NRC FORM 464 Part I
(6-1998)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST

FOIA/PA	RESPONSE NUMBER
2000-0041	2

RESPONSE TYPE: ___ FINAL ✓ PARTIAL

REQUESTER: Joseph Pohl

DATE: JUL 03 2000

PART I. -- INFORMATION RELEASED

___ No additional agency records subject to the request have been located.

___ Requested records are available through another public distribution program. See Comments section.

___ APPENDICES ___ Agency records subject to the request that are identified in the listed appendices are already available for public inspection and copying at the NRC Public Document Room.

✓ APPENDICES B Agency records subject to the request that are identified in the listed appendices are being made available for public inspection and copying at the NRC Public Document Room.

___ Enclosed is information on how you may obtain access to and the charges for copying records located at the NRC Public Document Room, 2120 L Street, NW, Washington, DC.

✓ APPENDICES B Agency records subject to the request are enclosed.

___ Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.

✓ We are continuing to process your request.

___ See Comments.

PART I.A -- FEES

AMOUNT *

$

* See comments for details

___ You will be billed by NRC for the amount listed.

___ You will receive a refund for the amount listed.

___ None. Minimum fee threshold not met.

___ Fees waived.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

___ No agency records subject to the request have been located.

___ Certain information in the requested records is being withheld from disclosure pursuant to the exemptions described in and for the reasons stated in Part II.

___ This determination may be appealed within 30 days by writing to the FOIA/PA Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Clearly state on the envelope and in the letter that it is a "FOIA/PA Appeal."

PART I.C COMMENTS (Use attached Comments continuation page if required)

SIGNATURE - FREEDOM OF INFORMATION ACT AND PRIVACY ACT OFFICER

Carol Ann Reed *Carol Ann Reed*

APPENDIX B
RECORDS BEING RELEASED IN THEIR ENTIRETY

NO.	DATE	DESCRIPTION/(PAGE COUNT)
1.	08/21/67	Ltr from Atomic Energy Commission (AEC) to Westinghouse Electric Corporation (14 pgs)
2.	06/28/67	Ltr from AEC to Westinghouse Electric Corp. (1 pg.)
3.	06/23/67	Ltr from Westinghouse Electric Corp. (2 pgs)
4.	06/02/67	Ltr from AEC to Westinghouse Electric Corp. (3 pgs)
5.	12/04/74	Ltr to United Nuclear Corp. from AEC (1 pg.)
6.	12/01/71	Ltr to Westinghouse Electric Corp. to AEC (1 pg.)
7.	03/14/72	Ltr. To Westinghouse Electric Corp. to AEC (1 pg.)
8.	09/20/71	Ltr to Westinghouse Electric Corp. to AEC (1 pg).
9.	09/15/71	TWX to AEC from Westinghouse Electric Corp. (1 pg)
10.	06/18/71	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
11.	02/12/71	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
12.	02/05/71	Ltr to AEC from Westinghouse Electric Corp. (2 pgs)
13.	12/16/70	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
14.	11/25/70	Ltr to AEC from Westinghouse Electric Corp. (1 pg)
15.	09/18/70	Ltr to Westinghouse Electric Corp. from AEC (2 pgs)
16.	09/28/70	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
17.	08/25/70	Ltr to AEC from Westinghouse Electric Corp. (2 pgs)
18.	07/30/70	Ltr to Westinghouse Electric Corp. from AEC (1 pg)

APPENDIX B
RECORDS BEING RELEASED IN THEIR ENTIRETY

NO.	DATE	DESCRIPTION/(PAGE COUNT)
19.	07/23/70	TWX to AEC from Westinghouse Electric Corp. (1 pg)
20.	06/08/70	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
21.	05/27/70	Ltr to AEC from Westinghouse Electric Corp. (2 pgs)
22.	No date	Ltr to Westinghouse Electric Corp. from AEC re: Amendment #20 (1 pg)
23.	01/20/70	Ltr to AEC from Westinghouse Electric Corp, (2 pgs)
24.	12/08/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
25.	12/01/69	Ltr to AEC from Westinghouse Electric Corp. (1 pg)
26.	09/22/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
27.	08/0769	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
28.	08/04/69	TWX to AEC (1 pg)
29.	04/03/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
30.	03/07/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
31.	02/24/69	Ltr to AEC from Westinghouse Electric Corp. (1 page)
32.	02/14/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
33.	01/29/69	Ltr to AEC from Westinghouse Electric Corp. (2 pgs)
34.	02/05/69	Ltr to Westinghouse Electric Corp. from AEC (3 pgs)
35.	01/24/69	Ltr to Westinghouse Electric Corp. from AEC (1 pg)
36.	01/21/69	TWX to AEC from Westinghouse Electric Corp. (2 pgs)

APPENDIX B
RECORDS BEING RELEASED IN THEIR ENTIRETY

NO.	DATE	DESCRIPTION/(PAGE COUNT)
37.	12/16/68	Ltr to Westinghouse Electric Corp. to AEC (1 pg)
38.	11/28/68	Ltr to Westinghouse Electric Corp. to AEC (1 pg)
39.	10/24/68	Ltr to AEC from Westinghouse Electric Corp.(2 pgs)
40.	06/23/72	Ltr from AEC to Westinghouse Electric Corp. (1 pg)
41.	05/25/72	Ltr to AEC from Westinghouse Electric Corp. (2 pgs)
42.	08/11/72	Ltr to Westinghouse Electric Corp. (2 pgs)
43.	08/11/72	Material License from AEC (6 pgs)
44.	08/11/72	Copy of License Amendment No. SG-5 (7 pgs)
45.	03/27/67	Ltr from AEC to Westinghouse Electric Corp. (76 pgs)
46.	No date	Table of Contents (continued) (8 pgs)
47.	06/01/67	Ltr from Westinghouse Electric Corp. to AEC (2 pgs)
48.	12/13/66	Ltr from AEC to Westinghouse Electric Corp. (2 pgs)
49.	12/09/66	TWX No. 662 to AEC (1 pg)
50.	02/14/67	Ltr from Westinghouse Electric Corp. to AEC - Amendment to license SNM-338 (15 pgs)
51.	01/29/65	Ltr from AEC to Westinghouse Electric Corp. and encl. (13 pgs)
52.	09/03/68	Ltr from AEC to Westinghouse Electric Corp. (1 pg)
53.	08/19/68	Ltr from Westinghouse Electric Corp. to AEC - Application for License (25 pgs)

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

AUG 21 1967

IN REPLY REFER TO:
DML:RLL
70-337
SNM-338, Amendment No. 2

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Materials License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the fabrication of fuel assemblies for the Indian Point No. 2 power reactor in accordance with the application dated August 4, 1967.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Donald A. Rosenberg, Chief
Source & Special Nuclear Materials Branch
Division of Materials Licensing

DISTRIBUTION:
Document Room
State Health
Compliance Hqts. (2)
Subject File
H. J. McAlduff, ORGO
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C. D. Luke, DML:CE
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Div. Reading File

From CD. Hyers

ITEM # 1

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

August 4, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for An Amendment to License SNM-338, Docket 70-337, for Fabrication of Indian Point #2 Fuel Rods and Assemblies

Gentlemen:

Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the fabrication of fuel assemblies for the Indian Point #2 power reactor.

The license amendment should be sent to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AN AMENDMENT TO
LICENSE SNM-338

FOR FABRICATION OF
INDIAN POINT #2 FUEL RODS AND ASSEMBLIES

8/4/67

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

For Div of Compliance

INDIAN POINT #2 FABRICATION

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REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason

1. Introduction

An amendment to License SNM-338 is hereby requested to authorize the receipt, possession, storage, use and transfer of UO_2 at enrichments of approximately 2.30 w/o, 2.90 w/o and 3.50 w/o. This material will be used to fabricate fuel rods and fuel assemblies at the Cheswick site for the Indian Point #2 reactor core. Completed assemblies will be shipped to the Indian Point Station of the Consolidated Edison Company at Buchanan, New York.

The production equipment and general procedures used in the manufacture of fuel rods and assemblies have been adequately described in previous applications for amendment to this license. Information presented in this application will reflect any significant changes. The shop locations, and the basic storage, manufacturing and criticality controls remain the same as described in prior applications approved by the Division of Materials Licensing. Prior transmittals which are particularly applicable have been listed in Appendix A to this application.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to Karl R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Material Requirements

Westinghouse requests approval to receive, possess, store, use and transfer up to 90,000 kg of UO_2 powder enriched to 2.30 w/o, 2.9 w/o and 3.50 w/o in the isotope U-235. The UO_2 will be formed into pellets and encapsulated in Zircaloy tubes. The tubes will have a wall thickness of $\sim$ 0.08 times the pellet diameter and the resulting fuel rods will be $<$ 0.5 inches in diameter and about 144 inches long.

No production, consumption or significant loss of special nuclear material is anticipated.

4. Equipment and Facilities for Radiation Protection

The radiation protection procedures and equipment described in the Westinghouse Electric Corporation Health Physics Manual, WAFD-HP-103, as amended, will be used. Currently, the latest revision of this manual is Revision IV, dated June, 1965.

5. Receipt of Material

The procedures and controls used for the receipt of fuel material are described in Section 4, Page 4, of our CVTR II application, Reference #1 in Appendix A. The weight of powder in each container will not exceed the maximum permissible mass specified in "Nuclear Safety Criteria," Section 7 of this application.

6. Powder and Pellet Storage

The details of the equipment, controls and nuclear safety analysis for powder storage (in the container in which it may be received) and for pellet storage are contained in Sections 6 and 7, pages 6 through 10, of the Southern California Edison application, Reference #2 in Appendix A.

7. Nuclear Safety Criteria

The principal operations involving special nuclear material and the corresponding maximum permissible values which have been established to assure nuclear safety are listed below:

Process Step	Control - Not to Exceed
1. Powder Preparation (Weighing, mixing, granulating, storage, etc.)	Mass - 2.30 w/o 180 lb. UO_2
	2.90 w/o 110 lb. UO_2
	3.50 w/o 75 lb. UO_2
	or
	Slab - 2.30 w/o 7.6 inches
	2.90 w/o 6.2 inches
	3.50 w/o 5.4 inches
2. Powder Tray Cleaning Cart	
Component A	Volume - 4.8 liters
Component B	Slab - 4.5 inches
3. Powder Feed to Pellet	
Pressing Feed Hopper	Mass - 2.30 w/o 180 lb. UO_2
	2.90 w/o 110 lb. UO_2
	3.50 w/o 75 lb. UO_2
Conveyor	Cylinder - 93 $in.^2$ conveyor

7. Nuclear Safety Criteria (continued)

Process Step	Control - Not to Exceed		
4. Green Pellet Conveyor (Storage)	Slab -	2.30 w/o	6.0 inches
		2.90 w/o	5.0 inches
		3.50 w/o	4.4 inches
5. Sintering Furnace	Slab -	2.30 w/o	6.0 inches
		2.90 w/o	5.0 inches
		3.50 w/o	4.4 inches
6. Centerless Grinder	Slab -	2.30 w/o	6.0 inches
		2.90 w/o	5.0 inches
		3.50 w/o	4.4 inches
Feed Hopper	Mass -	2.30 w/o	165 lb. UO_2
		2.90 w/o	105 lb. UO_2
		3.50 w/o	78 lb. UO_2
Waste Collection	Volume		4.8 liters
	Slab		4.5 inches
7. Sintered Pellet Storage	Slab -	2.30 w/o	6.0 inches
		2.90 w/o	5.0 inches
		3.50 w/o	4.4 inches
8. Rod Processing and Storage (Zircaloy Cladding)	Slab -	2.30 w/o	6.0 inches
		2.90 w/o	5.0 inches
		3.50 w/o	4.4 inches

7. Nuclear Safety Criteria (continued)

Process Step	Control - Not to Exceed	
9. Leak Testing Rods (Zircaloy Cladding)	Cylinder	9.5 in. dia.
10. Fabrication of Fuel Assemblies (Assumes sequential loading for any partially loaded assemblies - fully flooded but isolated)	$k_{eff} \leq 0.88$	
11. Fuel Assembly Storage and Assembly Cleaning		
Fully flooded, 12 inch minimum separation	$k_{eff} \leq 0.88$	
All degrees of moderation, 12 inch minimum separation	$k_{eff} \leq 0.93$	

8. Nuclear Safety Analysis

8.1 Maximum Permissible Values for Powder

The UO_2 powder was considered to be in the form of a homogeneous mixture with light water. The maximum permissible masses listed for powder in Section 7 of this application were determined by interpolating in Table XIV (page 22) of K-1019, Rev. 5.

8.1 (continued)

Each maximum permissible mass was then converted into pounds of UO_2:

2.30 w/o enrichment $\frac{1.65 \text{ kg U-235}}{(0.88)\ (0.023)\ (0.455)} = 180 \text{ lbs. } UO_2$

2.9 w/o enrichment $\frac{1.27 \text{ kg U-235}}{(0.88)\ (0.029)\ (0.455)} = 110 \text{ lbs. } UO_2$

3.5 w/o enrichment $\frac{1.05 \text{ kg U-235}}{(0.88)\ (0.035)\ (0.455)} = 75 \text{ lbs. } UO_2$

The maximum permissible slab thicknesses and maximum permissible cylinder diameters were calculated using Westinghouse LEOPARD/1 procedures. The maximum permissible cylinder diameter of 10.9 inches for 3.50 w/o material has a cross-sectional area > 93 square inches. Therefore, the 93 square inch cross-sectional area of the pellet pressing conveyor is nuclearly safe for all enrichments considered in this application.

/1 Barry, R.F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM-7094, "WCAP-3269-26 (Sept. 1963).

8.2 Maximum Permissible Values for Pellets

Westinghouse LEOPARD[1] procedures were used to calculate the minimum critical masses and the minimum critical slab thicknesses for pellets with enrichments of 2.30 w/o, 2.90 w/o and 3.50 w/o at optimum moderation and full reflection. The minimum critical masses were divided by a safety factor of 2.3, and the minimum critical slab thicknesses by a factor of 1.19, to obtain the maximum permissible values listed for pellets in Section 7 of this application.

8.3 Maximum Permissible Values for Clad Rods

The maximum permissible slab thicknesses for the processing and storage of Zircaloy clad rods were established to be the same as the maximum permissible slab thicknesses for pellets. These values are conservative, due to the fact that any foreseeable slab of rods more than one layer thick would be tightly packed and the tightly packed rods would be undermoderated even assuming they were to be flooded.

Calculations using LEOPARD plus a safety factor of 1.12 result in a maximum permissible cylinder diameter of 9.5 inches for Zircaloy clad rods containing 3.50 w/o fuel.

8.4 Volume Determination

The maximum permissible volume for slurries of UO_2, at 3.50 w/o has been set at 4.8 liters. This is the recommended value of 4.8 liters (1.27 gal.) given in TID-7016, Rev. 1, Table I, page 10.

8.5 Fuel Assembly Analysis

The fuel assembly analysis for the Indian Point #2 reactor was performed using the same techniques as those presented in "Fuel Assembly Criticality Limits," Section 8.B.5, pages 13 through 17, in our SENA application, Reference #4 in Appendix A. The calculated k_{eff} values of $\leq$ 0.88 and $\leq$ 0.93 are significantly within nuclearly safe limits.

APPENDIX A

REFERENCE APPLICATIONS

1. "Application for Amendment of License SNM-338 for Manufacture of CVTR Fuel Assemblies," November 11, 1965.

   Approved: December 7, 1965

2. "Application for Amendment to License SNM-338 for the Southern California Edison Fuel Rods and Assemblies," December 8, 1964, and supplemented December 21, 1964. Revised August 30, 1965.

   Approved: January 14, 1965. Revised application approved September 20, 1965.

3. "Application for Amendment to License SNM-338 for Consolidated Edison Indian Point Reactor Core II Fuel Rods and Assemblies," May 20, 1964. Revised June 22, 1964, with supplements dated June 23, 1964, and June 30, 1964; August 10, 1964; and January 22, 1965, with supplement dated February 1, 1965.

   Approved: July 16, 1964. Revised applications approved September 8, 1964 and February 12, 1965.

4. "Application for Amendment to License SNM-338 for SENA Fuel Rods and Assemblies," March 8, 1965. Revised July 8, 1965; August 4, 1965; September 7, 1965; and October 7, 1965.

   Approved: April 30, 1965. Revised applications approved August 18, 1965, September 21, 1965, and October 27, 1965.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:

DML:RLL
70-337
SNM-338, Amendment No. 1

JUN 23 1967

DISTRIBUTION:
Document Room
State Health
Compliance Hqts. (2)
Subject File
H. J. McRlduff, OROO
N. Doules, DML
D. George, NMM
C. D. Luke, DML
Br. Reading File
Div. Reading File

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl E. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the use of the Materials Systems Laboratory storage vault in accordance with the statements, representations and conditions specified in the applications dated October 19, 1966, February 14, June 1 and June 23, 1967.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

ITEM # 7

From CO - [illegible]

I

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

June 23, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Amendment to License SNM-338, Docket 70-337, for the Materials Systems Laboratory Storage Vault

For Div. of Compliance

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the storage of SNM in the storage vault described in our application dated 10/19/66, as revised 2/14/67. The attached, modified drawing WED-677 supplies additional information concerning the construction of the storage racks.

The revised design is transmitted to:

1. Show that the racks described in Elevation A-A will be constructed and mounted in a manner consistent with the remainder of the racks.

2. Indicate the use of cutouts in the shelving of the racks described in Elevation C-C, in order to permit the storage of containers which are more than 9" high.

3. Show the use of longitudinal angles to restrain the top row of blocks in addition to acting as braces.

B/3

ITEM # 3

From CO - Hdqrs.

2105

As the final design, the details of WED-677 will supersede the corresponding information contained in Figure 4.1 of the subject application.

Please send the amendment to me at the above address.

If you require any further information, please write to me at the above address, or telephone me collect at 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment:
Drawing WED-677

3 copies transmitted
(3 copies delivered 6/19/67)

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUN 2 1967

I

IN REPLY REFER TO:

DML:RLL
70-337

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H. J. McAlduff, OROO w/encl.
D. George, NMM w/encl.
N. Doulos, DML w/encl.
Br. Reading File w/encl.
Div. Reading File wo/encl.

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Enclosed is Special Nuclear Material License No. SNM-338, as revised in its entirety. Please note that the expiration date for this license has been extended to December 31, 1967. As discussed with Mr. Schendel, we have extended the expiration date in order to provide sufficient time for the completion of your consolidated renewal application. In order that we may be in a position to take action on your application at that time, the application should be submitted by August 31, 1967. If this time for submission is not satisfactory, please contact us.

Please note that Item 11 specifically authorizes you to deliver special nuclear material to a carrier for transport in accordance with license amendments 71-1, 71-2, 71-3 and 71-4. However, pursuant to Section 71.12, 10 CFR 71, you may continue to use the shipping packages previously approved under this license until such time as the Commission takes final action on your pending application for a superseding license.

Very truly yours,

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

Enclosure:
SNM-338

From CO

B/4

From CO - Hdqrs.

ITEM # 4

COPY

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	3. License No.
1. Name Westinghouse Electric Corporation	SNM-338
2. Address 3 Gateway Center Box 2278 Pittsburgh, Pennsylvania 15230	4. Expiration Date December 31, 1967
	5. Docket No. 70-337

6. Special Nuclear Material	7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license
Plutonium; Uranium enriched in the U-235 isotope	See Attachment A

8. Authorized use

See Attachment A

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

- - - - - -

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Authorized place of use: The licensee's facilities located near Cheswick, Pennsylvania.

11. Pursuant to 10 CFR 71, the licensee is authorized to deliver special nuclear material to a carrier for transport in accordance with amendments 71-1, 71-2, 71-3 and 71-4 to this license dated September 21, 1966, April 19, April 14 and April 28, 1967, respectively.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance JUN 2 1967

Donald A. Nussbaumer
Division of Materials Licensing

★U. S. GOVERNMENT PRINTING OFFICE: 1962 O-632574

COPY

JUN 2 1967

COPY

ATTACHMENT A
TO LICENSE SNM-338

The licensee shall receive, possess, use and transfer special nuclear material in accordance with the following applications:

A. 2.5 kilograms of plutonium and 10 kilograms of U-235 for use in accordance with the applications dated October 26 and December 22, 1966; and February 8, 1967.

B. 35 kilograms of plutonium oxide (PuO_2) for use in accordance with the application dated January 20, 1965.

C. 10,000 kilograms of contained uranium 235 for use in accordance with the applications dated June 2, August 10, October 15, October 26, December 3 and December 29, 1959; January 27, February 16, April 29, May 2, May 5 and December 12, 1960; April 25, May 8, May 10, June 1, June 13, June 21, July 11, September 21, September 26, October 9, October 18, and December 4, 1962; March 27, June 13, July 25 and November 26, 1963; January 17, February 7, May 20, May 25, June 11, June 22, June 23, June 30. October 6, October 14, October 26, October 29, November 25, December 8, December 21, and December 29, 1964; January 6, January 19, January 22, January 29, February 1, March 3, March 8, March 25, April 14, April 27, May 10, May 17, May 28, June 24, July 8, July 10, July 12, July 26, July 30, August 4, August 17, August 30, September 7, October 1, October 7, October 12, October 19, November 5, November 11, December 9, and December 17, 1965; January 10, February 2, March 22, April 1, July 22, July 29, September 16, and September 21, 1966; subject to the following conditions:

1. Neutronic interaction between arrays of special nuclear material may be neglected when the arrays are separated one from another in accordance with provisions of Section 6.2, page 35, of application dated December 22, 1966.

2. In the processing of the fuel components in accordance with application dated September 26, 1962, as supplemented October 18, 1962, the U-235 in the form of clad plates or cores when added to the U-235 in any solution bath shall not exceed 350 grams total.

3. In the processing of enriched uranium in accordance with application dated March 27, 1963, the UO_2 powder batch size for the 3.90 weight percent material shall be fifty-eight (58) pounds.

DEC 4 1974

L:FFRB#1:WGB
70-371
SNM-368, Amendment No. 30

United Nuclear Corporation
Naval Products Division
ATTN: Mr. Percy E. Clemons, Manager
Nuclear and Industrial Safety
Services
67 Sandy Desert Road
Uncasville, Connecticut 06382

Gentlemen:

In accordance with your application dated November 27, 1974 and pursuant to Title 10, Code of Federal Regulations, Part 70, AEC Materials License No. SNM-368 is hereby amended to reduce your special Nuclear Material possession limit at the New Haven, Connecticut facility to less than one (1) effective kilogram of uranium.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Leland C. Rouse

L. C. Rouse, Chief
Fuel Fabrication and Reprocessing
Branch No. 1
Directorate of Licensing

Distribution:
PDR
Local PDR
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ITEM # 5

B15

OFFICE	L:FFRB#1	L:FFRB#1				
SURNAME	WGBrowne	LCRouse				
DATE	12/4/74	12/4/74				

Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1974-526-166

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DEC 1 1971

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Donald A. Nussbaumer

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DONALD A. NUSSBAUMER, CHIEF
FUEL FABRICATION & TRANSPORTATION BR.
DIVISION OF MATERIALS LICENSING
USAEC, WASHINGTON, D.C. 20545

WESTINGHOUSE ELECTRIC CORPORATION
MONROEVILLE NUCLEAR CENTER
ATTN: MR. KARL SCHENDEL
P.O. BOX 355
PITTSBURGH, PENNSYLVANIA 15230

PURSUANT TO TITLE 10, CODE OF FEDERAL REGULATIONS, PART 70, SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-338, IS HEREBY AMENDED TO AUTHORIZE THE RECEIPT, POSSESSION, AND USE OF SPECIAL NUCLEAR MATERIAL IN ACCORDANCE WITH TWX APPLICATION DATED NOVEMBER 19, 1971.

ALSO, SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-338 AND SOURCE MATERIAL LICENSE NO. SMB-355 ARE HEREBY AMENDED TO EXTEND THE EXPIRATION DATES TO MARCH 31, 1972.

ALL OTHER CONDITIONS OF THESE LICENSES SHALL REMAIN THE SAME.

AS WE NOTIFIED YOU IN OUR LETTER DATED JUNE 18, 1971, FURTHER ACTION ON THESE LICENSES, i.e., RENEWAL OF LICENSE NO. SNM-338 AND TERMINATION OF LICENSE NO. SMB-355, ARE BEING HELD IN ABEYANCE UNTIL AFTER WE HAVE RECEIVED AN ANSWER TO OUR LETTER DATED MAY 26, 1971.

REFERENCE: DML:RTW; DOCKET NO. 70-337, SNM-338, AMENDMENT NO. 31
DOCKET NO. 40-4739, SMB-355, AMENDMENT NO. 10

ITEM # 6

B16

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MAR 14 1972

DML:RTW
70-337
SNM-338, Amendment No. 32
40-4739
SMB-355, Amendment No. 11

Westinghouse Electric Corporation
Monroeville Nuclear Center
ATTN: Mr. Karl Schendel
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, Source Material License No. SMB-355 and Special Nuclear Material License No. SNM-338 are hereby amended to extend the expiration dates to June 30, 1972.

All other conditions of these licenses shall remain the same.

Further action on these licenses, i.e., renewal of License No. SNM-338 and termination of License No. SMB-355, is being held in abeyance until after we have received an answer to our letter dated March 1, 1972.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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RTWoolsey, DML (2)
Branch R/F
DML R/F

ITEM # 7

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Original Signed by
Donald A. Nussbaumer

SEP 20 1971

DONALD A. NUSSBAUMER, CHIEF
FUEL FABRICATION AND TRANSPORTATION BR
DIVISION OF MATERIALS LICENSING
USAEC, WASHINGTON, D.C. 20545

WESTINGHOUSE ELECTRIC CORPORATION
MONROEVILLE NUCLEAR CENTER
ATTN: MR. KARL SCHENDEL
P.O. BOX 355
PITTSBURGH, PENNSYLVANIA 15230

PURSUANT TO TITLE 10, CODE OF FEDERAL REGULATIONS, PART 70, SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-338, IS HEREBY AMENDED TO AUTHORIZE THE RECEIPT, POSSESSION, AND USE OF SPECIAL NUCLEAR MATERIAL IN ACCORDANCE WITH TWX APPLICATIONS DATED SEPTEMBER 15 AND 17, 1971.

ALL OTHER CONDITIONS OF THIS LICENSE SHALL REMAIN THE SAME.

THE PREVIOUS AMENDMENT TO THIS LICENSE, DATED JUNE 28, 1971, SHOULD HAVE BEEN NUMBERED AMENDMENT NO. 29. PLEASE MAKE THE NECESSARY CORRECTIONS.

REFERENCE: DML:RTW; DOCKET NO. 70-337, SNM-338, AMENDMENT NO. 30

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ITEM # 8

VTHIS IS AEC GERMANTOWN GA PLS. **TWX INCOMING**

FROM

WESTINGHOUSE NUCLEAR ENERGY SYSTEMS

PITTSBURGH, PENNA.

TWX NO 710 797 3658

1971 SEP 15 PM 4 00

U.S. ATOMIC ENERGY COMM.
TWX UNIT

BETH
WSB
WRL

9-15-71

DOCKET NO. 70-337
SNM 338

For Div. of Compliance

TO

US ATOMIC ENERGY COMMISSION

DEPARTMENT OF MATERIAL LICENSING

WASH D C

RECEIVED
SEP 16 1971
U.S. ATOMIC ENERGY COMM.
Regulatory Mail Section

ATTN\ MR DONALD NUSSBAUMER

THE WESTINGHOUSE ELECTRIC CORPORATION REQUESTS AN AMENDMENT TO LICENSE SNM-338, DOCKET 70-337, TO AUTHORIZE THE RECEIPT, POSSESSION, USE AND TRANSFER OF UP TO 1930 KG OF URANIUM-235 CONTAINED IN LOW ENRICHED URANIUM OXIDE FOR THE FABRICATION OF FUEL ASSEMBLIES AS LISTED BELOW.

1. 640 KG OF 235U CONTAINED IN 16,000 KG OF URANIUM OXIDE AT A NOMINAL ENRICHMENT OF 4.0 W/O FOR A REPLACEMENT REGION FOR THE SELNI NUCLEAR POWER REACTOR.

2. 140 KG OF 235U CONTAINED ON 4000 KG OF URANIUM OXIDE AT A NOMINAL ENRICHMENT OF 3.4 W/O FOR REPLACEMENT FUEL FOR THE MIHAMA \1 NUCLEAR POWER REACTOR.

ITEM # 9

3. 300 KG OF 235U CONTAINED IN 16,700 KG OF URANIUM OXIDE AT A NOMINAL ENRICHMENT OF 1.8 W/O FOR A REPLACEMENT REGION FOR THE NOK \1 NUCLEAR POWER REACTOR.

B/9

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUN 18 1971

DML:RTW
40-4739
SMB-355, Amendment No. 9
70-337
SNM-338, Amendment No. 28

Westinghouse Electric Corporation
ATTN: Mr. Karl R. Schendel
License Administrator
Monroeville Nuclear Center
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, Special Nuclear Material License No. SNM-338 and Source Material License No. SMB-355 are hereby amended to extend the expiration dates to December 31, 1971.

All other conditions of these licenses shall remain the same.

As you know, further actions on these licenses, i.e., renewal of License No. SNM-338 and termination of License No. SMB-355, are being held in abeyance until after we have received an answer to our letter dated May 26, 1971.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer
Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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ITEM # 10

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

FEB 12 1971

[illegible]:MIW
[illegible]-337
SNM-338, Amendment No. 27

Westinghouse Electric Corporation
Attn: Mr. Karl R. Schendel
License Administrator
Westinghouse Building
Gateway Center
Pittsburgh, Pennsylvania 15222

Gentlemen:

Pursuant to 10 CFR 70, Special Nuclear Material License No. SNM-338 is hereby amended to authorize the receipt, possession, and use of special nuclear material in accordance with your application dated February 5, 1971.

All other conditions of this license shall remain the same.

The previous amendment to this license, dated December 16, 1970, should have been numbered Amendment No. 26. Please make the necessary corrections.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Leland C. Rouse

Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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L. Rouse, DML

ITEM # 11

Westinghouse Electric Corporation

FEB 3 1971

Westinghouse Building
Gateway Center
Pittsburgh Pennsylvania 15222

February 5, 1971

WRL

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch

Gentlemen:

For Div. of Compliance

Subject: Application for an Amendment to License SNM-338, Docket 70-337

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the receipt, possession, use and transfer of a total of 4,825 kilograms of ^{235}U contained in low enriched uranium oxide for the fabrication of fuel assemblies as listed below.

1. 480 kilograms of ^{235}U contained in 17,000 kilograms of uranium oxide at a nominal enrichment of 3.2 w/o for a replacement region for the NOK I nuclear power reactor.

2. 1410 kilograms of ^{235}U contained in 60,000 kilograms of uranium oxide at a nominal enrichment of 2.6 w/o for the Turkey Point #4 nuclear power reactor

3. 2,935 kilograms of ^{235}U contained in 120,000 kilograms of uranium oxide for the Zion #1 nuclear power reactor. This quantity can be broken down as 805 kilograms of ^{235}U in 40,000 kilograms of uranium oxide at a nominal enrichment of 2.3 w/o, 980 kilograms of ^{235}U in 40,000 kilograms of uranium oxide at 2.8 w/o, and 1150 kilograms of ^{235}U in 40,000 kilograms of uranium oxide at 3.3 w/o.

ITEM # 12

B/12

539

In all instances, the processes and nuclear criticality safety limits specified in our Indian Point #2 application, dated August 4, 1967, will apply. When the enrichment to be processed differs from that specified in the Indian Point #2 application, the nuclear criticality safety limits in that application that are applicable to the next higher enrichment will be used.

This request is intended to supersede, in its entirety, our transmittal of January 15, 1971.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 244-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS: sw

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

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R. T. Woolsey, DML (2)
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DEC 16 1970

[illegible]
[illegible]-355, Amendment No. 8
[illegible]-337
[illegible]-338, Amendment No. 25

Westinghouse Electric Corporation
ATTN: Mr. Karl R. Schendel
Westinghouse Building
Gateway Center
Pittsburgh, Pennsylvania 15222

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, Special Nuclear Material License No. SNM-338 and Source Material License No. SMB-355 are hereby amended to extend the expiration dates to June 30, 1971.

All other conditions of these licenses shall remain the same.

The above extension of the expiration dates for the referenced licenses is in response to your letter dated November 25, 1970.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Leland C. Rouse

for Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

ITEM # 13 B/13

Eor Div of Compliance
70-337
DOCKET NO. 40-4739

Westinghouse Electric Corporation

Westinghouse Building
Gateway Center
Pittsburgh Pennsylvania 15222

November 25, 1970

Mr. Donald A. Nussbaumer
U. S. Atomic Energy Commission
Division of Materials Licensing
Fuel Fabrication & Transportation Branch
Washington, D. C.

Dear Mr. Nussbaumer:

The Westinghouse Electric Corporation hereby requests that the expiration dates of Licenses SNM-338, Docket 70-337, and SMB-355, Docket 40-4739, be changed to 6/30/71. Westinghouse plans to submit a revised application which will be responsive to your letter of 9/30/70, and which will revise the application to reflect our current organization, no later than 12/30/70.

Please send the amendments to me at Westinghouse Electric Corporation, Westinghouse Building, Gateway Center, Pittsburgh, Pennsylvania 15222.

If you have any questions, telephone collect at (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

mlh

ITEM # 14

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

SEP 18 1970

Co: I
Crocker
WHB

DML:RTW
70-337
SNM-338, Amendment No. 25

Westinghouse Electric Corporation
ATTN: Mr. Karl R. Schendel
Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Gentlemen:

In accordance with your application dated August 25, 1970, and pursuant to Title 10 Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, is hereby amended to authorize the receipt, possession and use of the following:

1. 50,000 kilograms of uranium oxide at enrichments up to 3.4 w/o for the NOK #2, Nuclear Power Reactor;

2. 6,000 kilograms of uranium oxide at a nominal enrichment of 3.2 w/o for the Robert Emmett Ginna Nuclear Power Reactor;

3. 20,000 kilograms of uranium oxide at a nominal enrichment of 3.03 w/o for the Point Beach #2, Nuclear Power Reactor;

4. 7,500 kilograms of uranium oxide at a nominal enrichment of 3.6 w/o for the Zorita Nuclear Power Reactor; and

5. 27,000 kilograms of uranium oxide at a nominal enrichment of 4.0 w/o for the Connecticut Yankee Nuclear Power Reactor.

All other conditions of this license shall remain the same.

We note that the maximum enrichment of 3.4 w/o quoted by you for the NOK No. 2 fuel does not exactly match any of those enrichments quoted in your submissions dated October 10 and 25, 1967. It is therefore assumed that the

ITEM # 15

limits quoted for the 3.48 w/o fuel will be used if fuel of 3.4 w/o is fabricated. If our assumption is incorrect, please let us know.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Center
~~DMC~~
~~WM~~

SEP 28 1970

DML:RTW
40-4739
SMB-355, Amendment No. 7
70-337
SNM-338, Amendment No. 24

H80

Westinghouse Electric Corporation
ATTN: Mr. Karl R. Schendel
Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, Special Nuclear Material License No. SNM-338 and Source Material License No. SMB-355 are hereby amended to extend the expiration dates to December 30, 1970.

All other conditions of these licenses remain the same.

The above extension of the expiration dates for the referenced licenses is in response to your letter of August 25, 1970.

In connection with our review of your application for renewal of License No. SNM-338 we need to know whether you desire a separate license for the Material Systems Laboratory or inclusion in License No. SNM-330.

