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Docket No: 70-1257
Applicant: Exxon Nuclear Company (ENC)
Facility: Fuel Fabrication Plant, Richland, Washington
SUBJECT: REVIEW OF APPLICATION TRANSMITTED BY LETTER DATED NOVEMBER 19, 1979, SUPPLEMENTED FEBRUARY 21, AND MARCH 12, 1980, CONCERNING ION EXCHANGE, ACCOUNTABILITY STATION AND WASTE RECOVERY, 07001257A03S

Background

The Exxon Nuclear Company application requests authorization to install and use new facilities and equipment: (1) SNM Accountability Measurement Station, (2) Ion Exchange Treatment System for liquid effluent from the conversion process, and (3) Waste Uranium Recovery Facility (WUR). In addition to the new facilities and equipment, the application concerns some changes in position titles, minor organization changes, and changes in authorized activities. (All of the proposed changes are given in the format of changes to the existing license. Since the existing Exxon license is on timely renewal under the provisions of 70.33(b), if the proposed amendment is authorized, it will be necessary for the licensee to make corresponding changes in the license renewal application.)

The facility and equipment changes had been briefly described and identified as the subject for future licensing action in Exxon's information letter dated June 22, 1979. The information supplementing the November 1979 application was provided in response to questions sent Exxon in the letter dated January 24, 1980, and asked Mr. H. P. Estey of Exxon on February 27, after he delivered the February 21, 1980 supplement.

The locations of the new facilities and equipment are shown on the attached site plan as Items 8, 9, and 10.

The SNM Accountability Measurement Station consists of a surge tank for combining the uranium-bearing liquid waste streams, with metered discharge and continuous sampling for representative samples. The metering and sampling equipment will be protected by a small building of 600 square foot floor area. The purpose of the installation is to allow improved accountability of very low concentration uranium-contaminated liquid waste streams.

The Ion Exchange Treatment System is a large scale replacement of ion exchange equipment that had been located in the existing chemical conversion area. The system includes a small addition (floor area approximately 290 square feet) constructed on the north side of the UO₂ Building to house eluate tanks and

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pumps and identified as the Ion Exchange Eluate Storage Building Addition. The new ion exchange columns will be located in the conversion areas.

The Waste Uranium Recovery Facility (WUR) will be housed in a new separate building which is intended to be constructed and licensed in two stages. Ultimately, the operations are to include wet processing as well as dry operations such as sorting to recover uranium from uranium-contaminated solid wastes, which Exxon has been stockpiling for several years. The subject application concerns the dry end of the recovery operation only and the initial WUR building with a ground floor area of 2,400 square feet.

As noted in the first paragraph, the amendment application includes revised pages for the existing license, (Section I or license condition section) to revise the chart for the corporate organization, revise position titles, authorize the proposed new activities and update the license to accord with the amendments and changes made since the section was last revised.

The licensee's compliance history, record of personnel exposures to radiation, and environmental releases during the past three years are being evaluated as part of the review of the pending renewal application for SNM-1227. No major or significant continuing problems have been identified. (The results of the evaluations of the health, safety, and environmental programs will be summarized in somewhat more detail in the reports to be issued before license renewal, within the next five months.)

The Exxon amendment application was discussed in a telecon on March 19, 1980, with Mr. William Cooley, principal inspector for the Exxon plant from Region V, Office of Inspection and Enforcement. Mr. Cooley saw no objection to issuance of a license amendment to authorize the activities proposed.

Discussion

Because of the minor impact of the SNM Accountability Measurement Station, it is discussed first before the discussion of the safety and environmental considerations applicable to the Ion Exchange Treatment System and the WUR.

SNM Accountability Measurement Station

The station consists primarily of changes in piping for low concentration waste streams. The surge tank to be used is an existing concrete tank which will be lined with plastic before use. The existing UF₆-UO₂ conversion process liquid effluent pH adjustment station will be modified to become the basic component. The building to house the metering and sampling equipment is a 600 square foot, single story cubicle. There are thus no safety problems involved and the environmental impact is quite small since there are no changes in effluents.

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Radiation Safety

The same controls will be used to ensure radiation safety and adherence to ALARA principles in the new areas that are used in the existing licensed operations. These will include the following:

1. Categorization of the new SNM areas as contamination controlled areas with appropriate personnel access limits.
2. Routine surveys of surface contamination levels with cleanup at the action levels used in the corresponding areas of the balance of the operations.
3. All work involving radioactive materials subject to the existing radiation work procedures and approvals.
4. Continuous monitoring of room air, and assessment of personnel exposures.
5. Process equipment and room air ventilated into appropriate exhaust systems including HEPA filters, exhaust air sampling and analyses.

