U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION V

Report No. 70-1257/81-07

Docket No. 70-1257 License No. SNM-1227 Safeguards Group 1

Licensee: Exxon Nuclear Company

2101 Horn Rapids Road

Richland, WA 99352

Facility Name: Richland Facility

Inspection at: Richland, Washington

Inspection conducted: October 19-22, 1981

Inspectors: William J. Cooley 11/13/81
W. J. Cooley, Fuel Facilities Inspector Date Signed

P. R. Zurakowski 11/13/81
P. R. Zurakowski, Radiation Specialist Date Signed

Approved by: R D Thomas 11/23/81
R. D. Thomas, Chief, Materials Radiological Protection Section Date Signed

Approved by: H. E. Book 11/23/81
H. E. Book, Chief, Radiological Safety Branch Date Signed

Summary:

Inspection on October 19-22, 1981 (Report No. 70-1257/81-07)

Areas Inspected: Internal review and audit; safety committee activities; environmental programs; transportation activities; emergency plan, procedures, and tests; criticality safety; operations review; employee training; and radiation protection.

The inspection involved 38 inspector-hours onsite by two NRC inspectors.

Results: No items of noncompliance or deviations were identified within the scope of this inspection.

DETAILS

1. Persons Contacted

*R. Nilson, Manager, Licensing
*T. L. Davis, Manager, Auxiliary Operations
T. C. Probasco, Engineer, Nuclear and Industrial Safety
*R. L. Miles, Supervisor, Radiological Safety
E. L. Foster, Radiation Safety Assistant, Radiological Safety
*C. W. Malody, Manager, Licensing and Compliance, Operating Facilities
*J. E. Pieper, Engineer, III-Licensing
*D. E. Clark, Senior Engineering Assistant
*C. O. Brown, Senior Licensing Engineer
*F. W. Woodfield, Manager, Logistics
D. K. Perry, Senior Engineer, Quality Assurance
W. Gority, Engineer, Quality Control
*M. G. Hill, Supervisor, Chemical Operations
R. E. Hahn, Chemical Supervisor

*Denotes those attending the exit interview.

2. Internal Review & Audit/Criticality Safety

Between June 18 and September 15, 1981, the Nuclear and Industrial Safety Engineer conducted four inspections devoted to the accuracy and completeness of posting of criticality safety specifications, nuclear safety practices and the effectiveness of employee training.

Deficiencies found in those inspections included excess containers used to catch reject pellets; one misplaced five gallon can of fuel; one failure to post a criticality limit sign; and the relocation of laboratory work stations requiring reanalysis of the laboratory for criticality. The relocated work stations had not been used with fissile material. All deficiencies observed had been corrected.

Between June 30 and September 23, two criticality safety audits were conducted by the Senior Licensing Engineer. Those included reviews of the performance of ion exchange columns used in conversion lines number one and number two; a walk through of production facilities; and visual inspections of geometrically safe slab tanks.

Various tests are performed on safety related devices and the reports of those tests are forwarded to the Senior Licensing Engineer for review. Those tests include checks on the operability of UF_6 cylinder header interlocks; conversion line one and line two scrubbers; ion exchange interlocks; powder slab hopper (geometrically safe); liquid slab tanks; and U_3O_8 furnace interlocks.

The Senior Licensing Engineer has completed his review of the standard operating procedures for consistency with the criticality safety specifications in effect. He is presently revising the licensee's Document JN30, Chapter III (Criticality Safety). That revision was out for comment at the time of this inspection and its issuance as a revised chapter of the document is anticipated in November 1981. The Senior Licensing Engineer has started a review of the Licensee's Document XN31 (Physics). Plans include adding bench mark calculations for low enriched, low moderation, homogeneous UO_2 systems including validation of codes for low moderation. Some studies may be done at higher enrichments (five to ten percent) in the future.

3. Safety Committee Activities

A review of the minutes of meetings of Industrial Health and Safety Council indicated that Council inspections and discussions were continuing at a monthly frequency. At the August and September 1981 meetings the council received reports on radiation trends by the Radiological Safety Group.

