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September 11, 1984

Ivan W. Smith, Chairman
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
West Tower - Room 439
Bethesda, Maryland 20814

Dr. Richard F. Cole
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
West Tower - Room 439
Bethesda, Maryland 20814

Dr. A. Dixon Callihan
Administrative Judge
Union Carbide Corporation
Bear Creek Road
Oak Ridge, Tennessee 37830

Re: In the Matter of Commonwealth Edison Company
(Byron Nuclear Power Station, Units 1 and 2)
Docket Nos. 50-454 and 50-455 -OL

Dear Administrative Judges:

In accordance with the recently published decision in Philadelphia Electric Co. (Limerick Generating Station, Units 1 and 2) LBP-84-16, 19 NRC 857 (1984), we are furnishing the following documents on behalf of Commonwealth Edison Company:

1. Letter from T. R. Tramm, Commonwealth Edison Company, Nuclear Licensing Administrator to John G. Davis, Director of Nuclear Material Safety and Safeguards, USNRC, dated October 6, 1982

2. Letter from T. R. Tramm to John G. Davis, dated February 28, 1983

3. Letter from R. G. Page, Chief, Uranium Fuel Licensing Branch, USNRC, to T. R. Tramm, dated May 6, 1983

4. Letter from T. R. Tramm to John G. Davis, dated June 20, 1983

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5. Letter from R. G. Page to T. R. Tramm, dated August 9, 1983

The above documents consist of Edison's applications for licenses, and amendments thereto, to receive and store unirradiated fuel at Byron in connection with the planned operation of Byron Units 1 and 2, and the NRC's grant of a license to Edison to receive and store fuel at Byron Unit 1. We understand that the NRC Staff is currently processing Edison's application insofar as it concerns the receipt and storage of fuel at Byron Unit 2.

Very truly yours,

Michael I. Miller
One of the Attorneys for
Commonwealth Edison Company

MIM:gi
Enclosures

cc: Service List

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

October 6, 1982

Mr. John G. Davis
Director of Nuclear
Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Davis:

Commonwealth Edison hereby makes application for amendment of the Byron Generating Station special nuclear materials license, SNM-1860. Authorization is requested pursuant to the provisions of 10 CFR 70 to receive, possess and store unirradiated fuel assemblies in the amount necessary for operation of Byron Units 1 and 2. This authorization is needed by May 1, 1983.

Information required by 10 CFR 70.34 regarding this amendment request is contained in Attachment A to this letter.

Pursuant to 10 CFR 170.11, Commonwealth Edison has determined that no fee is required to accompany this application.

Please address questions regarding this matter to this office.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

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ATTACHMENT A

Application for Amendment of Special
Number Materials License SNM-1860

Byron Station Units 1 and 2

PURPOSE OF AMENDMENT

Authorization is requested to receive, possess, store, and package for return to the vendor unirradiated fuel assemblies in the amount necessary for operation of Byron Units 1 and 2.

SPECIAL NUCLEAR MATERIALS SPECIFICATIONS

Total mass of SNM: A maximum mass of 5320 kg of U^{235} is contained in fuel assemblies.

Form: Westinghouse, PWR 17 x 17 optimized design type, uranium dioxide fuel assemblies.

Assembly average enrichments, core regions 1, 2, 3: 2.1%. 2.6%, 3.1%

Full core average enrichment: 2.6%

Total mass of uranium per unit: 81,639 kg

Total mass of U^{235} per unit: 2,120.5 kg

Clad material and thickness: Zircaloy-4, 0.0225 inches

Clad outside diameter: 0.360 inches

Fuel pellet diameter: 0.309 inches

Overall assembly length, including RCCA insert: 167.22 inches

Assembly cross section dimensions: 8.426 inches x 8.426 inches

Gross weight per assembly: approximately 1600 lbs, max. with RCCA insert

Assemblies per core: 193

The maximum mass of 5320 kg U^{235} contained in assemblies is obtained as follows: 2 cores of 193 optimized assemblies each for Units 1 and 2 initial load, 64 optimized reload assemblies assuming 3.5% U^{235} enrichment, and 10 optimized replacement assemblies for either unit assuming 3.1% U^{235} enrichment should any additional assemblies be required to replace those rejected during receiving inspection but not immediately returned to the vendor.

TECHNICAL QUALIFICATIONS

In addition to the responsible personnel identified in Chapter 13 of the FSAR, the Station Nuclear Materials Custodian (NMC) also becomes involved in the receipt and handling of Special Nuclear Materials at the Station. The individual(s) assuming the responsibilities of the NMC will have training and experience in reactor engineering as well as technical expertise in reactor, nuclear fuel and nuclear instrumentation design.

The nuclear materials custodian is primarily responsible for the control of special nuclear material (SNM) at the plant site. His responsibilities include: inventorying and maintaining records of movement and location of SNM, preparation of necessary reports verifying receipt of nuclear fuel, all fuel transfers within the station, and all fuel shipments from the station. Specific methods of performing these functions are defined in Company and Station procedures.

EQUIPMENT AND FACILITIES

Section 9.1 of the Byron/Braidwood FSAR contains a complete description of equipment and facilities for fuel handling and storage. Descriptive drawings are also contained in Chapter 1.

Up to 132 new fuel assemblies may be stored in the Byron new fuel storage racks. Up to 1050 fuel assemblies may be stored under water in the spent fuel storage racks. Simultaneous storage of the initial core loadings for Byron Units 1 and 2 will require the use of the spent fuel storage racks. As described below, administrative controls will be required to limit the use of spent fuel racks when they are used for dry storage of new fuel assemblies.

SCHEDULES

Construction, testing, and inspection of new and spent fuel storage racks is scheduled to be complete prior to the storage of fuel assemblies in these racks. The scheduled receipt of fuel from Westinghouse is outlined below:

The first fuel will be ready for shipment to Byron in May of 1983, with the scheduled shipment date date to be August of 1983 (i.e., shipment of last fuel assembly) for Byron Unit 1.

We are requesting licensing to receive and store fuel for both units at the same time for the following reasons:

1. Storage facilities will be available to handle Unit 2 fuel at the same time as receipt of Unit 1 fuel.

2. We would like flexibility with the fuel vendor to receive Unit 1 and 2 fuel at nearly the same time.

3. No additional testing of new and spent fuel racks will be required for storage of Unit 2 fuel.

PROCEDURES

Receiving procedure for initial core fuel assemblies:

1. Fuel assemblies will be received on site in Westinghouse model RCC-1 or RCC-3 shipping containers presently licensed under NRC license #USA/5450/A(F). This shipping container is a reusable metal container designed for shock and vibration isolation, humidity control and leak tightness to protect fuel assemblies from damage during normal handling and shipping at temperatures from -40°F to 150°F. Each container may contain one or two fuel assemblies with or without core components. Shipments are made via flatbed truck with a maximum of 12 assemblies per shipment. The weight of a fully loaded shipping container will not exceed 6700 pounds.

2. The transport truck and metal shipping containers will be moved to the unloading area of the fuel handling building trackway or to the area immediately outside the fuel building.

3. The metal shipping containers will usually be unloaded from the transport truck using the fuel handling building crane, moved to the floor of the new fuel unloading area, and be placed in a suitable unloading attitude. The shipping containers may be unloaded from the transport truck using a suitable mobile crane or fork lift truck, transferred to the fuel handling building, and transported to the new fuel unloading area via the fuel handling building crane.

4. Before opening a shipping container, an external inspection for damage and a pressure differential check will be made.

5. The cover will be removed from the metal shipping container and set aside.

6. An inspection of the inside of the container will be made and documented.

7. Shipping container outrigger members located on the outside of the container assembly will be positioned as required for unloading. Other necessary support structures will be positioned as required for pivoting the support frame of the shipping container to the vertical position. Fuel assembly clamping frames, except top and bottom, may be partially loosened at this time.

8. The support frame will then be slowly raised to the vertical position where the supports and securing hardware will be installed to secure the support frame in the vertical position.

9. Fuel assembly components such as rod control cluster assemblies, burnable poison rod assemblies, thimble plugs, or source assemblies may be visually inspected at this time.

10. The new fuel assembly handling tool and a scale for the fuel handling building crane will be properly installed and the new fuel assembly handling tool coupled to the fuel assembly upper nozzle.

11. After lifting cable slack is removed, fuel assembly shipping container clamping frames can be removed. The fuel assembly may now be removed from the shipping container.

12. The fuel assembly protective cover will be inspected for damage, removed and an inspection will be done on the exposed assembly. A radiation survey of the exposed assembly will be performed. Protective covers may then be replaced.

13. The new fuel will be placed in storage by one of the following methods:

    a. The fuel assembly will be placed in the new fuel elevator and lowered into the spent fuel storage pool. The spent fuel handling tool and the spent fuel pit bridge crane will be used to place the new fuel assemblies into the spent fuel storage racks. Loading of the spent fuel racks with new fuel in a dry condition (maximum enrichment of 3.2% U^{235}) will require a checkerboard loading arrangement. The rack position of each fuel assembly will be recorded as it is placed.

    b. The assembly will be inserted directly into the spent fuel storage racks using the new fuel handling tool and the fuel handling building crane. This method of fuel storage will require an override of the fuel handling building crane interlocks and would occur only for receipt and dry storage of first core fuel. Loading of the spent fuel racks with new fuel in a dry condition (maximum enrichment of 3.2% U^{235}) will require a checkerboard loading arrangement. The rack positon of each fuel assembly will be recorded as it is placed.

c. The assembly will be inserted into the new fuel storage racks using the new fuel handling tool and the fuel handling building crane. The rack position of each fuel assembly will be recorded as it is placed.

14. Steps 9 through 13 above will be repeated for unloading the second fuel assembly from the shipping container. After the fuel assemblies have been removed from the shipping container, the container will be made ready for return shipment to Westinghouse.

