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a McDermott company

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October 1, 1984

Standardization and Special Projects Branch
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Harold Bernard

Reference: (a) license CX-10, docket 50-13
(b) Letter dated January 6, 1984, from Arne F. Olsen, B&W, to Harold Bernard, USNRC.

Subject: Amended Application

Gentlemen:

Reference (b) is an application to amend Reference (a). In reference (b) I request authorization to cut fuel rods that were used in connection with the facility. Fuel rod cutting was necessary because there was no NRC licensed shipping container that was approved for use with individual fuel rods of a length comparable to those that are possessed under the facility license. The only containers that were identified were the 6-M containers the use of which would require the cutting of each rod into acceptable lengths.

Subsequent to submitting reference (b) the Department of Energy, the owner of the fuel, was able to amend the certificate of compliance of the Westinghouse MO-1 container which permits the rods to be shipped in an intact condition, thus obviating the need to cut the fuel.

The certificate of compliance, however, requires that the cladding of each fuel rod to be intact. An examination of each fuel rod in appoximately 200 rejects of the approximately 10,000 rods that must be shipped. These 200 rods cannot be shipped in the MO-1 container and must therefor be cut into sections for use with the 6-M containers originally considered.

This amended application is similar to the January 6, application. The differences arise from the reduced number of fuel rods (200 versus 10,000) which will require cutting. In the original application I specified that the operation would be conducted in the labyrinth area of Bay 2. This was considered appropriate for contamination control. The reduced scope of the work and the reduced chance of contamination makes it possible to consider locations within the bay that offer more space for the operator to work in and greater ease of equipment installation. This amended application deletes the references to the labyrinth and Figure No. 2. Figure No. 1 and

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the drawing No. LRC-61403 remain unchanged. The monorail suspended hoist is no longer needed because only the labyrinth, of the areas within the bay, is outside the reach of the normal crane. The criticality safety analysis was for the revised operation continues to indicate that the operation is safe for normal and accident conditions.

The fuel rod cutting and subsequent shipping of the 6-M containers are the final actions to be taken to complete the removal of all fuel from the facility prior to commencing dismantling operations. Your early consideration of this application will assist to facilitate our long range plan to decommission the CX-10 facility.

Very Truly Yours,

BABCOCK & WILCOX COMPANY
Lynchburg Research Center

Arne F. Olsen

Arne F. Olsen
Senior License Administrator

ccm

Subscribed and sworn to before me

this 1st day of October, 1984,

City of Lynchburg, Virginia.

[signature]
Notary Public

My commission expires November 2, 1985

DATE: 10/1/84

INTRODUCTION

The Lynchburg Research Center (LRC) has discontinued operation of the CX-10 (50-13) facility. In preparation for decommissioning, plans are being made to return the fuel used at this facility to the owner, the Department of Energy. No container licensed by the NRC that will accept unsealed full-length fuel pins is available. It is therefore necessary that each unsealed full-length fuel pin be cut into two sections for shipment in DOT-6M containers.

Movement of the fuel within the facility and shipment of the fuel off-site are operations permitted under the license. Cutting of the fuel in preparation for shipment is not addressed in the facility's Safety Analysis Report and is not permitted pursuant to the provisions of 10 CFR 50.59. It is therefore necessary to seek an amendment to the license describing this unreviewed safety question.

A similar operation was conducted successfully in 1977 under the LRC's materials license SNM-778. That operation was performed in a fuel handling facility which is being decommissioned and is no longer available for this type of operation. That earlier operation was reviewed by the LRC's Safety Review Committee as this proposed operation will be. The LRC Safety Review Committee is requiring that procedures must be developed to guide the operations. These procedures are presently being developed and must be reviewed and approved by the Safety Review Committee.

1.0 Location

The fuel pin cutting operation shall be performed in Bay 2. Figure 1 shows the location of Bay 2 inside Building A.

2.0 Operation

The fuel pin cutting operation consists of the following sequence:

1. Fuel pins are removed from their storage location in the bay. A pin storage box is moved into a storage position near the fuel pin cutting hood.

2. Fuel pins will be removed, one at a time, from the storage box and fed through the sealing gaskets on either side of the fuel pin cutting hood.

