11-23-64

COPY

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	3. License No. SNM-777, as amended
1. Name United Nuclear Corporation ✓	4. Expiration Date March 31, 1967
2. Address 365 Winchester Avenue New Haven, Connecticut	5. Docket No. 70-820

6. Special Nuclear Material	7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license
Uranium enriched in the U-235 isotope.	Two thousand (2000) kilograms U-235

8. Authorized use For use in accordance with the licensee's application dated November 27, 1963, as revised and supplemented by communications specified below, except (1) as otherwise provided by conditions of this license, and (2) that exemptions or specific authorizations pursuant to (continued)

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part
- - - - -

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.
Authorized place of use: The licensee's Fuels Recovery Plant
Wood River Junction, Rhode Island

11. Pursuant to 10 CFR 40, the licensee is hereby authorized to possess those quantities of source material (except thorium-228) which are required for the purposes specified in the application.

C-70

SPECIAL NUCLEAR MATERIAL LICENSE License Number 777, as amended

Supplementary Sheet

2. Pursuant to 10 CFR 71, the licensee is hereby authorized to ship special nuclear materials in accordance with the procedures described in Section 700 of his application dated November 27, 1963, and supplements dated February 24, 1964, (submitted as an amendment to the shipping procedures described in the application dated July 15, 1963, for renewal of SNM-33), May 26, 1964, May 27, 1964, June 2, 1964, June 25, 1964, June 30, 1964, July 1, 1964, and July 9, 1964. This authorization does not authorize (a) transhipment or intermediate unloading of any shipment of special nuclear material (b) the shipment of solutions in the shipping container designated as BE 1483 described in Section 700 of application dated November 27, 1963.

3. Pursuant to 10 CFR 30, the licensee is hereby authorized to possess those quantities of byproduct material produced as a result of the criticality incident which occurred on July 24, 1964.

8. (continued)
Commission regulations are not authorized unless provided by conditions of this license. Supplemental communications dated: December 3, 1963, January 6, 1964, January 9, 1964, January 20, 1964, January 31, 1964, February 4, 1964, February 20, 1964, February 21, 1964, March 3, 1964, August 6, 1964, September 15, 1964, and October 19, 1964.

COPY

Date NOV 25 1964

For the U. S. Atomic Energy Commission

Lyall Johnson, Acting Director
by Division of Materials Licensing
Washington 25, D. C.

UNITED STATES ATOMIC ENERGY COMMISSION

SAFETY ANALYSIS BY THE

SOURCE AND SPECIAL NUCLEAR MATERIALS BRANCH

DIVISION OF MATERIALS LICENSING

AEC LICENSE SNM-777

UNITED NUCLEAR CORPORATION, WOOD RIVER JUNCTION, RHODE ISLAND

DOCKET 70-820

Following the criticality accident on July 24, 1964, United Nuclear Corporation (UNC) requested by application dated September 15, 1964, a revision of their Special Nuclear Material License No. SNM-777. The application involved changes in the General Information and Procedures Manual, Health Physics Manual, Emergency Plan, and included revised criticality calculations. Following a review of these revisions we requested additional information of UNC by letter dated October 12, 1964. By application dated October 19, 1964, UNC submitted a completely revised Emergency Plan and a revision of Section 200 of the General Information and Procedures Manual, along with the additional information we requested.

The revised General Information and Procedures Manual presented a new administrative organization which provides principally for: (a) a Director of Licensing who has the responsibility for health physics and nuclear safety at the Wood River Junction facility which is carried out under his direction by on-site personnel; (b) monitoring of nuclear safety by an on-site Process Engineer, with periodic audits by the Director of Licensing; (c) a system for establishing process control (plant operation) procedures, with provisions for orderly revisions of these procedures; and (d) methods for more clearly identifying and labeling process containers. The system by which plant operating procedures are prepared and changed has adequate checks and balances, if followed, to assure that abnormal situations come to the attention of the proper persons.

