U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 70-1100/90-08

Docket No. 70-1100

License No. SNM-1067 Priority 1 Category ULFF

Licensee: Combustion Engineering, Incorporated
1000 Prospect Hill Road
Windsor, Connecticut 06095

Facility Name: Nuclear Fuel Manufacturing and Nuclear Laboratories

Inspection At: Windsor, Connecticut

Inspection Conducted: November 13-16, 1990

Inspectors: M A Austin 11/28/90
M. A. Austin, Radiation Specialist, Effluents date
Radiation Protection Section (ERPS), Facilities
Radiological Safety and Safeguards Branch (FRSSB)

for Robert J Bores 11/29/90
J. Jang, Senior Radiation Specialist, ERPS, FRSSB date

Approved by: for Robert J Bores 11/29/90
R. J. Bores, Chief, ERPS, FRSSB, Division of date
Radiation Safety and Safeguards

Inspection Summary: Inspection on November 13-16, 1990
(Report No. 70-1100/90-08)

Areas Inspected: Routine, unannounced inspection by two region-based inspectors of the licensed program including review of radiological controls and environmental monitoring. The inspection also included review of licensee actions on previously identified items and in response to NRC recommendations made in SALP Report 70-1100/88-99.

Results: Within the areas inspected, no violations were noted. However, several weaknesses of the Environmental Monitoring Program were identified (See Section 5.0 of this report for details). With regard to the SALP Report recommendations, it was noted that appropriate actions had been taken by the licensee to implement each of the recommendations in the Radiological Controls functional area.

DETAILS

1.0 Individuals Contacted

**J. Ballard, Operations Consultant
**R. Bennett, Manager, Training
**J. Conant, Manager, Nuclear Material Licensing
*W. Graves, Supervisor, Analytical Chemistry
*J. Helems, Radiochemist
*G. Hess, Nuclear Material Licensing Engineer
*S. Pati, Supervisor, Core Components
*P. Rosenthal, Program Manager, Radiological and Industrial Safety
***R. Sharkey, Manager, Radiological and Industrial Safety
***R. Vaughan, Plant Manager
J. Vollaro, Supervisor, Radiological and Industrial Safety
**C. Waterman, Acting Vice President-Nuclear Fuel

*Denotes those present at the November 15, exit interview.
**Denotes those present at the November 16, exit interview.
***Denotes those present at both exit interviews. The inspectors also interviewed other licensee employees during the inspection.

2.0 Review of Previous Violations

The inspector reviewed the information described in the licensee's response, dated September 14, 1990, to the NRC letter dated August 1, 1990, which was enclosed with the NRC Region I Inspection Report No. 70-1100/90-06. That inspection report documented the results of a special inspection conducted to evaluate the information in the licensee's response, dated May 11, 1990, to the Notice of Violation enclosed with NRC Region I Inspection Report No. 70-1100/90-03. Three violations (identified as Items A, B and C in the aforementioned Notice of Violation) remained open and required further examination during an on site inspection in order to be closed by the NRC. The violations described below are identified in the same manner as in the aforementioned Notice of Violation.

2.1 Violation A (1100/90-03-02)

Violation A involved the licensee's failure to complete evaluations to:

1. (Closed) Show that adequate surveys were conducted in the Pellet Shop stack and load area to prove compliance with the dose limits of 10 CFR 20.101(a) and (b);

2. (Open) Determine the adequacy of beta dose measurements to the skin of the whole body, in this case, the face, and;

3. (Open) Determine the adequacy of beta shielding of safety glasses used in the Pellet Shop to ensure compliance with whole body dose limits specified in 10 CFR 20.101(a) or (b).