3. The fuel pin is then clamped into the drill motor chuck.

4. The drill motor is turned on, which turns the fuel pin.

5. The tubing cutter, located within the cutting hood, is tightened on the fuel pin, cutting the cladding.

6. Upon completion of the cut, the operator at the hood will place a polyethylene cap on each of the two cut ends of the fuel pin and clean the cut ends with a Chemwipe.

7. The operator at the loading station will withdraw one section of the cut pin from the hood and place it in a DOT-6M container.

8. The operator at the hood will loosen the chuck, remove the other section of the cut pin, and insert it in the DOT-6M container.

3.0 Equipment

The main piece of equipment to be constructed and installed for this operation is the fuel pin cutting hood. Details of this apparatus are shown in drawing No. LRC-61403. The purpose of the hood is to provide a confinement for the cutting operation. Off gas is provided by a blower that is dedicated to this system. An air flow of $\geq$ 100 lfm shall be maintained through the opening in the front of the hood. An air baffle and rubber seals shall be installed to minimize air turbulence in the vicinity of the cut. Exhaust air is drawn through an HEPA filter and a venturi for flow indication. A fixed filter air monitor with alarm capability will sample the off gas stream isokinectically within ± 10%. The system exhausts to the inlet of the Bay 2 off gas system HEPA filter.

4.0 Air Flow

Bay 2 has an exhaust air system located on the roof of the building. The system consists of an HEPA filter and a fan. This system takes its suction at the ceiling level of the bay. No ducting is utilized for this system inside the bay.

Bay 2 is provided with a motor operated intake damper which opens to the outside of Building A. During the fuel cutting operation, this damper will be closed to insure maximum air flow from Building A into Bay 2. This will insure that Bay 2 air pressure is negative with respect to the rest of Building A.

5.0 Contamination Control

The fuel involved in this operation has been used in the CX-10 reactor for many years. However, the use of the fuel has been limited to very low powers which has resulted in a low inventory of fission products. The contaminant of interest during the cutting operation is therefore alpha.

5.1 Protective Clothing

All personnel entering the fuel cutting area shall be required to wear lab coats and shoe covers. The operator at the cutting hood station shall wear rubber gloves while working in the hood.

5.2 Exit Monitoring Requirements

A step-off pad shall be located at the exit from the fuel cutting area. A monitor shall be placed at the step-off pad. This monitor shall be sensitive to alpha contamination. Each person exiting this area shall survey their hands and shoes prior to exiting.

5.3 Routine Surveys

Bay 2 floors are smear surveyed for alpha and beta contamination weekly.

A continuous air sample shall be taken from the exhaust line providing off gas to the fuel pin cutting hood. The sample will be removed for counting at the conclusion of the fuel cutting operation.

Samples of breathing zone air shall be taken during the fuel rod cutting operation. The frequency of this sampling will be determined by the LRC Health Physicist.

6.0 Nuclear Criticality Safety

Fuel within the fuel cutting area shall be limited to no more than two 6-M containers being loaded (one 55 gallon and one 110 gal.), one 16-inch by 4-inch box of fuel pins, and the cutting table. Fuel on the cutting table will consist of the pin being cut and fines from the cuts. The total accumulation on the table will be limited to 350 grams U-235 and will be spaced at least one foot from other accumulations within the fuel cutting area. All loaded 6-M containers will be sealed for shipment before being moved out of the fuel cutting area.

The only other fuel on the same level of Bay 2 will consist of a planar array of loaded and sealed 6-M containers, awaiting shipment. These containers will be stored in contact with one another. Each container will be limited to a loading of 3Kg of U-235 and an H/X ration of less than three. The nearest distance between the 6-M container storage array and the fuel cutting area will be 1 foot.

The bay is a moderation-controlled area so that there is no moderator expected in contact with the fuel except for the polyethlene end caps on the cut pins in the 6-M shipping containers. Under this condition, a Keff of less than 0.39 is conservatively calculated for the interacting with the storage array. A box of fuel pins falling and landing on top of the storage array changes this Keff value almost imperceptibly.

If all the fuel containers within the fuel cutting area are assumed to be loaded with a 25 vol. % UO_2 - 75 vol. % H_2O mixture, which is near optimum for criticality, the Keff of the system is still less than 0.96.

