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G.E. NUCLEONICS PROJECT

GENERAL ELECTRIC COMPANY

PA. 7

HW-11853

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By Authority of
By D.L. SAMPLES
Date 10/31/86

#1,2,3,4 - F.C. Schlemmer,

Richland, Washington

December 15, 1948

U. S. Atomic Energy Commission
Hanford Operations Office
Richland, Washington

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Attention: Mr. F. C. Schlemmer, Manager

Gentlemen:

FABRICATION YIELDS WITH FORGED URANIUM

During the uranium production rolling run at Vulcan in Aliquippa, Pa., on October 27 and 28, fifty-two Type B uranium billets were forged to 2" squares and finish-rolled to 1.45" nominal diameter rounds. The details of this forging trial are recorded in Doc. HW-11739, dated Dec. 3, 1948.

In accordance with the verbal request of H. F. Reichard (New York A.E.C. Office) to R. J. Schier, we present below the results obtained in machining slugs from these rods at Hanford. The comparative data for regular alpha rolled uranium represent the average for all Type B billets rolled to Oct. 1. An estimate of the yields theoretically obtainable is included.

	Forged Rods	Regular Rolled Rods	Theoretical Yields
Rolling Yield (Billet to Rod)	97.3%	97.9%	99.0%
Machining Yield (Rod to Slug)	72.3	70.8	79.0
Overall Yield (Billet to Slug)	70.5	69.3	78.2
Machining Scrap - Solid	4.0	8.8	2.5
Machining Scrap - Turnings	23.7	20.4	18.5

These data show that significantly less solid rod scrap was obtained with the forged material than is normal for rolled metal. Even this amount of scrap probably would have been less had flat-bottomed billets been forged, since the projections on the bottoms of the present billets produced flaws that were not removed in machining. This reduction in rod scrap is not reflected in the rod-to-slug yield, however, because these rods proved to be slightly oversize and gave an unusually large amount of turnings. Rolling conditions suitable for producing 1.45" nominal diameter rods with straight alpha rolling produced oversized rods after forging. With the small number of rods forged, it was not possible to determine the rolls adjustment necessary to obtain this nominal diameter.

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Slightly more surface oxidation occurred during the combined forging and rolling fabrication than is normal with straight rolling, because it was necessary to use two preheats (one for the billet and one for the forged bar). The forging hammer was located too far from the rolling mill to permit finishing the forged rods without an additional preheat.

These promising results indicate that a substantial increase in the fabricating yield of uranium may be effected by forging billets to intermediate-size squares and finish-rolling to rounds. The rod forming time economy of this combination process has been noted previously, and metallographic examination of the resultant rod structure shows it to be very similar to that of regular rolled material. Prompt pile evaluation is planned.

Yours very truly,

T. W. Hauff, Head,
Metallurgy and Control Division

RJ Schier/mcs