AIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910

301/587-8202

Centimeter

Inches

MANUFACTURED TO AIM STANDARDS
BY APPLIED IMAGE, INC.

DISCLAIMER

This is a **historical document** that is being released for public availability. This was made from the best available copy. Neither the United States Government nor any agency thereof, nor Battelle Memorial Institute, 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. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DECLASSIFIED

HW-75607 A

HANFORD CODE 15

This document classified by

MaChinton

This document consists of
8 pages.

PRODUCTION TEST IP-550-I, SUPPLEMENT A
ROUTINE MONITORING FOR MODERATOR OXIDATION RATES

by

R. E. Baars
Process Engineering Unit
Process Technology Subsection
Research and Engineering Section
IRRADIATION PROCESSING DEPARTMENT

Classification Cancelled and Referred To

DECLASSIFIED

By Authority of CG-PR-2,
DS Hums, 3-15-94.
By Jerre Maley, 4-6-94.
Verified By J E Saily 4-15-94

April 29, 1964

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

NOTICE

This report was prepared for use within General Electric Company in the course of work under Atomic Energy Commission Contract AT(45-1) - 1350, and any views or opinions expressed in the report are those of the author only. This report is subject to revision upon collection of additional data.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

DECLASSIFIED

FW 160 A

DISTRIBUTION

1. AEC-RLOO: FM Midkiff
2. AEC-RLOO: RL Plant
3. AEC-RLOO: CN Zangar
4. TW Ambrose
5. RE Baars
6. GD Baston
7. RS Bell
8. MA Clinton
9. RG Clough
10. AE DeMers
11. JE Ferguson
12. EJ Filip
13. SM Graves
14. OH Greager
15. AK Hardin
16. CG Lewis
17. AR Maguire
18. AW Medcalf
19. JE Morrissey
20. RV Myers
21. RE Nelson
22. RW Reid
23. A Russell
24. BA Ryan
25. OC Schroeder
26. HG Spencer
27. SA Wood
28. FH Spivey
29. JOC Ellis
30. R. J. ...

DECLASSIFIED

PRODUCTION TEST IP-550-I, SUPPLEMENT A
ROUTINE MONITORING FOR MODERATOR OXIDATION RATES

OBJECTIVE

The objective of this supplement to Production Test IP-550-I¹ is to include the K reactors in the program for routinely monitoring graphite oxidation rates. This supplement does not initiate a new program; it continues one which has been in existence for some time.

BASIS AND JUSTIFICATION

Oxidation of the reactor graphite weakens its structural capacity. At some degree of oxidation, sufficient loss of strength will occur to significantly affect the ability to maintain and operate the reactors. For this reason it is necessary to control and to monitor the rates of oxidation in reactor. It is difficult to accomplish the latter in a truly representative fashion. A number of methods of obtaining information on this subject must be used; one of these is to expose small samples to the reactor atmosphere under operating conditions and then determine the average rate at which the samples have changed weight. This method has been employed in one fashion or another for some time. Until June, 1962, the program was authorized by Production Test 105-532-E,^{2,3} from June, 1962, until January 26, 1964, the program was authorized by PITA IP-20-I⁴ at the K reactors.

TEST REQUIREMENTS

The specific test requirements are outlined below. For further discussion and information see Reference 1.

The standard oxidation samples will be 0.4375 inches in diameter by 4 inches long, and will be located in sample carriers (boats) of one of the following two designs:

1. Open Carriers

Hollow cylinders of graphite 1.25 inches O.D., 0.75 inches I.D., and 17 to 22 inches long, with perforated walls, and shaped on the downstream ends to facilitate insertion and removal from the channel.

2. Open-Closed Carriers

Similar to the above design but compartmented so that the downstream one-half of the carrier totally encloses the samples with graphite.

The open carriers will normally contain five samples; the open-closed carriers will normally carry four samples with two in each half of the carrier.

DECLASSIFIED

HW-75607 A

Eleven carriers will be charged and so spaced that 1) the region between 80 and 100 inches from the front of the stack, and 2) the region between 180 and 200 inches from the front of the stack are continuously monitored. Coverage of other portions of the channel shall be as specified by representative of Hanford Laboratories with the concurrence of a representative of Research and Engineering. Non-standard carriers may be used except for the required coverage regions mentioned above, but must meet the following criteria:

1. Maximum O.D. - 1.5 inches.
2. Maximum length - 22 inches, minimum length - 6 inches (8 inches at DR and H).
3. Small samples located within carriers shall be long enough so that there is small likelihood of falling out, or the carrier design shall be such that they cannot fall out.
4. The probability of interfering with installation or removal of standard carriers and samples is small.