15. The above procedure will be repeated until all the fuel has been unloaded and properly stored.

16. Reactor fuel loading will be performed following receipt of the station operating license, under direct supervision of a licensed supervisor.

17. In the event that fuel must be repackaged and returned to the vendor, the above procedure will be reversed.

SAFEGUARDS

The Security Plan for Special Nuclear Material Byron Station will be implemented during the fuel handling and storage. This Plan was provided to the NRC in a letter dated February 2, 1982 from L. O. DelGeorge to H.R. Derton.

The following are areas where new fuel may reside for varying periods of time prior to its installation in the reactor.

1. The area immediately outside the fuel handling building.

2. The following areas of the fuel handling building:

   a. Unloading area of the fuel handling building trackway

   b. New fuel unloading area (for removal from shipping containers)

   c. New fuel storage racks

   d. Spent fuel storage pool.

During plant construction whenever fuel is being handled or stored in any of these areas, access to that area will be contolled. Unauthorized personnel will be prevented from entering the area by either locked physical barriers or by watchmen stationed at each functional entrance to the area. Secured entrances to the fuel storage area shall be periodically checked by a watchman during each shift and any irregularities shall be reported immediately to the Shift Supervisor.

Personnel access to areas where fuel is stored will be controlled by means of an authorized entry list. This list will be reviewed and updated periodically and will receive final approval from the Station Security Administrator and the Station Superintendent. Entry to these areas will be coordinated with the Fuel Handling Supervisor or an Operating Engineer. Personnel on the authorized entry list will include:

1. CECo personnel who have work related assignments in the fuel handling building and have been designated by their supervisor.

2. Contractor personnel who may be required to complete construction activities and have been designated by CECo management personnel.

HANDLING EQUIPMENT

Any fuel handling equipment used will meet the servicing and capacity requirements of the equipment listed below:

1. Fork lift truck - larger than 6700 pounds lifting capacity.

2. Fuel handling building crane - a motorized overhead crane to service the fuel handling building, rated capacity is 125 tons with one 15 ton auxiliary hoist.

3. New fuel handling tool - short handled tool used to transfer new fuel assemblies from the unloading area to the new fuel elevator or new fuel storage via the fuel handling building crane. For receipt and storage of first core fuel, the new fuel handling tool may be used to directly insert new fuel into the spent fuel racks. The tool will be preoperationally tested at 125% of the weight of one fuel assembly.

4. Spent fuel handling tool - a long handled tool used in the spent fuel pool with the spent fuel pit bridge crane. The tool with be preoperationally testing at 125% of the weight of one fuel assembly.

5. New fuel elevator - the new fuel elevator, load rating 2000 pounds, (Byron/Braidwood FSAR Figure 9.1-14) consists of a box shaped elevator assembly with its top end opened and sized to house one fuel assembly. The new fuel elevator is used predominantly to lower a new fuel assembly to the bottom of the fuel storage area where it is transported to the storage racks by the spent fuel pit bridge crane.

6. Spent fuel pit bridge crane - a motor operated traveling bridge crane with overhead hoist to position personnel and tools over the spent fuel pool for refueling. The bridge will span the pool. Fuel assemblies are moved between storage positions with the spent fuel handling tool suspended from the hoist and manipulated by an operator on the bridge walkway. The hoist capacity will be 4000 pounds.

FUEL HANDLING PROCEDURE LIMITATIONS

1. All radiation surveying and personnel monitoring will be performed by CECo radiation protection personnel or approved equivalent, using approved procedures.

2. All fuel receiving, handling, and cleaning will be performed by qualified CECo personnel under the supervison of a qualified Fuel Handling Foreman, in accordance with approved procedures.

3. Lifting slings used to handle loaded fuel shipping containers will have a capacity of at least 7000 pounds.

4. Loaded shipping containers will not be stacked more than two high unless auxiliary support is provided to prevent the stack from tipping over, and in this case stack height should not exceed three containers.

5. By 10 CFR 71.4(d)(2)(3) a limitation will be placed on the number of loaded shipping containers that may be located together.

6. All instructions labelled on the shipping container must be followed.

7. New fuel assemblies received for initial core loading are removed one at a time from the shipping container, lowered into the spent fuel storage area by the new fuel elevator, and stored in the spent fuel storage racks using a checkerboard loading arrangement. Alternatively, for receipt and storage of first core fuel, the new fuel assemblies may be inserted directly into the spent fuel storage racks using the new fuel handling tool and the fuel handling building crane, again using a checkerboard loading arrangement. New fuel may also be stored in the new fuel racks by removing assemblies one at a time from the shipping containers.

8. Criticality during fuel handling and storage operations is prevented by a geometrically safe configuration of the fuel handling equipment and storage facilities. Dry storage of new fuel up to 3.2% U^{235} enrichment in the spent fuel racks will require a checkerboard loading pattern.

RECORDS

1. Shipping and receiving papers for special nuclear materials will be maintained by CECo.

2. All fuel movements in the fuel handling building will be recorded on the tag boards and updated at least once per shift by the Fuel Handling Supervisor.

3. Inventory maps of all fuel storage locations will be maintained by CECo.

REQUEST FOR EXEMPTION OF REQUIREMENTS OF 10 CFR 70.24

It is requested that Commonwealth Edison Company be exempted from the requirements of 10 CFR 70.24 as they apply to the handling and storage of nuclear fuel assemblies at Byron Station.

The procedures and storage facilities described in this application provide assurance that inadvertant criticality cannot occur during receipt, handling, and storage of nuclear fuel assemblies at the Byron Station. The Westinghouse model RCC-1 and RCC-3 shipping containers are approved for transport as defined in 10 CFR 71.4(d)(2)(3). The procedures for unloading and inspecting the fuel are based in part on the prevention of criticality during these operations. The new fuel storage racks are designed to prevent a critical configuration under conditions of optimum moderation in storage of 4.0% U^{235} enriched fuel. The spent fuel racks are designed to prevent a critical configuration in wet storage of 4.0% U^{235} enriched.The spent fuel racks are designed to prevent a critical configuration in wet storage of 4.0% U^{235} enriched. Procedural controls will prevent dry storage of new fuel with greater than 3.2% U^{235} in the spent fuel racks and will limit to a checkerboard array any new fuel stored in these racks with enrichment of 3.2% or less.

INDEMNITY AND INSURANCE

To cover the storage of nuclear fuel assemblies described in the application, an application will be prepared for $1,000,000 standby coverage with NELIA.

As soon as the policy is issued, copies will be sent to the Office of State Programs so that when the Special Nuclear Materials License amendment to include nuclear fuel for Byron Station Units 1 and 2 is issued, an indemnity agreement can be issued simultaneously.

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

February 28, 1983

Mr. John G. Davis
Director of Nuclear Material Safety and
Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Byron Generating Station Units 1 and 2
Special Number Materials License
Number SNM-1860

References (a): October 6, 1982 letter from T. R. Tramm
to J. G. Davis.

(b): January 14, 1983 letter from W. T. Crow
to T. R. Tramm.

Dear Mr. Davis:

This is to provide additional information requested by the NRC in reference (b) regarding our request for authorization to receive, possess and store unirradiated fuel assemblies at Byron Generating Station.

Reference (b) transmitted a hand-marked version of proposed Revision 1 to Regulatory Guide 3.15. Most of the information called for in this document has been provided to the NRC in various documents already docketed. For your convenience, Attachment A to this letter contains a table which cross-references the sections of the Regulatory Guide to the pertinent sections of the existing licensing documents. Where necessary, additional information is provided in the table.

Reference (b) also transmitted a list of "Additional Guidance" relating to the application submitted in reference (a). Attachment B to this letter contains specific responses to those questions.

Please address further questions regarding our application to this office. This authorization is still needed by May 1, 1983.

One signed original and fifteen copies of this letter and the attachments are provided for your information.

Very truly yours,

CW Schroeder
for T. R. Tramm 2/28/83
Nuclear Licensing Administrator

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Attachments

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ATTACHMENT A

REGULATORY GUIDE 3.15 (PROPOSED REVISION 1)
CROSS REFERENCE LIST

Note: References are abbreviated as follows:

FSAR	-	Byron/Braidwood FSAR
ER	-	Byron Environmental Report
FPR	-	Byron/Braidwood Fire Protection Report
SER	-	Byron Safety Evaluation Report
SNM Sec. Plan	-	Byron Station Special Nuclear Materials Security Plan
ANSI N18.1	-	ANSI N18.1 (1971)
CECo	-	Commonwealth Edison Company

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
1.1.1	ER - Intro. - Page 1; FSAR Chap. 1.0-1.1; SER cover page	--
1.1.2	FSAR 4.2.1.1; 4.2.1.2; 4.2.1.4; 4.2.2; 4.2.2.1; 4.2.2.2; Table 4.3-1; Figures 4.2-1,2	--
1.1.3	FSAR Table 4.3-1; 9.1; 9.1.2.2; 9.1.4.3.1 - Spent/ New Fuel Handling Tools	Per a recent pre-manufacturing audit of the Byron initial core fuel, there will be an average of 423.038 Kg U per assembly. Maximum enrichments will not exceed 0.05 w/o U-235 above the 3 region enrichments of 2.1, 2.6, 3.1 w/o U-235.
1.1.4	Same as above (except FSAR 9.1.4.3.1 is not included).	Same as above.
1.2.1	FSAR Figures 9.1-1,2,3; Figure 1.2-9	--
1.2.2	FSAR Table 3.2-1; 3.8.4.1.2; 9.1.1.1; 9.1.1.2; 9.1.2.1; 9.1.2.2	
1.2.3	FSAR Figure 1.2-9; 9.1; 9.1.1.2; 9.1.2.1; 9.1.2.2; 9.1.3; 9.1.2.3; SER 9.1.1	--