4. Environmental Program

This inspection included a review of gaseous effluents as measured at the exhaust stacks and the results of soil, vegetation, and ambient air measurements. The parameters measured are uranium and fluoride concentrations. Gaseous exhaust stack samples are measured weekly; soil analyses are performed quarterly; and vegetation and ambient air samples are measured on a monthly and quarterly basis.

TABLE 1

Exhaust Stack Identification	Range of Results (uCi/cc)	Maximum Results (uCi/cc)	Building and Location Ventilated
K-3	10^{-15}-10^{-16}	-	Southeast Side and South Central Building UO-2
K-6	10^{-16}	-	Northwest Side Speciality Fuels Building
K-9	10^{-15}-10^{-16}	-	Etch Room Balcony UO-2 Building
K-10	10^{-13}-10^{-15}	$1.4X10^{-13}$	Line One Conversion Area
K-21	10^{-15}-10^{-16}	-	Southeast Wall and South End of UO-2 Building
K-25	10^{-15}-10^{-16}	-	Engineering Laboratory Operations Building
K-31	10^{-15}-10^{-16}	-	Conversion Line No. 2
K-32	10^{-12}-10^{-14}	$2X10^{-12}$	Conversion Area, Conversion Line No. 2
K-33	10^{-13}-10^{-14}	-	Tank Galley UO-2 Building (Unfiltered)

None of the concentrations listed in the table above exceeds the permissible concentration for low enriched uranium as measured at the exhaust stack and without consideration of the dispersion factor to the licensee's site boundary.

The licensee obtains and analyzes soil samples at several locations at distances of 450 and 2,000 feet from the licensed facility. These samples are obtained quarterly in a northeasterly direction from the facility. Similar soil samples are obtained at distances of one mile and three miles but are not analyzed, although they are retained as historical samples. Soil samples obtained in April, 1981 indicated less than approximately 0.4 uranium parts per million which is the licensee's limit of detection. Samples obtained in July 1981 indicated approximately the same results.

Vegetation samples are obtained monthly at the distances of 450 feet and 2,000 feet northeast of the facility as well as in an alfalfa field approximately one half mile due east of the facility. Quarterly vegetation samples are obtained southeast of the facility at the distances of 2,000 feet, one mile and three miles. An additional vegetation sample is obtained in the Hanford Reservation 300 Area approximately one mile to the northeast of the facility. Vegetation samples are analyzed for uranium and fluoride ion. Only the 450 feet and 2,000 feet northeasterly samples are analyzed for uranium. All other samples are analyzed for fluoride ion. Results of vegetation sampling indicate a maximum of 0.36 parts per million uranium. The maximum fluoride ion concentration was 72 parts per million F in vegetation samples at the alfalfa field. The three mile vegetation samples of the southeast indicated approximately 17 parts per million F.

Ambient air measurements for fluoride ion are made at similar locations surrounding the licensee's facility. Most of the results averaged approximately 0.2 parts per billion F, with a maximum of 8 parts per billion F.

The State of Washington has set a limit of 40 parts per million F on alfalfa and an ambient F air concentration of 0.5 micrograms/M^3.

The licensee also measures fluoride ion in the stack effluent from exhaust systems K-10, K-31, and K-32. The concentrations measured are less than 0.1 parts per million F.

5. Transportation Activities

The licensee has established an organization and management controls for shipping and receiving radioactive materials. That function is in the Purchasing and Logistics Department. Mr. F. W. Woodfield, Manager, Logistics manages that function. Mr. G. Mulligan, Supervisor, Shipping and Receiving, supervises approximately 18 people who handle the details of shipping and receiving. The responsibilities for shipping and receiving are addressed in the employees' position descriptions. The 18 persons involved with shipping and receiving radioactive materials are divided into two groups. One group is responsible for loading products (fuel elements) into containers and radioactive waste into trucks and a second group is responsible for controlling the fuel element shipping container hardware.

