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Preliminary Data Report

Testing to Evaluate Synergistic Effects from LOCA Environments

Test IX. Simultaneous Mode; Cables, Splice Assemblies,
and Electrical Insulation Samples

Frank V. Thome

Sandia Laboratories

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PRELIMINARY DATA REPORT -
TESTING TO EVALUATE SYNERGISTIC EFFECTS
FROM LOCA ENVIRONMENTS
TEST IX. SIMULTANEOUS MODE: CABLES, SPLICE ASSEMBLIES,
AND ELECTRICAL INSULATION SAMPLES

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ABSTRACT

This test was conducted to complement Test VIII which was a sequential test of cables, cable splices, and insulation samples. In this test, the generic LOCA environments (radiation, temperature, pressure, chemical spray) were simulated and simultaneously applied to the test items. There were no failures of any assemblies and all were able to function at rated current and voltage throughout the entire test. An additional parameter, dissipation factor, was monitored in this test and when used in conjunction with capacitance, provided a better indication of insulation degradation.

THIS REPORT IS PRELIMINARY AND
IS BASED ON INCOMPLETE TESTS.
FURTHER TESTING AND EVALUATION
OF RESULTS IS CONTINUING.

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PRELIMINARY DATA REPORT
TESTING TO EVALUATE SYNERGISTIC EFFECTS
FROM LOCA ENVIRONMENTS
TEST IX. SIMULTANEOUS MODE: CABLES, SPLICE ASSEMBLIES
AND ELECTRICAL INSULATION SAMPLES

Project Description

Sandia Laboratories, under contract to the Nuclear Regulatory Commission, is conducting a program to obtain data to examine the suitability of current standards and regulatory guides for the qualification testing of safety-related equipment. In this program, tests are being conducted on hardware which is qualified for nuclear plant use in environmental conditions which are hypothesized to exist in a loss-of-coolant accident (LOCA). These tests are conducted to evaluate the adequacy of the testing methodology and not to verify the qualification of any specific piece of equipment.

The objective of this project is to experimentally determine the existence and extent of synergistic effects in qualification testing of Class 1 components for nuclear power plants. The synergisms, if any, are postulated to result from the simultaneous application of radiation, pressure, temperature, spray, etc. (prescribed as the conditions of a LOCA, for nuclear power plants) as compared with sequentially applied radiation followed by the other LOCA environments. The procedure for this project is to perform each test on typical, and identical, Class 1 equipment. If present, the synergisms may be manifested in the rate, degree, or mode of failure of the component. Additional background information on this program and previous tests is contained in References 1-4.

Test Components Description

The necessary test equipment and controller were assembled and installed at the Gamma Irradiation Facility (GIF) in Sandia Laboratories' Technical Area V (Reference 5).

Cables and cables with splices were arranged inside and outside the test chamber. Those inside the chamber were subjected to aging and LOCA environments. Those outside were located inside the GIF cell but outside the test chamber and provided the control samples.

The test chamber was loaded as described below.

Cables - Inside Chamber

- 1 control cable, 3-conductor/No. 12 AWG, tinned copper conductor, 30-mil ethylene propylene rubber insulation, 15-mil chlorosulfonated polyethylene jacket, cabled asbestos tape, 45-mil chlorosulfonated polyethylene jacket, rated 600 V, cable diameter 0.55 in. (Cable type designated A.)
- 1 control cable, 3-conductor/No. 12 AWG, 40-mil neoprene insulation, paper wrap, fiber cord banded to jacket, 60-mil neoprene jacket, rated 600 V, cable diameter 0.47 in. (Cable type designated C.)
- 1 power cable, 1-conductor/No. 12 AWG, 60 mil neoprene insulation, 15-mil neoprene jacket, rated 600 V, cable diameter 0.20 in. (Cable type designated C/single.)
- 1 power cable, 1-conductor/No. 12 AWG, 50-mil cross-linked polyethylene insulation, no jacket, rated 600 V, cable diameter 0.19 in. (Cable type designated D/single.)

Cables with Splices - Inside Chamber

- 1 cable assembly, 3-conductor, using type A cable with the splice in a formed bend of the cable. (Assembly designated A/bend.)
 - 1 cable assembly, 3-conductor, using type A cable with the splice in a straight section of the cable. (Assembly designated A/straight.)
 - 1 cable assembly, 1-conductor, using type A/single cable with the splice in a formed bend of the cable. (Assembly designated A/single/bend.)
- Note: Cable type, designated as type A/single, consists of power cable, 1-conductor/No. 12 AWG, tinned copper conductor, 45-mil ethylene propylene rubber insulation, 30-mil chlorosulfonated polyethylene jacket, rated 600 V cable diameter 0.20 in.
- 1 cable assembly, 1-conductor, using type A/single cable with the splice in a straight section of the cable. (Assembly designated A/single/straight.)
 - 1 cable assembly, 3-conductor, using type B cable with the splice in a formed bend of the cable. (Assembly designated B/bend.)
- Note: Cable type, designated as B, consists of control cable, 3-conductor/No. 12 AWG, tinned copper conductor, 30-mil crosslinked polyethylene insulation, silicon glass tape, 65-mil crosslinked polyethylene jacket, rated 600 V cable diameter 0.455 in.

- 1 cable assembly, 3-conductor, using type B cable with the splice in a straight section of the cable. (Assembly designated B/straight.)
- 1 cable assembly, 3-conductor, using type C cable with the splice in a formed bend of the cable. (Assembly designated C/bend.)

Cables/Cables with Splices - Outside Chamber

- 1 control cable, 3-conductor, type A
- 1 power cable, splice, type A/single/bend
- 1 control cable, 3-conductor, type C
- 1 power cable, type C/single
- 1 power cable, type D/single

The cables/assemblies (in the foregoing listing) were positioned outside the test chamber but inside the radiation hot cell. These received much lower doses (approximately 5 Mrad or less) and served as control samples during the test; they were exposed to none of the other LOCA environments. The control cables were routed in this manner to relate, or compare, the damage done inside the test chamber with essentially ambient environmental damage.

The conductors in all cables were electrically loaded to 20 A and 600 V at the start of the test; the 600 V was applied between each conductor and ground. The cables/assemblies were electrically loaded through four separate voltage/current circuits. These are designated, for convenience, as Panels 1-4. Table I indicates the cables, assemblies loaded through each panel.

Electrical Insulation Samples - Inside Chamber

Company D supplied two compounds of typical radiation crosslinked highly flame retarded polyolefins used in their insulating systems for nuclear power applications. These insulation samples were subjected to all environments of the test profile. Four types of tensile-specimen samples were supplied with the following histories:

- Compound A - Unaged
- Compound A - Aged 168 hours, 175°C forced-air circulating oven
- Compound B - Unaged
- Compound B - Aged 168 hours, 175°C forced-air circulating oven

Three samples of each type (i.e., a set) were exposed in two different zones within the test chamber and subjected to the following environments of the simultaneous test.

Set	Zone	Environment	Dose Across Samples Top-Bottom (Mrad)	
1	1	Aging	5 to 8.5	
2	1	Aging plus LOCA	5 to 8.5 + 15.5 to 30.0	} = 20.5 to 38.5
3	2	Aging	10.5 to 18.5	
4	2	Aging plus LOCA	10.5 to 18.5 + 35 to 60	} = 45.5 to 78.5
5	1	LOCA	15.5 to 30	
6	2	LOCA	35 to 60	

Quality Assurance

The Test IX test plan and cable splicing procedures used in preparation for the test were reviewed by a Sandia Laboratories QA inspector (see Appendix A). He concluded that the control of materials from procurement to use, although informal, was satisfactory. Splicing techniques are similar to certified techniques used by industry in that Sandia personnel were trained by factory personnel and that a second person, not the assembler, inspected and approved the splices.

Simultaneous Test Description

Simultaneous testing was generally conducted to the procedures of Reference 6, as depicted in Figure 1.

Heat aging was accomplished by circulating hot air through the test chamber containing the test samples. Heat was supplied by heater elements; approximately 100 cfm air was blown across the heaters into the test chamber near the top and baffled to provide uniform chamber heating. The return air exited near the (opposite) top of the chamber and was redirected by tubing through the blower; the system provided a closed loop for the circulating air, although there was no requirement to make it completely airtight. Three thermocouples were used to monitor the environment temperatures. Thermocouple 1 (T1) was located below the insulation samples, in the neighborhood of the cable bends (15 in. below the chamber flange). T2 was located in the top section of the chamber, almost directly in the path of the heated air. T3 was used to control the input air temperature through a proportional process controller connected to the heater elements. The controller was adjusted so that T1 was the temperature which followed the prescribed profile.

Figure 1. Simultaneous test profile

The radiation environment for the components was selected from Table II. During the aging phase, the dose rate of 0.2 Mrad/hr was achieved with the source top positioned 24 in. below the chamber flange. Figure 2 shows the relative dose (or dose rate) profile, for all selected dose rates during the simultaneous test, as a function of chamber position. The region between 14 and 20 in. is where all cable bends, bend splices, and the cable bend of each of the straight splices were located for the test. This is an area of large gradients; average dose rate for the aging period over the 2- and 20-in. positions was 0.23 Mrad/hr and over the 14 and 20-in. positions was 0.44 Mrad/hr. During the LOCA irradiation the source position was selected to yield the desired average dose rate for the test items of interest. The source was at 16 inches for 3.1 Mrad/hr, at 19 in. for 1.9 Mrad/hr, at 21-1/2 in. for 0.76 Mrad/hr, and at 24 in. for 0.44 Mrad/hr (Table II). Total doses as well as actual times at the desired dose rates are listed in Table II. Figure 3 shows the doses delivered to the respective test items.

Fresh chemical spray was pumped for the first 24 hours during the LOCA simulation. The pressure profile is depicted in Figure 1; the profile was generally maintained as shown. The pressure rises to 70 psig are achieved in approximately 10 sec as indicated by the thermocouple monitors. Although shown as smooth transitions in the figure, the pressure changes to the next lower pressure were taken in steps of 10 psig, or less, depending on the magnitude of the change.

Figure 2. The relative dose and rate profiles as a function of vertical chamber position and indicated source position.

Figure 3. Dose profiles as a function of vertical chamber position and test item location.

Aging Environments

The temperature during the aging environment was maintained near the required 130°C (266°F). As previously described, the T3 thermocouple was located in the top section of the chamber, almost directly in the path of the heated air, and was used to control the input air temperature. Through the process controller, such that T1, located near the cable bends/splices, was approximately at the desired 130°C aging temperature.

The temperature profile was maintained for 5 days (less 10 minutes). The total irradiation time specified was 120 hours but as a result of source downtime, it was short of this by 3 hours 56 minutes (3.3%). Thus the required 24 Mrad was actually 23.2 Mrad at the 14 in. position (51.1 Mrad averaged over the lower 4 in. and 26.5 Mrad averaged over the test chamber).

LOCA Environments

The temperature during the LOCA environment is shown in Figure 4 along with the pertinent callouts of associated events; there was essentially no difference in any of the thermocouple values (T1, T2 or T3). The stair-stepped downside pressure changes are also shown in the figure; these were obtained by varying mechanical regulators, then holding the intermediate pressure for a selected period of time based on the total specified time to achieve the next pressure level.

