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DATE 10/3/62 INIT

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MOUND LABORATORY-MONSANTO
Central File No. 62-10-49

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October 3, 1962

Mr. J. F. Willging
The Dow Chemical Company
Rocky Flats Division
P. O. Box 2131
Denver 1, Colorado

CLASSIFICATION	
1. AUTHORITY <input type="checkbox"/> AOC <input checked="" type="checkbox"/> ADC <input type="checkbox"/> ADD	1. CLASSIFICATION GRA
NAME: <u>JIM FRANZMAN</u>	2. CLASSIFICATION GRA
END REVIEW DATE: <u>12/31/68</u>	3. CONTAINS NO DOE CLA
AUTHORITY: <u>ADD</u>	4. COORDINATE WITH
NAME: <u>[Handwritten]</u>	5. CLASSIFICATION CANCELLED
	6. CLASSIFIED INFO BRACKETED
	7. OTHER (SPECIFY)

Dear Jim:

I am enclosing a typical differential thermal analysis trace which we obtained on the plutonium alloy containing one weight per cent gallium which you had prepared for Hank Weiss of LRL. This is the material that I discussed with you at Hanford. Since you have found an abnormality in the region immediately below 400°C, the break in the heating curve at 396°C becomes a further substantiation of your results.

The DTA trace of this alloy sample, which had equilibrated at room temperature overnight, shows that no transformation occurs until the alloy temperature reaches 396°C. Following this transformation, the trace indicates transformations which are identified as the start of delta to epsilon transformation at 508°C, the completion of this transformation at 576°, the start of melting at 623° and the completion of melting at 660°. Each of these transformations occurs during the cooling cycle, although the 396° transformation super-cools to 380°. All of these transformations are in agreement with the phase diagram for this system presented in LA-2312, except for the transformation at 396° and the initiation of the melting at 623°.

The plot of the specific heat data is also being sent to you to illustrate this abnormality. The specific heat determinations were measured in the Mound high-temperature calorimeter. The specific heat values are given in terms of gram-atoms (gram-atoms plutonium plus gram-atoms gallium). A graph of these data shows

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RESTRICTED DATA

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Mr. J. F. Willging

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that the specific heat of this alloy is in the same range as found for unalloyed plutonium. The difference in the specific heats of the two phases above and below 397° is very small as compared to the differences among the phases in unalloyed plutonium. The appreciable heat of transformation measured at 397°, 28 calories/gram-atom, confirms that a first-order phase transformation occurs at this temperature. The agreement on the temperature of the transformation as measured by DTA, 396°, and by the calorimeter, 397°, is remarkably good.

We plan to analyze this alloy for impurities, as time permits, and to scan polished sections of the sample for inclusions by means of the electron microprobe x-ray analyzer. I would appreciate it if you could send me an analysis of a typical lot of this alloy or of the plutonium used to make the alloy.

I enjoyed talking to you at Hanford. I hope that you can arrange to visit the plutonium activity at Mound Laboratory some time in the near future.