Regarding Item 1 of this violation, the inspector determined that the licensee now conducted weekly surveys using a portable ion chamber instrument to measure the beta dose rates present at operator workstations in the Pellet Stack and Load area. The inspector reviewed the records of surveys done by the licensee in November 1990. The survey data were recorded on forms that show the locations where the measurements were made, the open window measurements, the closed window measurements, the beta correction factors, and the beta dose rates calculated from these measurements. The inspector observed that the beta dose rates measured by these weekly surveys ranged from approximately 3 to 37 millirads per hour, depending upon the quantity of pellets on the Stack and Load tables and in the nearby storage cabinets. The inspector used a survey instrument to conduct independent measurements in the same locations and observed a similar range of beta dose rates in this area. Based upon this review of records and the observed dose rate measurements, the inspector determined that the licensee was now conducting adequate surveys in the Pellet Stack and Load area. This item is closed.

Regarding Items 2 and 3 of this violation, the inspector reviewed the raw data obtained by the licensee from beta radiation surveys conducted at the Pellet Stack and Load tables during a time period of approximately two months. The licensee designed a study to gather information about the attenuation of beta radiation by protective clothing and safety glasses worn by workers. At the time of the current inspection, the thermoluminescent dosimeter (TLD) measurements obtained from this study were summarized by the Radiological and Industrial Safety (RIS) Program Manager in a handwritten draft format, dated August 3, 1990, which was reviewed by the inspector. The licensee's evaluation of the raw data was not completed, and final conclusions had not been made as of the time of inspection. Relevant to this violation, the inspector used a licensee survey instrument to obtain measurements that indicate that the "salad bar" polycarbonate shield, which was recently installed over the Pellet Stack and Load tables, was essentially 100 percent effective in shielding the skin of the face and the lens of the eyes of workers from further exposure. However, because the evaluation of the beta radiation study data was not complete, the licensee had not yet decided what action would be taken to address the recorded exposures for workers in this area prior to installation of this shield. Furthermore, the licensee had not yet decided what, if any, action would be taken to address all other Pellet Shop workers whose recorded beta exposures were being based upon measurements from TLDs worn beneath their protective clothing. For these reasons, these two items of this violation remain open.

2.2 Violation B (1100/90-03-03) (Closed)

Violation B involved the licensee's failure to furnish, within the time period allowed by 10 CFR 20.408, exposure records for seven former licensee employees to the NRC Director of Nuclear Regulatory Research and to former employees following termination of employment.

Regarding this violation, the inspector reviewed RPI-205, "TLD Issue, Control, and Exposure Record Keeping", Revision 1, dated August 24, 1990. RPI-205 was revised to describe the formal mechanism by which the Radiation Protection (RP) office is notified of the departure dates of terminated individuals. The inspector reviewed several exposure record files for individuals who were terminated in 1990. All required reports for the files reviewed by the inspector were issued within 90 days of the termination date. The inspector examined a log book maintained by the RP technician responsible for preparing the summaries of exposure data for the termination reports. The inspector observed that this log book provided a practical mechanism to readily determine the status of all required termination reports and to maintain compliance with 10 CFR 20.408. Based upon these inspector observations, this violation is closed.

2.3 Violation C (1100/90-03-04) (Closed)

Violation C involved the licensee's failure to issue "special" dosimeters to Radiation Protection Technicians (RPTs) in accordance with Radiation Protection Instruction (RPI)-205.

Regarding this violation, the inspector found that Revision 1 of RPI-205, dated August 24, 1990, did not contain the requirement for "special" neutron dosimetry for RP technicians. The deletion of this requirement was based, in part, upon a report dated April 25, 1990, from the RP Supervisor to the RP Manager, which provided information on the use of neutron dosimetry within Building 17. This report provided historical data that showed the RP technicians had received no measurable neutron exposures. Based upon this information, the requirement for wearing neutron dosimetry on a routine basis was deleted from RPI-205; however, the procedure still allows for the use of neutron dosimetry during planned, non-routine activities (e.g., maintenance work on the head/shielding of the fluoroscopic equipment). For these reasons, this violation is closed.