Figure 4. The T3 temperature during the LOCA environments. Pertinent events relative to the test are shown.

All profiles nearly match the desired test requirements for the simultaneous LOCA simulation. The exceptions were the initial rate requirement of 0 to 70 psi in 10 sec and a 13-hour loss of steam on March 3, 1978. The risetime of 10 sec outset of the LOCA test on February 21, 1978 was not met because minor steam leaks forced temporary adjustments of seats and seals; actual risetime was approximately 120 sec. On March 3, 1978 (the 10th day of the LOCA test), with steam at 10 psi and temperature at 113°C, the T1 thermocouple opened causing the boiler to shut down. (This thermocouple is wired into the boiler control system as a safety system in the event of an overtemperature.) Because of the large accumulator volume, steam flow continued for another 7-1/2 hours. The sequence was as follows:

~ 1300 March 3, 1978. Boiler shutdown (T1 opened).

~ 1430 Steam pressure started down from 10 psi.

~ 2200 Steam pressure reached 0 psi.

2250 Chamber temperature equilibrated at about 62°C, because of the load currents in the cables.

0830 March 4, 1978. Repairs to thermocouple connector completed.

0905 Restarted boiler.

1100 Returned steam to test chamber at 10 psi and 113°C.

Total time without steam flow was 13 hrs.

Total time with steam at 10 psi was 10 days, 3 hrs, and 8 min.

An anomaly was noted in the temperature indications upon restoration of steam. Normally, temperatures respond almost instantly when steam pressures are changed. In this case the T2 and T3 thermocouples indicated the presence of 10 psi steam immediately, but T1 took several minutes to respond, and, when it did change, it did so in a near step response. The explanation for this phenomenon is that the chamber was partially filled with water (which covered T1) and it took this amount of time for the water to be forced from the chamber through the discharge tube located at the bottom of the chamber.

Chemical spray was pumped into the test chamber during the first 24 hours of the LOCA phase at the rate of approximately 2 gals/hr as shown in Figure 5. Total solution pumped was 49.8 gals.

A summary of the LOCA environments is given in Table III.

Figure 5. Pumped chemical solution as a function of pumping time.

Dissipation Factor Diagnostics

Test IX is the first test where the dissipation factor (DF) of the cables was measured in conjunction with capacitance. The purpose for taking this data was to determine whether deterioration and damage of cable insulation could be evaluated and followed as the cable was aged and then subjected to the LOCA condition.

Capacitance is primarily a unit governed by geometric proportions of plate (wire) area and plate (wire) separation distance and dielectric constant that only varies between 1 and 8 for typical cable materials, Reference 7. (Other selected dielectric constants are rubber 3.0, polyethylene 2.3, crosslinked polystyrene 2.6, polyvinyl chloride 3.2, and neoprene 6.7; these values are for 25°C and a frequency of 60 Hz and decrease with increasing temperature and frequency, but can never go below 1.) Severe damage, in the form of cracks, under LOCA environments will admit water (with a much higher dielectric constant) and thus increase the capacitance and DF values.

Capacitance for parallel wires as taken from Reference 8, where $D < 10d$ is,

$$C = \frac{3.877 K}{\cosh^{-1}(D/d)} = \text{pf/ft.}$$

and for parallel wires when $D > 10d$ is,

$$C = \frac{3.877 K}{\log(2D/d)} = \text{pf/ft.}$$

and for a single wire to ground where $h > 2d$ is,

$$C = \frac{7.354 K}{\log(2h/d)} = \text{pf/ft.}$$

where,

K = relative dielectric constant (relative to air = 1)

D = distance between plates or wire centers (cm), also dielectric thickness

d = diameter of conductor (cm)

h = height above ground.

A typical capacitor has the following losses and can be represented by the circuit below.

R_1 = lead or wire resistance

R_2 = leakage resistance (normally $X_c \ll R_2$)

R_3 = dielectric absorption or dielectric hysteresis

X_c = capacitive reactance (frequency dependent impedance).

All resistance can be combined into a simple resistance or loss term referred to as equivalent series resistance (ESR).

$$ESR = R_1 + R_{2esr} + R_3$$

where

$$R_2 = \frac{E_{DC}}{I_{DC}}$$

and

$$R_{2esr} = \frac{X_C^2}{R_2}$$

As the leakage resistance (R_2) decreases, R_{2esr} increases due to insulation degradation; greater signal currents flow in this path bypassing the capacitor. R is the quality of the capacitor which is affected and it is this 'figure of merit' which is measured as the dissipation factor. By definition,

$$DF = \frac{ESR}{X_C} = (ESR)(2\pi fC) .$$

Based on this information it can be seen that as cable is aged, outgassing occurs and polymer density decreases, forcing the dielectric constant to appreciably decrease. This will result in a small change in the capacitance value but a large change in DF. As the insulation further degrades it loses its ability to stand off voltage and large leakage currents bypass the capacitor. In the case of a LOCA where the cable is exposed to steam and moisture in the presence of cracked insulation, the DF and capacitance will both rise dramatically. Standard high voltage insulation resistance (IR) measurements will not pick up the degradation as early as DF because the insulation is still able to withstand voltage without breakdown. IR measurements are certainly valuable in observing the insulation resistance but are not as early an indication of changes in insulation quality as is DF.

Several problems exist in measuring and interpreting DF and capacitance data. One is that the measurements are made on cables and not discrete capacitors. The cable, having some large length, acts as an antenna and picks up large noise signals. Most capacitance bridges do not have adequate filtering to provide reliable measurements in this environment. Another problem is that some cable dielectrics are polar and therefore the frequency at which DF and capacitance are measured is important. In the case where only about 3 feet of cable is subjected to the aging LOCA environment, out of a total of about 30 feet, the results of the measurements require additional interpretation. The cable has distributed properties of resistance and capacitance but can be simulated in terms of lumped parameters as shown below.

As temperature increases the density of the dielectric decreases forcing the capacitance to decrease slightly and the DF to decrease greatly (ESR decreases). This can easily be seen even when only a small portion of the cable is exposed to higher temperatures since the impedances are in parallel and a decrease in just one of the parallel resistances will force the total impedance to always be smaller than the smallest impedance. Changes in the cable insulation which cause the ESR to increase (e.g., increasing pressure) will not reflect as a significant increase in DF. The increase in measured DF cannot be attributed to the increased ESR because in this case the remaining cable length, or other parallel resistances hold the cable at a near constant resistance. Whenever a DF value increases above the original value (that for a new untested cable) the increase must be attributed to the increased capacitance. In summary, the DF should be an excellent indication of the cable's condition due to aging and LOCA.

A factor which affects the ability to acquire good measurements is the radiation environment. Gamma radiation ionizes the dielectric material (including the air) which affects all measurements including insulation resistance. Because of all the variables involved, the best data is achieved by returning the experiment to ambient conditions to observe the level of insulation degradation. Data taken during the active portion of the test best determines when step changes take place (i.e., cracking and moisture absorption).

Test Results

Electrical Insulation Samples

After test completion, the electrical insulation specimens were removed and have been returned to the supplier to conduct tensile and elongation tests; however, the results of this testing are not yet available. As described previously, three samples of each type were exposed in two different zones within the test chamber and subjected to different portions of the simultaneous test. The chamber was opened on February 20, 1978 to remove some of the samples and to photograph the post-aging results (see Figures 6 and 7).

Figure 6. Overall view of the experiment at post-aging inspection.

Figure 7. Post-aging view of insulation samples and type C/bend splice, with no visible damage.

Figure 8. Post-aging view of type B/bend splice (upper front) and type C/bend splice (lower background).

Figure 9. Post-aging view of type A/bend splice and type A/straight splice.

Figure 10. Post-aging overall view with some splice positioning dimensions.

Figure 11. Post-test overall view showing general distribution of cables and insulation for phase after initial chamber opening.

Figure 12. Post-test view of type C bent splice showing the characteristic circumferential cracks.

Figure 13. Post-test view of type A/straight splice (lower-most cable in chamber) showing significant material damage.

Figure 14. Post-test view of type C cable showing the circumferential cracks.

Figure 15. Post-test view of type A, type B, and type C cables and a straight splice. Type C cable has the circumferential cracks.

Figure 16. Post-test view of type A/straight splice (lower left), type B cable to the left of type C cable (with the large circumferential crack), and (lower right) type A cable (in this case no cracks).

Figure 17. Post-test view of type A/straight splice (lowermost), type A cable (next up from bottom), and type C cable (third up).

Figure 18. Post-test view of type B/straight splice compared to a new, untested cable.

Panel 2: B Cable/Bend Splice - This cable, in all three configurations, showed large changes in the insulation properties (DI) while the capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the B cable in the area of the bend, a large split occurred but inner wrap remained.

Panel 3: A Cable, A Cable/Bend Splice and A Cable/Straight Splice - This cable, in all three configurations, showed large changes in the insulation properties (DI) while the capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the A cable in the area of the bend, a large split occurred but inner wrap remained.

Panel 4: C Cable/Bend Splice - This cable, in all three configurations, showed large changes in the insulation properties (DI) while the capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the C cable in the area of the bend, a large split occurred but inner wrap remained.

Panel 5: D Cable/Bend Splice - This cable, in all three configurations, showed large changes in the insulation properties (DI) while the capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the D cable in the area of the bend, a large split occurred but inner wrap remained.

B Cable/Bend Splice - Same explanation as the B cable above. The capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the B cable in the area of the bend, a large split occurred but inner wrap remained.

B Cable/Bend Splice - Same explanation as the B cable above. The capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the B cable in the area of the bend, a large split occurred but inner wrap remained.

B Cable/Straight Splice - Same explanation as the B cable above.

Panel 3: A Cable, A Cable/Bend Splice and A Cable/Straight Splice - This cable, in all three configurations, showed large changes in the insulation properties (DI) while the capacitance indicates that moisture did not penetrate the inner insulation separating the wires. The photographs illustrate that, for the A cable in the area of the bend, a large split occurred but inner wrap remained.

intact. Large differences in DF values for the two frequencies indicate the dielectric is polar.

Panel 4 A Cable and C Cable - These cables were routed inside the gamma facility next to all other cables but were outside the test chamber. These "control cables" show some sign of minor degradation which is due to the small radiation doses they received.

The best information obtained from these measurements was attained under quiescent conditions, but the experiment does not allow for routine shutdown. Monitoring of the experiment at regular intervals does provide an indication of the significant changes to the cable in spite of the irregularities caused by the environment. This could be realized only from the DF and capacitance values and not insulation resistance. Data with the highest confidence level was that measured at 1000 Hz because of more precise meter nulling; however, it was the 120 Hz measurements that provided the earliest indication of changes in insulation quality. Work is continuing in an effort to identify the best measurement frequency, especially for those cables having a polar dielectric. These types of measurements are only useful on cables with two or more conductors. All single conductor cables tested were only evaluated for insulation resistance to ground and showed no measurable degradation. All single conductor cables were functionally operational at the end of the test.