The calculations assumed 4 wt % and were performed using the Monte Carlo criticality code, KENO-IV, and employed the 16-group Knight modified Hansen-Roach cross-section library. Considerable conservatism was introduced into the calculation by:

1. Assuming both 6-M containers and the 16-inch x 4-inch box of fuel pins to be completely filled and combining their contents to form a single cylinder of UO_2 or UO_2/H_2O.

2. Assuming a 7x7 planar array of loaded shipping containers, although a full shipment would consist of only 42 (In fact it is estimated that no more than 18 6-M containers will be needed during this operation.)

3. Assuming an H/X ratio of 3 for the contents of the shipping containers, although we expect an actual value of 2.25 or less.

4. Assuming a U-235 loading in each 6-M container of 5.7 Kg, although the actual loading will be less than 3 Kg.

5. Use of the Hansen-Roach Cross-Section Set.

7.0 Organization

7.1 Project Coordination

The Manager, Building A Decommissioning shall have overall responsibility for the direction and coordination of the fuel rod cutting operation. This individual has experience and training in reactor operations, nuclear criticality safety aspects of fuel handling operations and health physics. This individual shall direct the day-to-day activities of this operation.

7.2 Project Performance

A senior reactor operator shall have the responsibility for supervising the fuel cutting operation. This individual has been a licensed senior reactor operator at the CX-10 facility and has health physics experience.

7.3 Health and Safety Support

Health Physics and Industrial Safety Support for this operation shall be provided by the Health and Safety group. This group is comprised of a certified health physicist, two health physics engineers, three technicians and three monitors. This group has provided support for the CX-10 facility during operational phase and for fuel fabrication operations elsewhere at the LRC.

7.4 Nuclear Criticality Safety Support

Nuclear criticality safety support for this project shall be provided by the Nuclear Criticality Safety group. This group is comprised of three engineers who provide criticality safety analyses for the B&W Company. They are experienced in performing criticality safety calculations for both fuel processing systems and reactors.

7.5 Safety Review Committee

The Safety Review Committee (SRC) is chartered to review projects and procedures involving licensed activities.

The SRC is comprised of at least five senior technical members. No more than 75% of the senior technical members shall be from the LRC. In addition to the technical members, one member will be a management representative who will act as the Committee coordinator. Members of the Committee are appointed by the Director, LRC. The combined experience of the members includes reactor operations, reactor engineering, health physics, radiological safety, handling of licensed material, and chemistry. Specialized consultants are also available to the Committee.

The SRC shall meet at least four times annually. Committee approvals are determined by a majority vote of the members present. A quorum consists of a majority of the members, including the Chairman or Alternate Chairman.

The Committee minutes shall be kept by the Chairman and forwarded to the Director, LRC, with copies sent to all Committee members, laboratory managers, facility supervisor, facilities manager, section managers and the reactor operations supervisor.

7.6 Safety Audit Subcommittee

The Director, LRC, shall designate two or more members of the SRC to serve on the Subcommittee for Audits (SAS). The SAS will perform audits of each licensed facility at least three times annually. As a guide, the SAS uses the following records: Operating procedures, maintenance records, health physics records, nuclear safety records, safeguards records, and reactor records.

The SAS Chairman will file with the SRC Chairman a written report of the Subcommittee's findings and recommendations. The SRC Chairman will forward this report to the Director of the LRC, with comments as appropriate. It shall be the responsibility of the License Administrator to act on the recommendations of the SAS. The License Administrator shall also confirm the action taken.

8.0 Environmental Consideration

8.1 Liquid Radioactive Waste

The fuel cutting operation will generate no liquid radioactive waste. If any cleaning solutions are used during the project or at its completion, they will be disposed of through the normal liquid waste disposal system.

8.2 Solid Radioactive Waste

Solid radioactive waste generated during this operation will consist of rubber gloves, Chemwipes, plastic sheeting and the fuel pin cutting hood and associated off gas system. This waste will constitute an insignificant portion of the waste generated at the LRC and will be included along with other area wastes for off-site disposal.

8.3 Airborne Environmental Releases

The fuel pin cutting hood and associated off gas system has been designed to preclude environment releases. That system and the use of approved procedures reduces the possibility of such releases from this operation to a level comparable to that achieved in other fuel handling operations carried out at the LRC for over 25 years with no history of a release.