The Ion Exchange Eluate Storage Building Addition will be exhausted by the way of the exhaust system of the UO₂ Building conversion process liquid effluent quarantine tank gallery. The design of the heating, ventilation, and air conditioning system for the WUR facility is consistent with the criteria used for the existing facilities. The WUR exhaust air cleanup systems include liquid scrubbing of air exhausted from aqueous process equipment and two stages of HEPA filtration.

Nuclear Criticality Safety

With one exception, the nuclear criticality safety standards used in the design and planned operating procedures for the new areas for special nuclear material are the same as those specified in the existing license. A single exception is the use of concentration control for the ion exchange columns for the liquid effluent from the chemical conversion process. The bases for nuclear criticality safety in the new operations are summarized as follows:

1. Ion Exchange Columns - The uranium bearing feed stream to the 20-inch diameter columns consists of liquid wastes from the chemical conversion operation (UF₆ to UO₂, via ammonium diuranate - ADU) which have been centrifuged twice and filtered to remove residual ADU solids. Normally the feed stream will be limited to a maximum 300 ppm uranium content. Higher concentration streams will be recycled upstream of the ion exchange columns. A turbidity meter in the feed line to the ion exchange system will alarm and stop the flow to the columns at a concentration of 300 ppm uranium. The maintenance of a safe concentration of uranium in the columns under normal and off-standard conditions for both the loading and unloading cycles was demonstrated based on the following:

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- a. The maximum ion exchange capacity of the resin for uranium under the operating conditions.
- b. The maximum credible concentration of uranium in the feed stream.
- c. The maximum credible concentration of uranium in the recovery step ("eluate solution") based on the concentration of nitric acid in the eluting stream. (There are controls to ensure that the elutant acid does not exceed 2 N.)

The safety demonstration presented by Exxon showed that the maximum uranium concentration in the ion exchange columns would remain below the minimum critical concentration as given in Document ARH-600, "Criticality Handbook."

2. Eluate Storage Tanks - The nuclear criticality safety of the eluate storage tank is based on units of favorable geometry (meeting the safety margin called for in the license) and spaced to allow for interaction, as already documented for a similar system in Section 4.6.4 of the existing license.

3. Waste Uranium Recovery Facility - Criticality safety for the dry end of the Waste Uranium Recovery Facility will be assured on a safe batch basis. Any storage areas associated with the dry end of the WUR will also be limited to one safe batch. (The wet operations will be the subject of a separate amendment application.)

Environmental Impact of the Ion Exchange Treatment System and the WUR Facility

The operation of the revised ion exchange system will not result in the release of liquid or gaseous effluents and, in fact, it results in a decrease in the uranium content of the UF_6-UO_2 conversion liquid waste. The impact on land use associated with the approximately 290 square foot addition to the UO_2 Building is expected to be insignificant since the area to be affected is relatively small compared with the total site plan.

Similarly, the main impact of the construction and use of the WUR for dry uranium recovery operations will be associated with construction of the building itself. Construction of the initial WUR Building with a ground floor area of 2,400 square feet located entirely on the Exxon site, should have only a minor incremental impact. The mechanical type operations to be conducted with the solid wastes should not result in any significant increase in the solid waste volumes and ultimately the overall WUR operation should effect a reduction in the volume of wastes to be disposed of at a licensed burial site and a reduction in uranium losses. The exhaust gases from the WUR will be double HEPA filtered, continuously monitored and controlled to meet the concentration limits applicable to the UO_2 plant. The overall releases of radioactivity in gaseous effluents from the Exxon site will have to meet the same overall release limits now imposed on the Exxon operations. The limits on total radioactive releases in gaseous effluents were imposed by Amendment No. 22 to License No. SNM-1227 issued January 28, 1980. These limits assure that Exxon

meets the environmental radiation protection standards set forth in Title 40, Chapter 1, Subchapter F, Part 190 of the Code of Federal Regulations.

Process Safety

The safe use of ion exchange resin requires control to prevent possible rapid chemical reactions between the resin and the oxidizing agents such as nitric acid. Exxon will establish the usual controls to limit such reactions including limits on the nitric acid concentrations used for resin elution, limits on the duration of acid-resin contact, and installation of pressure relief devices on the columns.

The mechanical operations in the WUR should present no unusual hazards. The building was designed to meet a variety of national and local codes and standards including the Uniform Fire Code.