Also, as indicated in a telephone conversation with you on August 31, 1970, we need an answer to the question contained in Item No. 9 in the attachment to our letter dated March 4, 1970, and the specifications on the experience and technical qualification requirements for the position of Manager, Criticality and Health Physics.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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... L. Stevenson, DML
R. T. Woolsey, DML (2)
Branch R/F
Division R/F

B116

ITEM # 16

Westinghouse Electric Corporation

Westinghouse Building
Gateway Center
Pittsburgh Pennsylvania 15222

RECEIVED
AUG 27 1970
U.S. ATOMIC ENERGY COMMISSION

August 25, 1970

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. David A. Nussbaumer, Chief
Fuel Fabrication & Transportation Branch

Gentlemen:

For Div. of Compliance

Subject: Application for an Amendment to License SNM-338, Docket 70-337 and License SMB-355, Docket 40-4739

The Westinghouse Electric Corporation interprets that our application, dated June 17, 1970, for revision and renewal of the subject SNM license represents a timely request as provided in 10CFR70.33(b), and that the license will continue in effect until final action on the application is determined. Since that application also makes provision for the possession and use of source material, Westinghouse requests that License SMB-355, Docket 40-4739, be extended until such time as a revised SNM-338 is issued.

Furthermore, Westinghouse requests an amendment to License SNM-338, Docket 70-337, under the existing terms and conditions, to authorize the receipt, possession, use and transfer of SNM for the fabrication of fuel assemblies as listed below.

1. 50,000 kilograms of uranium oxide at nominal enrichments up to 3.4 w/o for the NOK #2 nuclear power reactor. The processes and the nuclear criticality safety limits specified in our NOK application dated October 10, 1967, and October 25, 1967, will apply.

B/17

ITEM # 17

2680

2. 6,000 kilograms of uranium oxide at a nominal enrichment of 3.2 w/o for the Robert Emmett Ginna nuclear power reactor. The processes and the nuclear criticality safety limits for 3.48 w/o uranium specified in our NOK application dated October 10, 1967, and October 25, 1967, will apply.

3. 20,000 kilograms of uranium oxide at a nominal enrichment of 3.03 w/o for the Point Beach #2 nuclear power reactor. The processes and the nuclear criticality safety limits for 3.0 w/o uranium specified in our NOK application, dated October 10, 1967, and October 25, 1967, will apply. The very minimum discrepancy between the 3.0 w/o specified in the referenced application and the 3.03 w/o nominal enrichment is negligible.

4. 7,500 kilograms of uranium oxide at a nominal enrichment of 3.6 w/o for the Zorita nuclear power reactor. The processes and the nuclear criticality safety limits for 3.7 w/o uranium specified in our Zorita application, dated July 22, 1966, will apply.

5. 27,000 kilograms of uranium oxide at a nominal enrichment of 4.0 w/o for the Connecticut Yankee nuclear power reactor. The processes and the nuclear criticality safety limits for 4.15 w/o uranium specified in our Indian Point application, dated May 20, 1964; June 22, 1964; and August 10, 1964, will apply.

Please send the amendments to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect at (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS:sw
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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUL 30 1970

DML:RTW
70-337
SNM-338, Amendment No. 23

Westinghouse Electric Corporation
Attn: Mr. Karl R. Schendel
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Gentlemen:

In accordance with your application dated July 23, 1970, and pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, is hereby amended to delete the existing authorization for possession and use of special nuclear materials in your ARD Plutonium Laboratory in Building No. 7 at the Cheswick, Pennsylvania site.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

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M. A. Dean, DML
Branch R/F
Division R/F
R. T. Woolsey, DML (2)

ITEM # 18

TWX INCOMING

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ROGER T. WOOLSEY

DIVISION OF MATERIALS LICENSING

U. S. ATOMIC ENERGY COMMISSION

WASHINGTON D C

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1970 JUL 23 AM 9 40

U.S. ATOMIC ENERGY COMM.
TWX UNIT

DOCKET NO. 70-337

For Dir. of Compliance

THE WESTINGHOUSE ELECTRIC CORPORATION HEREBY REQUESTS THAT AT SUCH TIME AS AN SNM LICENSE IS ISSUED ON DOCKET 70-1086 IN RESPONSE TO OUR APPLICATIONS, DATED JANUARY 28, 1969 AND REVISED NOVEMBER 14, 1969 AND JUNE 30, 1970, THE CORRESPONDING EXISTING AUTHORIZATION TO POSSESS AND USE SPECIAL NUCLEAR MATERIALS IN THE ARD PLUTONIUM LABORATORY BE DELETED FROM LICENSE SNM-338, DOCKET 70-337.

KARL R. SCHENDEL, LICENSE ADMINISTRATOR WESTINGHOUSE ELEC CORP GATEWAY CENTER PITTSBURGH PA

B/19

ITEM # 19

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUN 8 1970

DML:RTW
70-337
SNM-338, Amendment No. 22

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R. T. Woolsey, DML
M. A. Dean, DML
Branch R/F
Division R/F

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with your application dated May 27, 1970, and pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338 is hereby amended as follows:

1. Authorized to receive, possess and use 17,000 kilograms of uranium oxide at the enrichments specified in your referenced applications for fabrication of fuel assemblies for the NOK II nuclear power reactor.

2. Authorized to receive, possess and use 60,000 kilograms of uranium oxide at the enrichments specified in your referenced application for fabrication of fuel assemblies for the Turkey Point No. 3 nuclear power reactor.

3. Authorized to receive, possess and use 60,000 kilograms of uranium oxide at the enrichments specified in the referenced application for fabrication of fuel assemblies for the Surry No. 1 nuclear power reactor.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

Donald A. Nussbaumer, Chief
Fuel Fabrication &
Transportation Branch
Division of Materials Licensing

ITEM # 20

DOCKET NO. 70-337

For Div. of Compliance

Westinghouse Electric Corporation

Gateway Center
Box 2278
Pittsburgh Pennsylvania 15230

RECEIVED JUN 1 1970

May 27, 1970

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Fuel Fabrication & Transportation Branch

Gentlemen:

Subject: Application for an Amendment to License SNM-338, Docket 70-337

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the receipt, possession, use and transfer of special nuclear material for the fabrication of fuel assemblies as listed below.

1. 17,000 kilograms of uranium oxide for the NOK II nuclear power reactor. The enrichments, processes, and nuclear criticality safety limits specified in our NOK application, dated October 10, 1967 and October 25, 1967, will apply.

2. 60,000 kilograms of uranium oxide for the Turkey Point #3 nuclear power reactor. The enrichments, processes and nuclear criticality safety limits specified in our Indian Point #2 application, dated August 4, 1967, will apply.

3. 60,000 kilograms of uranium oxide for the Surry #1 nuclear power reactor. The enrichments, processes and nuclear criticality safety limits specified in our Indian Point #2 application, date August 4, 1967, will apply.

ITEM # 21

B/21

1654

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS:sw

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

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R. Stevenson, DML
N. Doulos, DML
A. Cabell, DR:ADM
C. F. Eason, GM

DML:RLL
70-337
SNM-338, Amendment No. 20

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with the application dated January 20, 1970, and pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338 is hereby amended as follows:

1. Authorized to receive, possess, and use 30,000 kilograms of uranium oxide at a nominal enrichment of 1.85 w/o U-235 for fabrication of fuel assemblies for the Turkey Point #3 nuclear power reactor;

2. Authorized to receive, possess, and use 30,000 kilograms of uranium oxide at a nominal enrichment of 1.85 w/o U-235 for fabrication of fuel assemblies for the Surrey #1 nuclear power reactor;

3. Authorized to receive, possess, and use 25,000 kilograms of uranium oxide at a nominal enrichment of 4 w/o U-235 for fabrication of fuel assemblies for the San Onofre nuclear power reactor; and

4. Authorized to receive, possess, and use 75 kilograms of plutonium as clad fuel rods containing not more than 4 w/o Pu in mixed oxides for fabrication of fuel assemblies for the San Onofre nuclear power reactor except that the reactivity for fuel assemblies shall be computed and reviewed as specified in paragraph (c), page 144 of the licensee's application dated December 16, 1969, under Docket 70-337.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

ITEM # 22

B/22

Westinghouse Electric Corporation

Gateway Center
Box 2278
Pittsburgh Pennsylvania 15230

RECEIVED
JAN 22 1970
U.S. ATOMIC ENERGY COMMISSION

January 20, 1970

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Gentlemen:

Subject: Application for an Amendment to
License SNM-338, Docket 70-337 For Div of Compliance

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the receipt, possession, use and transfer of special nuclear material for the fabrication of fuel assemblies as listed below.

1. 30,000 kilograms of uranium oxide at a nominal enrichment of 1.85 w/o for the Turkey Point #3 nuclear power reactor. The processes and the nuclear criticality safety limits specified for the lowest enrichment value in our Indian Point #2 application, dated August 4, 1967, will apply.

2. 30,000 kilograms of uranium oxide at a nominal enrichment of 1.85 w/o for the Surrey #1 nuclear power reactor. The processes and the nuclear criticality safety limits specified for the lowest enrichment value in our Indian Point #2 application, dated August 4, 1967, will apply.

3. 25,000 kilograms of uranium oxide at a nominal enrichment of 4 w/o for the San Onofre nuclear power reactor. The processes and the nuclear criticality safety limits specified for the 4.02 w/o enrichment in our Indian Point application, dated May 20, 1964, June 22, 1964 and August 10, 1964, will apply.

ITEM # 23

B/23

196

4. 75 kilograms of plutonium as clad fuel rods, containing not more than 4 w/o Pu in mixed oxides, for fuel assemblies for the San Onofre nuclear power reactor. Fuel rod possession and use will be controlled using the MPV's for 4.0 w/o Pu given in Figure 2.3.2.8 of our application for a broad license, Docket 70-337, dated December 16, 1969. The fuel assemblies will have a $k_{eff} \leq 0.95$, assuming maximum moderation and reflection by light water.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS:sw

7 copies transmitted

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DEC 8 1969

DML:RLL
70-337, SNM-338, Amendment No. 19
40-4739, SMB-355, Amendment No. 5

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, the respective expiration dates for Special Nuclear Material License No. SNM-338 and Source Material License No. SMB-355 are hereby extended to March 31, 1970, in accordance with your applications dated December 1, 1969.

All other conditions of this license shall remain the same.

Based on the telephone conversation on November 26, 1969, between Mr. Karl R. Schendel and Mr. Robert L. Layfield of this office, we understand that your revised application for renewal of these licenses will be submitted within sixty (60) days from the date of this letter.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

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N. Doulos, DML
A. Cabell, DR:ADM
C. F. Eason, GM

ITEM # 24

Westinghouse Electric Corporation

Gateway Center
Box 2278
Pittsburgh Pennsylvania 15230

December 1, 1969

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Gentlemen:

Subject: Special Nuclear Materials License
SNM-338, Docket 70-337

For Div of Compliance

The Westinghouse Electric Corporation hereby requests that the expiration date of the subject license be revised to read March 31, 1970. No other change in the terms or conditions of the license are requested.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS: sw

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ITEM # 25

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
~~70-337~~
SNM-338, Amendment No. 18

SEP 22 1969

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to include your program for coping with emergency conditions as submitted in your application dated August 11, 1969, except that, as a condition of this amendment, appropriate layouts and/or floor plans showing the location of processing equipment, special nuclear material storage areas, etc., shall be maintained at accessible locations for possible use such as planning reentry procedures.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

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R. Wishchow, NMS
C. Luke, DML
N. Doulos, DML
A. Cabell, DR:ADM

ITEM # 26

Cracker
~~Clark~~
~~WRG~~
8/13

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

~~JUL 7 1969~~ AUG 7 1969

DML:RLL
70-337
SNM-338, Amendment No. 17

Westinghouse Electric Corporation
Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to increase the maximum possession limit for uranium enriched in the U-235 isotope to 12 kilograms U-235 for the Advanced Materials Laboratory in accordance with your application dated August 4, 1969.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

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8/27

ITEM # 27

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U. S. ATOMIC ENERGY COMM
TWX UNIT

ITEM # 28

SNM 338

DOCKET NO. 70-337

For Div. of Compliance

MR. DONALD A. NUSSBAUMER CHIEF, SOURCE & SPECIAL NUCLEAR MATERIAL BRANCH
ATOMIC ENERGY COMMISSION
DIVISION OF MATERIALS LICENSING
WASHINGTON DC
8-4-69 1016AM

THE WESTINGHOUSE ELECTRIC CORPORATION HEREBY REQUESTS AN AMENDMENT TO LICENSE SNM-338, DOCKET 70-337, TO AUTHORIZE AN INCREASE IN THE URANIUM-235 POSSESSION LIMIT. SPECIFICALLY, WE REQUEST THAT THE TEN KILOGRAM LIMIT SPECIFIED IN OUR APPLICATION FOR LICENSE SNM-338, DATED OCTOBER 26, 1966 AND REVISED DECEMBER 22, 1966, FEBRUARY 8, 1967, APRIL 1, 1968, APRIL 24, QOYI AND MARCH 21, 1969, BE INCREASED TO TWELVE KILOGRAMS OF CONTAINED URANIUM-235.

WESTINGHOUSE WILL TRANSMIT REVISED PAGES INCORPORATING THIS CHANGE.

PLEASE SEND THE AMENDMENT TO KARL R. SCHENDEL, WESTINGHOUSE ELECTRIC CORPORATION, BOX 2278, PITTSBURGH, PA. 15230.

IF YOU HAVE ANY QUESTIONS, PLEASE TELEPHONE COLLECT /412/ 255-3907.

B/28

KARL R. SCHENDEL LICENSE ADMINISTRATOR WESTINGHOUSE ELEC CORP

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

APR 3 1969

DML:RLL
70-337
SNM-338, Amendment No. 16

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Processing Fast Reactor Fuel

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to include the revised pages 6, 7, 34 and 45 as submitted in your application dated March 21, 1969.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

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ITEM # 29

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
40-4739
SMB-355, Amendment No. 4
70-337
SNM-338, Amendment No. 15

MAR 7 1969

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Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with your application dated February 24, 1969, Source Material License No. SMB-355, dated November 10, 1964, and Special Nuclear Material License No. SNM-338, dated June 2, 1967, are hereby amended as follows:

A. The respective expiration dates for Source Material License No. SMB-355 and Special Nuclear Material License No. SNM-338 are hereby extended to December 31, 1969.

B. Special Nuclear Material License No. SNM-338 is hereby amended to authorize the receipt, possession, use and transfer of 60,000 kilograms of uranium oxide for fabrication of fuel assemblies for the Point Beach #1 reactor.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

MAR 11 1969

ITEM # 30

Westinghouse Electric Corporation

For Div of Compliance
3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

February 24, 1969

DOCKET NO. 70-337

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Extension of Cheswick Site Licenses SNM-338, Docket 70-337, and SMB-355, Docket 40-4739

Gentlemen:

The Westinghouse Electric Corporation hereby requests that the expiration date of each of the two subject licenses be revised to read December 31, 1969. In addition, we request an amendment to License SNM-338, Docket 70-337, to authorize the receipt, possession, use and transfer of 60,000 kilograms of uranium oxide for the Point Beach #1 nuclear power reactor. The enrichments, processes and nuclear criticality safety limits specified in our NOK application, dated October 10, 1967, and October 25, 1967, will apply.

Please send the amendments to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS:sw

7 copies transmitted

FEB 27 1969

ITEM # 31

640

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
70-337
SNM-338, Amendment No. 14

FEB 14 1969

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the use of a maximum permissible value of 700 grams U-235 as a mass control during the fabrication of fuel assemblies in the Materials Systems Laboratory in accordance with your application dated January 29, 1969.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

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B/32

ITEM # 32

RECEIVED FEB 3 1969 U.S. ATOMIC ENERGY COMMISSION

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

DOCKET NO. 70-337

January 29, 1969 For Div of Compliance

CWN
WRL

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for an Amendment to
License SNM-338, Docket 70-337

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to authorize the use of an increased maximum permissible mass during assembly operations in the Materials Systems Laboratory (MSL).

Paragraph 1. of Section 7.2 of our application dated November 25, 1964, establishes a maximum permissible batch size of 350 grams of contained ^{235}U. Currently, this is the only mass control value used in MSL. This value was selected from Table I of TID-7016. It is recommended as a nuclearly safe limit for fully-enriched uranium in the form of a homogeneous solution, assuming a spherical geometry and optimum moderation and full reflection by light water. It also provides an allowance for inadvertent double batching.

Westinghouse requests authorization to use a maximum permissible value of 700 grams of contained ^{235}U as a mass control during the fabrication of fuel assemblies in the Materials Systems Laboratory. This request is based on the consideration that double batching is not credible at the assembly operation stage. At this point, the fuel rods have been released following a rigorous inspection and the probability of a rod having an excessive loading is negligible. Obviously, the likelihood

FEB 4 1969 B/33

ITEM # 33

FEB 4 1969

313

of an operator inserting twice the specified number of rods in an assembly is also negligible. The requested 700 gram maximum permissible value is still ultra conservative since such considerations as spherical geometry, optimum moderation, etc. will not be applicable.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

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Crooks
~~Gray~~
WRL

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N. Doulos, DML, w/encl.
C. D. Luke, DML:CB, w/encl.
R. P. Wischow, NMD, w/encl.
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Hap

DML:CEM
70-337
SNM-338, Amendment No. 13
SNM-338, Amendment No. 71-28

FEB 5 1969

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the receipt, storage only and transfer of the special nuclear material described in paragraph 2 of your application dated January 21, 1969. attached to Amend 12

All other conditions of this license shall remain the same.

Enclosed is Amendment No. 71-28 to Special Nuclear Material License No. SNM-338 authorizing the delivery of special nuclear material to a carrier for transport in the OR-12 package. Please note that this amendment does not authorize the transport of special nuclear material. Such transport is normally subject to regulation by the Department of Transportation (DOT). Questions regarding their requirements should be directed to DOT.

FOR THE ATOMIC ENERGY COMMISSION

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

Enclosures:
As stated above

FEB 6 1969

cc: Mr. William A. Brobst, DOT

Compliance, HQ

B/34

ITEM # 34

UNITED STATES
ATOMIC ENERGY COMMISSION

FEB 5 1969

COPY

LICENSE AMENDMENT
for
DELIVERY OF SPECIAL NUCLEAR MATERIAL
to a
CARRIER FOR TRANSPORT

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, and Part 71, the following amendment to the special nuclear material license identified below is hereby issued, authorizing the licensee to deliver special nuclear material to a carrier for transport, and is subject to the conditions specified in that license and to the conditions specified below.

Licensee	
1. Name: Westinghouse Electric Corp.	3. License No. SNM- 338 Amendment No. 71-28
2. Address: 3 Gateway Center Pittsburgh, Pennsylvania 15230	4. Docket No. 337

CONDITIONS

5. (a) Packaging

(1) Model number: OR-12

(2) Description: (SEE PAGE 2)

(b) Contents

(1) Type and form of material: Uranium hexafluoride: enrichment in the U-235 isotope not to exceed 5.0%, H/U-235 ratio not to exceed 1.7.

(2) Maximum quantity of material per package: 450 pounds UF_6, containing not more than 6.9 kg U-235,

(c) Fissile Class: II

(1) Minimum transport index to be shown on label for Class II: 1.2

COPY

(2) Maximum number of packages per shipment for Class III: N.A.

COPY

5. (a)(2) Twelve inch ID x 53-inch long UF_6 cylinder (Model 12A or 12B) as described in Section 8, ORO-651; protective package for 12-inch diameter UF_6 cylinder as described in K-1714.

REFERENCES

Licensee's application dated January 21, 1969, requesting approval to deliver special nuclear material to a carrier for transport in the above container.

K-1714, "Protective Shipping Packages for 8- and 12-Inch Diameter UF_6 Cylinders," April 20, 1967, Union Carbide Corporation, Nuclear Division, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee.

ORO-651, "Uranium Hexafluoride Handling Procedures and Container Criteria", Union Carbide Corporation; Nuclear Division, Oak Ridge, Tennessee.

FOR THE ATOMIC ENERGY COMMISSION

COPY

Date of Amendment FEB 5 1969

Donald A. Nussbaumer
Division of Materials Licensing

COLLECT

JAN 24 1969

DONALD A. BURKHARDT, CHIEF
SOURCE & SPECIAL NUCLEAR MATERIALS BRANCH
DIVISION OF MATERIAL LICENSING
USAEC, WASHINGTON, D. C. 20545

WESTINGHOUSE ELECTRIC CORPORATION
3 GATEWAY CENTER
BOX 2278
PITTSBURGH, PENNSYLVANIA 15230

ATTENTION: MR. KARL R. SCHENDEL
LICENSE ADMINISTRATOR

PURSUANT TO TITLE 10, CODE OF FEDERAL REGULATIONS, PART 70, SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-338, DATED JUNE 2, 1967, IS HEREBY AMENDED TO AUTHORIZE THE ACTIVITY DESCRIBED IN PARAGRAPH 1 OF YOUR APPLICATION DATED JANUARY 21, 1969.

ALL OTHER CONDITIONS OF THIS LICENSE SHALL REMAIN THE SAME.

THE LICENSE AUTHORIZATIONS REQUESTED IN PARAGRAPHS 2 AND 3 OF YOUR APPLICATION ARE UNDER REVIEW. REFERENCE: DML:RLL; 70-337; SNM-338, AMENDMENT NO. 12

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R. P. Wischow, RMS
C. D. Luke, DML
N. Doulos, DML

JAN 24 1969

B/35

ITEM # 35

TWX INCOMING

For Div of Compliance

1969 JAN 21 PM 4 22

1969 JAN 21 PM 4 35

U. S. ATOMIC ENERGY COMMISSION
DIVISION OF MATERIALS LICENSING
WASHINGTON, D. C.

70-337

RECEIVED JAN 22 1969

ATTENTION MR. ROBERT L. LAYFIELD

1-21-69 408PM

WESTINGHOUSE REQUESTS AMENDMENT OF LICENSE SNM-338, DOCKET 70-337 TO AUTHORIZE THE FOLLOWING --

1. PROCESSING OPERATIONS IN THE UPPER NOZZLE REGION OF TWO ASSEMBLED FUEL ASSEMBLIES WHILE THE ASSEMBLIES ARE SECURED TO A STRONGBACK SUPPORT FIXTURE. EACH COMBINATION OF ASSEMBLIES AND STRONGBACK WILL BE IDENTICAL TO ONE OF THOSE DESCRIBED EITHER IN OUR RCC OR RCC-1 SHIPPING PACKAGE APPLICATIONS AS APPROVED IN AMENDMENTS 71-24 AND 71-25 DATED MAY 28, 1968, RESPECTIVELY. THE NUCLEAR CRITICALITY SAFETY OF TWO ASSEMBLIES IN A STRONGBACK WAS DEMONSTRATED IN THE SHIPPING AMENDMENT APPLICATIONS. EACH COMBINATION OF FIXTURE AND ASSEMBLIES WILL BE SEPARATED FROM OTHER ACCUMULATIONS OF SNM BY A MINIMUM DISTANCE OF TWELVE INCHES.

ITEM # 36

B/36

2. RECEIPT, POSSESSION AND TRANSFER OF 750 KG OF UF6 ENRICHED UP TO 3.40 W/O IN THE ISOTOPE 235U IN SPECIFICATION 12A CYLINDERS. THE CYLINDERS WILL NOT BE OPENED.

3. DELIVERY TO A CARRIER FOR TRANSPORT OF THE SNM DESCRIBED IN PARA. 2 /I.E., 3.40 W/O ENRICHED UF6 IN SPEC 12A CYLINDERS/ IN PACKAGES FULFILLING ALL THE REQUIRMENTS OF DOT SPECIAL PERMIT NUMBER 4909.

IF YOU HAVE ANY QUESTIONS CONCERNING THIS APPLICATION PLEASE TELEPHONE ME COLLECT AT /412/ 255-3907. WESTINGHOUSE REQUESTS AN IMMEDIATE RESPONSE TO THE AUTHORIZATION REQUESTED IN PARA. 1. APPROVAL OF THE AUTHORIZATIONS REQUESTED IN PARA. 2 AND 3 ARE REQUESTED NO LATER THAN FEBRUARY 21, 1969.

KARL R. SCHENDEL, LICENSE ADMINISTRATOR WESTINGHOUSE ELEC CORP
GATEWAY CENTER PITTSBURGH PA

END

O

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DEC 16, 1968

DML:RLL
40-4739
SMB-355, Amendment No. 4
70-337
SNM-338, Amendment No. 11

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, the expiration dates for Licenses SNM-338, dated June 2, 1967, and SMB-355, dated November 10, 1964, are hereby extended to March 31, 1969.

All other conditions of these licenses shall remain the same.

In accordance with your application dated November 26, 1968, we extended the expiration date for License SMB-355. Also, since it appears that we will not be in a position to renew License No. SNM-338 prior to its expiration date on December 31, 1968, we extended its expiration date.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by
Donald A. Nussbaumer

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

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ITEM # 37

DEC 16 1968

ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
70-337
SNM-338, Amendment No. 10

NOV 8 1968

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the receipt, possession and use of special nuclear material for the fabrication of fuel assemblies in accordance with the application dated October 24, 1968.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

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NOV 28 1968

ITEM # 38

DOCKET NO. 70-337

For Div of Compliance

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 24, 1968

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for an Amendment to
License SNM-338, Docket 70-337

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the receipt, possession, use and transfer of special nuclear material for the fabrication of fuel assemblies as listed below.

1. 60,000 kilograms of uranium oxide for the Ginna nuclear power reactor. The enrichments, processes, and nuclear criticality safety limits specified in our NOK application, dated October 10, 1967 and October 25, 1967, will apply.

2. 50,000 kilograms of uranium oxide for the Mihama nuclear power reactor. The enrichments, processes, and nuclear criticality safety limits specified in our NOK application, dated October 10, 1967 and October 25, 1967, will apply.

3. 90,000 kilograms of uranium oxide for the Robinson #2 nuclear power reactor. The enrichments, processes and nuclear criticality safety limits specified in our Indian Point #2 application, dated August 4, 1967, will apply.

B/39

ITEM # 39

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

7 copies transmitted

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUN 23 1972

L:FFR:MAD
70-337
SNM-338, Amendment No. 33
40-4739
SMB-355, Amendment No. 12

Westinghouse Electric Corp.
Monroeville Nuclear Center
ATTN: Mr. Karl Schendel
P. O. Box 355
Pittsburgh, Pennsylvania 15230

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Parts 40 and 70, Source Material License No. SMB-355 and Special Nuclear Material License No. SNM-338 are hereby amended to extend the expiration dates to December 31, 1972.

All other conditions of these licenses shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
R. B. Chitwood

R. B. Chitwood, Chief
Fuel Fabrication and
Reprocessing Branch
Directorate of Licensing

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A. Cabell, DRA
B. Brooks, GM
R. T. Woolsey, L:FFR (2)

B/40

ITEM # 40

DOCKET NO. 70-337
RO (HDQRS)

Westinghouse Electric Corporation Power Systems

PWR Systems Division
Box 355
Pittsburgh Pennsylvania 15230

May 25, 1972

MAY 31 1972

U. S. Atomic Energy Commission
Directorate of Licensing
Washington, D. C. 20545

Attention: R. B. Chitwood, Chief
Fuel Fabrication & Reprocessing Branch

Gentlemen:

Subject: Renewal of License SNM-338, Docket 70-337

The Westinghouse Electric Corporation hereby requests that License SNM-338, Docket 70-337, be extended until December 31, 1972 in accordance with the following provisions:

1. Existing license conditions will remain unchanged through September 25, 1972.

2. After September 25, 1972, the total authorized quantity of SNM will be 4500g ^{235}U as contained in uranium at enrichments equal to or less than 5 w/o.

3. SNM possessed after the September 25, 1972, date will be possessed, used and transferred as required incidental to the termination of activities involving the uses of radioactive materials at the NFD Manufacturing Facility at Westinghouse Cheswick Site.

4. Efforts will be made to dispose of or decontaminate the entire facility to below the limits described in "Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Materials" dated April 22, 1970.

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ITEM # 41

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5. Upon completion of cleanup and decontamination activities, USAEC representatives will be invited to inspect the areas. Following USAEC approval, the license may be terminated, and the facility will be released for non radioactive manufacturing activities.

Please send the amended license to me at the above address.

If you have any questions, please write to me at the above address or telephone me on (412) 373-4652.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS:jh

7 copies transmitted

AUG 11 1972

Hurc 9/1
PR Nelson
~~6/19/18 WK Lorting~~
Epstein
file SNM-1120

L:FFRB:RTW
70-1143
70-1086, SNM-1170, Amendment No. 1
70-337, SNM-338, Amendment No. 34

Westinghouse Electric Corporation
Monroeville Nuclear Center
ATTN: Mr. Karl R. Schendel
License Administrator
P.O. Box 355
Pittsburgh, Pennsylvania 15230

Gentlemen:

Enclosed are AEC Material License No. SNM-1120, as amended in its entirety and Special Nuclear Material Safeguards Amendment No. SG-5. License No. SNM-1120 now authorizes Advanced Reactor Division (ARD) laboratory activities formerly licensed under Special Nuclear Material License No. SNM-1170 and the Materials Systems Laboratory (MSL) activities in Building 7 which were heretofore authorized under License No. SNM-338.

We have not issued specific amendments for use of the packages formerly covered under this license since these packages may be used under the general license provisions of paragraph 71.9(b) of 10 CFR 71. We have considered your application as meeting the requirements of subparagraph 71.9 (b)(iii) for use of the Models Nos. L-3(BP-1), HA-10(LA-36 w/HA-10 Insert), III-B-2-W, III-B-3, PU-10-I and NFS-10 LI packages under the general license.

Since the activities formerly covered by Special Nuclear Material License No. SNM-1170 (Docket 70-1086) have been incorporated by Special Nuclear Material License No. SNM-1120, License No. SNM-1170 is hereby terminated.

Also, authorization to use special nuclear material in Building No. 7 under Special Nuclear Material License No. SNM-338 (Docket No. 70-337) is hereby terminated.

In addition, Special Nuclear Material License No. SNM-338 is hereby amended by adding License Condition No. 12 to read as follows:

> The licensee shall maintain an emergency plan and implementing procedures in accordance with the conditions specified in the enclosed Annex B.

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ITEM # 42

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Please note that this condition is also incorporated in the enclosed License No. SNM-1120 as Condition No. 13.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
W. H. Ray

for R. B. Chitwood, Chief
Fuel Fabrication and Reprocessing
Branch
Directorate of Licensing

Distribution:
Public Document Room, w/encl
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ACabell, DRA, w/encl
BBrooks, GM, w/encl
CMacDonald, L:T, w/encl
RLStevenson, L:TS, w/encl
RTWoolsey, L:FFRB, (2), w/encl
RBChitwood, L:FFRB, w/encl

COPY

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, and Title 10, Code of Federal Regulations, Chapter 1, Parts 40 and 70, a license is hereby issued authorizing the licensee to receive and possess the materials designated below; to use such materials for the purpose(s) and at the place(s) designated below; and to transfer such materials to persons authorized to receive them in accordance with the regulations in said Parts. This license shall be deemed to contain the conditions specified in the Atomic Energy Act of 1954, as applicable, the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect, and to any conditions specified below.

1. Licensee

Westinghouse Electric Corporation

2. Address

Post Office Box 355
Pittsburgh, Pennsylvania 15230

3. License No.

SNM-1120, as revised in its entirety

4. Expiration Date

April 30, 1974

5. Docket No.

70-1143

6. Materials

Plutonium; uranium enriched in the U-235 isotope; and source material

7. Maximum Quantity of Materials Licensee May Possess At Any One Time Under This License

A. Plutonium: One hundred (100) kilograms for fuel fabrication with a maximum Pu-238 content of 2.0% and a minimum Pu-240 content of 5.0%, and twenty (20) grams as calibration samples.

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ITEM # 43 B/43

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MATERIAL LICENSE

Supplementary Sheet

License Number SNM-1120

7. continued

B. U-235: One hundred (100) kilograms as contained in uranium enriched to 1.0% in the U-235 isotope; and thirty (30) kilograms contained in uranium of any enrichment.

C. Natural and/or depleted uranium: Ten thousand (10,000) kilograms.

D. Thorium: Twenty-five (25) kilograms.

E. Plutonium: Fifteen (15) kilograms as encapsulated components with a maximum Pu-238 content of 2.0% and a minimum Pu-240 content of 5.0%.

F. U-235: Six (6) kilograms contained in uranium of any enrichment.

G. Natural and/or depleted uranium: Twelve thousand (12,000) kilograms.

H. Thorium: Five hundred (500) pounds.

I. Plutonium: Five (5) kilograms.

J. U-235: Twelve (12) kilograms as contained in uranium of any enrichment.

K. Natural and/or depleted uranium: One hundred (100) kilograms.

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License Number SNM-1120

MATERIAL LICENSE

Supplementary Sheet

8. Authorized use

The licensee shall use the materials specified in 7.A., 7.B., 7.C., and 7.D., above, in accordance with the statements, representations, and conditions specified in the licensee's applications dated June 13, August 22, October 3, October 14, and October 31, 1969; February 4, July 15, September 4, and October 22, 1970; December 9, and December 10, 1971; and April 13, and May 26, 1972.

The licensee shall use the materials specified in 7.E. and 7.F. above for storage only and 7.G. and 7.H. above in accordance with the statements, representations, and conditions specified in the licensee's applications dated December 9, 1971 and December 10, 1971.

The licensee shall use the materials specified in 7.I., 7.J., and 7.K. above in accordance with the statements, representations, and conditions specified in the licensee's applications dated January 28, 1969, November 14, 1969, and June 30, 1970 (Docket No. 70-1086), and December 9 and 10, 1971.

SNM 1120

9. Authorized Places of Use

A. Except in those states where such materials would be subject to licensing by an Agreement State, the licensee is authorized to possess and use up to 15 grams of U-235 and/or up to 0.5 gram plutonium for nonnuclear nondestructive modification, demonstration, and testing purposes subject to the conditions set forth in s 12.2 of application dated June 13, 1969; and

B. Items 7.A., 7.B., 7.C., and 7.D. may be possessed and used at the licensee's Plutonium Fuels Development Laboratory at Cheswick, Pennsylvania; and

C. Items 7.E., 7.F., 7.G., 7.H., 7.I., 7.J., and 7.K. may be possessed and used at the licensee's laboratories in Building No. 7 at Cheswick, Pennsylvania.

10. The licensee is authorized to abandon or dispose of materials and equipment contaminated with source or special nuclear material to persons not possessing an appropriate AEC material license providing the conditions set forth in Section 11.3, page 41 of the licensee's Health Physics Manual dated May 1966, are met.

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MATERIAL LICENSE

License Number SNM-1120

Supplementary Sheet

11. The licensee is authorized to abandon or dispose of record materials such as notebooks, films, and account papers which are contaminated with source or special nuclear material provided the conditions set forth in § 12.4 of license application dated June 13, 1969, are met.

12. Pursuant to § 20.103(c)(1) and (3), 10 CFR 20, the licensee is hereby authorized to make allowance for the use of respiratory equipment in determining whether individuals in restricted areas are exposed to concentrations of airborne radioactivity in excess of the limits specified in Appendix B, Table 1, Column 1, 10 CFR 20, subject to the conditions specified in the attached Annex A.

13. The licensee shall maintain an emergency plan and implementing procedures in accordance with the conditions specified in the attached Annex B.

14. The licensee shall conduct a bioassay program as specified in Section 6.11 of the application dated June 13, 1969, subject to the following conditions: (a) the level for immediate investigation shall be 0.2 alpha d/m/day for plutonium and 25 d/m/day for uranium, (b) the maximum interval for a bioassay shall be ninety days, (c) fecal sampling and/or lung counting shall be performed for confirmed urinalyses above the investigation levels if investigation indicates that the exposure may have been to relatively insoluble forms of radioactive material. The bioassay program shall also include the capability for on-site measuring of plutonium in wounds.

15. For the materials specified in Items 7.A., 7.B., 7.C., and 7.D., the licensee shall comply with the criteria specified in Section 10.3, Interaction Criteria of the application dated October 3, 1969.

16. Notwithstanding the requirements imposed by paragraph 7.2, page 66, of application dated June 13, 1969, spacing of fissile units shall be provided as exemplified in Figure 3 of the May 26, 1972 letter (1) using a square surface area for each unit and (2) avoiding overlapping of such areas.

17. The licensee shall establish appropriate controls over the transfer of special nuclear material from safe geometry or nuclear poisoned vessels to unsafe geometry vessels so as to assure that the criticality control limits for the unsafe geometry vessels are met.

