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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

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DEC 13 1963

IN REPLY REFER TO:
DLR:RLL
70-36

United Nuclear Corporation
Chemicals Division
3000 North Second Street
St. Louis 7, Missouri

Attention: Mr. J. A. Lindberg
Vice President

Gentlemen:

This refers to your letter dated July 15, 1963, transmitting the consolidated application for renewal of Special Nuclear Material License No. SNM-368 and to your letter of October 15, 1963, transmitting your revised Health Physics Manual.

In order to continue the review of this application, we require the information specified in the attachment to this letter. The review of your shipping containers and procedures has not been completed. If we require additional information, we will notify you.

Proprietary markings were noted on the drawings submitted in this application. If it is your intention to have these drawings withheld from public disclosure, then, pursuant to Section 2.790, 10 CFR 2, "Rules of Practice," you must submit information showing why the drawings should be withheld from public disclosure and how such disclosure would adversely affect the Corporation.

In order to complete our formal distribution, we require three additional copies of your July 15, 1963, letter and all enclosures to this letter. In future correspondence concerning licensing matters, please submit six copies of such correspondence.

Very truly yours,

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

Enclosure:
As stated

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UNITED NUCLEAR CORPORATION
CHEMICALS DIVISION
HEMATITE, MISSOURI

DOCKET NO. 70-36

In order to continue the review of your consolidated application dated July 15, 1963, we require the following information:

1. Will special nuclear material not held under this license be isolated from SNM held under the license in accordance with Section 70.57, 10 CFR 70 (proposed), or shall all special nuclear material be received, stored, processed and transferred as provided in the conditions of this license.

2. A detailed description and analysis of procedures to independently confirm the package contents of all special nuclear material, including scrap, upon receipt into the facility. This analysis of package contents should include confirmation of the isotopic content unless the material is handled and processed as fully enriched uranium. Incoming shipments should be held in isolated arrays (see Part 70.57, (proposed)) until the package contents are confirmed. The handling of wet and damaged packages should also be delineated.

3. A nuclear safety analysis to confirm that the muffle box coolers will be safe from accidental criticality in case of inleakage of water. The use of Table 3, ORNL-2367, to justify the nuclear safety of the spacing of the spray cooler, Section 303.3.2 does not appear to be applicable. In the reference, there was six inches of full density water between the cylinders.

4. Description of your procedures for controlling build-up of special nuclear materials in ventilation ducts or provide a nuclear safety analysis to show that such build-up will not result in accidental criticality.

5. Limiting the quantity of uranium compounds to that which can be contained in a limited safe volume in glove box (240-2-34) and hood

(240-2-7) does not in itself insure nuclear safety unless confurrent additional controls are used. This may include excluding waterlines from the hoods and other possible sources of moderating materials or the total quantity of material is always handled in a safe volume container. Therefore, we require a more detailed description and nuclear safety analysis of this hood and glove box.

6. In several hoods and glove boxes, nuclear safety depends on maintaining a minimum one-foot spacing between safe geometry and/or mass containers or equipment. In some of these hoods and glove boxes, spacer blocks will be used. Please describe the means by which this minimum spacing will be maintained in other hoods.

7. In Section 301.3.2, please describe the nuclear safety of the vent bottle, page 12, last paragraph. Also, in this Section we have been unable to confirm the nuclear safety of the upper tees of the dissolver columns. On page 20, TID-7016, Rev. 1, it states reduced diameters should extend 18 inches from the intersection. From the description given it appears that the 4-inch diameter extends only 8 inches.

8. Figure 14, referred to in Section 301.3.4 is missing from the license renewal application; therefore, in order to continue the review of this Section, this Figure should be submitted.

9. Will all references to limited safe mass, volume or geometry be based on optimum moderation and reflection except as explicitly provided for in the license application.

10. Will the maximum quantity of U-235 in the form of uranium metal in the packaging hood (240-2-7) and uranium metal storage containers, Section 301.4.2, be 10 kg.

11. The values of the multiplication factor, k_{eff}, obtained from Figure 4, K-1317, are acceptable for purposes of solid angle calculations provided the vessel wall thickness is less than or approximately equal to that of Schedule 40 pipe. However, if there is additional reflector material between two or more interacting units the values from Figure 4 would not be acceptable since they were calculated from bare units, and we would require detailed calculations to support the proposed values of the multiplication factors.

