

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

JUL 2 1979

FCPF:NK 70-824 SNM-778

Babcock and Wilcox Company ATTN: Mr. A. F. Olsen License Administrator Lynchburg Research Center P. O. Box 1260 Lynchburg, Virginia 24505

Gentlemen:

We have completed the initial review of the Lynchburg Research Center renewal application for License No. SNM-778, dated December 21, 1978, and find that additional information is needed to complete our evaluation. The enclosures to this letter list our comments and questions relating to your renewal application, all of which were discussed with your staff during my visit on June 11-13, 1979.

Prior to submitting formal responses to our questions and comments, you may find it prudent to arrange a meeting to discuss a draft of your responses. Formal responses are due no later than September 10, 1979.

If there are any questions concerning this matter, please call me.

Sincerely, Morman Stylach

Norman Ketzlach

Uranium Fuel Fabrication Section Fuel Processing & Fabrication Branch

Division of Fuel Cycle and

Material Safety

Enclosures: Request for Additional Information Nos. 1, 2, and 3

7909050330

ENCLOSURE 1

B&W LYNCHBURG RESEARCH CENTER RENEWAL APPLICATION NUCLEAR CRITICALITY AND RADIATION SAFETY COMMENTS

I. License Conditions

1. Page A-2

- (a) Clarify item A.1.7.2) so that it is a license condition rather than a request.
- (b) Address the authorized uses of SNM.
- (c) Include Sections A.3.4 and A.3.5 under "Authorized Use." They are not "restrictions" as indicated by Section A.3.
- (d) Specify in the demonstration section the buildings and outside areas in which the authorized materials may be used. Describe the activities to be performed therein.
- Page A-3 Notwithstanding Section A.1.9, the renewal of Licence No. SNM-778 shall be limited to a period of five years.

3. Page A-4

- (a) Identify the isotope of antimony.
- (b) Identify the isotope of cobalt.
- (c) Confirm that 6 kg is the requested possession limit for source material (item E).
- (d) Include source material in the identification of the material under item "G."

4. Page A-5

- (a) Define the "bench-scale" and "unsubstantial" quantities of plutonium for the indicated activities.
- (b) Define "pyrophoric form."
- (c) Include in Section A.3 the restriction from conducting any research and development or processing of uranium hexafluoride.
- 5. Page A-6 Identify the location in Section 4 that describes the methods for handling plutonium and zircaloy fines.

6. Page A-8

(a) Confirm that the Nuclear Safety Officer and the second party reviewer shall have at least two years' experience with nuclear criticality

safety calculations similar to those associated with LRC activities, or justify any deviation from this requirement.

(b) Include in Section A.4.2 the minimum qualifications of the License Administrator as described in the demonstration on page 2-5.

7. Page A-9

- (a) Confirm that approved operating procedures, including the controls associated with radiation and criticality safety shall be followed and available at each operation.
- (b) Confirm that unless the operation or maintenance work is covered by an effective operating procedure, a Radiation Work Permit (RWP) shall be prepared for all work involving entry into a system containing SNM or where a potential for release of contamination exists such that the airborne radioactivity concentration to which employees are exposed from the proposed operation or work is likely to exceed the concentration in Appendix B, Table 1 of 10 CFR 20 or the potential external radiation exposure to which employees are exposed from the proposed operation or work is likely to exceed 6 mrem/hr. However, justification shall be provided for use of higher levels of airborne radioactivity concentration or potential radiation exposure for preparing an RWP as described above.

The RWP's shall specify the necessary radiation safety controls including but not limited to respiratory protection, special air sampling, and special local ventilation.

All RWP's shall be signed by representatives of the appropriate line supervision and the responsible representative of the radiation protection function prior to the start of operations except that during off-shift hours approval of the supervisor of the responsible radiation protection component or his designee may be obtained via telephone.

- (c) Include in Section A.5.2.1 the requirement for the independence of the safety related functions from those they review.
- (d) Notwithstanding A.5.1.1 confirm that any changes to the license conditions shall also require amendment of SNM-778.

8. Page A-10

- (a) Specify the criteria used to determine what additions and/or changes require SRC approval.
- (b) Confirm that all safety audits shall be made in accordance with a written plan and documented. Include the corrective actions taken on the recommendations made during previous audits. The report shall identify what was inspected and address each item in the plan. Provide in the demonstration section a description of the preconceived audit program.