Detailed written procedures exist for low level waste shipments. Separate procedures are addressed to the use of a solid waste compactor; packaging low level radioactive waste; US Ecology license conditions; waste assay; instructions for exclusive use/sole use of shipments; internal inspections and certifications of waste shipments; marking and labeling; shipping and warehousing; use of 7A shipping containers; and a check list for radioactive waste shipments to see that all important subjects have been addressed. Similar written procedures are available for the shipment of Exxon Nuclear fuel assemblies; inspection reports for containers during and after loading; and shipping record sheets. Procedures of that type exist for the Models M51032, CE250, & RA3 shipping containers.

Recent training received by the shipping and receiving personnel included training in transportation by the Department of Transportation (July 23, 1981); by G. Mulligan on handling UF6 gas cylinders (12 attendees - July 14, 1981); by R. Nunamaker on Criticality Safety Specifications applying to container storage areas (12 attendees - April 23, 1981); Nuclear Energy Waste Management Consultants Training (4 day course on several occasions); and Consolidated Freightways on the subject of Hazardous Materials (April 4, 1981).

Planned and periodic audits of the shipping and receiving program are conducted by the Quality Assurance Department using the 18 criteria appearing 10 CFR 50, Appendix B, and using 10 CFR 71. The last audit of this type was conducted during September 28 - October 2, 1981 and was addressed to the shipment of fuel elements. The audit was addressed to the Logistics organization; shipping QA program; design control; procurement document control; control of purchased material, equipment and devices; inspections, tests and operating status; nonconforming material; and instructions, procedures, drawings, parts and components.

The licensee had an approved NRC documented program for quality assurance in transporting radioactive materials.

Additional inspections and audits of shipments and receipts of radioactive material are conducted for each shipment and receipt by the QA Department; Environmental Specialist; and Health Physics Technicians.

The licensee uses shipping container models M51032, CE250 and RA3 almost exclusively in the shipment of fuel elements and fuel pellets. Low level radioactive waste is handled in 17H drums. The licensee retains current copies of the NRC Certificate of Compliance and references for fuel shipping containers. This inspection included an

examination of fuel element shipping containers awaiting shipment. They were found to be in good condition and exhibited the required labeling and certificate marking.

The licensee fabricates and uses DOT specification 7A containers. The licensee tests those containers for the normal conditions of transport and retains copies of the test certifications. The licensee does not rely upon a special form determination in order to qualify the packages for exempt or type A categories. The licensee does not offer plutonium shipments by air. All shipments of radioactive materials, whether fuel element products or low level radioactive waste, are shipped exclusive use only.

The Quality Assurance Department routinely inspects shipping containers prior to first use. Representatives of the Quality Assurance Department witness the loading of packages and inspect the package and its internal hardware for physical conditions.

Every tenth container is inspected by the Quality Control Group before being returned to the shipping cycle. A record of an inspection of a Model RA3 container made upon receipt of that container from a vendor was examined during this inspection. Mr. Mulligan checks all containers before reuse.

No liquid radioactive material was shipped by the licensee. Prior to each shipment, proper package marking is assured by inspections conducted by the Logistics and Licensing and Compliance Personnel. Radiation and surface contamination levels are measured by Health Physics Technicians on packages being shipped and received.

No incidents have occurred during transportation of radioactive materials to and from the licensee's Richland Facility. No incident in which the effectiveness of the packaging was substantially reduced has occurred.

6. Emergency Plans and Procedures

The licensee's Emergency and Radiological Contingency Plan was submitted for review to the NRC on August 18, 1981.

The licensee relies to various degrees upon outside organizations to augment the emergency plans. They include the Northwest Health Services and Pacific Northwest Laboratories of Battelle Memorial Institute with whom agreements have been made. Northwest Health Services would supply medical care in the event of an emergency and Battelle would furnish emergency assistance, in general, including exposure evaluation. Similar written agreements exist with the

Richland Police and Fire Departments, Disaster Planning and Coordination Group - State of Washington, US Ecology (for waste disposal), and US Testing for sample analytical work. Also available to the licensee are the Washington State Police and the State Radiological Health Department although no written agreements have been made with those two organizations.