Summary

Simultaneous testing of cables, splice assemblies, and electrical insulation samples was conducted February 15 through March 13, 1978. The purpose was to determine the degree of synergistic effects reflected by comparison of data from this test with its complement (Test VIII), the sequential portion. There were no functional failures in either test, with cables and cables with splices maintaining their rated current and voltage through both tests and the preliminary indications are that no significant functional or material synergisms exist. The tensile-specimen insulation samples are currently being evaluated and no results are available.

Measurements made on this test included insulation resistance and capacitance and, for the first time, dissipation factor. Dissipation factor, when observed in conjunction with capacitance, provided a good indication of degradation during the aging and LOCA portions of test. From the data, times at which the cables cracked and started absorbing moisture from the LOCA environment were bracketed. All splicing materials endured the conditions of LOCA better than the insulation materials in the attached cable. Type A cable showed less degradation of its electrical properties than did types B or C.

TABLE I
Electrical Current/Voltage Circuits

<u>Panel</u>	<u>Location</u>	<u>Cables/Cables with Splices Attached</u>
1	Inside Chamber	1 - C Cable - 3 Conductor
		1 - D/Single Cable
		1 - C/Single Cable
		1 - A/Single/Bend Splice
		1 - A/Single/Straight Splice
2	Inside Chamber	1 - C Cable - 3 Conductor - Bend Splice
		1 - B Cable - 3 Conductor - Bend Splice
		1 - B Cable - 3 Conductor - Straight Splice
3	Inside Chamber	1 - A Cable - 3 Conductor
		1 - A Cable - 3 Conductor - Bend Splice
		1 - A Cable - 3 Conductor - Straight Splice
4	Outside Chamber	1 - A Cable - 3 Conductor
		1 - C Cable - 3 Conductor
		1 - C/Single Cable
		1 - D/Single Cable
		1 - A/Single/Bend Splice

TABLE II
Chamber Dose-Rate Profiles for Test IX¹

Chamber Position (in.)	②③ ² Actual $\dot{\gamma}$ ing 116.07 hr (120 hr @ 0.2 Mrad/hr) ³		①⑥ Actual LOCA 2 hr (2 hr @ 4 Mrad/hr)		①⑦ Actual LOCA 6 hr (6 hr @ 2 Mrad/hr)		①⑧ Actual LOCA 14.27 hr (16 hr @ 1 Mrad/hr)		②④ Actual LOCA 336.65 hr (350 hr @ 0.4 Mrad/hr)		LOCA Total Dose	Total Experiment Dose
	Rate	Dose	Rate	Dose	Rate	Dose	Rate	Dose	Rate	Dose		
2	0.04	04.64	0.10	0.20	0.08	00.48	0.06	00.86	0.04	013.47	015.01	019.65
4	0.05	05.80	0.14	0.28	0.11	00.66	0.08	01.14	0.05	016.83	018.91	024.71
6	0.07	08.12	0.18	0.36	0.13	00.90	0.11	01.37	0.07	023.57	026.40	034.51
8	0.09	10.45	0.22	0.58	0.20	01.20	0.14	02.00	0.09	030.30	034.08	044.53
10	0.12	13.93	0.48	0.96	0.28	01.68	0.19	02.71	0.12	040.40	045.75	059.68
12	0.15	17.41	0.78	1.56	0.42	02.52	0.26	03.71	0.15	050.50	058.29	075.70
14	0.20	23.21	1.24	2.48	0.70	04.20	0.37	05.28	0.20	067.43	079.29	102.50
16	0.29	32.50	2.22	4.44	1.26	07.56	0.55	07.85	0.28	094.26	114.11	145.61
18	0.50	58.04	4.12	8.24	2.48	14.88	0.88	12.56	0.50	168.33	204.01	262.05
20	0.78	90.53	4.90	9.80	3.16	20.16	1.24	17.64	0.78	282.50	310.24	400.77
Avg. 14-20	0.40 Mrad/hr		3.12 Mrad/hr		1.95 Mrad/hr		0.76 Mrad/hr		0.44 Mrad/hr			

Dose in Mrad } Dose
Dose Rate in Mrad/hr } /hr

1. Dosimetry taken on January 18, 1978; (reduce data by 1% for this test) - all values for chamber center line
2. Numbers circled above represent source position in inches.
3. Desired time and dose rate.

TABLE III
LCCA Environments

STEAM			RADIATION			
Press. Desired and Actual (psig)	Time		Chamber Position (in.)			
	Desired	Actual	17.8	17.3	18.6	17.3
0-70	10 sec	120 sec				
70	3 hr	3 hr				
70-0	2 hr	2 hr				
0-70	10 sec	~10 sec				
70	3 hr	3 hr				
70-40	30 min	30 min				
40	6 hr	6 hr				
40-25	30 min	30 min				
25	4 days	4 day, 5 min				
25-10	30 min	30 min				
10	10 day	5 day, 6 hr, 12 min				
10-0	30 min	7 hr, 33 min				
no steam	0	13 hr				
10	0	4 day, 20 hr, 56 min				
10-0	0	30 min				
0	24 hr	23 hr, 48 min				
			Time (hr)			
			Desired	2.00	6.00	16.00
			Actual	2.00	6.00	14.30
			Dose Rate (mrad/hr)			
			Desired	4.00	2.00	1.00
			Actual	4.00	2.00	1.00
			Actual* (14-20 in.)	3.12	1.95	0.76
			Actual* (2-20 in.)	1.45	0.90	0.34
			Total Dose (mrad)			
			Desired	1.00	12.00	16.00
			Actual	8.00	12.00	14.30
			Actual* (14-20 in.)	6.24	11.70	10.90
			Actual* (2-20 in.)	2.80	05.40	04.86

* = av values

TABLE IV
Test Data Summary

		Average Data				For Any Wire Pair			Comments
		Pretest 2/15/78	Postaging 2/21/78	Posttest 3/10/78	Posttest (Annealed) 3/13/78	Lowest Value and Date	Highest Value and Date		
Panel 1 C 1-6	D.F. (120 Hz)	0.0774	0.0453	0.0002	0.0093	~ 0 2/21-3/6	0.1152 3/8		Cable cracked 3/6 to 3-8 and took on moisture.
	D.F. (1 kHz)	0.0694	0.0421	0.0091	0.0150	~ 0 2/21-3/9	0.07 2/13		
	Cap (120 Hz)	1107.3	1076.7	1358.5	1388.3	735.0 2/22	1596. 3/8		
	Cap (1 kHz)	1014.	1017.3	1361.7	1367.3	799.5 2/21	1481. 3/10		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	1.8×10^8 2/17	$> 5 \times 10^9$		
Panel 2 C (Bend) 1-6	D.F. (120 Hz)	0.0787	0.0538	~ 0	0.0396	~ 0 2/22-3/9	0.0787 2/15		Bend splice in high radiation area. Cracking above splice.
	D.F. (1 kHz)	0.0720	0.0495	0.0215	0.0361	~ 0 2/23-3/3	0.0720 2/15		
	Cap (120 Hz)	1164.7	1108.3	1159.3	1257.7	812.0 2/22	1284. 3/13		
	Cap (1 kHz)	1063.7	1031.2	1172.7	1184.9	883.1 2/21	1207. 3/13		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	6.2×10^7 2/21	$> 5 \times 10^9$		
Panel 2 B (Bend) 7-12	D.F. (120 Hz)	0.0243	0.0177	0.0217	0.0797	0 2/16-2/20	0.2120 2/27		Cable cracked 2/22 to 2/23 and took on significant amount of moisture.
	D.F. (1 kHz)	0.0254	0.0146	0.0144	0.0344	~ 0 2/21	0.0470 2/27		
	Cap (120 Hz)	647.	663.	891.5	1081.8	310.0 2/16	1089.5 3/13		
	Cap (1 kHz)	634.8	648.8	1025.8	1036.5	598.0 2/21	1070. 3/10		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	3.83×10^8	4.0×10^8	2×10^7 2/27	$> 5 \times 10^9$		
Panel 2 B (Straight) 13-18	D.F. (120 Hz)	0.0240	0.0159	0.0087	0.0504	0 2/16-2/22	0.0721 2/24		Cable cracked 2/22 to 2/24 and took on moisture.
	D.F. (1 kHz)	0.0251	0.0195	0.0143	0.0348	0 2/21	0.0380 3/10		
	Cap (120 Hz)	602.7	678.	854.8	939.5	544.0 2/16	950.2 3/10		
	Cap (1 kHz)	647.8	664.2	892.3	904.	616.8 2/21	977.4 3/10		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	1.82×10^8	2.23×10^8	6×10^7 3/3	$> 5 \times 10^9$		
Panel 3 A 1-6	D.F. (120 Hz)	0.0569	0.0628	0	~ 0	0 2/21-3/13	0.0685 2/21		Polar Dielectric. No significant changes.
	D.F. (1 kHz)	0.0863	0.0736	0.1977	0.0186	0 3/7-3/9	0.0610 2/15		
	Cap (120 Hz)	874.7	845.7	874.3	801.7	617.0 2/22	844.3 3/3		
	Cap (1 kHz)	798.3	773.7	876.1	887.3	668.4 2/22	906. 3/10		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	5×10^9 3/9	$> 5 \times 10^9$		
Panel 3 A (Bend) 7-12	D.F. (120 Hz)	0.0517	0.0628	0.0077	0.0119	~ 0 2/22-3/9	0.0602 2/20		Polar Dielectric. No significant changes.
	D.F. (1 kHz)	0.0810	0.0693	0.0209	0.0240	~ 0 2/21	0.0839 2/15		
	Cap (120 Hz)	0792.5	0772.4	0779.5	0812.2	560.0 2/22	825.6 3/3		
	Cap (1 kHz)	0733.7	0713.2	0798.4	0808.5	605.4 2/22	822.2 3/10		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	2.8×10^9 2/24	$> 5 \times 10^9$		
Panel 3 A (Straight) 13-18	D.F. (120 Hz)	0.0552	0.0586	0	0	~ 0 2/22-3/13	0.0620 2/20		Polar Dielectric. And Not Anneal.
	D.F. (1 kHz)	0.0823	0.0689	~ 0	0	~ 0 3/4-3/13	0.0860 2/15		
	Cap (120 Hz)	755.6	732.2	693.0	676.7	552.0 2/22	763.4 2/15		
	Cap (1 kHz)	0609.4	675.6	701.1	706.3	582.9 2/22	757.0 3/1		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	1×10^9 3/8	$> 5 \times 10^9$		
Panel 4 A 1-6	D.F. (120 Hz)	0.0485	0.0497	0.0492	0.0579	0.0070 3/19	0.0614 3/13		Polar Dielectric. Shows slight radiation aging.
	D.F. (1 kHz)	0.0841	0.0826	0.0614	0.0811	0.0451 2/21	0.0869 2/15		
	Cap (120 Hz)	1006.7	994.2	890.5	868.8	914.8 3/10	1028.0 2/15		
	Cap (1 kHz)	928.3	879.5	889.6	886.6	853.6 3/2	947.8 2/15		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$		
Panel 4 C 7-12	D.F. (120 Hz)	0.0720	0.0798	0.0579	0.0588	0.028 3/4	0.0712 2/15		Shows slight radiation aging.
	D.F. (1 kHz)	0.0717	0.0701	0.0488	0.0657	0.0458 2/21	0.0721 2/15		
	Cap (120 Hz)	1144.7	1147.0	1062.4	1116.3	1047.0 2/15	1155.0 2/21		
	Cap (1 kHz)	1037.7	1043.3	1002.8	1019.0	947.6 2/27	1045.0 2/15		
	I.R.	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$		