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
1.2.4	FSAR 3.2.1.1; Table 3.2-1; 3.3; 3.8.4.1.2; 9.1.1.1; 9.1.1.2; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3; 9.1.4.1; 9.1.4.2; 9.1.4.3; 9.1.4.4	--
1.2.5	FPR 2.3.12; 3.2(i); 3.7(1), (m); FSAR Table 3.2-1	--
1.2.6	FSAR 13.6; SNM Sec. Plan; SER 13.6	--
1.3	Same as above.	--
1.4.1	FSAR 4.2.4.1	--
1.4.2	---	Any unirradiated fuel to be returned to the vendor will be packed and shipped in the containers originally used to ship fuel to Byron.
1.5.1	SER 22.1; 22.2	Proof of financial protection shall be filed with the NRC in the manner specified in 10 CFR 10 CFR 140.15 prior to issuance of the requested amendment.
2.1.1	FSAR 12.1.1.1; 12.1.1.2; 12.1.1.3; 12.5.1; 13.1.2.2; 13.1.3.1; 13.1.3.2	--
2.1.2	Same as above, and SER 12.5	--
2.1.3	FSAR 12.1.1.3; 13.1.3.1; 13.1.3.2; 13.2.1; 13.2.1.6; 13.2.1.7; 13.2.1.12	
2.1.4	FSAR 12.1.1.3; 12.5.2; 12.5.3.1; 12.5.3.2; 12.5.3.3; 12.5.3.4; Table 12.5-2; 13.3.11	--
2.1.5	FSAR 12.1.1.3.h; 12.5.2; Table 12.5-2	--

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
2.2.1	FSAR 12.1.1.2; 13.1.2.2; 13.1.3.1; Table 13.1-2; 13.2.1.4; 13.2.1.12; ANSI N18.1	--
2.2.2	FSAR 12.1.1.2; 13.1.2.2	--
2.2.3	Normally assemblies will not be stored in their shipping containers - FSAR 9.1.1.2.	Two assemblies are packaged per metal shipping container to be temporarily stored in the receiving area of the Fuel Handling Building. Westinghouse has indicated that the number of loaded shipping containers that may be located together is not a criticality concern.
2.2.4	FSAR Table 3.2-1; 9.1.1.1; 9.1.1.2; 9.1.1.3; 9.1.2.1; 9.1.2.3; 9.1.4.1; 9.1.4.2; Figure 9.1-1; Figure 9.1-2; Figure 9.1-3; Figure 9.1-20; Figure 9.1-21; FPR 2.3.12; 3.2; 3.7	--
2.2.5	N/A - See FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3	--
2.2.6	N/A - Same as above	--
2.2.7	1st portion is N/A (Optimum moderation condition was assumed.) However, water retention was evaluated by bounding with optimum moderation condition. Thus: FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3	
2.2.8	FSAR 9.1.1.3; 9.1.2.3	--

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
2.2.9	FSAR 9.1; 9.1.1.2; 9.1.2.2; 9.1.4.1; 9.1.4.2; 9.1.4.3	--
2.2.10	N/A (We have already requested the exemption.)	--
2.3	FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.3; SER 9.1.1	--
3	N/A (License to cover this has already been granted.)	--

ATTACHMENT B

ANSWERS TO SPECIFIC QUESTIONS FROM ENCLOSURE 2 "ADDITIONAL GUIDANCE"

Question 1.a.

Confirm both Byron Units 1 and 2 have common fuel assembly unloading, inspection, and storage areas. Specify the desired quantity of U-235 each unit is to be authorized to possess and store.

Answer 1.a.

Byron Units 1 and 2 do have common fuel assembly unloading, inspection, and storage areas.

The desired quantity of U-235 each unit is to be authorized to possess and store is as follows:

Kg U-235 (in fuel assemblies only, enrichments are weight % U-235)

Unit 1	Unit 2	Description
2120.7 kg	2120.7 kg	193 initial core assemblies per unit @ 2.1, 2.6, 3.1% enrichment
947.6 kg	0.0 kg	64 Unit 1 reload assemblies @ 3.5% enrichment
65.6 kg	65.6 kg	5 initial core replacement assemblies per unit @ 3.1% enrichment
3133.9 kg	2186.3 kg	5320.2 kg total for both units

Note: The above quantities of U-235 were calculated based upon an average mass of 423.038 kg U per assembly. Nominal enrichments of 2.1, 2.6, 3.1, or 3.5% were used. Manufacturing tolerances were not considered in this calculation. More precise enrichment values will be available when the fuel is actually fabricated. As is mentioned in the answer to question 1.b. that follows, the maximum value of enrichment will not exceed .05% above the nominal value.

Question 1.b.

Specify the maximum U-235 enrichment requested (including manufacturing tolerances). The nuclear criticality safety of your fuel assembly handling and storage should be based on the maximum U-235 enrichment.

Answer 1.b.

The maximum U-235 enrichment this license is requested for is 3.5% with a manufacturing tolerance not to exceed $\pm$ 0.05%.

Nuclear criticality safety of fuel assembly storage is based upon U-235 enrichments as follows:

The new fuel storage racks were analyzed for dry storage of 4.00% enriched fuel assemblies. No limitations were placed on the loading pattern.

The spent fuel storage racks were analyzed for dry storage of 3.20 + 0.015% enriched fuel assemblies. Dry storage of new fuel assemblies with enrichments below this value will be accomplished by checkerboard loading the racks. Fuel assemblies with enrichments above 3.20 + 0.015% will be stored in the new fuel storage racks.

The spent fuel storage racks were also analyzed for wet storage of 4.00 enriched new fuel assemblies. No limitation was placed on the loading pattern.

The nuclear criticality safety of our new fuel assembly storage is thus based on values that bound the maximum U-235 enrichments.

Nuclear criticality safety of fuel assemblies being handled is based upon limiting the number of fuel assemblies that will be out of their respective shipping containers or storage racks at a given time and controlling the proximity of each fuel assembly to other fuel assemblies. Refer to answer 4.a. below.

Question 1.c.

Indicate when and how you plan to store the fuel assemblies that are rejected during receiving inspection and not immediately returned to the vendor.

Answer 1.c.

Fuel assemblies will be inspected visually upon receipt from the manufacturer. Fuel assemblies rejected during this inspection will be repackaged in the vendor shipping container and stored in the fuel handling building until shipment to the vendor can be completed.

Question 2.a.

Confirm the personnel handling fuel and the radiation control personnel will receive training in their assignments before being allowed to perform the related operations. Specify the training they receive and identify the position(s) of the person(s) performing the training.

Answer 2.a.

Personnel handling fuel, radiation control personnel, and radiation chemistry department management personnel will receive training in their assignments before being allowed to perform the related operations. Training will be received/performed as necessary in accordance with the descriptions given in the Byron/Braidwood FSAR, sections/subsections 12.5.3.5, 13.1.2.2, 13.1.3.1, 13.2.1, 13.2.1.4, 13.2.1.6, 13.2.1.7, and 13.2.1.12. As specified in plant administrative procedures, the following personnel are involved in the performance of the traiing program: the Nuclear Sation Training Supervisor, personnel assigned to the Station Training Department as Instructors, the Fuel Handling Foreman, the Radiation Protection-Chemistry Supervisor, the Station Chemist, the Station Health Physicist, and the Health Physicists.

Question 2.b.

Specify whether all activities related to this license application for both Byron Units 1 and 2 are performed by the same personnel.

Answer 2.b.

All activities related to this license application for both Byron Units 1 and 2 will be performed by the same personnel or their designated alternate(s).

Question 2.c.

Provide the minimum qualifications for the key position(s) having radiation safety, nuclear criticality safety, and fuel handling responsibilities.

Answer 2.c.

Qualifications for personnel holding key positions having radiation safety, nuclear criticality safety, and fuel handling responsibilities are in accordance with requirements given in the Byron/Braidwood FSAR, sections/subsections 12.1.1.2, 12.5.1, 13.1.2.2, 13.1.3.1, and 13.1.3.2 with the exception of the fuel handling foreman who is in training for a limited senior reactor operator license but will not be examined until after fuel is delivered to the site.

Question 3.

Describe the steel guide tubes in the new fuel storage racks. Include the inner and outer dimensions, wall thickness, and type of steel.

Answer 3.

The steel guide tubes in the new fuel storage racks have the following specifications: the inner dimension is 9.00(+.12, -.00) inches square at all cross sections; the wall thickness is .125 $\pm$ 0.010 inches; and the outer dimension is therefore a nominal 9.25 inches square. The material of composition is type 304 stainless steel. Portions of the outer can surface have additional metal pieces welded to them to provide structural support. A general description of the racks is provided in the Byron/Braidwood FSAR, subsections 9.1.1.1, 9.1.1.2, and 9.1.1.3.

Question 4.a.

Confirm that there shall be no more than one fuel assembly outside its shipping container or storage rack at a given time or provide justification for having more than one fuel assembly outside its shipping container or storage rack.

Answer 4.a.

There will be no more than one fuel assembly outside its shipping container or storage rack at a given time. (Two fuel assemblies normally occupy a shipping container and upon removal are lifted together to the vertical position by lifting the strong back apparatus to the vertical position, but until one is removed from the strong back both are considered to be located in the shipping container.)

Question 4.b.

Confirm that the protective covers are open at the bottom to allow free drainage of water (e.g., from a sprinkler under accident conditions).

Answer 4.b.

The criticality calculations for storage of fuel assemblies in the new and spent fuel storage racks assume both optimum moderation and no moderation conditions. The Fuel Handling Building has a water based fire protection system. However, to be conservative, provisions have been made for draining water that may accumulate around the stored fuel assemblies. This will be accomplished by either ensuring the protective covers are open on the bottom or by placing a slit in the protective cover near the bottom of the fuel assembly.