3.0 Facility Tour

The inspector toured the Pellet Shop area to observe the current status of the deployment of powder-processing equipment from this area. The inspector observed that a "weighing hood" remained in service in the Annex, two "general purpose hoods" remained in service in the Pellet Shop, and a large ceiling-level duct remained open and operational for room air ventilation. All other exhaust inlets within the area had apparently been shutdown or closed. The inspector inquired as to the current status of airflows between the controlled area and the uncontrolled area. The RP Supervisor showed the inspector records of his weekly checks of airflow patterns. These records showed that, on June 25, 1990, within the controlled area, the airflow from the Stack and

Load area into the previous Powder Handling area was beginning to fluctuate because of the gradual elimination of ventilation exhaust points in the Pellet Shop West. However, these records also showed that the licensee had continued to maintain the required airflow pattern from the uncontrolled areas into the controlled areas of the plant. No deviations or violations were observed.

4.0 Licensee Actions in Response to the Systematic Assessment of Licensee Performance (SALP) Report

The inspector reviewed the current status of the licensee's actions taken in response to SALP Report No. 70-1100/88-99, enclosed in the NRC letter dated July 19, 1990. These actions were described in the licensee's October 8, 1990 response to the SALP Report. In particular, the inspector examined the licensee's actions with regard to the NRC recommendations in the SALP Report in the functional area of Radiological Controls.

4.1 Recommendation No. 1

The first SALP Report recommendation made by the NRC to the licensee was: "Promptly fill the Manager, RIS, position with a technically qualified individual".

Regarding this recommendation, the inspector interviewed the individual hired in July 1990 for the position of Manager, RIS. This individual has a Bachelor of Science degree and a Master of Science degree in health physics, and he had acquired approximately two years of applied health physics experience before joining the licensee's RP staff. Although this individual had been in this position for approximately four months at the time of the current inspection, he had already assumed all of the day-to-day responsibilities of the Manager, RIS, and he was also providing the day-to-day technical guidance to the RP Technicians. His assumption of these duties has allowed the Program Manager, RIS, to focus on upgrading RP program requirements, and it has allowed the Supervisor, RIS, to play a more active role in the day-to-day operations of the manufacturing facility. The inspector observed that the Supervisor, RIS, was allowed to spend much more time on direct supervision of the RP technicians than had been observed during in previous inspections. The inspector determined that the individual in the position of Manager, RIS, was technically qualified and had begun to enhance the effectiveness of the overall RP program.

4.2 Recommendation No. 2

The second SALP Report recommendation made by the NRC to the licensee was: "Maintain a technically qualified, professional RP staff".

This recommendation was based upon the observations that, at the end of the most recent SALP period, the licensee had not yet filled the RIS Manager position with a technically qualified individual; and

the licensee's RP technician staff was comprised mostly of outside contractor personnel who were transient workers and did not provide a stable RP organization. The concern regarding the RIS Manager position was addressed in the preceding Section 4.1 of this current inspection report. Regarding the concern about the RP technician staff, the inspector determined during the current inspection that four of the five RP technicians were now licensee employees. Discussions held by the inspector with some of these RP technicians indicated a marked improvement in their confidence in the new RP organization compared to that observed by the inspector in previous inspections. In addition, the recently initiated training program (described in Section 4.3 of this current inspection report) promises to enhance the technical qualifications of the RP technicians. The inspector determined that the licensee has taken and is currently taking actions that should assure it maintains a technically qualified, professional RP staff.

4.3 Recommendation No. 3

The third SALP Report recommendation made by NRC to the licensee was: "Establish and implement an upgraded RP Technician training program".

