

70-903
EOL DIV
I
2 NEW STREET
WHITE PLAINS, NEW YORK 10601
WHITE PLAINS 8-8800
W.S. FORTNEY
In reply please refer to
UNC H&S-564
November 29, 1965

UNITED NUCLEAR
CORPORATION
DEVELOPMENT DIVISION

United States Atomic Energy Commission
Source and Special Nuclear Material Branch
Division of Materials Licensing
Washington, D.C. 20545

Attn: Mr. Donald A. Nussbaumer

Dear Mr. Nussbaumer:

This is a request for a temporary license revision to permit the storage of up to two (2) kg of U²³⁵ and 500 grams of Pu²³⁹ in the Bulk Storage Array and/or the Completed Rod Storage Array located in the vault of the Critical Facility at our Pawling Site (see Figure #14).

The contents of the vault are expected to include the PLATR and PRR fuel described in our present license. The PLATR and PRR fuel is presently stored in shipping containers awaiting transfer to the Savannah River Operations Office. Therefore, the Critical Facility vault limit should be increased to permit the storage of 17.5 kg of U²³⁵ (15.5 kg being PLATR and PRR fuel) and 500 grams of Pu.

The material to be stored in the Bulk Storage Array under this temporary revision will consist of two (2) types:

- 1) Material transferred from the Plutonium Facility and
- 2) Material received from an outside vendor such as NUMEC.

The material from the Plutonium Facility will be in the form of pellets and/or powder. The material will be packaged as follows:

- a) The Pu-U will be placed in a 2R container under a helium and/or nitrogen atmosphere.

UNITED NUCLEAR
CORPORATION
DEVELOPMENT DIVISION

H&S-564
p. 2

- b) The container will be placed in a 0.020 inch thick polyvinyl chloride bag. The bag will be sealed.
- c) The above mentioned "package" will be placed in a second polyvinyl bag.
- d) The entire package will then be placed in a second 2R container.

The material to be stored in the Completed Rod Storage Array will consist of assembled rods of Pu-U carbide pellets. The maximum rod diameter is 0.7 inch. The proposed cladding material is:

- a) Stainless steel
- b) Vanadium or vanadium alloys.

The fuel will be placed in the cladding and the cladding will be welded and helium leak checked. This "package" will be placed in a tubular container with a diameter of 1½-2 inches and a length of approximately forty (40) inches. In each instance, the fuel will have double containment.

This storage structure is obviously designed to safely contain much more fuel than this request covers. The brief safety analysis presented below indicates that each storage location can, in fact, safely contain more fuel than is requested herein.

The Bulk Storage Array and the Completed Rod Storage Array are contained in concrete walls constructed from normal density solid concrete blocks laid with mortar. The blocks are interlocked such that the completed structure closely approximates a solid block of full density concrete. The structure provides at least twelve (12) inches of concrete separating each array from the area designated for storage of shipping containers. These shipping containers (provided by Savannah River) contain the 15.5 kg of U²³⁵ from PLATR and PRR. We are awaiting shipping instructions.

This structure is sufficiently strong to withstand building collapse and will maintain spacing between their own elements and isolation between itself and the shipping containers. The

UNITED NUCLEAR
CORPORATION
DEVELOPMENT DIVISION

H&S-564

p. 3

Spacings and mass limits provide safety under all conditions. As indicated above and in Fig. 14, the arrays are isolated by twelve (12) inches of concrete under all conditions. Each is therefore analyzed separately.

The Bulk Storage Array is a plane array of sixteen units with each unit on a center to center spacing of sixteen inches and a minimum edge to edge spacing of twelve inches.