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License Number SNM-1120

MATERIAL LICENSE

Supplementary Sheet

18. The licensee shall vent all plutonium nitrate shipping containers within thirty (30) days of receipt, and shall establish a procedure for periodically venting plutonium nitrate solutions held in storage at intervals not to exceed thirty (30) days to preclude excessive pressure buildup.

19. This license does not authorize the outside storage of any plutonium bearing materials except that which may occur incident to receipt and shipment.

20. High efficiency particulate filters in the air exhaust systems shall be certified by the supplier to be 99.97 percent efficient for 0.3 micron particles. In-place testing of the final high efficiency filters in the stack exhaust systems shall be performed upon installation of the filters, after each change of filters and, as a minimum, annually thereafter using the "cold" DOP test. The acceptance efficiency for a filter using the standard polydisperse DOP aerosol (count median diameter of about 0.8 micron) shall be 99.95 percent.

21. Air sampling units shall be located to obtain continuous samples representative of personnel exposure to airborne concentrations of radioactive material. Sufficient "lapel" or breathing zone air samples shall be taken in order to demonstrate the accuracy of the fixed sampling methods.

22. All exhaust ventilation systems servicing confinement systems or process areas where plutonium in dispersible forms is handled, shall be equipped with instrumentation to measure pressure drop across the final filters or filter banks. The pressure drop across a final filter shall not exceed 6" of H_2O. Readings of these pressure drops shall be taken and recorded at a minimum frequency of once per week unless automatic instrumentation equipped with warning alarms and failure indicators are provided which comply with this requirement.

23. For all exhaust ventilation systems servicing confinement systems or process areas where materials in dispersible forms are handled, the effluent shall be continuously sampled at locations downstream from the final high efficiency filter bank using a system designed to obtain a representative sample of the concentration of radioactivity in the exhaust effluent and capable of determining total activity and average concentration of radioactivity released.

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MATERIAL LICENSE

License Number SNM-1120

Supplementary Sheet

24. Sealed plutonium sources shall be leak tested in accordance with the attached condition.

25. Notwithstanding the audit functions specified in Sections 5.3 and 5.6, nuclear and radiological safety audits shall be conducted on a semi-annual basis by the NFD Engineering Nuclear Safety Committee. Records of the audit shall be maintained and a copy will be forwarded to the Manager PFDL for any necessary corrective action. Also, written records shall be maintained of the monthly audit made by the Manager PFDL and the Manager, Health and Safety.

For the U. S. Atomic Energy Commission

Original signed by
W. H. Ray
for R. B. Chitwood, Chief
Fuel Fabrication and
by ~~Reprocessing Branch~~
Directorate of Licensing
Washington, D. C. 20545

Date AUG 11 1972

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UNITED STATES
ATOMIC ENERGY COMMISSION

LICENSE AMENDMENT
FOR
SPECIAL NUCLEAR MATERIALS SAFEGUARDS

Pursuant to the Atomic Energy Act of 1954, as amended, and Title 10, Code of Federal Regulations, Chapter I, Part 70, the following amendment to the special nuclear material license identified below is hereby issued, incorporating controls for the safeguarding of special nuclear material.

Licensee

Name: Westinghouse Electric Corporation

Address: Westinghouse Building
Gateway Center
Pittsburgh, Pennsylvania
15222

License No. SNM-1120

Amendment No. SG-5, superseding all previous safeguards amendments

Docket No. 70-1143

CONDITIONS

1.0 FACILITY ORGANIZATION

1.1 For each designated organization, the following management position(s) shall be responsible for and carry out the duties assigned herein to the Safeguards Manager, the Safeguards Representative and the Safeguards Q.C. Manager:

1.1.1 Plutonium Fuels Development Laboratory (PFDL), Nuclear Fuels Division (NFD), Building 8 -- the Manager, PFDL, NFD, shall be the Safeguards Manager; he or his designee shall be the Safeguards Representative; and the Manager, Quality Control, Manufacturing (Cheswick), NFD, shall be the Safeguards Q.C. Manager.

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B/44

ITEM # 44

1.1.2 PFDL, NFD, Building 7 -- the Manager, PFDL, NFD, shall be the Safeguards Manager; he or his designee shall be the Safeguards Representative; and the Manager, Quality Control, Manufacturing (Cheswick), NFD, shall be the Safeguards Q. C. Manager.

1.1.3 Plutonium Laboratory, Advanced Reactors Division (ARD), Building 7 -- the Manager, Cheswick Fuel Facilities (CFF), ARD, shall be the Safeguards Manager; he or his designee shall be the Safeguards Representative; and the Manager of Reliability, ARD, shall be the Safeguards Q. C. Manager.

1.2 The Safeguards Manager shall develop, revise, implement, and enforce the nuclear material control procedures and manage an overall system of special nuclear material control.

1.3 Nuclear material control procedures and revisions thereto shall be approved by the Manager, Nuclear Materials Management and Safeguards, Nuclear Energy Systems (NES), and the Safeguards Manager. A manual containing all current nuclear material control procedures shall be maintained by the Safeguards Manager.

1.4 The Safeguards Manager shall assure that the nuclear material control procedures are appropriately reflected in process specification, manufacturing instructions, standard operating procedures, or similar detailed management instructions.

1.5 All delegations of safeguards responsibilities by the Safeguards Manager, shall be in writing.

2.0 FACILITY OPERATION

2.1 Material Balance Areas (MBA's) shall be established by the Safeguards Representative.

2.2 Each MBA shall be an identifiable physical area into and out of which movement of special nuclear material can be measured.

2.3 Sufficient numbers of MBA's shall be established so that losses of special nuclear material can be identified and localized.

2.4 All operations within an MBA shall be the responsibility of a single employee who shall also be responsible for the custody of special nuclear material within his MBA.

3.0 MEASUREMENTS AND STATISTICAL CONTROLS

3.1 The licensee shall determine the U-235, U-233, and/or Pu content of all receipts, shipments, intentional discards and material inventoried, along with the limits of error associated with these quantities. The licensee shall make sufficient measurements to substantiate the stated quantities and associated limits of error. Measurements are not required on items which have been determined by other means to contain less than ten (10) grams U-235, U-233, and/or Pu each. Limits of error as used herein means the boundaries within which the true or best value of the parameter being measured lies with a probability of 95%.

3.2 A program of standardization and calibration of measurement equipment and analytical procedures shall be maintained to provide data to substantiate the limits of error associated with all measurements required for safeguards purposes.

3.3 All measurements required by this amendment shall be reviewed annually by the Safeguards Q. C. Manager. This review shall include a quantitative calculation of limits of error of the measurement system. The Safeguards Q. C. Manager shall utilize data obtained through calibrations specified in Condition 3.2 to monitor performance of the measurement system to assure calculated limits of error are maintained between reviews. Records of reviews, calculations, and use of calibration data shall be kept under the direction of the Safeguards Q. C. Manager.

3.4 After any physical inventory the material unaccounted for (MUF) and the limits of error associated with the material unaccounted for shall be computed promptly. The limits of error associated with MUF shall be calculated by statistically combining the limits of error determined for shipments, receipts, beginning inventory, and measured losses for the period since the last inventory.

3.5 If the quantity of MUF exceeds the associated limits of error, the licensee shall promptly notify the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Materials and Plant Protection Branch, Region I, Newark, New Jersey. The licensee shall

investigate the MUF and notify the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Materials and Plant Protection Branch, Washington, D. C. 20545 within thirty (30) days after the initial notice, specifying the probable reasons for the MUF and the corrective action taken or planned.

4.0 SHIPPING AND RECEIVING

4.1 All shipper-receiver differences shall be brought to the attention of the Safeguards Representative who shall evaluate these differences to determine whether they are statistically significant and of sufficient magnitude to warrant investigation. The Safeguards Representative shall investigate all statistically significant differences which exceed $500 value. A shipper-receiver difference shall be considered statistically significant when (1) the difference exceeds the statistical combination of the limits of error of the shipper's and receiver's measurements, or (2) if the shipper's limits of error are unknown, the difference exceeds twice the limits of error for the receiver's measurement. Statistical analyses of past performance, measurement uncertainties, and other data shall be kept by the Safeguards Representative.

5.0 STORAGE AND INTERNAL TRANSFERS

5.1 A documented system of control over special nuclear material stored and processed within the facility shall be maintained which will provide continuous knowledge of the location, and quantity of all material contained in discrete, identifiable items or containers.

5.2 All transfers of special nuclear material between MBA's shall be documented to show the identity, quantity, and isotopic analysis of the material transferred. A system of controls shall be maintained by the licensee for the distribution and accounting of all transfer documents.

5.3 Each document supporting a transfer of material between MBA's shall be signed by the delegated individual.

6.0 INVENTORY

6.1 A complete physical inventory of all special nuclear material subject to this license shall be conducted at approximately twelve-month intervals, but in no case shall more than fourteen months elapse between inventories.

6.2 Prior to each complete physical inventory, written procedures shall be prepared which:

6.2.1 specify the extent to which each MBA is to shut down and clean out process equipment;

6.2.2 specify the extent to which each MBA is to remain static during the inventory;

6.2.3 identify the basis for accepting for inventory purposes previously made measurements and their limits of error;

6.2.4 designate measurements to be made for inventory purposes to establish and demonstrate the limits of error associated with the quantity of material on inventory; and

6.2.5 identify the manner by which material on inventory will be listed to assure each item is inventoried and there are no duplications or omissions.

6.3 The book inventory shall be reconciled with and adjusted to the results of the physical inventory upon completion of the physical inventory.

6.4 Special physical inventories of an MBA shall be conducted whenever there is reason to believe that subsequent to the last prior physical inventory a particular MBA has experienced losses or gains that are different by statistically significant amounts from those expected.

7.0 RECORDS AND REPORTS

7.1 The licensee shall establish and maintain a records system which will provide sufficient information to maintain a material balance around each MBA and the total plant. These records shall contain information pertaining to all receipts, shipments, measured discards, inventory, and MUF for each material balance. MBA and plant records shall be reconciled at the end of each accounting period. All entries in the records shall be supported by appropriate documents.

7.2 All measured discards and MUF shall be reported on a monthly basis by the Safeguards Representative to the Safeguards Manager.

7.3 The licensee shall report on a monthly basis all intentional discards and material unaccounted for. The MUF shall be that which has been determined during the month as a result of completing a material balance around a single operation, a number of operations, or the entire plant. This report shall be made within fifteen (15) days after the end of the month in which the discard was made or the material unaccounted for was determined. Reports shall be sent to the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Materials and Plant Protection Branch, Region I, Newark, New Jersey. Each report shall be identified by the Reporting Identification Symbol(s) (RIS) assigned to the licensed operations and shall include a statement of the nature of the discards, the probable reasons for the MUF and any actions taken or planned with respect to the MUF.

8.0 MANAGEMENT OF MATERIALS CONTROL SYSTEM

8.1 At least once each year the licensee shall conduct, independent of the Safeguards Representative, an internal review of the nuclear materials control procedures and management of the overall system of special nuclear material control, and report the findings to senior licensee management.

8.2 An estimate of anticipated losses (measured discards plus MUF) for each period of time between inventories shall be prepared for each MBA, with the concurrence of the Safeguards Manager, and shall be based on prior experience, throughput quantities and rates, etc. If losses exceed the estimate of those anticipated, they shall be investigated by the Safeguards Representative and the results of his investigation shall be reported to the Safeguards Manager.

COPY

License No. SNM-1120

Amendment No. SG-5

Docket No. 70-1143

8.3 Any apparent loss of a discrete item or container of special nuclear material which cannot be resolved by an immediate investigation shall be reported to the Safeguards Manager who shall promptly notify the U. S. Atomic Energy Commission, Directorate of Regulatory Operations, Materials and Plant Protection Branch, Region I, Newark, New Jersey, and shall conduct an investigation of the loss. The Safeguards Manager shall report the results of his investigation to senior licensee management.

FOR THE ATOMIC ENERGY COMMISSION

Date of Amendment AUG 11 1972

/s/

Materials and Plant Protection Branch
Directorate of Licensing

COPY

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MAR 27 1967

IN REPLY REFER TO:

DML:RLL
70-337

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338 is hereby amended to authorize the activities described in your application dated October 26, 1966, as amended by your applications dated December 22, 1966 and February 8, 1967.

FOR THE ATOMIC ENERGY COMMISSION

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

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ITEM # 45

B/45

From CO - Hdqrs.

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

March 21, 1969

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

For Div. of Compliance

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nulcear Materials Branch

Subject: Amendment to License SNM-338, Docket 70-337, to Authorize the Processing of Plutonium Fuel

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to revise, in accordance with the attachment to this letter, one of the maximum permissible values which may be used in the processing of plutonium-bearing reactor fuel components.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address, or telephone me collect at (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

KRS: sw

Attachment
7 copies transmitted

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

February 8, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

For Div of Compliance

Subject: Amendment to License SNM-338, Docket 70-337, to Authorize the Processing of Plutonium Fuel.

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to authorize the processing of plutonium-bearing reactor fuel components in accordance with our application dated 10/26/66, as modified by the revision transmitted to you on 12/22/66 and by the attachment to this letter.

The changes appearing as Revision 2 of the application have been made in response to questions raised in your letter of 12/22/66 and during your recent tour of the facility. In addition to the changes in the application, two explanatory comments appear to be in order.

1. In your letter of 12/22/66, you request information on the basis for our assumption of 99% efficiency for the remote filters in the event of a fire in a glove box. This assumption is based on the consideration that there is a minimum of 30' of metal ductwork (not including bends or elbows) separating the nearest drybox from the filters. In addition to the separation, the ductwork will provide approximately 120 square feet of heat radiating surface. When this information is considered together with the revised

From CO - Hdqrs.

license requirements for fire- and pressure-resistant filter construction and for two filters to be mounted in series, the assumption appears thoroughly conservative.

2. During your visit you inquired concerning the filtered connections leading to the downstream side of the absolute filter caisson. As I explained by telephone, this connection has been supplied only in case it is necessary to bleed a caisson back to room pressure following the insertion of the blast gates in preparation for changing filters.

Please send the license to me at the above address.

If you have any further questions, please write to me at the above address or telephone me collect, 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment

6 copies transmitted

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Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

December 22, 1966

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
For Div of Compliance

Subject: Amendment to SNM-338, Docket 70-337, to Authorize Processing of Plutonium Fuel

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to authorize the processing of plutonium-bearing reactor fuel components in accordance with our application, dated 10/26/66, as revised by the attachment to this letter.

The revisions contained in this transmittal have been made in response to your letter dated 12/1/66. For your convenience, comments and references to revised pages, numbered to correspond to the items in your letter, are given below.

1. pp. 34, 43, 46 - The recognition of limitations on the application of MPV's, such as those now incorporated into Table 6.1.1, is an assigned function of the AML Nuclear Safety Committee. (See comments, below, on Item 4 of your letter.) The assumptions listed in Section 9.1 of our application dated 10/26/66, lead to so many degrees of conservatism in the MPV's that a gross misapplication of an MPV sufficient to produce an unsafe condition is incredible.

2. pp. None - The inclusion of the referenced statement signifies our recognition of the experimental and diverse nature of the operations for which we request authorization. It is unrealistic

From CO - Hdqrs.

to expect a first-level manager to be fully competent with respect to all the procedures used and the results expected from every operation which may be performed. Therefore, specific provision has been made, as a part of the basic philosophy under which the facility will be operated, for the first-level manager to exercise the prerogative of employing the most knowledgeable available assistance. The "cognizant engineer" is that individual who has been assigned the responsibility for the technical planning, follow, and evaluation of the program or program phase under consideration. His "guidance" would consist of selection of initial parameters, special briefing of the operator, observation of the progress of the process, evaluation of the progress of the process against that deduced from theory, guidance in modifying the process to approach more closely to the desired results, emergency instructions and such other assistance as may be required, based on his prior theoretical or practical knowledge of the process.

3. pp. 19, 22 - The definition of equivalence in terms of demonstrated capabilities seems superior to any attempt to establish a relationship based on years of experience, formal education short of that required for a degree, technical potential and other diverse and often intangible factors.

4. pp. 27, 27.1 - Paragraph 4.2.6 of our application specifies that the Supervisor of Industrial Hygiene may obtain experience in performing nuclear safety calculations under the direction of the AED (Atomic Equipment Division) Nuclear Safety Committee. The AED Committee is a separate and distinct group which includes members of the caliber of Mr. R. J. French and Mr. E. C. Barnes. I am sorry that this distinction was not made more obvious.

It is not the intent of our application to establish the Advanced Materials Laboratory Nuclear Safety Committee as an MPV-determining

body. Its duties may be summarized as:

(a) to evaluate the effect of assigning an MPV to a new operation or of a substitution in MPV's for an existing operation and to determine whether supporting computations by the Nuclear Engineering Dept. are required. The Committee members have ample experience with standard practices in the handling of plutonium, and will be capable of recognizing unusual situations. Mr. Piros is capable of performing the check calculations on an assembly, which is the one nuclear safety calculation specifically included in its authority.

(b) to review the evaluation of all new or revised processes, where nuclear safety or radiation protection procedures may be affected, to assure that all required approvals have been given.

(c) to conduct audits of laboratory operations to assure that established nuclear safety and radiation protection procedures are being fully observed.

5. pg. 27 - None

6. pp. 30, 31 - None

7. pg. 31, App. A - None

8. pg. 36 - None

9. pg. 37 - None

10. pg. 39 - Plutonium shipments into the laboratory will be relatively infrequent. Each shipment will be very carefully surveyed at each step of the unpacking to reduce to the minimum any possibility of facility contamination. The storage vault is a limited space which could be properly decontaminated should it somehow become necessary.

11. pg. 41 - None

Please send the license amendment to me at the above address.

If you have any questions, please call me collect, 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment:
License Application
6 copies transmitted

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 26, 1966

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

RECEIVED OCT 27 1966 For Div of Compliance

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Material Branch

Subject: Amendment to SNM-338, Docket 70-337, for Processing Fast Reactor Fuel

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the use of special nuclear materials for the development of materials and processes adapted to the fabrication of fast reactor fuel components.

The plutonium facility described in the attached application is the same as that described in our application for amendment of this license dated 6/3/66 and revised 9/16/66. Some of the contents of the attached application supersede or conflict with statements made in the earlier application. Therefore, we request that action on the revised application dated 9/16/66 be held in abeyance, pending a decision on our part either to withdraw it completely or to revise it to conform with the statements in the attached application.

Please send the license amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, 412-255-3907.

Very truly yours

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AN AMENDMENT TO LICENSE SNM-338

PROCESSING FAST REACTOR FUEL

10/26/66

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

For Div of Compliance

PROCESSING FAST REACTOR FUEL

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REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
1	12/22/66	1, 2, 3	Revise Table of Contents
1	12/22/66	19, 22	Define equivalent of college degree
1	12/22/66	26	Retyped
1	12/22/66	27,27.1	Add Section 4.4, "Change Procedures"
1	12/22/66	30	Added reference to App. A and detail on air monitoring equipment.
1	12/22/66	31	Added detail on effluent and personnel monitoring equipment.
1	12/22/66	34	Revised Table 6.1.1 to clarify applicability of MPV's
1	12/22/66	35	Retyped
1	12/22/66	36	Added details concerning interaction calculation methods and limits.
1	12/22/66	37	Added criteria for containers.
1	12/22/66	37.1	Added. Section 6.4 retyped only.
1	12/22/66	39	Specified use of storage vault area for opening packages.
1	12/22/66	41	Added description of gas handling techniques to prevent dry box atmosphere contamination.
1	12/22/66	43	Added procedure for assuring the nuclear safety of an assembly.
1	12/22/66	46	Added use of pellet slab MPV for high density homogeneous material.
1	12/22/66	Appendix A	Added.

REVISION RECORD (continued)

Revision No.	Date of Revision	Pages Revised	Revision Reason
2	2/8/67	2	Inserted reference to Sections 5.9 and 5.10
2	2/8/67	14	Combined last two sentences of first paragraph.
2	2/8/67	25	Corrected typing error.
2	2/8/67	27.1	Clarified responsibility of first two operations. Deleted reference to Note 5 on next-to-last operation. Clarified Note 5.
2	2/8/67	30	Specified monitoring equipment.
2	2/8/67	31	Added blast gate sealing, filter capabilities, monitor specifications and description of inert gas system.
2	2/8/67	31.1	Specified personnel monitoring after withdrawing from gloves. Added Section 5.9 "Fire Prevention and Control."
2	2/8/67	31.2	Added Section 5.10 "Alarm Systems"
2	2/8/67	32	Retyped to conclude Section 5.10
2	2/8/67	36	Deleted use of Ⓦ interaction calculational methods.
2	2/8/67	37	Retyped to permit deletion of page 37.1
2	2/8/67	37.1	Deleted
2	2/8/67	41	Changed "not credible" to "essentially negligible."
2	2/8/67	59	Added Reference #10
2	2/8/67	60	Added superscript /10 to identify source
3	4/1/68	36	Added surface density interaction evlauation.
3	4/1/68	36.1	New
4	4/24/68	9	5 kg. of Pu was 2.5 kg.

REVISION RECORD (continued)

Revision No.	Date of Revision	Pages Revised	Revision Reason
5	3/21/69	34	In Item 2 of Table 6.1.1, "Any Unmoderated (H/Pu $\leq$ 20)" was "Solid Metal."
5	3/21/69	45	Added sentence on 2.5 kg MPV applicability.

Page 7 intentionally left blank.

1. General

An amendment to License SNM-338 is hereby requested to authorize the receipt, possession, storage, use and transfer of plutonium at the Cheswick Site.

The special nuclear materials (SNM) will be used to develop optimum processing techniques for producing fuel rods and test assemblies containing a plutonium-uranium carbide, (Pu,U)C, or other fast breeder reactor fuel material. The SNM will be received in a variety of forms to determine the most desirable starting material. A majority of the plutonium will be received as PuO_2 or as metallic plutonium. A majority of the uranium will be received as UO_2 or as metallic uranium, enriched up to ~93 w/o in the isotope U-235. However, SNM may be received as other compounds or in other forms as dictated by program requirements. These materials will be processed into the final fuel form, where the Pu may constitute up to 25 w/o of the total SNM, and the U may be any enrichment up to fully enriched. The fuel will be pelletized and encapsulated in metal tubes to form fuel rods. The fuel rods may then be shipped to the customer, or they may be fabricated into test assemblies prior to shipment.

The processing operations will be performed in the Advanced Materials Laboratory of the Atomic Power Divisions at the Cheswick Site. Certain non-destructive test procedures may be performed on encapsulated fuel at other areas at the Cheswick Site.

1. (continued)

This application describes the radiation protection and nuclear safety controls which will be instituted to assure the safe operation of the plutonium facility in the Advanced Materials Laboratory, along with the bases on which these controls were selected. It describes the application of these controls to the processes and equipment as presently designed. Also, administrative procedures, which will not be changed without license amendment, are specified. These administrative procedures will permit limited flexibility in processing techniques and the selection of nuclear safety controls.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to Karl R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Materials Requirements

Westinghouse requests authorization to receive, possess, store, use and transfer up to 5 kilograms of contained plutonium in any chemical or physical form, and up to 10 kilograms of contained U-235 in any chemical or physical form at any enrichment up to fully enriched.

The material will be procured in accordance with program requirements. No production, consumption or significant loss of special nuclear material is anticipated.

4. Administration

4.1 Organization Chart

The organization chart for the APD Advanced Materials Laboratory and related staff activities is shown in Figure 4.1.1.

4.2 Responsibilities and Qualifications

The responsibilities and qualification requirements of the several positions shown in Figure 4.1.1 are stated in the following paragraphs. Changes or replacement of management personnel will be made subject to concurrence and approval by two higher levels of management.

4.2.1 Manager of Advanced Materials Section

The Manager of the Advanced Materials Section directs the activities conducted in the Advanced Materials Laboratory, including all functions under this license amendment. He bears the prime responsibility for overall health protection and safety. He selects competent management personnel and makes certain they have adequate facilities and equipment to conduct laboratory operations expeditiously and safely. He plans, directs and controls laboratory activities either personally or through other management personnel. He performs management functions in accordance with Westinghouse policy and higher management directives. He consults with the Supervisor of Industrial Hygiene on health physics, industrial hygiene, laboratory safety and nuclear safety. A tour of the facility is made frequently with

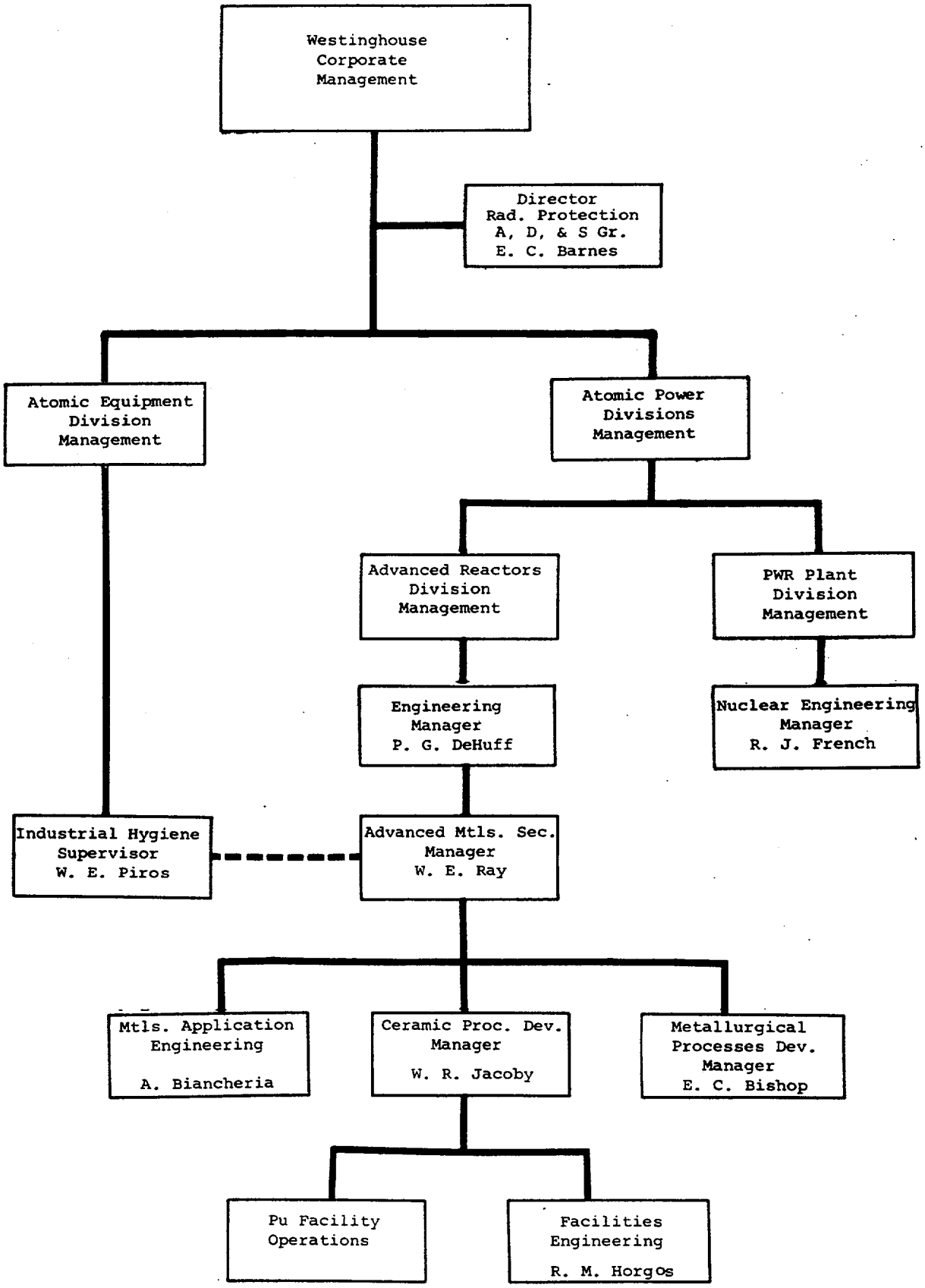

Westinghouse Corporate Management
Director Rad. Protection A, D, & S Gr. E. C. Barnes
Atomic Equipment Division Management
Atomic Power Divisions Management
Advanced Reactors Division Management
PWR Plant Division Management
Engineering Manager P. G. DeHuff
Nuclear Engineering Manager R. J. French
Industrial Hygiene Supervisor W. E. Piros
Advanced Mtls. Sec. Manager W. E. Ray
Mtls. Application Engineering A. Biancheria
Ceramic Proc. Dev. Manager W. R. Jacoby
Metallurgical Processes Dev. Manager E. C. Bishop
Pu Facility Operations
Facilities Engineering R. M. Horgos

Figure 4.1.1

4.2.1 (continued)

his first-line management to insure operational efficiency, conformance with nuclear safety requirements and provision of adequate radiation protection procedures.

A Manager, responsible for the activities conducted under this license, will have a minimum of a Bachelor's Degree in one of the Sciences or Engineering. He will have demonstrated significant achievements as evidenced by publications, patents or work accomplishments. He will have demonstrated management capability by successfully supervising technical personnel for a minimum period of two years.

This position is currently filled by Mr. W. E. Ray whose resumé follows:

W. E. Ray
M.S., Pennsylvania State University - Metallurgy

Mr. Ray joined the Hanford Atomic Products Operation in 1952, where he assisted in the development of fuels for production reactors and in weapons materials development. In 1955, he transferred to the Knolls Atomic Power Laboratory. By 1960, he held the position of Consulting Engineer, Core Component Materials, Submarine Advanced Reactor Project. It was his responsibility to oversee materials selections, provide direction in materials development work, and actively contribute to the resolution of mechanical, hydraulic and physics design problems.

4.2.1 (continued)

In 1960, Mr. Ray joined Dresser Products as Vice-President, Research and Development. In that capacity, he directed the development of fabrication methods for lanthanon metal sheet, tubing, strip and wire. During this period, he also directed the fabrication of control rods for BONUS, EGCR, and several smaller reactors.

Mr. Ray joined Westinghouse in 1963 as Manager, New Fuel Cores Projects for the Atomic Fuel Division. The programs under his direction involved the manufacture of naval reactor prototypes of advanced design. In 1965, he was transferred to his present position as Manager, Advanced Materials Development, Atomic Power Divisions. Mr. Ray is responsible for the development of neutron absorber materials and plutonium-containing fuels.

4.2.2 Manager of Ceramic Processes Development

The Manager of Ceramic Processes Development directs the engineering activities related to plutonium processing. He is responsible for all the drawings, specifications, tooling, fixtures, and equipment needed for the plutonium facility. His personnel also are responsible for all program outlines and operating procedures. He obtains a nuclear safety evaluation of specific equipment and operations from Nuclear Engineering and

4.2.2 (continued)

assures that designated limitations are incorporated into the equipment design. He also assures that the instructions contained in the operating procedures reflect the designated limitations and that information about the nuclear safety limits is prepared for posting in the various work areas.

The Manager of Ceramic Processes Development will have a minimum of a Bachelor's Degree in one of the Sciences or Engineering. He will have demonstrated significant achievements by his technical capability and his work accomplishments. He will have demonstrated management capabilities by successfully supervising personnel for a minimum period of one year.

This position is currently filled by Dr. W. R. Jacoby whose resumé follows:

W. R. Jacoby
Ph.D., Rutgers University - Ceramics Engineering

Dr. Jacoby joined the Knolls Atomic Power Laboratory in 1957 as a Research Associate in the SAR Reactor Materials Group. He was engaged in the fabrication and the irradiation testing of laboratory-type burnable poison and fuel elements.

4.2.2 (continued)

During the period from 1959 through 1964, Dr. Jacoby was employed by the Minnesota Mining & Manufacturing Company, Nuclear Products Department, where he was successively, Senior Ceramic Engineer, Supervisor of the Reactor Materials Laboratory, and Research Specialist. He was responsible for projects concerned with materials and processes development of graphite, graphite fuel elements (Pebble Bed Reactor), Si and SiC protective coatings for graphite, UC_2 microspheres, B_4C microspheres, pyrolytic and refractory metal coating of microspheres, and ceramic and refractory metal honeycomb structures.

Dr. Jacoby joined the Westinghouse Atomic Power Divisions in 1965. He was assigned at the Argonne National Laboratory as a temporary staff member. He was engaged in research and development on the preparation and properties of mixed U-Pu ceramic fuels and their compatibility with cladding materials. Dr. Jacoby is also responsible for liaison activities between WAPD and ANL concerning fast reactor fuel development.

4.2.3 Manager of Metallurgical Processes Development

The Manager of Metallurgical Processes Development has the same responsibilities for those programs involving metallic materials as the Manager of Ceramic Processes Development (Section 4.2.2) has in the area of ceramic materials. He is also responsible for the development of welding and other metals joining techniques. His personnel provide technical support to the Manager of Ceramics Processes Development in these areas.

The requirements for this position are identical to those specified for the Manager of Ceramics in Section 4.2.2.

This position is currently filled by Mr. E. C. Bishop, whose resumé follows:

E. C. Bishop
M.S., Massachusetts Institute of Technology - Metallurgy

Mr. Bishop joined Westinghouse in 1946 as an engineer in the Materials Engineering Department. In 1950, he was appointed Supervisory Engineer, and in 1955 he was promoted to Section Engineering Manager at the Westinghouse Metals Plant at Blairsville, Penna. From then until 1964, he held a number of managerial positions, the last being Engineering Manager for the Blairsville operation. During this 14 year period he held

4.2.3 (continued)

administrative and technical responsibility for a myriad of material and processing developments. The materials included non-fuel nuclear materials, such as Zircaloy and hafnium; refractory metals such as columbium, tungsten and molybdenum; metallic and ceramic magnetic materials; resistance alloys and superalloys. The processes included powder metallurgy; air and vacuum induction and arc melting; hot working by forging, extrusion and rolling; cold working by rolling, swaging and drawing; air, controlled atmosphere and vacuum heat treating; finishing using all commercial methods; and quality determination using a variety of destructive and non-destructive test methods.

In 1964, Mr. Bishop joined the Beryllium Corporation of America. He worked on the development of beryllium alloys with a toxicity equivalent to that of plutonium.

Mr. Bishop rejoined Westinghouse, as Manager of Metallurgical Processes Development in 1966.

4.2.4 Foreman or First Level Supervisor

The individual Foreman or First Level Supervisor has the responsibility for the processing operations involved in his area. He schedules and assigns work tasks according to job description, equipment availability, personnel availability, and overall schedular requirements. He insures that operating procedures are clearly understood by all of his personnel. He insures that all nuclear safety controls and procedures prescribed by the Manager, Ceramic Processes Development, are followed by all personnel under his jurisdiction. He requests direct technical guidance of the operator by the cognizant engineer, when required. He insures that all his equipment is operating properly and that his personnel have all the necessary tools and supplies. He is directly responsible for the health and safety of the men under his supervision.

A Foreman or First Level Supervisor will have either experience or training in handling special nuclear materials. He will be familiar with nuclear safety controls. He will have demonstrated above-average ability by his work accomplishments. He will have demonstrated supervisory ability or will have successfully completed a management training course.

4.2.4 (continued)

Currently, the Supervisor of Pu facility operations is Dr. W. R. Jacoby whose resumé is given in Section 4.2.2 of this application. A Technician-in-Charge, with the qualifications specified above for a Foreman or First Level Supervisor, will be responsible for the immediate technical direction of operating personnel.

4.2.5 Manager of Nuclear Engineering

The Manager of the Nuclear Engineering Department is responsible for the nuclear design of pressurized water reactor cores. He, or personnel under his direction, provides the nuclear safety evaluations for the Advanced Materials Laboratory facilities. This includes a nuclear safety analysis of the laboratory layout, equipment, operations, shipping containers and special nuclear material shipments. Members of his activity make occasional inspections of the facility.

The Manager of Nuclear Engineering will have a minimum of a Master's Degree in one of the Sciences or Engineering or equivalent. The equivalent technical competence of an individual will be established by his performance, for a minimum period of one year, of work assignments and duties normally assigned to degree holders. He will have a minimum of two years experience in nuclear engineering, including nuclear safety analysis, and will have demonstrated significant achievements as evidenced by publications or work accomplishments. He will have demonstrated management capability by successfully supervising technical personnel for a minimum period of one year.

