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.

DECLASSIFIED

HW-71619 RD Rev. 7-4

DATE
February 16, 1962

GENERAL ELECTRIC

X

TITLE

TECHNICAL SPECIFICATIONS - HANFORD PRODUCTION REACTORS

□

AUTHOR

Compiled By

W. D. Gilbert

CIRCULATING COPY
RECEIVED 100 AREA

FEB 20 1962

RETURN TO

TECHNICAL INFORMATION FILES

THIS DOCUMENT IS NOT BE LEFT UNATTENDED WHERE AN UNAUTHORIZED PERSON MAY HAVE ACCESS TO IT. WHEN IN USE, IT MUST BE STORED IN AN APPROVED LOCKED REPOSITORY WITHIN AN APPROVED GUARDED AREA. WHILE IT IS YOUR RESPONSIBILITY AND UNTIL YOU HAVE OBTAINED A SIGNED RECEIPT FROM CLASSIFIED FILES, IT IS YOUR RESPONSIBILITY TO KEEP IT AND ITS CONTENTS WITHIN THE LIMITS OF PROJECT AND FROM ANY UNAUTHORIZED PERSON. ITS TRANSPORT, USE, AND STORAGE IN YOUR PLACE OF RESIDENCE IS PROHIBITED. IT IS NOT TO BE DUPLICATED. IF ADDITIONAL COPIES ARE REQUIRED, OBTAIN THEM FROM THE ISSUING FILE. ALL PERSONS READING THIS DOCUMENT ARE REQUESTED TO SIGN IN THE SPACE PROVIDED BELOW.

[illegible]

DECLASSIFIED

DECLASSIFIED

HW-71619-RD, - Rev. 04
Page 1

TECHNICAL SPECIFICATIONS HANFORD PRODUCTION REACTORS

By the
Research and Engineering Operation
IRRADIATION PROCESSING DEPARTMENT

Compiled by
W. D. Gilbert

February 16, 1962

DISTRIBUTION

1. FW Albaugh
2. JH Brown
- 3-4. TR Clark
- 5-6. CH Crandall
7. RL Dickeman
8. JW Finnigan
9. WD Gilbert
10. OH Greager
11. AB Greninger
12. MC Leverett
13. WR Lewis
14. R Nilson
15. HM Parker
16. PH Reinker
17. NG Wittenbrock
- 18-21. AEC-HOO: CN Zangar

Classification Cancelled and Changed To

DECLASSIFIED

By Authority of D. S. Lewis

CG-PR-2, 3-3-94

By J E Squely 3-7-94

Verified By DK + Hanson, 3-17-94

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

This document consists of
23 pages. No. 12 of
21 copies. [REDACTED]

DECLASSIFIED

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 2

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS
HANFORD PRODUCTION REACTORS

	<u>Page</u>
I. FACILITY IDENTIFICATION	3
II. REFERENCES TO DESCRIPTION OF FACILITIES	3
III. OPERATING AND PERFORMANCE RESTRICTIONS	3
A. Reactivity	3
B. Reactor Control and Safety Elements	5
C. Power Level	7
D. Temperature and Heat Flux	7
E. Reactor Fuel Loadings	8
F. Reactor Coolant System	8
G. Reactor Confinement	10
H. Test Facilities	11
I. Code Compliance	11
J. Reactor Scram Set Points	12
IV. ADMINISTRATIVE PROCEDURES	19
A. Process Control Procedures	19
B. Training Programs	21
C. Audits and Inspections of Reactor Operation and Maintenance	21
D. Reports and Records	22
V. AUTHORIZATION FOR CHANGES	22

DECLASSIFIED

HW-71619 RD Rev 4
Page 3

TECHNICAL SPECIFICATIONS HANFORD PRODUCTION REACTORS

I. FACILITY IDENTIFICATION

These Technical Specifications shall be applicable to the eight operating production reactor facilities, namely B, C, D, DR, F, H, KE and KW (hereinafter referred to as the Hanford Production Reactors), located at the Hanford Site in the State of Washington.

II. REFERENCES TO DESCRIPTION OF FACILITIES

Basic descriptions of the reactor facilities are contained in the following reports. These reports are not to be considered a part of these Technical Specifications.

HDC-2225, C431-B Scope Document, 105-C Reactor Plant, H. L. Hollister, 6-1-51.