12. A nuclear safety analysis of all lines and vessels which will be

employed to collect steam condensate or cooling water demonstrating that they will be safe from accidental criticality in case of a possible uranium leakage. This analysis should include all possible steam heated UF_6 vaporizer ovens, unless the oven does not contain more than one limited safe mass, and spray coolers. Will the condensate discharge lines from the ovens and coolers contain any valves or traps and is there a possibility for condensate to accumulate within the ovens or coolers, which could be hazardous in the event of accidental leakage.

13. Will only one limited safe mass be collected in the 15-gallon drum located within milling hood (240-3-10), if not please submit a nuclear safety analysis of the collection drum.

14. Will utility hood (240-4-7) contain more than one limited safe mass or one limited safe volume container of uranium, if so, describe in greater detail the nuclear safety of the hood. A limited safe volume of material does not always insure nuclear safety unless there is no other source of moderating materials within the hood, such as water lines, or the total quantity of material is always handled in a safe volume container.

15. Are there any water lines or any other source of moderating material in glove box (240-2-23), where nuclear safety is based on moderation control. Also, please describe the nuclear safety of the 15-gallon bomb slag collection drum when it is removed from the glove box.

16. An evaluation of the neutron interaction between tanks (240-2-1 through 240-2-6) with the product storage shelves, the 11-liter bottle storage racks and any other equipment which contains special nuclear material.

17. The entire problem of uranium hold-up in the system between additions of limited safe batches has not been included in the nuclear safety analysis of Sections 302.6 and 303.5. Batch sizes should be reduced to account for uranium hold-up from previous operations in Sections 302.6, 303.5, and 303.7. We also request confirmation that a maximum of one limited safe batch will be processed in any vessel at one time during the scrap recovery operations of Section 303.7, or submit a revised nuclear safety analysis. In a large process vessel, such as the dissolver, a safe concentration does not necessarily insure nuclear safety if precipitation might take place. Also, a limited safe batch surrounded by a uranium solution reflector will be more reactive than a water reflector.

18. We are unable to confirm the nuclear safety of the filtrate collection and hold-up tanks. The safety analysis of these tanks should take into account the possibility of forming a critical slab in the vessels, if precipitate gets through the filter. A method of calculating this minimum critical mass is given on page 51, HW-71666.

19. A nuclear safety analysis of the uranium hold-up within the centerless grinder (255-2-7) in addition to the settling tank which has been described.

20. We agree that if possible moderation would be completely excluded from the oxide contained in the dry box (255-2-14) there would be no criticality problem for enrichments less than about five percent; on the other hand, the pick-up of moisture from the air can reach as high as an H/U^{235} of 25 for 2 w/o enriched oxide. Therefore, nuclear safety controls should be based on the actual operating conditions in the plant, and procedures must be described for preventing certain credible accidents, such as maloperation of the furnaces and intermediate storage that might result in moisture pick-up between furnace operations.

21. We agree that the procedures given in Section 401.3 for processing $UO_2SO_4 \cdot 3D_2O$ at a 20 w/o enrichment is safe from accidental criticality if it is confirmed that normal operation of the box is suspended as long as heavy water will be held in storage within the box. However, we do not agree that Figure 8, page 183, Karlsruhe Criticality Control Symposium, shows that the critical mass of D_2O moderated uranium is greater than the critical mass of H_2O moderated uranium for all dilutions, (e.g., this figure shows that for a fraction of U-235 less than 0.001, the critical mass of a D_2O moderated uranium system is less than the critical mass of a light water moderated uranium system. If you plan to conduct operations involving enriched uranium and D_2O or other moderating materials, in various combinations, we require a more detailed description of the type of operations and the nuclear safety parameters which would be applied in such operations; or, if such operations are not to be performed too frequently, you may wish to submit a nuclear safety analysis for our approval prior to the commencement of each operation.

22. More detailed description of the in-process floor storage areas and outside storage areas in order to determine that such areas will be safe from accidental criticality. You should submit positive design features which will insure the spacing requirements for nuclear safety.

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We do not consider that painting designs on the floor will insure proper spacing. Additionally, the in-process storage areas should have a railing around the array and the outside storage areas should be fenced in, in order to guard against accidental dislocations of the storage arrays by vehicles, forklift trucks, hand carts and overhead loads. Also, all storage arrays must be covered by the monitor alarm system.