The licensee's emergency equipment includes a mobile van equipped with radio, telephone, and radiation detection measurement equipment. Additional instrumentation, emergency clothing, and emergency accessories are stored in the licensee's office building No. 4. That equipment is checked monthly and the instrumentation calibrated quarterly. No special environmental monitoring systems are operated by the licensee since information of that type would be immediately available from Pacific Northwest Laboratories.

The licensee conducts two criticality drills each year which are planned, monitored and critiqued. The last two drills of that nature were conducted on April 23 and October 13, 1981.

No fire drills are conducted by the licensee. An annual visit to the facility for orientation purposes is conducted by the Richland Fire Department Fire Inspector. Monthly fire prevention inspections are made by personnel of the licensee's Auxiliary Operations Department. These inspections review the condition of housekeeping, proper storage of flammable liquids, and fire sources and miscellaneous fuels in general. A contractor to the licensee inspects fire extinguishers monthly and performs maintenance on those extinguishers once every six months and performs hydrostatic tests each five years. A recent fire training session for all licensee employees was conducted. Approximately 400 of the employees participated in "hands-on" use of extinguishers. A total of 600 employees attended out of a total of 800 Exxon employees at the Richland Plant. The session was conducted over a one week period.

7. Radiation Protection

Approximately 1.5 man days were expended in reviewing the licensee's external radiation exposures, bioassay results, airborne uranium concentration data and wipe survey results.

A. Bioassay

The bioassay program consists of periodic urinalysis for uranium concentrations, lung counts and whole body counts.

Results above 25 ug/l uranium in the urine demands a reanalysis. Workers with results above 100 ug/l are removed from controlled area work until the concentration drops below 100 ug/l. 10 ug/l is normally the sensitivity limit used. A review of the 1981 urinalysis data disclosed that most results were at the measurement sensitivity limit of 10 ug/l. However, workers in the UF_6-UO_2 Conversion and Scrap Recovery Operations continue to receive the higher concentrations. For the 1st quarter of 1981 the average for these areas was 14.7 ug/l with a high of 197 ug/l. The 2nd quarter average was 14 ug/l with a high of 261 ug/l. For the 3rd quarter a high of 117 ug/l was reported. The only other significant high of 88.4 ug/l was reported for a maintenance worker during the 2nd quarter. When compared to 1980 results, the overall average appeared to be slightly lower.

Approximately 160 persons are scheduled to take a lung count by an outside contractor in the week of October 26. For the 148 persons counted earlier in 1981, a high of 86 ug U-235 was noted. Positive results for those counted varied from 14.3% to 50% MPLB. The 50% fraction was for those workers in the conversion and scrap recovery areas. The average lung deposition for workers in this area was 54.4 ug U-235.

B. Airborne Uranium Concentrations

Airborne uranium concentration data obtained from fixed air samplers by the licensee were reviewed. The data for the Line I and II Conversion Areas, Scrap Recovery Area, UHN Room, U_3O_8 Room, Power Storage Room, Rotary Presses and Blend Hoods, and the Grinder and Pellet Inspection Area of Room 100 were highlighted. Individual air sample data are assembled in the form of quarterly averages and is subsequently reduced to graphical form. Ten percent and twenty-five percent of the DAC (Derived Air Concentration) are also drawn in on this graph. The licensee exceeded 10% of the DAC for the first quarter of 1981 in the Line I Conversion Area and the U_3O_8 Room. They have not exceeded 25% of DAC in any area during 1981. For the present bioassay program, the subject license limits the licensee to 25% of the DAC.

