U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No.: 70-903/72-01 Docket No.: 070-00903

Licensee: Gulf United Nuclear Fuels Corporation License No.: SNM-871

Grassland Road Priority: I

Elmsford, New York 10523 Category: A(1)

Location: Pawling, New York

Type of Licensee: Fuel Fabrication

Type of Inspection: Routine - unannounced

Dates of Inspection: October 30-31, 1972

Dates of Previous Inspection: November 22-24, 1971

Principal Inspector: _____ 11/22/72
W. J. Cooley, Fuel Facilities Inspector Date

Accompanying Inspectors: None _____
Date

_____ _____
Date

Other Accompanying Personnel: None

Reviewed By: _____ 11/22/72
H. W. Crocker, Senior Fuel Facilities Inspector Date

SUMMARY OF FINDINGS

Enforcement Action

None

Licensee Action on Previously Identified Enforcement Items

None required

Unusual Occurrences

The licensee reported an incident by telephone and telegram to the U. S. Atomic Energy Commission, on December 29, 1971. That incident was a pressure excursion which occurred in interconnected glove boxes and caused the distribution of uranium-plutonium oxide mixtures in a portion of the laboratory. The licensee presented the Commission with a detailed report of the incident dated January 28, 1972, in which he presented a description of the incident, possible personnel exposure, probable cause of the incident, and the corrective action which had been taken to prevent recurrence. This inspection included a review of the corrective action taken by the licensee in this matter. (Paragraphs 16 through 21)

Other Significant Findings

A. Current Findings

The licensee possessed approximately 14.5 kilograms plutonium and 9.6 kilograms of uranium-235 at his Pawling Facility. An additional 334 grams of uranium-235 in the form of stored fuel rods were located at his Eastview facility. The only AEC license work in process was at the Pawling Facility and included the production of a number of mixed oxide pellets for irradiation at the Argonne National Laboratory.

Mr. P. E. Clemons, Director, Health and Safety, left Gulf United Nuclear Corporation employment approximately 3 weeks prior to this inspection. The licensee was actively recruiting for a replacement. In the interim Mr. Peter Loysen, Manager, Nuclear and Industrial Safety, had assumed Clemons' responsibilities.

Lung counts performed on the licensee's employees indicate a maximum deposition of approximately 10% of the maximum permissible lung burden.

B. Status of Previously Reported Unresolved Items

There were no unresolved items noted during the previous inspection.

Management Interview

The results of the inspection were discussed with Mr. J. Andersen, Manager, Plutonium Operations, and Mr. D. Rosh, Manager, Plutonium Facility Engineering, who were informed that no items of noncompliance were observed. The inspector informed those persons that he had verified the corrective action taken to prevent recurrence of the glove box pressurization incident and that he had no further questions in the matter. The licensee's representatives were informed of the Commission's policy of placing inspection reports in the Public Document Room and of the provisions of 10 CFR Part 2 and 10 CFR Part 9 which permit the withholding from public disclosure proprietary information.

DETAILS

1. Persons Contacted

J. Andersen, Manager, Plutonium Operations
D. Rosh, Manager, Plutonium Facility Engineering
R. Ard, Health Physics Technician, Plutonium Fuel Fabrication
P. Loysen, Manager, Nuclear and Industrial Safety
D. Darr, Nuclear Safety Specialist, Pawling Plant

2. General

The licensee was producing mixed oxide fuel bodies for the Argonne National Laboratory and continuing research and development in nuclear fuels. Special attention was given to the continuity of health physics surveillance and services because of the termination of the Director, Health and Safety.

3. Organization

Changes in organization and personnel have occurred since the last inspection. Mr. J. Andersen has replaced Mr. A. Strasser as Manager, Plutonium Operations. In that capacity Mr. Andersen reports to J. D. O'Toole, Vice President, Development Engineering Operations. Mr. Andersen also acts as Section Manager of Plutonium Fabrication. Mr. D. Rosh, Manager, Plutonium Facility Engineering reports to Andersen in the capacity of Manager, Plutonium Operations. Mr. P. Loysen, Manager, Nuclear and Industrial Safety reports through an organizational line separate from manufacturing operations to the President of Gulf United Nuclear Fuels Corporation. The position of Director, Health and Safety, recently vacated by Mr. P. Clemons, reports to Mr. Loysen. Mr. Loysen stated he had assumed the responsibilities of the Director, Health and Safety until that position can be filled. The licensee's representatives stated they are actively recruiting to fill the vacancy. Mr. R. Ard, Health Physics Technician, presently reports to Mr. Loysen and provides the health physics services and surveillance at the Pawling Plutonium Facility.

