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DATE 11/12/62 INIT. [illegible]

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Central File No. 62-7-141

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July 12, 1962

Mr. Hank Weiss
University of California
Lawrence Radiation Laboratory
Livermore, California

Dear Hank:

We received from Rocky Flats on Transfer Number SFJ-SBX-51P the alloy material which you had ordered. The two items arrived satisfactorily in the forms as requested. The weight of the tantalum container for the one item was not recorded. Only the weight of the alloy, 132 grams, was stated. Can you obtain more exact information on the weight of the alloy or the tantalum? The exact composition of this material is needed since a small variation in weight per cent composition results in a larger deviation in atomic per cent.

The smaller alloy sample was examined by differential thermal analysis. A copy of the actual DTA trace is included. The temperatures of the recorded phase transformations are listed in the accompanying table. The interpretation of the DTA data is based on the phase diagram which appears in LA-2312.

The only transformation which appears in conflict with the phase diagram is the one at 396°. This transition gives a sharp DTA peak, which is similar to the results obtained with other solid state phase transformations. This reaction is probably due to the zeta to zeta-prime transition of Pu_3Ga which is listed at 363° on the LASL phase diagram. According to that phase diagram, this phase is not expected to be present. Possibly the solid solution line for delta plutonium is in error in the diagram, or the composition of the alloy examined is greater than one weight per cent gallium.

MOUND DECLASSIFICATION REVIEW
1ST REVIEW-DATE: 12/17/72 DETERMINATION (CIRCLE NUMBER)
AUTHORITY: DADC DADC DADD 1. CLASSIFICATION RETAINED
NAME: [illegible] 2. CLASSIFICATION CHANGED TO:
3. CONTAINS NO DOE CLASSIFIED INFO
2ND REVIEW-DATE: 11/10/77 4. COORDINATE WITH:
AUTHORITY: [illegible] 5. CLASSIFICATION CANCELLED
NAME: [illegible] 6. CLASSIFIED INFO BRACKETED
7. OTHER (SPECIFY)

GROUP 1
Excluded from automatic downgrading and declassification

RESTRICTED DATA
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SECRET

Based on the foregoing information, the heat capacity determinations will be made at 100° intervals up to 500°C with additional measurements made immediately below and above 396°. If the reaction at this temperature is the zeta to zeta-prime phase change, in Pu_3Ga, the heat of the transformation will be measured. For a first-order phase reaction of this type we expect very little difference in the heat capacity above and below this temperature. As an example, only small differences have been observed in the specific heats of the many phases of unalloyed plutonium. A large change in heat capacity would be expected if the alloy went through a second-order phase reaction, such as at the Curie point of nickel, but this type of transformation was not indicated from the DTA examination.

The calorimeter has been calibrated for this determination and the heat capacity determination on the alloy is in progress this week. As soon as additional information is developed, I will forward it to you.

Yours truly,

L. J. Wittenberg

L. J. Wittenberg
Section Leader
Reactor Fuels Section

LJW:clt
Enclosures (2)

Distribution:
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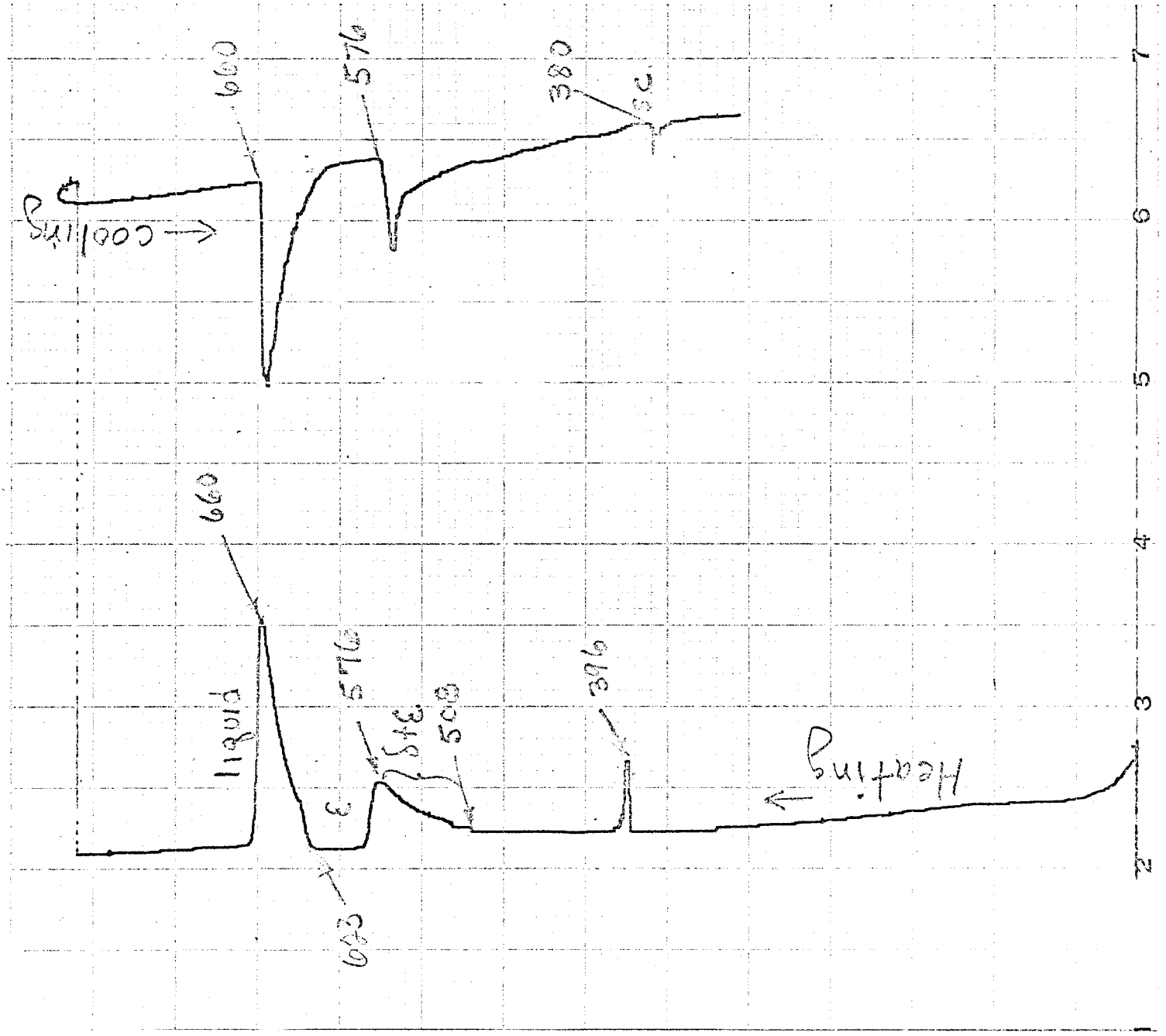
PHASE TRANSFORMATIONS BY DTA

Temperature Indication, °C Heating	Cooling	Phase Diagram Interpretation
396	380 - supercooled	see discussion
508	508	start of delta to epsilon two phase area
576	576	completion of delta to epsilon two phase area
623	620	start of melting
660	660	completion of melting


cooling
660
576
380
S.C.
Heating
396
508
576
660
liquid
ε
673
1
2
3
4
5
6
7