NOTES: Dissipation Factor - No Units
Capacitance - Picofarads
Insulation Resistance - Ohms

TABLE V

Dissipation Factor - 120 Hz on ESI-Model 273 Bridge

			Date: Time: $T_1/T_2/T_3$ Comment:	2/15/78 1023 23°C Pretest	2/15/78 1250 128/129/126 Start Aging Source @ 24 in.	2/16/78 1017 127/129/125 Aging Source DN (Temporary) @ 24 in.	2/16/78 1045 127/129/125 Aging Source @ 24 in.	2/17/78 0831 127/129/125 Aging Source @ 24 in.	2/18/78 0915 129/130/127 Aging Source @ 24 in.	2/19/78 0945 128/132/129 Aging Source @ 24 in.
Panel 1	1-3	C		0.0788	0.0440	0.0740	0.0440	-	0.0541	0.0645
	3-5	↓		0.0770	0.0430	0.0720	0.0430	-	0.0521	0.0630
	1-5			0.0785	0.0395	0.0745	0.0440	-	0.0539	0.0605
	av.			0.0774	0.0422	0.0735	0.0440	-	0.0534	0.0627
									0.0265	0.0540
Panel 2	1-3	C		0.0785	0.0460	0.0365	0.0265	-	0.0297	0.0538
	3-5	Bend		0.0785	0.0430	0.0340	0.0271	-	0.0229	0.0462
	1-5	↓		0.0790	0.0364	0.0325	0.0170	-	0.0264	0.0513
	av.			0.0787	0.0419	0.0343	0.0235	-		
	7-9	B		0.0220	0.0176	-0	-0	-	-0	-0
	9-11	Bend		0.0290	0.0244	-0	-0	-	-0	-0
	7-11	↓		0.0220	0.0131	-0	-0	-	-0	-0
	av.			0.0243	0.0188	-0	-0	-	0	0
	13-15	B		0.0280	-0	-0	-0	-	-0	-0
	15-17	Straight		0.0280	0.010	-0	-0	-	-0	0.0170
	13-17	↓		0.0280	0.0008	-0	-0	-	-0	-0
	av.			0.0280	0.0035	-0	-0	-	-0	-0.0017
Panel 3	1-3	A		0.0540	0.0064	-	-0	-	0.0312	0.0370
	3-5	↑		0.0600	0.0110	-	0.0044	-	0.0393	0.0195
	1-5			0.0550	0.0035	-	-0	-	0.0312	0.0345
	av.			0.0563	0.0070	-	-0.0015	-	0.0329	0.0370
	7-9	A		0.0530	-0	-	-0	-	0.0413	0.0482
	9-11	Bend		0.0540	0.0200	-	0.0205	-	0.0563	0.0580
	7-11	↓		0.0540	0.0140	-	0.0175	-	0.0442	0.0437
	av.			0.0537	0.0113	-	-0.0127	-	0.0473	0.0500
	13-15	A		0.0515	-0	-	-0	-	0.0315	0.0357
	15-17	Straight		0.0570	0.0180	-	0.0036	-	0.0423	0.0440
	13-17	↓		0.0570	0.0110	-	-0	-	0.0305	0.0365
	av.			0.0552	0.0097	-	-0.0012	-	0.0348	0.0387
Panel 4	1-3	A		0.0490	0.0078	-	-0	-	0.0228	0.0172
	3-5	↑		0.0505	0.0110	-	0.0155	-	0.0285	0.0220
	1-5			0.0490	0.0020	-	0.0054	-	0.0197	0.0140
	av.			0.0495	0.0069	-	-0.0070	-	0.0237	0.0177
	7-9	C		0.0732	0.0390	-	0.0365	-	0.0473	0.0400
	9-11	↓		0.0708	0.0385	-	0.0380	-	0.0437	0.0422
	7-11			0.0719	0.0365	-	0.0360	-	0.0460	0.0400
	av.			0.0720	0.0380	-	0.0368	-	0.0473	0.0407

TABLE V (cont)

			Date:	2/20/78	3/20/78	2/20/78	2/21/78	2/21/78	2/21/78	2/21/78
			Time:	0900	1012	1254	1355	1703	1915	2158
			$T_1/T_2/T_3$	129/133/129	127/130/127	35/34/36	19/20/19	157/159/156	157/159/156	155/156/155
			Comment:	Aging Source @ 24 in.	Heat Aging Only Source Down @ 0951	Post Aging Source Down	Pre-Pressure Source Down	Steam @ 70 @ 1635 Source @ 1647	Steam @ 70 Source @ 1847	Steam @ 70 Source @ 19 in. @ 1847
										Following steps to 4 psi & 10 sec. Ramp Up
Lines										
Panel 1	1-3	C		0.0180	0.0140	0.0512	0.0450	-	~0	-
	3-5	↓		0.0170	0.0413	0.0530	0.0458	-	~0	-
	1-5			0.0156	0.0388	0.0502	0.0450	-	~0	-
	av.			0.0169	0.0414	0.0515	0.0453	-	~0	-
Panel 2	1-3	C		0.0207	0.0341	0.0137	0.0530	-	0.0220	-
	3-5	Bend		0.0210	0.0315	0.0112	0.0548	-	0.0220	-
	1-5	↓		0.0186	0.0272	0.0091	0.0538	-	0.0161	-
	av.			0.0201	0.0309	0.0113	0.0539	-	0.0200	-
	7-9	B		~0	~0	~0	0.0141	-	~0	-
	9-11	Bend		~0	~0	~0	0.0190	-	~0	-
	7-11	↓		~0	~0	~0	0.0201	-	0.0100	-
	av.			~0	~0	~0	0.0177	-	0.0033	-
	13-15	B		~0	~0	~0	0.0148	-	~0	-
	15-17	Straight		~0	~0	~0	0.0170	-	~0	-
	13-17	↓		~0	~0	~0	0.0160	-	~0	-
	av.			~0	~0	~0	0.0159	-	~0	-
	1-3	A		0.0312	0.0533	0.0548	0.0600	-	~0	-
	3-5	↓		0.0391	0.0589	0.0590	0.0600	-	~0	-
	1-5			0.0320	0.0600	0.0570	0.0685	-	~0	-
	av.			0.0341	0.0577	0.0576	0.0628	-	~0	-
Panel 3	7-9	A		0.0415	0.0582	0.0529	0.0615	-	~0	-
	9-11	Bend		0.0573	0.0662	0.0592	0.0620	-	0.0160	-
	7-11	↓		0.0440	0.0622	0.0564	0.0650	-	~0	-
	av.			0.0476	0.0622	0.0562	0.0628	-	0.0053	-
	13-15	A		0.0330	0.0550	0.0417	0.0590	-	~0	-
	15-17	Straight		0.0430	0.0604	0.0582	0.0585	-	0.0060	-
	13-17	↓		0.0363	0.0620	0.0595	0.0591	-	~0	-
	av.			0.0374	0.0591	0.0531	0.0589	-	0.0020	-
	1-3	A		0.0238	0.0382	0.0412	0.0475	-	0.0140	-
	3-5	↓		0.0292	0.0460	0.0495	0.0530	-	0.0175	-
	1-5			0.0200	0.0392	0.0419	0.0485	-	0.0060	-
	av.			0.0243	0.0411	0.0442	0.0497	-	0.0125	-
	7-9	C		0.0455	0.0647	0.0680	0.0719	-	0.0450	-
	9-11	↓		0.0470	0.0617	0.0673	0.0680	-	0.0470	-
	7-11			0.0451	0.0631	0.0658	0.0716	-	0.0438	-
	av.			0.0459	0.0632	0.0670	0.0708	-	0.0453	-

TABLE V (cont)

			Date: 2/22/78	2/22/78	2/22/78	2/22/78	2/22/78	2 23 78	2/23/78
			Time: 0610	0616	0621	0615	1555	0930	1030
			$T_1/T_2/T_3$	155/156/155	139/140/140	139/140/138	128/129/129	127/131/130	127/128/126
			Comment:	Steam @ 70	Steam @ 40	Steam @ 40	Steam @ 25	Steam @ 25	Steam @ 25
				Source @ 19 in.	Source 21-1/2	Source 21-1/2	Source 21-1/2	Source 1in.	Source 24 in.
				SL @ 0110	SL @ 0740	SL @ 0740	Source to 24 in. @ 1647	(Temporary)	
Lines									
Panel 1	1-3	C ↓	-0	-0	-0	-0	-0	-	-0
	3-5		-0	-0	-0	-0	-0	-	-0
	1-5		-0	-0	-0	-0	-0	-	-0
	av.		-0	-0	-0	-0	-0	-	-0
Panel 2	1-3	C Bend ↓	0.0160	-0	-0	-0	-0	-	-0
	3-5		0.0190	-0	-0	-0	-0	-	-0
	1-5		0.0128	-0	-0	-0	-0	-	-0
	av.		0.0132	-0	-0	-0	-0	-	-0
	7-9	B Bend ↓	-0	-0	-0	-0	-0	-	-0
	9-11		0.0361	0.0788	0.0444	0.0310	0.0290	-	0.0665
	7-11		0.0271	0.0712	0.0347	0.0250	0.0248	-	0.1020
	av.		0.0211	0.0700	0.0254	0.0187	0.0179	-	0.0562
	13-15	B Straight ↓	-0	-0	-0	-0	-0	-	-0
	15-17		-0	0.0372	0.0059	-0	-0	-	-0
	13-17		-0	-0	-0	-0	-0	-	-0
	av.		-0	-0.0124	-0.0020	-0	-0	-	-0
Panel 3	1-3	A ↓	-0	-0	-0	-0	-0	-0	-0
	3-5		-0	-0	-0	-0	-0	-0	-0
	1-5		-0	-0	-0	-0	-0	-0	-0
	av.		-0	-0	-0	-0	-0	-0	-0
	7-9	A Bend ↓	-0	-0	-0	-0	-0	-	-0
	9-11		-0	-0	-0	-0	-0	-	-0
	7-11		-0	-0	-0	-0	-0	-	-0
	av.		-0	-0	-0	-0	-0	-	-0
	13-15	A Straight ↓	-0	-0	-0	-0	-0	-	-0
	15-17		-0	-0	-0	-0	-0	-	-0
	13-17		-0	-0	-0	-0	-0	-	-0
	av.		-0	-0	-0	-0	-0	-	-0
Panel 4	1-3	A ↓	0.0091	0.0116	0.0128	0.0090	0.0134	0.0472	0.0207
	3-5		0.0210	0.0193	0.0194	0.0160	0.0151	0.0438	0.0215
	1-5		0.0044	0.0060	0.0081	0.0056	0.0056	0.0481	0.0161
	av.		0.0115	0.0131	0.0134	0.0102	0.0114	0.0464	0.0194
	7-9	C ↓	0.0320	0.0438	0.0444	0.0458	0.0459	-	0.0543
	9-11		0.0348	0.0447	0.0467	0.0470	0.0448	-	0.0508
	7-11		0.0328	0.0400	0.0402	0.0450	0.0448	-	0.0501
	av.		0.0332	0.0455	0.0438	0.0459	0.0452	-	0.0517