4.2.5 (continued)

This position is currently filled by Mr. R. J. French whose resumé follows:

Mr. French received a B.S. degree in Physics from Carnegie Institute of Technology in 1952. He received a M.S. degree in Nuclear Science from Carnegie Institute of Technology in 1957. In 1957, Mr. French attended Oak Ridge School of Reactor Technology.

Mr. French joined the Chemical and Radiological Laboratories in 1954 where he was engaged in the radiological analysis of atomic weapons fallout samples.

In 1956, Mr. French joined Westinghouse at APD, participating in the evaluation of the nuclear characteristics of reactor systems as well as the development of analytical techniques for these evaluations. He also participated in the design of experimental programs and facilities for the determination of the nuclear characteristics of reactor cores. In addition, he performed the nuclear design of the SELNI and Saxton cores.

Mr. French was appointed to the position of Manager, Nuclear Design in 1961 and was responsible for the physics design of cores such as San Onofre, SENA, Con. Ed. Cores B and C, Yankee

4.2.5 (continued)

Cores III and IV, Malibu, and Connecticut Yankee. Also, he was responsible for the R&D effort under the Large Reactor Development (LRD) Project in the area of core physics.

Mr. French was appointed to his present position in 1966, in which the added responsibilities of physics testing in operating reactors, computer services, and programming were included.

4.2.6 Industrial Hygiene Supervisor

The responsibilities and qualifications of the Supervisor, Industrial Hygiene, are presented in the Health Physics Manual. (Section 5.1 of this application.) In addition to the qualifications required in Section 2.1 of the Health Physics Manual, the Industrial Hygiene Supervisor will have had a minimum of two years experience in performing nuclear safety calculations. Such experience will be carried out under the direction of, or to the satisfaction of, the AED Nuclear Safety Committee, or similar competent authority.

4.2.7 Nuclear Safety Committee

The Nuclear Safety Committee will be responsible for the review and approval of any process changes or nuclear safety control substitutions within the scope of this application. This committee will also conduct the audits specified in Section 4.3 of this application.

The Nuclear Safety Committee will consist of a minimum of three members including personnel with pertinent experience in matters dealing with radiation protection, nuclear safety, facility design and operation, administrative control and general plant safety.

Each committee member will have a minimum of a Batchelor's Degree in one of the Sciences or Engineering or equivalent. The equivalent technical competence of an individual will be established by his performance, for a minimum period of one year, of work assignments and duties normally assigned to degree holders. In addition, each member will have a minimum of two years' experience in one or more of the areas specified above.

Currently, the membership of the Nuclear Safety Committee is:

A. Biancheria, Chairman & Secretary (Facility design and operation)

E. C. Bishop, (Facility operation and administrative control)

R. M. Horgos, (Facility design and general plant safety)

W. E. Piros, (Radiation protection, nuclear safety and general plant safety)

Mr. Bishop's resumé is given in Section 4.2.3 of this application, and Mr. Piros' in the Health Physics Manual. The resumés for Dr. Biancheria and Mr. Horgos are given below.

4.2.7 (continued)

Dr. A. Biancheria
Ph.D., Clark University - Physical Chemistry.

Dr. Biancheria joined the Westinghouse Atomic Power Divisions in 1957. His duties involved advanced research in slurry physical chemistry and solid state chemistry.

He left Westinghouse in 1959 to join the Nuclear Materials and Equipment Corporation (NUMEC). While with NUMEC, Dr. Biancheria investigated the effects of preparation methods and variables on the properties of PuO_2 and mixed PuO_2-UO_2 powders, and the relation of these properties to the fabricability and sinterability of the powders. His duties also included the design of equipment for use in glove boxes and assistance in glove box design and facility layout.

In 1959, Dr. Biancheria rejoined the Westinghouse Atomic Power Divisions. He is currently responsible for the materials phase of the Saxton Plutonium Program. His other duties include the planning of plutonium development programs and facilities and technical surveillance of plutonium fuels programs conducted at other laboratories and facilities.

4.2.7 (continued)

R. M. Horgos

Mr. Horgos joined the Bettis Atomic Power Laboratory in 1950. From 1954 until 1960 he was associated with the PWR Core II program. During this time he assisted in the development of techniques for the fabrication of irradiation test specimens, in the design of test capsules, in pre- and post-irradiation testing of irradiation samples and in the design of special equipment for the post-irradiation evaluation of test assemblies.

In 1960, Mr. Horgos joined the Nuclear Materials and Equipment Corporation (NUMEC) with responsibility for the design and supervision of the ceramic line in the NUMEC plutonium facility. He was made Supervisor of Hot Cell Operations in 1961, while simultaneously assuming responsibility for the design and installation of dry boxes and equipment in the Hot Laboratory and for the post-irradiation evaluation of plutonium-bearing test assemblies. In 1964, Mr. Horgos was appointed as Project Engineer to supervise the construction and start-up of a plutonium laboratory for the Japan Atomic Fuel Corporation, an agency of the Japanese Government. He lived

4.2.7 (continued)

twenty months in Japan, the last five of which were spent in operating the facility, first with natural UO_2 and then with plutonium-bearing mixed oxides.

Upon his return to the United States in early 1966, Mr. Horgos was assigned the responsibility for the design of a production scale plutonium facility for NUMEC. In June, 1966, he was appointed Project Engineer to supervise the design and material procurement for the Hawaii Development Irradiator. This irradiator is presently being constructed at Honolulu, Hawaii, for the U. S. Atomic Energy Commission.

Mr. Horgos joined the Westinghouse Advanced Reactor Division in 1966 as Senior Engineer with the responsibility for the design, installation and testing of experimental equipment in the plutonium facility.

4.2.8 Health and Safety Consultants Available

The names and qualifications of additional personnel within the Westinghouse Electric Corporation, who are available as consultants on matters of health and safety are given in Sections 2.2 and 2.3 of the Health Physics Manual. (Section 5.1 of this application.)

4.3 Administrative Procedures

The Advanced Materials Laboratory will be operated in accordance with the general operating philosophy that is employed in Westinghouse plants and facilities. Briefly, this philosophy may be stated as follows: Responsibility for all phases of operations, including safety and health protection, follows the usual lines of organizational authority. Advisory and service groups are provided to assist line management in the analysis of operations within their control and to provide measurements, determinations and information which aid in the analysis of specific operations and situations. Such a service and staff function in no way relieves the individual line supervisor of responsibility for the operation of his function and facility and for ascertaining and assuring, through appropriate management channels, that adequate service is provided. Basic policies and procedures are established by line management with the approval of cognizant staff groups; and within the framework of these policies, the responsibility for making decisions at the operating level rests with the first level supervisor. He has a basic responsibility to operate his facility in a safe and orderly manner. The cognizant engineer will provide close tech-

4.3 (continued)

nical guidance to the operator during the conduct of experimental processing.

All personnel concerned with the operation of the facility have the right to request a review of the safety of any particular operating step or procedure. Specifically, the Industrial Hygiene Staff member on duty has the authority to forbid any operation which, in his opinion, involves undue immediate hazard, until the situation is reviewed with cognizant supervision and there is a satisfactory resolution of the methods and procedures to be used. Good liaison between the Industrial Hygiene personnel and laboratory staff members assures appropriate consideration and resolution of new problems as they arise.

The Nuclear Safety Committee will conduct a semi-monthly tour of the facility to assure compliance with radiation protection and nuclear safety requirements.

The Nuclear Safety Committee will make its reports and recommendations to the Manager of Advanced Materials Section. Written records of the authorizations and recommendations resulting from each nuclear safety review or audit will be accumulated by the Manager of Ceramics Processes Development. The records concerning a project will be retained for a minimum period of six months after the completion of the project.

4.4 Change Procedures

Figure 4.4.1 is a tabulation summarizing the normal sequences followed when making processing changes which could affect nuclear safety or radiation protection.

Type of Processing Change \ Operations[1]	Project Engr. assure customer data is available	Project Engr. prepare new or revised program outline and operating procedure	Mgmt. review outline and procedures to determine if facilities and MPV are compatible with economic operation	Nuclear Engrg. determine revised MPV[2]	Obtain AEC approval of revised facility or MPV[3]	Nuclear Engrg. evaluation of interactions	Industrial Hygiene evaluation of radiation protection effects	AML Nuclear Safety Committee check for compliance with change procedure and approve	Mgmt. institute change
New Project	X	X	X	X	X	X[4]	X	X[4]	X
Existing Project - Substitute approved MPV, only		X				X[5]		X	X
Existing Project - Other changes affecting nuclear safety or radiation protection		X	X	X	X	X	X	X	X

NOTES:

1. Operations are in approximate sequential order from left to right.
2. This operation will be performed only when a revised MPV is desired.
3. AEC approval must be obtained when a revised MPV is desired or when a facility change which could downgrade approved radiation protection provisions is desired. This operation will not otherwise be required.
4. Evaluation of the nuclear safety of any assembly (if projected) must be performed as a part of one of these operations. See Section 8.10 of this application
5. Evaluation of interactions or specific considerations regarding the application of an MPV will be required as determined by the Nuclear Safety Committee.

Figure 4.4.1
Change Procedure Tabulation

5. Equipment and Facilities for Radiation Protection

5.1 Health Physics Manual

The radiation protection procedures and equipment described in the Westinghouse Electric Corporation Health Physics Manual, WAFD-HP-103, as amended, will be used. Currently, the latest revision of this manual is Revision V, dated May, 1966.

5.2 Cheswick Site Plant Emergency Procedures

The emergency procedures and equipment described in the Cheswick Site Plant Emergency Procedures, AF-294756, as amended, will be used. Currently, the latest revision of these procedures is Revision 1, dated February, 1965. Approval was received on March 22, 1965 of these procedures as transmitted November 13, 1964, and revised February 25, 1965.

5.3 Effluent Control

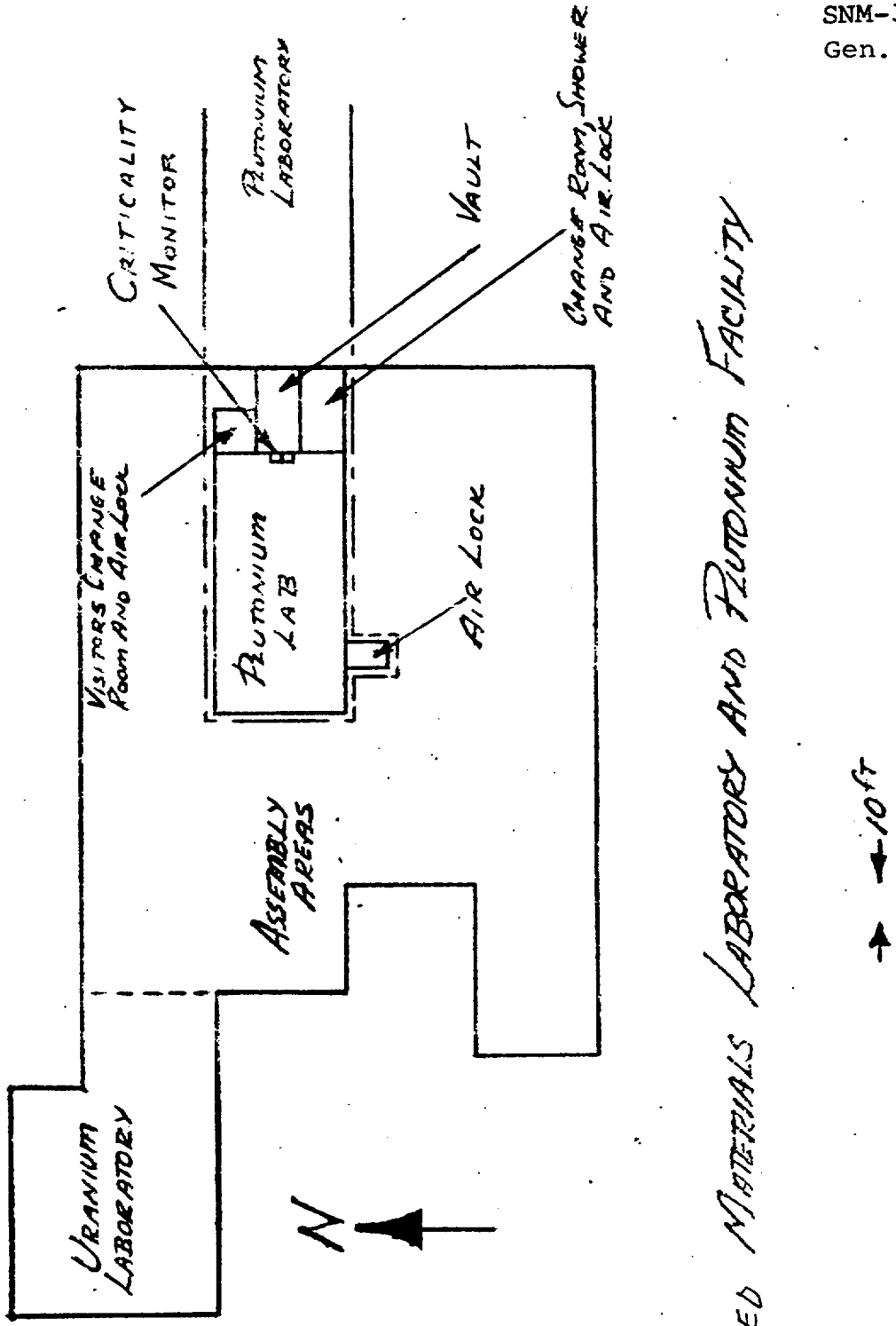
General effluent control techniques are specified in the Health Physics Manual (Section 5.1 of this application).

5.4 Disposal of Solid Contaminated Wastes

The definition and the procedures for the handling and disposal of solid contaminated wastes are specified in the Health Physics Manual (Section 5.1 of this application).

5.5 Criticality Monitors

Criticality monitors with alarms will be installed in the plutonium facility in accordance with the requirements of the Cheswick Site Plant Emergency Procedures (Section 5.2 of this application). The planned location of the criticality monitor is shown on Figure 5.5.1.



Advanced Materials Laboratory and Plutonium Facility

Figure 5.5.1

5.5 (continued)

The line-of-sight distance from this monitor to any point in the facility is less than 75 feet. This is well within the requirement of 10 CFR 70.24. If the storage of material requires the use of concrete block partitions to assure isolation (see Sections 8.6, 8.8 and 8.10), the material will be located within 60 feet of the monitor when one 10-inch thickness intervenes, and within 25 feet if two 10-inch thicknesses are used.

5.6 Ventilation

The plutonium facility will be essentially isolated from the remainder of the Advanced Materials Laboratory. All communications between the facility and the rest of the Laboratory will be through a system of airlocks. The facility and airlocks will be maintained at less than atmospheric pressure, so that air transfers during airlock operations and any air leakage will be into the facility.

Within the facility, two independent ventilation systems will be maintained. (See Westinghouse drawing WED-598, attached as Appendix A to this application.) The first will be a room air recirculation system. This will be a closed system which removes air from the facility, passes it through absolute filters and returns it into the facility through suitable diffusers. In the event of the release of fissionable material into the facility atmosphere, airborne contamination levels will be reduced approximately 87.5% per hour because of the 100% filtration.

Airborne radioactivity levels within the facility will be evaluated on a continuing basis at nine or more fixed sampling locations. Sampling will be performed using 1" diameter Gelman heads with Whatman No. 41 or equivalent filters. The filters will be removed and counted at least once each working day. In addition, a portable air sampler will be used for specific surveys.

5.6 (continued)

The second system will be a combined process gas and room air exhaust. This system will remove from the dryboxes any gases having any possibility of being in contact with fissionable materials. The gases will be passed through absolute filters into a sealed exhaust duct. Room air pressure will be controlled to a nominal -0.1 inches of water by removing room air through an absolute filter into the same sealed duct. Blast gates in this duct will be enclosed in plastic bags such that the gates may be moved without impairing the seal integrity. Prior to release to the atmosphere, the air and any waste gases will pass through a second bank of two absolute filters in series. The absolute filters will be capable of withstanding temperatures up to 350°F and pressure differentials of up to 3.4 psig. In the event of the release of fissionable material into the facility atmosphere, this system also will be used to the maximum possible extent to remove contaminated air from the facility.

The effluent will be monitored using an in-line probe on the exit side of the absolute filters. The sample will be filtered in the same manner, and using the same equipment, as the room air samplers.

An inert gas recirculating and repurification system will also be installed to maintain an atmosphere of pure argon in the boxes. This system will include absolute filters at the point where gas is removed from a box and at the point where it reenters the box. The circulation system will include automatic flow and pressure regulation devices to assure that the pressure in the dryboxes will be maintained at approximately 0.5 in. H_2O below the room pressure. Make up gas will be fed into the system ahead of the purification unit to assure that any chemical contamination is removed before it goes to the boxes.

5.7 Training

All new employees will receive an indoctrination in the general principles of radiation protection and nuclear safety. In addition, general refresher instructions will be given to all employees approximately semiannually.

The first level manager will ensure that each of his employes has been instructed in the specific radiation protection, nuclear safety, and emergency procedures applicable to the employe's particular assignment.

5.8 Personnel Radiation and Contamination Monitoring

Personnel radiation monitoring will consist of the use of film badges (including a neutron-sensitive film) and dosimeters (also sensitive to neutrons as well as beta-gamma radiation).

The use of protective clothing and change procedures as specified in the Health Physics Manual will be required of all employees assigned to work in the plutonium facility.

At least one hand and foot monitor will be available within the facility. This monitor will be used by employees to make checks for excessive hand or body contamination whenever employees remove their hands from the gloves. A similar monitor will be placed at each personnel airlock exit to assure that no contamination is carried into clean areas.

5.9 Fire Prevention and Fire Control

The plutonium facility is of concrete, concrete block, and steel construction to reduce fire hazards to a minimum. Dry chemical and CO_2 type fire extinguishers will be mounted in the facility for use, if required. In addition,

5.9 (continued)

the maximum permissible values, which control the use of SNM in the facility, have been established such that the optimum moderation and full reflection of any or all of the fissile material would still result in nuclearly safe configurations. Therefore, water may safely be used to fight a fire of such size or kind as to dictate its use. See Section 13 of the Health Physics Manual.

Fires in the drybox line will basically be prevented by the inert atmosphere maintained in the boxes. In the very unlikely event that a fire did occur it would be detected by fire detector units which are strategically located in the drybox lines. Batch size controls on the quantity of combustible materials within a box will limit the extent of the fire, and G-1 or similar powder will be stored in each box to permit extinguishing it. The pass-throughs between boxes will be blanked off unless one is being used, so that the individual boxes will normally be isolated from one another.

5.10 Alarm Systems

A central alarm panel will be installed in the facility. This panel will provide a specific audible alarm plus a visual indication for each separate type of emergency. The panel will contain no reset provisions, so that the alarm will continue to sound until the condition which triggered the alarm has been rectified.

The types of emergencies which will be annunciated are a nuclear incident, excessive oxygen in the drybox lines, or a fire. The warning of a nuclear incident will be in addition to those alarms incorporated in the monitoring unit itself. The presence of excessive oxygen in the

5.10 (continued)

dryboxes will be cause for alarm because it could result from a leak, puncture or other violation of the isolation integrity of the line. The fire alarm will be further refined so that the visual signal will indicate that the source is located in the #1 Line, the #2 Line, or in the facility at large.

6. General Nuclear Safety Controls

6.1 Basic Nuclear Safety Criteria

The possible consequences of a nuclear incident are so severe that comprehensive precautions will be taken to render such an occurrence incredible. Nuclear safety is based on the inherent characteristic of fissionable materials which is such that a self-sustaining nuclear chain reaction will occur only when mutually dependent values of certain parameters are satisfied. As a result, the limitation of one or more of the values of these parameters will make such a reaction impossible. To assure such a positive control, the system of fissionable materials is evaluated and a limiting value of one or more parameters is selected such that at least two unlikely, independent and concurrent changes in one or more of the conditions originally specified as essential to nuclear safety must occur before a nuclear accident is possible. A limiting parameter will have a value which is the more restrictive of (1) a value based on conditions which give the maximum reactivity for the normal arrangement and state of the special nuclear material, or (2) a value based on conditions which give

6.1 (continued)

the maximum reactivity as the result of any credible accident. The conditions considered shall include, but not necessarily be limited to moderation, reflection, neutron interaction, geometry, chemical and isotopic composition, density or dilution, nuclear poisons, homogeneity or heterogeneity, temperature, fire (and the possibility that it would be fought with water) and reliability of equipment.

A limiting parameter may be selected which contains allowances for optimum moderation, optimum reflection, optimum geometry or infinite dimensions (where applicable), and an additional safety factor. Since it is not customary to process materials under these ideal conditions and because a suitable safety factor is incorporated, several changes or accidents which might combine to produce such ideal conditions would still not produce an unsafe system, so long as the limiting parameter is not violated.

The basic criteria used to assure nuclear safety in the plutonium facility are given in Table 6.1.1. The derivation of these maximum permissible values (MPV) and supporting calculations appear in Section 9 of this application. The use of an MPV other than one appearing in Table 6.1.1 will not be permitted without prior authorization by the Commission.

6.1 (continued)

TABLE 6.1.1

	Parameter	Form	MPV (units)	Safety Factor
1.	Mass	Any Homogeneous	220 (grams SNM)	2.3
2.	Mass	Any Unmoderated (H/Pu $\leq$ 20)	2.5 (kilograms SNM)	2.2
3.	Slab Thickness	Powders ($\leq$ 1 kg SNM/ liter density)	0.9 (inches)	1.4
4.	Slab Thickness	Powders (> 1 kg SNM/ liter density) Pellets or Rods ($\leq$ 95% theoretical density)	0.40 (inches)	~1.75
5.	Slab Thickness	Metal	0.18 (inches)	1.3
6.	Volume	Aqueous Solution	3.4 (liters)	1.3
7.	Concentration	Aqueous Solution	3.4 (grams SNM/ liter)	2.3

(For receipt and storage of SNM received in solution form. Not to be used as a processing control.)

The Safety Factor listed is the minimum factor by which the given maximum permissible value must be multiplied to achieve the theoretical minimum critical value under conditions of optimum reflection, optimum moderation and either optimum or specified geometry. Also, the safety factors listed are conservative. That is, to the extent that the plutonium content is less than 100 w/o, that any uranium present is not fully enriched, optimum reflection is not present, that moderation is not optimum, that a slab is not infinite, etc.; some increase in the margin of safety occurs.

6.1 (continued)

The maximum permissible values listed in Table 6.1.1 for homogeneous forms have been determined for 100 w/o PuO_2 content, where the PuO_2 is the oxide of Pu-239. Appropriate control of any one value selected from the table guarantees the nuclear safety of an isolated piece of equipment.

A particular maximum permissible value will be selected from Table 6.1.1 as the primary nuclear safety control for each operation or piece of equipment. The necessary administrative control or physical limitations to ensure control of the maximum permissible value will be designed into the operating procedure and/or equipment. Maximum permissible values of a secondary or supplementary nature may also be incorporated into a given operation but the primary control will be specifically identified and strictly observed.

6.2 Nuclear Interaction Evaluation

The values listed in Table 6.1.1 are expressly derived to be nuclearly safe for isolated dry box enclosures. The effects of interaction between enclosures will be evaluated. The equipment will be located or isolated as necessary to assure nuclear safety.

For purposes of this application, interaction may be neglected between components separated by 12 inches of water or by a distance through air which is the larger of: (a) 12 feet, or (b) the greatest distance across an orthographic projection of either component on a plane perpendicular to a line joining their centers. An 8-inch thickness of concrete with a minimum density of 140 lbs/cu.ft. will also be considered to reduce interaction effects for the subcritical systems in this facility to allowable proportions.

6.2 (continued)

Certain of the maximum permissible values listed in Table 6.1.1 (viz., maximum permissible concentration and maximum permissible slab thickness) incorporate the concept of infinite extent. When two or more units can be considered as elements of one, nuclearly-safe, infinite array, interaction ceases to be of concern and interaction calculations may be omitted.

Interaction effects will be evaluated using the interaction solid angle method. This method will involve evaluating the total solid angle subtended by the SNM surrounding the unit of interest, using the method given in TID-7016. This solid angle will be related to the k_{eff} of the unit of interest using Figure 26 of TID-7016.

When encapsulated special nuclear material is processed (e.g., Helium leak testing in the NFD Manufacturing facility) interaction may be evaluated using the surface density method. The spacing will be controlled using a limit of 110 g. SNM/sq.ft., or a minimum edge-to-edge spacing of 12", whichever requires the greater separation. The limit of 110 g. SNM/sq.ft. is based on 50% of the critical value for an infinite slab of fully reflected plutonium-239 in metallic form, as given in Figure 30 of TID-7028. This value is conservative, inasmuch as the SNM will be at least 75 w/o U-235 (and only 25 w/o plutonium) which is less reactive than plutonium.

6.3 Mechanical Design Criteria

Sound mechanical design of all components used to process fuel-bearing material contributes to nuclear safety by assuring that the physical configurations used to determine the safety of a facility remain unchanged.

All isolation media, vessels, racks, furnaces and other processing equipment which incorporate nuclear safety limiting parameters will be designed with an adequate strength factor to assure against failure under foreseeable loads. They will also be designed or mounted to assure stability in the event of any foreseeable shocks or collisions. The materials of construction will be selected to resist fire, corrosion or other deterioration which might tend to weaken them to the point of failure.

6.3 (continued)

Where concrete or concrete block construction is cited in this application as providing nuclear isolation, it will be construed to mean concrete with a minimum thickness of 8 inches and a minimum density of 140 lbs/cu. ft. or an equivalent thickness of lesser density.

All containers used for the storage of fuel-bearing material, or its transfer between the vault and the processing line, will consist of a fire-resistant container strong enough to withstand a free drop of six feet when loaded. It shall also be sufficiently rigid to permit it to pass through the sphincter locks into the drybox line. A suitable plastic inner container will be used when required by the material form or corrosiveness. The container enclosing the material will have a leakproof mechanical seal. No containers made of glass will be permitted in the drybox line.

6.4 Other Hazards

In addition to evaluating all intentional accumulations of fuel materials, the nuclear safety evaluation will also include consideration of the nuclear safety of those accumulations which might occur as the result of a conceivable disruptive accident. Alternatively, it will consider the probable effectiveness of protective measures designed to prevent such unintentional accumulations in spite of an accident.

Other considerations normally apparent to a technically competent nuclear engineer will be analyzed.

7. Processing Operations

Due to the highly developmental nature of the SNM processing, a variety of starting materials, processing operations and fabricating sequences may actually be employed. Subject to the conditions that each operation will be controlled using an MPV from Table 6.1.1; that the program outline will have been reviewed and approved by the Nuclear Safety Committee; and that no changes will be required which could degrade the dry box line integrity; processing changes may be made without requiring prior Commission approval.

A typical sequence of operations to be performed under the license amendment requested in this application is listed below, along with the corresponding maximum permissible values applied to each:

	Process Step	Control - Not to Exceed	
1.	Receiving	Shipping Package	
2.	Storage	Shipping Package	
3.	Mixing oxides	Mass	220 g. SNM
4.	Blending oxide mixture with carbon	Mass	220 g. SNM
5.	Pressing briquette	Mass	220 g. SNM
6.	Reacting briquette	Mass	220 g. SNM
7.	Crushing briquette	Mass	220 g. SNM
8.	(Pu,U)C powder processing	Mass	220 g. SNM
9.	Pellet pressing and sizing	Mass	220 g. SNM
10.	Pellet Processing and Rod Loading	Mass or Slab	220 g. SNM

7. (continued)

Process Step	Control - Not to Exceed	
11. Unsealed Rod Internal Decontamination	Slab	0.40 inches SNM
12. Sealed Rod Storage	Slab	0.40 inches SNM
13. Closure Welding	Mass	220 g. SNM
14. Rod Storage	Slab	0.40 inches SNM
15. Helium Leak Testing	Mass	220 g. SNM
16. Assembly	Slab to Assembly	0.40 inches SNM Designed safe

8. Processing Description and Nuclear Safety Analysis

A detailed analysis of the typical sequence is given below to demonstrate the application of the nuclear safety controls. Modified operations required by the developmental nature of the facility will be analysed in a similar fashion.

8.1 Receiving

Receiving processing will require the survey of the package before handling. Then the package will be moved to the plutonium storage vault and opened. Any internal container will be surveyed. If it displays undesirable contamination, the container will be enclosed in plastic (or be similarly protected) prior to further handling. The container and contents will be check weighed and placed in storage.

The contents of only one nuclearly safe shipping package will be processed through receiving inspection at one time.

8.2 Storage

The material will initially be stored, in the inner container in which it was received. Subsequent storage in the storage vault designated in Figure 5.5.1 will be in accordance with maximum permissible values established in Table 6.1.1. Each container will be placed in a cubicle surrounded on five sides by concrete at least 8" thick with a minimum density of 140#/cu.ft. The open sides of one array of cubicles will face the open sides of the array along the opposite wall across an intervening distance of approximately 7-1/2 feet. This distance is sufficient to reduce interaction effects to nuclearly safe levels for the individual small quantities involved.

8.3 General Powder Processing

The general features of the dry box line units are shown in Westinghouse Drawing 540F990, attached as Appendix A to our application dated 9/16/66. As shown on the drawing, the bottom and ends of the box are made of 1/4 inch thick stainless steel. The rest of the box is fabricated from 1/8 inch thick stainless steel. The windows are rubber or neoprene gasketed safety glass. Interconnections between the boxes are plastic tubes lined with stainless steel to prevent puncturing or tearing the plastic. The 6.125 inch diameter port on the ends of the box are used for combined sphincter and vacuum locks for introducing small tools or components into the box. No overhead crane facilities are present, so that the possibility of rupturing a box by dropping

8.3 (continued)

a heavy load on it is not present. A high purity argon atmosphere is maintained in the drybox line at all times, so the possibility of a fire in the box is essentially negligible. Make-up gas enters the line through the purifying and recirculating system. Compressed gas bottles are never emptied below a figure of approximately 25 psig to avoid the possibility of atmospheric contamination of the bottle, and the feed lines are thoroughly purged after a new bottle is connected. Therefore, the gas supply system offers no external source of atmospheric contamination in the drybox line. Purification removes any contamination occurring during processing.

One or two lines of approximately six dryboxes each will be maintained in the plutonium facility. When two lines are installed they will be separated by an aisle nominally 6 feet wide.

For the operations listed in Section 7 as No's. 3 through 9, only one safe batch consisting of a maximum of 220 grams of SNM may be loaded into a drybox. However, a number of the operations may be performed in sequence on a particular batch of material before the batch is passed into the next box for additional processing. A new batch may then be loaded into the original box.

8.4 <u>Pellet Processing the Rod Loading</u>

Pellet processing typically will consist of pellet dimensional checking and weighing, selective segregation into unit rod quantities to meet loading requirements, and loading into fuel rod tubes which already have one end welded and inspected.

Only one safe mass of pellets will be loaded into the drybox at one time.

8.5 Unsealed Rod Internal Decontamination

The unsealed rods will be moved to a work station in the dry box line where the inside of the open end of each rod will be carefully decontaminated in the area of the closure weld to prevent any contamination of the closure weld. An airtight, press fit closure will then be installed. The rods will be maintained in a slab less than 0.40 inches thick, which is the MPV from Table 6.1.1. (In actual practice, a slab will be only one rod, or a nominal 0.35 inches, thick.)

8.6 Sealed Rod Storage

The rods, which have been effectively sealed by the press fit closure, will be removed from the dry box. The rods will be free from and monitored for removable external contamination prior to their removal from the dry box. The rods in this condition will be stored in an upright or horizontal position in fixtures permitting a maximum slab thickness of 0.40 inches, which is the MPV specified in Table 6.1.1. The racks will be isolated in accordance with the criteria specified in Section 6.2 of this application.

8.7 Closure Welding

The sealed rods will be loaded into a controlled atmosphere weld box for closure welding. The general construction of this box is shown in Westinghouse Drawing 540F995, attached as Appendix B to our application dated 9/16/66. The quantity of SNM in each load will be limited to a safe mass of 220 grams.

8.8 Rod Storage

The completed rods may be stored horizontally or vertically and will be stored in a rack isolated as specified in Section 6.2 in a slab less than 0.40 inches thick, or a mass less than 220 grams of SNM. These are the MPV's for slab thickness and mass given in Table 6.1.1.

8.9 Helium Leak Testing

Helium leak testing will be limited to a maximum mass of 220 grams of SNM per load. This is the MPV given in Table 6.1.1. This operation may be performed in the existing APD Core Manufacturing facility. The rods will be moved in watertight containers with a maximum mass of 220 grams SNM per container. All rods will have been previously checked for gross weld defects so that negligible contamination could occur, even assuming that a rod produced a defect indication.

8.10 Assembly

The completed rods will be fabricated into assemblies, when required, in an area external to, but adjacent to the plutonium facility. Loose rods will be stored in a one-rod-thick slab. Only one test assembly will be processed at a time. Completed assemblies will be stored in the shipping container, or will be isolated in accordance with the requirements of Section 6.2.

The nuclear safety of a test assembly will be established, based on design data supplied by the customer. This data will be reviewed and independently approximated by the Nuclear Safety Committee, using hand calculations. Alternatively, the Nuclear Safety Committee may request a check of the customer data by the Nuclear Engineering group.

9. Derivation of Maximum Permissible Values

9.1 Assumptions

The maximum permissible values listed in Table 6.1.1 and in Section 7 were derived using the following assumptions:

1. The fuel material in homogeneous forms would contain 100 w/o plutonium oxide.

2. All plutonium would be considered 100% Pu-239. This assumption is conservative; since for moderated systems, the effect of any Pu-240 which may be present is to increase the critical mass of Pu as shown in the calculations by Goodwin and Roach reported in Figure 32 of TID-7028 (June, 1964).

3. The assumptions and safety factors would be sufficiently conservative to permit the use of values derived for PuO_2 to be used for other plutonium and plutonium-uranium compounds.

4. Maximum permissible values for material in heterogeneous (i.e., pellet) form would be calculated. MPV for material in homogeneous form would be interpolated from standard references, such as TID-7016, Rev. I and K-1019, Rev. 5. Unless the form was specified, the most restrictive MPV would be selected.

5. All maximum permissible values would incorporate a safety factor equal to or greater than the safety factor used in Table I of TID-7016, Rev. I.

6. All maximum permissible values for fuel rods would be identical to the corresponding values for pellets. This assumption is conservative, due to the parasitic absorption of neutrons by the cladding material.

9.1 (continued)

7. All maximum permissible values would be expressed in terms of SNM. When applying the MPV to control an operation, U-235 and Pu would be considered equally reactive, and the total quantity of fissile material present during the operation would be expressed as SNM and compared to the MPV.

9.2 Calculations

To obtain the maximum assurance of nuclear safety, all but two of the maximum permissible values listed in Table 6.1.1 were taken directly from Table I on page 10 of TID-7016, Rev. I. For the maximum slab thickness for metallic Pu, the more restrictive value, recommended for α-phase metal, was chosen. The general applicability of the 2.5 kg mass limit to Pu having an H/Pu ratio less than or equal to 20 is demonstrated in Figure 5 on page 16 of TID-7016.

Of the two exceptions previously referred to, one was the MPV for concentration. This value was reduced below the recommended value given in TID-7016 to increase the safety factor to 2.3, which includes sufficient margin for error to compensate for any conceivable double batching of a solution.

The other exception was the maximum permissible slab thickness for pellets or rods. The TID-7016 value for metallic Pu was too restrictive, while the heterogeneous form of the material prevented the use of the powder MPV.

9.2 (continued)

A recent study by the Nuclear Engineering group, which used LEOPARD/1 type computations, of 100 w/o PuO_2 at >95% theoretical density produced a minimum critical thickness for an infinite slab of approximately 0.70" under optimum conditions. The limited amount of experimental data available dictated an unusually large safety factor, so that a factor of 1.75 was chosen. The resulting MPV of 0.40 inches was credited with additional conservatism based on the fact that the maximum foreseeable composition of the pellet will not exceed 94 w/o fissile material. Of the fissile material, at least 74 w/o will be U-235, which is significantly less reactive than Pu-239.

