

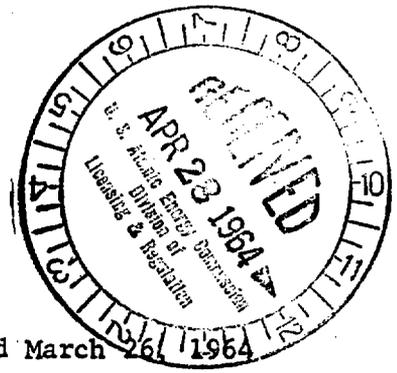
UNITED NUCLEAR CORPORATION

EXTRA

April 23, 1964

HEMATITE, MISSOURI 63047  
TELEPHONE 314-937-2575

Mr. Donald A. Nussbaumer  
U. S. Atomic Energy Commission  
Division of Licensing and Regulation  
St. Elmo and Norfolk Streets  
Bethesda, Maryland



SUBJECT: SNM-33 Renewal

REFERENCE: Your Letters Dated December 13, 1963 and March 26, 1964

Dear Mr. Nussbaumer:

Enclosed are six copies of additional information requested in your letter of December 13, 1963. The information is numbered consecutively with each numbered item corresponding to the number of the question raised by your letter.

Regarding the matter on proprietary information, we request that the drawings so marked be withheld from the Public Document Room on the basis that they reveal capacity and technological information in such detail that their release would place us at a disadvantage with our competition.

In addition to information enclosed per your December 13, 1963 request, the following modifications are made:

1. Section 203 Description of Material

Add: For uranium densities by which Figures 1, 2, 3, and 4 of TID-7016, Rev. 1 are not directly applicable the material will be processed in equipment and batches scaled down by applying the density correction factor specified on page 13 of TID-7016, Rev. 1 to Figures 1, 2, 3, and 4 of TID-7016, Rev. 1.

2. Section 300 Recovery Hood 240-2-26

The equipment in recovery hood 240-2-26 has been revised. This is described in revised page 22 and new page 22a of Section 300. Copies of these pages and related sketches are enclosed. Please incorporate this revised equipment into SNM-33.

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Mr. Donald A. Nussbaumer

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April 23, 1964

We have attempted to provide you with complete answers to your questions of December 13, 1963. If further questions remain, perhaps a meeting in your office will best serve to clarify these. In any event, we are looking forward to full renewal of License SNM-33.

Respectfully yours,



L. J. Swallow  
Operations Control Manager

LJS:jrt

DOCKET NO. 70-36

- ✓ 1. See attached revised page 8 of Section 200 (marked attachment 1).
- ✓ 2. Special nuclear materials received at Hematite include UF<sub>6</sub>, uranium compounds, and scrap materials. UF<sub>6</sub> will not normally be checked for isotopic assay and will be handled as described.

*Work*

On other materials, a sample per type of material per shipment will be obtained and checked for isotopic and uranium content. Incoming shipments will be held in isolated array until the package contents are confirmed. Damaged packages will receive special handling until their disposal arrangements can be established; this would include assessing the integrity of the container, determining if material had been lost in transit and/or had become wet, contacting shipper on possible return, etc. The disposal arrangement will be checked with the Operations Control Manager. (To be included as second paragraph under 207.2.4).

✓ 3. Muffle Box

The nuclear safety analysis of paragraph 301.2.2 is applicable to the system with optimal moderation.

Flooding of the box during spray cooling is not feasible since only a pin hole or small, narrow crack can develop in the wall of the box. Any large holes or cracks would be readily apparent to the operator at the time of transfer to the cooling chamber. If large openings are detected, the box would be air cooled rather than water spray cooled.

The reference to ORNL-2367 in paragraph 303.3.2 is applicable since the water reflected critical height at 6" spacing is 22.6" compared to 17.6" for the muffle box length. With no water reflection, the vessels were sub-critical for heights up to 35" at a spacing of only .15".