In the Bulk Storage Array fuel is stored in active material containers made from ten inch lengths of four inch I.D. pipe with ends capped as shown in Fig. 14. Each cylindrical active material container has a volume of 2.1 liters. The safety of each unit is established on the basis of the volume limit set by the active material containers (2.1 liters) and the mass limits established. Using figures 5 and 6 (for Pu²³⁹ only and full reflector) and figures 1 and 2 (for U²³⁵) from T.I.D. 7016, Rev. 1, it may be seen that:

- a) 2.1 liters is a safe volume for solutions of Pu up to three kg Pu per liter of water and that for mixtures with higher Pu to water ratios a mass limit of 2.4 kg provides an adequate margin of safety.
- b) 2.1 liters is a safe volume for solutions of U²³⁵ up to eight kg U²³⁵ per liter of water and that for mixtures with higher U²³⁵ to water ratios a nine kg mass limit provides an adequate margin of safety.

The Completed Rod Storage array consists of five small slab arrays each of which is isolated from other fuel by at least twelve inches of cement. Each slab contains two storage holes, two inches high, eight inches wide, and forty-four inches deep.

The safety of each slab is established on the basis of slab thickness which is limited to 0.7 inch by specifying the maximum rod diameter and setting mass limits for each slab at 2.4 kg of Pu and 9 kg of U²³⁵. Reference to figures 5 and 8 (for Pu) and 1 and 4 (for U²³⁵) of T.I.D. 7016, Rev. 1 indicates for Pu the 0.7 inch thickness limit establishes safety for solutions up to 3 kg of Pu per liter and the mass limit maintains safety for mixtures up to full density Pu metal. For U²³⁵ the 0.7 inch safe slab thickness is safe for up to

UNITED NUCLEAR
CORPORATION
DEVELOPMENT DIVISION

HS-564
p. 4

10 kg of U^{235} per liter of water and the 9 kg mass limit maintains safety over the remainder of the U^{235} to water mixtures. Thus the safety of the array is established over the full range of Pu-U to water ratios subject to double batching.

The use of a tubular storage container with a diameter exceeding $1\frac{1}{2}$ inches prevents the stacking of these containers in the two inch high storage holes. Each tubular container holds one rod with a maximum diameter of 0.7 inch.

We hope the preceding is sufficient to permit the temporary revision to our license. If additional information is required, please do not hesitate to inform us.

We appreciate your prompt attention to this problem.

Very truly yours,

William F. Roche

William F. Roche
Vice President

encls.

UNITED NUCLEAR
CORPORATION
DEVELOPMENT DIVISION

8 NEW STREET
WHITE PLAINS, NEW YORK 10601
WHITE PLAINS 9-8800

In reply please refer to
UNC H&S-576

January 5, 1966

Mr. Robert L. Layfield
Division of Materials Licensing
Source and Special Nuclear Materials Branch
United States Atomic Energy Commission
Washington, D.C. 20545



Re: DML:RLL
70-903

Dear Bob:

~~for Div of Compliance~~

Thanks very much for the prompt attention given us.
We appreciate it.

Enclosed are the additional sets of drawings re-
quested in your communication of December 27, 1965.
If additional copies are needed please inform us.

The Pu-Be source (80 grams Pu encapsulated) is no
longer in our possession. The source was given to
the National Bureau of Standards, Department of
Commerce, in August of 1965. The transfer was made
under Special Nuclear Material Draft #07/SNM-362/
291(3), authorized by the New York Operations Office
via Mr. Leo Graup.

Thanks again for your cooperation.