Question 4.c.

Describe the administrative controls to assure that the fuel will be stored and maintained in a checkerboard pattern.

Answer 4.c.

When transporting a new fuel assembly, the loaded area of the spent fuel racks will be approached from the unloaded side, never allowing a fuel assembly to pass over a storage cell that is immediately adjacent to a cell already containing a fuel assembly. Two independent persons will verify placement of the new fuel assemblies in the spent fuel pit storage rack locations to ensure the checkerboad pattern is maintained. During unloading, fuel assemblies nearest the unloaded side will be moved first ensuring that assemblies are not moved across each other.

Question 5.a.

The following information on the fuel assembly storage arrays (new fuel and spent fuel racks) is required to make our nuclear criticality safety analysis:

(1) Lattice spacing of the storage cells.
(2) Array size and shape.
(3) Distance from array to concrete floor and walls.
(4) Specify material type, composition, and location of neutron poisons, if any, to ensure nuclear criticality safety of the arrays.

Answer 5.a.

New Fuel Racks

(1) Refer to Byron/Braidwood FSAR figure 9.1-1. 132 new fuel storage cells are laid out in 3 groups of 44 storage cells each. Each group of 44 storage cells is made up of 2 rows of 22 storage cells each. The lattice spacing in either direction for storage cells within each group of 44 cells is 21.00" typical. The lattice spacing between the closest cells of adjacent groups of 44 cells is greater than 71".

(2) Refer to item (1) above.

(3) New fuel will be held off the floor of the new fuel vault by nominal 2.00 inch Douglas fir pads. The east side of the racks measures nominally 31.5" from the east vault wall to the east edge of the fuel cells. The west side of the racks measures nominally 36.5" from the west vault wall to the west edge of the fuel cells. There is at least 51" to the edge of the closest fuel cell as measured from the south end of the racks to the south vault wall. There is at least 69" to the edge of the closest fuel cell as measured from the north end of the racks to the north vault wall.

(4) N/A - No neutron poisons are used in the fabrication of the new fuel storage racks.

Answer 5.a. - (Continued)

Spent Fuel Racks

(1) Refer to Byron/Braidwood FSAR figure 9.1-2. 1050 spent fuel storage cells are laid out in 20 6X6 racks and 11 6X5 racks. An additional 10 cell failed fuel storage rack is located in the southwest corner of the spent fuel pit, having the same external size as a 6X5 rack. The lattice spacing in either direction for storage cells within each 6X5 or 6X6 rack is 14.00" typical. Spacing between racks in the north-south direction is 1.50" typical (to obtain a 14.5" typical pitch for perimeter fuel cells). Spacing between racks in the east-west direction is 7.00" typical (to obtain a 20.00" typical pitch for perimeter fuel cells).

(2) Refer to item (1) above.

(3) The distance from the bottom of the fuel assemblies placed in the spent fuel racks to the floor of the spent fuel pit will exceed 13.00". The east wall of the spent fuel pit is located 15.50" from the east side of the racks closest to it. The west wall of the spent fuel pit is located 28.50" from the west side of the racks closest to it. The east half of the south wall of the spent fuel pit is located 13.50" from the south side of the racks closest to it. The west half of the south wall of the spent fuel pit is located 20.50" from the south side of the racks closest to it. The north wall of the spent fuel pit is located 13.50" from the north side of the racks closest to it.

(4) N/A - No neutron poisons are used in the fabrication of the spent fuel storage racks.

Question 5.b.

Nuclear criticality safety controls for handling at an inspection station.

Answer 5.b.

Nuclear criticality safety controls for handling fuel assemblies at an inspection station will be as follows. Only one fuel assembly will be outside of its shipping container or storage rack for inspection at a given time. This inspection may occur at the shipping container during initial fuel assembly unloading, at the new fuel racks during initial fuel assembly insertion or removal for inspection, and at the spent fuel racks during initial fuel assembly insertion or removal for inspection. (If an inspection is performed at the spent fuel racks, the fuel assembly will not be moved laterally.) Refer to the answer to question 4.a.

Question 6.a.

Specify the keff of the assemblies in the new fuel vault when flooded with non-borated water and under conditions of optimum water mist moderation.

Answer 6.a.

Keff will be less than 0.95 with fuel of a maximum enrichment of 4.00 w/o U-235 in place in the new fuel vault, assuming the stored assemblies completely submerged in unborated water at a conservative water temperature and with no credit for neutron poison in the fuel assembly. Keff will be less than 0.98 with fuel of a maximum enrichment of 4.00 w/o U-235 in place in the new fuel vault, assuming optimum neutron moderation conditions (dry or fogged).

Question 6.b.

Confirm your definition of "checkerboard array" includes the absence of fuel assemblies in all four adjacent locations to an assembly.

Answer 6.b.

Under the checkerboard loading pattern, new fuel assemblies are to be placed in spent fuel rack positions with the four nearest adjacent positions empty. For those spent fuel rack storage cell locations on the perimeter of the spent fuel pit, the nearest adjacent positions are to remain empty (there may be 2 or 3 nearest adjacent positions).

Question 6.c.

Specify the keff of the assemblies in the spent fuel racks under optimum conditions of water moderation.

Answer 6.c.

Keff is less than 0.98 with fuel of a maximum enrichment of 3.2 $\pm$ 0.015 w/o U-235 in place in the spent fuel racks under conditions of optimum moderation, assuming fuel assembly loading is per the checkerboard arrangement.

Question 6.d.

Specify the distance (center-to-center) between each pair of rows in the new fuel racks (FSAR Figure 9.1-1).

Answer 6.d.

Refer to the answer to question 5.a.(1), New Fuel Racks, for the lattice spacing (center-to-center distance) for each pair of rows in the new fuel racks.

Question 6.e.

Describe the temporary storage of the assemblies in their shipping containers prior to their removal and provide the nuclear criticality safety of the temporary storage.

Answer 6.e.

Normally fuel assemblies will not be stored in their shipping containers after their arrival on site. As a shipment of fuel assemblies is received it will be unpackaged, inspected, and stored in either the new or spent fuel racks. However, more than one shipment of fuel assemblies can be temporarily stored in the new fuel receiving area of the Fuel Handling Building. The maximum number of closed containers that could be stored in the receipt area is dependent on the space available to store containers and the availability of empty shipping containers from the fuel vendor, Westinghouse. The unopened containers will be stored in conformance with vendor supplied specifications (e.g. not to be stacked more than 2 in height unless laterally supported, and then not to be stacked more than 3 in height) for the safety of the containers and the workforce.

The fuel vendor, Westinghouse, has indicated in writing that the number of loaded shipping containers that may be located together is not a criticality concern. Therefore, no special controls are required to ensure the nuclear criticality safety of the temporary storage of loaded shipping containers.

Question 6.f.

Specify the controls that ensure there will be no fuel in the four adjacent storage locations to each fuel assembly in the spent fuel pool.

Answer 6.f.

Refer to the answer to question 4.c.

Question 6.g.

Identify the requirements for handling and packaging of the wastes generated in your decontamination activities.

Answer 6.g.

For specific requirements for handling and packaging wastes generated in our decontamination activities refer to Byron/Braidwood FSAR sections/subsections 12.1.1.3, 12.5.2, 12.5.3.1, 12.5.3.2, 12.5.3.3, 13.3.11, and especially subsection 12.5.3.4.

Qestion 6.h.

Explain what prevents a dropped fuel assembly from occupying a position other than that in a normal checkerboard position.

Answer 6.h.

As specified in the answer to question 4.c., the racks will be loaded and unloaded from the unloaded side, never allowing a fuel assembly to pass over a storage cell that is immediately adjacent to a cell already containing a fuel assembly.

Question 6.i.

Describe the steel cover over the new fuel storage area (e.g. number of sections, areas of the vault covered). Include the maximum number of assemblies and rows uncovered at one time.

Answer 6.i.

In the new fuel storage racks, the three groups of storage cells (44 storage cells per group) are each directly covered by 12 separate steel cover plates of nominal 3'2" by 3'3" dimensions, for a total number of 36 steel cover plates. Removal of one plate will provide access for up to 4 fuel assemblies (2 rows of 2 assemblies each). Up to four steel cover plates will be removed at a given time uncovering up to 16 fuel assemblies.

Question 6.j.

Identify the controls that limit the supply of combustible materials in the fuel storage areas.

Answer 6.j.

The controls that limit the supply of combustible materials in the fuel storage areas will be in accordance with the descriptions given in the Byron/Braidwood Fire Protection Report, sections/subsections 2.3.12.1, 3.2-1. and 3.7-1.

In addition to the combustible materials, currently identified in the Fire Protection Report, the following combustible materials will be present in or near the new and spent fuel storage areas. Douglas Fir pads are used at the base of the new fuel vault (refer to the answer to question 5.a.(3)); railroad ties and structural lumber assembled to form a crosstown to support construction activities runs east-west adjacent to the north side of the spent fuel pit outside the security barrier protecting access to the spent fuel pit area; and limited usage of miscellaneous lumber that is temporarily used for construction related activities in other areas of the Fuel Handling Building which are not directly adjacent to either the new fuel vault or spent fuel storage pit areas.