HDC-2524, Basic Design Specifications for "X" Pile No. 1.10 (Twin K Reactors), G. M. Roy, 3-11-52.

HW-25892, Summary Report of Reactor Hazards for Twin 100-K Area Reactors, G. M. Roy, G. L. Locke, E. L. Armstrong, C. Sege, 10-10-52.

HW-44708, Vol. I Rev., Hazards Summary Report, Projects CG-558 and CG-600 Reactor Plant Modifications, R. E. Trumble, 3-6-57.

HW-44708, Vol. II, Hazards Summary Report, Projects CG-558 and CG-600 Reactor Plant Modifications, R. E. Trumble, 12-21-56.

III. OPERATING AND PERFORMANCE RESTRICTIONS

A. Reactivity

1. Maximum Loading Reactivity

The cold or hot reactivity of the water cooled loading⁽¹⁾ shall never exceed the combined negative reactivity worth associated with the Horizontal Control Rod System, the xenon present in the reactor, inserted

(1) The loading includes all fuel and integral fuel-target columns in the active zone of the reactor. Poison materials charged in separate columns or capable of insertion or discharge separate from adjacent fuel are considered separately as poison columns in the loading as defined above.

DECLASSIFIED

HW-71619 RD Rev 4
Page 4

supplementary control devices, and the poison pieces or poison columns under irradiation. That is, the reactivity in excess of that compensated by inserted supplementary and permanent poisons shall not exceed the strength of the Horizontal Control Rods, i.e., 1.5 per cent $\Delta k/k$ in the B, D, DR, and F Reactors, and 2.5 per cent $\Delta k/k$ in the C, H, KE and KW Reactors.

Supplementary control in the operating reactor shall be limited in use to compensate for not more than 4.0 per cent $\Delta k/k$ excess reactivity. Supplementary control in addition to this amount may be required for a shutdown reactor to satisfy Total Control requirements.

The fuel loadings as described in Section III E shall be consistent with these reactivity restrictions. Conditions more restrictive than the above may be required to fulfill Total Control requirements in the dry core as specified below.

2. Total Control Criterion

The operation of the Hanford Production Reactors shall be such that in the event of any credible combination of events, or complete and permanent loss of coolant, the total available control strength of the combined reactor control systems will be sufficient to ensure that no reactivity state will develop which would significantly increase the consequences of the accident.

No reactivity state following loss of coolant will be permitted to develop in the dry reactor after the scram and after any power excursion which may have accompanied the accident which would decrease the probability of restoring coolant to the reactor. That is, adequate control elements will be inserted or available for insertion into the reactor to ensure

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 5

subcriticality immediately following a complete loss of water from the reactor core. A delayed neutron critical state is permitted after significant numbers of process tubes have been rendered useless as coolant channels. A prompt critical state shall never be permitted.

3. Speed of Control Criterion

The operation of the Hanford Production Reactors shall be such that in the event of a power excursion resulting from any credible combination of events, or complete and permanent loss of coolant, the response of the reactor control system shall be sufficiently rapid to ensure that no energy state will develop during the excursion which would significantly increase the consequences of the accident.

The energy generated in a power excursion resulting from a loss of coolant accident as described in the referenced Hazards Summary Reports shall be insufficient to allow the surface temperature of the fuel in the reactor to reach the melting point of uranium, i.e., 1133 C. The excursion is considered terminated when the pile power level returns to its pre-accident value. Following this period, if coolant is not restored immediately, fuel melting would occur from heat generated by fission product decay, independent of a power excursion.

B. Reactor Control and Safety Elements

1. Horizontal Control Rods

- a. The maximum reactivity insertion rate due to the Horizontal Control Rod withdrawal will be limited mechanically to less than $5 \times 10^{-4} \Delta k/k$ per second.
- b. If the calculated control effectiveness of a Horizontal Control Rod is reduced by more than 10 per cent due to poison burnout, the rod shall be replaced.