In addition, since this value was determined to be nuclearly safe for compacts, it has been chosen as an MPV for homogeneous material with a fissile material density greater than 1 kilogram SNM per liter.

/1 Barry, R.F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM 7094," WCAP-3269-26 (September 1963).

9.3 Interaction Evaluation

Neutron interaction between the dry box lines will be of little nuclear consequence because the two lines are separated by at least 6 feet (edge to edge) and the fuel is handled at essentially the same elevation above the floor. Thus, the cross sectional area subtended by fuel in one line, as seen from a work station in the other, is near zero.

Neutron interaction within a line will also be minimal. The separation between work stations is 12". This distance is maintained by means of a rigidly attached 12"-long spacer bar. The material will be handled at essentially the same levels and will be in conservatively small batches. Thus, the solid angle subtended will be small compared to the permissible solid angle.

All other special nuclear material will be isolated from the Pu bearing fuel work stations in accordance with the criteria specified in Section 6.2 of this application.

10. Maximum Credible Accident Analysis

10.1 Maximum Credible Accident Summary

The maximum credible accident is assumed to be the transfer of plutonium from a dry box through the exhaust ventilation system to the atmopshere outside of the facility. The analysis indicates that, under the assumed conditions, an accident involving 10 kilograms of physically uncontained plutonium in a dry box would produce a dose to an individual at the site boundary within the guides specified in 10 CFR 100.

10.2 Assumptions

1. The incident involves ten kilograms of Pu-239 as physically uncontained material in the dry box.
2. No explosion occurs and the containment provided by the dry box is not significantly violated.
3. A fire results in the vaporization of twenty percent of the physically uncontained Pu-239, which becomes airborne particulate radioactivity and is exhausted over a two hour period.
4. The local filter at the dry box is damaged, but the two, more remote, fireproof absolute filters in series, which constitute the primary system, effectively remove 99% of the airborne particulate radioactivity.

10.2 (continued)

5. There is no deposition of airborne particulate radioactivity between the dry box and the primary system filters, or between the filters and the top of the stack.

6. The nearest site boundary is 400 feet (120 meters) from the base of the stack.

7. The exposure of an individual at the site boundary may extend over a two hour period.

10.3 Discussion of Analytical Methods

The analytical approach used in this maximum credible accident analysis is to assume a quantity of radioactivity available in the dry box. This quantity is reduced in accordance with the assumptions which have been made, to determine the quantity released at the stack. By means of generalized Gaussian equations, and taking into account the building effects and any deposition of radioactivity enroute, the concentration of activity at the site boundary is determined. The dose and contribution toward total body burden which this concentration produces in an individual is then calculated and is compared to the accepted allowable dose and allowable body burden.

10.4 Calculations

The average rate of release of radioactivity at the stack may be determined from the equation:

$$Q = \frac{(M)(P_a)(P_f)(S_pA)}{t} \qquad (1)$$

where: Q = rate of release, μCi/sec.

M = mass of physically uncontained radioactive material in the dry box = 10,000 grams.

P_a = fraction of material which becomes airborne = 1/5.

P_f = fraction of airborne material that passes through the filters = 1/100.

S_pA = specific activity of material being considered (Pu-239) = 6.17×10^4 μCi/gram.

t = duration of release from the stack = 2 hrs. = 7200 sec.

Substituting the assigned values:

$$Q = \frac{(10,000)(1/5)(1/100)(6.17 \times 10^4)}{7200}$$

= 172 μCi/sec. emitted from the stack

To calculate the concentration of radioactivity at the site boundary, it is necessary first to determine the effect of the deposition of material enroute and to evaluate any building effect which may be present. The Deposition Reduction Factor is given by the equation:/1

$$(DRF) = \exp\left(-\frac{2\,v_g}{\pi\,\bar{u}} \int_o^x \frac{1}{\sigma_z}\, e^{-1/2\left(\frac{h}{\sigma_z}\right)^2} dx\right) \qquad (2)$$

/1 In this section, superscripts in this form refer to reference documents listed in Section 10.5.

10.4 (continued)

The "h" term in this equation is the release height. For the plutonium facility, the stack height is 37 feet and the building height is 22 feet, so the ratio of stack height to building height is 1.68. According to the modified 2 1/2 times rule[2], the ratio of effective stack height to building height is 1.17. Therefore, the effective stack height is 22 x 1.17 = 25.7 feet. With this height the building effect essentially eliminates the stack effect; therefore h = o. Under this condition, Equation (2) reduces to:

$$(DRF) = \exp\left(-\frac{2\ v_g}{\pi\ \bar{u}} \int_o^x \frac{1}{\sigma_z}\, dx\right) \qquad (3)$$

where: (DRF) = Deposition Reduction Factor

v_g = deposition velocity = 4 cm/sec[3]

$\bar{u}$ = average wind velocity = 100 cm/sec

x = distance to site boundary = 120 m

σ_z = vertical diffusion factor

For Pasquill type "F" conditions the value of the integral term $\int_o^{120} \frac{1}{\sigma_z}\, dx$ is about 120[1].

Substituting in Equation (3):

$$(DFR) = e^{-(\frac{2}{\pi} \times \frac{4}{100} \times 120)}$$

$$= 4.8 \times 10^{-2}$$

10.4 (continued)

The evaluation of the building effect is performed using the graph attached as Figure 10.5.1 and the following equation[4]:

$$\frac{\psi\bar{u}}{Q} = \frac{1}{\pi\sigma_y\sigma_z + CA} \qquad (4)$$

where: ψ = concentration of radioactivity, $\mu Ci/m^3$

$\bar{u}$ = average wind velocity = 100 cm/sec = 1 m/sec.

Q = rate of release = 172 μCi/sec.

$\frac{\psi\bar{u}}{Q}$ = atmospheric diffusion ratio, m^{-2}

σ_y = transverse dispersion factor

σ_z = vertical dispersion factor

C = building dilution factor = 0.5

A = building cross-sectional area = 200 m^2

For a ground level point source, $\sigma_z = 0$; so the term $\pi\sigma_y\sigma_z$ disappears. Equation (4) then becomes:

$$\frac{\psi\bar{u}}{Q} = \frac{1}{CA} \qquad (5)$$

Substituting in Equation (5)

$$\frac{\psi\bar{u}}{Q} = \frac{1}{0.5 \times 200}$$

$$= 0.01 \ m^{-2}$$

From Figure 10.5.1, this value of the atmospheric diffusion ratio correlates with the distance from a theoretical point source of 230 meters for Pasquill Type "F" conditions. This distance, designated x_B, is the distance material would have to travel from a

10.4 (continued)

hypothetical point source in order for Gaussian dispersion effects alone to produce a concentration equal to the concentration existing in the immediate vicinity of the building as the result of building-induced air turbulence with its resulting dispersion.

This concentration will be further reduced due to Gaussian dispersion over the distance from the building to the site boundary. Therefore, the effective distance over which dispersion from a hypothetical point source occurs is given by the equation:

$$x_{eff} = x_B + x \qquad (6)$$

where:

x_{eff} = effective distance from a hypothetical point source

x_B = building effect equivalent distance = 230m

x = actual distance to site boundary = 120m

Substituting:

$$x_{eff} = 230 + 120$$

$$= 350 \text{ meters.}$$

For this distance, from Figure 10.5.1 for Pasquill type "F" conditions, the atmospheric diffusion ratio equals $4.4 \times 10^{-3}\ m^{-2}$.

Since: $\frac{\psi\bar{u}}{Q} = 4.4 \times 10^{-3}$

$$\psi = \frac{4.4 \times 10^{-3}\ Q}{\bar{u}}$$

10.4 (continued)

And when the Deposition Reduction Factor is also considered: $\psi = \frac{4.4 \times 10^{-3}\ Q\ (DRF)}{\bar{u}}$

Substituting previously determined values in the above expression:

$$\psi = \frac{(4.4 \times 10^{-3})(1.72 \times 10^{2})(4.8 \times 10^{-2})}{1}$$

$$= 3.63 \times 10^{-2}\ \mu Ci/m^3$$

The effect on the average human body of inhaling a concentration of Pu-239 equal to $3.63 \times 10^{-2}\ \mu Ci/m^3$ is determined in two ways, (1) calculating the resulting total integrated dose, and (2) calculating the resulting total body burden. For an assumed air intake rate (A) of 1.25 m^3/hr. and an exposure time (t) of 2 hrs., the activity inhaled is equal to:

$$q = \psi A t \qquad (7)$$
$$= 3.63 \times 10^{-2} \times 1.25 \times 2$$
$$= 9.08 \times 10^{-2}\ \mu Ci$$

From data in Appendix II of the IAEA's Safety Series No. 7 [9], the intake of 1 μCi of insoluble Pu-239 will produce a dose to the lungs of 60 rems. However, the calculations in this document use a standard 120 day effective half-life and for plutonium a 360 day half-life is more realistic. For a 360 day effective half-life, the resulting dose is 180 rems. Therefore, the dose (D_L) resulting from the intake of $9.08 \times 10^{-2}\ \mu Ci$ of insoluble Pu-239 is:

$$D_L = 9.08 \times 10^{-2} \times 180$$

$$= 16.3 \text{ rems.}$$

10.4 (continued)

In the ICRP Publication 2[5], a slightly different lung model is employed. This model postulates that, of the activity inhaled, 25% is immediately exhaled; 50% is eliminated through ciliary action, swallowing and intestinal elimination with a half-time of 18 hrs.; 15% is eliminated through phagocytic and ciliary action with a half-time of 140 days, and the remaining 10% goes to the bone with a half-time of 360 days. According to this model, after the relatively short time of 4 days (~ 5 half-times), only 25% of the inhaled activity remains in the body.

Then the dose rate to the lung can be determined from the equation:

$$q = \frac{2.8 \times 10^{-3}\ m\ R}{f_2\ E} \qquad (8)$$

or rearranging terms

$$R = \frac{2.8 \times 10^{3}\ q\ f_2\ E}{m} \qquad (9)$$

where:

R = dose rate, rems/week

q = activity inhaled, μCi

f_2 = fraction of body burden in lungs = 1

E = ΣEF (RBE) n = 54 from Tables

m = lung mass = 1000 grams

10.4 (continued)

To determine the dose rate after the four day period, for that portion of the inhaled activity with an assumed half-time of 140 days, a value of 1.36×10^{-2} μCi is assigned to q. Substituting

$$R = \frac{2.8 \times 10^{3} \times 1.36 \times 10^{-2} \times 1 \times 54}{10^{3}}$$

$$= 0.205 \text{ rems/wk.}$$

At the end of 20 weeks (140 days) this value would have decreased to 0.102 rems/wk. The conservative assumption of a linear decrease in the dose rate over this period produces an average dose rate of 0.153 rems/wk. This conservatism tends to compensate for neglecting the short term effects of the 50% which is rapidly eliminated.

Over the 20 week period, the integrated dose to the lung is:

$$D_L = \text{ave. dose rate} \times \text{weeks}$$

$$= 0.153 \times 20$$

$$= 3.06 \text{ rems}$$

The dose for the first half-time is one-half the total resulting dose. Therefore, the total dose due to this portion is 6.12 rems.

10.4 (continued)

In a similar fashion, the dose resulting from that portion of the inhaled activity assumed to have a half-time of 360 days can be computed.

$$R = \frac{2.8 \times 10^{3} \times 0.91 \times 10^{-2} \times 1 \times 54}{10^{3}}$$

$$= 0.136 \text{ rem/wk.}$$

The average dose over a one year (approx. 360 day) half-time is 0.102 rems/week. The integrated dose to the lung over the one year half-time is:

$$D_L = 0.102 \times 52$$

$$= 5.30 \text{ rems}$$

The total integrated dose due to this portion is 10.60 rems.

The total integrated dose due to both of these portions which are retained for appreciable periods is 6.12 rems plus 10.60 rems or 16.72 rems. This value is in good agreement with the value determined using the modified IAEA procedure.

It is also of interest to determine the effect of the inhalation of 9.08×10^{-2} μCi of Pu-239 in terms of its contribution to the maximum permissible body burden. From the ICRP Publication[5], the maximum permissible

10.4 (continued)

body burden of Pu-239 which will produce a 0.3 rem/wk dose rate is 0.036 μCi. Since only 10% of the quantity inhaled goes to the bone, the total body burden is given by the equation[7]:

$$B_t = 0.10\ \psi At$$

where:

B_t = total body burden, μCi

ψ = concentration of radioactivity = 3.63×10^{-2} $\mu Ci/m^3$

A = air intake rate = 1.25 m^3/hr

t = exposure time = 2 hrs.

From Equation (7) the quantity $\psi At = q$.

Therefore:

$$B_t = 0.10\ q$$
$$= 0.10 \times 9.08 \times 10^{-2}$$
$$= .009\ \mu Ci$$

This quantity is 25% of the maximum permissible body burden.

Since it is demonstrated that a person exposed at the site boundary under the assumed conditions would not receive either an excessive dose to the lung or an excessive body burden, it is concluded that no over-exposure will result following a release from the stack as a result of a fire involving this amount of Pu-239.

10.5 References

1. Chamberlain, A. C., "Aspects of Travel and Deposition of Aerosol and Vapor Clouds", AERE HP/R-1261 (1955).

2. Bryant, Pamela M., "Methods of Estimation of the Dispersion of Windborne Material and Data to Assist in Their Application", AHSB (RP) R-42.

3. Stewart, K., "The Particulate Material Formed by the Oxidation of Plutonium", Progress in Nuclear Energy Series IV, Vol. 5, The MacMillan Co., N.Y., 1963.

4. Gifford, F. A., Jr., "Atmospheric Dispersion Calculations Using the Generalized Gaussian Plume Model", Nuclear Safety, Vol. 2, No. 2, Dec., 1960.

5. ICRP Publication 2, Report of Committee II on Permissible Dose for Internal Radiation.

6. Handbook 52, Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water.

7. Langham, W. H. et al, "Plutonium Dispersal by Accident or Experimental Low-Order Detonation of Atomic Weapons, LA 1981, Revised Feb., 1966.

8. Editorial Staff, "Consequences of Accident Release", Nuclear Safety, Vol. 2, No. 1, Sept., 1960.

9. IAEA Safety Series No. 7, "Notes on Certain Aspects of the Regulations", 1961.

10. Turner, D.B., "Atmospheric Diffusion Computations", Operational Aspects of Radiation Surveillance, U.S. Department of Health, Education and Welfare, April, 1966.

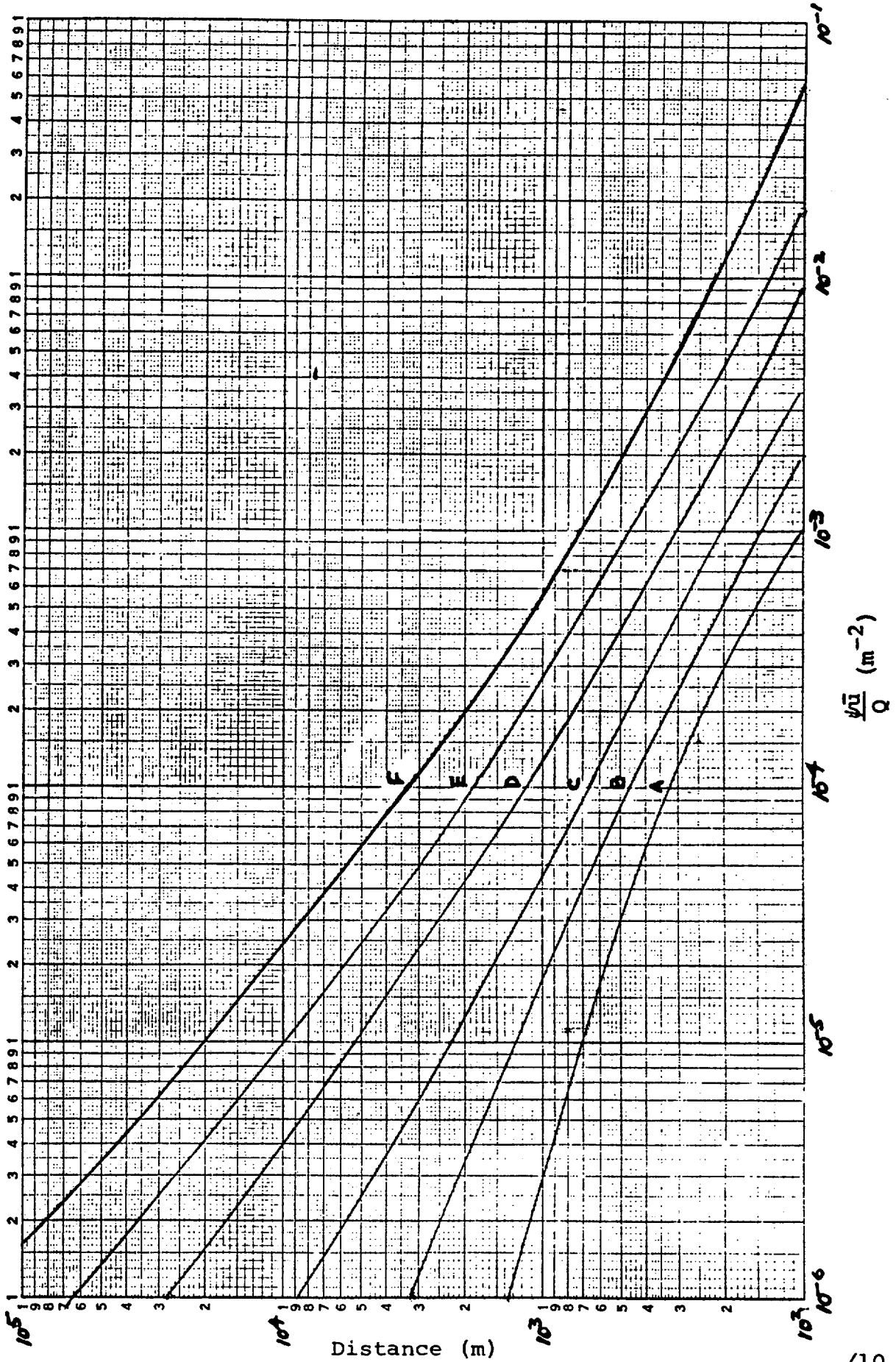


Fig. 10.5.1 Gaussian Dispersion--Ground Level - Point Source /10

11. Shipping Procedures

11.1 Shipment of Wastes

Waste material and quantities of SNM less than those exempted or generally licensed in 10 CFR 71 will be shipped in accordance with the applicable Federal and State regulations.

11.2 Shipment of Material

The procedures to be used to ship quantities of special nuclear material which would require licensing will be submitted in subsequent amendments to this application.

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ITEM # 46

B146

REVISION RECORD (continued)

Revision No.	Date of Revision	Pages Revised	Revision Reason
2	2/8/67	2	Inserted reference to Sections 5.9 and 5.10
2	2/8/67	14	Combined last two sentences of first paragraph.
2	2/8/67	25	Corrected typing error.
2	2/8/67	27.1	Clarified responsibility of first two operations. Deleted reference to Note 5 on next-to-last operation. Clarified Note 5.
2	2/8/67	30	Specified monitoring equipment.
2	2/8/67	31	Added blast gate sealing, filter capabilities, monitor specifications and description of inert gas system.
2	2/8/67	31.1	Specified personnel monitoring after withdrawing from gloves. Added Section 5.9 "Fire Prevention and Control."
2	2/8/67	31.2	Added Section 5.10 "Alarm Systems"
2	2/8/67	32	Retyped to conclude Section 5.10
2	2/8/67	36	Deleted use of Ⓦ interaction calculational methods.
2	2/8/67	37	Retyped to permit deletion of page 37.1
2	2/8/67	37.1	Deleted.
2	2/8/67	41	Changed "not credible" to "essentially negligible."
2	2/8/67	59	Added Reference #10
2	2/8/67	60	Added superscript /10 to identify source
3	4/1/68	36	Added surface density interaction evaluation.
3	4/1/68	36.1	New.

REVISION RECORD (continued)

Revision No.	Date of Revision	Pages Revised	Revision Reason
2	2/8/67	2	Inserted reference to Sections 5.9 and 5.10
2	2/8/67	14	Combined last two sentences of first paragraph.
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2	2/8/67	27.1	Clarified responsibility of first two operations. Deleted reference to Note 5 on next-to-last operation. Clarified Note 5.
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2	2/8/67	37	Retyped to permit deletion of page 37.1
2	2/8/67	37.1	Deleted.
2	2/8/67	41	Changed "not credible" to "essentially negligible."
2	2/8/67	59	Added Reference #10
2	2/8/67	60	Added superscript /10 to identify source

1. (continued)

This application describes the radiation protection and nuclear safety controls which will be instituted to assure the safe operation of the plutonium facility in the Advanced Materials Laboratory, along with the bases on which these controls were selected. It describes the application of these controls to the processes and equipment as presently designed. Also, administrative procedures, which will not be changed without license amendment, are specified. These administrative procedures will permit limited flexibility in processing techniques and the selection of nuclear safety controls.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to Karl R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Material Requirements

Westinghouse requests authorization to receive, possess, store, use and transfer up to 2.5 kilograms of contained plutonium in any chemical or physical form, and up to 10 kilograms of contained U-235 in any chemical or physical form at any enrichment up to fully enriched.

The material will be procured in accordance with program requirements. No production, consumption or significant loss of special nuclear material is anticipated.

6.2 (continued)

Certain of the maximum permissible values listed in Table 6.1.1 (viz., maximum permissible concentration and maximum permissible slab thickness) incorporate the concept of infinite extent. When two or more units can be considered as elements of one, nuclearly-safe, infinite array, interaction ceases to be of concern and interaction calculations may be omitted.

Interaction effects will be evaluated using the interaction solid angle method. This method will involve evaluating the total solid angle subtended by the SNM surrounding the unit of interest, using the method given in TID-7016. This solid angle will be related to the k_{eff} of the unit of interest using Figure 26 of TID-7016.

6.3 Mechanical Design Criteria

Sound mechanical design of all components used to process fuel-bearing material contributes to nuclear safety by assuring that the physical configurations used to determine the safety of a facility remain unchanged.

All isolation media, vessels, racks, furnaces and other processing equipment which incorporate nuclear safety limiting parameters will be designed with an adequate strength factor to assure against failure under foreseeable loads. They will also be designed or mounted to assure stability in the event of any foreseeable shocks or collisions. The materials of construction will be selected to resist fire, corrosion or other deterioration which might tend to weaken them to the point of failure.

9.1 (continued)

7. All maximum permissible values would be expressed in terms of SNM. When applying the MPV to control an operation, U-235 and Pu would be considered equally reactive, and the total quantity of fissile material present during the operation would be expressed as SNM and compared to the MPV.

9.2 Calculations

To obtain the maximum assurance of nuclear safety, all but two of the maximum permissible values listed in Table 6.1.1 were taken directly from Table I on page 10 of TID-7016, Rev. I. For the maximum slab thickness for metallic Pu, the more restrictive value, recommended for α-phase metal, was chosen.

Of the two exceptions previously referred to, one was the MPV for concentration. This value was reduced below the recommended value given in TID-7016 to increase the safety factor to 2.3, which includes sufficient margin for error to compensate for any conceivable double batching of a solution.

The other exception was the maximum permissible slab thickness for pellets or rods. The TID-7016 value for metallic Pu was too restrictive, while the heterogeneous form of the material prevented the use of the powder MPV.

6.1 (continued)

TABLE 6.1.1

Parameter	Form	MPV (units)	Safety Factor
1. Mass	Any Homogeneous	220 (grams SNM)	2.3
2. Mass	Solid Metal	2.5 (kilograms SNM)	2.2
3. Slab Thickness	Powders (≤ 1 kg SNM/liter density)	0.9 (inches)	1.4
4. Slab Thickness	Powders (> 1 kg SNM/liter density)	0.40 (inches)	~1.75
	Pellets or Rods (≤ 95% theoretical density)		
5. Slab Thickness	Metal	0.18 (inches)	1.3
6. Volume	Aqueous Solution	3.4 (liters)	1.3
7. Concentration	Aqueous Solution	3.4 (grams SNM/liter)	2.3

(For receipt and storage of SNM received in solution form. Not to be used as a processing control.)

The Safety Factor listed in this minimum factor by which the given maximum permissible value must be multiplied to achieve the theoretical minimum critical value under conditions of optimum reflection, optimum moderation and either optimum or specified geometry. Also, the safety factors listed are conservative. That is, to the extent that the plutonium content is less than 100 w/o, that any uranium present is not fully enriched, optimum reflection is not present, that moderation is not optimum that, a slab is not infinite, etc.; some increase in the margin of safety occurs.

Pages 6 and 7, inclusive, intentionally left blank.

RECEIVED
JUN 5 1967
U.S. ATOMIC ENERGY COMMISSION
Regulatory Mail Section

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

June 1, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

For Div of Compliance

Subject: Amendment to License SNM-338, Docket 70-337, for the Materials Systems Laboratory Storage Vault

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the storage of SNM in the storage vault described in our application dated 10/19/66, as revised 2/14/67. The attached drawing WED-677 supplies additional information concerning the construction of the storage rack.

The rack design described in WED-677 is the final choice of the Cheswick Works Engineering Dept. The 1/2 inch flange on each shelf will provide positive retention of the blocks which support it. The angle braces at each corner will, in turn, retain the shelves. The braces will be tied into the wall and floor as indicated to provide anchorage for the braces. The resulting arrangement will be a heavy, cohesive unit which will be extremely stable.

As the final design, the details of WED-677 will supersede the corresponding information contained in Figure 4.1 of the subject application.

Please send the amendment to me at the above address.

ITEM # 47

From CO - Hdqrs.

1862

If you require any further information, please write to me at the above address, or telephone me collect at 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment:
Drawing WED-677

6 copies transmitted

I

DGL:RLL
70-337

DEC 1 3 1966

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

This refers to your application dated October 18, 1966, and confirms the telephone conversation on November 7, 1966, between your Mr. Karl R. Schendel and Mr. R. L. Layfield of this office. In connection with our review of this application, the following information is needed:

1. Table 6.1 indicates that up to 6 wt% enriched UO_2 powder may be safely stored in a 9.6 inch diameter, long cylinder. This diameter was taken from X-1619, which quotes geometry values for (uranyl fluoride) systems of generally lower densities at any particular H/X value than those of UO_2 water systems. Also, Figure I.D. 11 of AHSB(S) Handbook 1, First Revision, indicates that the 9.6 inch diameter proposed may not provide an adequate margin of safety for homogeneous UO_2 water mixtures. Please demonstrate the adequacy of your safety margin or revise the diameter giving consideration to the foregoing comments.

2. It is implied in Table 6.2 that only one safe unit will be in transit at one time within the storage vault. Please confirm this limit or justify an alternative control. Also, we have been unable to confirm your calculated solid angles involving units in transit because you have not specified how you will assure a minimum separation distance and what the minimum will be. Please provide this information.

From CO - Hdqrs.

ITEM # 48

B/48

3. For Figure 4.1, please provide the separation distances between the several pieces of equipment or specify the scale for the drawing. Also, what activities are carried on in the area designated as "Air Handling"?

Very truly yours,

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

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DOCKET NO. 70-337

For Div of Compliance

RECEIVED DEC 9 1966 U.S. ATOMIC ENERGY COMMISSION

TWX NO 662

THIS IS WESTINGHOUSE PITTSBURGH PA

MR. R. E. LAYFIELD' 12/9/66 11.02A
U. S. ATOMIC ENERGY COMMISSION'
DIVISION OF MATERIAL LICENSING'
WASHINGTON' D. C.

applic 10/1

WESTINGHOUSE ELECTRIC CORPORATION HEREBY REVISES ITS APPLICATION DATED 10/19/66' FOR AMENDMENT OF LICENSE SNM-338' DOCKET 70-337' TO ADD THE FOLLOWING REQUIREMENTS.

1. ONLY ONE UNIT AT A TIME WILL BE PERMITTED IN TRANSIT IN THE VAULT.

2. IN ADDITION TO THE REQUIREMENTS STIPULATED IN TABLE 6.1' THE USE OF 9.6 INCH DIAMETER CONTAINERS WILL BE RESTRICTED TO SNM WITH A DENSITY EQUAL TO OR LESS THAN 3.2 KILOGRAMS OF URANIUM PER LITER.

3. FILTERS WILL BE STORED IN SEALED POLYETHYLENE BAGS OR OTHER CONTAINERS WHICH WILL ASSURE CONTAINMENT OF SNM.

4. THE RADIATION MONITOR WILL BE MOUNTED APPROXIMATELY 10 FEET ABOVE FLOOR LEVEL AT THE LOCATION SHOWN IN FIGURE 4.1.

IF YOU HAVE ANY QUESTIONS' PLEASE PHONE ME COLLECT' 412-255-3907.

KARL R. SCHENDEL' LICENSE ADMINISTRATOR'
WESTINGHOUSE ELECTRIC CORP.' 3 GATEWAY CENTER' PITTSBURGH' PA.

FB.

//RB#

superseded per letter 2/14/67

From CO - Hdqrs

B149

ITEM # 49

I

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

February 14, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
For Div of Compliance

Subject: Amendment to License SNM-338, Docket 70-337, for the Materials Systems Laboratory Storage Vault

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the storage of special nuclear material in the storage vault described in our application dated 10/19/66 as modified by the attached revision. This revision incorporates and supersedes the supplementary information contained in our telegram dated 12/9/66. Therefore, the 12/9/66 transmittal should be considered void.

The storage tanks for the monitor drain system, discussed during your visit of 1/12/67, will be fully covered and any smaller containers will be kept in an inverted position when not in use.

Please send the amendment to me at the above address.

If you have any questions, please write to me at above address or telephone me collect, 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

ITEM # 50

License Amendment
nsmitted

From CO - Hdqrs

544

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 19, 1966

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Amendment to License SNM-338, Docket 70-337, for Materials Systems Laboratory Storage Vault

Gentlemen:

For Div of Compliance

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the storage of special nuclear material in the storage vault described in the attached application.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, 412-255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

RECEIVED
OCT 20 1966
U.S. Atomic Energy Commission

3001

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AN AMENDMENT TO LICENSE SNM-338

MATERIALS SYSTEMS LABORATORY STORAGE VAULT

10/19/66

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

For Div of Compliance

MATERIALS SYSTEMS LABORATORY
STORAGE VAULT

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REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
1	2/14/67	5	Indicated intent to remove ventilating equipment. Specified monitor height and drawing scale.
1	2/14/67	6	Specified sealed container for filter storage. Added "one unit in transit" limit. Changed 6 w/o to 4.5 w/o and adjusted mass limit.
1	2/14/67	7	Area D1-D6, changed 6 w/o to 4.5 w/o.
1	2/14/67	9	Changed 6 w/o to 4.5 w/o, adjusted mass limit and changed reference. Clarified Note 6.
1	2/14/67	11	Added monitor mounting "at ceiling height."

1. Introduction

An amendment to License SNM-338 is hereby requested to authorize the storage of special nuclear material in the storage vault described herein. The special nuclear material will be used by the Materials Systems Laboratory and will be uranium compounds in powder, pellet, or solution forms, at a variety of enrichments, up to and including full enrichment, in the isotope U-235.

The Materials Systems Laboratory was formerly designated as the Engineering Laboratory. It is the laboratory described in our application for amendment of License SNM-338, dated 11/25/64, which was approved 2/1/65. The amendment requested in this application will supersede Section 6, and only Section 6, of the 11/25/64 application.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to K. R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Material Requirements

No changes in existing special nuclear material allocations are requested in this application.

4. Description of Storage Vault

The SNM storage vault will be located in the Materials Laboratory Building, designated as Building #7 in Figure 3.1 of the Health Physics Manual. (The latest revision of the Westinghouse Electric Corporation Health Physics Manual, WAED-HP-103, Revision V, was submitted on Docket 70-337 on July 28, 1966.) The vault will be established in a room, approximately 12 feet wide by 25 feet long, immediately adjacent to the uranium laboratory facility. Figure 4.1 shows a layout of the storage facilities.

The racks labelled "A" will be individual metal racks. Those labelled "B", "C" and "D" will be constructed of concrete blocks supporting metal shelves approximately 1/8 inch thick. The racks labelled "E" will be standard industrial utility shelving. The racks labelled "F" will be constructed of heavy angle iron and steel sheet, with sufficient strength and rigidity to support the loads which may be placed in them. The shelves will be separated by at least 12" of floodable space.

Additional details of the construction of these various racks appear in the second column of Table 5.1.

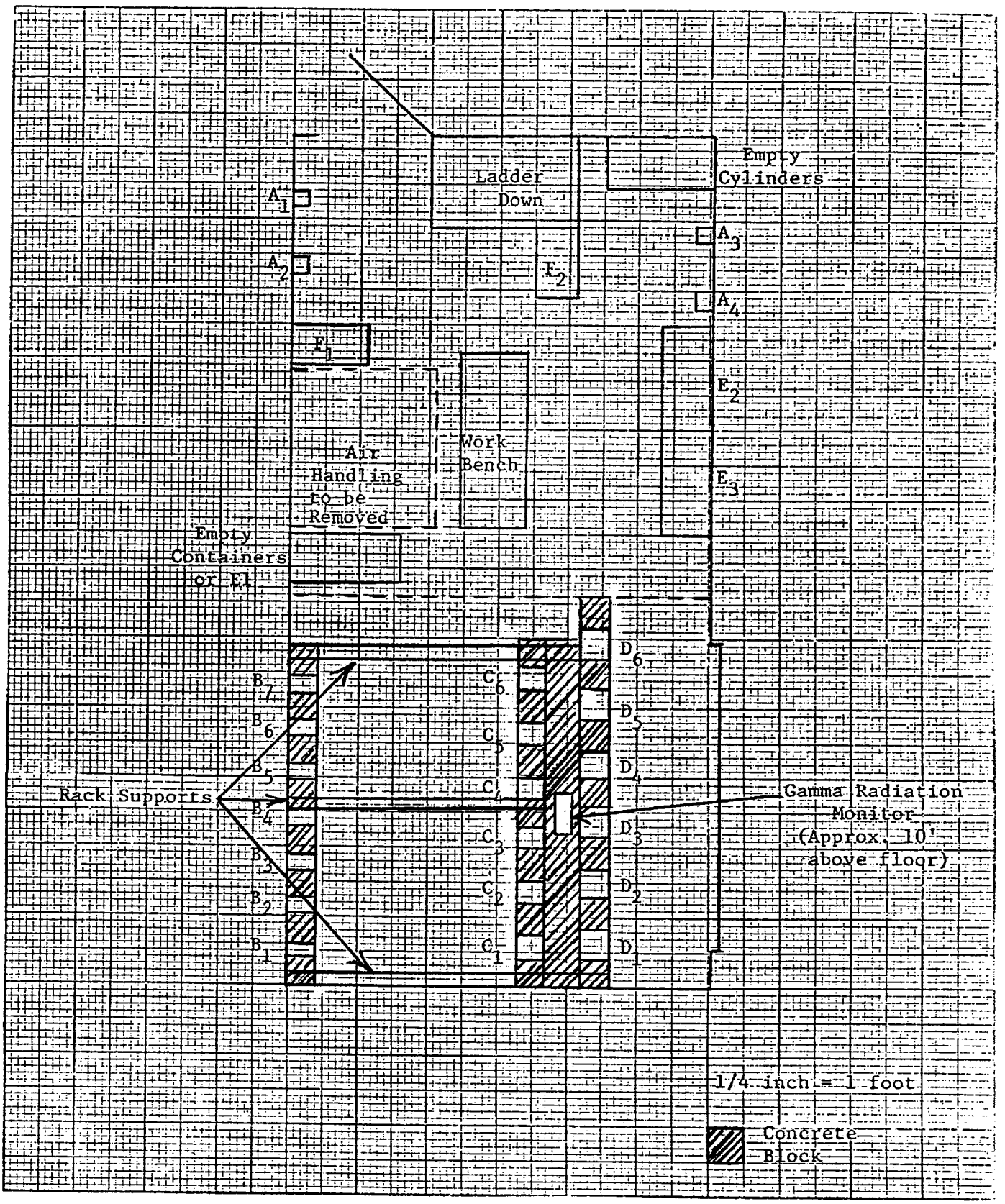

Figure 4.1

SKETCH OF MSL URANIUM VAULT LAYOUT

5. Nuclear Safety Limits

The applicable limiting values for enrichment, form, and container diameter (or tray thickness) for each of the designated storage areas are specified in Table 5.1. Please note the use of the subscript "i" as a general designation for any or all of the individual racks within a specified storage area.

