REPLY TO "COMMENTS ON REVIEW OF *THE ACCIDENT HAZARDS OF NUCLEAR POWER PLANTS*"

The original review of the subject book has been reassessed in line with the author's comments in the preceding Letter. From the tenor of this Letter as well as its substance, it is apparent that the original review was essentially accurate in both fact and interpretation. Hence, no further comment is indicated.

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July 29, 1977

COMMENT ON URANIUM-236 IN LIGHT WATER REACTORS

The paper by de la Garza[1] discussed the recycling of uranium containing ^{236}U to the enrichment plant. To account for the increase in ^{235}U product required to compensate for ^{236}U parasitic absorptions, the relation

$$Xp = Xop + K \cdot y_p$$

was developed, where

Xop = desired ^{235}U fuel concentration without ^{236}U

Xp and y_p = ^{235}U and ^{236}U fuel concentrations, respectively, with ^{235}U compensation for the ^{236}U present

K = compensation coefficient.

The value of K used in the analysis by de la Garza was 0.3; however, Ref. 2 was cited for further discussion of the factor K. The reference shows that K values previously given in the open literature vary from 0.3 to 0.6. Because of the implication of the K factor on the economic incentives for reprocessing, this Letter documents the values of K calculated by the latest version of the Westinghouse reactivity determination code LEOPARD (Ref. 3) for typical pressurized water reactor fuel.

TABLE I

^{235}U Enrichment Penalty for Fuel Containing ^{236}U

^{235}U Enrichment (wt%)	^{236}U Enrichment (wt%)	K Value (kg ^{235}U/kg ^{236}U)
2.10	0.05	0.29
2.10	0.10	0.28
2.10	0.50	0.25
2.10	1.00	0.22
2.10	1.50	0.21
3.20	0.05	0.36
3.20	0.10	0.35
3.20	0.50	0.31
3.20	1.00	0.28
3.20	1.50	0.25

The K values given in Table I were obtained at reactivity end-of-life for two different initial ^{235}U enrichments. It should be noted that K values computed at the beginning-of-life were as high as 0.6 for low ^{236}U concentrations. The reactivity end-of-life was used to properly establish the burnup penalty caused by the ^{236}U impurity. In particular, Table I supports the use of $K \approx 0.3$.

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May 19, 1977

REFERENCES

1. A. DE LA GARZA, "Uranium-236 in Light Water Reactor Spent Fuel Recycled to an Enriching Plant," *Nucl. Technol.*, **32**, 176 (1977).

2. A. DE LA GARZA, "Supplementary Testimony Related to Enrichment of Recycled Fuel from Light Water Reactors," before the Atomic Safety and Licensing Board, Docket No. 50-332 (Nov. 7, 1975).

3. R. F. BARRY, "LEOPARD–A Spectrum Dependent Non-Spatial Depletion Code for the IBM-7094," WCAP-3269-26, Westinghouse Electric Corporation (Sep. 1963).

REPLY TO "COMMENT ON URANIUM-236 IN LIGHT WATER REACTORS"

In the Introduction to my paper,[1] I invited workers outside the enriching step to supply their statements of reactor performance in making use of the presented methodology. Miller[2] accepted my invitation and has supplied us with information on K values for typical pressurized water reactor fuel calculated by the latest version of the Westinghouse reactivity determination code LEOPARD. It is much appreciated.

My invitation is again extended to others.

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July 12, 1977

REFERENCES

1. A. DE LA GARZA, "Uranium-236 in Light Water Reactor Spent Fuel Recycled to an Enriching Plant," *Nucl. Technol.*, **32**, 176 (1977).

2. JAMES W. MILLER, "Comment on Uranium-236 in Light Water Reactors," *Nucl. Technol.*, **36**, 240 (1977).