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 6

2. Vertical Safety Rods

- a. For a cold startup, the reactivity insertion rate afforded by Vertical Safety Rod withdrawal shall be limited by procedural control to less than $2 \times 10^{-4} \Delta k/k$ per second.
- b. For a hot startup, the reactivity insertion rate afforded by Vertical Safety Rod withdrawal shall be limited mechanically to less than $2.5 \times 10^{-3} \Delta k/k$ per second.
- c. At the power levels specified in Section III C, the maximum allowable insertion time and the minimum number of operable Vertical Safety Rods shall be as follows:

<u>Reactor</u>	<u>Rod Insertion Time - Seconds</u>	<u>Minimum Number of Operable Vertical Safety Rods</u>
B,D,F,DR	2.4	20
H, C	2.4	30
KE, KW	2.3	28

Rod insertion time is defined as the interval between first movement and 90 per cent downward travel of the rod. Rods not meeting this specification are considered inoperable. The outer six rods at the K Reactors are not considered as part of the safety system.

In the B, D, and F Reactors, an inoperable rod shall have no more than one adjacent rod also inoperable. In the C, DR, H, KW and KE Reactors, an inoperable rod shall have no more than two adjacent rods also inoperable.

- d. Rods which are not inserted in the reactor, are not to be included as a part of the control elements for Total Control requirements defined in Section A.

3. Ball 3X System

Small metallic or ceramic balls shall be available for insertion into the Vertical Safety Rod channels under emergency conditions wherein it becomes

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 7

apparent that Vertical Safety Rod insertion may be impossible, that coolant loss is imminent, and that Total Control strength should be available. The Ball 3X System, in conjunction with loaded supplementary control devices and inserted control and safety rods, shall be adequate for satisfying Total Control requirements.

4. Supplementary Control Devices

Supplementary control devices, such as poison splines, poison column control facilities, or supplementary control columns may be used to facilitate reactor operating control and may be utilized in satisfying Total Control requirements.

C. Power Level

1. The power levels of the reactors shall not exceed the following values:

<u>Reactor</u>	<u>Power Level Limit - MW</u>
B, D, DR, F, H	2090
C	2310
KE, KW	4400

2. The reactors will be scrammed automatically by high neutron flux level signals set as defined in Tables I - III.

D. Temperatures and Heat Flux

1. During steady state operation, the bulk outlet coolant temperature for all existing Hanford Production Reactors shall not exceed 95 C.
2. During steady state operation, process channel coolant outlet temperature shall not exceed 150 C.
3. At the reactor power levels defined in C.1 above, the calculated fuel surface heat flux at the point closest to burnout in any process channel shall not exceed 70 per cent of the burnout heat flux as predicted from established burnout correlations.

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 8

E. Reactor Fuel Loadings

1. Production Scale Loads

Production scale fuel loads shall consist of fertile and/or fissionable material supplemented with enriched uranium fuel containing not more than 0.96 per cent U-235. The fuel elements shall be metallic uranium enclosed in metallic aluminum cans. Production scale fuel loads which have not previously been approved for irradiation shall not be utilized in the reactors without prior approval of the General Electric Company and the Commission.

2. Test Scale Loads

Test scale fuel loads, which, by reason of loading errors or inherent differences in operational reactivity transient behavior may result in or have the potential for providing significant changes in reactivity, shall be limited in size such that the additional reactivity of the test load could not cause an increase of more than 1 per cent in the gross pile reactivity in the event of a loading error such as omission of poison pieces.

3. Blanket Loadings

It shall be permissible to load not more than two lattice units adjacent to the reflector with enriched lithium-aluminum poison pieces, and to provide additional enriched columns of 0.96 per cent U-235 to supply reactivity for reactor operation.

F. Reactor Coolant System

1. A pre-established decrease of coolant flow in individual process channels shall cause the reactor to be shut down automatically.
2. While the reactor is shut down, the reactor coolant flow rate shall be controlled so that the bulk coolant outlet temperature does not exceed

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 9

95 C, and the minimum process channel flow rates and pressures shall not be less than that required to prevent melting of the fuel cladding.

3. Coolant water shall be available from reservoirs to provide the following coolant capacities.

	<u>Available Water Storage - 10⁶ Gal.</u>		
	<u>B,D,DR,F,H</u>	<u>C</u>	<u>KE, KW</u>
Full normal flow for 15 minutes	1.25	1.42	2.70
Transient shutdown plus minimum of 24 hour shutdown cooling	6.25	7.78	14.30
TOTAL	7.5	9.2	17.0

In addition to the above, emergency coolant capacity may be available through the Export Water system, or from adjacent reactors in a dual reactor area.