The maximum permissible masses, when used as a control in the storage vault will be:

Enrichment $\leq$ 4.5 w/o	970 g	U-235
4.5 w/o $<$ Enrichment $\leq$ 13 w/o	530 g	U-235
Enrichment $>$ 13 w/o	350 g	U-235

Used, uranium-bearing filters in sealed polyethylene bags or other leakproof containers may be stored in this vault. Standard flat filters, 2 inches thick or less, may be stored (one per shelf) in the racks labelled "F", provided that the uranium enrichment does not exceed 23 w/o, or they may be stored using the mass limits specified above. Thicker filters, or those containing uranium with an enrichment greater than 23 w/o will be stored using the mass limits specified above. To provide the necessary storage space, storage columns may be converted into isolated storage bins by inserting solid concrete blocks at least 8 inches thick (density $\geq$ 140 lbs/ft^3) at intervals up the column. Each bin thus formed will be mass controlled.

Only one unit (bottle, can, tray, filter, etc.) will be permitted in transit in the vault at any one time.

TABLE 5.1

DESCRIPTION OF URANIUM BEARING MATERIAL WITHIN VAULT

Area	Normal Configuration	Maximum U-235 Enrichment and Form	Maximum Permissible Value
A1-A4*	Columns of 4.1" (max.) diameter cylinders spaced 24" center-to-center	~93 w/o Pellets, Powders, Solutions	4.1" Diameter
B1-B7	Columns of 4.1" (equiv. max.) diameter cylinders isolated from one another by at least 8 inches solid concrete ($\geq$ 140 lbs/ft^3)	~93 w/o Pellets, Powders, Solutions	4.1" Diameter
C1-C6*	Columns of 6 5/8" (max.) diameter cylinders (1 gal. paint cans) isolated from one another by at least 8 inches solid concrete ($\geq$ 140 lbs/ft^3)	13 w/o Pellets, Powders, Solutions	6.6" Diameter
D1-D6*	Columns of 9.6" (max.) diameter bottles isolated from one another by at least 8 inches solid concrete ($\geq$ 140 lbs/ft^3)	4.5 w/o Powders, Solutions	9.6" Diameter
E1-E3	Trays or bottles on shelf racks	Natural Enrichment; Also Empty Containers	No Limit
F1-F2	One 9" x 11 1/4" tray per shelf, 1" deep	~93 w/o Powder	1.5" Thick
F1-F2	One 15" x 23" corregated pellet tray per shelf, single layer of pellets	~93 w/o Pellets	1.1" Thick
F1-F2	One 12 1/2" x 18" tray per shelf, 2 1/4" deep	13 w/o Powder, Pellets	2.3" Thick
Work Bench	Any one of the containers described above (A_i thru F_i)	Any of the uranium materials described above (A_i thru F_i)	No more than one unit present (may employ either safe geometry or safe mass limit)

*Enriched material normally stored in A or B areas may be stored in C or D areas provided the geometry control (4.1" cylinder diameter) is not exceeded; similarly, material stored normally in C area may be stored in D area provided the geometry control (6.6" cylinder diameter) is not exceeded. Enrichment ranges and hence geometric limits should not be mixed within a given column.

6. Nuclear Safety Analysis

The various maximum permissible values (MPV) listed in Table 5.1 have, in general, been based on data appearing in standard references such as K-1019, Rev. 5, and TID-7028. For convenience, the various MPV and specific supporting reference information have been tabulated in Table 6.1. Comments have been added as footnotes where appropriate.

The results of interaction calculations performed to evaluate the overall safety of the storage vault have been tabulated in Table 6.2. These calculations used the following assumptions and techniques.

1. The effective neutron multiplication factor (k_{eff}) for the most reactive central unit was determined from information generated by LEOPARD/1.

2. Solid angle calculations were made using the procedures given in TID-7016, Rev. 1.

3. The calculated solid angles were then compared with the allowable solid angles given in Figure 26 on page 36 of TID-7016.

4. The solid angle calculations included consideration of a fissile unit in transit between the units being evaluated, where indicated.

5. Allowance was made for the increase in reactivity resulting from partial reflection, if any.

The results listed in Table 6.2 indicate that all interactions effects will be within allowable limits.

/1 Barry, R.F., "LEOPARD - A Spectrum Dependent, Non-Spatial Depletion Code for the IBM-7094," WCAP-3269-26, (September 1963)

Enrichment	Parameter	MPV/1	Source	Page
~93 w/o	Mass	350 grams/2	K-1019	22
	Cylinder Dia.	4.1 inches	LEOPARD/3	
	Slab Thickness	1.1 inches	LEOPARD/3	
≤23 w/o	Slab Thickness	2.3 inches/4	K-1019	21
≤13 w/o	Mass	530 grams/5	K-1019	22
	Cylinder Dia.	6.6 inches	TID-7028	29
	Slab Thickness	2.3 inches	TID-7028	30
≤4.5 w/o/6	Mass	970 grams	LEOPARD/3	
	Cylinder dia.	9.6 inches	LEOPARD/3	

Notes:

/1 MPV equals recommended value given in the reference. If the reference lists a minimum critical value, the MPV equals the minimum critical value reduced by a safety factor equal to that used in Table I of TID-7016.

/2 The 350 g. homogeneous limit is more restrictive than any mass limit on material in the heterogeneous form.

/3 See reference at bottom of page 8 of this application. The values listed are those determined for full density UO_2 compacts. The ultraconservative solid uranium metal values are not applicable in this situation.

/4 This is the maximum permissible slab thickness for homogeneous material, since only filter storage uses this enrichment break point.

/5 For material between 6 w/o and 13 w/o the homogeneous and heterogeneous recommended values for mass are identical.

/6 For 4.5 w/o material, the mass limit was computed for heterogeneous material, since this is the limiting quantity. However, the cylinder diameter was selected as the recommended value for homogeneous material, because only powder or solutions may be stored in the 9.6 inch diameter containers. Heterogeneous material containing uranium enriched to less than 4.5 w/o will be stored using the MPV for 13 w/o material when nuclear safety is based on geometry control.

TABLE 6.1

MAXIMUM PERMISSIBLE VALUE REFERENCES

Interaction	Most Reactive Unit: Unit	Most Reactive Unit: k_{eff}	Most Reactive Unit: Solid Angle	Calculated Interaction Solid Angle
A_2 column interacting with A_i columns and F_i racks	A_2	0.69	2.1	< 1.4
A_3 column interacting with A_i columns and F_i racks	A_3	0.69	2.1	< 0.6
B_i column interacting with C_i columns (includes either a C_i or a B_i in transit)	B_4	0.59	3.1	< 1.0
Unreflected B_i in transit interacting with B_i and C_i columns	B_i	0.49	4.2	< 3.3
C_i column interacting with B_i columns (includes either a C_i or a B_i in transit)	C_4	0.79	1.1	< 0.7
D_i column interacting with a D_i bottle in transit	D_3	0.80	1.0	< 0.8
E_i contains natural or depleted U			No Limit	
F_i interactions between shelves; 93 w/o enriched material, 9 x 11-1/4" trays	-	0.30	6.0	much < 6.0
F_i interactions between shelves; 13 w/o enriched material, 12-1/2" x 18" trays	-	0.40	4.7	much < 4.7

TABLE 6.2

NEUTRON INTERACTION BETWEEN INDIVIDUAL STORAGE AREAS WITHIN MSL VAULT

7. Criticality Monitoring

Criticality monitors will be mounted at ceiling height in the storage vault as shown in Figure 4.1. Evaluation has shown that monitors in this location will detect a nuclear incident in the vault in accordance with the requirements of 10 CFR 70.24.

SNM-338
MSL Storage

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "License SNM-338, Docket 70-337, Amendment for Materials Systems Laboratory Storage Vault, 10/19/66," immediately in front of the previous transmittal letter dated 10/19/66.

Revised pages 2, 5, 6, 7, 9, and 11 should be inserted and the old pages removed.

The removed pages may be filed in the back of the binder.

replaced

Revision No. 1
2/14/67

Limit operating

CO:I

Jan. 29, 1965

DML:BLL
70-337

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. C. F. Williams
License Administrator

Gentlemen:

Pursuant to 10 CFR 70, Special Nuclear Material License No. [illegible] is hereby amended to authorize the use of additional criticality controls in the Engineering Development Laboratory in accordance with the procedures described in the application dated November 25, 1964, and supplement dated January 19, 1965. All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

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ITEM # 51

[redacted]

From CO - Hdqrs.

B/51

MR. [illegible] LANTZILLA, 1/19/65 3.4CP

U. S. ATOMIC ENERGY COMMISSION -

SAFETY & FUEL FAB. NUCLEAR MATERIAL BR.,

WASHINGTON, D. C.

ACCOUNTING
COPY

DOCKET NO. 70-337

Fac Div of Compliance

SUBJECT - APPLICATION FOR AMENDMENT TO SPECIAL NUCLEAR MATERIALS LICENSE, SNM-338, DOCKKET 70-337, DATED NOV. 25, 1964, REF. DWL.RLL, 70-337.

WESTINGHOUSE SUBMITS THE FOLLOWING INFORMATION IN REPLY TO YOUR LETTER DATED JAN. 8, 1965 REGARDING THE SUBJECT LICENSE. THIS SUPPLEMENTS INFORMATION GIVEN IN THE APPLICATION AND WILL ASSIST YOU IN EVALUATION OF NUCLEAR HAZARDS ASSOCIATED WITH NEUTRON INTERACTION BETWEEN NUCLEARLY SAFE INDIVIDUAL UNITS OF MASS OR GEOMETRY AT WORK STATIONS IN THIS LABORATORY.

IN THE NORMAL SITUATION, UO2 WILL BE HANDLED UNMODERATED AT MOST OF THE WIDELY SCATTERED WORK STATIONS. FOR THIS SITUATION NUCLEAR SAFETY IS ASSURED BECAUSE THE TOTAL AMOUNT OF UO2 AT ANY ONE LOCATION IN THE LABORATORY ROOM WILL NOT EXCEED THE LIMIT GIVEN IN THE APPLICATION.

NORMALLY THE SPACE BETWEEN THE EDGES OF WORK STATIONS WILL BE MUCH GREATER THAN 12 INCHES. THIS SPACING, GREATER THAN 12 INCHES, ASSURES NUCLEAR SAFE MASS OR GEOMETRY UNITS IN CASE OF ACCIDENTAL FLOODING. AS DISCUSSED IN TID 7016, REV. I. EIGHT INCHES SEPARATION OF WATER OR CONCRETE IS SUFFICIENT TO ISOLATE UNITS WHILE 12 INCHES IS CONSERVATIVE.

FOR THE FEW PROCESSES WHERE WATER IS NORMALLY PRESENT AT THE FUEL WORK STATIONS, THE MINIMUM EDGE TO EDGE SEPARATION BETWEEN NUCLEARLY SAFE UNITS OF MASS OR GEOMETRY WILL BE SIX FEET.

THE NEUTRON INTERACTING SOLID ANGLE FOR ANY OF THE ABOVE UNITS IS NEAR ZERO EVEN FOR THE MOST REACTIVE CENTRALLY LOCATED UNIT. SOME WORK STATIONS IN ADJOINING ROOMS ARE FURTHER ISOLATED BY EIGHT INCH THICK CONCRETE WALLS. NO SNM OTHER THAN THAT SPECIFIED IN THIS LICENSE WILL BE LOCATED WITHIN 12 FEET OF A WORK STATION DURING THE PROCESSING OF THIS UO2 FUEL.

C. P. SKILLERN, LICENSE ADMINISTRATOR,
WESTINGHOUSE ELECTRIC CORPORATION, 22-E - NO. 3 GATEWAY CENTER,
PITTSBURGH, PA.

BUDGET 9400-5028.
FB.

TWX INCOMING

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh 30, Pa.

November 25, 1964

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D.C., 20545

Attention: Mr. Lyall E. Johnson, Acting Director
Division of Materials Licensing

Subject: Amendment of Special Nuclear Material License SNM-338, Docket 70-337, for Additional Criticality Controls in the Engineering Development Laboratory

Ed. Div. of Compliance

Gentlemen:

The Westinghouse Electric Corporation hereby applies for an amendment to the Special Nuclear Materials License SNM-338, Docket 70-337. This application requests authorization to use additional criticality controls in the Engineering Development Laboratory.

If you have any questions, please write to me at the above address or phone me collect, 412-391-2800, Extension 3449.

Very truly yours,

C. P. Skillern

C. P. Skillern
License Administrator

Attachment:
6 copies attached

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AMENDMENT TO LICENSE

SNM-338

FOR ADDITIONAL CRITICALITY CONTROLS IN THE ENGINEERING DEVELOPMENT LABORATORY

Date: November 25, 1964

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

ENGINEERING DEVELOPMENT LABORATORY

CRITICALITY CONTROLS

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REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason

APPLICATION FOR AN AMENDMENT TO SNM-338 TO PROVIDE ADDITIONAL CRITICALITY CONTROLS IN THE ENGINEERING DEVELOPMENT LABORATORY

1. Introduction

An amendment to SNM-338 is hereby requested to provide for a change in the criticality controls used for UO_2 powder fully enriched in the isotope U-235, in the Engineering Development Laboratory. Controls presently used were approved in the license dated October 30, 1959. This license approved the methods described in the application dated June 2, 1959, and the transmittals dated August 10, 1959 and October 15, 1959.

The control presently approved for use in the Engineering Laboratory is the use of a safe batch quantity that consists of 350 grams of U-235 at separate work stations.

Westinghouse requests authorization to use certain geometry control in addition to the limit presently licensed. These new control methods are described in Section 7.1 of this application.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to C. P. Skillern, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pa. (15230).

3. Materials, Amounts, and Specification

No additional amount of SNM is required for the Engineering Development Laboratory. The special nuclear material discussed in this application will only be UO_2 powder, pellets or clad pellets fully enriched in the isotope U-235.

4. Equipment and Facilities for Radiation Protection

In addition to the information in the previous transmittals, the equipment, facilities and updated procedures outlined in the Westinghouse Electric Corporation Health Physics Manual, WAFD-HP-103, Rev. III, March, 1962, as previously submitted in the July 11, 1962 transmittal and revised in the January 17, 1964 transmittal, will be used.

5. Receipt of Material

The UO_2 powder is received from a licensed processor or under contractual relationships in an authorized shipping container. The shipping container is visually inspected to assure proper loading and spacing; any discrepancies are reported to the supplier. Smear tests are made and the containers are surveyed with radiation detection instruments.

The material is contained in a heavy plastic bottle with a screw cap in an inner container of the birdcage. This bottle containing the material is removed from the birdcage. This plastic bottle has a 5-inch diameter which is an always safe diameter for UO_2 powder that is fully enriched. The material has a density of <3.2 grams/cm^3. The individual

5. Receipt of Material (continued)

packages are then taken to an area adjacent to the storage vault shown in Figure 3 of the application dated June 2, 1959, where it is weighed and placed in the storage rack. Records of the incoming material are listed on the appropriate accountability documents.

6. Powder Storage

The UO_2 powder will be stored as described in the original application dated June 2, 1959, and supplemented in the transmittal of August 6, 1959, and the telegram of October 15, 1959.

7. General Information about Processing Materials, the Equipment used and Criticality Controls

This section describes various types of criticality controls that will be used in making UO_2 pellets, fully enriched with U-235, other ceramic shapes and fuel rods.

The equipment used in this laboratory will be similar to that used at other locations in the facility. This type of equipment is being used to fabricate Indian Point Core II fuel pellets and rods. Information regarding this core fabrication was transmitted on May 20, 1964, with approval given on July 16, 1964. The same type press, sintering furnace, centerless grinder, weld box, and leak testing equipment is used in this laboratory. Each one is separated from the other by a distance >12 inches.

7. (continued)

7.1 The following describes the type of process that will be used and the types of criticality controls:

Type of Process	Control
1. Drying of UO_2 Powder	Slab = 1.5 inches
2. Pressing of Pellets	
Feed Hopper	Cylinder = 5 inches
Pellet Trays	Slab = 1.5 inches
Waste Collection	Volume = <4.8 liters Slab = 1.5 inches
3. Sintering of Pellets	Slab = 1.5 inches
4. Tube Loading, Processing, Inspection	Slab = 1.5 inches
5. Leak Testing (clad fuel rods)	Cylinder = 2.7 inches

The total quantity of UO_2 for each laboratory work room will be limited to 22 Kg (UO_2).

7.2 Criticality Determinations

1. Batch Size

A maximum permissible batch size to be used for UO_2 powder in the laboratory will be 350 grams of U-235. This is equal to 430 grams of UO_2 powder. This is within the limit given in Table I, TID-7016, Rev. 1, Page 10.

7. (continued)

7.2 Criticality Determinations (continued)

2. Slab Determinations

A maximum slab thickness has been set at 1.5 inches for UO_2 powder and pellets fully enriched with U-235. This slab thickness is within the limits given in Table I, TID-7016, Rev. 1, Page 10.

3. Cylinder Determinations

The maximum permissible cylinder diameter for the powder has been set at 5 inches using the uranium solution limit for a cylinder, TID-7016, Rev. 1, Page 10, Table I. This cylinder diameter is based upon the reduced density for UO_2 powder of 3.2 g U-235/cm^3. In the case of pellets where the UO_2 has a density of 10.5 g U-235/cm^3, a safe diameter of 2.7 inches has been set as given in TID-7016, Rev 1, Page 10, Table I.

4. Laboratory Mass Limit

The total mass limit of 22 Kg of UO_2 (22 x .82 = 18 Kg U-235) in one laboratory room is safe as the material will be spread out in various groupings throughout the room, such as in a 5-inch cylinder (about 1/3 of the material), 1.5-inch slab (about 1/3 of the material), and about 1/3 of the material in safe mass batches, 350 grams U-235. Thus no individual location when the material is used will

7. (continued)

7.2 Criticality Determinations (continued)

4. Laboratory Mass Limit (continued)

exceed the recommended limit of 10 Kg as given in Table I; TID-7016. Each of these work locations where one control method is used will be separated from any other work location by >12 inches of floodable space.

5. Volume Limits

A solution volume limit of 4.8 liters has been set as a critical control in this laboratory. A safe volume for fully enriched Uranium solution is 4.8 l. (1.3 gallons) according to TID-7016, Rev. 1, Table I, Page 10.

8. Emergency Controls

The emergency controls for the Site have been updated in the amendment application of November 16, 1964, containing the Cheswick Site Emergency Procedure (AF294756). Criticality Alarms are within 120 ft. of any of the SNM and they are set to alarm between 5-20 mr/hr. The types of alarm used on the Site are described in Section 8.2 and V-1-A of the Emergency Procedures.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
70-337
SNM-338, Amendment No. 9

SEP 3 1968

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the nondestructive testing and inspection of uranium enriched to 30 w/o in the U-235 isotope as contained in fuel rods in accordance with the statements, representations and conditions specified in your application dated August 19, 1968.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

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ITEM # 52

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

August 19, 1968

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for an Amendment to License SNM-338, Docket 70-337, to Authorize Processing of 30 w/o Enriched Uranium in the NFD Manufacturing Department

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337. The amendment would authorize the Manufacturing Department of the Nuclear Fuel Division to process uranium enriched up to 30 w/o in the isotope ^{235}U in accordance with the attachment to this letter.

The attachment to this letter revises our transmittal dated July 26, 1968. This transmittal supersedes the July 26th transmittal in its entirety, and no further action is required on that application.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel
by E C Barnes

Karl R. Schendel
License Administrator

Attachment

7 copies transmitted

ITEM # 52

B/53

SNM-338
30 w/o Inspect.
8/19/68

WESTINGHOUSE ELECTRIC CORPORATION
3 Gateway Center, Box 2278
Pittsburgh, Pennsylvania 15230

The Manufacturing Department of the Nuclear Fuel Division (NFD) requests approval to process uranium oxide enriched $\leq$ 30 w/o in the isotope ^{235}U in the form of fuel rods. The pelleting, jacketing and other fabrication operations will be performed by another facility.

Figure A, attached, depicts the general locations of the various buildings on the Cheswick site. The NFD Manufacturing Department occupies Buildings 5B and 5D, which have been lightly cross hatched on the figure. Figure B, also attached, is an enlarged plan of the NFD Manufacturing Department areas, and describes the relationships between the various processing areas. The processing authorized by this amendment will be carried out in the areas designated as the Testing Area and the Storage Area.

The fuel rods will be sintered UO_2 pellets clad in Zircaloy or stainless steel. The rods will be distinctively color-coded prior to their receipt by the NFD Manufacturing Department. The processing at the Manufacturing Department will be limited to in-process storage and to x-ray inspection, helium leak testing, dimensional inspection and similar operations which will not present any risk of violating the cladding integrity.

The nuclear criticality safety controls which will be applied are listed below.

Maximum Permissible Values

Mass	2.9 pounds UO_2
Slab Thickness	0.8 inches

Minimum Permissible Spacings

For mass controlled subcrits	A minimum 12" edge-to-edge spacing from any other SNM
For slab controlled subcrits	Spacing sufficient to assure an average "smeared" slab thickness of 0.47", or a minimum 12" edge-to-edge spacing from any other SNM, whichever is larger.

The mass limit is the 350 g ^{235}U limit given in Table I of TID-7016, converted into pounds of UO_2.

The slab thickness is 0.84 times the minimum critical thickness of an infinite slab of heterogeneous, fully enriched uranium dioxide at approximately 96% of theoretical density. This thickness was computed using LEOPARD/1 procedures, assuming optimum light water moderation and full reflection.

The spacing limit on mass controlled subcrits is a conventional spacing and has been derived to assure isolation in the event of flooding. Due to the configuration of the fuel rods, and the 350 g ^{235}U MPV, any spacing meeting the 12" edge-to-edge criteria automatically satisfies surface density spacing criteria (LA-3366/2).

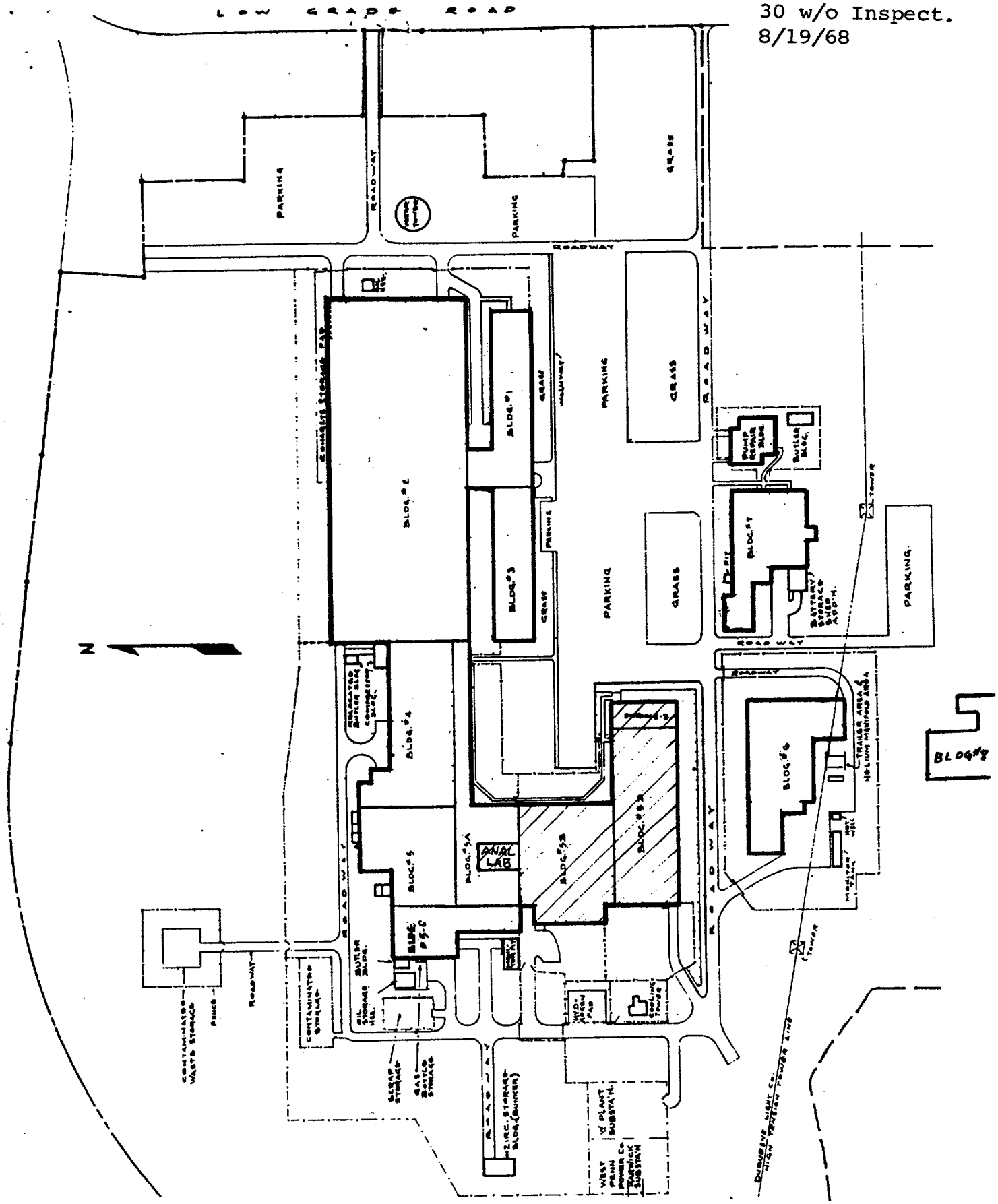
/1 Barry, R.F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM 7094," WCAP-3269-26 (Sept. 1963)

/2 Paxton, H.C., "Criticality Control in Operations with Fissile Material", Los Alamos Report LA-3366, 1966

The 0.47 in. "smeared" thickness limit is 50% of the computed minimum critical thickness of an infinite slab, determined as discussed previously. This requirement will be the limiting consideration for large accumulations. For smaller accumulations, the 12" edge-to-edge spacing requirement will override the above consideration.

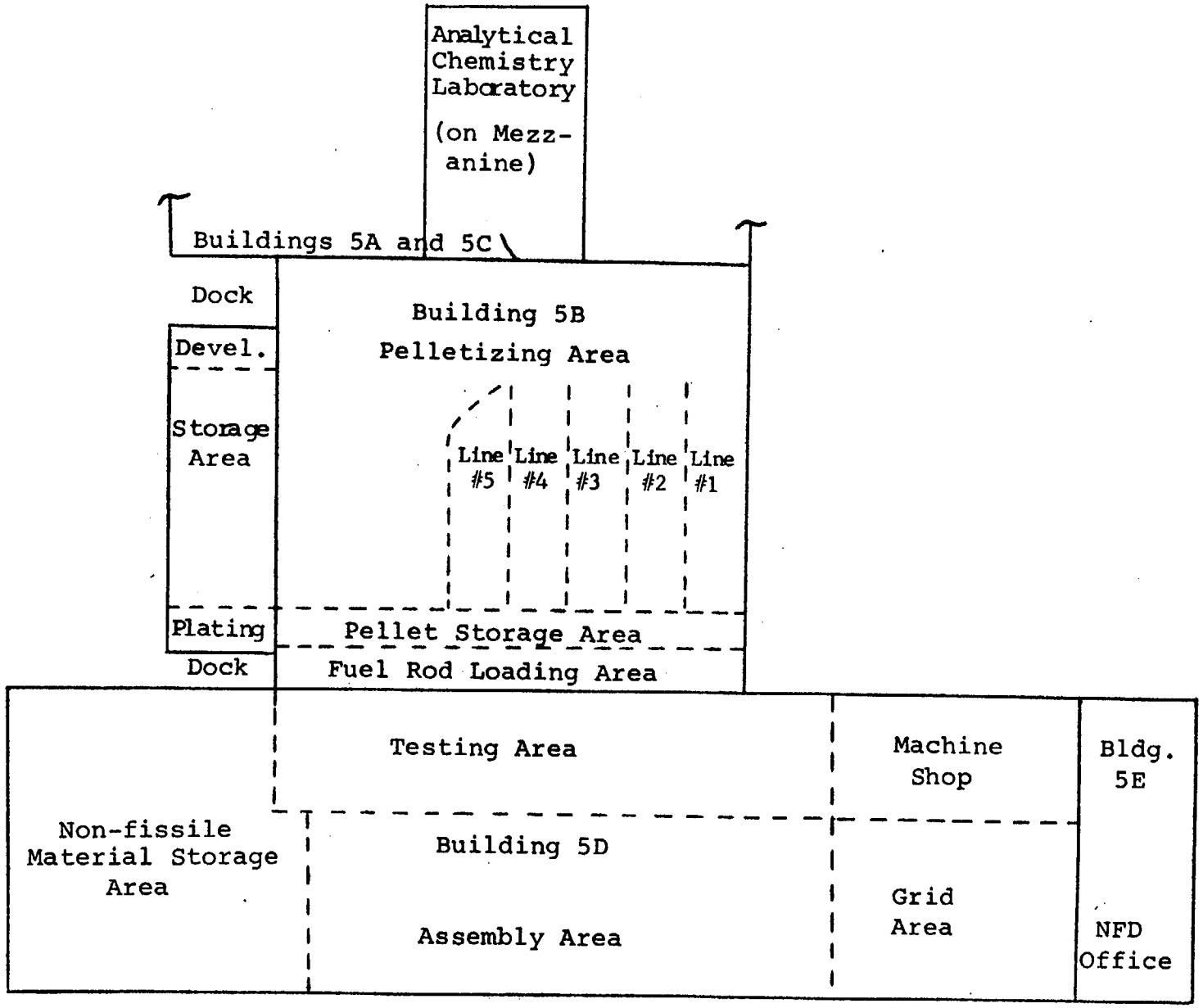
The processing of this material will present no radiation protection hazards which are significantly different from those associated with the lower enriched SNM which is normally processed in the Manufacturing Department.

SNM-338
30 w/o Inspect.
8/19/68



Cheswick Site Building Locations

Figure A



Scale 3/8 in. = 20 ft.

General Arrangement
NFD Manufacturing Department
Figure B

SNM-338
30 w/o Inspect.
8/19/68

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
70-337
SNM-338, Amendment No. 8

AUG 14 1968

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the fabrication of Saxton 9X9 fuel assemblies in the Materials Systems Laboratory in accordance with your application dated July 19, 1968.

All other conditions of this license shall remain the same.

As Mr. R. L. Layfield of this office discussed with your Mr. K. R. Schendel in the telephone conversation on August 12, 1968, this license amendment authorizes fabrication only. That portion of your application concerning the delivery of this material to a carrier for transport is still under review. We shall contact you if any additional information is required.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
Robert L. Layfield

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

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Westinghouse Electric Corporation
3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

July 19, 1968

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for Amendments to License SNM-338, Docket 70-337, to Authorize the Fabrication and Packaging of Saxton 9x9 Fuel Assemblies

Gentlemen: for Div of Compliance

The Westinghouse Electric Corporation hereby requests two amendments to License SNM-338, Docket 70-337. One amendment is requested to authorize the Materials Systems Laboratory at Cheswick to fabricate Saxton 9x9 fuel assemblies containing uranium enriched up to 12.7 w/o in the isotope ^{235}U. The other amendment is to authorize their packaging and delivery to a carrier for transport. The fabrication and packaging of the fuel assemblies will be carried out in accordance with the provisions of the attached application.

Please send the license amendments to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment

7 copies transmitted

JUL 29 1968

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AMENDMENTS TO
LICENSE SNM-338

SAXTON 9x9 ASSEMBLIES

7/19/68

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

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5.	Packaging for Shipment	6

REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason

1. Introduction

Amendments to License SNM-338 are hereby requested to authorize the fabrication, packaging and delivery to a carrier for shipment of 9x9 Saxton fuel assemblies containing UO_2 at enrichments up to 12.7 w/o in the isotope ^{235}U.

The assemblies will be fabricated in the Materials Systems Laboratory (MSL), which has already been approved to process and store uranium at any enrichment up to fully enriched. References to the applicable prior transmittals are included in the appropriate sections of this application.

2. Correspondence - Return Address

The license amendments and any correspondence should be sent to Karl R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Powder, Pellet, and Fuel Rod Processing

The processing of the SNM through all the operations required to produce finished fuel rods will be carried out as described in our transmittal dated November 25, 1964, and supplement dated January 19, 1965.

The storage of the SNM, up to and including the storage of finished fuel rods will be performed as described in our transmittal dated October 19, 1966 and supplements dated February 14, 1967 and June 1, 1967.

4. Fuel Assembly Fabrication

The general physical arrangement and dimensions of Saxton fuel assemblies are described in drawings which were transmitted on License SNM-38, Docket 70-43, on April 18, 1961.

The quantity and distribution of ^{235}U in a 9x9 assembly containing 12.7 w/o enriched uranium exceeds the criteria specified in our transmittal dated November 25, 1964, for single units. Therefore, the nuclear criticality safety of the assembly operations will be assured by the following requirements.

1. Finished rods will be transported to and handled in the assembly area in accordance with the maximum permissible values given in our transmittal dated November 25, 1964. Rods will be sequentially loaded into the assembly.

2. Only one assembly will be worked on at a time.

3. Assemblies not being worked on will be stored end-to-end, or will be stored in the shipping container.

4. A maximum of four assemblies will be present in the assembly area at one time.

5. Any other SNM in the assembly area will be isolated from the assemblies by a minimum distance of twelve feet.

6. A maximum of 18 kg of contained ^{235}U will be permitted in the assembly area at any one time. (See Item 4 on page 7 of our 11/25/64 transmittal.)

4. (continued)

LEOPARD/1 and PDQ-03/2 calculations demonstrate that the k_{eff} for a single fuel assembly would be $\leq$ 0.75 if the assembly were maximumly moderated and fully reflected by light water.

Similar calculations for the shipping configuration (two assemblies end-to-end aligned adjacent to two more assemblies end-to-end) demonstrate that the k_{eff} for the array would be $\leq$ 0.95 if the array were maximumly moderated and fully reflected by light water, and the assemblies were spaced (approx. 0.5") to provide maximum reactivity.

Either of the storage arrays specified (four assemblies end-to-end or four assemblies in the shipping configuration but mechanically spaced at wider-than-optimum spacing by the construction of the shipping packaging) will be less reactive than the array which was analyzed. Furthermore, since only one assembly at a time will be moved into or out of the array, no array as reactive as that analyzed can be formed.

/1 Barry, R.F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM 7094," WCAP-3269-26 (September 1963)

/2 Caldwell, W.R., "PDQ-03 - A Program for the Solution of the Neutron Diffusion Equations in Two Dimensions on the IBM 704," WAPD-TM-179 (May 1960)

5. Packaging for Shipment

The shipping packaging which will be used to transport the Saxton 9x9 fuel assemblies is a Westinghouse Model CC Shipping Container. This packaging is described in Section 5.1 of our application, dated November 18, 1966, and subsequent revisions, which requested amendments to License SNM-338, Docket 70-337, to authorize the use of NFD shipping packages. Authorization to deliver this packaging with a variety of contents to a carrier for transport is contained in Amendment 71-23 to License SNM-338.

Due to the relatively short length of a Saxton Fuel assembly, two assemblies may be loaded end-to-end on each side of the dividing structure of the strongback.

As described in Section 4, calculations assuming this arrangement of assemblies, maximum moderation and full reflection by light water, and spacing which produces the maximum reactivity in the array, demonstrate that the maximum k_{eff} for the array would be ≤ 0.95. This value is conservative inasmuch as the vertical member of the strongback mechanically imposes a spacing which is greater than optimum. Furthermore, no credit was taken in the calculations for the parasitic neutron absorption of the packaging structure. Therefore, a single package will be nuclearly safe under all conditions of moderation and reflection.