TABLE V (cont)

			Date:	2/24/78	2/25/78	2/26/78	2/27/78	2/28/78	3/1/78	3/2/78
			Time:	0900	0945	0714	0937	0929	0950	1100
			$T_1/T_2/T_3$	126/128/128	126/128/124	128/131/131	106/106/106	107/115/116	107/116/116	107/108/107
			Comment:	Steam @ 25 Source 24 in.	Steam @ 25 Source 24 in.	Steam @ 25 Source 24 in. Steam to 10 @ 0740	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
			Lines							
Panel 1	1-3	C ↓		~ 0	~ 0	-	~ 0	-	~ 0	-
	3-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	1-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0	~ 0	-	~ 0	-	~ 0	-
Panel 2	1-3	C Bend ↓		~ 0	~ 0	-	~ 0	-	~ 0	-
	3-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	1-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0	~ 0	-	~ 0	-	~ 0	-
	7-9	B Bend ↓		0.0472	~ 0	-	~ 0	-	0.0502	~ 0
	9-11			0.1520	0.2180	-	0.2320	-	0.0227	0.0228
	7-11			0.1780	0.1182	-	0.1920	-	0.0835	0.1750
	av.			0.1257	~ 0.1094	-	~ 0.1413	-	0.0521	~ 0.0639
	13-15	B Straight ↓		0.0356	0.0150	-	~ 0	-	0.0192	-
	15-17			0.0721	0.0617	-	0.0300	-	0.0478	-
	13-17			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0.0359	~ 0.0256	-	~ 0.0100	-	~ 0.0223	-
Panel 3	1-3	A ↓		~ 0	~ 0	-	~ 0	-	~ 0	-
	3-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	1-5			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0	~ 0	-	~ 0	-	~ 0	-
	7-9	A Bend ↓		~ 0	~ 0	-	~ 0	-	~ 0	-
	9-11			~ 0	~ 0	-	0.0091	-	0.0085	-
	7-11			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0	~ 0	-	~ 0.0030	-	~ 0.0028	-
	13-15	A Straight ↓		~ 0	~ 0	-	~ 0	-	~ 0	-
	15-17			~ 0	~ 0	-	~ 0	-	~ 0	-
	13-17			~ 0	~ 0	-	~ 0	-	~ 0	-
	av.			~ 0	~ 0	-	~ 0	-	~ 0	-
Panel 4	1-3	A ↓		0.0253	0.0082	-	0.0159	-	0.0155	-
	3-5			0.0301	0.0131	-	0.0233	-	0.0220	-
	1-5			0.0198	0.0034	-	0.0182	-	0.0182	-
	av.			0.0251	0.0082	-	0.0191	-	0.0186	-
	7-9	C ↓		0.0511	0.0410	-	0.0510	-	0.0442	-
	9-11			0.0518	0.0131	-	0.0471	-	0.0370	-
	7-11			0.0488	0.0400	-	0.0457	-	0.0361	-
	av.			0.0506	0.0414	-	0.0479	-	0.0391	-

TABLE V (cont)

		Date:	3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		Time:	1105	0945	2142	0715	0910	0846	0905
		$T_1/T_2/T_3$	107/111/108	52/43/46	109/110/108	108/114/115	108/110/108	111/112/112	109/111/108
		Comment:	Steam @ 10 Source 24 in.	Steam @ 0 Source 24 in. Boiler OFF ~1400 3/3/78	Steam @ 10 Source 24 in. Boiler ON ~1100 3/4/78	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
		Lines							
Panel 1	1-3	C ↓	-	~0	~0	-	~0	-	0.1152
	3-5		-	~0	~0	-	~0	-	0.1135
	1-5		-	~0	~0	-	~0	-	Could not read
	av.		-	~0	~0	-	~0	-	0.1144
Panel 2	1-3	C Bend ↓	~0	~0	~0	-	~0	-	~0
	3-5		~0	~0	~0	-	~0	-	~0
	1-5		~0	~0	~0	-	~0	-	~0
	av.		~0	~0	~0	-	~0	-	~0
	7-9	B Bend ↓	0.0775	0.0242	0.0430	-	0.0100	-	~0
	9-11		~0	~0	0.0045	-	0.0209	-	~0
	7-11		0.1350	0.0792	0.0760	-	0.0155	-	~0
	av.		~0.0708	~0.0345	0.0412	-	0.0155	-	~0
	13-15	B Straight ↓	0.0278	0.0237	0.0082	-	0.0275	-	0.0022
	15-17		0.0460	0.0415	0.0320	-	0.0563	-	0.0190
	13-17		~0	~0	~0	-	~0	-	~0
	av.		~0.0246	0.0217	~0.0134	-	0.0279	-	0.0072
Panel 3	1-J	A ↓	-	0.0148	~0	-	~0	-	0
	3-5		-	0.0146	~0	-	~0	-	~0
	1-5		-	0.0035	~0	-	~0	-	~0
	av.		-	0.0110	~0	-	~0	-	~0
	7-9	A Bend ↓	-	0.0145	0.0080	-	~0.0018	-	~0
	9-11		-	0.0223	0.0034	-	0.0056	-	~0
	7-11		-	0.0172	~0	-	~0	-	~0
	av.		-	0.0180	0.0038	-	~0.0025	-	~0
	13-15	A Straight ↓	-	0.0116	~0	-	~0	-	~0
	15-17		-	0.0129	~0	-	~0	-	~0
	13-17		-	0.0033	~0	-	~0	-	~0
	av.		-	0.0093	~0	-	~0	-	~0
Panel 4	1-3	A ↓	-	0.0242	0.0203	-	0.0238	-	0.0191
	3-5		-	0.0303	0.0197	-	0.0273	-	0.0237
	1-5		-	0.0152	0.0130	-	0.0125	-	0.0138
	av.		-	0.0233	0.0177	-	0.0212	-	0.0189
	7-9	C ↓	-	0.0322	0.0304	-	0.0414	-	0.0374
	9-11		-	0.0385	0.0310	-	0.0369	-	0.0331
	7-11		-	0.0320	0.0280	-	0.0408	-	0.0366
	av.		-	0.0342	0.0298	-	0.0397	-	0.0357

Table V (cont)

		Date:	3/9/78	3/10/78	3/10/78	3/13/78
		Time:	0719	0835	1413	1000
		T ₁ /T ₂ /T ₃	109/118/119	66/57/60	27/22/24	ND/20/19
		Comment:	Steam @ 10 Source 24 in. St. OFF 0025 So. DN 0756	Steam @ 0 Source DN Pwr. OFF @ 0000	Steam @ 0 Source DN	To Determine Annealing
Line						
Panel 1	1-3	C	~0	0.0046	~0	0.0095
	3-5	↓	~0	0.0045	0.0005	0.0094
	1-5		~0	0.0021	~0	0.0089
	av.		~0	0.0037	~0.0002	0.0093
Panel 2	1-3	C	0.0005	0.0006	~0	0.0401
	3-5	Bend	0.0016	0.0005	~0	0.0404
	1-5	↓	0.0010	0.0188	~0	0.0383
	av.		0.0010	0.0066	~0	0.0396
	7-9	B	0.0320	0.0047	~0	0.0540
	9-11	Bend	0.0218	0.0160	0.0410	0.0922
	7-11	↓	0.0455	0.0090	0.0240	0.0928
	av.		0.0331	0.0059	0.0217	0.0797
	13-15	B	0.0260	0.0325	0.0262	0.0593
	15-17	Straight	0.0360	0.0528	~0	0.0488
	13-17	↓	0.0290	~0	~0	0.0430
	av.		0.0303	~0.0284	~0.0087	0.0504
Panel 3	1-3	A	~0	0.0031	~0	~0
	3-5	↓	~0	0.0029	~0	~0
	1-5		~0	0.0031	~0	~0
	av.		~0	0.0030	~0	~0
	7-9	A	0.0010	0.0120	~0	0.0115
	9-11	Bend	0.0011	0.0159	0.0100	0.0122
	7-11	↓	~0	0.0130	0.0132	0.0120
	av.		~0.0007	0.0136	0.0077	0.0119
	13-15	A	~0	~0	~0	~0
	15-17	Straight	~0	~0	~0	~0
	13-17	↓	~0	~0	~0	~0
	av.		~0	~0	~0	~0
Panel 4	1-3	A	0.0310	0.0328	0.0452	0.0591
	3-5	↓	0.0390	0.0410	0.0500	0.0614
	1-5		0.0220	0.0415	0.0525	0.0532
	av.		0.0307	0.0384	0.0492	0.0570
	7-9	C	0.0478	0.0460	0.0560	0.0603
	9-11	↓	0.0483	0.0461	0.0588	0.0603
	7-11		0.0450	0.0539	0.0580	0.0559
	av.		0.0471	0.0493	0.0579	0.0588

TABLE VI
Dissipation Factor - 1 KHz on ESI - Model 273 Bridge

Lines		Date:	2/15/78	2/15/78	2/16/78	2/16/78	2/17/78	2/18/78	2/19/78
		Time:	1115	1250	1017	1045	0831	1000	1015
		$T_1/T_2/T_3$	29°C	328/129/126	127/129/125	127/129/125	127/129/125	129/130 127	129/132/129
		Comment:	Pretest	Start Age Source @24 in.	Aging Source 47N (Temporary)	Aging Source @24 in.	Aging Source @24 in.	Aging Source @24 in.	Aging Source @24 in.
Panel 1	1-3	C	0.0691	-	-	-	0.0680	0.0528	0.0552
	3-5		0.0700	-	-	-	0.0678	0.0530	0.0562
	1-5		0.0691	-	-	-	0.0675	0.0630	0.0550
	av.		0.0694	-	-	-	0.0678	0.0620	0.0555
Panel 2	1-3	C Bend	0.0720	-	-	-	0.0610	0.0582	0.0465
	3-5		0.0720	-	-	-	0.0615	0.0583	0.0465
	1-5		0.0720	-	-	-	0.0612	0.0567	0.0442
	av.		0.0720	-	-	-	0.0612	0.0577	0.0457
	7-9	B Bend	0.0255	-	-0	-0	0.0022	0.0010	0.0024
	9-11		0.0259	-	-0	-0	0.0100	0.0140	0.0118
	7-11		0.0240	-	-0	-0	0.0076	0.0122	0.0090
	av.		0.0254	-	-0	-0	0.0066	0.0091	0.0079
	13-15	B Straight	0.0251	-0	-0	-0	-0	0.0052	0.0078
	15-17		0.0253	-	-0	-0	0.0160	0.0192	0.0188
	13-17		0.0250	-	-0	-0	0.0090	0.0125	0.0073
	av.		0.0251	-	-0	-0	0.0083	0.0126	0.0100
Panel 3	1-3	A	0.0900	-	-	0.0375	0.0710	0.0715	0.0715
	3-5		0.0880	-	-	-	0.0745	0.0796	0.0796
	1-5		0.0910	-	-	0.0450	0.0797	0.0902	0.0811
	av.		0.0883	-	-	-0.0413	0.0764	0.0771	0.0774
	7-9	A Bend	0.0790	0.0280	-	-	0.0717	0.0738	0.0736
	9-11		0.0859	-	-	-0	0.0794	0.0812	0.0814
	7-11		0.0811	-	-	-	0.0735	0.0771	0.0773
	av.		0.0810	-	-	-0	0.0756	0.0774	0.0775
	13-15	A Straight	0.0758	-0	-	-0	0.0678	0.0685	0.0685
	15-17		0.0850	-	-	-	0.0748	0.0748	0.0741
	13-17		0.0860	-	-	0.0550	0.0772	0.0781	0.0792
	av.		0.0823	-	-	0.0275	0.0734	0.0741	0.0743
Panel 4	1-3	A	0.0805	-	-	0.0530	0.0826	0.0563	0.0620
	3-5		0.0869	-	-	-	0.0690	0.0654	0.0709
	1-5		0.0848	-	-	-	0.0856	0.0619	0.0642
	av.		0.0841	-	-	-0.0530	0.0858	0.0619	0.0642
	7-9	C	0.0723	-	-	-	0.0570	0.0520	0.0563
	9-11		0.0708	-	-	-	0.0518	0.0494	0.0543
	7-11		0.0720	-	-	-	0.0571	0.0518	0.0558
	av.		0.0717	-	-	-	0.0563	0.0511	0.0555