- (c) Confirm that the nuclear safety officer, the health physicist, or their respective supervisors have the authority to suspend operations until corrective action is taken if they observe practices which could result in a definite hazard
- (d) Confirm that all procedures are reviewed at least annually and updated, if necessary, or justify alternate administrative controls that provide equivalent assurance that only currently approved procedures are available at each operation.

9. Page A-11

4 5 7

- (a) Section A.6 shall contain the responsibilities and functions of the SRC. This includes selection of its membership, audit and review responsibilities, minimum frequency of meetings and audits and the documentation of its activities (see Appendix D, Sections D.1-D.4).
- (b) Confirm that a formal annual report by Health Physics shall be made to the SRC reviewing employee exposures and effluent release data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers or types of operations or effluent releases, (2) if exposures and releases might be lowered in accordance with the concept of as low as reasonably achievable, and (3) if equipment for effluent and exposure control is being properly used, maintained and inspected. This report shall include review of other required audits and inspections performed during the past 12 months and review the data from the following areas; employee exposures; bio-assay results; in-plant airborne radioactivity and environmental monitoring.
- (c) Include the records that will be maintained to control the quantity and identify the source, by-product and special nuclear material in the "cross-hatched" areas that are authorized by License SNM-778.

10. Page A-12

- (a) Confirm that all the hot cells, fumehoods, and glove boxes used for handling plutonium are equipped with at least two stages of high efficiency particulate air filters in series. (A high efficiency air filter is defined as a filter that has a particle removal efficiency of at least 99.97% for all measurable particles on a count basis.)
- (b) Confirm that the minimum frequency for checking the pressure drop across a filter, direction of air flow in the working area or at the entrance to all hoods and the hood face velocity shall be in accordance with the following frequencies or justify any lower frequencies.
 - (1) Pressure difference across the filter.....weekly
 - (2) Direction of air flow in the working area.....monthly

- (3) The hood face velocity.....monthly
- (c) Confirm that filters shall be all HEPA tested in accordance with Regulatory Guide 3.2, "Efficiency testing of air cleaning systems containing devices for removal of particles" dated August 1973 or justify any deviations.
- (d) Section A.7, confirm the evacuation alarm system also has emergency power.
- (e) Specify the minimum frequency for testing the operability of the emergency power sources and the alarm system. Test acceptance specifications shall be established to ensure operability of the emergency power sources.
- 11. Pages A-12, -13, -15 and -19 We feel that the stated face velocities, pressure drop, material composition and properties and effluent controls are commitments, accordingly:
 - (a) Section A.7.1, change "is maintained" to "shall be" maintained for the minimum velocity through an opened door and for the pressure differential across a cell face.
 - (b) Section A.7.2.2, add "shall" to the minimum air velocity for a 12-inch hood opening.
 - (c) Section A.7.2.3, replace "are" and "is" by "shall be" for the material composition and fire resistant properties, respectively of the glove boxes.
 - (d) Section A.7.2.6, replace "have" with "shall have" for the minimum velocity through the open face.
 - (e) Section A.8.3.1, replace "is" and "is normally" by "shall" and "shall be," respectively, for the control and discharge of potentially contaminated exhaust air.

12. Page A-13, Section A.7.1

- (a) Confirm that the monitors for airborne activity in the hot cell area are for measuring alpha and beta - gamma activity. Specify the action levels and the corrective action to be taken.
- (b) Specify the administrative controls to prevent exceeding the allowable quantities of volatile material in the hot cells. Include in the demonstration section the method for determining the allowable quantities. The same comment applies to the control of the quantity of volatile material in the glove boxes as described on Pages A-14, Section A.7.2.3.

- 13. Page A-13, Section A.7.2.3 Confirm that each glove box is equipped with a device to measure the negative pressure in the enclosure. The minimum negative pressure shall be specified.
- 14. Page A-15 Replace "other high alpha emitters" with "ther transuranium isotopes."