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
1.2.4	FSAR 3.2.1.1; Table 3.2-1; 3.3; 3.8.4.1.2; 9.1.1.1; 9.1.1.2; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3; 9.1.4.1; 9.1.4.2; 9.1.4.3; 9.1.4.4	--
1.2.5	FPR 2.3.12; 3.2(i); 3.7(1), (m); FSAR Table 3.2-1	--
1.2.6	FSAR 13.6; SNM Sec. Plan; SER 13.6	--
1.3	Same as above.	--
1.4.1	FSAR 4.2.4.1	--
1.4.2	---	Any unirradiated fuel to be returned to the vendor will be packed and shipped in the containers originally used to s fuel to Byron.
1.5.1	SER 22.1; 22.2	Proof of financial protection shall be filed with the NRC in manner specified in 10 CFR 10 C 140.15 prior to issuance of the requested amendment.
2.1.1	FSAR 12.1.1.1; 12.1.1.2; 12.1.1.3; 12.5.1; 13.1.2.2; 13.1.3.1; 13.1.3.2	--
2.1.2	Same as above, and SER 12.5	--
2.1.3	FSAR 12.1.1.3; 13.1.3.1; 13.1.3.2; 13.2.1; 13.2.1.6; 13.2.1.7; 13.2.1.12	
2.1.4	FSAR 12.1.1.3; 12.5.2; 12.5.3.1; 12.5.3.2; 12.5.3.3; 12.5.3.4; Table 12.5-2; 13.3.11	--
2.1.5	FSAR 12.1.1.3.h; 12.5.2; Table 12.5-2	--

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
2.2.1	FSAR 12.1.1.2; 13.1.2.2; 13.1.3.1; Table 13.1-2; 13.2.1.4; 13.2.1.12; ANSI N18.1	--
2.2.2	FSAR 12.1.1.2; 13.1.2.2	--
2.2.3	Normally assemblies will not be stored in their shipping containers - FSAR 9.1.1.2.	Two assemblies are packaged per metal shipping container to be temporarily stored in the receiv area of the Fuel Handling Buildi Westinghouse has indicated that the number of loaded shipping containers that may be located together is not a criticality concern.
2.2.4	FSAR Table 3.2-1; 9.1.1.1; 9.1.1.2; 9.1.1.3; 9.1.2.1; 9.1.2.3; 9.1.4.1; 9.1.4.2; Figure 9.1-1; Figure 9.1-2; Figure 9.1-3; Figure 9.1-20; Figure 9.1-21; FPR 2.3.12; 3.2; 3.7	--
2.2.5	N/A - See FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3	--
2.2.6	N/A - Same as above	--
2.2.7	1st portion is N/A (Optimum moderation condition was assumed.) However, water retention was evaluated by bounding with optimum moderation condition. Thus: FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.2; 9.1.2.3	
2.2.8	FSAR 9.1.1.3; 9.1.2.3	--

R.G. 3.15 Section	References Section/Subsection/Paragraph	Additional Information
2.2.9	FSAR 9.1; 9.1.1.2; 9.1.2.2; 9.1.4.1; 9.1.4.2; 9.1.4.3	--
2.2.10	N/A (We have already requested the exemption.)	--
2.3	FSAR 9.1.1.1; 9.1.1.3; 9.1.2.1; 9.1.2.3; SER 9.1.1	--
3	N/A (License to cover this has already been granted.)	--

ATTACHMENT B

ANSWERS TO SPECIFIC QUESTIONS FROM ENCLOSURE 2 "ADDITIONAL GUIDANCE"

Question 1.a.

Confirm both Byron Units 1 and 2 have common fuel assembly unloading, inspection, and storage areas. Specify the desired quantity of U-235 each unit is to be authorized to possess and store.

Answer 1.a.

Byron Units 1 and 2 do have common fuel assembly unloading, inspection, and storage areas.

The desired quantity of U-235 each unit is to be authorized to possess and store is as follows:

Kg U-235 (in fuel assemblies only, enrichments are weight % U-235)

Unit 1	Unit 2	Description
2120.7 kg	2120.7 kg	193 initial core assemblies per unit @ 2.1, 2.6, 3.1% enrichment
947.6 kg	0.0 kg	64 Unit 1 reload assemblies @ 3.5% enrichment
65.6 kg	65.6 kg	5 initial core replacement assemblies per unit @ 3.1% enrichment
3133.9 kg	2186.3 kg	5320.2 kg total for both units

Note: The above quantities of U-235 were calculated based upon an average mass of 423.038 kg U per assembly. Nominal enrichments of 2.1, 2.6, 3.1, or 3.5% were used. Manufacturing tolerances were not considered in this calculation. More precise enrichment values will be available when the fuel is actually fabricated. As is mentioned in the answer to question 1.b. that follows, the maximum value of enrichment will not exceed .05% above the nominal value.

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

MAY 6 1983

FCUP:NK
70-2973

Commonwealth Edison
ATTN: Mr. T. R. Tramm
Nuclear Licensing Administrator
P.O. Box 767
Chicago, IL 60690

Gentlemen:

Enclosed is the NRC Materials License No. SNM-1917 which authorizes the receipt, possession, inspection, and storage of uranium enriched in the U-235 isotope contained in fuel assemblies. All materials are for use at the Byron Generating Station Unit 1. Please note, the license contains additional conditions which were discussed with Mr. T. R. Tramm and Mr. Barry L. Serini of my staff. This license authorizes the storage of fuel assemblies in their shipping containers and in the New Fuel Storage Vault. This license does not authorize the storage of fuel assemblies in the racks in your Spent Fuel Storage Pool. Review and authorization for the storage of fuel assemblies in the pool will be made after resolution of the outstanding questions on the structural integrity of the pool and associated storage racks.

In addition, the license authorizes the packaging of fuel assemblies for delivery to a carrier for transport. This latter authority enables you to return damaged fuel assemblies to another location, e.g., return to the manufacturer. The delivery of the assemblies to a carrier must be in accordance with 10 CFR Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions," copy enclosed. In this regard, your attention is directed to 10 CFR Part 71.12(b) which provides a general license under specified conditions for the use of certain shipping packages which have been licensed for use by another licensee.

Also enclosed are two copies of Indemnity Agreement Number B-97 for your review, acceptance, and the return of one signed copy.

The Nuclear Regulatory Commission uses an electronic data processing system to record the location, by licensee, of special nuclear material. This system uses a three-letter Reporting Identification Symbol (RIS) to identify licensees who submit the material transfer reports, and periodic material status reports in accordance with 10 CFR Parts 70.53 and 70.54 of the Commission's regulations. For this purpose, you should continue to use the RIS: XYS, previously assigned to you. This symbol is to be used in completing the transfer reports and the periodic material status reports and should be used in any other correspondence with the NRC relative to such reports. You should also note the requirements of 10 CFR Part 70.51(b), (c), and (d) regarding records, material control and accounting procedures, and physical inventories. Your cooperation will be appreciated.

Your application for license requested an exemption from the provisions of 10 CFR 70.24. Such an exemption would relieve you from the requirement of having a criticality alarm system. Because of the inherent features associated with the storage and inspection of unirradiated fuel, the NRC staff has determined that you have shown good cause for being granted the exemption and that granting such an exemption will not endanger public life or property or the common defense and security and is otherwise in the public interest.

Enclosed is our evaluation report in support of this license.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosures:
1. Materials License No. SNM-1917
2. Safety Evaluation Report
3. 10 CFR Part 71
4. Indemnity Agreement Number B-97

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s); and to import such byproduct and source material. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Commonwealth Edison (CE)	3. License number SNM-1917
2. P.O. Box 767 Chicago, IL 60690	4. Expiration date May 31, 1988 or *
	5. Docket or Reference No. 70-2973

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
Uranium enriched in U-235 isotope	In unirradiated reactor fuel assemblies	2660 kg of U-235 in uranium enriched to no more than 3.55 w/o in U-235

9. Authorized Use

For receipt, possession, inspection, storage and packaging of fuel for delivery to a carrier in accordance with the statements, representations and conditions specified in the licensee's application dated October 6, 1982, and its supplement dated February 28, 1983, except as specifically provided otherwise by this license.

10. Authorized Place of Use

The licensee's Byron Nuclear Generating Station, Unit 1, located in north central Illinois, near the town of Byron, as described in the aforesaid application.

11. Procedures, and changes thereto, for the control and handling of nuclear fuel shall be reviewed and approved by an Operating Engineer and the Technical Staff Supervisor.

12. The minimum technical qualifications for the Station Superintendent shall be in accordance with Section 4.2.1, "Plant Manager," of ANSI N18.1-1971.

13. The minimum technical qualifications for the Fuel Handling Foreman shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

*Upon conversion of Construction Permit No. CPPR-130 to an operating license, whichever is earlier.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: SNM-1917

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14. The minimum technical qualifications for the Health Physicist shall be in accordance with the requirements for Radiation Protection Manager of Regulatory Guide 1.8, September 1975.

15. The minimum technical qualifications for the Operating Engineer shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

16. The minimum technical qualifications for the Technical Staff Supervisor shall be in accordance with Section 4.2.4, "Technical Manager," of ANSI N18.1-1971.

17. The following training shall be conducted prior to receipt of fuel onsite:

    a. All radiation safety personnel shall be trained in radiation safety and CE radiation protection procedures related to fuel assembly handling.

    b. All operations personnel involved in fuel handling shall receive training in proper fuel handling procedures, including the related health and safety aspects of the activities.

18. Notwithstanding the licensee's application dated October 6, 1982, and its supplement dated February 28, 1983, fuel assemblies shall not be stored in the Spent Fuel Storage Pool.

19. All preoperational testing of fuel handling equipment, related to activities authorized by this license, shall be completed and the test results shall be reviewed and approved by CE engineering before receipt of fuel onsite. This includes the testing of the following:

    a. The fuel assembly handling fixture tool,

    b. The Rod Cluster Control Assembly (RCCA) handling fixture,

    c. The fuel storage racks in the new fuel vault, and

    d. The fuel handling building crane.

20. Fuel assemblies shall be stored in such a manner that water would drain freely from the assemblies in the event of flooding and subsequent draining of the fuel storage area.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

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21. No more than 60 shipping containers, containing fuel, shall be stored onsite at any one time.