- ✓ 4. Build up of special nuclear material in ventilation ducts will be controlled by the following measures:

*Work*

- a) Hoods, glove boxes and enclosures in which significant quantities of uranium dust can be generated are equipped with high efficiency filters. These filters are located as close as practical to the enclosure.
- b) Filters are equipped with manometers to indicate loading and breaks in the filter media. These are checked by the operators and are opened for inspection and/or unloading when required.

- ✓ 5. No water lines will be connected to glove box 240-2-34 or hood 240-2-7 and other moderating type material will be excluded from these enclosures.

- ✓ 6. Spacing blocks will be provided in the pickling hood (240-2-17) to achieve a minimum of one-foot spacing between metal buttons.

- 7. ✓ The vent bottle mentioned in Section 301.3.2 is 5" in diameter.

The reduced diameter effected by the insertion of the 16" long 4" ID diameter sleeve make the Tee equivalent to a 3.7" diameter Tee for the 16" length of this insert. A 5.8" diameter by 2.9" diameter Tee is

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equivalent to a 5.1" diameter by method of pipe intersection of TID-7016, Revision 1. On page 15 of Section 301.3.2 it was concluded that the cadmium sheath has the effect of reducing the pipe diameter by 1 1/2". Therefore, the combination of the 1/4" ID sleeve 16" long plus the cadmium sheath results in an effective Tee diameter of less than 4.2".

- ✓ 8. Six copies of Figure 14 (for Section 301.3.4) are attached.
- ✓ 9. All reference to limited safe mass, volume or geometry are based on optimum moderation and reflection except as explicitly otherwise specified in the license application.
- ✓ 10. Maximum quantity of U metal in single containers will be 10 kg U<sup>235</sup>.
- ✓ 11. There is no more reflector material than that of Schedule 40 pipe between two or more interacting units in any of the situations considered in our application.
- ✓ 12. Control of uranium leakage into steam condensate or cooling water collection vessels is as follows:

a) UF<sub>6</sub> subdivide system. UF<sub>6</sub> leakage would be in the form of vapor which would dissipate by quickly cooling the UF<sub>6</sub> below its vaporization temperature.

Also, the heating tank for cylinders containing more than a safe mass has holes in the bottom so that the leaking uranium could not build up to an unsafe quantity or geometry.

b) Green Room muffle boxes cooled by water spray will not leak uranium. The boxes are continually inspected for any evidence of failure and either repaired or replaced to prevent the possibility of cracks.

- ✓ 13. Yes.
- ✓ 14. Utility hood 240-4-7 will contain only one limited safe mass or limited safe volume container of uranium.
- ✓ 15. There are no water lines or other source of moderating material in glove box 240-2-23. Slag drums will be limited to maximum of 280 grams of U<sup>235</sup>. The drums will be stored in the outside areas designated in paragraph 502.4. A two foot surface to surface spacing will be maintained in a single layer array.
- ✓ 16. The interaction between tanks 240-2-1 through 240-2-6 with product storage shelves #4 (Figure 20), 11 liter bottle storage rack and other equipment is 1.26 steradians and exist at tank 240-2-3. The safe solid angle for 5" diameter cylinders is 3.2 steradians. A copy of the solid angle calculation is attached.

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17. In the portable tanks and pump system described in Section 302.6, uranium hold up will be prevented by complete draining of the tanks, pump, filter as the uranium goes through the process. Assurance is achieved similarly in the extraction operation described in Section 303.5.

In the event that material is held up in the equipment for any reason, the subsequent batch will be reduced appropriately in size to allow for this uranium hold up.

We believe Section 303.7.1 and 303.7.2 provides a nuclear safety analysis showing that either a limited safe batch and/or a limited safe concentration control can be safely used in the equipment depending upon the enrichment of the scrap being processed.