15. Page A-16

- (a) Specify the action level(s) of personnel exposure above which an appropriate action will be taken to prevent the total exposure from exceeding the maximum permissible exposure specified in 10 CFR 20.101. Include the actions to be taken.
- (b) Confirm that the frequency for reading personnel dosimeters is monthly for film badges and quarterly for TLDs.
- (c) Provide justification for not following the requirements of Regulatory Guide 8.11 "Application of Bioassay for Uranium," dated June 1974. Please be aware that a bioassay program can be broken down into two parts; routine exposure control and diagnostic avaluation.
- (d) Confirm that bioassay samples (including both urinalysis and in vivo lung counting) shall be analyzed for both plutonium and uranium if the sample is taken from an employee working in an area where both plutonium and uranium may be present in the air.

16. Pages A-16 and -25

- (a) The training program shall include both nuclear criticality and radiation safety, the categories of personnel (e.g., handlers of unclad fuel, health physics technicians, members of emergency team, office personnel) to be trained, the general subjects covered for each, and the minimum frequency of retraining for each.
- (b) Documentation shall be maintained to verify attendance and identify the instructor. The effectiveness of the training and retraining programs shall be evaluated and documented.
- (c) The nuclear safety evaluations (including calculational support) shall receive a second independent review by a qualified person. The latter's evaluation shall be documented and the records maintained for the same period of time as the nuclear safety officer's evaluation.
- (d) The reference for the requirement for the SRC to review the administration of the nuclear safety program should be corrected. It is Appendix D, not E.

17. Page A-17, Section A.8.2.4

- (a) Permanently mounted air sampling equipment normally used to determine concentrations in a worker's breathing zone shall be evaluated for representativeness at least once every 12 months and wnenever any licensed process or equipment changes are made. In addition, the location of air samplers shall be checked out at the commencement of operations in an area that has been shut down for more than six months to verify the representative assist of the air sampling.
- (b) Confirm that permanently mounted air samples shall be changed and the filters counted according to the following schedule (justification should be provided for use of any lower frequencies):
 - a. Process areas during normal operation once/shift;
 - b. All areas during periods when normal operations are shut down -48 hrs. maximum interval.
 - c. Specify the minimum flow rate used in the air sampling. In the demonstration section, describe the method to be used to determine the true flow rate at each sampling station.
- 18. Page A-17, Section A.8.2.5 Confirm that the calibration frequency of all survey instrumentation shall be at least semi-annually.

19. Page A-19, Section A.8.2.6

- (a) Specify the survey frequency for all areas.
- (b) Include action levels and the corrective action to be taken to assure that allowable limits are not exceeded.

20. Page A-19, Section A.8.3

- (a) Specify the action levels and corrective action to be taken to assure the allowable limits are not exceeded.
- (b) Confirm that the stack samplers shall be operated continuously and isokinetically to insure a representative sample.

21. Page A-21

- (a) The liquids taken from the tanks prior to discharge to the James River shall be representative of the liquid discharged.
- (b) Confirm that liquid wastes are also discharged to the NNFD. Please specify the discharge criteria.

22. Page A-22

- (a) Define "ever safe."
- (b) Specify the "ever safe" concentration for ²³⁵U, ²³³U and Pu and provide the basis for safety in the demonstration section.
- (c) Specify the storage criteria for 55-gallon drums containing as much as 350 g 235 U or 220 g Pu and the 235 U limits in the waste drums.

23. Page A-23

- (a) Confirm the following records shall be maintained for at least two years or as otherwise stated.
 - (1) records of the safety review committee meetings.
 - (2) records of instrument calibration.
 - (3) safety audit records.
 - (4) records of training and retraining.
- (b) Records of nuclear safety evaluations shall be retained for at least six months after completion of the associated project.
- 24. Page A-24 Specify the water level control limits for storage pool water.

25. Page A-26

- (a) Specify the limits for the application of 12 inches as the isolation thickness for concrete.
- (b) Clarification should be provided for the number of units applied to a transfer cart (sections A.8.5.3.1.2 and A.8.5.4.1.2).

26. Page A-27

- (a) Clarify the table for the allowable mass limits for $Pu^{-235}U$ mixtures. The tabulated limits appear to be for total fissile ($Pu^{+235}U$) content.
- (b) Provide in the demonstration section the criteria that indicate the relative nuclear safety of a 74-unit concrete reflected array of Pu and a 74-unit concrete reflected array of 850g ²³⁵U units (4% ²³⁵U) with the same center-to-center spacing between units in each array (see comment associated with pages 4-18 and -19 on array safety).
- (c) A work station limit sign shall be posted at all work and storage stations.