The Emergency Plan as revised on October 15, 1964, presents the objectives of actions following emergency conditions caused by accidental criticality, fire, and other emergencies. These objectives are implemented by UNC by the preparation of detailed procedures and check lists to be given to their employees. The Emergency Plan describes the emergency supplies and equipment available for use as well as the training and drills to acquaint the employees with health physics and nuclear safety principles

and the emergency procedures. The plan indicates that re-entry of the plant following a criticality accident will be made only after a careful evaluation of the situation has been made.

Provisions are made in the Emergency Plan for coordination with local fire, police, ambulance, medical, and hospital personnel for assistance in dealing with an emergency condition.

The Report of the AEC Technical Review Committee, dated November 6, 1964, comments on the apparent lack of adequate administrative control with respect to changes made in plant operating processes. Section 200 of the revised General Information and Procedures Manual has established internal administrative controls which, if followed, should eliminate the problems that previously existed. Specifically, Section 204, Plans to Assure License Compliance, defines responsibilities and describes an organization which provides for (1) provision of on-site process, nuclear safety, and health physics control functions which are independent of the production function, (2) assurance of adequate technical support for the plant, (3) provision for nuclear safety and health physics review of all process and equipment modifications, (4) establishment of channels for reporting irregularities and abnormalities to higher management, and (5) systematic auditing of plant operations.

In addition, control of the process is maintained through a system of standard procedures and parameters, operating reports, and provisions for reporting and correcting abnormal occurrences. The principal control documents are: (1) Standard Operating Procedures, (2) Process Parameter Sheets, (3) Operating Reports; (4) Check Lists, (5) Rework Material Notices, (6) Route Cards, (7) Supervisors' Log Book, and (8) Daily Production Reports. The authority for issuing and approving these documents is clearly spelled out, and in the case of Standard Operating Procedures, the basic control document, approval for issuance or revision requires the signatures of engineering, production, nuclear safety, and health physics personnel to indicate concurrence. The Director of Licensing, in concurring, determines whether the Standard Operating Procedure falls within the scope of the license and if it does not, he submits an application for amendment to the license. The revised procedure is not put into effect until the license amendment has been issued.

The Technical Review Committee stated that the methods used by UNC for identification and labeling of special nuclear material appear to warrant improvement. Section 204.5 of the revised General Information and Procedures Manual describes a method for positive identification of materials in bottles by permanent stainless steel bottle identification plates, a serialized tag which describes contents, date, and by whom filled, and a sample analysis tag which accompanies the sample and reports concentration and total quantity of uranium. Tags are cross referenced

and results recorded in the sample log book. A check sign-off by the supervisor is required before any material may be transferred to unsafe geometry vessels from safe geometry or safe volume vessels, or vessels poisoned with neutron absorbers. This method is further described in item 4 of UNC's letter dated October 19, 1964.

An observation was made by the Technical Review Committee that control and review of criticality by non-resident personnel are likely to be ineffective unless supplemented by reasonably frequent contact with operations, and that day-to-day surveillance of operations by personnel informed on criticality rules, added to periodic thoughtful audit by competent observers independent of the line operating organization has been recognized as good practice in most organizations. The revised application submitted by UNC provides for on-site nuclear safety surveillance by the Process Engineer and health physics coverage by a Health Physics Technician, both of whom report to the Director of Licensing with respect to these functions. Both of these on-site employees participate in the issuance and approval of Standard Operating Procedures. In addition to these on-site employees, systematic auditing of the Fuels Recovery Plant by off-site UNC personnel is performed in the following areas: health physics by the Director of Licensing or Health Physics Specialist once per month; nuclear safety by the Director of Licensing or Nuclear Safety Engineer at least once every two months; procedures and records control by the Supervisor, Process Information Center at least once every three months; and accountability by the Superintendent, Materials Control or designee at least once every six months.