18. Nuclear safety of the filtrate collection and hold tanks is assured as follows:

- a) Filtrate is recycled back into the slurry feed tank until it is clear; the filtrate is then sent to the filtrate collection tanks.
- b) Only limited safe batches are filtered so that even if a cloth breaks and sizeable amounts get into tanks 240-3-4 and 240-3-5 a safe batch amount is maintained.
- c) During the press unloading the cloth is inspected which assures that only finely divided ADU could have gone into the filtrate tank undetected (and this only through mis-operation by the operator failing to check the filtrate stream and tank contents during the filtration step).
- d) Amounts of ADU small enough in quantity to escape detection at the filter unloading will be discovered at least upon checking the tank during the subsequent batch filtration and even if undiscovered will be slab safe upon settling (assuming the unlikely -- that the fine precipitate which passes through the filter cloth does settle out).

✓ 19. Answered in March 31, 1964 letter.

✓ 20. Answered in March 31, 1964 letter.

✓ 21. Only the specific process detailed in paragraph 401.3 will be done. If other projects of this type are planned, a specific license will be requested.

✓ 22. The answer given in the March 31, 1964 letter is applicable to all in process storage areas and outside storage areas. Also, as specified in paragraph 502.4 drums in outside storage are placed in polyethylene bags.

23. In the event of a power failure, all movement of fissionable materials is stopped until power is restored. No operation in the plant requires continuing power to avoid criticality or assembling of a critical configuration.

Practice drills will be performed no less frequently than every six months for each of the three operating shifts which include maintenance personnel. Such drills will include sounding of the alarm and evacuation of the area.

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New employees will be "walked through" emergency evacuation procedures to familiarize them with the routine to be followed in the event of sounding of the nuclear emergency alarm.

Calculations for the effectiveness of the Nuclear Alarm System are included in a report which is attached.

- 24. There will be no unsafe containers such as incinerators, etc., except as provided for in the license application in any area containing more than 500 g of U-235.

*MS*

Vacuum cleaners will not be used to collect spills and will be prominently marked with a sign to this effect. Spills will be collected in safe size containers; vacuum cleaners will be used only for picking up dust; the cleaner will be emptied each day to prevent an accumulation of an unsafe quantity.

- ✓ 25. There is no direct connection through a valve or drain from a safe geometry container to one of unsafe geometry.

- 26. Map of the plant area enclosed. Also, reference is made to our July 2, 1962 submittal on Source Material License SMB-293.

- 27. Attached copy of October 27, 1960 Mallinckrodt Chemical Works letter to the AEC provides an evaluation of the probability and effect of a nuclear incident.

- 28. The liquid waste effluent pond is just outside the south fence and thus within and some distance from any point on our property perimeter line. The maximum concentration of radioactive materials released to the pond is 0.01 grams/liter.

- 29. In general, the daily and weekly exposure are determined to be less than the maximum permissible by controlling the concentrations of airborne radioactivity at all operations to within the limits specified in Section VIII, B. "Control Limits" of the UNC Chemicals Operation Health Physics Manual.

The equipment used to gather samples for evaluation of exposures to airborne radioactivity is outlined in Appendix A attached. The sample media in most cases is Whatman No. 41 filter paper.

The location and frequency of sampling may be found in Appendix B following. This schedule replaces that in the Health Physics Manual and is being prepared for inclusion in this manual using the proper format.

Breathing zone samples are those which are taken specifically in a plant operator's breathing zone area during the performance of an operation. They are intended to indicate the concentrations of airborne radioactivity to which the operator is exposed as a result of performing that particular operation.

Since the various types of operations throughout the plant vary considerably in length of time, frequency, etc., required to perform that operation, such sampling will require the exercise of judgement by the Health Physics Technician

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as to the most desirable sampling method to be used. It may be collected by high volume sampling for short-term infrequent operations or by low volume, long period samples for frequent operations to cite some examples.

Breathing zone samples shall be taken for a sufficient length of time so as to permit collection of at least one cubic meter of air. Where operations are performed that do not permit this volume of sample due to a short period of operation, an interrupted sample may be performed covering several cycles of the operation, if convenient. Such a sample would still be representative of the airborne radioactivity levels resulting from that operation.

