
**Cover Sheet for a Hanford
Historical Document
Released for Public Availability**

Released 1994

**Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830**

**Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute**



DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.



ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY

INCORPORATED

P. O. Box 100 RICHLAND, WASHINGTON

EXPLOSIVES DEPARTMENT—TNX

DECLASSIFIED

- Copy #1. Simon-Hotman-Bugbee-700
- #2. R. F. Peterson
Wilmington
- #3. Swensson-Smith
- #4. Worthington
- #5. Crane
- #6. Miles-300
- #7. Pink Copy
- #8. Yellow Copy

700
X

Classification Cancelled (Change to

Declassified)

By Authority of H.F. Carrell

SECRET, 8-16-60 July 31, 1944

By B. Jones 11-8-66

PRODUCTION TEST NO. 105-1-P

EFFECT OF PILE OPERATION ON THE CHARACTERISTICS OF THE

GRAPHITE FILLER (WIGNER DISEASE)

Objective: To determine by tests on irradiated samples of graphite the effect of pile operation on the thermal conductivity, dimensional changes, and mechanical strength of the graphite filler. This information would assist in assuring the continuance and safety of the pile operation insofar as the graphite is concerned.

Basis: Investigations at the Metallurgical Laboratory and Clinton indicate that large changes in the thermal conductivity and mechanical strength of graphite are to be expected in relatively short periods of normal operation of the Hanford piles. Samples irradiated in the X pile for periods corresponding roughly to one day at W have shown a decrease of approximately 30% in thermal conductivity and an increase in breaking strength of approximately 30%. The thermal conductivity will not seriously affect the temperature of the pile so long as it does not decrease to below 5% of its initial value. The time required for such an occurrence has not been established. The changes in mechanical strength may eventually cause serious damage with the occurrence of embrittlement, crumbling or some other destructive change.

Procedure: Samples of graphite will be placed into the special test hole assembly provided for the purpose and these samples will be irradiated in the course of the normal pile operation. Samples will be removed from this assembly during shut-down periods after intervals of irradiation to be determined on the basis of best information available at the time. It is believed that the first samples will be removed at about the 100 Megawatt day point; the second, 200 MWd; third, 400 MWd, etc.

The performance of the test is not expected to interfere with normal operation unless a shut-down to remove samples is indicated by other data to be advisable in order to determine changes in the properties of the graphite. Samples will be removed by the Technical Department. Manufacturing will approve detailed plans for sample removal as regards any health hazards.

Data: The exact exposure of individual samples will be determined from operating records. The physical properties of thermal conductivity, transverse breaking strength and compressive strength of the irradiated samples will be measured by the Technical Department with equipment installed in Bldg. 3706.

DECLASSIFIED

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED DT

MASTER

PRODUCTION TEST NO. 105-1-P Continued

Equipment: Nine tube test hole, gas and water cooled, test hole "B", sample receivers, aluminum sample tubes, sample tube retriever, graphite samples, breaking strength and thermal conductivity equipment (Building 3706).

Responsibility:

J. B. Miles	100 Technical
W. E. Jordan	100 Technical
J. J. O'Connor	100 Technical
H. A. Fowler	100 Technical

Approvals:

<u>M. H. Smith</u>	M. H. Smith--Operations	<u>8/12/44</u>	Date
<u>P. W. Crane</u>	P. W. Crane--Technical	<u>8-10-44</u>	Date

Estimated Completion: The extent and duration of the Wigner disease monitoring will depend on the experimental results.

WEJ:al

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

UNCLASSIFIED