4. Each reactor coolant system shall consist of three independent, reliable sources of coolant supply as follows, all three of which must be in service during reactor operation, and at least two of which must be in service during reactor shutdown. Maintenance and testing of the back-up coolant systems shall be permissible during reactor operation, provided that such maintenance and testing is scheduled and performed in a manner which will not compromise the effectiveness or reliability of the three independent coolant systems, as defined below.

a. Primary Cooling System

The primary cooling system shall:

- 1) Be capable of providing adequate process channel cooling during all phases of normal reactor operation and shutdown.

b. Secondary Cooling System

The secondary cooling system shall:

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 10

- 1) Be capable of providing adequate process channel cooling indefinitely immediately following a reactor scram from full level, assuming instantaneous loss of power to the primary cooling system.
- 2) Be independent of both the primary and the last ditch cooling systems.

c. Last Ditch System

The last ditch cooling system shall:

- 1) Be capable of providing shutdown flow requirements indefinitely, assuming instantaneous loss of power to the primary cooling system and concurrent loss of flow in the secondary cooling system.
- 2) Be independent of both the primary and secondary cooling systems, including piping to the reactor coolant manifold.

The following definitions are appropriate for the interpretation of this specification:

- a. An independent system is one with power sources and pumping systems such that failure or cause of failure in one system cannot induce failure of the alternate system. In addition, failure of any single component within a system shall not be capable of rendering that system inadequate. In practice, common use of selected valves, pumps, and piping may be qualified as exceptions in meeting the requirements of this specification.
 - b. Adequate cooling is defined, as a minimum, as that required to maintain reactor process channel components below the melting point of the fuel jackets.
5. The reactor shall be scrammed upon loss of coolant as indicated in Tables I, II, and III.

G. Reactor Confinement

Each reactor shall be provided with a confinement system, designed primarily

DECLASSIFIED

HW-71619 RD, Rev. 4
Page 11

for the removal of particulate fission products and halogens from the ventilation exhaust air which might be released as a result of a minor accident, such as burning of a fuel element in a few process tubes. The confinement system shall be capable of handling the volume of air normally exhausted from the reactor building, but is not expected to remove the large amounts of fission products, nor to handle the large volumes of gases which might accompany a loss of coolant accident.

As a minimum, the confinement system shall consist of the following two major components:

1. A fog spray system, whose chief function is to reduce the magnitude and effects of fuel element burning in the discharge area.
2. A ventilation system designed to remove from the exhaust stream at least 90 per cent of the particulate matter reaching the filters and at least 50 per cent of the halogens reaching the filters. One bank of filters shall be in place continuously, and the exhaust fans shall be provided with alternate power sources.

H. Test Facilities

Irradiation Test Facilities may be installed in the Hanford Production Reactors and operated in accordance with the Administrative Procedures described in Section IV agreed to by the General Electric Company and the Commission.

I. Code Compliance

Wherever applicable in the design, procurement, construction, alteration, maintenance, and operation of plant facilities, the intent of national codes and standards shall be observed as minimum standards to the extent required in Engineering Standards adopted by the General Electric Company

DECLASSIFIED

HW-71719 RD, Rev. 4
Page 12

and in use at the Hanford Atomic Products Operation. In those cases where national codes and standards are not applicable, the design, procurement, construction, alterations, maintenance, and operation shall be guided by safe, economical, uniform designs consistent with the use intended and with sound engineering principles.

J. Reactor Scram Set Points

Nuclear and process control instrumentation shall be provided to automatically scram the reactor when preset control limits are exceeded. Tables I, II, and III indicate the instrumentation, the number of monitored channels, the set points, and by-pass availability for each function capable of scrambling the reactors automatically.

DECLASSIFIED

HW-71619 RD Rev. 4
Page 13

TABLE I

Reactor Protection Set Points - K Reactors

<u>Function</u>	<u>No. of Channels Required to Trip</u>	<u>Bypasses</u>	<u>Safety Circuit Automatically Tripped</u>	<u>Set Point Limits</u>	<u>Footnote</u>
Startup flux transient control	2 of 3	Manual	No. 1	Variable	2a, 2b
High neutron flux level	2 of 3	Manual	No. 1	Variable	3
Low reactor coolant pressure	1 of 2	Manual	No. 1	R.P. - 60	4a
Rapid loss of reactor coolant pressure	1 of 2	Manual	No. 3		5a
Process channel coolant adequacy	1 of 1	Manual	No. 1	Variable	6
Seismoscope	2 of 2	Manual	No. 1	Contact spacing 2.6 mm	7
In-reactor test loops	---	---	---		8
Electrical power loss	---	---	---		9
Manual reactor scram of No. 1, 2, and 3 safety circuits	Not applicable	None	---	Available at any time during reactor operation	1