Regarding this recommendation, the inspector interviewed the licensee's Training Manager. The Training Manager had developed Procedure TP-1, "Radiation Protection and Industrial Safety Technician Training Program", Revision 0, dated July 5, 1990. The inspector reviewed the procedure and found that the Training Manager is responsible for helping develop and coordinate the RP technician training program, but that the actual implementation and recordkeeping of the training is done by the RIS Manager and RIS Supervisor. The inspector interviewed the Manager and Supervisor of RIS regarding the RP technician training program. The inspector reviewed a memo, dated September 14, 1990, from the RIS Manager to the Training Manager, which presented a schedule for twelve separate training sessions, starting October 13, 1990 and concluding by May 4, 1991. The training was planned to include both "technical" and "procedural" subject matter. The inspector found that three of the twelve training sessions had already been held by the time of the current inspection, and that the program was adhering to the aforementioned schedule. The inspector reviewed documentation of the training sessions already completed. The inspector observed that the RP technicians were formally assigned required reading before the actual training session, and each RP technician had been given a personal training handbook. The inspector reviewed examinations, which include multiple choice and essay questions, which must be taken by each RP technician following a training session. Based upon these observations, the inspector determined that the licensee is currently implementing an upgraded RP technician training program.

4.4 Recommendation No. 4

The fourth SALP Report recommendation made by the NRC to the licensee was: "Address and document actions taken on each of Bechtel's recommendations".

Regarding this recommendation, the inspector interviewed the licensee's Operations Consultant, who had been assigned the administrative responsibility to assure that each Bechtel recommendation was addressed and the actions taken to resolve each were documented. Because the 1990 Bechtel Report encompassed all recommendations from the 1988 report that Bechtel still considered relevant, the licensee addressed the 1990 report. The inspector observed that the licensee had identified 98 individual recommendations in the 1990 report, and that licensee management had assigned each one to a specific individual for followup. At the time of the current inspection, the licensee had addressed and closed 58 of the 98 recommendations. The inspector examined a log book, maintained by the Operations Consultant, which contained memos and other paperwork to document the actions that had been taken on those specific recommendations that had already been addressed. The inspector randomly selected a number of recommendations that the licensee had addressed and found the Operations Consultant could readily provide documentation as to what actions had been taken. Based upon these observations, the inspector determined that an effective administrative control was being implemented to assure that the licensee did address and document actions taken on each of Bechtel's recommendations.

4.5 Recommendation No. 5

The fifth SALP report recommendation made by the NRC to the licensee was: "Continue to improve the work place safety attitude".

Regarding this recommendation, the inspector held discussions with a number of employees in their work place. The individuals interviewed expressed a genuinely positive attitude toward work place safety. This inspector personally observed continued improvement in this aspect of the work place environment during recent inspections. Based upon these observations, it appeared that the licensee was continuing to improve the work place safety attitude.

Based upon this review of the SALP report recommendations, the inspector determined that the licensee had initiated actions to address each recommendation. These initial licensee actions appeared appropriate to begin adequate implementation of the recommendations. However, except for Recommendation No. 5, the licensee had not had adequate time to demonstrate that satisfactory implementation could be sustained. The continuation of the licensee's actions in response to these recommendations will be monitored in future inspections.

5.0 Environmental Monitoring Program

The inspector reviewed the licensee's Environmental Monitoring Program (EMP) to determine whether the program described in Section 5.2 of the License was effectively implemented. The inspector reviewed the following areas.

- Analytical Procedures and Results
- Quality Control Program for Radiochemistry Laboratory
- Annual Reports

5.1 Review of Analytical Procedures and Results

The inspector reviewed the following procedures to determine the adequacy of the analytical method.

