UNCLASSIFIED NMI-PL-65

**REPORT ON EXPLOSION OF EXTRUDED
THORIUM METAL**

By
Paul Loewenstein

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CLASSIFICATION CANCELLED
DATE FEB 27 1957 *let*
For The Atomic Energy Commission
J. R. Canale
Chief, Declassification Branch

December 2, 1954

Nuclear Metals, Inc.
Cambridge, Massachusetts

This document is
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Hugh Kinsler
Authorizing Official
Date: *7-20-12*

UNITED STATES ATOMIC ENERGY COMMISSION
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AEC RESEARCH AND DEVELOPMENT REPORT

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NUCLEAR METALS, INC.

M E M O R A N D U M

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TO: J. T. Morris
FROM: F. Loewenstein
SUBJECT: Report on Explosion of Extruded Thorium Metal
DATE: 12-2-54

A 1/2" O.D. extrusion of thorium metal was made on 11-26-54 by the Fabrication Group. The starting material was powder provided by Horizons, Inc. The extrusion billet was produced by canning and cold pressing in copper. All necessary precautions were taken to avoid both inhalation and burning of the powder. The whole operation was approved and monitored by Mr. Sam Levin of Industrial Hygiene Associates. The rod was extruded at 1400°F.

The copper was removed from the rod by etching in dilute nitric acid. The technician doing this operation called me to point out that this material appeared to react slightly with the acid. The thorium usually used at NMI (both Ames and Fernald cast metal) does not visibly react with nitric acid. At the time I saw the rod, the action on the thorium was very slight, and all copper had been dissolved. The rod was washed in water and dried. The surface of the rod was somewhat rough but no more so than cast material.

About 2' of the rod was reduced in diameter by the swaging machine. One end was swaged first without any mishap. When the rod was turned and swaging started on the more ragged end, a violent explosion consisting mostly of a flash of fire occurred. The technician was not hurt as he wore gloves and safety glasses, but he reported small prickly deposits on those parts of

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Memo to J. T. Morris

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his face that were not protected. He had no visible burns.

The complete rod, after the explosion, was covered with a white powder distributed in deep ridges along the rod. Attempts will be made to determine the nature of the powder. Our first theory is that it is a thorium oxide and resulted from oxidation of the hydride. It could also be finely-powdered thorium metal deposited on the surface during packing with a coating of copper. When the copper was removed by etching it may have left a pyrophoric deposit. Chemical analysis is under way to determine the exact nature of the surface of the remaining material. Further work on this material will be done only with the greatest precaution to avoid any further accidents.

HEAD OF 12/2/54

THORUM

THORUM

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