Very truly yours,

Percy E. Clemons
Percy E. Clemons

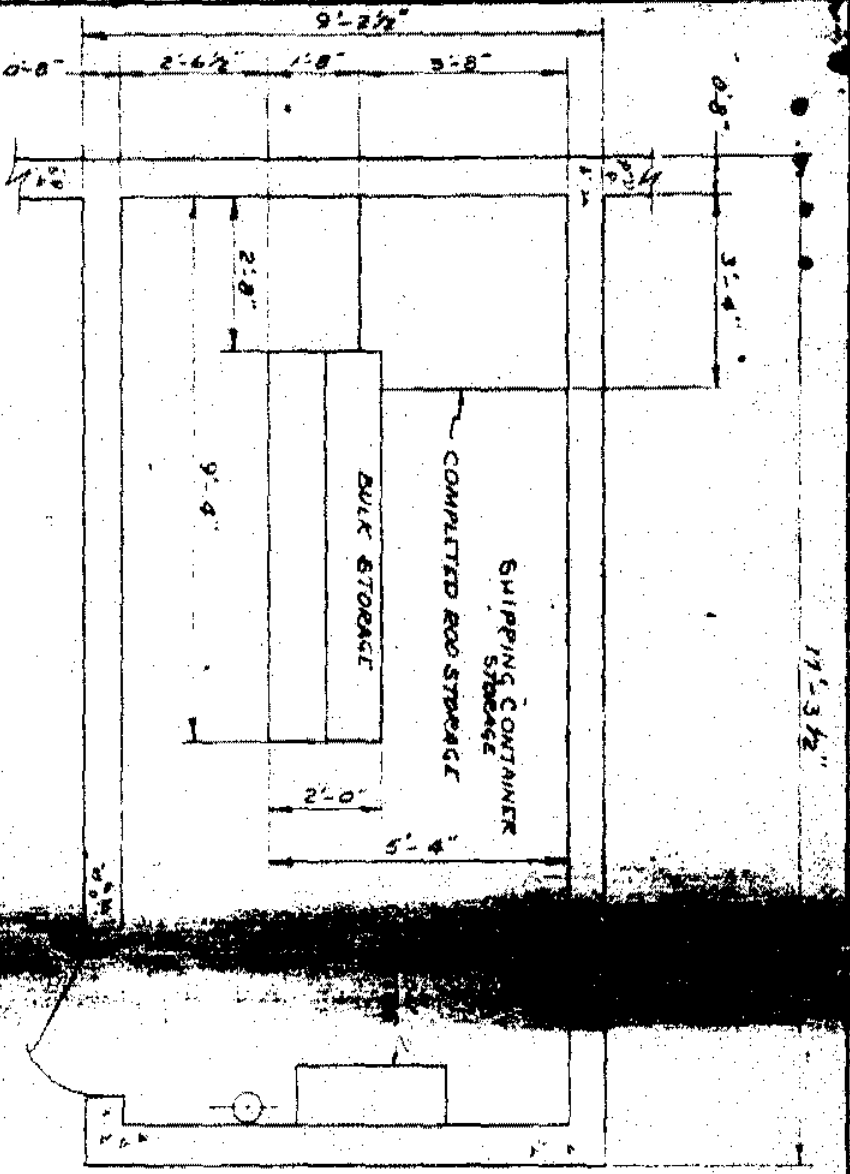
PEC:heb

COMPLIANCE
SAEC, N. Y.
JAN 7 1966

4 11 PM '66

ACKNOWLEDGED

CRITICAL FACILITY VAULT
FIG-10



PARTS LIST FOR DWG. NO.

ITEM NO.	QTY	DESCRIPTION	MATERIAL

REVISIONS: _____
 DATE: _____
UNITED NUCLEAR CORPORATION
 DEVELOPMENT DIVISION
 PAWLING FACILITY
 PU-U STORAGE VAULT PLAN

DESIGNED BY: *[Signature]*
 DRAWN BY: *[Signature]*
 CHECKED BY: *[Signature]*
 DATE: _____
 SCALE: 1/2" = 1'-0"
 SHEET NO. **B**

PARTS LIST FOR DWG. NO.