Should an operation exceed the appropriate radioactivity concentrations outlined in Appendix B of 10 CFR 20, the exposure of the involved operators will be analyzed on a time-weighted basis to determine that their overall exposure does not exceed the limits of 10 CFR 20. In this manner the operator exposure will be controlled and where necessary, his duties changed until modifications of equipment and/or techniques are completed.

30. See 29 above.

31. The frequency for contamination surveys may be found in Appendix C attached. This schedule is also being prepared for inclusion in the Health Physics Manual in the proper format for that document.

32. Monitoring effluent air is accomplished by perimeter air samples which are taken on all days that the plant is in operation. A weekly sample is taken 400 yards downwind from the facility in addition to the above samples.

The equipment used may be found in Appendix A. The location of perimeter samples is shown in Appendix B.

33. A plan view of the locker room facilities may be found as Exhibit A attached.

Personnel monitoring is accomplished by use of a Technical Associates Frisker-Monitor, Model FM-1, with P-AS-2 alpha probe. One of these monitors is located inside the door from the restricted area to the restricted locker room for use after washing hands before using restroom facilities, etc. The other monitor is located at the door leading from the clear locker room to other clear areas.

Personnel are required to scrub their hands thoroughly prior to leaving the locker area. They must then check for skin contamination on the frisker-monitor. If the monitor alarm sounds, they must rescrub their hands until the contamination level is sufficiently low that the alarm does not sound. If rescrubbing is required twice or more, their names and work locations are entered in a log located at the monitor.

Since street clothing is not worn in contaminated areas, nor plant clothing in clear areas, it is not necessary for the production personnel to monitor the clothing worn from the clear locker room.

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34. The hoods for which absolute filters are not provided are not used for dry operation where significant quantities of dust will be generated.

Operating experience shows no build up of significant quantities of special nuclear materials in vent lines.

35. Fire resistant filters are not used in order to facilitate recovery of uranium values by incineration.

36. a) Refer to manual entitled "General Information and Procedures Applicable to the Handling of Special Nuclear Material", Section 1001.

b) Design of storage and processing facilities and equipment takes into account the possibility of flood as a factor in criticality calculations.

c) Emergency instruments and protective apparel and equipment are located in the brick barn approximately 280 ft. west and 180 ft. north of the northwest corner of the fence surrounding the plant. This location is the emergency assembly area.

The emergency instruments provided at this location are as follows:

1. 1 ea. Technical Associates "Juno" Survey Meter.  
Model SRJ-6, 0-5,000 mr/hr.
2. 1 ea. Technical Associates "Juno" Survey Meter.  
Model HRJ-6, 0-25,000 mr/hr.
3. 1 ea. Technical Associates "Cutie Pie" Survey Meter.  
Model CP-4A, 0-2,500 mr/hr.

These instruments are inspected on a weekly basis.

d) Six complete sets of protective apparel will be stored in the brick barn at all times. This shall include the following:

1. 6 sets clean coveralls
2. 6 sets rubber shoe covers
3. 6 MSA Comfo Respirators, Type H (ultra) filter
4. 6 sets rubber gloves
5. 6 surgical caps

Also, located at the emergency assembly area is an emergency telephone, a complete set of emergency instructions and a blanket for the injured.

This equipment shall also be inspected on a weekly basis.

Non-nuclear emergency equipment is located at varied positions throughout the plant for easy accessibility. This equipment includes the following:

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1. Respirators
2. Self-contained air supply masks
3. Fire extinguishers
4. Fire fighting suits
5. Safety lines and belts
6. Fire cart

The majority of the severe emergency equipment is located in an emergency locker adjacent to building 240 just beyond the north end of building 250.

e) The nuclear alarm system is tested weekly between 8:00 and 8:05 A.M. every Monday permitting acquaintance of the personnel at the plant with the alarm sound, etc. The frequency of drills is outlined in answer to question 23.

37. Refer to attached Sections 205 and 207 issued April 22, 1964.
38. The information provided in Section 900 is for the purpose of obtaining AEC approval.

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