Standard samples shall be made of nuclear graphite of a grade equivalent to portion of the stack in which they will be exposed. (Investigations of the need for this requirement are being initiated.) Every effort shall be made to avoid using standard samples which contain catalytic impurities.⁵

Individual charges shall have a maximum residence of three months. However, with changing operating conditions, this time may be lengthened upon agreement between Processing and Process Technology. Residence times may be less than three months (but not less than 20 operating days) when there is cause to believe that oxidation rates have been excessive, or in order to obtain a fast evaluation of some change in operating conditions.

Samples shall normally be exposed in channels 3066-KE and 1880-KW, the channels permanently devoted to this purpose. Occasionally, other channels may be left empty for a period of operation. This production test authorizes the exposure of samples in such channels until they are again returned to service, with the approval of the Processing Manager for the reactor involved.

It is not the intent of this program to discourage new approaches to investigating moderator burnout. However, standardization of routine monitors and of charge makeup and spacing is needed if adequate routine monitoring is to be accomplished.

SCHEDULE

This production test shall be effective upon completion of all authorizing signatures. Those samples in residence at the effective date of authorization shall be changed out upon reaching three months residence time, as earlier specified. The duration of this supplement shall coincide with the original production test. The latter will expire on April 1, 1965.

COSTSCost Code

XXX-5R30-XXX.78

Production Loss

Approximately one hour of front and rear elevator time is needed to accomplish a sample changeout. Frequently, sample changeouts can be performed on unscheduled outages or at such times during a scheduled outage that a net loss of operating time is not incurred. To the extent required, however, twelve hours of outage time per year per reactor is authorized. This allowance assumes four routine and two short-term changeouts per permanent oxidation channels plus six changeouts in other than permanent oxidation channels.

<u>Cost</u>	<u>Production Loss/Year</u>	<u>Outage Time</u>	<u>Front & Rear Elevator Time</u>
(Per reactor per year)	Approx. 2200 MWD	12 hours	12 hours

A minimum of one process channel per reactor shall be devoted continuously to the exposure of oxidation samples for routine monitoring. The production loss associated therewith is in addition to that quoted above for sample changeout.

RESPONSIBILITIES1. Processing Operation

Each Processing Operation will be responsible for scheduling routine sample changeouts as previously specified with the Irradiation Testing Unit.

2. Testing Subsection

The Irradiation Testing Unit (ITU) will be responsible for sample changeouts as requested, and will be responsible for notifying the appropriate HLO component of scheduled changeouts. ITU will be responsible for assuring that nonstandard sample designs are feasible to install and remove and will have the authority to refuse to charge particular samples from this standpoint unless the additional risk is separately authorized by supplement to this production test. ITU will be responsible for supplying operating time data to the appropriate HLO component. ITU shall inform the manager of the affected reactor of the details of any nonstandard samples planned for insertion into his reactor. Unless ITU is notified otherwise, the manager's concurrence will be assumed.

3. Process Technology Subsection

The Process Technology Subsection will be responsible for arranging with HLO to supply samples and carriers and to determine the weight loss rate of

exposed samples, for auditing compliance with the provisions of the production test, and for interpretation of the oxidation rates determined, and recommendations for correction action where warranted.

4. Process and Reactor Development Subsection

The Process and Reactor Development Subsection shall be responsible for assisting in the interpretation of the routine monitor results, for programming such additional investigative work as may be pertinent to interpretation of monitor results; and, in general, for evaluating the effect of graphite oxidation rates and for developing technical bases for limits.

Engineer,
Process Engineering Unit

RE Baars:md

DECLASSIFIED

HW-75607 A

-/-

REFERENCES

1. Baars, R.E., Production Test IP-550-I, Routine Monitoring for Moderator Oxidation Rates, HW-75607, April 1, 1963, (Secret).
2. Woodley, R.E., Production Test 105-532-E, Graphite Burnout Monitoring Program, HW-29739, October 23, 1953, (Secret).
3. Woodley, R.E., Production Test 105-532-E, Supplement A, Graphite Burnout Monitoring Program, HW-30571, January 4, 1954, (Secret).
4. Baars, R.E., Process Improvement Transition Authorization IP-20-I, Increased Graphite Temperature Limits and Use of Nitrogen in the K Reactors, HW-73991, June 13, 1962, (Secret).
5. Ryan, B.A., Localized Oxidation in Nuclear Graphite, HW-73859 Rev., August 14, 1962.

APPROVALS

R. W. Reid, Manager
Process Technology Subsection
Research and Engineering

E. J. Filip, Manager
KW Processing Operation
KE-KW Reactors Operation
Manufacturing

T. W. Ambrose, Manager
Process & Reactor Development Subsection
Research and Engineering

R. G. Clough, Manager
KE Processing Operation
KE-KW Reactors Operation
Manufacturing

C. G. Lewis, Manager
Testing Subsection
Research and Engineering

O. H. Greager, Manager
Research and Engineering

A. R. Maguire, Manager
KE-KW Reactors Operation
Manufacturing

R. S. Bell, Manager
Manufacturing

**DATE
FILMED**

6/17/94

END