ITEM NO.	DESCRIPTION	QUANTITY	REVISION

1 SCH 40 PIPE CAP
4" PIPE CAP
GROUT OR PRECAST



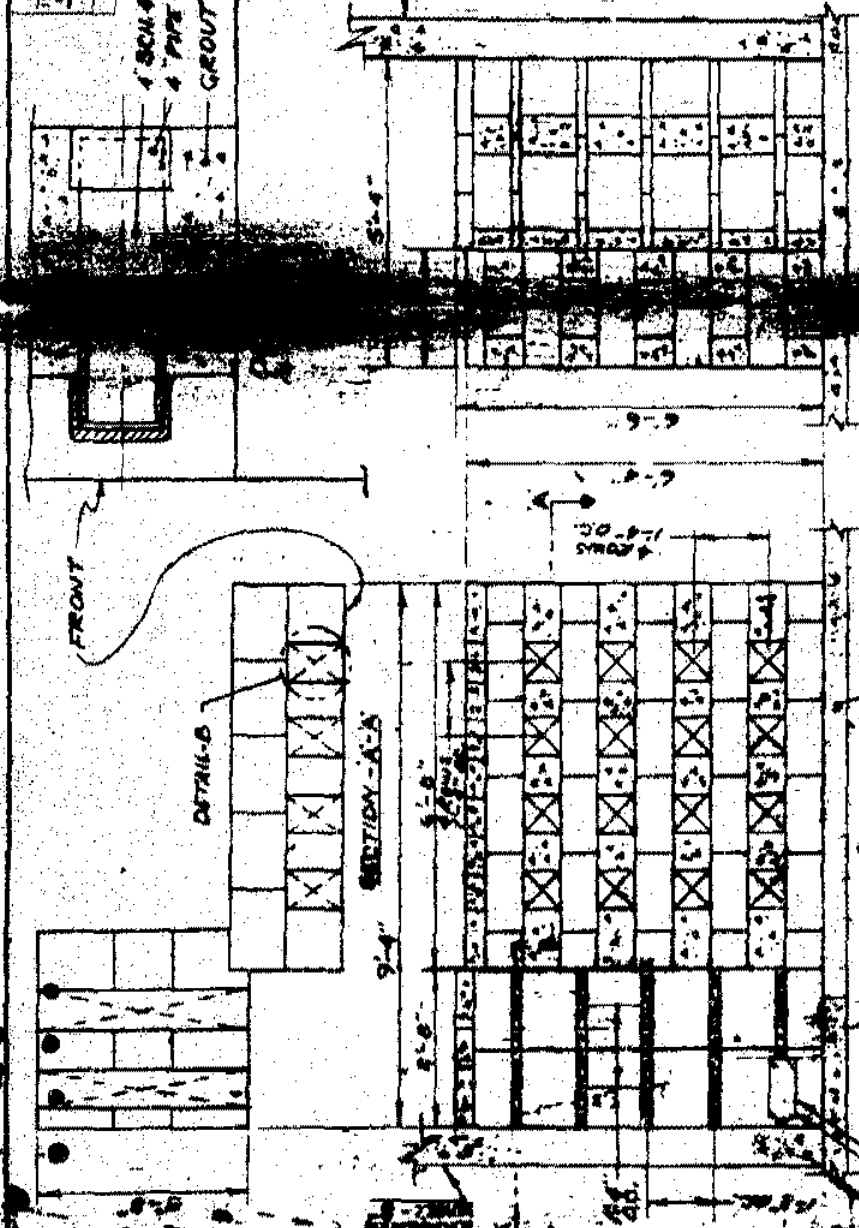
NOTE:
1. HORIZONTAL JOINT REINFORCE, EVERY THIRD COURSE.

See Site of Compliance

REVISIONS
UNITED NUCLEAR CORPORATION
 DEVELOPMENT DIVISION
 9500 Park Ave. York

PAWLING FACILITY
PU-U STORAGE ARRAY - E

DES. ENG.	DATE ENG.	DATE CHK.	SCALE
			1/4" = 1'-0"
			CLASS
			U
			DWG. NO.



PU-U STORAGE ARRAY
 FIG-14

EXISTING 5" FLOURED CONCRETE
 FLOTTING REBAR SLAB
 12" X 6" METAL COVER
 STUDS FOR KING NUTS
 (TYPE)