LOFT TECHNICAL REPORT LTR 1213-1
DECEMBER 20, 1977

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JUSTIFICATION FOR 80 PSI RAILROAD
DOOR SEALING PRESSURE

R. H. Larson

MASTER

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EG&G Idaho, Inc.

IDAHO NATIONAL ENGINEERING LABORATORY

DEPARTMENT OF ENERGY

IDAHO OPERATIONS OFFICE UNDER CONTRACT EY-76-C-07-1570

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LOFT TECHNICAL REPORT LOFT PROGRAM

FORM EG&G-229
(Rev. 12-76)

TITLE JUSTIFICATION FOR 80 PSI RAILROAD DOOR SEALING PRESSURE		REPORT NO. 1213-1
AUTHOR R. H. Larson <i>R.H. Larson</i>	GWA NO. 52162-400-610	<i>sh</i>
PERFORMING ORGANIZATION LPSB	DATE Published by CDCS 1-18-77 December 20, 1977	
LOFT APPROVAL <i>[Signatures]</i>		

INTRODUCTION

The normal operating pressure for the inner and outer Rail Road Door Seals is 90 psig. The instrumentation which monitors this pressure does not provide assurance that the 90 psig can be maintained during reactor operations. A decrease in pressure is detected by a low level pressure alarm set to alarm at 88 psig. When another 8 psig is allowed for the instrument error of this alarm and the operating band during the leak test, the minimum pressure maintained in the seals is reduced to 80 psig. 80 psig, therefore, is the pressure that the LOFT Technical Specifications have committed to maintain.

BASIS

To provide justification for the 80 psig sealing pressure, a leak test was performed at $80 \pm \frac{2}{0}$ psig. (Previous tests were performed at the normal operating pressure of 90 psig.) The leak rate through the seals at $80 \pm \frac{2}{0}$ psig was 3.188×10^{-4} f/day. A previous leak test at 90 ± 2 psig determined a leak rate through the Railroad Door Seals of 2.596×10^{-4} f/day. The requirement for acceptance for this test is that all the individual penetration Leak Rates combined be $< 12 \times 10^{-4}$ f/day. Using the Leak Rate with the Railroad Seals pressurized to $80 \pm \frac{2}{0}$, the combined leakage for all penetrations is 10.151×10^{-4} f/day which is 85% of the acceptance limit. (See Attachment 1)

If, in the future, it becomes necessary to reduce the Leak Rate through the Railroad Door Seals, the operating pressure can be increased to 95 psig, the low level alarm can be increased to 93 psig, and the pressure committed to be maintained by the LOFT Technical Specifications can be increased to 85 psig. (See Attachment 2)

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TEST REPORT

Test No. DOP 51-001 Revision No. 0
 Title Railroad Door Seals Leak Test

Changes in effect 1

Partial or final X report.

Test completed December 11, 1977

Enclosures:

Test Summary	See page <u>1</u> of <u>1</u>
Test Deficiencies	See page <u>NA</u> of <u> </u>
Conclusions and recommendations	See page <u>1</u> of <u>1</u>
Data sheets included	Yes <u> </u> No <u>X</u>

QDR(s) issued Yes No X

1. Test Summary

The railroad doors were tested for leakage of the seals annulus at a seal pressure of 80 ± 2 psig -0 psi. The annulus leak rate was determined to be 3.188×10^{-4} f/day. The acceptance limit for this component of the containment is 3.12×10^{-4} f/day.

2. Conclusions and Recommendations

It is recommended that the measured leak rate be accepted. This recommendation is based on a comparison with the results of S0-45.01. In this previous test the seals were pressurized to 90 ± 2 psig and resulted in an annulus leakage rate of 2.596×10^{-4} f/day. This leakage gave an overall containment leakage of 9.569×10^{-4} f/day which was 79.7% of the acceptance limit of 12×10^{-4} f/day. Using the annulus leak rate measured in this test gives an overall containment leakage of 10.161 f/day or 84.7% of the overall containment acceptance limit.

Approved by:

[Signature]
 Manager, LOFT Test and
 Data Branch

Prepared by:

[Signature] 12/16/77
 Date

12/20/77
 Date

Issued by LOFT CDCS

Date 12-20-77 [Signature]

TITLE LEAK RATE TEST

SUBJECT: RAILROAD DOOR SEALS LEAK TEST

DATA SHEET 1

Initial Conditions

Time 2030 (1) Seals Pressure 80.0 psig ± 2 [80 psig ± 0 psi]
 Pressure 36.0 (2) psig Pressure 48.3 (3) psia
 [(2) + 12.3]

ch. 1

PARAMETER					
Time (4)	2030	2045	2100	2115	2130
Pressure psig (5)	36	31.5	26.8	24.4	21.6
Pressure psia (6) (5) + 12.3	48.3	43.8	39.1	36.7	33.9
$\frac{P_2}{P_1} = \frac{(6)}{(3)}$ (7)		0.91	0.81	0.76	0.70
$1 - \frac{P_2}{P_1} = 1 - (7)$ (8)		.09	.19	.24	.30
Time Change hr (9) (4) - (1)		0.25	0.50	0.75	1.00
Leak Rate (wt%/day) = $0.14494 \times \frac{(8)}{(9)}$	5.127 x 10⁻²	5.127 x 10⁻²	5.127 x 10⁻²	5.127 x 10⁻²	5.127 x 10⁻²

$$\text{Leak Rate (wt\%/day)} = \frac{24 \text{ hr/day}}{\Delta \text{ hr}} \times \frac{V_a}{V_c} \times \left(1 - \frac{P_2}{P_1}\right) \times 100 = \frac{0.14494}{\Delta \text{ hr}} \times$$

$$1 - \frac{P_2}{P_1} \quad \text{where } V_a = \text{Seals Annulus Volume (ft}^3\text{)}$$

$$V_c = \text{Containment Vessel Volume (ft}^3\text{)}$$

Acceptance Limit : 3.12×10^{-2} wt %/day

Original Issue

Date: 5-12-77

ISSUED: _____

TITLE: LOFT DOP-50-001

LTR 1213-1

SUBJECT: RAILROAD DOOR SEALS LEAK TEST

DATA SHEET 1. (con't)

PARAMETER					
Time (4)	2145	2200	2215	2230	
Pressure psig (5)	19.3	17.5	16.1	14.7	
Pressure psia (6) (5) + 12.3	31.6	29.8	28.4	27.0	
$\frac{P_2}{P_1} = \frac{(6)}{(3)}$ (7)	0.65	0.62	0.59	0.56	
$1 - \frac{P_2}{P_1} = 1 - (7)$ (8)	0.35	0.38	0.41	0.44	
Time Change hr (9) (4) - (1)	1.25	1.50	1.75	2.00	
Leak Rate (wt%/day) $= 0.14494 \times \frac{(8)}{(9)}$	4.0×10^{-2}	3.7×10^{-2}	3.4×10^{-2}	3.188 2.46118	

Original Issue
Date: 5-12-77

PRESRAY

PAWLING, NEW YORK 12564

(914) 855 1220

January 10, 1978

EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, Idaho 83401

Attention: Mr. David J. Shimeck, Project Manager

Subject: LOFT Railroad Door Seals

Reference: Presray FO 11722

Dear Mr. Shimeck:

In answer to your letter of December 14th there is an adequate design safety margin to increase the seal operating pressure to 95 psig.

Sincerely,

PRESRAY

Theodore C. Hollander, Jr.
Vice President

TCH/amc