Westinghouse will ship a single package as a Fissile Class III shipment, using the exclusive use of the vehicle. Therefore, array nuclear safety calculations are not required.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:
DML:RLL
70-337
SNM-338, Amendment No. 7

MAY 1 1968

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with your application dated April 24, 1968, and pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to include revised pages 5 and 9 to your application "Amendment for Processing Fast Reactor Fuel" dated October 26, 1966.

All other conditions of this license shall remain the same.

FOR THE U. S. ATOMIC ENERGY COMMISSION

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

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R. Wischow, NMS

Form 00 - Hdqrs.

I

APR 26 1968

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

April 24, 1968

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

For Div of Compliance

Subject: Amendment to License SNM-338, Docket 70-337, to Authorize the Processing of Plutonium Fuel

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to increase, in accordance with the attachment to this letter, the quantity of material which may be received, possessed and used in the processing of plutonium-bearing reactor fuel components.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address, or telephone me collect at (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
7 copies transmitted

From CO - Hdqrs.

1492

SNM-338
Gen. Plutonium

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "License SNM-338, Docket 70-337, Amendment for Processing Fast Reactor Fuel, 10/26/66," immediately in front of the previous transmittal letter dated 4/1/68.

Pages 5 and 9 should be inserted in the binder and the old pages removed.

The removed pages may be filed in the back of the binder.

Revision No. 4
4/24/68

I

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

DML:RLL
70-337
SNM-338, Amendment No. 6

APR 24 1968

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with your application dated April 1, 1968, and pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to include revised pages 2, 5 and 36, and add page 36.1 to your application "Amendment for Processing Fast Reactor Fuel," dated October 26, 1966.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

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Division Reading File

From CO - Hdqrs.

I

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

April 1, 1968

~~Locker~~
~~Nilson~~
~~Loring~~ 3 b,L

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

For Div. of Compliance

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Amendment to License SNM-338, Docket 70-337,
to Authorize the Processing of Plutonium Fuel

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-338, Docket 70-337, to authorize the processing of plutonium-bearing reactor fuel components in accordance with our application dated 10/26/66, as modified by the revision transmitted to you on 12/22/66, 2/8/67 and by the attachment to this letter.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address, or telephone me collect at (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
7 copies transmitted

From CO - Hdqrs.

1175

SNM-338
Gen. Plutonium

Attachment with
April 1 68

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "License SNM-338, Docket 70-337, Amendment for Processing Fast Reactor Fuel, 10/26/66," immediately in front of the previous transmittal letter dated 2/8/67.

Pages 2, 5 and 36 should be inserted in the binder and the old pages removed.

New page 36.1 should be inserted immediately after page 36.

The removed pages may be filed in the back of the binder.

Revision No. 3
4/1/68

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

NOV 21 1967

Mr Crocker
CM Nelson
JB Brown
pd

IN REPLY REFER TO:
DML:CEM
70-337
SNM-338, Amendment No. 5

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburg, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

As requested in your letter dated November 14, 1967, Item 12 is hereby added to Special Nuclear Material License No. SNM-338, dated June 2, 1967 to read as follows:

"12. The transportation of AEC-licensed material shall be subject to all applicable regulations of the Department of Transportation and other agencies of the United States having jurisdiction.

When Department of Transportation regulations in 49 CFR Parts 173 - 179 are not applicable to shipments by land of AEC-licensed material, (1) the transportation shall be in accordance with the requirements relating to packaging of radioactive material, marking and labeling of the package, placarding of the transportation vehicle, and accident reporting set forth in the regulations of the Department of Transportation in § 173.391 - 173.395, 49 CFR Part 173, "Regulations Applying to Shippers," and § 177.823, 177.860(c) and (d), 49 CFR Part 177, "Regulations Applying to Shipments Made by Way of Common, Contract, or Private Carriers by Public Highways," and (2) any requests for modifications or exceptions to those requirements, and any notifications referred to in those requirements shall be filed with, or made to, the Atomic Energy Commission."

All other conditions of this license shall remain the same.

License amendments for the delivery of special nuclear material to a carrier for transport do not authorize the transport of special nuclear material, since such transport is normally subject to regulation by the Department of Transportation. Transport of such material by a carrier subject to DOT regulations is subject to a special permit issued by that agency. This amendment authorizes the transport, under authority of this license, of the special nuclear material for any package which has been approved for delivery to a carrier for transport when such transport would not be subject to DOT regulations. For example, transport in a Government vehicle, or an intra-state movement not subject to DOT regulations would be authorized by this amendment, provided that the appropriate packaging, marking, and labeling requirements are satisfied.

FOR THE ATOMIC ENERGY COMMISSION

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

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70-337

For Div of Compliance

Westinghouse Electric Corporation

For Div of Compliance

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

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1967 NOV 16 AM 9 22

U.S. ATOMIC ENERGY COMM.
REGULATORY
MAIL & RECORDS SECTION

November 14, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Approval for Transportation of a Shipping Package in Intra-state Commerce

Gentlemen:

The Westinghouse Electric Corporation hereby requests authorization for the transportation of special nuclear material by highway in intra-state commerce. The transportation of SNM will be conducted in compliance with the following provisions:

1. The package will consist of the PWR Seed Fuel Element Packaging and contents as described in Part 4 of our application, dated 11/6/67, for an amendment to License SNM-338, Docket 70-337, to authorize the delivery of SNM to a carrier for transport.

2. The shipment may be transported by a common or contract carrier; or a Westinghouse or a Federal Government vehicle may be used.

3. The packaging of the SNM, the marking and labelling of the packages, the placarding of the vehicles and the accident reporting procedures will be in compliance with the requirements of the appropriate paragraphs of the DOT regulations concerning transportation of radioactive materials in interstate commerce; and particularly Sections 49CFR173.391 through 173.395, Section 49CFR177.823, and Paragraphs 49CFR177.860 (c) and (d). Any notifications referred to in these regulations will be filed with the AEC.

Co:I

3784

The Westinghouse Electric Corporation urges that the authorization requested herein be issued simultaneously with the authorization requested by our application, dated 11/6/67, on Docket 70-337, to deliver the PWR Seed Fuel Element Packaging to a carrier for transport. Please send the authorization to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

6 copies transmitted

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

SEP 15 1967

IN REPLY REFER TO:
DML:RLL
70-337
SNM-338, Amendment No. 3

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Branch Reading File
Division Reading File

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

In accordance with your application dated August 24, 1967, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended (1) to authorize the fabrication of fuel rods containing uranium enriched up to 6.6 w/o U-235 in the Materials Systems Laboratory provided that the same batch controls approved for the processing of highly enriched uranium are used, and (2) to authorize the fabrication of Zorita test assemblies containing uranium enriched up to 6.6 w/o U-235 in the NFD Manufacturing Department.

All other conditions of this license shall remain the same.

The proviso to this amendment was discussed during the telephone conversation on August 30, 1967, between your Mr. Karl R. Schendel and Messrs. R. Layfield and R. Stevenson of this Division. Also, as discussed with Mr. Schendel, during the telephone conversation on September 7, 1967, this amendment does not authorize the packaging of the test assemblies for delivery to a carrier for transport. Based on the telephone conversation on September 7, 1967, between Mr. Schendel and Mr. Layfield, it is understood that you will submit an application for amendment under Part 71 to cover the shipment of the Zorita fuel assemblies.

FOR THE ATOMIC ENERGY COMMISSION

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

ITEM # 54

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

August 24, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Amendment to License SNM-338, Docket 70-337
to Fabricate Zorita Test Assemblies For Div of Compliance

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the fabrication and packaging of four Zorita test assemblies using the procedures and packagings described in our applications dated October 19, 1965, January 10, 1966 and July 22, 1966. The test assemblies are special in that the uranium used in selected rods in the assemblies will be enriched to approximately 6.6 w/o in the isotope U-235.

Fuel rod fabrication will be performed by the Materials Systems Laboratory under existing authorizations. The amendment requested in this application is intended to authorize fabrication and packaging of the assemblies. Fuel rod storage and processing in the NFD Manufacturing Department will be performed using the 2.9 inch maximum slab thickness and 7.3 inch maximum cylinder diameter specified for 6.95 w/o material in our application dated September 21, 1966. Only certain fuel rods will consist of enrichments between the 3.7 w/o enrichment currently authorized and the 6.6 w/o enrichment. Approximately twenty rods in a test assembly will be dummy rods containing Al_2O_3 pellets. Calculations using PDQ and LEOPARD procedures show that no special assembly will have a

2834

reactivity greater than the 0.86 value computed for standard assemblies containing 3.7 w/o enriched uranium. Therefore, the fabrication and packaging of these assemblies will present no hazards in excess of those already evaluated.

Please send the amendment to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

6 copies transmitted

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

January 10, 1966

U.S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C., 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application, Dated October 19, 1965, for Amendment of License SNM-338, Docket 70-337, For Shipment of Nuclear Reactor Fuel Assemblies

For Div of Compliance

Gentlemen:

The Westinghouse Electric Corporation transmits herewith a revision of the subject application. This revision contains the changes and additional information requested in your letter of November 27, 1965. Westinghouse hereby requests that the RCC Shipping Packaging be authorized for use in accordance with the terms and conditions of this revised application.

Westinghouse Drawing 684J580, transmitted as a part of this application, may be treated as a non-proprietary document in accordance with the "Voided" notation appearing on the drawing.

The license amendment should be sent to me at the above address.

111

From CO - Hdqrs

If you have any questions, please write to me at the above address or telephone collect, 412-391-2800, Extension 3449.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: Revised Application
6 copies transmitted

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 19, 1965

U.S. Atomic Energy Commission
Division of Materials Licensing
Washington, D.C., 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

For Div of Compliance

Subject: Amendment of License SNM-338, Docket 70-337,
For Shipment of Nuclear Reactor Fuel Assemblies

RECEIVED
OCT 21 1965
U.S. ATOMIC ENERGY COMMISSION
Regulatory Mail Section

Gentlemen:

Westinghouse hereby applies for amendment of the subject license to authorize the shipment of nuclear reactor fuel assemblies.

The license amendment should be sent to me at the above address.

If you have any questions, please write to me at the above address or telephone collect, 412-391-2800, Extension 3449.

Very truly yours,

Karl R Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AMENDMENT OF
LICENSE SNM-338

FOR SHIPMENT OF NUCLEAR REACTOR
FUEL ASSEMBLIES

10/19/65

U.S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

SHIPMENT OF NUCLEAR REACTOR FUEL ASSEMBLIES

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	4.2 Proposed Connecticut Yankee Fuel Assembly	8
	Appendix A	
	Appendix B	

REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
1	1/10/66	1	New Table of Contents
1	1/10/66	4-5	"Qualified Courier" defined
1	1/10/66	8	Changed to Proposed Connecticut Yankee Fuel Assembly
1	1/10/66	9-10	Added information about and analysis of poison plate mounting integrity. Page 10 added.
1	1/10/66	Appendix B	Added Drawing 684J580

1. Introduction

Amendment of License SNM-338 is hereby requested to provide for the shipment of nuclear reactor fuel assemblies in the shipping package described in this application. The fuel material will be in the form of unirradiated uranium slightly enriched (equal to or less than 5 w/o) in the isotope U-235. The uranium will be encapsulated in stainless steel, Zircaloy, or other metallic cladding and will be held in a rigid, predetermined array. Two fuel assemblies will normally be shipped in each package.

In addition to possible use for shipment of fuel assemblies of a type approved by previous amendments of this license, this package will be used for shipment of assemblies having a modified design. These fuel assemblies are designed so that they will receive a cluster of individual control rods suspended from a movable spider and guided in full length thimble tubes interspersed among the fuel rods. These movable control rods contain nuclear poison. This design, called Rod Cluster Control (RCC), eliminates the requirement for cruciform control rods between certain fuel assemblies and results in the fuel assemblies having a consistent geometric shape. RCC fuel assemblies can be shipped with the control elements in place.

Each separate type of fuel assembly to be shipped in the packaging described in this application will be evaluated for nuclear safety. The results of the evaluation will be submitted for approval prior to any shipment.

1. Introduction (continued)

Shipments will be made by common or contract carrier or by Westinghouse truck. The control to prevent commingling with other special nuclear material in transit may be the exclusive use of the vehicle; escort by a qualified courier; or the execution by the carrier of a signed "Certification for Transporting Nuclear Material." A typical Westinghouse form for this purpose is attached as Appendix A to this application. A qualified courier will be a person with adequate knowledge and authority to assure that the shipment will not be placed in the same motor vehicle, railroad car, aircraft, inland water craft, or hold or deck of a seagoing vessel with other fissile material; and that during loading, transshipment or delivery, the shipment will not be allowed to come within twenty feet of other fissile material except that fissile material in other vehicles need not be considered.

The limitations and minimum packaging requirements specified in this application are such that a theoretically unlimited number of packages could be included in a single shipment. (See Section 3, "General Nuclear Safety Analysis."). However, vehicle capacity, allowable load limits, packaging availability, and other practical considerations will impose reasonable, finite limits on each shipment.

The packages will be labelled in compliance with ICC Regulations and will be loaded on the vehicle using good shipping practices. Necessary Bureau of Explosives approvals will be obtained prior to use.

2. Description of Packaging

The packaging which will be used to ship fuel assemblies under the authority requested in this application is described in Equipment Specification 676200 and related drawings attached as Appendix B to this application.

The requirements in Appendix B are considered sufficient to assure an acceptable shipping container. The production-prototype testing requirements will assure adequate strength and shock insulation. The specified dimensions will assure nuclearly safe spacing. Provision is included for inserting poison material as securely restrained members within the container, if required. This material will reduce the reactivity of the array under accidental flooding conditions.

3. General Nuclear Safety Analysis

Under the provisions of this application, no fuel assemblies containing uranium enriched to greater than 5 w/o in the isotope U-235 will be transported in these shipping packages. Therefore, under normal shipping conditions, an infinite array of these packages would be nuclearly safe, since unmoderated uranium at or below this enrichment is subcritical for any quantity in any geometric array.

The k_{eff} of two fuel assemblies in an accidentally flooded, but otherwise undamaged, shipping package will be determined, using standard Westinghouse procedures, for each type of assembly to be shipped in this packaging. The presence of poison material will be specified if required to assure nuclear safety under this accident condition. The interaction between adjacent, flooded, undamaged shipping packages can be neglected, since each pair of fuel assemblies will be isolated by more than 12 inches of water. This dimension

3. General Nuclear Safety Analysis (continued)

is assured by the specified deflection envelope for the fuel suspension system (ED SK 319402F in Appendix B to this application). When the packages are drained, there will be no restrictions to prevent the water from simultaneously draining from the fuel assemblies. Thus, there will be no situation arise when the assemblies would be moderated without being isolated.

The k_{eff} for the maximum credible accident will also be determined. For purposes of this application, the maximum credible accident will be considered to be two packages with their longitudinal axes parallel, crushed top-to-top and flooded. Under these conditions, the minimum lateral spacing between two fuel assemblies will be assumed to be 2-3/8 inches (2 inches of water plus two 3/16 inch thick steel plates). This is the design spacing in the packaging, neglecting any cushioning material. The vertical spacing under crushed conditions will be assumed to be a minimum of 1.7 inches, consisting of a water-steel mixture.

The top-to-top abutment is the most reactive arrangement of two packages. In any other arrangement, the resistance to crushing due to the presence of heavy structural members along the sides and bottom of the container would prevent juxtaposition of the fuel assemblies in any more reactive array.

4. Applicability to Specific Fuel Assembly Types

The packaging described in this application will be used to transport the following fuel assembly types:

4.1 Southern California Edison Fuel Assembly

This fuel assembly will be an RCC design, with a cross-section approximately 7.8 inches square. The maximum enrichment to be used will be 3.85 w/o. An amendment of this license to permit the manufacture of these assemblies was submitted December 8, 1964, revised August 30, 1965, and approved as revised on September 20, 1965.

The nuclear safety analysis of the shipping package containing this type of fuel assembly in the RCC packaging described in this application was made using PDQ-03/1 and LEOPARD/2 codes. Verification of the accuracy of these codes is supplied by Eich and Kovacik/3 and by Strawbridge and Barry/4, respectively.

/1 Cadwell, W. R., "PDQ-03 - A Program for the Solution of the Neutron Diffusion Equations in Two Dimensions on the IBM-704," WAPD-TM-179 (May 1960).

/2 Barry, R. F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM-7094," WCAP-3269-26 (1963).

/3 W. J. Eich, W. P. Kovacik, "Reactivity and Neutron Flux Distribution Studies in Multi-Region Loaded Reactor Cores," WCAP-1433 (June 1961).

/4 Strawbridge, L. E. and Barry, R. F., "Criticality Calculations for Uniform Water-Moderated Lattices," Nuclear Science and Engineering - Vol. 23, No. 1 (Sept. 1965).

4.1 (continued)

The calculations were made assuming a uranium enrichment of 3.85 w/o, the absence of control rod absorbers inserted in the fuel assemblies, and the absence of poison material in the packaging. The effective neutron multiplication factor (k_{eff}) of two assemblies in a flooded, undamaged container was determined to be $\leq$ 0.87. The k_{eff} of four assemblies in the maximum credible accident condition (packaging abutted, crushed and flooded) was determined to be $\leq$ 0.96.

Due to the physical configuration of the fuel assemblies, they would be undermoderated when flooded. The effect of reduced water density was investigated to assure that the k_{eff}'s given above were maximum values. Calculations for a finite array of shipping packages show that no peak occurs in the effective neutron multiplication factor at reduced water densities. This is attributable to the parasitic neutron absorption and additional isolation provided by the container walls.

4.2 Proposed Connecticut Yankee Fuel Assembly

This fuel assembly will be an RCC design with a cross-section approximately 8.4 inches square. The maximum enrichment to be used has been assumed to be 4.2 w/o.

A nuclear safety analysis of this proposed design was made using the same procedures referenced in Section 4.1 of this application. Assuming fuel assemblies containing the maximum enrichment of 4.2 w/o, the absence of inserted

4.2 (continued)

control rod absorbers, and the absence of any poison material in the packaging, the k_{eff} of two flooded fuel assemblies in an undamaged container was found to be ≤ 0.90. The k_{eff} of the four assemblies in the maximum credible accident configuration was calculated to be ≤ 0.99

Since the k_{eff} for the maximum credible accident condition is marginal, the Proposed Connecticut Yankee fuel assemblies would be shipped with poison material inserted into the packaging.

The poison material selected is a boronated stainless steel containing 1.3 w/o natural boron. The material is in the form of two plates, each 0.19 inches thick, inserted in the structure separating the two assemblies. The method of mounting in the packaging will have no effect on the 2-3/8 inches lateral spacing between the fuel assemblies.

The arrangement of the boronated stainless steel plates in the packaging is shown in Drawing 684J580 (Appendix B to this application). All structural members used to fabricate the vertical member separating the fuel assemblies will be made of mild carbon steel. For the most part, welded construction will be employed. The poison plates (Item 9 on the drawing) will be inserted through an opening in one end of the structure and will butt up against a heavy end plate at the opposite end. They will be secured by a clamp plate (Item 10 on the drawing) which will be bolted in place using two each, 1/2 inch

4.2 (continued)

bolts and self-locking nuts. The clamp plate will exert a compressive stress on the poison plates, rendering them immovable.

When mounted as described, the poison plates will be constrained by the 3/16" thick continuous steel skin, the internal structure (spaced at approximately two-foot intervals along the length) of the vertical member, the heavy end plate, and the clamp plate. Therefore, it is not credible that any foreseeable accident could displace them so as to reduce their effectiveness. Furthermore, the method of mounting provides a positive, readily-apparent, visual indication of their presence.

The k_{eff} of two assemblies in a flooded but undamaged container with the poison plates in place was determined to be ≤ 0.85. That of four assemblies in the maximum credible accident condition was found to be ≤ 0.94.

APPENDIX A

Ⓦ Form 54307 No. _____

CERTIFICATION FOR TRANSPORTING NUCLEAR MATERIALS

We the _____ hereby certify that we will assume full control of the nuclear shipments which we may contract to transport for the Westinghouse Atomic Power Division between _____ and _____. This control shall consist of the limitations that:

1. The shipments of nuclear materials will remain at all times in the same trailers performing the pickup service and be delivered by the same trailers performing the pickup service.
2. No other radioactive material will be loaded into the trailers while transporting nuclear shipments for Westinghouse.

We warrant this control will be exercised at all times from point of loading at origin to point of unloading at destination provided that the bill of lading and shipping order be endorsed "Shipment moving under Certification No. _____ for Transporting Nuclear Materials."

Freight charges shall be computed at the applicable truckload rate based on actual weight but not less than the authorized minimum weight.

WITNESS

_____ Signing for _____

_____ Name _____, Vice Pres.

Address

Date _____

APPENDIX B

SNM-338
SHIPPING PACKAGE -
RCC ASSEMBLIES

EQUIPMENT SPECIFICATION COVER SHEET

WESTINGHOUSE FORM 54064 A

EQUIPMENT SPECIFICATION	DATED	REVISION NO.	DATED	ORIGINAL ISSUE	SUPERSEDES PREVIOUS REVISIONS
676200	Aug. 9, 1965	0		X	

ATTACHMENTS

Dwg. ED.SK. 319402F(8/6
ED.SK. 319401F(8/6
ED.SK. 323133B(8/6

Appendix A

PROJECT: Southern California Edison and Connecticut Yankee

SHOP ORDER: SCFA-29

SYSTEM:

EQUIPMENT: Fuel Assembly Shipping Container

FOR SUPPLIER'S CONVENIENCE

REV. NO.	REVISION ENTERED BY & DATE

WESTINGHOUSE ELECTRIC CORPORATION
Atomic Power Division
P.O. Box 355
Pittsburgh, Pennsylvania, 15230

APPROVAL

	ORIGINAL ISSUE	REV. 1	REV. 2	REV. 3	REV. 4
AUTHOR	H. W. Keller H.W. Keller				
SHOP ORDER HOLDER	H. N. Andrews				
PROJECT MANAGER	H. E. Walchli H.E. Walchli				

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1.0 Scope

This specification covers:

a) Design and construction of reusable metal shipping containers for domestic and overseas shipments of special nuclear materials in the form of atomic power reactor fuel assemblies. The fuel assemblies are to be housed in a special shock-mounted cradle assembly designed by W and utilizing highly damped elastomeric shear mounts.

b) Construction of one production-prototype unit to be used for pre-production testing.

c) Acceptance testing of production-prototype unit using cradle assembly and shear mounts as supplied by W.

2.0 Supporting Documents

a) Westinghouse Drawing EDSK 319402 , Figure 1

b) Westinghouse Drawing EDSK 319401 , Figure 2

c) Westinghouse Drawing EDSK 323133 , Figure 3

3.0 Requirements

3.1 Design and Construction

3.1.1 General

The shipping container shall employ horizontal mounting of the fuel assemblies such that the longitudinal axis of the fuel assemblies is parallel to the base of the container. Each container shall contain two (2) fuel assemblies which are housed in a cradle assembly designed to: provide structural support for the fuel assemblies during loading, unloading, and shipping; protect the assemblies from damage during normal conditions of shipping and handling; and, facilitate efficient and safe loading and unloading of fuel assemblies from the container.

Shipping position shall be with both the cradle assembly and container assembly positioned horizontally as shown in Figure 1. Handling of a fuel assembly outside of the cradle assembly is permitted only in the vertical position, i.e., with the longitudinal axis in the vertical position. Loading and unloading of the container shall be performed with the cradle assembly in the vertical position while the container base (with cover removed) is positioned horizontally as shown in Figure 2. For a detailed description of fuel assembly and cradle assembly, see Appendix A.

Primary concern in the container design is protection of the fuel assembly during conditions of normal shipping and handling as well as some likely abuse or accident. In addition, the container must satisfy Interstate Commerce Commission and Atomic Energy Commission regulatory standards on container specific design features and structural integrity with regard to nuclear safety.

3.1.2 Internal Component Parts

The internals and component parts shall be designed and constructed by W. Specific information on physical details of the internal components parts as pertains to design of the container assembly is illustrated in Figure 1. For the detailed design criteria and a description of the internal component parts, see Appendix A.

The container assembly design and construction as defined in paragraph 3.1.3 below shall be compatible with the internal component parts.

3.1.3 Container Assembly

3.1.3.1 Size

Limits on overall external dimensions of the container assembly as illustrated in Figure 1 shall be as follows:

		Dimension
Height	-	A maximum of 47 inches per container or a stacking height for two (2) containers of 94" or less.
Width	-	45 inches

Length	-	Minimum practicable

The internal arrangement shall be such as will provide the following clearances for the movement of the internals component parts as required by the shock-suspension system:

Location		Minimum Clearance between suspended mass and container assembly
TOP	-	4.5"
BOTTOM	-	9.5"
SIDES	-	clearance as provided by shock-mount attachment
ENDS	-	6.0"

3.1.3.2 Design Features to Accommodate Internals

The following container design features and components shall be included as part of the requirements for the container assembly to accommodate the internal component parts:

a) Shock-mount bracket - Provisions shall be incorporated in the container assembly to attach the shock-mounts (Lord Manufacturing Company Part No. J-5735-64) in the manner and relative locations shown in Figures 1 and 2. Each bracket shall be designed for the following loading conditions:

	Combined loading, force (LBS.)			
Test Condition	Vertical	Lateral	Fore & Aft	Moment abou axis perpendicular to force (LB-
Vertical drop	2700	1350	-	675
End Impact	-	850	1700	425
Roll-over	600	1200	-	300

b) Removable Top - The container shall have a removable top to permit loading and unloading as described in Appendix A and illustrated in Figure 2.

c) Support pads for lateral cross-bars - The container shall provide support pads at the aft end to accept the lateral cross bars of the internal component parts during loading and unloading. Specific details on the configuration and location of the support pads are illustrated in Figure 2, Section A-A. Each support pad shall be designed to support the entire weight of the internal component parts. A section of standard rectangular tubing shall be attached to the support pad to accommodate a screw clamp for anchoring the 2 inches square tubing lateral cross-bars of the internal component parts in the loading and unloading configuration.

d) Support pad for uprighted cradle assembly - The container shall provide an adjustable support pad to provide support for the cradle assembly when raised to the loading and unloading position. Specific details on the general arrangement and location of the adjustable support pad are illustrated in Figure 2, Section A-A. The pad shall be designed to support the entire weight of the internal component parts.

e) Supports for stabilizing bars - Supports shall be provided on the container to anchor the stabilizing bars as shown in Section A-A of Figure 2. The preferred location is on a shear-mount bracket as shown. Provisions shall be provided to store and secure the stabilizing bars during shipping, as illustrated in Figure 1.

f) Outrigger Members - Outrigger members similar to those illustrated in Figure 2 shall be provided to prevent accidental tipping-over of the container during loading and unloading. The outrigger members shall be retractable and securable in an unexposed position during shipping, as illustrated in Figure 1. All components shall be permanently attached to container assembly to avoid misplacement or loss of pieces.

g) Accessibility - The container assembly design shall permit ready accessibility to interior components and supports and shall permit loading and unloading of the container

through a sequence of simple operations.

h) Instrumentation - Shock-overload monitors will be supplied and specified by W. Special provisions may be required in the container assembly to accommodate the instrumentation. To ensure compatibility of the instrumentation with the container design, these provisions will be negotiated during the final design and prior to fabrication. Final specifications for the instrumentation will be issued after the container preproduction testing.

3.1.3.3 Container Closure

The top and bottom sections of the container shall be fabricated so as to ensure proper realignment of mating surfaces and clamp fittings after repeated use. Clamp fittings shall be easy to operate, and vibration and shock "fail-safe". The time required to open and close the container shall be the minimum practicable. Only common hand tools shall be required to open and close the container. All hardware shall be permanently attached to container assembly to prevent misplacement or loss. Clamp fittings which are required for maintaining structural integrity of the container shall be designed to not be released or readily damaged from impact of the container on any side when dropped onto a flat unyielding surface. Clamp fittings such as may be required to maintain air and water-tight closure need only be designed to prevent release or damage during normal shipping and handling conditions plus any likely abuse. Figure 3 is an example of one type of structural integrity closure clamp fitting that will be acceptable.

The container shall be capable of being pressurized to 20 psi gage with dry air or nitrogen. Sealed closure must be maintained at a pressure of 10 psi gage under repeated use.

3.1.3.4 Handling Provisions

a) Crane Lifting - Suitable lifting rings, eyes or lugs shall be provided for lifting the loaded weight of the container. The design of the lifting provision shall be in accordance with established safety practice. The lifting provisions shall be disposed so as to permit the container to be lifted with its axis parallel to, and also normal to the position used

for shipping. Four-point suspension shall be used when lifting the container with its base parallel to the shipping position.

b) Fork Lifting - The container shall be so constructed that it may be lifted by forklift truck from the side without employing additional blocking and without damage to the container. Two openings, a minimum of 3 inches high and 10 inches wide, spaced 30 inches center-to-center; or one opening a minimum of 3 inches high by 40 inches wide shall be provided in the base structure to accommodate the forklift truck. The opening, or openings, shall be symmetrically disposed about the center of balance of the loaded container.

c) Skids - Four or more wood skids shall be provided on the bottom of the container. The vertical clearance between the bottom plane of the skids and the bottom of the container shall be a minimum of 4 inches.

d) Stacking - The container shall be suitable for parallel straight stacking one upon another, in such a manner as not to interfere with forklift access. In addition, the container shall be suitable for parallel triangular stacking with one container stacked on top and across two like containers positioned side-by-side. Each container shall be capable of supporting the weight of two(2) like containers fully loaded.

e) Towing Provisions - Provisions for towing from the end of the container shall be attached to, or provided in, the container base structure.

f) Rolling - The container shall be provided with flanges to permit rolling the container about its longitudinal axis.

g) Tie-down - Provisions shall be provided for securing the container to the conveyance vehicle from at least four (4) tie-down points. The container tie-down anchors shall accommodate one (1) inch diameter steel cable or chain and be of sufficient strength not to distort or fail when used to secure loaded containers under conditions normally

encountered during truck, rail, or air shipment.

3.1.3.5 Services and Maintenance Facilities

The following provisions shall be incorporated in each container:

a) Desiccant Holder - The container shall be equipped with interior receptacles for desiccants. Each receptacle shall include a refillable enclosure which shall retain bagged desiccant while permitting the passage of air. The enclosure shall be accessible for replenishing desiccant from the inside as well as through an opening in the surface of the container assembly provided with an air-tight cover. The total capacity of the receptacle shall be a minimum of 0.5 cubic feet. Desiccant material shall be protected against spillage.

b) Humidity Indicator -A relative humidity indicator shall be provided on the surface of the container for monitoring the relative humidity inside.

c) Gas Filling Valve - An air and Nitrogen gas filling valve shall be provided on the surface of the container.

d) Relief Valve -A relief valve actuated at 10 ± 1 psi gage and closing at 5 ± 1 psi gage shall be provided on the surface of the container.

e) Drain Plug - A drain plug shall be installed in the lowest point of the container assembly shell.

f) Location of Service Facilities - The desiccant holder port, humidity indicator, gas filling valve, relief valve and drain plug shall be grouped at one end of the container in an area easily accessible for servicing the container or inspection under row storage conditions. All service facilities shall be located in the container base and be adequately protected from unnecessary exposure or damage during shipping and handling.

3.1.3.6 Free Drainage

The outer surfaces of the container assembly shall be so designed as to avoid the collection and retention of water.

3.1.3.7 General Construction

Standard No. 14 gage steel shall be used for the container assembly shell.

3.2 Limits on Weight

The container shall be of the minimum practical weight consistent with the performance requirements of this specification.

3.3 Materials of Construction

All materials used in the manufacture of the container shall be suitable for the purpose intended for a service temperature range of -40°F to +170°F. Materials of all structural components shall have physical and mechanical properties equivalent to or better than mild steel throughout a temperature range of -40°F to 1500°F.

3.4 Finish

All metal surfaces, except for fasteners and similar hardware, shall be thoroughly cleaned and painted inside and out with a minimum paint system of one coat of rust inhibitor primer and two finish coats of dark blue. Fasteners and similar hardware shall be of corrosion resistant material or be plated with a durable and effective corrosion resistant material.

3.5 Performance

When tested in accordance with the requirements of Section 4 below, the container assembly and all container accessories shall reveal no significant structural weaknesses. No deformation shall have occurred that will not permit ready disassembly, reassembly, and reuse of the container for the purpose intended. The container contents shall have been protected from being subjected to the established shock-load and deflection design limits.

3.6 Labeling and Markings

All markings shall be of waterproof ink or paint. The following markings shall be applied to the container at the locations, and in the sizes and colors indicated:

a) On opposite sides of the upper section of the container near the center, in 4-inch white letters:

DO NOT DROP

b) Directly below the marking in a) above, in 2-inch white letters:

ANCHOR SECURELY TO CONVEYANCE FLOOR

c) Directly below the marking in b) above, in 2-inch white letters:

CAUTION: HANDLE WITH CARE - CONTAINER SHOCK INSTRUMENTED

RELEASE PRESSURE BEFORE OPENING CONTAINER

d) On opposite sides of the upper section of the container to the left of the center, in 4-inch yellow letters:

RADIOACTIVE MATERIAL

B. E. PERMIT NO. _____

U.S.C.G. PERMIT NO. _____

e) Adjacent to each lifting facility, in 2-inch white letters:

LIFT HERE

Arrows 5 inches long shall point to the lifting facility.

f) Adjacent to the air-filling valve, in 1-inch white letters:

AIR VALVE

FILL TO 5 P.S.I. PRESSURE

g) Adjacent to the relief valve in 1-inch white letters:

RELIEF VALVE

DO NOT DISTURB

A nameplate, permanently and legibly marked with the following information, including all information required to be inserted in the blanks indicated, shall be permanently attached to the external surface of both the top and bottom sectic

SHIPPING CONTAINER, REUSABLE, DO NOT DESTROY

Property of: Westinghouse Electric Corporation

Atomic Power Division

Cheswick, Pennsylvania

MAXIMUM LOADED WEIGHT (lbs.)_____
EMPTY WEIGHT (lbs.)_____
DIMENSIONS _____

Serial No.: _____

(Cont. on next page)

Manufacturers Name: _____

Manufacturers Part No: _____

MADE IN U.S.A.

Additional markings as required to facilitate shipping and handling may be included.

3.7 Interchangeability

All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance.

3.8 Workmanship

The container shall be of clean design, fabricated in a workmanlike manner, and free from any defects which may affect durability, strength, and serviceability.

3.9 Drawings

A reproducible copy of all container assembly and detail drawings shall be submitted by the container vendor to W APD prior to the completion of the order.

3.10 Design Approval and Manufacturing Release

3.10.1 Before manufacturing release is granted the container design must have the approval of W APD and numerous regulatory agencies governing shipment of radioactive material. To implement this approval, the vendor shall submit 2 sets of drawings of all container assembly and detail drawings, plus any substantiating design information which may be helpful in demonstrating the adequacy of the design. The vendor shall incorporate changes requested by W in granting design approval and forward copies of drawings, or reproducibles, as required, for W to obtain the approval of the necessary regulatory agencies.

3.10.2 Manufacturing release on the production-prototype will be granted upon receipt of approvals per paragraph 3.10.1 above.

3.10.3 Manufacturing release on the balance of the order will be granted upon the satisfactory completion of the requirements of paragraph 3.5 above.

4.0 Quality Assurance Provisions

4.1 Preproduction Testing

4.1.1 General

The first shipping container completed shall be termed the production-prototype and shall be tested in accordance with the test methods specified in paragraph 4.1.5 below to assure ability of the container to protect contents. The tests shall be performed using the production-prototype container assembly, production-prototype internal component parts, and two (2) prototype or simulated fuel assemblies. The internal component parts and fuel assemblies shall be supplied by Westinghouse. The tests shall be witnessed by the cognizant W engineer. Failure of the container to conform to the test requirements shall be cause for rejection. The rejected design may be reworked, modified, or replaced to correct the defects, and then retested. Before retesting, full particulars concerning the failure and the corrective action taken shall be furnished to the cognizant W engineer.

