

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 40-3392/91001(DRSS)

Docket No. 40-3392

License No. SUB-526

Licensee: Allied-Signal, Inc.
P. O. Box 430
Metropolis, IL 62960

Facility Name: Metropolis Works

Inspection Conducted: February 26-28, and
March 1, 1991

Inspector:

J. M. France, III
J. M. France, III

March 26, 1991
Date

Reviewed By:

D. J. Sreniawski
D. J. Sreniawski, Project
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March 26, 1991
Date

Approved By:

John A. Grobe
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March 27, 1991
Date

Inspection Summary

Inspection Conducted February 26-28, and March 1, 1991 (Report
No. 40-3392/91001(DRSS))

Areas Inspected: This was an unannounced routine safety inspection of facility requirements specified in NRC regulations, and license conditions, including radiation protection (IP 83822); environmental protection (IP 88045); operations review (IP 88020); the status of the licensee's metallurgical review of an unplanned intrusion of ethylene glycol and water into a uranium hexafluoride distillation cold trap; and the licensee's progress in resolving issues identified by the "Lessons Learned Group," which were published in NUREG-1198.

Results: Within the areas inspected one apparent violation was identified as follows: License Condition No. 9.C-2.6 requirement to follow procedures - two operators failed to wear respiratory protection while cleaning metal filters that were previously exposed to uranyl fluoride.

The corrective action was implemented during this inspection and reviewed by the inspector. Consequently, no reply to the violation is required.

As part of the "Lessons Learned" efforts, the licensee determined that the uranium hexafluoride in-line sampling unit met their developmental and operational testing requirements. Under routine conditions this will eliminate the need to heat a cylinder in order to reliquify uranium hexafluoride for sampling purposes.

DETAILS

1. Persons Contacted

- C. Blanden, General Foreman
- *P. Gasperini, Manager, Production
- R. Hahn, Manager, Maintenance
- *J. Honey, Manager, Regulatory Affairs
- D. Huffman, Technical Supervisor
- M. Kosmider, Plant Manager
- *H. Roberts, Supervisor, Health Physics
- M. Shepherd, Manager, Process Technology/Quality Assurance
- *R. Yacobi, Supervisor, Health Physics/Medical Services

*Denotes licensee attendance at the exit meeting on March 1, 1991.

The inspector also interviewed other licensee safety and production personnel, including: Health Physics Technicians and Distillation Operators.

2. Licensee Action on Previously Identified Items

In July 1986, the licensee received a copy of NUREG-1198, "Release of UF₆ from a Ruptured Model 48-Y Cylinder at Sequoyah Fuels Corporation Facility: Lessons Learned Report." The licensee evaluated and implemented several of the recommendations discussed in NUREG-1198. The licensee's progress in implementing the remaining items were reviewed during the special team inspection conducted on May 15-19, 1989 (Inspection Report No. 40-3392/89001). During this inspection, the inspector conducted a follow-up review of the licensee's progress in implementing the Lessons Learned recommendations.

- a. (Open) Open Item No. 40-3392/89001-01: Perform the tests on proportional (in-line) sampling in a timely manner.

Operation of the in-line sampling system will eliminate the need to heat the cylinder for the purpose of obtaining a sample of UF₆. A combination of in place load cells, and the crane porta scale, along with in-line sampling will also eliminate at least one requirement to lift/move cylinders containing liquid UF₆. The licensee's sample data indicates that this system meets their requirement for reliability and safety.

The inspector confirmed that an appropriation request for procuring a second in-line sampling unit was approved. In response to the inspector, the licensee stated that the second of two units to be installed should be in place by June 1991.

The inspector concluded that in-line sampling is an integral part of the licensee's UF₆ distillation program and that the need to heat cylinders will only occur when UF₆ purity specifications are

exceeded. This item will remain open until the second unit is integrated into the distillation system.

- b. (Open) Open Item No. 40-3392/89001-02: Conduct a study to eliminate lifting (UF₆ filled) heated cylinders.

The inspector reviewed four technical drawings of alternate ways to eliminate the lifting of heated cylinders. A contractor prepared one of the drawings (November 1990), while the other three were prepared by the licensee's Reliability Engineering Staff. None of the alternatives were accepted because they required extended plant shut down. The major concern involves the displacement of the railroad tracks that provides service to the plant. The licensee is currently attempting to develop a design that will enable the plant to continue to operate during the revitalization phase.

In response to the inspector, the licensee was noncommittal as to specific dates of resolving this issue. The Region III inspectors will continue to monitor the licensee's progress in completing this item.

- c. (Open) Open Item No. 40-3392/89001-04: Submit results of probabilistic risk analysis of fluoride, hydrogen fluoride and uranium hexafluoride bearing vessels.

