measurements of concentrations of radioactive materials in air in the worker's breathing zone, already identified in NRC Inspection Report No. 70-1100/87-05. However, the licensee received the Notices of Violation from the NRC on January 25, 1988, and did not have sufficient time to address and take corrective action on the violations. Therefore, this will be characterized as another example of a continuing problem in this area.



Prior to the exit on January 29, 1988, the licensee had initiated a breathing zone air sampling program for all workers in the Pellet Shop working at loose powder stations. This area will be reviewed in a future inspection.

#### 4.5.2 Bioassay Program

The licensee's annual lung count and urinalysis for Pellet Shop workers took place in November, 1987. At that time, the licensee also conducted fecal sampling and additional urine sampling to assess intake. The licensee employed a consultant to perform the analyses and assessment of the data. However, these analyses and assessments were not complete at the time of the inspection.

Within the scope of this review, the following was identified:

The licensee's routine in-house urinalyses, utilizing a standard fluorometric technique and procedure normally detects very small amounts of uranium in urine. This is due to the form of uranium found at this site. During the November sampling, additional urine samples were taken from selected Pellet Shop workers and sent to a vendor for additional analyses. Preliminary review of this data shows uranium in the urine. However, there was no information available to determine the type of analyses performed by the vendor. Further, the results of the analyses were in different units than those reported by the on-site radiochemist. The licensee stated that the consultant hired to evaluate this bioassay data will review all data in order to assess the differences in results.

The fecal samples taken in November did show positive indications of uranium intakes. The consultant will also analyze and assess these data to determine the possible body burdens of the workers.

The bioassay samples taken in November were grab samples, rather than 24 hour composited samples needed for the analysis of the data. This makes the data obtained from these samples much more difficult to analyze and quantitatively assess intakes of uranium by involved individuals.

This area will remain open and will be reviewed in a future inspection.

#### 5.0 Gaseous Effluents

During NRC Inspection No. 70-1100/87-01, the inspector noted concerns regarding the adequacy of the licensee's ability to obtain a isokinetic

samples from the ventilation stacks (Follow-up Item 87-01-08). During NRC Inspection No. 70-1100/87-05, the licensee provided a copy of a purchase order for a ventilation consultant to perform a verification of isokinetic sampling in the ventilation stacks. The licensee specified in the purchase order that the sampling system must be in conformance with the ANSI 13.1-1969 standard.

During this inspection, the licensee indicated that, due to continuing problems with the FA-2 filtered exhaust system, the entire filter exhaust line is being replaced. This exhaust line provides ventilation exhaust for the pellet presses and the calcine furnace. After replacement of the FA-2 system, the entire exhaust system for Building 17 will be checked for verification of isokinetic sampling. This item remains open and will be reviewed in a future inspection.

#### 6.0 Allegations Received During the Inspection

During the conduct of this NRC inspection during the week of January 25-29, 1988, an NRC Inspector was approached by a plant worker who informed the inspector of safety concerns. The allegations were received on January 26, 1988.

##### 6.1 Allegation No. 1

On January 14, 1988, a small fire was burning on the bottom of the No. 1 Dewaxing Furnace, which created smoke. The dewaxing furnace is located in the Pellet Shop. The health physics technician covering the Pellet Shop at the time told workers to stay away from the area. The alleged stated one individual complained about feeling sick in the presence of the smoke.

##### Inspector Review

The inspector spoke to one worker who was present in the Pellet Shop on January 14, 1988 during the smoking of the No. 1 Dewaxing Furnace. He stated that the dewaxing furnace periodically caught fire and smoked, but the supervisors felt that it did not warrant evacuation. He also stated that he did not get sick during the incident.

The inspector spoke to a design engineer who is assigned the responsibility of refurbishing, repairing, and the construction of containments around equipment in the Pellet Shop. He stated that the smoke in the furnace was caused by a buildup of zinc stearate which was burned off of the pellets prior to sintering. He further stated that periodic cleaning of the furnace might eliminate the zinc stearate buildup. The engineer told the inspector that a procedure would be considered to periodically clean out the dewaxing furnaces before the zinc stearate accumulated enough to cause this problem.

Due to time constraints, the inspector is unable to interview the worker who complained about feeling sick in the presence of the smoke.

## 6.2 Allegation No. 2

On January 15, 1988, at approximately 7:15 a.m., a heating system, which had not been operated for four years, was turned on. This resulted in smoke coming from the ventilation units in the Pellet Shop. Initially, the smoke was light, but by about 7:45 a.m., the smoke became heavy. At that time the Pellet Shop was evacuated and remained evacuated until a Shop meeting was held at approximately 9:15 a.m. During the Shop meeting, the Manager of Nuclear Licensing, Safety, Accountability and Security stated that air samples collected during the event indicated the smoke contained no measurable levels of radioactivity.

Subsequently, a worker claimed to have overheard two health physics technicians saying that the air samples were higher than normal, and if the smoke came out of the ventilation ducts again, the shop should be evacuated immediately. The worker who heard the health physics technicians thought from their conversation that there could be a problem with the data, or even that the data may have been falsified since timely evacuation had not taken place. The worker passed this information on to the alleged.

### Inspector Review

The inspector obtained and reviewed the event description in the health physics files and the results of the air samples collected during the periods of time that smoke was allegedly present in the Pellet Shop. The licensee analyzed the air sample filters in the areas of closest proximity to the smoke. One air sample (S.P.#12) indicated that the radioactivity concentration in air, early in the incident, was approximately 0.05 MPC. This constitutes a very small fraction of airborne concentration that would delimit the area to an "Airborne Radioactivity Area." Another air sample (S.P. #18) which was collected in the proximity of the heavy smoke, later when the shop had been evacuated, indicated an air concentration of about 2 MPCs.

The inspector noted that the calculated air concentration in the event description based on the S.P. #18 measurement was originally wrong (too low) but was later corrected to 2 MPCs. Licensee personnel stated that a typographical error had been made and a breathing zone air sample result was originally incorrectly typed two times in the report.

The inspector interviewed the two health physics technicians and the worker who indicated that he overheard the HP technicians talking about the air sample results. The technicians stated that they had noted the incorrect air sample result typed in the event description, and probably questioned the recorded result in the presence of

the worker in the Pellet Shop. However, they stated that it appeared to be a typographical error which was corrected when brought to the attention of management. They did not believe that the report was deliberately falsified. It did not appear to the inspector that there was any deliberate falsification of the air sample results.

The inspector discussed the results of this review with the alleged on January 29, 1988, prior to the exit interview. The alleged had no further concerns at that time.

Since the subject of these allegations included other non-radiological aspects of the licensee's operation, the Occupational Safety and Health Administration (OSHA) Region I Hartford, Connecticut Office was notified of these issues by telephone on February 5, 1988.

#### 7.0 Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on January 29, 1988. At that time the inspector summarized the scope and findings of the inspection.