C. External Radiation Exposures

For external exposure control, the licensee utilizes a quarterly TLD program from US Testing Company of Richland, Washington. A review of the records indicated that the average exposure during 1980 was 140 mrem. To the date of the inspection, the high 1981 reading was 1.51 Rem. The person involved was on temporary assignment from the licensee's facility in Germany. When the individual's work assignment and other activities at the Richland Facility were considered, it appeared that the exposure could not have been real. On several trips to Germany, the individual sent his badge through the X-ray baggage checking device. The investigation of the probable cause of the exposure to the badge is continuing. The investigation has been slowed by the fact that the individual has returned to Germany. The available evidence indicates that the exposure is not real and is therefore not reportable as an over exposure. However, because the investigation has not been completed, this will be carried over as an unresolved item until the next inspection. (81-07-01)

D. Wipe Survey Results

A review of the wipe test records indicated that visible contamination and wipe results above 10,000 DPM/100 cm^2 continues to be of concern in the restricted areas. It was clear from the reports that the spills were immediately cleaned up after discovery. However, the continuing, relatively high air concentration levels in the conversion areas, U_3O_8 Room and the Scrap Recovery area indicate that the problem is a continuing one and the significant efforts expended by the licensee to alleviate the problem must be continued and perhaps increased.

8. Training

This inspection included a review of some aspects of training given by the licensee in radiation and criticality safety. In general, periodic training is given by three licensee groups: Radiological Safety, Nuclear and Industrial Safety, and Operations. Specific topics covered by this training were reviewed in Report No. 70-1257/79-04.

Retraining in both radiological and criticality safety is given on a yearly basis. Training in these areas for new employees normally occurs within the first few weeks of employment. Occasionally, this requires individual or small group training sessions. Most formal radiological safety training is handled by E. L Foster and most formal criticality training is done T.C. Probasco.

A review of the training records indicated that attendance sheets for all training are maintained by the licensee. Training and retraining records for the more formal radiological and criticality classes are transferred to personnel files. The less formal weekly or monthly training given by Operations normally is not transferred to personnel files. However, records of all training are maintained. It was noted that formal written examinations are now given at the end of radiological and criticality training. A review of a Radiological Safety Examination disclosed that it was composed of nine multiple choice questions and eleven true-false questions. The questions appeared to be appropriate and well written.

9. Operations Review

This inspection included visits to all areas where licensed materials are used. This included the Speciality Fuels Building, all of the UO_2 Building, Machine Shop and Component Fab Building, PI Tools Building, Waste Storage Area, Hot Laundry Facility, ELO Building and the Evaporation and Storage Lagoons.

During the tour it was noted that the Hot Laundry operation will be moved to a new facility with more work area and better ventilation in the near future. The machine shop in the UO_2 Building had been moved out in June of this year. Expanded fuel rod assay and inspection capabilities are being added in the vacated space. It was also noted that the licensee has hired a contractor to install transfer pipes and pumps to allow transfer of material from one storage lagoon to another. At the time of the inspection the contractor was working outside of the restricted area. It was learned that the contractor will not be allowed to work in the restricted area where contamination is possible until he has received special radiological safety training. E. L. Foster is scheduled to give this training in the near future.

In touring the waste storage area it was noted that the storage drums were in good condition with very few visible rust spots or dents. Waste shipment boxes appeared to be well constructed and protected from the weather by tarpaulins or plastic sheets. The waste storage area was roped off as a separate controlled area. Appropriate warning signs were posted in several places. While touring the UO_2 Building, a respiratory protection status board was observed at the entrance to the restricted area. Its purpose was to inform workers of the current respiratory protection requirements in the various work areas. It was also learned that the decontamination shower and sink in the new Health Physics Technician (HPT) Room drain to the storage lagoons rather then to the sanitary sewer. Because of the large number of air samples processed by the HPT's ($\sim$3000/month) an automatic sample changer is being installed in the HPT room. At the present time each sample is counted one at a time by an HPT. This cuts deeply into the monitoring time available.

In the conversion area some visible contamination was noted. A worker was observed cleaning up some of the contamination.

No violations of good health physics or criticality safety practices were noted during the tour.

10. Management Interview

The scope and of the results of this inspection was discussed with the licensee personnel at the conclusion of the inspection on October 22, 1981. Those persons were informed that no items of noncompliance or deviations were observed within the scope of this inspection.

Exxon NRC licensee SNM-1679 was discussed with those representatives because of its expiration date of October 31, 1981. The licensee indicated that action would be taken with regard to the expiring license.