In response to the inspector, the licensee indicated that certain preliminary engineering installations must be performed prior to initiating a probabilistic safety study. This will be handled in two phases. During Phase I, two remote valves were added to the hydrogen fluoride (HF) storage tanks to facilitate emergency transfer to the dump tank. A circulating water scrubber system was also installed. Dispensing lines were previously lengthened to reduce the number of flanges/elbows, as potential sources of HF leaks. During Phase II, alarms will be added to the above listed emergency transfer systems. Drawings that indicate piping and instrumentation will be prepared and submitted to a contractor for the initial review. The licensee did not commit to a date for completing these tasks.

- d. (Open) Unresolved Item No. 40-3392/89001-14: Review the UF₆ process and determine the feasibility of using containment type of autoclaves.

The combination of lower steam temperature and three methods of cylinder weighing (load cells, porta scale, and accountability scale) for determining and monitoring the weight of the cylinder are engineered safety controls that the licensee favors over the autoclave environment. However, two of the drawings reviewed under Open Item No. 89001-02 did indicate that the licensee has considered the use of autoclaves in the proposed revitalization. This item will be monitored by Region III inspectors in conjunction with Open Item No. 40-3392/89001-02.

Summary

The development and installation of an in-line sampling system as part of the distillation process represents a major effort in reducing safety concerns at the licensee's Metropolis Works. Over the 1984-88 operating period the licensee installed engineering controls (flow meters, load cells and porta scale) and reduced the number of crane lifts required to move/lift a single UF₆ liquid-bearing cylinder from four moves to one move. However, the licensee has made only marginal progress toward completely eliminating the need to lift the liquid bearing cylinders.

Region III will continue to monitor the licensee's progress in resolving these concerns.

3. Radiation Protection (IP 83822)

The inspector reviewed the licensee's internal exposure control records, health physics audit findings, ALARA concerns, and instructions to workers via compliance with 10 CFR 19.

a. Bioassay Program

Special urine samples are obtained from workers involved in any unplanned release of radioactive material. Partially due to less production, more engineering controls, a reduction in force and a more aggressive safety program, the number of unplanned releases were reduced and as a result, the number of special urine samples for the 1985-1990 operating period was reduced from 611 in 1985 to 207 in 1990.

Routine samples ranged from 5,343 to 6,339 analyses over the same operating period. The highest reported exposure for 1990 operations was the equivalent of 9-MPC hours which is significantly less than the 40 MPC-hour intake limit for uranium as specified in 10 CFR 20. (See Inspection Report No. 40-3392/90005 for further discussion/review.)

Annual whole body counts on plant production workers continue to be less than the minimum detectable limits of 63 micrograms of uranium.

b. Radiation Exposure Records

During the 1985-90 operating period, the licensee installed a computer controlled Health Physics Data Base to calculate and record personnel exposures. The data base enables the licensee to record/recall exposure data for workers in specific plant locations and/or job assignments in a more efficient manner. The licensee demonstrated this technique by recalling the data discussed in paragraph a. of this section. This appeared to be a good way to maintain records pursuant to 10 CFR 20.401, Records of Surveys, radiation monitoring and disposal.

c. Health Physics Audits

The quarterly health physics audit is conducted by the Supervisor, Health Physics and Medical Services to ensure licensee activities are in accordance with license conditions and NRC regulations. According to the audit findings, operations were being conducted in accordance with plant procedures designed to assure compliance with license conditions. The procedures reviewed included: bag house entry, drum dumping and special urine sampling requirements. The Health Physics Supervisor did not identify any problems during the 4th quarter 1990 audit. Quarterly audits are conducted by the Health Physicist in compliance with License Condition No. 16.

d. ALARA Concerns

In response to the inspector, the licensee mentioned a program recommended by the ALARA committee to reduce exposure.

The wet oxide dust collector is used to collect excess moisture and particulate matter from production units such as the calciner, and the mud ball mixer. These units produce moisture and or oxide dust during the drying and sizing of uranium oxide particles. Time operated valves will be installed to control the flow of oxide particles by pressure demand instead of continuous air flow. Test runs monitored by the ALARA committee indicate that the pressure demand valve can be opened on alternating cycles and eliminate the continuous air flow which seems to cause frequent wear and maintenance on the filter bags. This combination of extended performance and reduced maintenance (bag changes) is designed to reduce the potential exposure to workers while prolonging the operating cycle of the filter bag. This program will be monitored during future inspections.

e. Instructions to Workers (10 CFR 19)

The inspector determined that any outside person or firm performing work or providing services at Metropolis Works must sign a "Contractor's Safety Declaration." This certifies that a contractor or individual workers have been provided information regarding the hazards that may exist and to which they may be exposed while working at the Metropolis Works. In addition, effective October 1, 1990, visitors must also read and sign the "Visitor Health and Safety Instructions." This alerts the worker to the hazards associated with the facility, requires the person to have a respirator upon entering the Feed Materials Building, and provide instructions on where to assemble in case of a plant emergency. The inspector concluded that the licensee's program meets compliance with 10 CFR 19.12, for workers frequenting the restricted area. No violations or deviations were identified.