4. Inventory

The licensee's fissile material inventory at the Pawling Facility as of September 13, 1972 was 14,484.64 grams of plutonium and 9,625.35 grams of uranium-235. That material was in various forms including unencapsulated oxides. The licensee's inventory of fissile material at his Eastview Facility was 334 grams of contained uranium-235 in the form of fuel rods which were in storage at the time of the inspection.

5. Nuclear and Industrial Safety Audits

A monthly audit is conducted by two members of management, accompanied by the operating area supervisor. That audit is performed at all buildings at the Pawling Facility. According to licensee representatives, required corrective action is often taken at the time of the inspection. In some instances requiring more than minor changes and in cases of disagreement among the members of the auditing party, internal correspondence is used to record positions and the ultimate action taken.

6. Procedures and Feasibility Report

The Facility Manager has the responsibility to see that the plutonium facility is operated in accordance with license conditions, feasibility reports and operating procedures. A plutonium laboratory Operating Manual is maintained which contains detailed laboratory procedures, emergency procedures, and the requirement of feasibility reports for each change in equipment, processes and experiments. Changes in the Procedures Manual are initiated by facility management and are given an internal review by Operations. They are ultimately approved by Corporate Development Engineering Operations, based on independent reviews by Health and Safety, Criticality Committee, and Operations Management.

7. A brief review of the current laboratory Operating Manual indicated that it was originated March 1, 1968. Revisions to the manual were apparent dating through 1970 and 1971 which showed the signatures of approval. Two copies of the Procedures Manual were available in the plutonium laboratory and an additional two copies were located in the office area of the Pawling Facility according to the licensee representative.

8. The Procedures Manual is presently undergoing a major review. The review has been held up by the reported glove box pressurization and by organization changes. The licensee indicated that presently proposed revisions to the manual have been pending for approximately a year.

9. The feasibility report required by the laboratory Operating Manual indicate the proposed change in operation, the reason for the change, and details on how the work will be accomplished. A review indicated that eight feasibility reports had been written and reviewed since the last inspection none of which required an AEC license amendment for implementation. All reports had received a review from the point of view of nuclear and radiological safety. The content of those reports included considerations of contamination measurements on welds, limitation on the hydrogen content of hydrogen-gas mixtures,

the routine monitoring of operations, and the use of natural uranium.

10. Emergency Procedure

The licensee's emergency procedures for the Pawling Facilities appear in a separate section of the plutonium laboratory Operating Manual. Those procedures contain a statement as to the general objectives of the emergency plan and include consideration of accidental criticality, radiation spills and accidental releases, fires, personnel injury, and disasters. Overall emergency responsibility is assigned to the Manager, Plutonium Operations with the Director, Health and Safety acting in an advisory capacity. The plan specifies, by name, three emergency coordinators. Three site emergency teams are specified for fire fighting, radiation monitoring and first aid and rescue.

11. The procedures contain lists of all key personnel including names of emergency team members along with both residence and office telephone numbers. The call list includes upper management as well as personnel and organizations who could assist in the event of an emergency. Those include the local fire department, sheriff's officer, local physicians and hospitals, the Gulf United Nuclear Facility in New Haven, Connecticut, and both state and federal authorities. The plan describes the location, distance, and capabilities of those groups.

12. The plan includes lists of emergency supplies and equipment and their location along with the requirement of maintenance and inventory. Detailed procedures are given for each of the postulated accidents along with notes on immediate action to be taken. The above described emergency procedures were current having been last revised on July 20, 1972 and approved by the Vice President of Gulf United Nuclear Fuels Corporation.

13. Among the licensee's emergency equipment are two gas powered emergency generators as well as heat detection equipment and fire suppression powders located in each glove box at the facility. The licensee also has three distinctive, audible alarms for the radiation, criticality, and fire types of incidents.