Pages A-33 & -34 - Provide in the demonstration section the criteria that indicate the nuclear safety of a 70-unit array of 850g 235U units (4% 235U) on 24-inch centers with an edge-to-edge spacing of eight inches under all conditions of interspersed moderation [see comment (b) associated with pages 4-18 and -19].

28. Page A-34

- (a) We note no 233 U limits specified (A.8.5.5.2). Therefore, we assume no ²³³U storage is planned.
- (b) If safe geometry criteria are to be used, they shall be specified and their basis for safety demonstrated.
- Page A-35 Provide in the demonstration section the basis for safety of an array of drums with 45 g 235U/drum.
- 30. (a) Include as a licensing condition the double contingency principle shall be followed in establishing the basis for the nuclear criticality safety of all operations.
 - (b) Specify the administrative controls that provide assurance of the structural integrity of nuclear criticality safety associated equipment.
- Page D-1 Define an "unreviewed safety question". 31.
- Page D-3 Specify who acts on the recommendations of the Safety Audit 32. Committee and who is responsible to confirm its implementation.
- 33. Page F-5 The financial assurance should include copies of letters from L. Graves and G. G. Zipf dated January 20, 1978, and from G.G. Zipf dated March 13, 1978.

II. Demonstration Section

Page 2-1 - Clarify the designation of responsibilities for Laboratory managers for operations within specified buildings (p. 2-1) and responsibilities of facility supervisors within specified buildings (p. 2-2). Establish the relationship between the Laboratory managers and facility supervisors.

2. Page 2-3

- (a) Identify the part of the organization to whom the health physicist reports.
- (b) The relationship between the supervisor of Health and Safety and the supervisor of the Health Physics Group (see pages B-6 and B-8) should be indicated on the organization chart and in the division of responsibilities.

- 3. Pages 2-7 and -8 In the safety review process describe the relationship of the Safety Review Committee to the remainder of the LRC organization.
- 4. Pages 3-3, -12 and -16 Describe the criticality alarm system and include the location of the criticality monitors in Figure 3-5.
- 5. Page 3-10

Include the minimum pressure drop between the operations area and the cell interior in the license conditions section.

- 6. Page 3-34 A legible reproduction of Figure 3-10 should be supplied.
- 7. Pages 4-8 and -9 Specify the units (e.g., gm contained ²³⁵U) for the mass limits in the tables.

8. Page 4-9

- (a) Demonstrate that fully reflected and optimally moderated spheres within arrays assures maximum reactivity compared to those with optimum interspersed water moderation.
- (b) Demonstrate that replacement of the 3.6 kg ²³⁵U (93.5% ²³⁵U) units in an array with 850 gm ²³⁵U(4% ²³⁵U) units in the array, having the same center-to-center spacing between units, results in an array with no greater reactivity. Independent calculations indicate the reverse to be true.
- 9. Page 4-11 Provide justification and the applicability for the isolation thickness of 10 inches or more of concrete.
- 10. Page 4-12 Specify the spacing between units in the array, the numbers of units, and the resulting k_{eff} .
- 11. Page 4-13 Include the date of the reference page in the reference to SNM-1168.
- 12. Page 4-14 Correct the reference to the basis for safety for 4 inches thick slabs of rods. There is no Section 4.4.7.4 in the application.

13. Pages 4-18 and -19

- (a) Please clarify the reference to "TID-7016 (as amended)". TID-7016 has been amended twice.
- (b) Justify the substitution of a 850 gm contained ²³⁵U(4.0% ²³⁵U) unit for a 3.6 kg ²³⁵U(93.5% ²³⁵U) unit in an array. Independent calculations indicate a 64-unit array of 850 gm units on 21.69 inches centers has greater reactivity than the same number of 3.6 kg units at the same center-to-center spacing between units.