22. No more than one fuel assembly shall be out of its shipping container or storage location at any given time.

23. The minimum edge-to-edge distance between the fuel assembly outside its shipping container or storage rack and all other fuel assemblies shall be 12 inches.

24. The licensee is hereby exempted from the provisions of 10 CFR 70.24 insofar as this section applies to material held under this license.

25. A 24-hour fire watch shall be present in the areas adjacent to the fuel storage locations.

26. The "Special Nuclear Materials Security Plan for Byron Station" shall be fully implemented by the date of fuel receipt and shall be in effect whenever fresh fuel is stored onsite.

FOR THE NUCLEAR REGULATORY COMMISSION

Date MAY 6 1983

By R G Page
Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

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

MAY 6 1983

Docket No: 70-2973

Applicant: Commonwealth Edison

Facility: Byron Generating Station Unit 1

Subject: Safety Evaluation Report - Review of License Application Dated October 6, 1982 and Revised Application Dated February 28, 1983 for a Materials License

I. Introduction

A. General

By application dated October 6, 1982 and its supplement dated February 28, 1983, Commonwealth Edison (CE) requested that NRC Materials License No. SNM-1860 be amended to authorize them to receive, possess, inspect, and store fuel assemblies containing uranium enriched to 3.55 w/o. Since Materials License No. SNM-1860 only authorized possession of 90 mg of U-235, the staff chose to issue a new license for the fuel assemblies. Possession of the material authorized by SNM-1860 will be incorporated into the Byron Unit 1 license at a later date (see Section II below). The application requested authorization to store fuel assemblies for both Byron Units 1 and 2 in shipping containers, in the New Fuel Storage Vault and in the Spent Fuel Pool. However, because of the limited storage space that can be approved at this time (See Section VI below on "Nuclear Criticality Safety") the present authorization will be limited to fuel storage only for Byron Unit 1 in the shipping containers and in the New Fuel Storage Vault. The finished fuel assemblies will be supplied by the Westinghouse Electric Corporation. Each fuel assembly contains 264 fuel pins, 24 guide thimble tubes and one instrumentation thimble tube. The fuel, guide and instrumentation thimbles are spaced and supported in a 17 x 17 array by eight spacers and a top and bottom nozzle. Table 1 gives general fuel rod parameters that describe the fuel which will eventually be used in Byron Generating Station Units 1 and 2. The Materials License is being issued to allow early receipt of the fuel for the purpose of inspection and preparation of the fuel for reactor loading. The license will automatically terminate upon issuance of the Part 50 operating license for Unit 1.

B. Location Description

The Byron Generating Station is located about 3 miles south-southwest of the town of Byron in Ogle County, Illinois. The construction permit, CPPR-130, was issued for Byron Unit 1 on December 31, 1975 (Docket No. 50-454).

TABLE 1

Byron Generating Station Units 1 and 2

General Fuel Data

Fuel Assembly Data	Inches
Overall Length	159.8
Nominal Active Fuel Length	144
Fuel Rod Pitch	0.496
Rod Array	17 x 17
Rods Per Assembly	264
Fuel Rod Data	
Outside Diameter	0.360
Cladding Inside Diameter	0.315
Cladding Thickness	0.0225
Fuel Pellet Immersion Density (% theoretical)	95.0
Fuel Pellet Diameter	0.3088
Fuel Pellet Length	0.507

II. Authorized Activities

The license will authorize the receipt, possession, and storage of 252 finished fuel assemblies with a maximum pin enrichment of 3.55 w/o in U-235 in their shipping containers and in the New Fuel Storage Vault. The license will also authorize the repackaging of any assembly, if necessary, for delivery to a carrier. It should be noted that this license does not authorize insertion of a fuel assembly into the reactor vessel.

CE currently holds Materials License No. SNM-1860 for receipt, possession and use of 90 mg of U-235 (in incore monitoring detectors) and Materials License No. 12-05650-18 (for special and byproduct material), which authorizes the receipt, possession and use of sealed sources. The material possessed under these licenses will be incorporated into the Byron Unit 1 license at a later date and the 2 licenses (for incore monitoring detectors and byproduct material) will be terminated.

III. Scope of Review

The safety review of CE's request for a Materials License included an evaluation of the application dated October 6, 1982, its supplement dated February 28, 1983, and the referenced sections of the FSAR.

A detailed review was made of the CE organization, administration, nuclear criticality safety, radiation protection and fire protection programs.

Discussions were held with the NRR project manager, the resident inspectors, NRC Region III staff members and with staff members of the applicant during the course of the reviews. The evaluation of the physical security plan was made by the Physical Security Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards.

IV. Possession Limits

Conditions 6, 7, and 8 of the license specify the type, form, and quantity of material the licensee may possess at any one time under this license and will read as follows:

6. Material	7. Form	8. Quantity
Uranium enriched in the U-235 isotope	In unirradiated reactor fuel assemblies	2660 kg of U-235 in uranium enriched to no more than 3.55 w/o in U-235

V. Organization

A. Nuclear Criticality Safety and Radiation Protection Responsibilities

1. Station Superintendent

The Station Superintendent exercises overall managerial and supervisory responsibility for the safe operation of the plant and its equipment. He is responsible for compliance with the station's NRC licenses, government regulations, ASME code requirements, and the applicant's quality assurance program.

2. Fuel Handling Foreman

New fuel is handled under the supervision of the Fuel Handling Foreman. He is responsible for developing and implementing procedures involving the control and handling of nuclear fuel.

3. Station Health Physicist

The Station Health Physicist is responsible for daily health physics activities. He reviews health physics surveys, dose data, internal deposition data, meteorological data and environmental data. He has access to the Station Superintendent on matters of radiation protection during unusual or abnormal radiological conditions.

4. Operating Engineer

The Operating Engineer is responsible for the operation of the mechanical and electrical equipment and certain common plant systems, such as radioactive waste processing and fuel handling. He is also responsible for authorizing functional acceptance tests to be conducted by Operation and/or Technical Staff personnel.

5. Technical Staff Supervisor

The Technical Staff Supervisor provides technical support for plant operations, refueling, maintenance and modification and evaluates process data and equipment performance, and adequacy of station procedures. He also has the responsibility and authority for implementation of the onsite review function.

Although the FSAR, related to the reactor operation, specifies the review and approval requirements for procedures and changes thereto, the commitment is not included in the license application. Therefore, it is recommended that Condition No. 11 be added specifying the procedure review and approval requirements.

Condition 11. Procedures, and changes thereto, for the control and handling of nuclear fuel shall be reviewed and approved by an Operating Engineer and the Technical Staff Supervisor.

B. Minimum Qualifications

The qualifications of the aforementioned safety related personnel have been reviewed and the staff finds that they meet the minimum qualifications specified in Regulatory Guide 1.8, "Personnel Selection and Training" or ANSI N18.1, "Selection and Training of Nuclear Personnel" or both; however, the applicant has not specified minimum qualifications for these positions. Accordingly, Condition Nos. 12-16 are recommended to correct this deficiency and shall read as follows:

Condition 12. The minimum technical qualifications for the Station Superintendent shall be in accordance with Section 4.2.1, "Plant Manager," of ANSI N18.1-1971.

Condition 13. The minimum technical qualifications for the Fuel Handling Foreman shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

Condition 14. The minimum technical qualifications for the Health Physicist shall be in accordance with the requirements for Radiation Protection Manager of Regulatory Guide 1.8, September 1975.

Condition 15. The minimum technical qualifications for the Operating Engineer shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

Condition 16. The minimum technical qualifications for the Technical Staff Supervisor shall be in accordance with Section 4.2.4, "Technical Manager," of ANSI N18.1-1971.

C. Training

The application incorporates the educational experience and technical qualifications for onsite radiation control personnel, the Station Training Supervisor and Fuel Handling Foreman (responsible for the training of the staff and administrative controls for fuel handling and storage). The training of CE's staff is included in the FSAR and referenced in the application. The training includes training in radiation safety and fuel handling procedures. The staff has concluded that the applicant's radiation safety and fuel handling training programs are adequate to allow them to reasonably carry out the activities

for which a license is requested. Their radiation protection training program meets the requirements in 10 CFR Part 19 and Regulatory Guide 1.8. Since the timing of the training is only specified relative to reactor operations, it is recommended that Condition 17 be added requiring the training be given prior to receipt of fuel assemblies.

Condition 17. The following training shall be conducted prior to receipt of fuel onsite:

a. All radiation safety personnel shall be trained in radiation safety and CE radiation protection procedures related to fuel assembly handling.

b. All operations personnel involved in fuel handling shall receive training in proper fuel handling procedures, including the related health and safety aspects of the activities.

D. Administrative Procedures

The Fuel Handling Foreman will develop administrative procedures for the control and handling of nuclear fuel bundles. These procedures, and any change to these procedures require the review and approval of an Operating Engineer and the Technical Staff Supervisor.

VI. Nuclear Criticality Safety

The applicant requests authorization to store fuel assemblies in the Spent Fuel Storage Pool, the New Fuel Storage Vault, and in their shipping containers in the New Fuel unloading area of the fuel handling building and the area immediately outside the fuel handling building. Because the Spent Fuel Pool and related fuel storage area do not meet the Category 1 seismic criteria specified in the FSAR and are in need of repair, the storage of fuel assemblies in the spent fuel pool will not be authorized prior to resolution of the classification and the structural integrity problem. Therefore, the staff recommends that Condition 18 be added to the license.

Condition 18. Notwithstanding the licensee's application dated October 6, 1982, and its supplement dated February 28, 1983, fuel assemblies shall not be stored in the Spent Fuel Storage Pool.

