GE-H-11,1

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FILE

Route List

1. ~~[illegible] Montgomery~~
2. ~~L. W. Fox~~
3. ~~[illegible]~~
4. ~~[illegible]~~
5.

M. W. Hubie

~~W. H. [illegible]~~

Reviewed and Approved for Public Release by the Hanford Declassification Project

DJ Brown PNNL ADD

7-25-2002 Date

DATE 8-29-47

SUBJECT Heavily Irradiated Lithium Fluoride Slugs

TO E.B. Montgomery

FROM W.M. Manning

COPY NO. [redacted]

Incorporated in ~~[illegible]~~

GEH. 11,162 [redacted]

pages 2 & 3

7-15-55

BEFORE READING THIS DOCUMENT, SIGN AND DATE BELOW:

~~[illegible] 11,162, dated [illegible]~~

W K [illegible] 9/3/47

[illegible] 8/19/48

[illegible] 11-5-48

[illegible] 10-11-50

Classification Cancelled and Changed To

DECLASSIFIED

By Authority of DOC

MAY 1973

SPECIAL RE-REVIEW
FINAL DETERMINATION
DECLASSIFICATION CONFIRMED
BY JP Derouin DATE 2-17-82

JE Savely 1-6-03

PD Amah 1-30-03

INVENTORIED
SEP 19 1952
DOCUMENT AUDIT AND
INVENTORY UNIT

INVENTORIED
MAR 16 1950
DOCUMENT AUDIT AND
INVENTORY UNIT

INVENTORIED
AUG 18 1953
DOCUMENT AUDIT AND
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[redacted]

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(ANL-WMM-21C) GE-H-11, 16

Consisting of 3 pages.
Containing 0 figures.

[redacted]

Plus Attachment

Argonne National Laboratory
P.O. BOX 5207
CHICAGO 80, ILLINOIS
BUTTERFIELD 1400

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[redacted]

August 29, 1947

Mr. E. B. Montgomery
P. O. Box 100
Richland, Washington

Subject: Heavily Irradiated Lithium Fluoride Slugs

Dear Mr. Montgomery:

Enclosed is a memorandum by Mr. Abraham giving additional information on the pressure phenomena in irradiated lithium fluoride. The table in his memorandum represents data on the more recent slugs. Data on earlier material are too fragmentary to permit quantitative generalizations. As Mr. Abraham's description implies, it is difficult to resist the conclusion that a sudden release of stored energy during irradiation is probably involved in the case of the swelled cans. It appears that there is a definite discontinuity between cans which show no swelling and no appreciable pressure release on one hand, and those which are considerably swelled, with high pressure release, on the other. However, Abraham feels that the correlation of external corrosion of cans is more with the total exposure than with whether cans are swelled or not.

It will probably be possible, with one or two man-weeks of work, to prepare an apparatus for measuring pressure inside the irradiated cans. We will have such a set-up prepared if you feel that the information to be gained would justify the time required. It would be highly desirable, in my opinion, for you or someone whom you may designate at Hanford to come to Chicago to go over the available information in further detail. It is probable that the direct exchange of questions during such a visit would yield further light on the problem than is possible through correspondence.

Sincerely yours,

W. M. Manning

W. M. Manning

WMM:rpr
cc: Area Office-Rodin
Reading File
Abraham

[redacted] prohibited by law.

[redacted]

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August 29, 1947

W. M. Manning

B. Abraham

Heavily Irradiated LiF Slugs

The following qualitative information is available on the heavily irradiated LiF slugs.

To my knowledge, only one slug has burst before arrival in Chicago; however, numerous cans have swelled because of the high internal pressure. If the top of such a can is sheared off, as in the normal opening procedure, this "gassy" can will explode; many cans that are not swelled will also explode. These explosions occur after the wall of the can has been thinned, or pierced by the cutter; accompanying the explosion is a burst of flame from the reduction of the free fluorine. The cans which are heavily irradiated are frequently corroded on the outside. Many cans have been so heavily corroded that it was impossible to read the numbers stamped on the ends. It was also observed, among the cans that did explode, that the LiF had sintered into the holes in the copper spacers. (A few of these spacers have been retained). It is difficult to explain this phenomenon unless it is assumed that the cans reached a high temperature during irradiation. If this were the case part of the high pressure could easily be accounted for by T_2 or TF released from the crystal; this would also account for the low yields on a weight basis (cc T_2/g LiF). To my knowledge, none of the swollen cans have been opened in vacuo to see if free T_2 or TF were present in larger amount than in the less heavily irradiated cans.

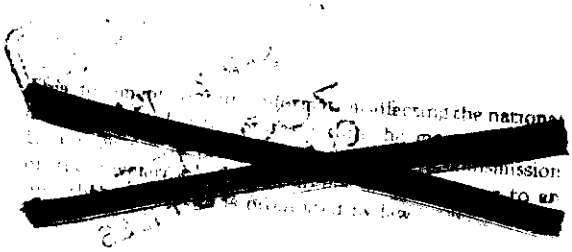
The following table lists some figures on the explosive cans.

Series	Number	Number Exploded	Average Irradiation (MWD/AT)
9	133-197	15 in 65	118
10	1-27	9 in 27	95
10	18-45	9 in 28	90
10	46-73	5 in 28	103

It is entirely possible that a contributing factor to the high pressures of fluorine present in the slugs is the lack of purity of the LiF. When the disks are sintered some of them are

a cream color to a deep red because of impurities which fall on the pellet from the fire brick. Recently some of the disks had bubbles formed during the sintering process; this was caused apparently by incompletely dried LiF. Also the cans are welded with the end slightly out of water. Although Mr. Carver at Ryerson assures me that the cap fits so tightly that no water would leak into the can, yet various amounts of water vapor could enter. The effects of these factors on the LiF are unknown.

BA:rpp
cc: Montgomery
Reading File
Rodin



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