DECLASSIFIEDHW-71619 RD Rev 4
Page 14TABLE IIReactor Protection Set Points - B, D, DR, F and H Reactors

<u>Function</u>	<u>No. of Channels Required</u>		<u>Safety Circuit Automatically Tripped</u>	<u>Set Point Limits</u>	<u>Footnote</u>
	<u>to Trip</u>	<u>Bypasses</u>			
Startup flux transient control	2 of 3	Manual	No. 1	Variable	2a, 2b
High neutron flux level	2 of 3	Manual	No. 1	Variable	3
Low reactor coolant pressure (optional - see footnote 6)	1 of 2	Manual	No. 1	R.P. - 130	4b
Rapid loss of reactor coolant pressure	1 of 2	Manual	No. 3		5b
Process channel coolant adequacy	1 of 1	Manual	No. 1	Variable	6
Seismoscope	2 of 2	Manual	No. 1	Contact spacing 2.6 mm	7
In-reactor test loops	---	---	---		8
Electrical power loss	---	---	---		9
Manual reactor scram of No. 1, 2, and 3 safety circuits	Not applicable	None	---	Available at any time during reactor operation	1

DECLASSIFIED

HW-71619 RD Rev 4
Page 15

TABLE III

Reactor Protection Set Points - C Reactor

<u>Function</u>	<u>No. of Channels Required</u>		<u>Safety Circuit Automatically Tripped</u>	<u>Set Point Limits</u>	<u>Footnote</u>
	<u>to Trip</u>	<u>Bypasses</u>			
Startup flux transient control	2 of 3	Manual	No. 1	Variable	2a, 2b
High neutron flux level	2 of 3	Manual	No. 1	Variable	3
Low reactor coolant pressure (optional - see footnote 6)	1 of 2	Manual	No. 1	R.P. - 60	4c
Rapid loss of reactor coolant pressure	1 of 2	Manual	No. 3		5c
Process channel coolant adequacy	1 of 1	Manual	No. 1	Variable	6
Seismoscope	2 of 2	Manual	No. 1	Contact spacing 2.6 mm	7
In-reactor test loops	---	---	---		8
Electrical power loss	---	---	---		9
Manual reactor scram of No. 1, 2, and 3 safety circuits	Not applicable	None	---	Available at any time during reactor operation	1

DECLASSIFIED

HW-71619 Rev 4
Page 16

FOOTNOTES TO TABLES I, II, AND III

Footnote

- 1: No. 1 Safety Circuit trip consists of insertion of Vertical Safety Rods.
No. 2 Safety Circuit trip consists of insertion of Horizontal Control Rods.
No. 3 Safety Circuit trip consists of insertion of the poison balls into the Vertical Safety Rod channels.
- 2a: No. 1 Safety Circuit trip results if any combination of high and/or low-scale trips occurs in any two of three flux monitors, or if fewer than three flux monitors are in the Safety Circuit. Manual adjustments of the indicating range and the trip set points are controlled by established procedures to provide high startup flux transient control.
- 2b: Approach to critical is monitored by at least two instruments whose sensitivity is 500 watts power or less.
- 3: No. 1 Safety Circuit trip results if any combination of high and/or low-scale trips occurs in any two of three flux monitors, or if fewer than three flux monitors are energized in the safety circuit. High neutron flux trip points will be set as follows:

<u>Maximum Tube Outlet Temp.</u>	<u>Trip Setting % of Indication</u>
Above 95 C	110 maximum
90-95	115
85-90	120
80-85	125
Below 80	130

Low-scale trips, the set points of which are variable depending upon the reactivity status of the reactor, are provided to sense failure of the flux monitor equipment and to ensure that an adequate number of protective devices are in service on the appropriate sensitivity range.