In order to be sure the fuel handling equipment is ready to safely handle the fuel assemblies, it is recommended the following license condition be added:

Condition 19. All preoperational testing of fuel handling equipment, related to activities authorized by this license, shall be completed and the test results shall be reviewed and approved by CE engineering before receipt of fuel onsite. This includes the testing of the following:

a. The fuel assembly handling fixture tool,

b. The Rod Cluster Control Assembly (RCCA) handling fixture,

c. The fuel storage racks in the new fuel vault, and

d. The fuel handling building crane.

After the fuel assemblies are removed from their containers, they will be stored dry in the New Fuel Storage Vault. The New Fuel Storage Vault has a capacity of 132 fuel assemblies.

In the New Fuel Storage Vault there will be three groups of fuel assemblies with each group having 2 rows of 22 assemblies each. The fuel assemblies within a group are spaced on 21 inches center-to-center. There are two 50-inch aisles between the 3 groups. The fuel storage cells have 0.125-inch thick square stainless steel tubes with an inner diameter of 9 inches. The staff has determined the maximum k_{eff} for the array to be less than 0.89 independent of the degree of water moderation within and between assemblies or the degree of concrete reflection surrounding the array.

The licensee plans to wrap the fuel assemblies in polyethylene covers to protect them from the environment while in storage. If the covers were sealed at their bottoms, the assemblies could become internally moderated with water while the spaces between assemblies would be occupied only with air. This could occur if the bottoms were closed, the storage area flooded and drained, and water retained in the covers. Large arrays, under these conditions, may become critical. The licensee has stated that the covers will either be open on the bottom or have a slit near the bottom of the fuel assembly to prevent the postulated accident from occurring. This added precaution taken by the licensee to prevent such a situation will be represented in Condition 20 for emphasis.

Condition 20. Fuel assemblies shall be stored in such a manner that water would drain freely from the assemblies in the event of flooding and subsequent draining of the fuel storage area.

It is the staff's opinion that with this condition, the licensee has established reasonable and satisfactory precautions to avoid accidental criticality.

The fuel assemblies may also be stored in their shipping containers (Westinghouse Model RCC-1 or RCC-3). Since 60 of the containers filled with fuel assemblies may be shipped in a single Class III shipment, they may be stored safely as a group independent of stacking or the degree of water moderation and reflection. Therefore, the staff recommends the storage of shipping containers of fuel assemblies be limited to 60 (Condition 21).

Condition 21. No more than 60 shipping containers, containing fuel, shall be stored onsite at any one time.

Calculations have indicated that two assemblies could be made critical at optimum conditions of water moderation and reflection; however, one assembly, separated from another assembly by 12 inches, cannot be made critical under any conditions. Because of this, the applicant has committed to have no more than one fuel assembly outside its shipping container or storage rack at a given time but did not specify the minimum separation between this assembly and others. Therefore, the staff recommends the following license conditions limiting the number of fuel assemblies out of storage and the minimum distance from all other fuel:

Condition 22. No more than one fuel assembly shall be out of its shipping container or storage location at any given time.

Condition 23. The minimum edge-to-edge distance between the fuel assembly outside its shipping container or storage rack and all other fuel assemblies shall be 12 inches.

The licensee has requested, pursuant to 10 CFR 70.24(d), an exemption from the provisions of 10 CFR 70.24. Because of the inherent features associated with the storage and inspection of unirradiated fuel containing uranium enriched to less than 5% in the U-235 isotope when no fuel processing activities are to be performed, the staff hereby determines that granting such an exemption will not endanger life or property, or the common defense and security, and is otherwise in the public interest. This exemption is authorized pursuant to 10 CFR 70.14. It is recommended that the exemption be identified as Condition 24.

Condition 24. The licensee is hereby exempted from the provisions of 10 CFR 70.24 insofar as this section applies to material held under this license.

VII. Radiation Safety

Since the radioactive materials (fresh fuel assemblies) are sealed sources, the principle pathway to an individual is via external radiation from the fuel assemblies. For a low enriched uranium fuel bundle (<4% U-235 enrichment), the exposure rate at one foot from the surface is normally less than 1 mr/hr; therefore, it is estimated that the exposure level to workers from these sources would be less than 25% of the maximum permissible exposure specified in 10 CFR 20. At Byron Generating Station, Unit 1, personnel external exposures are continuously monitored using pencil dosimeters and film badges. The pencil dosimeters are evaluated daily for control purposes. An individual dose is normally estimated every two weeks from the film badge results and entered into Commonwealth Edison's Computerized Radiation Exposure Record System.

VIII. Environmental Protection

The Final Environmental Statement related to the operation of Byron Generating Station, Units 1 and 2, dated April 30, 1982, has been prepared and issued by the NRC as NUREG-0848. Based on the environmental statement relating to the operating license, implementation of the 10 CFR Part 70 license for the storage and handling of special nuclear materials will have an insignificant effect on the environment. Accordingly, the issuance of this license is not a major federal action significantly affecting the quality of the human environment, and thus, pursuant to 10 CFR 51.5(d)(4), no environmental impact statement, negative declaration, or environmental impact appraisal need be prepared.

IX. Fire Safety

The materials used in the fuel storage areas are steel and concrete with the exception of wooden (Douglas Fir) pads covering the bottom of the New Fuel Storage Vault. There is also a significant quantity of wood (timber supports and plywood) on the refueling floor required during construction. The fire fighting equipment consists of portable extinguishers and several fire hose stations. There are also automatic fire detectors located throughout the fuel storage areas. The automatic fire detectors may not detect a fire started in the timber supports and plywood early enough to prevent a fire from getting out of control; therefore, it is recommended that a 24-hour fire watch be present in the vicinity of the fuel assembly storage areas (Condition 25).

Condition 25. A 24-hour fire watch shall be present in the areas adjacent to the fuel storage locations.

The staff has determined that, with the addition of Condition 25, the fire protection measures provided are adequate for the facility.

X. Physical Protection

The Division of Safeguards, NMSS, has reviewed CE's Physical Security Plan and has determined that it meets the requirements of 10 CFR 73.67. To ensure that the physical security plan shall be fully implemented and remain in effect whenever fresh fuel is stored onsite, the staff recommends Condition 26.

Condition 26. The "Special Nuclear Materials Security Plan for Byron Station" shall be fully implemented by the date of fuel receipt and shall be in effect whenever fresh fuel is stored onsite.

XI. Conclusions

After reviewing the application and its supplement, the staff finds that:

a. The application meets the requirements of the Atomic Energy Act, as amended, and of the regulations of the Commission,

b. Issuance of the license would not be inimical to the common defense and security,

c. Issuance of the license would not constitute an unreasonable risk to the health and safety of the public.

XII. Recommendations

The staff recommends approval of the application and its supplement subject to the following conditions which the staff finds are appropriate to protect health or to minimize danger to life or property.

11. Procedures, and changes thereto, for the control and handling of nuclear fuel shall be reviewed and approved by an Operating Engineer and the Technical Staff Supervisor.

12. The minimum technical qualifications for the Station Superintendent shall be in accordance with Section 4.2.1, "Plant Manager," of ANSI N18.1-1971.

13. The minimum technical qualifications for the Fuel Handling Foreman shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

14. The minimum technical qualifications for the Health Physicist shall be in accordance with the requirements for Radiation Protection Manager of Regulatory Guide 1.8, Heptember 1975.

15. The minimum technical qualifications for the Operating Engineer shall be in accordance with Section 4.3.1, "Supervisors Requiring AEC Licenses," of ANSI N18.1-1971.

16. The minimum technical qualifications for the Technical Staff Supervisor shall be in accordance with Section 4.2.4, "Technical Manager," of ANSI N18.1-1971.

17. The following training shall be conducted prior to receipt of fuel onsite:

    a. All radiation safety personnel shall be trained in radiation safety and CE radiation protection procedures related to fuel assembly handling.

    b. All operations personnel involved in fuel handling shall receive training in proper fuel handling procedures, including the related health and safety aspects of the activities.

18. Notwithstanding the licensee's application dated October 6, 1982, and its supplement dated February 28, 1983, fuel assemblies shall not be stored in the Spent Fuel Storage Pool.

19. All preoperational testing of fuel handling equipment, related to activities authorized by this license shall be completed and the test results shall be reviewed and approved by CE engineering before receipt of fuel onsite. This includes the testing of the following:

    a. The fuel assembly handling fixture tool,

    b. The Rod Cluster Control Assembly (RCCA) handling fixture,

    c. The fuel storage racks in the new fuel vault, and

    d. The fuel handling building crane.

20. Fuel assemblies shall be stored in such a manner that water would drain freely from the assemblies in the event of flooding and subsequent draining of the fuel storage area.

21. No more than 60 shipping containers, containing fuel, shall be stored onsite at any one time.

22. No more than one fuel assembly shall be out of its shipping container or storage location at any given time.

23. The minimum edge-to-edge distance between the fuel assembly outside its shipping container or storage rack and all other fuel assemblies shall be 12 inches.

24. The licensee is hereby exempted from the provisions of 10 CFR 70.24 insofar as this section applies to material held under this license.

25. A 24-hour fire watch shall be present in the areas adjacent to the fuel storage locations.

26. The "Special Nuclear Materials Security Plan for Byron Station" shall be fully implemented by the date of fuel receipt and shall be in effect whenever fresh fuel is stored onsite.

Barry L. Serini

Barry L. Serini
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Approved by: Norman Hetzlach
for W. T. Crow, Section Leader

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

June 20, 1983

Mr. John G. Davis
Director of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Byron Generating Station Units 1 and 2
Special Nuclear Materials License
Number SNM-1917
NRC Docket Nos. 50-454 and 50-455

References (a): October 6, 1982 letter from T. R. Tramm to J. G. Davis.

