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**Pacific Northwest Laboratory
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TEST REPORT

GENERAL ELECTRIC COMPANY - HANFORD WORKS

REACTOR DIVISION

This document consists of

10 pages

TITLE

"O" RING SEALED PROCESS TUBE, PHASE II

Date: April 9, 1951

Test Project No. 44

Classification Cancelled and Changed To

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By Authority of RM:Oten

CG-NMP-1 6-27-94

By J.E. Savely 6-30-94

Verified By Jenni Molen

7-26-94

Prepared by:

R.E. Johnson
Test Engineer

4-9-51

Date

Approved by:

H. White
Section Head

4/9/51

Date

H.E.G.
Approved by:

W.D. Johnson
Manager, Reactor Division

4/9/51

Date

MASTER

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TEST PROJECT NO. 44

SUMMARY

The purpose of this test was to obtain information concerning the in-pile effectiveness of the "O" ring seal.

The following observations and conclusions were reached after a period of 6 months exposure to operating conditions (5 months charged with dummy slugs; 1 month charged with uranium slugs).

- (a) No liquid or gas leaks were observed
- (b) No physical deformation was noted
- (c) All functioning appeared entirely satisfactory.

The "O" ring seal will not be completely adaptable to existing piles but could be adapted to a specially designed shield.

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INTRODUCTION

The "O" ring seal has been proposed to replace the van stone flange and the bellows thermal expansion assembly currently used on the existing Hanford piles to achieve water and gas seals, respectively. Possible advantages of the "O" ring seal are:

- (1) Simplification of component parts and elimination of van stone corrosion
- (2) Simplification of maintenance
- (3) Lower costs of initial erection
- (4) Increased strength

This test supplements Test Project No. 27 (a preliminary thermal cycling test) in applying the "O" ring seal assembly to actual pile operating conditions.

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PROCEDURE

A damaged, fringe process tube (2194) was removed and replaced by a new, pressure tested tube in 105-F which was 6-3/4" longer than standard. The use of a damaged tube hole prevented any loss of production in obtaining a process tube facility.

Although the tube was difficult to place because of extensive graphite growth, the far end emerged without any very serious scratches. The scratches that were present were removed by polishing with crocus cloth. After the tube was properly dimensioned in length, the "O" ring seal assembly was placed as per drawing SP-10685 and SP-10686 (attached) and given a 1000# tension test.

A small tube was run from the tapped hole between the "O" rings of the coupling to a plexiglas container so that even a small leak could be quite readily detected.

The tube was then charged with dummy slugs. These slugs remained within the tube (5 months) until the stainless steel nozzles of 100-F Area were replaced by aluminum nozzles. This waiting period occurred because the "O" ring nozzles would not fit the charging machine that was used with the stainless steel nozzles.

Inspection for malfunctioning and leakage was conducted once per shift for the first two days, daily for the next four weeks and routine thereafter.

The tube and assembly will remain as a permanent operating facility until removal is advised or becomes necessary.

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CONCLUSION

The "O" ring seal assembly has functioned satisfactorily through five months loaded with dummy slugs, a subsequent charging operation, and one month loaded with active slugs.

This assembly is not considered to be completely satisfactory for installation in the existing piles because the force of the water is transferred to the front shield rather than being released as tension on the process tube.

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FIGURE 1 O RING SEAL TEST EQUIPMENT - EXPI CODED VIEW

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THE FINEST

STUDY UNIT 2

THE UNIVERSITY OF CHICAGO

REF-10040

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HANFORD WORKS

OUTLET TUBE - 1/2" DIA.
STUB LOCATED AT 1/2" DIA.

1. THESE DRAWINGS ARE FOR THE
DESIGN OF THE REACTOR VESSEL
AND ITS SUPPORTS. THE REACTOR
VESSEL IS TO BE MADE OF
STEEL AND SHALL BE 1/2" DIA.
AT THE TOP AND 1/2" DIA.
AT THE BOTTOM. THE REACTOR
VESSEL SHALL BE 1/2" DIA.
AT THE TOP AND 1/2" DIA.
AT THE BOTTOM.

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