14. Shipping Container Records

Fissile material shipping records were reviewed during the inspection. Those records gave a detail description of each container and each shipment and included the shipping container model number, the condition of the container, the condition of sealing gaskets, container contents by isotope, amount, and form and the license number of the cosignee. Those records also included health physics survey data showing radiation levels and instrumentation used. Additional information recorded for each shipment includes the transport group and index numbers, fissile class, DOT label used and the method of shipment. The licensee includes with each shipment and retains a copy of a drawing of each shipping

container and the arrangement of its contents. Additionally, shipping papers indicate the date of shipment, and the name and address of the cosignee.

15. The review of records indicated that most shipments since the last inspection involved small quantities of fissile material. An exception was an inventory reduction which occurred about June 1972 which involved the shipment of approximately 2.2 kilograms plutonium and 6.2 kilograms of uranium-235. The licensee indicated that no incidents or accidents involving fissile material have occurred in transportation.

16. Licensee Corrective Action Following Reported Unusual Occurrence

In his detailed report to the AEC dated January 28, 1972, the licensee listed the steps he had taken to prevent recurrence of the glove box pressurization incident. This inspection included verification of the licensee's corrective actions.

17. The licensee's statement of the probable cause of the incident was the substitution of 8.2% H_2-Ar gas mixture for the usual 6% H_2-He in the oxygen to metal determination procedure conducted in glove box S-202. As a corrective action the licensee has established written procedures and administrative controls to limit the gas mixture in the oxygen to metal procedure to 6% H_2-He. The hydrogen content of gas mixtures has been further limited by internal control to 5.7% H_2-N_2 used in sintering operations and 3% H_2-Ar. The licensee also limits the H_2 content of all glove boxes to a maximum of 3%.

18. The hydrogen-helium mixture used in the oxygen to metal determination procedure is obtained from premixed tanks which are supplied by a vendor. In addition to the vendor's analysis those tanks are analyzed by gas chromatography prior to use at the laboratory.

19. According to the licensee's report, a contributing cause of the glove box pressurization may have been the introduction of oxygen to the carbon analysis procedure conducted in glove box S-203. Prior to the incident glove boxes S-202 and S-203 were interconnected permitting the mingling of oxygen and the hydrogen gas mixtures. As a corrective action the licensee has physically separated those two analytical boxes.

20. As a result of the licensee's review of the incident an internal document was produced setting guidelines for the percent hydrogen gas mixtures used in the laboratory. Feasibility reports had been written previously for the oxygen to metal analysis and the sintering press operation in the laboratory.

21. In sintering operations conducted at the laboratory the licensee uses both a vendor-supplied 5.7% hydrogen-nitrogen mixture and a supply of that gas mixture which he mixes at the site. According to the licensee the on site mixture is produced in a MSA volumetric mixing system and is automatically analyzed at the mixing tank. If the hydrogen content of the mixture exceeds 5.7%, the mixed gas is automatically shut off at the mixed gas reservoir and the laboratory starts drawing from the premixed gas supplied by the vendor. As a backup to that gas control system, the gas mixture is again analyzed as it enters the laboratory where a high hydrogen content will again cause a switch over to the premixed supply. The switch over mechanism in this latter system had not been completely wired at the time of this inspection. The latter gas analysis system also monitors the glove boxes for hydrogen content. If greater than 3% hydrogen is detected an alarm is actuated.

22. Health Physics Surveillance

Routine health physics surveillance is provided by the technician at the Pawling Facility. Health physics technical and professional assistance is available from the licensee's New Haven, Connecticut and Hematite, Missouri plant as well as the Eastview Facility in Elmsford, New York.

23. A review of the health physics program indicated that contamination surveys are made at the laboratory approximately once each week. Those surveys consist of approximately 50 smears each. Any indication on the order of 50 counts per minute requires notification of the laboratory supervisor and a decontamination effort.

24. A review of survey records indicated an extensive decontamination effort from the beginning of the year through approximately March, 1972 as a result of the pressurization incident. Complete decontamination was indicated with only occasional residual spots greater than 50 counts per minute currently detected.

25. Additional controls at the plutonium facility include routine personnel checks as hands are removed from glove boxes and a routine glove inspection every two months with gloves being replaced upon observation of deterioration.

26. Air samples are obtained from 23 fixed air sampler stations located in the plutonium laboratory. Air samples are collected and counted on a daily basis after an approximate 12 hour decay period. A review of the results of those restricted area samples indicated a range of concentration from 10^{-14} microcuries/cc to 5×10^{-13} microcuries/cc.