4.1.2 Test Data and Instrumentation

The test container shall be instrumented to continuously monitor acceleration of the fuel assembly and deflection of the internal component parts with respect to the container assembly. Acceleration along the two most prominent perpendicular axes (as determined by the particular test), plus vertical deflection, shall be obtained simultaneously at least at both ends of the suspended assembly and at the longitudinal center. For measuring acceleration, the Statham, Strain Gage Type Accelerometer, or equivalent, with a range of ± 25 g's shall be used with a calibrated amplitude versus time readout on a Honeywell Visicorder or equivalent instrument.

Displacement shall be obtained by integrating the acceleration trace or by any other acceptable method. The shock-overload monitors specified in paragraph 3.1.3.2 (h) above will be supplied by Westinghouse and shall be installed during testing.

4.1.3 Test Procedures

Preproduction-prototype test procedures shall be prepared describing in detail the test procedures, test equipment, and test facilities to be used. The test procedures shall be submitted to W for approval prior to testing.

4.1.4 Test Report

A report shall be prepared summarizing the test results for each test conducted. Photographs shall be included showing the condition of the container and its contents before and after testing.

4.1.5 Test Methods

4.1.5.1 Examination of Product

The container shall be carefully examined to determine conformance with the materials, design, finish, and workmanship requirements of this specification and with any applicable drawings.

4.1.5.2 Leakage

The container shall be examined for leakage when assembled, loaded, and sealed in the manner to be used for actual shipment, except that the relief valve shall be blocked off. The container shall be filled with air to 20 psi gage and tested for leakage by either a water immersion test or a loss-of-gage-pressure test. The loss-of-gage-pressure test shall be for a minimum of 30 minutes. A stream of air bubbles from any surface or seam shall be cause for rejection in the water immersion test. Any loss of gage pressure in a 30 minute period shall be cause for rejection in the pressure retention test.

4.1.5.3 Loading Test

With the internal component parts and container assembly prepared for loading as illustrated in Figure 2, the prototype or simulated fuel assembly shall be loaded using the procedures established.

4.1.5.4 Drop Tests

The container, loaded with actual contents for which it was designed, or if this is not possible, with a dummy load simulating such contents in weight, shape, and position in the container, and, prepared as for actual shipment, shall be subjected to the following drop tests:

a) Flatwise Drop Test

The container shall be raised and allowed to fall freely from a height of 18 inches onto a concrete or similarly hard surface, landing flat on its bottom.

b) Edgewise Drop Test

The container shall be supported on one end of its base on a block approximately 5 inches high, placed at right angles to the skids. The opposite end of the container shall be raised and allowed to drop freely from heights of 12, 24, and 36 inches onto a concrete or other similarly hard surface. This test shall be applied to each end of the container.

c) Cornerwise Drop Test

The container shall be supported at one corner of its base on a block approximately 5 inches high. A block approximately 12 inches high shall be placed under the other corner of the same end of the container. The opposite end of the container shall be raised and allowed to fall freely from heights of 12, 24, and 36 inches onto a concrete or other similarly hard surface. This test shall be applied to the diagonally opposite corners of the container.

4.1.5.5 Roll-Over Test

The container erect on its base on a concrete or other similarly hard surface shall be tipped slowly sidewise until it falls freely and by its own weight from the base to the side, side to the top, top to the other side, and from the other side to the base, thus completing one revolution.

4.1.5.6 Impact

An impact test shall be applied to each end of the container. The test shall consist of placing the container in motion in such a manner that it will strike a hard flat surface normal to the direction of load at a velocity of 10 ft/sec (equivalent to approximately an 18-inch free fall). Two procedures that will successfully duplicate this condition are:

a) Incline Impact Test for Shipping Containers, ASTM Standard Method D880-50, modified suitably to accommodate the container.

b) The Pendulum impact method wherein the container is suspended as a pendulum at the end of four or more cables and permitted to swing into a barrier from a height 18 inches above the point of impact.

4.1.5.7 Stacking Test

A load equal to two times the weight of the container carrying the contents for which designed, shall be applied to the top of the container in a manner simulating containers being stacked on top of the container.

4.1.5.8 Hoisting Test

The loaded container shall be lifted free of the ground separately by means of each of the lifting provisions provided.

4.1.5.9 Lifting Test

The loaded container shall be lifted clear of the ground by a forklift truck and transported for a distance of 100 feet.

4.1.5.10 Towing Test

The loaded container shall be towed using the towing provisions provided for a minimum of 50 feet over a concrete or similar surface. This test shall be applied to each end of the container.

4.1.5.11 Unloading Test

With the internals component parts and container assembly prepared for unloading as illustrated in Figure 2, the prototype or simulated fuel assemblies shall be unloaded using the procedures established.

4.1.5.12 Shipping Test

The loaded shipping container shall be loaded onto a truck and shipped for a distance of not less than 200 miles. During loading and unloading of container from transport vehicle, it shall be demonstrated that at least eight identical containers can be loaded, unloaded, and properly positioned for tie-down. During the over-the-road test, the container shall be equipped with instrumentation which accurately determines the vibration characteristics of the suspended cradle assembly.

4.2 Final Production Acceptance

The container shall be carefully examined to determine conformance with the materials, design, finish, and workmanship requirements of this specification and with any applicable drawings.

APPENDIX A

Description of SCE-and-CYW Fuel Assembly Shipping Container

1. General

Illustrated in Westinghouse drawing ED.SK.319428F is a cross-section view of the SCE-and-CYW fuel assembly shipping container. There are two (2) fuel assemblies housed in a special shock-mounted cradle assembly forming the internal component parts. The internal parts are contained in a completely enclosed metal shell. The fuel assemblies are shipped in a horizontal position. Handling of the fuel assemblies without external structural support is permitted only in a vertical position. Consequently, a portion of the cradle assembly functions as the structural support frame for the fuel assemblies during shipping in a horizontal position and while moving the fuel assemblies between the vertical and horizontal positions during loading and unloading of the container.

The approximate sizes of the fuel assemblies to be shipped are 7.763 and 8.426 inches square by 139 inches in length. Because of the special adjustable clamping features in the design, slightly larger and smaller fuel assembly cross-sections can be accommodated. The fuel assemblies can be shipped with or without the Rod Cluster Control Rods. Neutron poison material is contained in the lateral spacing between the fuel assemblies to maintain nuclear safety of the shipment under maximum credible accident conditions.

2. Cradle Assembly (Internal Component Parts)

The cradle assembly consists of a shock-mount support frame and a fuel assembly support frame. The fuel assembly support frame is removable and is attached to the shock-mount support frame at the lower end by means of a pivot joint which permits uprighting the assembly during loading and unloading of the fuel assemblies. During shipping, when the fuel assemblies and support frame are in a horizontal position, the fuel assembly support frame is clamped to the shock-mount support frame by means of swing-bolt clamps.

The shock-mount support frame consists of steel structural angle formed into a rectangular box. Structural tees are employed as cross-bar members. Brackets are welded to the angle frame members for attachment of the shock-mounts. The swing-bolt clamps are attached to the outside vertical edge of the frame assembly.

The basic structure of the fuel assembly support frame (strong-back) consists of two pieces of 3/16-inch thick sheet steel formed into "Z" sections running the entire length of the cradle assembly. At axial intervals of about every 2 feet the "Z" sections are supported on and attached to horizontal and vertical structural members. The horizontal structural members seat on

the shock-mount support frame and have a special fitting at each end to accommodate the swing bolt clamps.

The vertical structural members provide a lateral spacing between the "Z" sections and act as supports for the neutron poison plates. Unistrut channel is attached to the top of the vertical structural member and is sandwiched between the "Z" sections above the poison material plates. Unistrut channels are also attached to the outside surfaces of the bottom legs of the "Z" sections at ledges on both ends of the horizontal structural members. The Unistrut channels run the entire length of the cradle assembly and become an integral part of the fuel assembly support frame.

Two adjacent sides of each fuel assembly are supported on the "Z" sections. The fuel assemblies are clamped to the "Z" sections at each fuel assembly grid by clamping frames anchored to the Unistrut channels. This permits the positioning of the clamping frames at any desired location by sliding the anchors along the channels and securing the special channel hardware. The pressure pads of the clamping frames are adjustable to accommodate the various fuel assembly sizes. The clamping frames are hinged at the anchors to the Unistrut, permitting them to be swung clear of the fuel assemblies during loading and unloading.

The rigidity of the fuel assembly support frame is based on limiting the deflection of the fuel assembly to an acceptable amount under the most severe loading conditions. All metal surfaces in contact with the fuel assemblies are coated with a resilient, non-marring, non-injurious material.

The neutron poison material consists of two 3/16" thick plates of boron stainless steel. The plates slide between the steel skin and the vertical structural members. A bolted cover on the bottom end of the cradle assembly holds the poison plates in position.

A plate at the bottom end of the fuel assembly support frame positions and supports the fuel assemblies axially. The axial support for the fuel assemblies at the top end is hinged to permit opening of the top for free access to the top fuel assembly nozzle with the fuel assembly handling tool. Adjustable screws in the top end support member load against the four corners of the fuel assembly nozzle. Another adjustable screw in the center of the four corner screws is used for holding the Rod Cluster Control Rod is place when it is shipped with a fuel assembly.

3. Container Assembly

The enclosure for the cradle assembly is a re-usable metal container with a completely enclosed shell. The minimum thickness of the metal enclosure is .074 inches (14 gage steel sheet).

Special design features of the container are sealed closure, humidity control, and shock and vibration isolation of the fuel assemblies to protect them against damage during normal handling and shipping conditions for a temperature range of -40°F to +160°F.

4. Shock and Vibration Protection

The cradle assembly is suspended in the container using as many as 14 each Lord Manufacturing Company shear sandwich elastomeric mountings. Special Lord Part No. J-5735-64 was designed to meet Westinghouse requirements for this particular container application. Positioning of the mounts was engineered to obtain the maximum protection in the space available and permit flexibility in use of the container with a range of fuel assembly sizes and weights. For the CYW fuel assembly all 14 mounts are to be used. For the lighter weight SCE fuel assemblies, two (2) mounts at the longitudinal center of the cradle assembly are to be removed.

The suspension system is designed to limit the shock-load at any position on the fuel assemblies to the following values under severe handling conditions:

Direction	Acceleration, (g's)
Horizontal, parallel to the longitudinal axis	6.0 Max.
Vertical and Horizontal, perpendicular to the longitudinal axis	11.0 Max.

5. Fuel Assembly Loading and Unloading Procedure

A. Loading

1. Depressurize the shipping container by release of the air - filling valve located at the forward end of the container.

2. Loosen container closure fastener hardware and remove container cover.

3. Position Outrigger Members located on outside of container assembly to the opened position. Lock in place using hardware provided. Adjust as required to obtain firm contact with the floor.

4. Remove locking pin securing Lateral Cross-Bars at aft end of cradle assembly and slide cross-bars from housing until they rest on support pads of container assembly. Tighten screws on support pad brackets to secure cross-bars in place. Use crane to lift cradle assembly to proper position if required.

5. Loosen swing-bolt clamps of shock-mount support frame and swing free of fuel assembly support frame.

6. Attach crane to lifting eye at the forward end of the fuel assembly support frame.

7. Pivot support frame to vertical position.

8. While holding support frame with crane in vertical position, install the stabilizing bars and secure to support frame with hardware provided.

9. Remove pins securing top end support assembly and swing supports free of top opening.

10. Open the fuel assembly clamping frames for the fuel assembly position being loaded.

11. Attach the crane using the fuel assembly handling fixture, to the top nozzle of the fuel assembly to be loaded.

12. Lift the fuel assembly until the bottom end is at an elevation slightly higher than the bottom end support of the cradle assembly, and then carefully move the fuel assembly horizontally into the container support frame. Position the fuel assembly against the support frame and lower it until the bottom nozzle contacts the bottom support plate.

13. While supporting the weight of the fuel assembly with the crane, close the clamping frames onto the fuel assembly grids and tighten clamp fasteners.

    NOTE: Before tightening clamps check that the clamp pads are in proper alignment with the fuel assembly grid.

14. Repeat steps 10 through 13 above to load the second fuel assembly.

15. Swing closed the top end support assembly and insert locking pins.

16. Attach crane to lifting eye at top end of support frame assembly in preparation for lowering to horizontal position.

17. Remove stabilizing bars and lock in storage position on container assembly.

18. Lower fuel assembly support frame assembly to horizontal position.

19. Engage and tighten swing-bolt clamps to secure fuel assembly support frame to shock-mount support frame.

20. Attach crane to lower end of cradle assembly to remove load from lateral cross-bar members. Retract lateral cross-bars into housing in cradle assembly, and install locking pins.

21. Retract outrigger members to storage position and lock in place.

22. Check tightness of all fastener hardware.

23. Install container assembly cover and prepare for shipment.

B. <u>Unloading</u>

Follow the same procedure for loading except perform steps outlined above in reverse order where necessary.

SNM-338
Shipping Package -
RCC Assemblies

FILING INSTRUCTIONS

REVISION NO. 1

The new cover letter, dated January 10, 1966, should be inserted in the binder in front of the letter dated October 19, 1965.

Existing pages 1, 2, 4, 5, 8 and 9 should be removed and replaced with revised pages bearing the same numbers. Page 10 should be inserted following revised page 9. Drawing 684J580 should be inserted at the end of Appendix B, following the existing drawing EDSK 323133B.

OK RA
1/28/66

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ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

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IN REPLY REFER TO:
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70-337
SNM-338, Amendment No. [illegible]

NOV 9 1967

Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Pursuant to Title 10, Code of Federal Regulations, Part 70, Special Nuclear Material License No. SNM-338, dated June 2, 1967, is hereby amended to authorize the fabrication of NOK fuel rods and assemblies in accordance with the statements, representations and conditions specified in your application dated October 18, 1967, as supplemented by the application dated October 25, 1967.

All other conditions of this license shall remain the same.

FOR THE ATOMIC ENERGY COMMISSION

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

Co. I B/S

ITEM # 55

16

I

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 25, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for An Amendment to License SNM-338, Docket 70-337, for Fabrication of NOK Fuel Rods and Assemblies

Gentlemen:

Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the fabrication of fuel assemblies for the NOK power reactor in accordance with our application dated October 10, 1967 as modified by the attached revision.

The license amendment should be sent to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

Lcm CO - Hdqrs.

3560

Westinghouse Electric Corporation

3 Gateway Center
Box 2278, Pittsburgh, Pa. 15230

October 10, 1967

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Application for An Amendment to License SNM-338, Docket 70-337, for Fabrication of NOK Fuel Rods and Assemblies

Gentlemen:

Westinghouse Electric Corporation hereby requests an amendment to the subject license to authorize the fabrication of fuel assemblies for the NOK power reactor.

The license amendment should be sent to me at the above address.

If you have any questions, please write to me at the above address or telephone me collect, (412) 255-3907.

Very truly yours,

Karl R. Schendel

Karl R. Schendel
License Administrator

Attachment: License Amendment
6 copies transmitted

WESTINGHOUSE ELECTRIC CORPORATION

APPLICATION FOR AN AMENDMENT TO LICENSE SNM-338

FOR FABRICATION OF NOK FUEL RODS AND ASSEMBLIES

10/10/67

U. S. ATOMIC ENERGY COMMISSION

DOCKET 70-337

NOK FABRICATION

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REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
1	10/25/67	5	Adjust Slab Control values in Step #1

1. Introduction

An amendment to License SNM-338 is hereby requested to authorize the receipt, possession, storage, use and transfer of UO_2 at enrichments of approximately 2.44 w/o, 2.78 w/o, 3.0 w/o, and 3.48 w/o. This material will be used to fabricate fuel rods and fuel assemblies at the Cheswick site for the NOK reactor core at Beznau, Switzerland.

The production equipment and general procedures used in the manufacture of fuel rods and assemblies have been adequately described in previous applications for amendment to this license. Information presented in this application will reflect any significant changes. The shop locations, and the basic storage, manufacturing and criticality controls remain the same as described in prior applications approved by the Division of Materials Licensing. Prior transmittals which are particularly applicable have been listed in Appendix A to this application.

2. Correspondence - Return Address

The license amendment and any associated correspondence should be sent to Karl R. Schendel, Westinghouse Electric Corporation, Box 2278, Pittsburgh, Pennsylvania 15230.

3. Material Requirements

Westinghouse requests approval to receive, possess, store, use and transfer up to 75,000 kg of UO_2 powder enriched to 2.44 w/o, 2.78 w/o, 3.00 w/o, and 3.48 w/o in the isotope U-235. The UO_2 will be formed into pellets and encapsulated in Zircaloy tubes. The tubes will have a wall thickness of $\sim$ 0.08 times the pellet diameter and the resulting fuel rods will be $<$ 0.5 inches in diameter and about 144 inches long.

No production, consumption or significant loss of special nuclear material is anticipated.

4. Equipment and Facilities for Radiation Protection

The radiation protection procedures and equipment described in the Westinghouse Electric Corporation (Cheswick site) Health Physics Manual, WAED-HP-103, as amended, will be used. Currently, the latest revision of this manual is Revision IV, dated June, 1965.

5. Receipt of Material

The procedures and controls used for the receipt of fuel material are described in Section 4, Page 4, of our CVTR II application, Reference #1 in Appendix A. The weight of powder in each container will not exceed the maximum permissible mass specified in "Nuclear Safety Criteria," Section 7 of this application.

6. Powder and Pellet Storage

The details of the equipment, controls and nuclear safety analysis for powder storage (in the container in which it may be received) and for pellet storage are contained in Sections 6 and 7, pages 6 through 10, of the Southern California Edison application, Reference #2 in Appendix A.

7. Nuclear Safety Criteria

The principal operations involving special nuclear material and the corresponding maximum permissible values which have been established to assure nuclear safety are listed below:

Process Step	Control - Not to Exceed		
1. Powder Preparation (Weighing, mixing, storage, etc.)	Mass -	2.44 w/o	155 lb. UO_2
		2.78 w/o	115 lb. UO_2
		3.00 w/o	100 lb. UO_2
		3.48 w/o	75 lb. UO_2
	or		
	Slab -	2.44 w/o	7.2 inches
		2.78 w/o	6.4 inches
		3.00 w/o	6.0 inches
		3.48 w/o	5.4 inches
2. Powder Tray Cleaning Cart			
Component A	Volume - 25 liters		
Component B	Slab - 4.4 inches		

7. Nuclear Safety Criteria (continued)

Process Step	Control - Not to Exceed
3. Slugging, Storage, Granulation, etc.	Mass - 2.44 w/o 145 lb. UO_2
	2.78 w/o 110 lb. UO_2
	3.00 w/o 100 lb. UO_2
	3.48 w/o 75 lb. UO_2
	or
	Slab - 2.44 w/o 5.6 inches
	2.78 w/o 5.2 inches
	3.00 w/o 4.9 inches
	3.48 w/o 4.4 inches
4. Powder Feed to Pellet Pressing Feed Hopper	Mass - 2.44 w/o 145 lb. UO_2
	2.78 w/o 110 lb. UO_2
	3.00 w/o 100 lb. UO_2
	3.48 w/o 75 lb. UO_2
Conveyor	Cylinder - 93 $in.^2$ conveyor
5. Green Pellet Conveyor (Storage)	Slab - 2.44 w/o 5.6 inches
	2.78 w/o 5.2 inches
	3.00 w/o 4.9 inches
	3.48 w/o 4.4 inches
6. Sintering Furnace	Slab - 2.44 w/o 5.6 inches
	2.78 w/o 5.2 inches
	3.00 w/o 4.9 inches
	3.48 w/o 4.4 inches

7. Nuclear Safety Criteria (continued)

Process Step	Control - Not to Exceed		
7. Centerless Grinder	Slab -	2.44 w/o	5.6 inches
		2.78 w/o	5.2 inches
		3.00 w/o	4.9 inches
		3.48 w/o	4.4 inches
Feed Hopper	Mass -	2.44 w/o	145 lb. UO_2
		2.78 w/o	110 lb. UO_2
		3.00 w/o	100 lb. UO_2
		3.48 w/o	75 lb. UO_2
Waste Collection	Volume		25 liters
	Slab		4.4 inches
8. Sintered Pellet Storage	Slab -	2.44 w/o	5.6 inches
		2.78 w/o	5.2 inches
		3.00 w/o	4.9 inches
		3.48 w/o	4.4 inches
9. Rod Processing and Storage (Zircaloy Cladding)	Slab -	2.44 w/o	5.6 inches
		2.78 w/o	5.2 inches
		3.00 w/o	4.9 inches
		3.48 w/o	4.4 inches
10. Leak Testing Rods (Zircaloy Cladding)	Cylinder		9.5 in. dia.

7. Nuclear Safety Criteria (continued)

Process Step	Control - Not to Exceed
11. Fabrication of Fuel Assemblies (Assumes sequential loading for any partially loaded assemblies - fully flooded but isolated)	$k_{eff} \leq 0.86$
12. Fuel Assembly Storage and Assembly Cleaning	
Fully flooded, 12 inch minimum separation	$k_{eff} \leq 0.86$

8. Nuclear Safety Analysis

8.1 Maximum Permissible Values for Powder

The UO_2 powder was considered to be in the form of a homogeneous mixture with light water. The maximum permissible masses listed for powder in Section 7 of this application were determined by interpolating in Table XIV (page 22) of K-1019, Rev. 5.

Each maximum permissible mass was then converted into pounds of UO_2.

8.1 (continued)

The maximum permissible slab thicknesses and maximum permissible cylinder diameters were calculated using Westinghouse LEOPARD/1 procedures. The maximum permissible cylinder diameter of 10.9 inches for 3.48 w/o material has a cross-sectional area > 93 square inches. Therefore, the 93 square inch cross-sectional area of the pellet pressing conveyor is nuclearly safe for all enrichments considered in this application.

8.2 Maximum Permissible Values for Pellets

Westinghouse LEOPARD procedures were used to calculate the minimum critical masses and the minimum critical slab thicknesses for pellets with enrichments of 2.44 w/o, 2.78 w/o, 3.00 w/o and 3.48 w/o at optimum moderation and full reflection. The minimum critical masses were divided by a safety factor of 2.3, and the minimum critical slab thicknesses by a factor of 1.19, to obtain the maximum permissible values listed for pellets in Section 7 of this application.

/1 Barry, R.F., "LEOPARD - A Spectrum Dependent Non-Spatial Depletion Code for the IBM-7094, "WCAP-3269-26 (Sept. 1963).

8.3 Maximum Permissible Values for Clad Rods

The maximum permissible slab thicknesses for the processing and storage of Zircaloy clad rods were established to be the same as the maximum permissible slab thicknesses for pellets. These values are conservative, due to the fact that any foreseeable slab of rods more than one layer thick would be tightly packed and the tightly packed rods would be undermoderated even assuming they were to be flooded.

Calculations using LEOPARD plus a safety factor of 1.12 result in a maximum permissible cylinder diameter of 9.5 inches for Zircaloy clad rods containing 3.48 w/o fuel.

8.4 Volume Determination

The maximum permissible volume for pellets, or for slurries of UO_2, at 3.48 w/o has been set at 25 liters. This value was calculated using LEOPARD and a safety factor of 1.31.

8.5 Fuel Assembly Analysis

The fuel assembly analysis for the NOK reactor was performed using the same techniques as those presented in "Fuel Assembly Criticality Limits," Section 8.B.5, pages 13 through 17, in our SENA application, Reference #4 in Appendix A. The calculated k_{eff} value of ≤ 0.86 is significantly within nuclearly safe limits.

APPENDIX A

REFERENCE APPLICATIONS

1. "Application for Amendment of License SNM-338 for Manufacture of CVTR Assemblies," November 11, 1965.

   Approved: December 7, 1965

2. "Application for Amendment to License SNM-338 for the Southern California Edison Fuel Rods and Assemblies," December 8, 1964, and supplemented December 21, 1964. Revised August 30, 1965.

   Approved: January 14, 1965. Revised application approved September 20, 1965.

3. "Application for Amendment to License SNM-338 for Consolidated Edison Indian Point Reactor Core II Fuel Rods and Assemblies," May 20, 1964. Revised June 22, 1964, with supplements dated June 23, 1964, and June 30, 1964; August 10, 1964; and January 22, 1965, with supplement dated February 1, 1965.

   Approved: July 16, 1964. Revised applications approved September 8, 1964 and February 12, 1965.

4. "Application for Amendment to License SNM-338 for SENA Fuel Rods and Assemblies," March 8, 1965. Revised July 8, 1965; August 4, 1965; September 7, 1965; and October 7, 1965.

   Approved: April 30, 1965. Revised applications approved August 18, 1965, September 21, 1965, and October 27, 1965.

SNM-338
NOK
10/25/67

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "SNM-338, Docket 70-337, Fabrication of NOK Fuel Rods and Assemblies" immediately in front of the previous transmittal letter dated 10/10/67.

Pages 2 and 5 should be inserted in the binder and the old pages removed.

The removed pages may be filed in the back of the binder.

SNM-338
Gen. Plutonium
12/22/66

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "License SNM-338 - Docket 70-337, Amendment for Processing Fast Reactor Fuel, 10/26/66, immediately in front of the previous transmittal letter dated 10/26/66.

Pages 1, 2, 3, 4, 19, 22, 26, 27, 30, 31, 34, 35, 36, 37, 39, 41, 43, and 46 should be inserted in the binder and the old pages removed.

OK (ad) 1/4/67

New pages 27.1 and 37.1 should be inserted immediately after pages 27 and 37, respectively. New Appendix A should be inserted following page 61.

The removed pages may be filed in the back of the binder.

ITEM # 56

B/56

SNM-338
Gen. Plutonium

FILING INSTRUCTIONS

The cover letter should be filed in the binder, "License SNM-338, Docket 70-337, Amendment for Processing Fast Reactor Fuel, 10/26/66," immediately in front of the previous transmittal letter dated 12/22/66.

Pages 2, 4, 14, 25, 27.1, 30, 31, 32, 36, 37, 41, 59, and 60 should be inserted in the binder and the old pages removed.

New pages 31.1 and 31.2 should be inserted immediately after page 31. The existing page 37.1 should be removed.

The removed pages may be filed in the back of the binder.

OK
2/20/67

Revision No. 2
2/8/67

SNM-338
Gen. Plutonium

FILING INSTRUCTIONS

The transmittal letter should be filed in the binder labelled, "License SNM-338, Docket 70-337, Processing Fast Reactor Fuel," immediately in front of the last previous letter dated April 24, 1968.

Revised pages 6, 7, 34 and 45 should be inserted in the binder and the old pages removed. OK G.A.M.

The removed pages may be filed at the back of the binder.

3/21/69

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:

DML:CEM
70-337
SNM-338, Amendments Nos. 71-23, 71-24, 71-25

MAY 28 1968

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Westinghouse Electric Corporation
3 Gateway Center
Box 2278
Pittsburgh, Pennsylvania 15230

Attention: Mr. Karl R. Schendel
License Administrator

Gentlemen:

Enclosed are Amendments Nos. 71-23, 71-24 and 71-25 to Special Nuclear Material License No. SNM-338, authorizing the delivery of special nuclear material to a carrier for transport in the CC, RCC and RCC-1 packages, respectively. Amendments Nos. 71-23, 71-24 and 71-25 supersede, in their entirety, Amendments Nos. 71-22, 71-13 and 71-21, previously issued for the CC, RCC and RCC-1 packages.

As discussed with you on May 16, 1968, by Mr. C. E. MacDonald, the RCC package (Amendment No. 71-24) includes the package submitted as Model RCC-2. The modification of the RCC package would require the closure clamp fitting described in Drawing EDSK323133B.

Please note that these amendments do not authorize the transport of special nuclear material. Such transport is normally subject to regulation by the Department of Transportation (DOT). Questions regarding their requirements should be directed to DOT. Transport of special nuclear material not subject to DOT regulations is authorized by Amendment No. 5 to Special Nuclear Material License No. SNM-338, dated November 21, 1967, provided the appropriate packaging, marking, and labeling requirements of that amendment are satisfied.

Very truly yours,

ITEM # 57

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

Enclosures:
As stated above

cc: Mr. William A. Brobst DOT

B/57

UNITED STATES
ATOMIC ENERGY COMMISSION

MAY 28 1968

LICENSE AMENDMENT
for
DELIVERY OF SPECIAL NUCLEAR MATERIAL
to a
CARRIER FOR TRANSPORT

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, and Part 71, the following amendment to the special nuclear material license identified below is hereby issued, authorizing the licensee to deliver special nuclear material to a carrier for transport, and is subject to the conditions specified in that license and to the conditions specified below.

Licensee	
1. Name: Westinghouse Electric Corporation	3. License No. SNM-338 Amendment No. 71-23
2. Address: 3 Gateway Center Box 2278 Pittsburgh, Pennsylvania 15230	4. Docket No. 70-337

CONDITIONS

5. (a) Packaging

(1) Model number — CC

(2) Description — Steel fuel element cradle assembly consisting of a strongback and fuel element clamping assembly, shock mounted to a 14-gage steel outer container by shear mounts.

(3) Drawings — Container constructed in accordance with The Champion Company Drawings 10410, 10536, 10538, and 10541.

(b) Contents

(1) Type and form of material — Uranium dioxide as stainless steel clad unirradiated fuel elements of the following specifications:

Type	14 x 14	15 x 15
Pellet diameter (Nom)	0.317"	0.355"
Rod diameter (Nom)	0.341"	0.385"
Maximum Fuel Length	105"	106"
Maximum Rods/element	173	208

5. (b)(1) (CONTINUED)

Type	14 x 14	15 x 15
Maximum Cross Section (Nom)	6.284"	7.695"
Maximum U-235/element	10 kgs	13.5 kgs
Maximum U-235 enrichment	4.1 w/o	4.1 w/o

(2) Maximum quantity of material per package — Two fuel elements containing not more than 27 kilograms U-235.

(c) Fissile Class II and III

(1) Minimum number of radiation units to be shown on label for Class II — 1.2 radiation units

(2) Maximum number of packages per shipment for Class III — 60 packages

6. This amendment supersedes, in its entirety, Amendment No. 71-22 to SNM-338, dated March 29, 1968.

REFERENCES

Licensee's application dated November 18, 1966, requesting approval to deliver special nuclear material to a carrier for transport in the CC package.

Supplements dated May 25, December 12, 1967, January 30, March 14, and April 29, 1968.

FOR THE ATOMIC ENERGY COMMISSION

Date of Amendment MAY 28 1968

Donald A. Nussbaumer
Division of Materials Licensing

COPY

UNITED STATES
ATOMIC ENERGY COMMISSION

---------MAY 28 1968

LICENSE AMENDMENT
for
DELIVERY OF SPECIAL NUCLEAR MATERIAL
to a
CARRIER FOR TRANSPORT

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, and Part 71, the following amendment to the special nuclear material license identified below is hereby issued, authorizing the licensee to deliver special nuclear material to a carrier for transport, and is subject to the conditions specified in that license and to the conditions specified below.

Licensee	
1. Name: Westinghouse Electric Corporation	3. License No. SNM-338 Amendment No. 71-24
2. Address: 3 Gateway Center Box 2278 Pittsburgh, Pennsylvania	4. Docket No. 70-337

CONDITIONS

5. (a) Packaging

(1) Model number	RCC
(2) Description	Steel fuel element cradle assembly consisting of a strongback and adjustable fuel element clamping assembly, shock mounted to a minimum 0.074" steel outer container by shear mounts.
(3) Drawings	Container constructed in accordance with Westinghouse Electric Corporation Drawings EDSK319401F, EDSK319402F, EDSK323133B, and 684J580 or 684J963, 541F613, 541F614, and EDSK323133B.

COPY

(b) Contents

(1) Type and form of material

Uranium dioxide as zircaloy or stainless steel clad unirradiated fuel elements of the following specifications:

Type	14 x 14 Zr Clad	14 x 14 SST Clad	15 x 15 SST Clad
Pellet diameter (Nom)	0.367"	0.384"	0.384"
Rod diameter (Nom)	0.423"	0.422"	0.422"
Maximum Fuel Length	120"	120"	122"
Maximum Rods/element	180	180	204
Maximum Cross Section (Nom)	7.8"	7.8"	8.4"
Maximum U-235 element	16 kgs	18 kgs	20 kgs
Maximum U-235 enrichment	3.7 w/o	3.9 w/o	3.7 w/o

(2) Maximum quantity of material per package

Two fuel elements containing not more than 40 kilograms U-235.

(c) Fissile Class II and III

(1) Minimum number of radiation units to be shown on label for Class II

1.2 radiation units

(2) Maximum number of packages per shipment for Class III

60 packages

6. This amendment supersedes, in its entirety, Amendment No. 71-13 to SNM-338, dated February 29, 1968.

REFERENCES

Licensee's application dated November 18, 1966, requesting approval to deliver special nuclear material to a carrier for transport in the RCC package.

Supplements dated May 25, 1967, January 30, and April 29, 1968.

FOR THE ATOMIC ENERGY COMMISSION

Date of Amendment MAY 28 1968

Donald A. Nussbaumer
Division of Materials Licensing

COPY

UNITED STATES
ATOMIC ENERGY COMMISSION

MAY 28 1968

LICENSE AMENDMENT
for
DELIVERY OF SPECIAL NUCLEAR MATERIAL
to a
CARRIER FOR TRANSPORT

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, and Part 71, the following amendment to the special nuclear material license identified below is hereby issued, authorizing the licensee to deliver special nuclear material to a carrier for transport, and is subject to the conditions specified in that license and to the conditions specified below.

Licensee	
1. Name: Westinghouse Electric Corporation	3. License No. SNM-338 Amendment No. 71-25
2. Address: 3 Gateway Center Box 2278 Pittsburgh, Pennsylvania 15230	4. Docket No. 70-337

CONDITIONS

5. (a) Packaging

(1) Model number — RCC-1

(2) Description — Steel fuel element cradle assembly consisting of a strongback and adjustable fuel element clamping assembly, shock mounted to a 14-gage steel outer container by shear mounts.

(3) Drawings — Container constructed in accordance with Westinghouse Electric Corporation Drawings 541F351, 684J861 and 684J898.

(b) Contents

(1) Type and form of material — Uranium dioxide as zircaloy or stainless steel clad unirradiated fuel elements of the following specifications:

Type	15 x 15 Zr Clad	14 x 14 Zr Clad	14 x 14 Zr Clad	14 x 14 SST Clad	15 x 15 SST Clad
Pellet diameter (Nom)	0.372"	0.372"	0.367"	0.384"	0.384"
Rod diameter (Nom)	0.422"	0.422"	0.423"	0.422"	0.422"
Maximum Fuel Length	144"	144"	120"	120"	122"

COPY

5. (b)(1) (CONTINUED)

Type	15 x 15 Zr Clad	14 x 14 Zr Clad	14 x 14 Zr Clad	14 x 14 SST Clad	15 x 15 SST Clad
Maximum Rods/element	204	180	180	180	204
Maximum Cross Section (Nom)	8.4"	7.8"	7.8"	7.8"	8.4"
Maximum U-235/element	15 kgs	15.5 kgs	16 kgs	18 kgs	20 kgs
Maximum U-235 enrichment	3.2 w/o	3.5 w/o	3.7 w/o	3.9 w/o	3.7 w/o

(2) Maximum quantity of material per package — Two fuel elements containing not more than 40 kilograms U-235.

(c) Fissile Class II and III

(1) Minimum number of radiation units to be shown on label for Class II — 1.2 radiation units

(2) Maximum number of packages per shipment for Class III — 60 packages

6. This amendment supersedes, in its entirety, Amendment No. 71-21 to SNM-338, dated March 29, 1968.

REFERENCES

Licensee's application dated December 8, 1967, requesting approval to deliver special nuclear material to a carrier for transport in the RCC-1 package.

Supplements dated January 30, March 1, March 5, and April 29, 1968.

FOR THE ATOMIC ENERGY COMMISSION

Date of Amendment MAY 28 1968

Donald A. Nussbaumer
Division of Materials Licensing

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