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# Raychem Energy Division

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GPO-33911 10/82	

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Title	ENVIRONMENTAL QUALIFICATION TEST REPORT OF RAYCHEM NEIS ENVIRONMENTAL INTERFACE SEAL KITS ON STAINLESS STEEL PIPE		Pages: 30
Report Number:	EDR-653	Date: 10-22-82	Enclosures:
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Docket No. 50-345/104 C.V.P. Official Exh. No. 35  
 In the matter of Alabama River Company  
 Staff ✓ IDENTIFIED 12:15 p.m. 2/19/92  
 Applicant                      RECEIVED 12:23 p.m. 2/19/92  
 Intervenor                      REJECTED                       
 Cont'g Off'r                      DATE 2/19/92  
 Contractor                      Witness                       
 Other                       
 Reported by L. Estep

## 1.0 SUMMARY

Twelve Raychem NEIS (Nuclear Environmental Interface Seal) kit assemblies were subjected to an environmental qualification type test program to determine their suitability for service within the containment of a nuclear power generating station. The qualification program was based on the methods, procedures, and guidelines set forth in IEEE Standards 323-1974<sup>1</sup> and 383-1974<sup>2</sup> as endorsed by USNRC Regulatory Guides 1.89<sup>3</sup> and 1.131<sup>4</sup> respectively. The test program was conducted by Raychem and by Wyle Laboratories, Norco, California during the period of May to July, 1982.

The test program consisted of the following:

1. Thermal aging - 0 and 120 hours at 175°C; to simulate beginning and end of a 40 year installed life.
2. Radiation exposure - 165 and 215 Mrads gamma; to simulate the postulated LOCA accident dose plus margin and the integrated dose over the 40 year installed life.
3. Electrical testing - Insulation resistance and voltage withstand
4. Helium leak rate measurements - 70 psid (pressure differential) at 25°C.
5. 26 day simulated LOCA/MSLB (Loss Of Coolant Accident/Main Steam Line Break) environmental exposure with chemical spray
6. Nitrogen and helium leak rate measurements - 70 psid (pressure differential) at 25°C.
7. Electrical testing - Insulation resistance and voltage withstand

The NEIS kits were installed on one half inch stainless steel conduit nipples, six inches long, through which either two or three insulated wires were installed.

The specimens were threaded into two 8-inch test vessel flanges which were bolted to the LOCA/MSLB test vessel. The NEIS kit assembly became part of the test vessel pressure boundary.

Performance of the NEIS kit sealing function was evaluated by measuring gas leak rates before and after (following the guidelines developed for penetration assemblies in IEEE-317) and by monitoring the internal pressure of the pipe nipple over which the kits were installed. This was accomplished with individual pressure transducers, capable of monitoring pressures to 20 psi, connected to strip chart recorders.

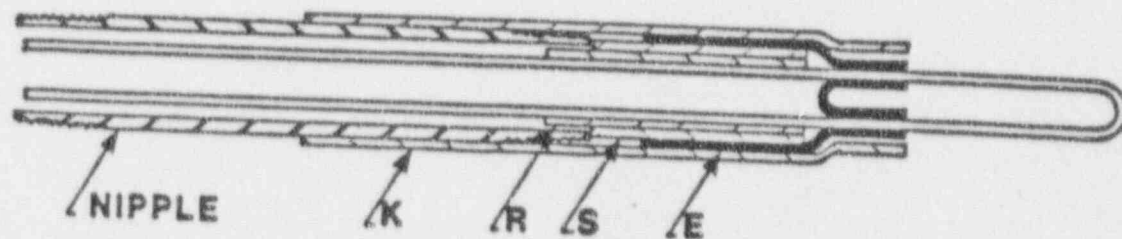
Eleven of the twelve NEIS kit test specimens had helium leak rates less than  $4 \times 10^{-6}$  cc/sec before and after the LOCA/MSLB exposure. One of the twelve was found to have a damaged component which, when repaired, also had a helium leak rate less than  $4 \times 10^{-6}$  cc/sec.

Performance of the test specimens during the LOCA/MSLB exposure was monitored by the pressure transducers. This pressure data is summarized in Section 4.3 of this report. Problems were encountered during the test with thread leakage where the kits were installed into the test vessel flange. Accordingly, interpretation of the pressure data is obscured by sources of leakage other than through the NEIS kit test specimens themselves.

Post-test examination and dissection of the specimens were conducted to evaluate the source of observed leakage. This data is presented in Section 4.6. Only two of the twelve test specimens had any evidence of leakage or ingress of the LOCA/MSLB environment into the NEIS seal interfaces.

With the exception of one cable breakout which was found to have a small split at the base of the sealing leg, all NEIS kit components retained physical integrity throughout the test program.





R - Inner Shim	<u>NEIS-2-50A</u>	<u>NEIS-3-50B</u>
S - Outer Shim	WCSF-115-3U	WCSF-200-3U
E - Conductor Sealing Breakout	WCSF-300-2.3U	WCSF-300-2.3U
	602A212-52-12/144	403A112-52-10/144
K - Outer Sealing Sleeve Wire (XLPE Insulation)	WCSF-500-6N	WCSF-500-6N
Conduit Nipple:	1/c#16 - 0.12" dia.	1/c#10 - 0.18" dia.
	1/2" x 6" stainless steel, type 316, sch. 40	
	Nominal dimensions - 0.84" O.D., 0.63" I.D.	

FIGURE 1. Test Specimen Construction

2.2.2 Twelve test specimens were prepared by Raychem personnel in accordance with Product Installation Instruction sheet PII-57049. Six two-wire configurations (NEIS-2-50A) and six three-wire configurations (NEIS-3-50B) were prepared. One additional three-wire specimen (3BH) was prepared and aged with the twelve test specimens