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FINAL REPORT - PRODUCTION TEST 105-524-A COPY 1 OF 1
WASHER SEAL AND SEAL LEAKAGE TESTS FOR THE HORIZONTAL ROD

INTRODUCTION

Production Test 105-524-A(1) authorized the installation of a washer seal on the "A" horizontal control rod at C Pile in order to determine the characteristics of this type seal when used on unlubricated rods. The most important characteristic to be observed during the test was the gas leakage rate. A qualitative study of the seal wear and radiation damage to the seal were also to be made.

This document reports the conclusion of the test and discusses the results obtained.

- (1) Johnson, R.E., "PT-105-524-A, Washer Seal and Seal Leakage Tests for the Horizontal Rod," HW-25889, 11-6-52.

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SUMMARY AND CONCLUSIONS

The original washer seal failed to operate properly after approximately six months, and a new seal with greater interference and double guides was installed.

The new seal continued to operate favorably for over a year without sustaining damage sufficient to require its removal. Graphite dust, hydrograph, and rubber particles collected between the rubber washers, and the rubber washers lost some of their resilience due to irradiation and age.

The built-up washer seal of this design would not be suitable for installation on the piles since the collection of particles between the washers impairs its sealing qualities. The information gained from this test has, however, made possible the design of a one-piece molded seal which has been chosen for installation on both the vertical and horizontal rods for the twin K piles. A similar molded washer seal will also be used on the horizontal rods for B, D, F, DR and H units during the Water Plant Expansion Project No. CG-558.

DISCUSSION

The built-up washer seal was installed on the "A" horizontal rod at C Pile prior to start up. This seal (Dwg. No. P-8934) was used on a clean rod and utilized a leakage monitor system as shown on Drawings SP-7556 and SK-1-1077. After approximately six months operation, the seal was leaking about 2 to 4 cubic feet per hour. It was removed and replaced with a similar seal having 1/16 inch diametral interference rather than 1/32 inch interference. The alignment problem was improved by adding another graphite guide bushing thus providing support on both sides of the seal. The improved seal operated favorably for six months and was then inspected⁽²⁾ and found to be satisfactory. Little wear had occurred; however, considerable graphite powder, hydrograph, and some rubber particles had filled the space between the washers. This material was removed and the seal re-installed.

After an additional six months the seal was again removed and replaced with a molded ribbed sphincter seal which is currently being tested⁽³⁾.

The washer seal was operating favorably with little or no leakage prior to its removal; however, upon examination it was found to contain the graphite-hydrograph-rubber particles as before. The neoprene washers showed some effects from the radiation in that their resilience had decreased but not to the degree that it caused excessive leakage.

The information that has been gained thru the testing of this seal has made possible the design of one-piece molded washer seals for both horizontal and vertical control rods. The "K" reactors will have molded washer seals on both of these safety systems

- (2) Cawley, W.E., "Interim Report, PT-105-524-A, Washer Seal and Seal Leakage Tests for the Horizontal Rod," HW-31055, 1-29-54.
- (3) Jackson, P.M., "Pile Technology Development Test 105-571-A, Molded Ribbed Sphincter Seal and Seal Leakage Test for the 'C' Horizontal Rod," HW-31688, 4-30-54.

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and Project CG-558 makes use of an elliptical molded washer seal for the horizontal rods on B, D, F, DR, and H reactors.

The most advantageous characteristic of the washer seal is its ability to seal, even during cycling, without a lubricant of any kind. The hydrograph lubricant on the C Pile rods has proven to be quite undesirable from the building air and inner rod room contamination standpoints.

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