- (c) Provide justification for the isolation thickness of 15 inches earth.
- 14. Page 4-36 The description of the training program (section 4.5.8) shall include the method used for the evaluation of its effectiveness and its associated documentation.
- 15. Page 4-37 Include training in nuclear criticality safety and the effects of radiation on humans in Program II.
- 16. Page 4-40 The figure indicating the location of smoke and thermal detectors should be provided.
- 17. Section 7 Consideration should be given to a postulated criticality accident in the evaluation of accidents at the LRC.

18. ALARA

Paragraph 20.1(c) of 10 CFR Part 20 states, in part, that licensees should make every reasonable effort to maintain radiation exposure as far below the limits specified in that part as reasonably achievable. Regulatory Guide 8.10, copy enclosed, describes the basic operating philosophy and administrative practices that a licensee should follow to keep occupational radiation exposures as low as reasonably achievable. Incorporating the intent of Regulatory Guide 8.10 in your renewal application will require the following:

Provide as an appendix or addendum to your application, an analysis of occupational exposures (external and internal) covering at least the past two years of plant operations for each plant area and type of operation performed. The analysis should identify the sources and locations where most exposures occurred, as related to job categories and work activities. Any trends in exposures that can be identified should be discussed. Abnormal occurrences should be reviewed and categorized, considering such aspects as frequency, operations being performed, and the magnitude of the resulting exposure. The analysis of internal exposures should consider air sampling data, as well as bioassay data (including in vivo counting). The analysis should conclude with a description of any steps or measures taken to reduce employee exposure, the effectiveness of these measures, and any additional actions planned.

19. General

- (a) Remove from Appendix A information that is not a license condition (e.g., principal officers, ownership and control of Company, period of license, counting efficiencies for "current monitors," current monitors used) and place it in a demonstration section.
- (b) Consolidate each of the management control programs (e.g., audits, training, procedures review) or separate them by discipline (e.g., radiation safety, nuclear safety).

ENCLOSURE 2

B&W LYNCHBURG RESEARCH CENTER RENEWAL APPLICATION FIRE SAFETY COMMENTS

Section 2 - Discuss the responsibility for fire protection.

2. Section 3

- (a) Describe the fire detection systems, and fixed or portable fire suppression systems or equipment for all the buildings associated with the license.
- (b) Discuss the potential fire hazards (e.g., Section 3.4.5 discusses the preparation of samples for analysis but does not address associated fire protection safety). Several fire protection type questions suggest themselves and should be addressed:
 - (1) What is used to dissolve the samples?
 - (2) Are any fire related hazards involved? i.e., Is hydrogen liberated? Does the potential for nitrated organics or unstable perchlorates exist? If so, what protection measures are there against these hazards?
 - (3) Are organic solvents used? If so, in what quantities and how are they controlled and handled?
 - (4) Are any special problems created during decontamination activities? How are they controlled and protected against?
- (c) The potential fire hazards associated with all other LRC operations should similiarly be reviewed.
- (d) All ductwork in Building C (Section 3.5.6) for the BOG (box off gas system for the glove boxes) is rigid polyethylene pipe with all joints sealed air tight. Ventilation ducting should be noncombustible material. If plastic material is used as ducting, show how it will be protected to offer the same degree of resistance to heat and/or fire damage as...carbon steel.
- Section 4 Discuss fire protection.
 - (a) Who is responsible for fire protection? The only reference to fire safety responsibilities (p. 4-40) is that of the facility supervisor and industrial safety officer for the relocation of smoke and thermal detectors. No position description in Section 2 includes the responsibility for fire protection.

- (b) Who reviews area operating procedures for fire safety?
- (c) Is the Safety Review Committee involved in fire safety reviews?
- (d) Section 4.6.3 references the Emergency Plan Section (Appendix C) for fire control. The adequacy of the fire control system can not be evaluated from the general fire protection information in Appendix C. Fire control should be more adequately covered.
- (e) Include a detailed description of your entire fire safety organization (e.g., in Section 2 on organization).

ENCLOSURE 3

B&W LYNCHBURG RESEARCH CENTER RENEWAL APPLICATION EMERGENCY PLAN COMMENTS

- 1. Page C-1 Include the definition for "Protective Action Guides." Protective Action Guides should be used in the determination of protective actions to be taken based on projected radiological doses to individuals following a release of radioactive material.
- Page C-4 Specify, the notification requirements of the Commonwealth of Virginia Radiological Emergency Response Plan. Include the State required action levels.
- Page C-8 Notification of offsite agencies may be required for site emergencies.