DECLASSIFIED

HW-71619 RD Rev 4
Page 17

- 4a: For the KE and KW Reactors, No. 1 Safety Circuit trip results if process water riser pressure drops more than 60 psi below normal.
- 4b: For the B, D, DR, F, and H Reactors, No. 1 Safety Circuit trip results if process water riser pressure drops more than 130 psi below normal. This trip setting is optional, and may have substituted for it the trip setting of the flow detection device for individual process channels as noted in Footnote 6.
- 4c: For the C Reactor, No. 1 Safety Circuit trip results if process water riser pressure drops more than 60 psi below normal. This trip setting is optional, and may have substituted for it the trip setting of the flow detection device for individual process channels as noted in Footnote 6.
- 5a: For K Reactors, No. 3 Safety Circuit trip results if process water pressure drops 100 psi below Low Reactor Coolant Pressure set point in 3.5 seconds or less, or if the Top of Riser Pressure becomes less than 25 psi.
- 5b: For the B, D, DR, F, and H Reactors, No. 3 Safety Circuit trip results if process water pressure drops 150 psi below Low Reactor Coolant Pressure set point in 5.0 seconds or less.
- 5c: For C Reactor, No. 3 Safety Circuit trip results if process water pressure drops 90 psi below Low Reactor Coolant Pressure set point in 5.5 seconds or less.
- 6: All process channels in the active zone of the reactor containing production materials are equipped with pressure sensing flow detection devices, the trip limits of which are variable depending upon location of the tubes in the reactor and other factors. Set point limits are set so that flow reductions and/or power level increases in individual process tubes will not result in serious fuel element damage. These flow detection devices are also used in the B, C, D, DR, F, and H Reactors to provide a No. 1 Safety Circuit trip for the condition of low reactor coolant pressure.

DECLASSIFIED

HW-71619 RD Rev. 4
Page 18

- [REDACTED]
- 7: The seismoscope contact spacing of 2.6 mm corresponds to detection of an earthquake having an intensity of 5 on the Modified Mercalli scale.
 - 8: Special procedures are provided for operation of in-reactor test loops. Instrumentation and set points are variable depending on function and complexity of the loop. Set points will be provided to shut down the reactor under conditions established by Administrative Procedures.
 - 9: Electrical power failure results in insertion of the Vertical Safety Rods and reactor shutdown.
- [REDACTED]

DECLASSIFIED

HW-71619 RD Rev 4
Page 19

IV. ADMINISTRATIVE PROCEDURES

The General Electric Company shall establish and place into effect those specifications, process controls, reviews, approvals, and other administrative procedures as necessary to achieve safety of the reactor process during all phases of reactor operation. These procedures shall include the following:

A. Process Control Procedures

The General Electric Company shall establish and maintain in force a system of administrative control of reactor operation including the eight features as defined below. These control methods shall include written technical and operating guides necessary to ensure safety of the reactor process during all phases of reactor operation. The procedures or limitations shall not be less restrictive than the limitations imposed by the Operating and Performance Restrictions, and they shall not authorize operation under conditions which involve an Unreviewed Safety Question, as defined in Section V.

1. Process Standards

The Process Standards are mandatory written instructions, prepared by an independent component having no line responsibility for reactor operation or production efficiencies. The Process Standards specify for the reactor process and vital auxiliary plants the limits, materials, procedures, equipment, and frequency of functional checks where such specification is necessary to safeguard against nuclear hazards.

2. Equipment Maintenance Standards

Equipment Maintenance Standards include mandatory equipment and component specifications, methods and frequency of performing functional tests, and maintenance procedures for equipment critical to nuclear safety. These Equipment Maintenance Standards are derived from functional requirements established in the Process Standards.

DECLASSIFIED

HW-71619 RD Rev 4
Page 20

3. Process Change Authorization

The Process Change Authorization is a method of providing for reactor operation under temporary waiver of Process Standards or Equipment Maintenance Standards.

4. Production Test Authorization

A test which has the prime objective of developing engineering or technological data may be conducted under a Production Test Authorization. Such tests may be conducted outside the conditions authorized by Process Standards or Equipment Maintenance Standards. Authorizing documents describe the risks and hazards involved in the test so that formal approval by the technical and operating components signify that the risks are known, understood and reasonable. Copies of Production Test Authorizations shall be transmitted to the Commission for information immediately upon issuance.

5. Process Improvement Transition Authorization

A test which has the prime objective of piloting the application of knowledge or techniques to the reactors on a large scale may be conducted under a Process Improvement Transition Authorization. Such tests may be conducted outside the conditions authorized by Process Standards or Equipment Maintenance Standards, and require authorization similar to Production Test Authorizations. Copies of Process Improvement Transition Authorizations will be transmitted to the Commission for information.