Conclusion and Recommendations

Based on the safety and environmental reviews of the amendment application as supplemented, it is concluded that the proposed facilities and equipment for the Exxon Horn Rapids Fuel Fabrication Plant may be installed and operated without undue risk to the health and safety of the operating staff or the public. Further, the issuance of this license amendment is not deemed to be a major federal action significantly affecting the quality of the human environment; and thus, pursuant to Section 10 CFR 51, Section 51.5(d)(4), an environmental impact statement, negative declaration, or an environmental appraisal need not be prepared.





Approval of the amendment application is recommended.

Original Signed By:
R. L. Stevenson
Robert L. Stevenson
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

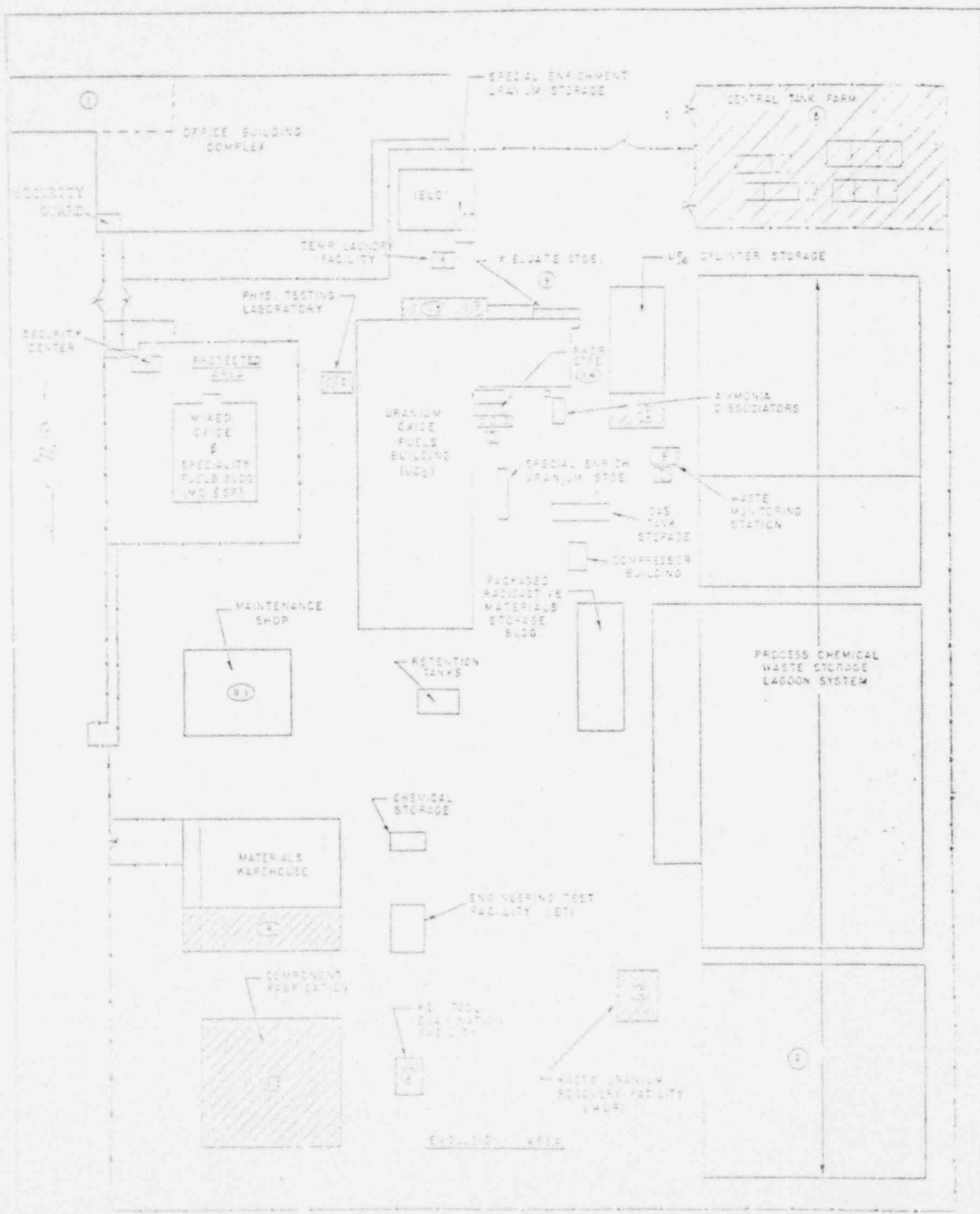
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Approved By: _____
W. T. Crow, Section Leader

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