TABLE VI (CONT)

Lines		Date:		2/20/78		2/20/78		2/21/78		2/21/78		2/21/78		2/21/78	
		Time:	0830	1045	1330	1430	1703	1703	1700	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156
		$T_1/T_2/T_3$	129/133/19	127/130/127	-23°C	18/20/19	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156	157/159/156
		Comment:	Aging Source #24 in.	Heat Aging Only Source DN #0951	Post Aging Source DN	Prepressure Source DN	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647	Stream #70 #1633 Source #18 in. #1647
Panel 1	1-3	C	0.0470	0.0282	0.0455	0.0420	0.0345	0.0121	-0	-0	-0	-0	-0	-0	
	3-5		0.0470	0.0282	0.0459	0.0421	0.0333	0.0160	-0	-0	-0	-0	-0	-0	
	1-5		0.0461	0.0275	0.0451	0.0421	0.0310	0.0081	-0	-0	-0	-0	-0	-0	
	av.		0.0467	0.0283	0.0455	0.0421	0.0330	0.0101	0	0	0	0	0	0	
Panel 2	1-3	C Bend	0.0510	0.0396	0.0248	0.0500	0.0340	0.0221	0.0110	0.0110	0.0110	0.0110	0.0110	0.0110	
	3-5		0.0515	0.0401	0.0247	0.0495	0.0332	0.0218	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	
	1-5		0.0498	0.0383	0.0212	0.0490	0.0282	0.0159	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	
	av.		0.0508	0.0393	0.0236	0.0495	0.0318	0.0203	0.0082	0.0082	0.0082	0.0082	0.0082	0.0082	
	7-9	B Bend	0.0130	-0	-0	0.0180	-0	0.0010	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	
	9-11		0.0167	0.0052	-0	0.0208	0.0045	0.0186	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	
	7-11		0.0135	0.0025	-0	0.0200	-0	0.0128	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	
	av.		0.0144	0.0026	-0	0.0196	0.0015	0.0105	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	
	13-15	B Straight	0.0112	-0	-0	0.0190	-0	0	0.0081	0.0081	0.0081	0.0081	0.0081	0.0081	
	15-17		0.0214	0.0064	-0	0.0194	0.0058	0.0185	0.0180	0.0180	0.0180	0.0180	0.0180	0.0180	
	13-17		0.0158	-0	-0	0.0200	-0	0.0070	-0	-0	-0	-0	-0	-0	
	av.		0.0161	0.0031	-0	0.0195	0.0019	0.0058	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	
Panel 3	1-3	A	0.0708	0.0725	0.0662	0.0680	0.0520	0.0111	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	
	3-5		0.0708	0.0708	0.0728	0.0738	0.0400	0.0200	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	
	1-5		0.0708	0.0686	0.0742	0.0770	0.0400	0.0180	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	
	av.		0.0765	0.0784	0.0711	0.0736	0.0377	0.0164	0.0051	0.0051	0.0051	0.0051	0.0051	0.0051	
	7-9	A Bend	0.0733	0.0733	0.0622	0.0660	0.0410	0.0124	0	0	0	0	0	0	
	9-11		0.0812	0.0811	0.0698	0.0728	0.0490	0.0222	0.0066	0.0066	0.0066	0.0066	0.0066	0.0066	
	7-11		0.0768	0.0778	0.0676	0.0690	0.0440	0.0132	0	0	0	0	0	0	
	av.		0.0771	0.0774	0.0666	0.0695	0.0447	0.0161	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	
	13-15	A Straight	0.0691	0.0708	0.0615	0.0634	0.0355	0.0111	-0	-0	-0	-0	-0	-0	
	15-17		0.0758	0.0777	0.0682	0.0712	0.0438	0.0190	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	
	13-17		0.0788	0.0810	0.0708	0.0720	0.0456	0.0182	0.0077	0.0077	0.0077	0.0077	0.0077	0.0077	
	av.		0.0745	0.0785	0.0668	0.0689	0.0416	0.0161	0.0088	0.0088	0.0088	0.0088	0.0088	0.0088	
Panel 4	1-3	A	0.0722	0.0642	0.0635	0.0704	0.0451	0.0682	0.0442	0.0442	0.0442	0.0442	0.0442	0.0442	
	3-5		0.0777	0.0707	0.0702	0.0855	0.0591	0.0668	0.0609	0.0609	0.0609	0.0609	0.0609	0.0609	
	1-5		0.0733	0.0673	0.0673	0.0830	0.0550	0.0619	0.0560	0.0560	0.0560	0.0560	0.0560	0.0560	
	av.		0.0744	0.0674	0.0670	0.0826	0.0531	0.0630	0.0570	0.0570	0.0570	0.0570	0.0570	0.0570	
	7-9	C	0.0623	0.0582	0.0573	0.0710	0.0490	0.0528	0.0502	0.0502	0.0502	0.0502	0.0502	0.0502	
	9-11		0.0598	0.0559	0.0550	0.0682	0.0458	0.0500	0.0490	0.0490	0.0490	0.0490	0.0490	0.0490	
	7-11		0.0600	0.0577	0.0560	0.0710	0.0475	0.0514	0.0497	0.0497	0.0497	0.0497	0.0497	0.0497	
	av.		0.0610	0.0573	0.0561	0.0701	0.0476	0.0514	0.0496	0.0496	0.0496	0.0496	0.0496	0.0496	

TABLE A1 (CONT)

Lines		2/21/78 Time: 2345 T ₁ /T ₂ /T ₃ 155/156/155 Comment: Steam @70 Source 19 in.	2/22/78 0147 159/140/140 Steam @40 Source 21 1/2 in. @0.10 So. @0047	2/22/78 0356 139/140/138 Steam @30 Source 21 1/2	2/22/78 0758 128/129/129 Steam @75 Source 21 1/2 in. @0740	2/22/78 1535 128/129/128 Steam @35 Source 21 1/2 Source to 24 in. @1647	2/23/78 0710 127/131/130 Steam @35 Source 19 (Temperature)	2/23/78 1005 127/127/126 Steam @35 Source 24 in.
Panel 1 1-3	C	-0	-0	-0	-0	-0	-	n
3-5		-0	-0	-0	-0	-0	-	n
1-5		-0	-0	-0	-0	-0	-	n
av.		-0	-0	-0	-0	-0	-	n
Panel 2 1-3	C Bend	0.0129	0.0014	0.0065	0.0025	-0	-	n
3-5		0.0119	0.0025	0.0052	0.0027	0.0045	-	n
1-5		0.0078	-0	0.0011	-0	0.0027	-	n
av.		0.0108	0.0021	0.0043	0.0017	0.0023	-	n
7-9	D Bend	0.0061	0.0040	0.0038	0.0037	0.0120	-	0
9-11		0.0218	0.0287	0.0178	0.0176	0.0180	-	0.0187
7-11		0.0189	0.0225	0.0135	0.0139	0.0140	-	0.0178
av.		0.0149	0.0177	0.0116	0.0117	0.0147	-	0.0199
13-15	H Straight	0.0078	0.0148	0.0110	0.0077	0.0050	-	n
15-17		0.0108	0.0248	0.0208	0.0148	0.0150	-	0.0027
13-17		0.0014	0.0028	0.0055	0.0078	0.0075	-	n
av.		0.0107	0.0148	0.0124	0.0091	0.0072	-	0.0090
Panel 3 1-3	A	-0	0.0090	0.0072	0.0130	0.0110	0.0029	0.0101
3-5		0.0016	0.0149	0.0163	0.0212	0.0170	0.0159	0.0153
1-5		0.0013	0.0189	0.0167	0.0209	0.0180	0.0163	0.0154
av.		0.0010	0.0133	0.0141	0.0114	0.0153	0.0136	0.0136
7-9	A Bend	-0	0.0065	0.0080	0.0110	0.0150	-	0.0158
9-11		-0	0.0148	0.0173	0.0159	0.0230	-	0.0222
7-11		-0	0.0061	0.0086	0.0127	0.0140	-	0.0140
av.		-0	0.0090	0.0117	0.0142	0.0180	-	0.0187
13-15	A Straight	-0	0.0058	0.0067	0.0108	0.0130	-	0.0195
15-17		0.0014	0.0153	0.0110	0.0180	0.0210	-	0.0168
13-17		0.0024	0.0153	0.0130	0.0191	0.0210	-	0.0180
av.		0.0013	0.0121	0.0115	0.0154	0.0183	-	0.0151
Panel 4 1-3	A	0.0718	0.0731	0.0738	0.0722	0.0770	0.0518	0.0552
3-5		0.0789	0.0819	0.0798	0.0798	0.0800	0.0838	0.0822
1-5		0.0742	0.0748	0.0765	0.0740	0.0780	0.0810	0.0800
av.		0.0750	0.0773	0.0771	0.0753	0.0777	0.0807	0.0838
7-9	C	0.0890	0.0882	0.0874	0.0872	0.0720	-	0.0521
9-11		0.0842	0.0840	0.0848	0.0852	0.0850	-	0.0850
7-11		0.0842	0.0870	0.0853	0.0857	0.0700	-	0.0811
av.		0.0848	0.0872	0.0858	0.0860	0.0700	-	0.0800

TABLE VI (CONT)