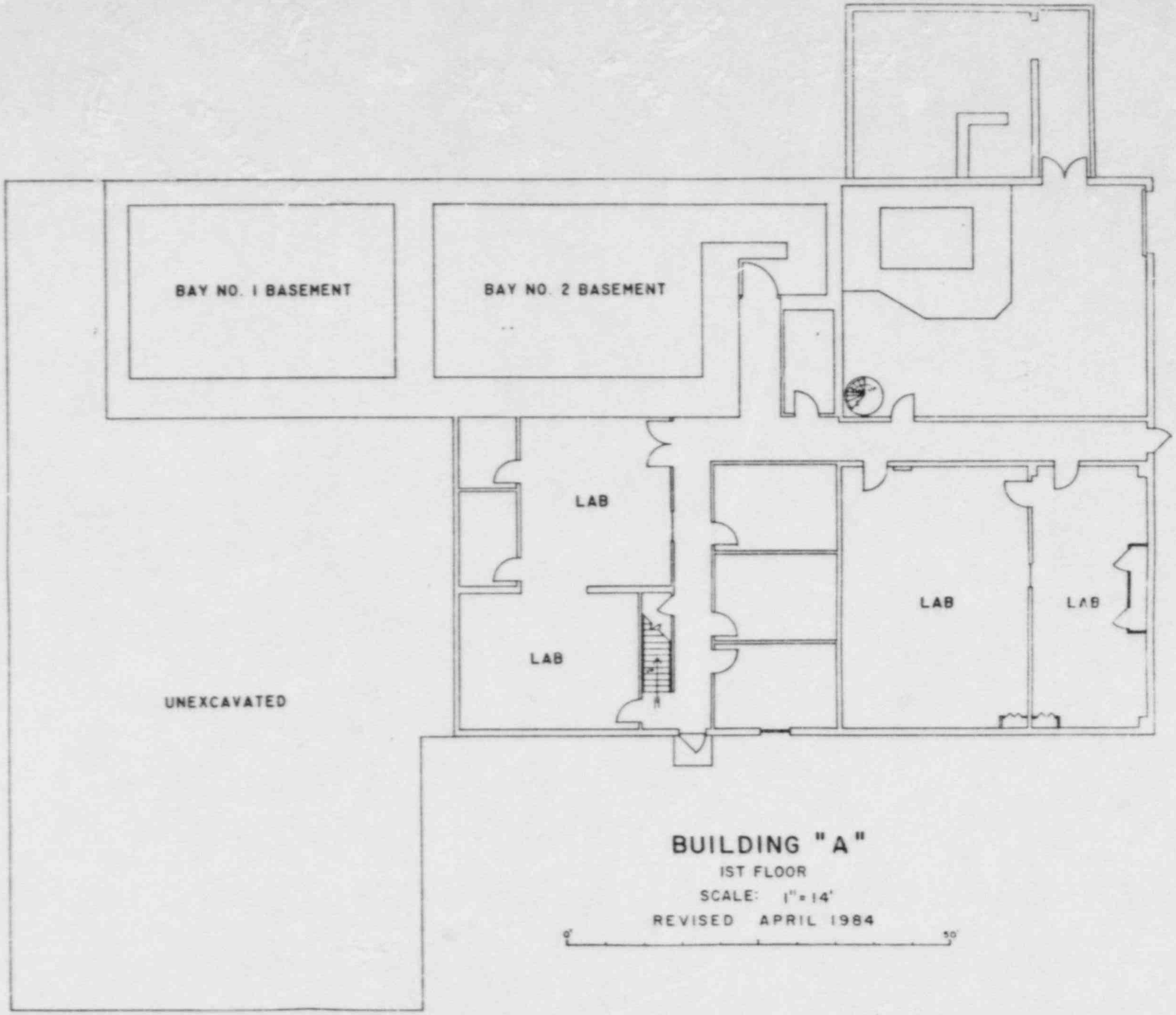
BAY NO. 1 BASEMENT
BAY NO. 2 BASEMENT
LAB
LAB
LAB
LAB
UNEXCAVATED
BUILDING "A"
1ST FLOOR
SCALE: 1" = 14'
REVISED APRIL 1984
0'
50'

Figure 1