23. Calculations should be submitted demonstrating that is a criticality accident of 300 r at one foot from the source occurred, intervening shielding between the possible sources of radiation and detector heads would permit at least 20.8 mr/hr to reach the detector heads. We have confirmed that the detector heads are within 120 feet of possible sources of radiation, except some possible proposed outside storage areas, but it is not evident that the attenuation of concrete has been considered, as for example, in the enriched uranium storage area of Building 255-1. Also, we request confirmation that in the event of a power failure to the monitor alarm system either emergency power will be provided or immediate evacuation will be instituted until power is restored to the monitor alarm system. In addition, we require confirmation that a practice evacuation drill, including sounding the monitor alarm, will be conducted at least once every three months for each operation and maintenance shift.

24. Confirmation that there will be no unsafe containers, vacuum cleaners, incinerators, etc., except as explicitly provided for in the license application and described in the text of the nuclear safety analysis in any area containing more than 500 g of U^{235}. This should include sumps and other points of possible spill accumulation in case of leaky vessels. In case of a uranium spill inside a hood, the solution should form a safe slab in the bottom of the hood or a nuclear safety analysis should be submitted demonstrating a criticality hazard would not result.

25. Confirmation that there will not be any direct connection through a valve or drain from a safe geometry container to one of unsafe geometry. This should include, but not be limited to, overflow lines and their associated vessels.

26. A scale map of the area surrounding the plant showing the nature of the occupancy and the use of such surrounding area.

27. An evaluation of the probability and effect of release of radioactive

materials as a result of a fire, explosion or nuclear incident.

28. The location of liquid waste effluent pond. Is it within the restricted area. What is the maximum concentration of radioactive materials released to this pond.

29. A more detailed description of your procedures for evaluating personnel exposure to concentrations of airborne radioactivity including type of equipment, method of sample analysis, location and frequency of sampling. This should also include your criteria for taking breathing zone samples. Please indicate whether the floor plans in the appendix of the Health Physics Manual are intended to show the location of all sampling stations.

30. A description of the procedures followed in determining the average daily and weekly exposure to airborne radioactivity for each employee who frequently or occasionally occupies areas where airborne radioactivity concentrations exceed the appropriate limits in Appendix B, of Part 20.

31. In Section IX, B, you state that the schedule for contamination surveys is in the appendix. We cannot identify this.

32. More detailed description of your procedures for evaluating the concentrations of radioactive materials in the air effluent including type of equipment, frequency and location of such surveys.

33. A detailed description of the locker and change room including a plan view showing the delineation between contaminated and non-contaminated areas, clothing receptables, etc. Procedures for monitoring the skin and clothing of personnel for contamination before they are allowed to leave the restricted area.

34. A number of exhaust stacks are indicated as not containing any type of air cleaning equipment, yet the exhaust from some of these stacks appears to come from areas where there is a possibility of airborne radioactivity being generated; therefore, please describe the basis for not using air cleaning equipment for these exhausts. Also, please indicate how you intend to control the build-up of special nuclear material in vent lines, i.e., are clean-out ports provided.

35. In your "Handbook of Rules, Practices and General Information" under Pyrophoricity On pages 8 and 9 you indicate the likelihood of air

filters being destroyed by fire. Please indicate why fire resistant filters are not used for such operations. Also in the last sentence of the first paragraph of this section it appears you intended to indicate a CO_2 extinguisher should not be used when the material is in a drum to be closed.

36. In regard to your emergency procedures we require the following:

a. Description of the coordination which has been accomplished with local fire departments.

b. Procedures in the event that major fires cannot be extinguished by the use of portable equipment, taking into account the possibility of accidental criticality if water is used.

c. Storage location and description of emergency instruments and protective clothing and equipment; at what frequency is this emergency equipment inspected.

d. Description of emergency instructions and protective clothing and equipment provided to personnel who must enter the incident area.

e. Frequency of evacuation drills including all shifts. Such practice evacuation drills, including sounding of the alarm, should be conducted at least quarterly.

37. Detailed description of the training and experience of the persons who are responsible for the operations at Bonsite plant including the person in charge of the health and safety program.

38. Your application mentions the use of respiratory equipment to control exposure of employees to concentrations of airborne radioactivity. Pursuant to Section 20.103 of 10 CFR 20 the use of respiratory equipment to control exposure of employees to concentrations of radioactivity to within Part 20 limits requires specific Commission approval. Please indicate whether the information provided in Section 900 of your application is provided for the purpose of obtaining such approval.

Enclosure:
10 CFR 20