Lines		Date:	2/24/78	2/25/78	2/26/78	2/27/78	2/28/78	3/1/78	3/2/78
		Time:	0827	0814	0714	0612	0529	0500	1100
		$T_1/T_2/T_3$	126/126/126	126/126/124	126/131/131	107/106/107	107/115/116	107/116/116	107/108/107
		Comment:	Steam @25 Source 24 in.	Steam @25 Source 24 in.	Steam @25 Source 24 in., Steam to 10 @740	Steam @10 Source 24 in.	Steam @10 Source 24 in.	Steam @10 Source 24 in.	Steam @10 Source 24 in.
Panel 1	1-3	C	-0	-0	-0	-0	-0	-0	-0
	3-5	↓	-0	-0	-0	-0	-0	-0	-0
	1-5	↓	-0	-0	-0	-0	-0	-0	-0
	av.	↓	-0	-0	-0	-0	0	-0	-0
Panel 2	1-3	C Bend	-0	-0	-0	-0	-0	.002	-0
	3-5	↓	-0	-0	-0	-0	-0	.003	-0
	1-5	↓	-0	-0	-0	-0	-0	-0	-0
	av.	↓	-0	-0	-0	-0	-0	0.0017	-0
	7-8	B Bend	0.0081	0.0195	0.0120	0.0133	0.0150	0.0200	-0
	8-11	↓	0.0238	0.0341	0.0249	0.0470	0.0240	0.0220	0.0136
	7-11	↓	0.0342	0.0280	0.0170	0.0423	0.0230	0.0230	0.0185
	av.	↓	0.0254	0.0245	0.0183	0.0342	0.0203	0.0213	-0.0107
	13-15	B Straight	0.0129	0.0171	0.0210	0.0236	0.0220	0.0190	0.0098
	15-17	↓	0.0205	0.0239	0.0200	0.0288	0.0270	0.0180	0.0133
	13-17	↓	0.0072	0.0118	0.0100	0.0138	0.0168	0.0240	-0
	av.	↓	0.0110	0.0176	0.0210	0.0221	0.0219	0.0267	-0.0077
Panel 3	1-3	A	0.0002	0.0122	0.0080	0.0200	0.0170	0.0120	0.0022
	3-5	↓	0.0128	0.0172	0.0120	0.0242	0.0210	0.0150	0.0041
	1-5	↓	0.0138	0.0181	0.0130	0.0239	0.0210	0.0140	0.0028
	av.	↓	0.0110	0.0158	0.0110	0.0227	0.0107	0.0137	0.0030
	7-8	A Bend	0.0103	0.0188	0.0150	0.0252	0.0250	0.0230	0.0104
	8-11	↓	0.0242	0.0244	0.0210	0.0302	0.0300	0.0300	0.0241
	7-11	↓	0.0308	0.0210	0.0170	0.0251	0.0264	0.0250	0.0207
	av.	↓	0.0214	0.0214	0.0177	0.0268	0.0271	0.0260	0.0214
	13-15	A Straight	0.0101	0.0072	-0	0.0164	0.0123	0.0120	0.0041
	15-17	↓	0.0150	0.0121	0.0060	0.0220	0.0210	0.0170	0.0093
	13-17	↓	0.0173	0.0131	0.0090	0.0228	0.0172	0.0130	0.0071
	av.	↓	0.0144	0.0108	0.0220	0.0205	0.0175	0.0140	0.0078
Panel 4	1-3	A	0.0742	0.0739	0.0710	0.0718	0.0672	0.0730	0.0508
	3-5	↓	0.0820	0.0816	0.0820	0.0809	0.0821	0.0830	0.0802
	1-5	↓	0.0778	0.0778	0.0780	0.0765	0.0783	0.0780	0.0834
	av.	↓	0.0780	0.0778	0.0773	0.0771	0.0760	0.0787	0.0838
	7-8	C	0.0683	0.0672	0.0680	0.0657	0.0670	0.0670	0.0523
	8-11	↓	0.0685	0.0669	0.0680	0.0654	0.0655	0.0658	0.0508
	7-11	↓	0.0681	0.0670	0.0680	0.0662	0.0665	0.0660	0.0510
	av.	↓	0.0676	0.0672	0.0680	0.0658	0.0663	0.0660	0.0518

TABLE VI (CONT)

Lines		Date:	3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		Time:	1045	0910	2125	0515	0837	0848	0848
		$T_1/T_2/T_3$	109/111/109	65/57/64	109/112/108	108/114/115	108/113/112	111/112/112	105/112/111
Comment:		Stream #10	Stream #10	Stream #10	Stream #10	Stream #10	Stream #10	Stream #10	Stream #10
		Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.
			~1400 3/3/78	~1100 3/4/78					
Panel 1	1-3	~0	~0	~0	~0	~0	0.0030	~0	~0
	3-5	~0	~0	~0	~0	~0	0.0017	~0	~0
	1-5	~0	~0	~0	~0	~0	~0	~0	~0
	av.	~0	~0	~0	~0	~0	0.0016	~0	~0
Panel 2	1-3	~0	0.0378	~0	0.0125	~0	~0	~0	~0
	3-5	~0	0.0378	~0	0.0100	~0	~0	~0	~0
	1-5	~0	0.0355	~0	0.0078	~0	~0	~0	~0
	av.	~0	0.0370	~0	0.0101	~0	~0	~0	~0
	7-9	0.0243	0.0331	0.0308	0.0328	0.0170	0.0207	0.0147	0.0147
	9-11	0.0174	0.0271	0.0190	0.0236	0.0298	0.0173	0.0205	0.0195
	7-11	0.0317	0.0354	0.0271	0.0200	0.0193	0.0248	0.0195	0.0192
	av.	0.0215	0.0331	0.0233	0.0219	0.0230	0.0200	0.0192	0.0192
	13-15	0.0297	0.0502	0.0250	0.0260	0.0277	0.0290	0.0240	0.0240
	15-17	0.0327	0.0360	0.0296	0.0290	0.0310	0.0343	0.0290	0.0290
	13-17	0.0320	0.0190	0.0261	0.0250	0.0247	0.0250	0.0241	0.0241
	av.	0.0315	0.0277	0.0269	0.0247	0.0278	0.0295	0.0257	0.0257
Panel 3	1-3	0.0074	0.0248	0.0020	0.0040	0.0030	~0	~0	~0
	3-5	0.0092	0.0281	0.0030	0.0040	0.0044	~0	~0	~0
	1-5	0.0077	0.0258	0.0010	0.0030	0.0031	~0	~0	~0
	av.	0.0081	0.0254	0.0020	0.0040	0.0035	~0	~0	~0
	7-9	0.0191	0.0390	0.0141	0.0124	0.0140	0.0114	0.0115	0.0115
	9-11	0.0232	0.0250	0.0173	0.0182	0.0170	0.0151	0.0132	0.0132
	7-11	0.0204	0.0321	0.0155	0.0180	0.0147	0.0110	0.0110	0.0110
	av.	0.0208	0.0338	0.0156	0.0155	0.0152	0.0137	0.0122	0.0122
	13-15	~0	0.0180	~0	~0	~0	~0	~0	~0
	15-17	~0	0.0225	~0	~0	~0	~0	~0	~0
	13-17	~0	0.0236	~0	~0	~0	~0	~0	~0
	av.	~0	0.0214	~0	~0	~0	~0	~0	~0
Panel 4	1-3	0.0736	0.0751	0.0789	0.0743	0.0785	0.0739	0.0750	0.0750
	3-5	0.0804	0.0815	0.0831	0.0830	0.0821	0.0812	0.0820	0.0820
	1-5	0.0749	0.0775	0.0785	0.0795	0.0788	0.0774	0.0778	0.0778
	av.	0.0770	0.0780	0.0796	0.0796	0.0792	0.0775	0.0783	0.0783
	7-9	0.0648	0.0642	0.0671	0.0680	0.0642	0.0648	0.0661	0.0661
	9-11	0.0632	0.0619	0.0643	0.0651	0.0643	0.0630	0.0640	0.0640
	7-11	0.0638	0.0631	0.0660	0.0650	0.0687	0.0628	0.0648	0.0648
	av.	0.0639	0.0631	0.0662	0.0654	0.0651	0.0635	0.0650	0.0650

TABLE VI (CONT)

Lines		Date: Time: $T_1/T_2/T_3$ Comment:	3/9/78 0735 109/111/109 Stream 00 Source 24 m. St. Off 0025 So. DN 0754	3/10/78 0620 75/71/75 Stream 20 Source DN Pwr. Off 0000	3/10/78 1420 27/22/24 Stream 20 Source DN	3/13/78 0015 ND/10/10 To Determine Annealing
Panel 1	1-3	C ↓	-0	0.0131	0.0090	0.0153
	3-5		-0	0.0131	0.0053	0.0146
	1-5		-0	0.0130	0.0070	0.0152
	av.		-0	0.0131	0.0091	0.0150
Panel 2	1-3	C Bend ↓	-0	0.0430	0.0225	0.0333
	3-5		-0	0.0420	0.0231	0.0341
	1-5		-0	0.0419	0.0199	0.0400
	av.		-0	0.0423	0.0215	0.0361
	7-9	B Bend ↓	0.0170	0.0299	-0	0.0312
	9-11		0.0220	0.0335	0.0240	0.0362
	7-11		0.0212	0.0337	0.0183	0.0350
	av.		0.0201	0.0323	-0.0144	0.0344
	13-15	B Straight ↓	0.0275	0.0352	0.0243	0.0330
	15-17		0.0290	0.0380	0.0188	0.0340
	13-17		0.0250	0.0350	-0	0.0330
	av.		0.0272	0.0361	-0.0143	0.0348
Panel 3	1-3	A ↓	-0	0.0110	0.0185	0.0175
	3-5		-0	0.0125	0.0196	0.0188
	1-5		-0	0.0098	0.0200	0.0195
	av.		-0	0.0117	0.0194	0.0180
	7-9	A Bend ↓	0.0125	0.0175	0.0140	0.0220
	9-11		0.0120	0.0190	0.0280	0.0457
	7-11		0.0120	0.0181	0.0226	0.0235
	av.		0.0122	0.0182	0.0209	0.0240
	13-15	A Straight ↓	-0	-0	-0	-0
	15-17		-0	-0	-0	-0
	13-17		-0	-0	-0	-0
	av.		-0	-0	-0	-0
Panel 4	1-3	A ↓	0.0700	0.0777	0.0543	0.0770
	3-5		0.0622	0.0643	0.0570	0.0642
	1-5		0.0785	0.0827	0.0628	0.0812
	av.		0.0709	0.0816	0.0614	0.0811
	7-9	C ↓	0.0650	0.0655	0.0495	0.0622
	9-11		0.0630	0.0635	0.0480	0.0641
	7-11		0.0643	0.0630	0.0401	0.0608
	av.		0.0641	0.0650	0.0480	0.0657

