

DATE 5-6-66 INIT *WMS*

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May 6, 1966

MOUND LABORATORY-MONSANTO  
CENTRAL FILE NO 66-5-157

Mr. W. P. Carroll, Chief  
Classification Branch  
Division of Classification  
Atomic Energy Commission  
San Diego, Tennessee 37831

| MOUND DECLASSIFICATION REVIEW  |                                     |
|--|-------------------------------------|
| 1ST REVIEW-DATE: <u>12/11/66</u>   | DETERMINATION (CIRCLE NUMBER(S))    |
| AUTHORITY: <input type="checkbox"/> AOC <input checked="" type="checkbox"/> KDC <input type="checkbox"/> ADD | 1. CLASSIFICATION RETAINED          |
| NAME: <u>Penetration</u>   | 2. CLASSIFICATION CHANGED TO: _____ |
| 2ND REVIEW-DATE: <u>1/9/67</u>   | 3. CONTAINS NO DOE CLASSIFIED INFO  |
| AUTHORITY: <u>ADP</u>  | 4. COORDINATE WITH: _____           |
| NAME: <u>R. P. Rota</u>  | 5. CLASSIFICATION CANCELLED         |
|  | 6. CLASSIFIED INFO BRACKETED        |
|  | 7. OTHER (SPECIFY): _____           |

Dear Mr. Carroll:

Enclosed are three rough drafts of a paper entitled "Autoradiographic Studies of the Penetration of Tritium in Stainless Steel" by Joseph D. Evans and Gene L. Downs which they wish to present at the "Frontier Meeting of the Metallography Group" which is to be held in Denver, Colorado, May 18, 1966. Would you please advise by telephone by May 16, if they may present this paper. While the meeting will be attended by AEC contractor employees only, clearance will not be required and the papers are supposed to be declassified.

The purpose of the authors is to demonstrate that the penetration of tritium in stainless steel is better disclosed by autoradiography than by beta counting of small samples machined from a large sample. Primarily, the authors wish to discuss the method in which samples are prepared and data acquired.

The data presented in this paper were acquired as part of the surveillance program at Mound. The stainless steel samples were sections of a stainless steel reservoir. Therefore, it is important that the data in the paper do not disclose any information requiring classification by Section 4, Reservoir Surveillance, of MM-CF-61-1-126, Mound Laboratory Classification Guide. The enclosed paper does not disclose any data falling under Topics 4.4.1 and 4.4.2. No quantities of material are presented which require classification by Topic 4.6.1. Topics 4.1, 4.2, 4.3, and 4.5 do not appear to apply.

GROUP 1  
Excluded from automatic  
downgrading and  
declassification

**RESTRICTED DATA**

This document contains restricted data as defined in the Atomic Energy Act of 1954. Its transmittal or the disclosure of its contents in any manner to an unauthorized person is prohibited.

**SECRET**

~~SECRET~~

Mr. H. F. Carroll

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May 6, 1966

Because of Topics 7.1.4.1 and 7.1.4.2, we have treated the existence at Mound Laboratory of uranium beds in stainless steel for handling tritium as unclassified and the existence at Mound Laboratory of stainless steel reactors used in the decomposition of tritium containing wastes as unclassified. Topic 7.2.2.1 allows the existence of sizable quantities of tritium at Mound on an unclassified basis. Topic 7.3.2.1 also allows us leeway in discussing the diffusion of tritium in stainless steel.

I believe the following points require careful consideration:

1. Do Figures 1 and 4, which show degree of darkening as a function of penetration, disclose that the sample was a gas contained a high pressure?
2. Do Table 1, Figure 2, and Figure 3 tend to disclose the nature of the sample?

The authors have lent me a copy of reference to "An Autoradiographic Technique for the Study of Tritium in Metals and Its Application to Diffusion in Zirconium at 149° to 240° C" by C. R. Cupp and P. Flubacher which appeared in the Journal of Nuclear Materials, No. 2, page 213, 1962. This paper shows concentration of tritium as a function of penetration into zirconium to be of the same order of magnitude as the Mound authors find for stainless steel. In the experiments by Cupp and Flubacher, a layer of zirconium hydride was prepared on a surface of the zirconium metal sample. The authors estimated the hydride to be one part tritium to 299 parts hydrogen. The uranium beds and the tritium recovery reactors used at Mound contain materials with tritium concentrations exceeding those in the experiments of Cupp and Flubacher. In addition, the uranium beds and tritium recovery reactors are operated at temperatures exceeding those in the experiments of Cupp and Flubacher. Therefore, the tritium concentrations and distances of penetration shown in the Mound work may be inconsistent with our unclassified uses of stainless steel to contain tritiated materials.

~~SECRET~~

**WBT**

Mr. H. F. Carroll

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May 6, 1966

I am transmitting a copy of this paper to Dr. L. M. Redman at LASL in case he wishes to give an opinion. I shall also ask Dr. D. W. Sherwood to confer with Dr. Redman about this paper.

We have given some consideration to deleting all data and remarks about depth of the penetration. Thus, we could delete the paragraph on page 4 which starts "Figure 1 shows photomicrographics..." On page 5 starting on line 8, we would delete the sentence "Figure 4 shows the concentration of tritium..." and the next sentence which starts "In these curves no correction..." We would also delete Figure 1 and Figure 4. However, we would prefer to present the paper without deletions if this is possible.

To expedite clearance of this information, copies are simultaneously being sent to Messrs. D. W. King and R. A. Anderson for patent review. If I can be of further assistance, please contact me.

Very truly yours,

Original Signed  
By J. F. Eichelberger

J. F. Eichelberger  
Coordinating Organization Director

JFE:va  
Enclosures (3)

**DISTRIBUTION:**

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**WBT**