

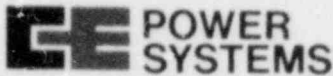
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June 1, 1981

U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. R. G. Page, Acting Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle & Material Safety

Reference: Letter from Mr. H. V. Lichtenberger to Mr. R. G. Page, dated
March 18, 1981; Amendment Application - Pellet Storage Shelves

Dear Mr. Page:

In response to comments made to our amendment application referenced above by
Mr. N. Ketzlach of your staff, we are hereby submitting the attached as a sup-
plement to the original application.

The additional criticality analysis plus the resolution of other comments are
submitted for your approval in the following page changes:

<u>Add Page</u>	<u>Delete Page</u>
C-16, Rev. 2, 6/1/81	C-16, Rev. 1, 3/18/81
D-18, Rev. 2, 6/1/81	D-18, Rev. 1, 3/18/81
D-19, Rev. 2, 6/1/81	D-19, Rev. 1, 3/18/81

Very truly yours,

H. V. Lichtenberger
H. V. Lichtenberger
Vice President-Nuclear Fuel
Nuclear Power Systems-Manufacturing

HVL/GJB/ssb

Enclosures

FEE EXEMPT
add'l info

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6.2 Pellet Storage Shelves

Steel shelves (W.S. P-22 and P-114) are provided for pellet storage. The shelves are three high. They have a width of 30" and are limited to a slab thickness of 4.0 inches. The slab thickness of 4.0" is assured by limiting the number of fuel pellet trays stacked at any position.

- * The entire storage array is covered by a sheet metal top which would prevent significant moderation of the array from discharge of the overhead sprinkler system. Water fire-fighting is not permitted in the pellet shop. The local fire department has been instructed that only dry chemical extinguishing techniques are permitted here and a 24-hour guard service (and one vehicle access gate only) assures that this requirement is strictly enforced.

Criticality Safety Analysis

The following conservative assumptions were incorporated into the calculational model of the pellet storage shelves:

- 1) Each shelf was assumed to hold a 4.0 inch thickness of UO_2 at optimum moderation and maximum enrichment (4.1 wt.% U^{235}).
- 2) The system was assumed to be infinite in the horizontal plane.
- 3) Variable density external water mist was introduced to determine peak reactivity.

The KENO-IV Code with 16 group Hansen-Roach cross sections was used to determine the reactivity of the pellet storage shelves under various conditions of moderation. Optimum moderation of the fuel occurred at a concentration of 2.4 gm U/cc in water, assuming no external water mist. The peak reactivity of the system, $K_{eff} = 0.9313 \pm 0.0044$ occurred at an external water mist density of 0.025 gm/cc which is higher than one could attain from fire fighting equipment or a sprinkler system. The criticality safety analysis demonstrates that the spacing boundary can be located 60 inches from the front of the shelves.

Note: In the determination of cross sections for the pellet-water mixture, a volume homogenization procedure was employed which is non-conservative for low enrichment fuel. However, it will be shown that the non-conservatism of this approximation is more than offset by the conservative assumption that the pellet-water mixture is at an optimum fuel concentration of 2.4 gm U/cc. For actual loading of the trays, the pellets pack to an average density of 5.95 gm UO_2 /cc (5.24 gm U/cc), with

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K-E 10 X 10 TO 1/4 INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

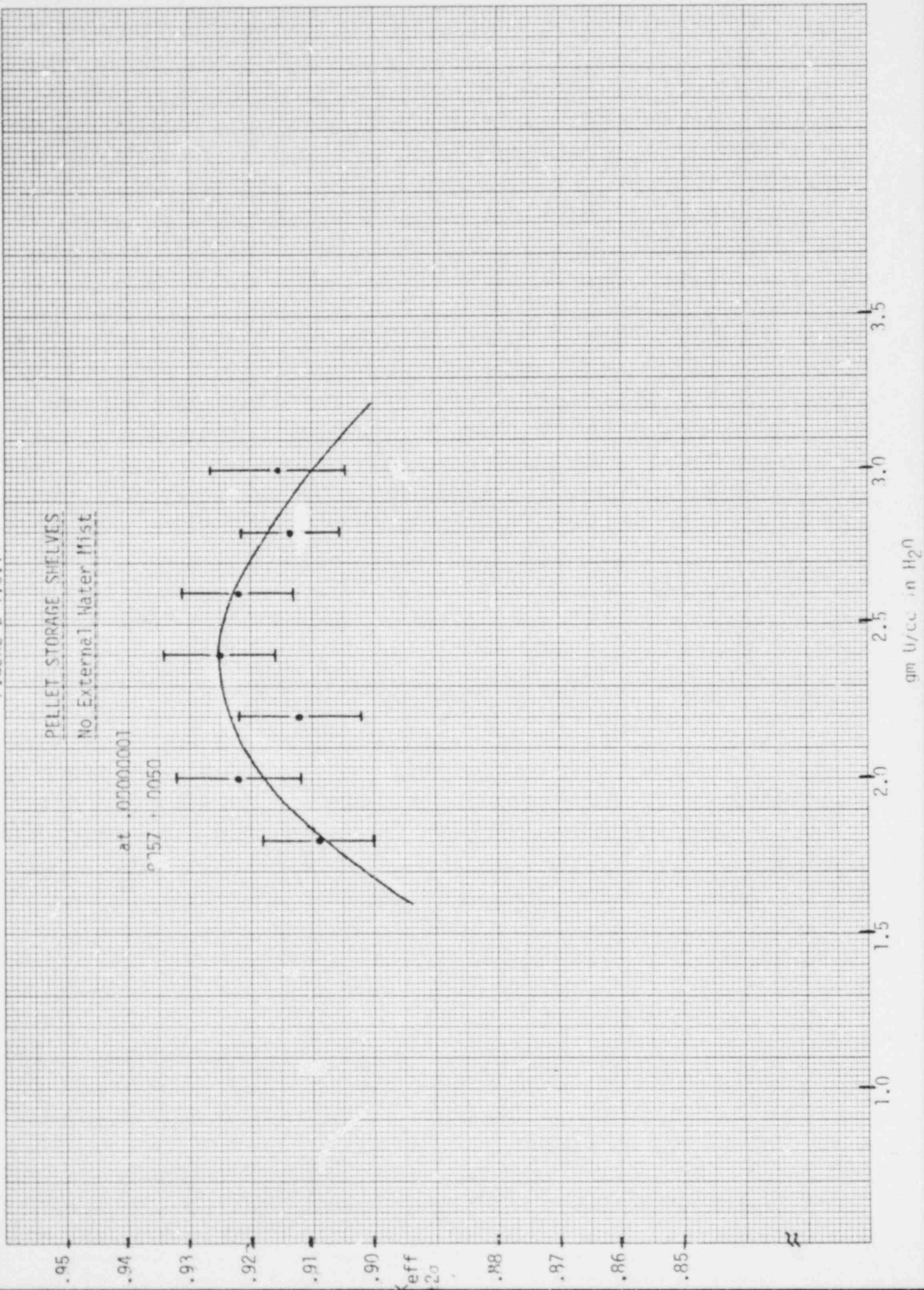
FIGURE D-1.6.1

PELLET STORAGE SHELVES

No External Water Mist

at .000000001

0.757 ± 0.050



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K&E 10 X 10 TO 1/4 INCH KEUFFEL & ESSER CO. MADE IN U.S.A.

FIGURE D-1.6.2