Very truly yours,

Original Signed By
Lerroy V. Jones

Lerroy V. Jones, Director
Technical Support Department

LVJ:clt

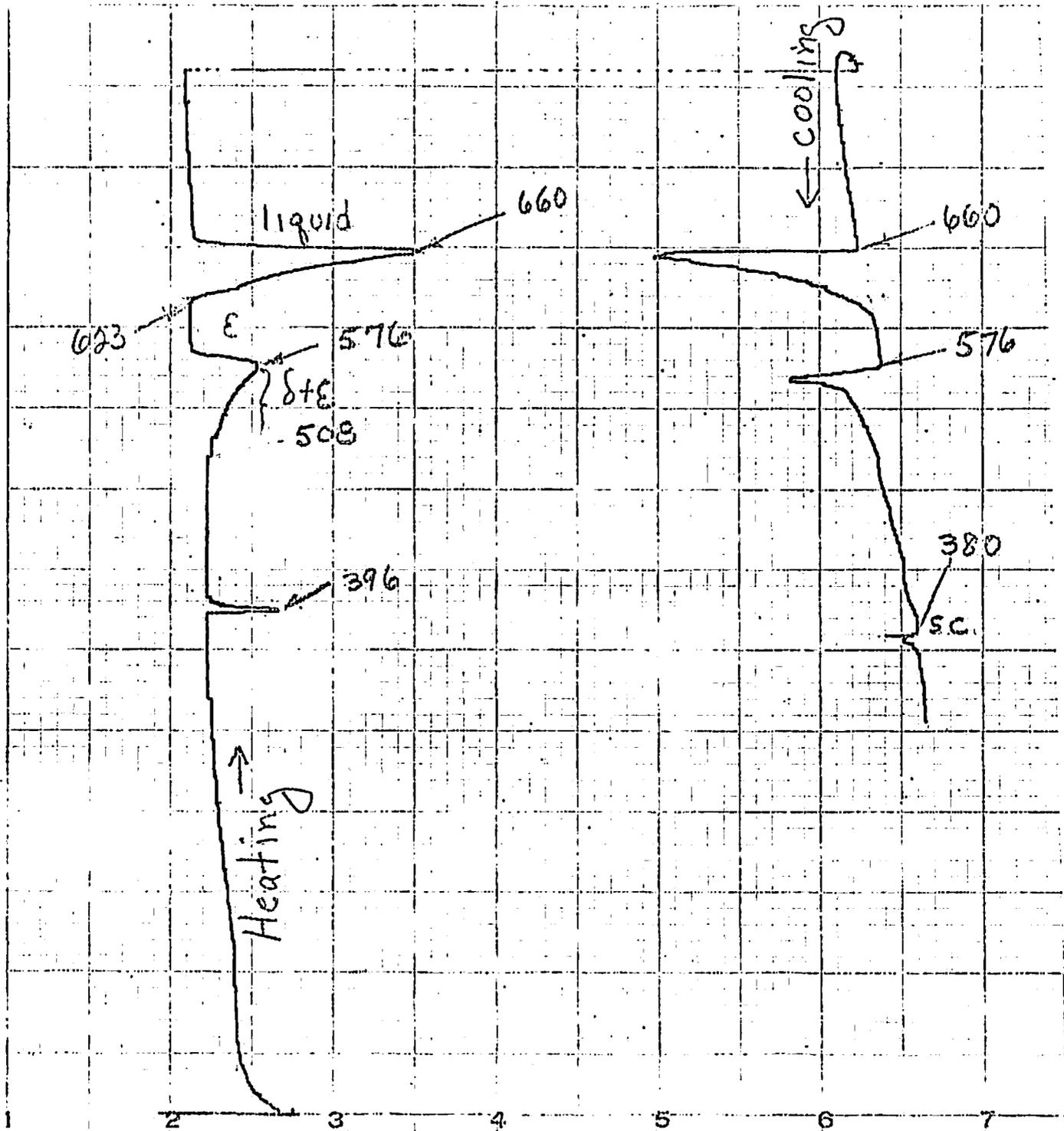
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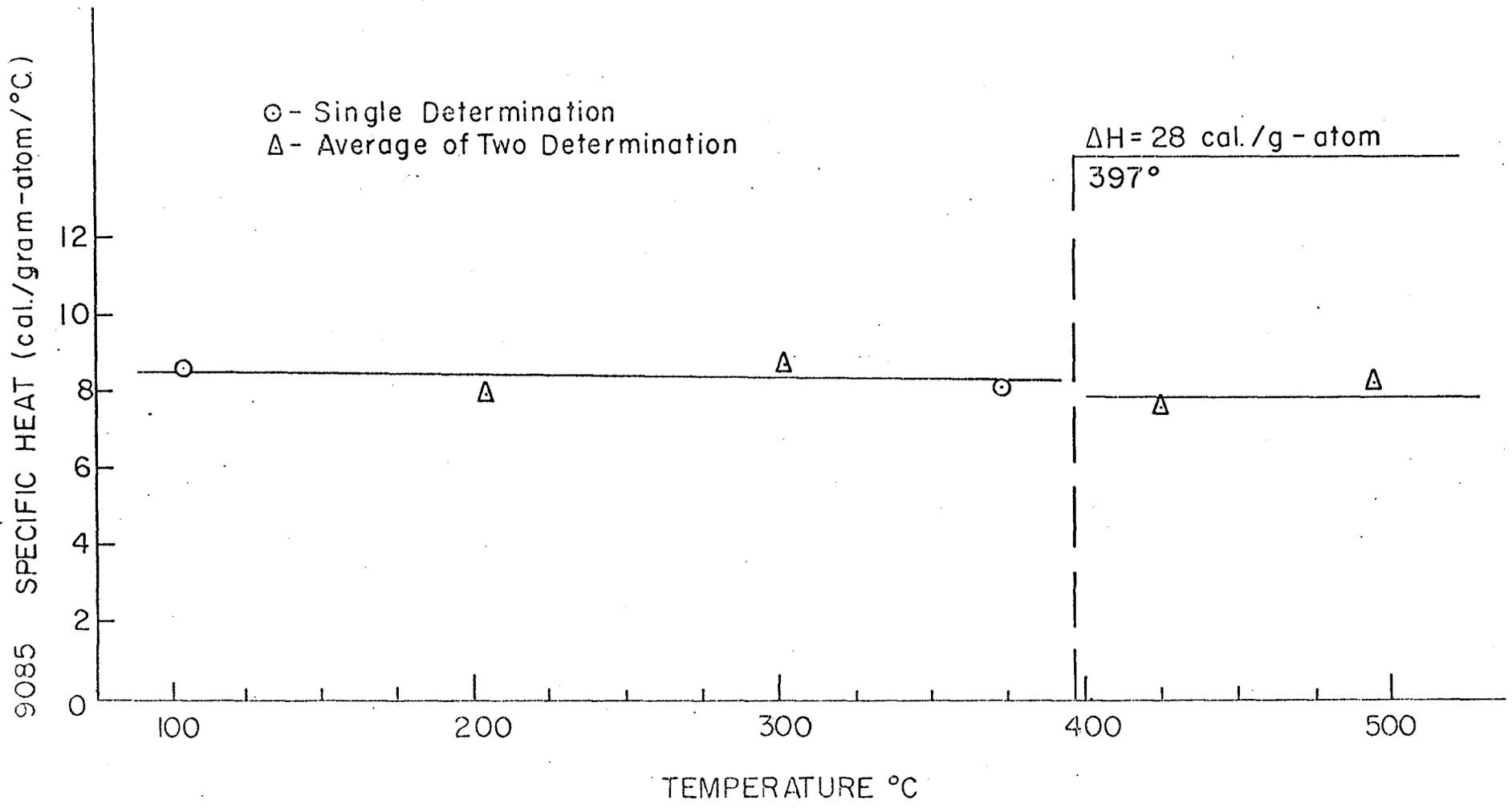


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SPECIFIC HEAT OF Pu-10% Ga. ALLOY

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