27. Exhaust air samples are obtained from the plutonium facility exhaust stacks approximately once or twice each week. A review of the results of those samples, approximately May 29, 1972 to the date of the inspection

indicated a range of concentrations from 10^{-16} microcuries/cc to 3×10^{-14} microcuries/cc.

28. Survey smears and air samples are routine counted on a NMC PC-3T gas proportional counter. Direct reading instruments available include Eberline models PAC 3G and PAC 4G.

29. By telephone call from the licensee's Hematite Plant in Missouri a licensee representative informed the inspector that lung counts had been performed on approximately 9 employees involved in the decontamination effort at the Pawling Facility. He said that the report of the results had been mailed by the analytical laboratory on October 27, 1972. He said preliminary results received by telephone from the analyst indicated a maximum lung deposition of 0.17 nanocuries of americium-241. That result will correspond to a maximum plutonium deposition of 10% of the maximum permissible lung burden.

30. Training Program and Employee Experience

A training program for Pawling site employees was conducted from the latter part of 1970 through 1971. The program was in the form of 1 hour seminars which were addressed to subjects such as criticality, emergency procedures, health physics procedures, and fire fighting. According to the licensee that program was discontinued about the time of the pressurization incident and has not been resumed.

31. Employees at the plutonium facility presently include glove box operators, chemist, process engineers and technicians in addition to management personnel. Licensee representatives estimated that present employees represented in excess of 70 man years experience with uranium and plutonium processing operations.

32. Committee Membership

The licensee maintains both Criticality and Radiation Control Committees. Membership of those committees is by managerial personnel to the Department Manager level. Present members of the Criticality Committee are Messrs. P. Buck, W. L. Brooks, R. Schamberger, and J. R. Tomoto. Membership of the Radiation Control Committee includes J. Andersen, and N. Fuhrman, P. Loygen, and W. J. Manion. A vacancy on the Radiation Control Committee was created by the termination of one member of management.

33. Inspection of Facilities

The plutonium laboratory was visited during this inspection. The lab had a generally neat appearance with no extraneous equipment or materials about. Criticality limits were posted at glove box and glove box combination operating stations which indicated the mass limit and both the solid and liquid hydrogenous material limits where applicable. That

posting arrangement permitted chalk and slate notations of the quantities of those materials which were contained in the boxes. Material limits in the boxes are posted and maintained by the nuclear material accountant who keeps a running inventory of fissile material by location in the laboratory.

34. Fixed station air sample drops appeared to be generally at the breathing zone of glove box operating stations. The physical isolation of glove boxes S-202 and S-203 were observed. There was no evidence of floor contamination as determined by personnel shoe cover checks upon departure from the laboratory.

U.S. ATOMIC ENERGY COMMISSION

REGULATORY OPERATIONS - STATISTISTICAL DATA

A. DOCKET NUMBER	B. REPORT NUMBER	C. PRIORITY CATEGORY	D. INSPECTION INVESTIGATION DATES (FROM / TO)	F. REGION CONDUCTING ACTIVITY
5 [illegible] 03	7202	1	[illegible]	1

LICENSEE/VENDOR: [illegible]

FACILITY: [illegible]

LICENSE NUMBER: [illegible]

G. ACTIVITY CONDUCTED:
1 ☐ INSPECTION 2 ☐ INQUIRY 3 ☐ INVESTIGATION 4 ☐ VENDER INSPECTION 5 ☐ MANAGEMENT VISIT 6 ☐ INQUIRY—NON LICENSEE

H. INSPECTION INVESTIGATION RESULTS:
1 ☐ 591 2 ☐ REGIONAL OFFICE LETTER 3 ☐ REFERRED TO HQS FOR ACTION 4 ☐ REGIONAL OFFICE LETTER & REFERRED TO HQS FOR ACTION

J. INSPECTION INVESTIGATION FINDINGS:
1 ☐ CLEAR 2 ☐ SAFETY ITEM 3 ☐ NONCOMPLIANCE 4 ☐ NONCONFORMANCE

K. FIELD ACTION AS A RESULT OF INQUIRY
1 ☐ CONDUCT INVESTIGATION 2 ☐ REVIEW NEXT INSPECTION 3 ☐ REFER TO OTHER REGION 4 ☐ REFER TO NON-REG. AUTH. 5 ☐ REFER TO OTHER REG. OFFICE 6 ☐ HQS FOR ACTION 7 ☐ NO FURTHER ACTION