The matters of initial and continuing training and indoctrination of employees were discussed by the Technical Review Committee. UNC provides formal training programs for personnel of the Fuels Recovery Plant. The objectives of UNC's training program are (1) to insure knowledge and comprehension of the plant operating procedures, (2) to highlight nuclear safety and health physics practices which are integrated into plant operating procedures, (3) to assure awareness of and capability in following health physics practices, (4) to maintain current knowledge of revisions in operating practices and any changes in health physics or nuclear safety practices or criteria, and (5) to assure readiness for execution of emergency plans and procedures. Each operator is assigned to work with experienced personnel until he has demonstrated to the satisfaction of supervision that he knows plant operating procedures. Prior to assignment on his own, each operator is administered a written test dealing with his comprehension of procedures. The tests are maintained as part of the permanent employee record. Unsatisfactory test results preclude assignment. Monthly safety meetings are held with all employees. Semi-annual drills are conducted for continuing awareness and capability in execution of emergency procedures. These drills include plant evacuation, use of first aid and fire fighting techniques, use of health physics monitoring equipment, and

practice in taking various environmental samples. To the extent practical State Police, medical personnel, ambulance corps and State civil defense personnel will be periodically involved in drills.

The Technical Review Committee concluded that instrumentation on hand was not appropriate for survey following a nuclear incident and that the building was re-entered without informed assessment of the situation that existed, and without special protective clothing or equipment. UNC now has instrumentation and criteria for re-entry which appear to be adequate for an emergency situation. Health physics and nuclear safety approval must be obtained by the Emergency Co-ordinator before any re-entry attempt. Approval may be by telephone if, in the judgment of the Emergency Co-ordinator and the Director of Licensing or by his designee, adequate protective measures have been taken. These shall include as a minimum the use of film badges and dosimeters, protective clothing and respiratory equipment, and both low level ($\leq$100 mr/hr) and high level (up to 500 r/hr) beta gamma instruments. Penetration beyond the 100 mr/hr line for shutdown of equipment, prevention of criticality recurrence, or other cause shall be performed only after careful evaluation of potential exposure. Re-entry instructions shall provide guidelines to assist in making such determinations, and shall discourage exposures in excess of normal quarterly limits.

The Technical Review Committee stated that startups should be recognized as a shakedown of organization, equipment, processes, and procedures and, for this reason, operational checkout with unenriched uranium is often considered desirable for new plants and new processes. We interpret this Committee comment as being directed to new plant startups generally, such as the UNC Fuels Recovery Plant startup last Spring, and not as a recommendation that unenriched uranium be used by UNC in resumption of operations at this plant. Problem areas in UNC's administrative organization, equipment, processes and procedures have been clearly identified in connection with its operations prior to and immediately following the criticality accident and appropriate corrective measures have been and are being taken by UNC. There appears to be no justification, therefore, for a requirement that UNC use unenriched uranium in resuming production operations.

By letter dated October 12, 1964, the Director, Division of State and Licensee Relations, notified United Nuclear of items of apparent noncompliance and observed safety items which existed prior to and following the criticality incident. These items were based on information gathered by the Division of Compliance during its investigation of United Nuclear Corporation's accident. United Nuclear replied by letter dated October 19, 1964, stating what corrective actions had already been taken and other actions that would be taken to correct the items and conditions noted in the AEC's letter. Compliance inspectors have made frequent

visits to the UNC plant to observe activities by UNC following the criticality accident. The activities included decontamination and cleanup of the plant, inventory of special nuclear material and the conduct of an experimental program involving existing equipment. These inspections included observation of the corrective actions being taken by UNC as enumerated in their letter to the AEC dated October 19, 1964, as well as observation of the conduct of the inventory and experimental program. The inspections confirmed that UNC had accomplished the corrective actions indicated with respect to all items except the ones dealing with management safety audits and radiation surveys, as related to production operations. Assessment of the effectiveness of these two corrective actions will be made upon resumption of production operations. With respect to the inventory and experimental program, the inspections revealed that UNC had conducted these activities in a responsible manner and in accordance with the safety conditions established for these operations.

Based on the foregoing, we conclude that there is reasonable assurance that UNC can resume and continue production operations in such a manner as to protect health and minimize danger to life and property.

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Materials Licensing

Approved:
Dr. Marvin M. Mann
Assistant Director of Regulation
for Nuclear Safety

NOV 27 1964

Concur:
11/23/64
CO
11-23-64