4. Operations Review (IP 88020)

During the September 17-21, 1990, onsite inspection, the inspector determined that the primary cold trap used to collect UF₆ prior to the transfer of UF₆ through purification/distillation which had failed and allowed a ethylene glycol/water leak had been scheduled for a metallurgical review (Inspection Reports No. 40-3392/90002 and 90005). During the current inspection, the licensee agreed to submit to Region III, a copy of the metallurgical report along with an addendum that characterizes the generic safety significance to other cold traps and other vessels in the distillation train, generic safety concerns to other licensees with similarly designed cold traps, actions taken to prevent a recurrence, and actions and/or training conducted to enable operators to detect a similar abnormality in cold trap systems. The licensee is currently reviewing the metallurgical report and committed to submit the report along with the addendum to Region III by March 31, 1991.

The inspector, accompanied by the Health Physics Supervisor, toured the Feed materials Building and the UF₆ cylinder storage area. The following observations were made during the plant tour: In accordance with the approved UF₆ Cylinder Handling Procedure, a distillation foreman accompanied two distillation operators, while they weighed a cylinder in preparation for UF₆ collection. No problems were identified by the inspector.

The Health Physics Supervisor (HPS) observed that two operators failed to wear full-face respirators while performing routine maintenance on a metal filter that had been removed from the fluorinator. Apparently, fluorinator metal filters are exposed to a calcium fluoride matrix that may entrap uranium fluorides and hydrogen fluoride. Hence, the HPS instructed the two operators to wear full-face respirators when performing this task. The inspector reviewed the procedure "Metal Filter and Hardware Cleaning" and concurred with the HPS and the General Foreman that the procedure Job Safety Analysis (provides knowledge of hazards associated with a specific job), requires the worker to wear a full-face respirator. The inspector concluded that the action taken to correct the procedure violation along with the instructions to the operators should prevent recurrence. There was no visible emanation of uranyl fluoride, but the odor of hydrogen fluoride was present. The air sample data and the workers bioassay sample data will be reviewed when completed.

One violation was identified. Because corrective actions were taken during the inspection period no reply is required.

6. Environmental Protection:

The licensee assures compliance with 40 CFR 190 (exposure to the general public and/or nearest residence) by conducting operations in a manner that will limit the air concentrations of total alpha radioactivity at the fence boundary to less than 3.0 E-14 microcuries/milliliter when measured over a calendar quarter. Quarterly composite samples are taken at the fence line and at sample station No. NR-7 which is located

in the vicinity of the nearest residence. The quarterly average for the four fence line samples (1990) was reported to about 0.3% of the restricted limit. The data reviewed for sample station No. 7 indicated that the exposure to the nearest residence from 1990 operations was less than 2 mrem. The data indicated that the radiological exposure to the nearest residence is less than the value for the general public in the Below Regulatory Concern (NRC) policy of 10 mrem per year.

No violations or deviations were identified.

7. Transportation of Radioactive Materials (IP 86740)

On January 16, 1991, DOE informed the licensee that two empty cylinders with a 14-ton capacity received from Allied-Signal showed significant levels of surface contamination. One cylinder had a smearable level of 10,000 alpha dpm/100 cm² on one smear count, and the other cylinder had a maximum smear count of 3,000 alpha dpm/100 cm². In accordance with DOT regulations 49 CFR 173.443, Table 10 Removable External Radioactive Contamination-Wipe Limits, non-fixed contamination shall not exceed 22,000 dpm/100 cm² for natural uranium on any package during transport. The inspector determined that the average smear count was significantly less than the limits reported above. The inspector also determined that the licensee did not adequately smear the area in the vicinity of the cylinder valve. The licensee initiated the following steps to prevent a recurring problem: The area in the vicinity of the valve will be targeted for smears on all cylinders. Smears will be taken just prior to releasing a shipment for transport. Since the limit for smearable contamination was not exceeded, there was no apparent violation of DOT/NRC regulations.

No violations or deviations were identified.

8. Exit Meeting

The scope and findings of the inspection were discussed with licensee representatives (Section 1) at the close of the onsite inspection on March 1, 1991.

The licensee committed to submitting to NRC the metallurgical report along with the addendum concerning the leaking cold trap by March 31, 1991.

During the course of the inspection and the exit meeting, the licensee did not identify any documents or inspector statements and references to specific processes as proprietary.