L. REASON INSP. FINDINGS REFERRED TO HEADQUARTERS FOR ACTION

01 ☐ IMMEDIATE THREAT TO HEALTH AND SAFETY

COMPLEX ITEM INVOLVING:
02 ☐ NONCOMPLIANCE/NONCONFORMANCE
03 ☐ LICENSING PROBLEM
04 ☐ POLICY MATTER
05 ☐ INTERPRETATION
06 ☐ SAFETY ITEM
07 ☐ MANAGEMENT DEFICIENCY
08 ☐ INADEQ. REPLY TO LETTER
09 ☐ NO REPLY TO LETTER
10 ☐ NO CORRECTIVE ACTION PLANNED
11 ☐ INADEQUATE CORRECTIVE ACTION PLANNED
12 ☐ HQS LETTER REQUIRED
13 ☐ HQS REVIEW REQUIRED
14 ☐ UNREVIEWED SAFETY MATTER
15 ☐ DESIGN CHANGE
16 ☐ OTHER
17 ☐
18 ☐
19 ☐

M. SUBJECT OF INQUIRY OR INVESTIGATION

01 ☐ TYPE A INT. OVEREXPOSURE
02 ☐ TYPE A EXT. OVEREXPOSURE
03 ☐ TYPE A RELEASE
04 ☐ TYPE A LOSS OF FACILITY
05 ☐ TYPE A PROPERTY DAMAGE
06 ☐ TYPE B INT. OVEREXPOSURE
07 ☐ TYPE B EXT. OVEREXPOSURE
08 ☐ TYPE B RELEASE
09 ☐ TYPE B LOSS OF FACILITY
10 ☐ TYPE B PROPERTY DAMAGE

10 CFR 20.405
11 ☐ INTERNAL OVEREXPOSURE
12 ☐ EXTERNAL OVEREXPOSURE
13 ☐ EXCESSIVE RADIATION LEVELS
14 ☐ EXCESSIVE CONCENTRATION LEVELS
15 ☐ CRITICALITY
16 ☐ LOSS OR THEFT
17 ☐ CONTAMINATION
18 ☐ UNSAFE OPERATION
19 ☐ FIRE, EXPLOSION
20 ☐ HUMAN (OPERATOR) ERROR
21 ☐ COMPLAINT
22 ☐ PUBLIC INTEREST
23 ☐ LEAKING SOURCE
24 ☐ TRANSPORTATION
25 ☐ EXPIRED LICENSE
26 ☐ EXPOSURE REPORTED AND FOUND INVALID
27 ☐ CONSTRUCTION [illegible] DEFICIENCY
28 ☐ EQUIPMENT FAILURE
29 ☐ EXCEEDED [illegible]
30 ☐ [illegible]
31 ☐ OTHER

N. HEADQUARTERS ACTION ON INSPECTION AND INVESTIGATION

01 ☐ NO ACTION REQUIRED
02 ☐ LETTER-CLEAR
03 ☐ LETTER-NONCOMPLIANCE
04 ☐ LETTER-SAFETY ITEM
05 ☐ PART 2 NOTICE
06 ☐ PART 2 NOTICE AS RESULT OF FOLLOWUP TO REGIONAL OFFICE LETTER
07 ☐ ORDER
08 ☐ REFER TO RL FOR RESOLUTION
09 ☐ REFER TO RL FOR INFORMATION
10 ☐ REFER TO ML FOR RESOLUTION
11 ☐ REFER TO ML FOR INFORMATION
12 ☐ REFER TO REGION TO CLOSE OUT
13 ☐ OTHER

REGIONAL OFFICE ACTION DATES

O. REPORT SENT TO HEADQUARTERS: 080273

P. LETTER ISSUED: [illegible]

Q. ☐ REPLY NOT REQUIRED

R. LICENSEE REPLY RECEIVED: 062073

S. ☐ REPLY INADEQUATE

T. DATE LETTER, NOTICE, ORDER ISSUED:

U. DATE LICENSEE REPLY RECEIVED:

V. 1 ☐ REPLY NOT REQUIRED

1 ☐ CARD CODE B/D9