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HW-68544

GENERAL ELECTRIC

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

DATE

February 16, 1961

COPY NO. AND SERIES

FILE DESIGNATION

TITLE

IRRADIATED URANIUM FIRE HAZARD

AUTHOR

R. W. Reid

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March 20, 1961

W. J. Gartin
S. L. Nelson

IRRADIATED URANIUM FIRE HAZARD

ref: HW-68544, "Irradiated Uranium Fire Hazard" R.W. Reid
to W. J. Gartin and S. L. Nelson, dated 2-15-61.

Since the issuance of the reference document, calculations have been completed to determine how long the Fog Spray should be left on to cool a slug lodged in the discharge area.

The words "one-half hour" in line three, last paragraph, page 2, document HW-68544 should be changed to read "ten minutes".

Manager,
PROCESS TECHNOLOGY SUB-SECTION

RW Reid:AKH:jm

cc: Distribution
File

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IRRADIATION PROCESSING DEPARTMENT

February 15, 1961

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HW-68544

Page 2

W. J. Gartin
S. L. Nelson

IRRADIATED URANIUM FIRE HAZARD

Ref: (1) Letter, Same Title, R. W. Reid to Distribution, 1-12-61,
Confidential-Undocumented.

Earlier this year we briefly discussed the potential hazard of incurring an inadvertent uranium fuel element fire during discharge⁽¹⁾. This letter will provide data which will be of assistance to you in assessing the potential hazard, and in establishing charge-discharge procedures to minimize the probability of an irradiated fuel element lodged in the discharge area reaching aluminum jacket melting temperature without detection.

Using the data presented in Figure 1, attached, a procedure for minimizing the potential of slug jacket melting might be derived along the following lines:

For a K Reactor, 1600 kw charge at four months exposure, a slug discharged to air four hours following a reactor outage would attain aluminum jacket melting temperature in 23 minutes.

Assume that it takes five minutes to determine or accomplish the following:
(1) the discharge area radiation level indicates a slug did not enter the basin, and (2) operation of the fog spray system.

On the above basis, one would need to stop discharge every 18 minutes to determine from the rear face radiation level whether a fuel element had failed to enter the basin. Thus, at a charging rate of 30 tubes per hour, discharge would be stopped at the completion of the ninth tube and a determination made that all slugs had entered the basin as indicated by the discharge area radiation level.

The above procedure is intended only to illustrate how the attached data may be used, and with some probability does not represent the optimum procedure for minimizing failure to detect an irradiated slug lodged in the discharge area.

We are continuing this study to determine how long the fog spray must be left on to cool a slug lodged in the discharge area. Until such data are obtained, the fog spray should be left on for one-half hour following each slug heating interval. Process and Reactor Development Operation studies are also in progress to determine the end result of irradiated slug fires in the discharge areas. Such studies are expected to be of value in determining the emphasis which should be placed on prevention of such incidents. Even without such data we believe significant effort to improve the reliability and response of discharge area radiation level monitoring equipment, and a minor sacrifice of charge-discharge efficiency is justified to detect a slug lodged in the discharge area prior to the slug jacket reaching melting temperature.

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HW-68544

Page 3

It is cautioned, there is no conservatism calculated into the attached curves. Data have been used, however, which considers the worst case, i.e. the slug which does not enter the basin may be the highest power slug in the tube.

ACKNOWLEDGEMENT

The data from which Figure I was derived was calculated by F. R. Zaloudek, Thermal Hydraulics Operation, H. L. O., and G. R. Sparks, Process Engineering Operation, Process Technology Sub-Section.

R. M. Reil

Manager, Process Technology Sub-Section
RESEARCH AND ENGINEERING SECTION
IRRADIATION PROCESSING DEPARTMENT

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HW-68544

Page 4

FIGURE I.

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