4. Page C-10

- (a) Specify the type system (e.g., alarm, PA) is used to notify personnel to evacuate?
- (b) A thorough search should be completed and authorization to return should be obtained before personnel are allowed to re-enter the building after a bomb threat is received that requires evacuation.
- (c) Identify the method(s) used by the Emergency Officer to maintain communications with all parts of the Emergency Control organization and vice versa.

5. Page C-11

- (a) Describe the operation of the emergency telephone system (see page C-9). Include the locations of its emergency phones.
- (b) Describe the operation of the "paging system."
- (c) Confirm the evacuation alarm is activated automatically (e.g., under fire conditions) and may be operated manually at other times.
- (d) Correct Section B.4.1.3.1. to indicate Class III Emergency.
- 6. Pages C-13 & -14 Specify emergency action levels for declaring a site emergency and for notification of offsite authorities (e.g., State).
- 7. Page C-15 Describe the handling of emergencies during offshift hours.

8. Page C-16

(a) Identify the responsibility for release of information to news media during an emergency co-ordinated with governmental authorities.

- (b) The referenced section in the first paragraph should be C.8.
- (c) Identify responsibility for the request of NNFD support for the evacuation functions (see pages C-12 and C-21). Is it the responsibility of the Evacuation Officer or the Emergency Officer?

9. Page C-17

Describe the means for notification of a supervisor informed of an emergency in his building?

10. Page C-17 to C-19

- (a) Confirm the Emergency Officer is the one that requests both the onsite and offsite emergency support when needed.
- (b) Specify the location of the offsite emergency support agencies, where not obvious (e.g., Virginia State Office of Emergency Services).

11. Page C-22

- (a) Describe the emergency measures that are part of the plan, as distinguished from the detailed procedures. Section C.6 on "Emergency Measures" does not meet the requirements of Regulatory Guide (RG) 3.42, "Emergency Planning for Fuel Cycle Facilities and Plants Licensed Under 10 CFR Parts 50 and 70."
- (b) Identify the equipment available and its location, for communication between members of the Emergency Control Organization and between them and the remainder of the LRC personnel during an emergency. There is no designated emergency control center.
- (c) Confirm a redundant power source is available for communications with the CNFP.

12. Pages C-23, -24 & -26

The number of instruments of each type need not be part of the plan.

13. Page C-24

- (a) Identify the fire protection available in parts of buildings that do not have sprinkler systems.
- (b) Confirm the fire detection systems are connected to a facility alarm.
- (c) The description and location of assembly areas should emphasize those features of the facility that provide adequate capacity for personnel and their and protection during an emergency.

(d) Describe the relative location of the training area of the NNDF and the buildings at the LRC.

14. Page C-25

Confirm Building C personnel use the first aid and medical facilities in Buildings A and B.

15. Page C-27 to-29

- (a) Specify the minimum frequency of retraining of all estegories personnel on the Emergency Control Organization.
- (b) Specify the minimum frequency of retraining for medical support personnel. Training for medical support facility personnel is incorporated every two years in exercises and drills held at the CNFP.
- (c) Justify the semi-annual drills for members of the fire team. RG 3.42 specifies quarterly drills for fire team members.
- (d) Document all training, drills and exercises. The documentation should include evaluations and follow up on corrective actions.

16. Page C-30

- (a) Document the annual review of the emergency plan. The documentation should include updating and improving the procedures to incorporate the results of training, drills and exercises and to account for changes onsite or in the environs.
- (b) Specify the minimum frequency for inventory and inspection of emergency equipment and supplies.
- (c) Designate the areas for the storage of emergency equipment and supplies to assure that access can be maintained in the event of a facility evacuation.

17. Page C-31

Specify the criteria for the allowable exposure of personnel during rescue operations, termination or reduction in accident effects, recovery of deceased personnel, and for the resumption of routine plant operations.

18. Appendix 1

Letters of agreement should be included from the following:

(a) Concord Fire Department(b) Lynchburg Fire Department

- (c) DOE radiological assistance team(d) Back up hospital

19. Other Appendix

Include a listing, by tible, of written procedures that implement the