(b): February 28, 1983 letter from T. R. Tramm to J. G. Davis.

(c): May 6, 1983 letter from R. G. Page to T. R. Tramm.

(d): July 20, 1983 letter from T. R. Tramm to H. R. Denton.

Dear Mr. Davis:

Commonwealth Edison hereby renews the request of reference (a) for amendment of the Byron Generating Station Special Nuclear Materials License, SNM-1917. Authorization is requested pursuant to 10 CFR 70 to receive, possess and store unirradiated fuel assemblies in the amount necessary for operation of Byron Units 1 and 2. Partial authorization was granted in reference (b) for storage of fuel in the new fuel vaults. Additional authorization is needed by July 22, 1983 so that new fuel can also be stored in the spent fuel racks.

The license and SER attached to reference (c) indicated that reclassification of the spent fuel pool liner would need to be reviewed before authorization could be given for storage of fuel in the spent fuel pool. That issue has now been resolved and revised FSAR pages were provided in reference (d). Condition 18 can now be deleted.

Pursuant to 10 CFR 170.11, Commonwealth Edison has determined that no fee is required to accompany this application.

One (1) signed original and fifteen (15) copies of this letter are provided for your use.

Please address any questions regarding this matter to this office.

Very truly yours,

T. R. Tramm
Nuclear Licensing Administrator

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6802N

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

AUG 9 1983

FCUP:NK
70-2973
SNM-1917, Amendment No. 1

Commonwealth Edison
ATTN: Mr. T. R. Tramm
Nuclear Licensing Administrator
P.O. Box 767
Chicago, IL 60690

Gentlemen:

In accordance with your application dated June 20, 1983 and pursuant to Title 10, Code of Federal Regulations, Part 70, Materials License No. SNM-1917 is hereby amended to allow storage of new fuel assemblies in the Spent Fuel Storage Pool. Accordingly, Condition 18 is amended to read:

Condition 18. New fuel assemblies may be stored in the Spent Fuel Storage Pool subject to the following additional conditions:

a. The maximum U-235 enrichment shall be 3.22 w/o.

b. The fuel assemblies shall be stored in a checkerboard pattern.

c. The Fuel Handling Foreman shall verify correct fuel assembly location after insertion of each fuel assembly into the assigned storage rack in accordance with a prepared written procedure approved by an Operating Engineer and the Technical Staff Supervisor.

d. An independent loading verification shall be made by a Quality Control Inspector.

e. The Fuel Handling Foreman and the Quality Control Inspector shall each sign a document assuring proper storage of each fuel assembly.

f. The gate between the Spent Fuel Pool and the Fuel Transfer Canal shall be removed prior to the storage of fuel assemblies in the Spent Fuel Storage Pool.

g. The gate shall not be replaced until dye penetrant examinations of all gate hinge attachment welds have been performed and any resultant rework and reexaminations successfully completed.

h. The fuel assemblies shall be protected to preclude damage and preserve fuel assembly cleanliness during gate repair and replacement activities.

All other conditions of the license shall remain the same.

The above license conditions were discussed with Mr. T. R. Tramm of Commonwealth Edison and Mr. Norman Ketzlach of my staff on July 27, 1983. It should be noted the intent of Condition 19 in your license regarding the preoperational testing of the fuel handling equipment is to require completion of the testing program before use of the equipment.

FOR THE NUCLEAR REGULATORY COMMISSION

R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosure: Safety Evaluation Report

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

AUG 9 1983

DOCKET NO.: 70-2973

LICENSE NO.: SNM-1917

LICENSEE: Commonwealth Edison

SUBJECT: SAFETY EVALUATION REPORT - REVIEW LICENSE AMENDMENT APPLICATION DATED JUNE 20, 1983

I. Background

By application dated June 20, 1983, Commonwealth Edison (CE) requested authorization for the storage of new fuel assemblies in the Spent Fuel Storage Pool Racks. At the time NRC Materials License No. SNM-1917 was issued for the storage of fuel assemblies for later use at the Byron Generating Station, Unit 1, the Spent Fuel Storage Pool and related fuel storage area did not meet the Category 1 seismic criteria specified in the FSAR. Therefore, the storage of fuel assemblies in the spent fuel pool was not authorized. By letter dated June 20, 1983, CE submitted to NRR advanced copies of revised FSAR pages for its review and approval describing the Byron spent fuel pool liner. The spent fuel pool liner has been reclassified from a Safety Category I structure to Category II. The application, however, did not address a Region III unresolved item related to the stability of the hinged gate between the Spent Fuel Storage Pool and the Fuel Transfer Canal (see Discussion below).

II. Discussion

By memorandum dated June 28, 1983, O. D. Parr, Chief Auxiliary Systems Branch, Division of Systems Integration, NRR, confirmed the reclassification of the pool liner to a Safety Category II structure and that the liner meets the NRR acceptance criteria. However, W. Forney, Resident Inspector at the time, stated the Spent Fuel Storage Pool was not ready to receive fuel because of an unresolved item related to the stability of the hinged gate between the Spent Fuel Storage Pool and the Fuel Transfer Canal.

The fuel assemblies in the racks in the Spent Fuel Storage Pool are spaced on 14 inch-centers. The racks consist of square stainless steel tubes having a thickness of 1/8 inches. The tubes are held together in the array pattern by type 304 stainless steel plates welded to the side of the tubes at four elevations. The racks have a total capacity of 1050 fuel assemblies. However, an infinite array of assemblies at this spacing between assemblies and moderated by water at optimum mist density would be supercritical even with an enrichment of 3.22 w/o U-235. Therefore, the licensee specified the assemblies would be stored in the spent fuel pool in a checkerboard pattern. An independent nuclear criticality safety analysis by the staff indicates the k_{eff} of an infinite array of fuel assemblies at the specified enrichment and positioned in the racks in a checkerboard pattern is less than 0.90 at optimum water mist

density. Therefore, any size array of fuel assemblies in a checkerboard pattern in the Spent Fuel Storage Pool Racks is safe from inadvertent criticality. It is recommended Condition 18 be revised to allow storage of new fuel assemblies having a maximum U-235 enrichment of 3.22 w/o in the Spent Fuel Storage Pool.

The licensee, in the amendment application, did not specify the administrative controls that will be used to provide assurance that the fuel assemblies will not be placed closer together in the Spent Fuel Storage Pool Racks than those in a checkerboard pattern. Therefore, it is recommended the revised Condition 18 provide the required assurance; namely:

a. The Fuel Handling Foreman shall verify correct fuel assembly location after insertion of each fuel assembly into the assigned storage rack in accordance with a prepared written procedure approved by an Operating Engineer and the Technical Staff Supervisor.

b. An independent loading verification shall be made by a Quality Control Inspector.

c. The Fuel Handling Foreman and the Quality Control Inspector shall each sign a document assuring proper storage of each fuel assembly.

Since the stability of the hinged gate could not be demonstrated by CE to assure that it could not accidentally fall on the fuel assemblies or storage racks and damage the fuel assemblies and/or storage racks, it is recommended the storage of the assemblies in the Spent Fuel Storage Pool also be subject to conditions which would protect the fuel assemblies and to preserve the integrity of the storage racks. Accordingly, the following additional conditions are recommended:

a. The gate between the Spent Fuel Pool and the Fuel Transfer Canal shall be removed prior to the storage of fuel assemblies in the Spent Fuel Storage Pool.

b. The gate shall not be replaced until dye penetrant examinations of all gate hinge attachment welds have been performed and any resultant rework and reexaminations successfully completed.

c. The fuel assemblies shall be protected to preclude damage and preserve fuel assembly cleanliness during gate repair and replacement activities.

III. General

The application was discussed with Mr. L. N. Olshan, NRR Project Manager, Mr. W. Forney (former Senior Resident Inspector Byron Generating Station, Unit 1), and Mr. J. M. Hinds, Region III Project Manager for the Byron Facility and newly appointed Senior Resident Inspector for Byron Unit 1. None of the above foresaw any safety or environmental problem with the authorization for storage of new fuel assemblies in the Spent Fuel Storage Pool Racks with the incorporation of the license conditions discussed above.

IV. Recommendation

On the basis of the above, the staff recommends issuance of a license amendment with the revision of Condition 18 to allow the storage of new fuel assemblies in the Spent Fuel Storage Pool, which includes the administrative controls providing assurance the fuel assemblies are stored in the Spent Fuel Storage Pool Racks no closer to each other than in a checkerboard pattern, and conditions for the protection of the fuel assemblies and storage racks from damage in the event the gate between the Spent Fuel Storage Pool and the Fuel Transfer Canal should accidentally fall.

Condition 18. New fuel assemblies may be stored in the Spent Fuel Storage Pool subject to the following additional comments:

a. The maximum U-235 enrichment shall be 3.22 w/o.

b. The fuel assemblies shall be stored in a checkerboard pattern.

c. The Fuel Handling Foreman shall verify correct fuel assembly location after insertion of each fuel assembly into the assigned storage rack in accordance with a prepared written procedure approved by an Operating Engineer and the Technical Staff Supervisor.

d. An independent loading verification shall be made by a Quality Control Inspector.

e. The Fuel Handling Foreman and the Quality Control Inspector shall each sign a document assuring proper storage of each fuel assembly.

f. The gate between the Spent Fuel Pool and the Fuel Transfer Canal shall be removed prior to the storage of fuel assemblies in the Spent Fuel Storage Pool.

g. The gate shall not be replaced until dye penetrant examinations of all gate hinge attachment welds have been performed and any resultant rework and reexaminations successfully completed.

h. The fuel assemblies shall be protected to preclude damage and preserve fuel assembly cleanliness during gate repair and replacement activities.

Norman Ketzlach

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Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Approved by: W. T. Crow

W. T. Crow, Section Leader