6. Development Test Authorization

Development work utilizing reactor facilities which can be accomplished without deviation from Process Standards or Equipment Maintenance Standards is permitted under a Development Test Authorization with the approval of the technical and operating components.

DECLASSIFIED

HW-71619 RD Rev 4
Page 21

7. Authorizations for Facility Modifications

Major modifications to the plant facilities may be accomplished under the provisions of a Project Authorization, and minor modifications may be accomplished under a Design Change. The modifications may result in conditions which require changes in the Operating and Performance Restrictions, may involve an Unreviewed Safety Question, or may require changes in the Process Standards or Equipment Maintenance Standards.

Copies of Project Authorizations and Design Changes which involve changes in the Operating and Performance Restrictions as defined in Section III, or which may involve an Unreviewed Safety Question as defined in Section V, shall be transmitted to the Commission.

8. Standard Operating and Maintenance Procedures

Methods, procedures, and check lists for process operations with nuclear hazard potential are prepared to ensure that execution of maintenance work, process functions, inspections, functional tests of critical equipment, reactor startup preparations, and reactor operations are conducted in accordance with Process Standards and Equipment Maintenance Standards. Special operating and maintenance procedures are provided for in-reactor test facilities.

B. Training Programs

(Contents of this section yet to be agreed upon.)

C. Audits and Inspection of Reactor Operation and Maintenance

The General Electric Company shall maintain in force organizational and procedural arrangements which provide for frequent and periodic checks of (1) degree to which the facilities are operated in accordance with the limits specified in the Process Standards, (2) facility maintenance, particularly in those areas of equipment and components critical to

DECLASSIFIED

HW-71619 RD Rev 4
Page 22

reactor safety as specified in the Equipment Maintenance Standards, and
(3) adequacy of training of reactor operators and maintenance personnel.

The General Electric Company shall also provide for investigation of any unusual or unpredicted reactor conditions which might affect safe reactor operation, such investigation to be by an independent, competent body of the General Electric Company. Independent in this usage is defined to mean "not having direct responsibility for operation or maintenance of the facility in question."

D. Reports and Records

In addition to those otherwise provided within these Specifications, the General Electric Company shall make the following reports:

1. General Electric Company shall immediately report to the Commission in writing any change in the physical or operating characteristics of the reactor that might affect the safe operation of the reactor.
2. The General Electric Company shall advise the Commission in writing of changes, tests, or experiments, judged to be of interest to the Commission, and which do not require Commission approval.
3. General Electric Company shall file with the Commission an annual report of operating experience pertinent to reactor safety.
4. General Electric Company shall maintain records for demonstrating compliance to procedures and limitations within the Technical Specifications.

V. AUTHORIZATION FOR CHANGES

- A. The Hanford Production Reactors shall be operated by the General Electric Company in accordance with the Operating and Performance Restrictions and the Administrative Procedures as defined in these Technical Specifications.
- B. General Electric Company may (1) make changes in the reactor facilities,

DECLASSIFIED

HW-71619 RD Rev 4
Page 23

[REDACTED]

(2) make changes in the procedures described herein, and (3) conduct tests or experiments utilizing the reactor facilities, provided the change, test, or experiment does not involve a change in the Operating and Performance Restrictions, and does not involve an Unreviewed Safety Question.

- C. A proposed change, test, or experiment shall be deemed by the General Electric Company to involve an Unreviewed Safety Question if (1) the probability of occurrence of a type of accident analyzed in the referenced Hazards Summary Report may be significantly increased; or (2) if the consequences of any type of accident analyzed in the referenced Hazards Summary Report may be significantly increased; or (3) if such change, test, or experiment may create a credible probability of a nuclear accident of a different type than any analyzed in the referenced Hazards Summary Report.
- D. If a proposed change, test, or experiment involves an Unreviewed Safety Question, or involves a change in the Operating and Performance Restrictions as defined in these Technical Specifications, it may not be carried out unless authorized by the Commission and approved by General Electric Company. General Electric Company shall submit a written request to the Commission for such authorization, accompanied by an appropriate hazards report with respect to any change, test, or experiment which must be authorized. The Commission may approve such change, test, or experiment, and in such case shall so notify General Electric Company in writing.

WDG:mmm

[REDACTED]

DATE

FILMED

7/28/94

END