- Procedure No. 18, Rev. 1, "Determination of Alpha and Beta Radioactivity in Atmospheric Fallout", June 29, 1989

- Procedure No. 19, Rev. 1, "Determination of Alpha and Beta Radioactivity in Surface and Well Water", June 29, 1989

- Procedure No. 20, Rev. 1, "Determination of Alpha and Beta Radioactivity in Vegetation", June 29, 1989

- Procedure No. 21, Rev. 1, "Determination of Alpha and Beta Radioactivity in Soil and Sediment", June 29, 1989

During the review of the above procedures, the inspector noted that the licensee analyzed gross alpha and beta activities for only the soluble fraction of the media. During the sample preparation, the licensee filtered samples using a Whatman #541 filter paper. The licensee dried the filtrate on the planchet, determined net weight, and counted the material using a proportional counter. The licensee discarded the insoluble fraction. Only the filtrate was used to determine gross alpha and beta activities. The inspector further noted that the licensee did not apply self-absorption correction factors to determine the gross alpha and beta activities. The inspector noted that the licensee had self-absorption correction factors for the gross alpha and beta, but these factors were invalid for the current instrumentation because the factors were determined using the previous proportional counter. The inspector also noted that the licensee used the acid leaching technique for analyzing soil and sediment samples. The resulting leachate may not be representative of the gross alpha and beta activities in soil and sediment samples, depending on the chemical form of the radionuclides. Relative to fallout sampling, the inspector discussed methods of better assessing plant impacts on the environment through the use of improved sampling and analytical techniques. The inspector also noted that the licensee did not calculate the analytical uncertainty

for any of the reported results. Results reported without the associated uncertainties make an environmental assessment of any impact very difficult. The inspector further noted that the licensee did not have written procedures for the total uranium analysis (fluorometric method) of environmental sample media. The licensee has an appropriate uranium analytical procedure for bioassay samples.

Based on the above review and discussion with the licensee, the following areas for improvement were discussed by the inspector with the licensee.

- Reevaluation and update of the above analytical procedures to properly measure gross alpha and beta radioactivity in EMP samples.

- Application of appropriate self-absorption correction factors for the more accurate determination of gross alpha and beta radioactivity in EMP samples.

- Calculation of analytical uncertainties associated with reported results.

- Preparation of more appropriate analytical procedures for the determination of total uranium in EMP samples.

The inspector stated that actions taken in the above areas will be reviewed during subsequent inspections.

5.2 Quality Control Program for Radiochemistry Laboratory

The inspector reviewed the licensee's Procedure No. 57, "The Radiochemistry Laboratory Quality Control Program", to determine the accuracy and precision of the analytical measurements for the EMP samples. The licensee wrote this procedure to establish a quality control program for the Radiochemistry Laboratory, in which all EMP samples were analyzed. Although this procedure was written to ensure the accuracy and precision of analytical results, the inspector was not able to evaluate this information because the licensee had not analyzed quality control samples (e.g., spike, and blind duplicate and standard samples) utilizing this procedure. The inspector stated that this area will be reviewed during a subsequent inspection.

The inspector determined that the licensee participates in the EPA cross-check program. The inspector reviewed comparison data for 1989 and 1990 and noted that comparisons were within the licensee's acceptance criteria. However, the inspector noted that the licensee did not analyze all of the EPA cross-check samples in 1989 due to a heavy work load in the Radiochemistry Laboratory.

The inspector reviewed quality control data (efficiency and background) and control charts for the proportional counter. The inspector also reviewed operating voltage for tnis instrument (plateau checks). The inspector noted that the licensee performed these activities as required by the procedure.

No violations were identified.

5.3 Review of Annual Reports

The inspector reviewed the Annual Environmental Monitoring Reports for 1986, 1987, 1988, and 1989. These annual reports provided analytical results of EMP samples and trend analyses. The inspector discussed the trend analyses with the licensee, because the inspector noted that the analytical results for gross beta activity in grass samples were lowest in May 1986. This sample should have exhibited one of the highest beta activity results because of fallout from the Chernobyl accident in 1986. The inspector stated that the current trend analysis technique should be evaluated to assess whether the results are reasonable. The licensee stated that the technique will be reviewed.

No violations were identified.

6.0 Exit Meeting

The inspectors met with licensee personnel denoted in Section 1.0 on November 15, 1990, and at the conclusion of the inspection on November 16, 1990. The scope and findings of the inspection were discussed at that time.