TABLE VII
Capacitance (Picofarads) - 120 Hz on ESI - Model 273 Bridge

Date:			2/15/78	2/15/78	2/16/78	2/16/78	2/17/78	2/18/78	2/19/78
Time:			1023	1250	1017	1045	0831	0915	0945
$T_1/T_2/T_3$			23°C	128/129/128	127/129/125	127/128/125	127/129/125	128/130/127	129/132/129
Comment:			Pretest	Start Age Source @ 24 in.	Aging Source Dn (Temporary)	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.
Panel 1	1-3	C	1114.0	1152.0	1068.5	1063.0	--	1081.0	1097.0
	3-5		1117.0	1145.0	1071.0	1067.0	--	1082.0	1099.0
	1-5		1081.0	1110.0	1047.0	1042.0	--	1058.0	1071.0
	av.		1107.3	1125.7	1062.2	1057.3	--	1073.7	1089.0
Panel 2	1-3	C	1175.0	1182.0	1056.5	1044.0	--	1084.0	1101.0
	3-5	Bend	1194.0	1205.0	1077.0	1080.0	--	1101.0	1122.0
	1-5		1125.0	1124.0	1006.6	1010.0	--	1032.0	1044.0
	av.		1164.7	1170.3	1047.2	1051.3	--	1072.3	1090.0
	7-9	B	0853.2	0853.1	-0520.0	-0510.0	--	-0595.0	-0628.0
	9-11	Bend	0853.6	0857.2	-0590.0	-0590.0	--	-0613.0	-0635.0
	7-11		0844.1	0828.2	-0574.0	-0585.0	--	-0590.0	-0608.0
	av.		0847.0	0844.5	-0561.0	-0553.0	--	-0599.0	-0623.0
	13-15	B	0870.5	-0851.0	-0544.0	-0550.0	--	-0612.0	-0640.0
	15-17	Straight	0860.3	0855.9	-0600.0	-0600.0	--	-0633.4	-0655.4
	13-17		0857.2	0845.5	-0570.0	-0560.0	--	-0610.0	-0640.0
	av.		0862.7	0850.8	-0571.0	-0570.0	--	-0618.5	-0645.1
Panel 3	1-3	A	0877.0	0825.8	--	0775.9	--	0841.2	0847.5
	3-5		0887.1	0813.5	--	0783.0	--	0834.5	0835.2
	1-5		0880.0	0824.0	--	0775.0	--	0841.4	0845.0
	av.		0874.7	0821.1	--	0771.3	--	0839.0	0842.6
	7-9	A	0785.0	0732.5	--	-0610.0	--	0765.9	0772.0
	9-11	Bend	0791.0	0735.2	--	0723.0	--	0777.7	0779.1
	7-11		0781.5	0728.8	--	0718.5	--	0764.8	0767.8
	av.		0782.5	0732.2	--	-0683.8	--	0769.5	0773.0
	13-15	A	0783.4	-0580.0	--	-0550.0	--	0727.4	0729.2
	15-17	Straight	0746.9	0722.6	--	0678.0	--	0716.6	0719.0
	13-17		0756.6	0728.0	--	0684.0	--	0726.0	0724.5
	av.		0755.6	0676.9	--	-0637.7	--	0723.3	0724.2
Panel 4	1-3	A	1000.0	0924.3	--	-1000.0	--	0940.5	0943.8
	3-5		1028.0	0954.0	--	0970.0	--	0971.0	0977.6
	1-5		0992.0	0922.2	--	0935.8	--	0940.0	0944.0
	av.		1006.7	0933.5	--	-0988.6	--	0950.5	0955.1
	7-9	C	1142.0	1048.0	--	1073.0	--	1079.0	1082.0
	9-11		1150.0	1057.0	--	1083.0	--	1087.0	1092.0
	7-11		1142.0	1047.0	--	1071.0	--	1076.0	1080.0
	av.		1144.7	1050.7	--	1075.7	--	1080.7	1084.7

TABLE VII (cont)

			Date: Time: $T_1/T_2/T_3$ Comment:	2/20/78 0900 129/133/129	2/20/78 1012 127/130/127	2/20/78 1254 35/34/36	2/21/78 1355 19/20/19	2/21/78 1703 157/159/156	2/21/78 1913 157/159/156	2/21/78 2158 155/156/155
				Aging Source @ 24 in.	Heat Aging Source Dn @ 0951	Post Aging Source Dn	Pre- Pressure Source Dn	Steam @ 70 @ 1635 Source @ 16 in. @ 1647	Steam @ 70 Source @ 19 in. @ 1947	Steam @ 70 Source @ 19 in. Following Steps To 0 psi & 10 sec Ramp up
Panel 1	1-3	C		1026.0	1025.0	1070.0	1092.0	--	0833.4	--
	3-5	↓		1029.0	1025.0	1064.0	1084.0	--	0840.0	--
	1-5			1004.0	0998.2	1037.0	1054.0	--	0820.0	--
	av.			1019.7	1016.1	1037.0	1076.7	--	0831.1	--
Panel 2	1-3	C		1053.0	1079.0	1009.0	1119.0	--	0909.6	--
	3-5	Dend		1068.0	1096.0	1022.0	1136.0	--	0929.7	--
	1-5	↓		0999.0	1017.5	0952.8	1070.0	--	0854.0	--
	av.			1040.0	1064.2	0994.6	1108.3	--	0894.4	--
	7-9	B		-0395.0	-0600.0	-0570.0	0669.4	--	0520.0	--
	9-11	Bend		0612.5	-0620.0	-0600.0	0668.5	--	0622.0	--
	7-11	↓		-0590.0	-0600.0	-0570.0	0631.0	--	0597.4	--
	av.			-0599.2	-0609.7	-0590.0	0663.0	--	0579.8	--
	13-15	B		-0620.0	-0620.0	-0550.0	0694.9	--	0570.0	--
	15-17	Straight		-0640.0	-0640.0	-0620.0	0674.1	--	0620.0	--
	13-17	↓		-0610.0	-0610.0	-0570.0	0675.0	--	0540.0	--
	av.			-0623.3	-0623.3	-0580.0	0678.0	--	0583.3	--
Panel 3	1-3	A		0839.0	0840.1	0837.7	0856.8	--	0687.0	--
	3-5	↓		0825.0	0836.0	0820.8	0835.0	--	0673.0	--
	1-5			0835.4	0850.8	0832.5	0845.2	--	0686.0	--
	av.			0833.1	0845.2	0830.3	0845.7	--	0682.7	--
	7-9	A		0785.5	0771.1	0754.0	0772.0	--	0611.0	--
	9-11	Bend		0774.8	0780.0	0759.3	0781.3	--	0630.0	--
	7-11	↓		0783.0	0770.0	0756.6	0784.0	--	0616.0	--
	av.			0787.8	0773.7	0754.3	0772.4	--	0619.0	--
	13-15	A		0725.8	0737.2	0722.2	0740.5	--	0592.0	--
	15-17	Straight		0714.8	0725.9	0710.0	0728.5	--	0588.5	--
	13-17	↓		0720.0	0733.0	0714.3	0727.5	--	0593.0	--
	av.			0720.2	0732.0	0715.5	0732.2	--	0591.2	--
Panel 4	1-3	A		0936.5	-0940.0	0942.3	0977.7	--	0928.5	--
	3-5	↓		0971.5	0975.8	0977.3	1023.0	--	0978.8	--
	1-5			0937.5	0943.8	0945.3	0982.0	--	0937.9	--
	av.			0948.5	0952.8	0955.0	0994.2	--	0948.4	--
	7-9	C		1082.0	1085.0	1086.0	1146.0	--	1077.0	--
	9-11	↓		1082.0	1084.0	1093.0	1155.0	--	1094.0	--
	7-11			1080.0	1084.0	1084.0	1140.0	--	1080.0	--
	av.			1084.7	1088.0	1087.7	1147.0	--	1083.7	--

TABLE VII (cont)

Line		Date: Time: $T_1/T_2/T_3$ Comment:	2/22/78	2/22/78	2/22/78	2/22/78	2/22/78	2/23/78	2/23/78
			0010 155/156/155	0216 132/140/140	0621 139/140/138	0815 128/129/125	1535 128/129/128	0930 127/131/130	1023 127/128/126
			Steam @ 70 Source @ 19 in.	Steam @ 46 Source @ 21 1/2 in. ST. @ 0110 SO. @ 0047	Steam @ 40 Source @ 21 1/2 in.	Steam @ 25 Source @ 21 1/2 in. ST. @ 0740	Steam @ 25 Source @ 21 1/2 in. Source to 24 in. @ 1647	Steam @ 25 Source On (Temporary)	Steam @ 25 Source @ 24 in.
Panel 1	1-3	C ↓	-0793.0	-0795.0	-0775.0	-0773.0	0783.0	--	-0835.0
	3-5		-0790.0	-0775.0	-0775.0	-0745.0	0789.0	--	-0835.0
	1-5		-0763.0	-0755.0	-0745.0	-0741.0	0735.0	--	-0815.0
	av.		-0782.0	-0775.0	-0765.0	-0759.7	0758.3	--	-0826.3
Panel 3	1-3	C Bend ↓	0887.3	-0880.0	-0876.0	-0873.0	0871.0	--	-0895.0
	3-5		0891.1	-0890.0	-0885.0	-0885.0	0883.0	--	-0895.0
	1-5		0827.7	-0820.0	-0825.0	-0812.0	0815.0	--	-0830.0
	av.		0868.7	-0863.3	-0862.0	-0856.7	0856.3	--	-0873.3
	7-9	B Bend ↓	-0535.0	-0535.0	-0555.0	-0565.0	0600.0	--	-0645.0
	9-11		0640.0	0659.8	0652.9	0654.0	0671.0	--	0722.6
	7-11		0613.3	0632.7	0626.3	0629.3	0644.8	--	0700.2
	av.		0596.1	-0609.2	-0611.4	-0616.4	0636.5	--	-0689.3
	13-15	B Straight ↓	-0620.0	0644.2	-0645.0	-0655.0	0683.0	--	-0730.0
	15-17		0644.0	0648.5	0669.7	0679.5	0700.0	--	0785.5
	13-17		-0580.0	-0590.0	-0600.0	-0628.0	0656.0	--	-0710.0
	av.		-0614.7	-0634.2	-0638.2	-0654.3	0682.7	--	-0735.2
Panel 3	1-3	A ↓	-0634.0	-0665.0	-0665.0	-0678.0	0684.0	-0825.0	-0730.0
	3-5		-0617.0	-0650.0	-0645.0	-0645.0	0650.0	-0800.0	-0710.0
	1-5		-0640.0	-0685.0	-0655.0	-0686.0	0682.0	-0820.0	-0725.0
	av.		-0630.3	-0660.0	-0651.7	-0676.3	0685.3	-0815.0	-0721.7
	7-9	A Bend ↓	-0570.0	-0605.0	-0585.0	-0610.0	0609.0	--	-0680.0
	9-11		-0578.0	-0605.0	-0599.0	-0618.0	0621.0	--	-0650.0
	7-11		-0560.0	-0595.0	-0580.0	-0605.0	0614.0	--	-0670.0
	av.		-0569.3	-0601.7	-0596.0	-0611.0	0614.7	--	-0660.0
	13-15	A Straight ↓	-0562.0	-0500.0	-0575.0	-0590.0	0596.0	--	-0640.0
	15-17		-0553.0	-0580.0	-0565.0	-0580.0	0583.0	--	-0625.0
	13-17		-0552.0	-0580.0	-0570.0	-0584.0	0587.0	--	-0630.0
	av.		-0555.7	-0583.3	-0570.0	-0584.7	0588.7	--	-0631.7
Panel 4	1-3	A ↓	0524.1	0923.8	0930.3	0932.5	0967.6	1000.4	0930.5
	3-5		0967.4	0953.8	0970.0	0972.5	1004.0	1037.2	0966.9
	1-5		0928.0	0925.8	0930.8	0934.8	0969.5	0994.1	0932.1
	av.		0939.2	0937.7	0943.7	0946.5	0980.4	1010.6	0942.9
	7-9	C ↓	1085.0	1074.0	1084.0	1083.2	1107.6	--	1085.8
	9-11		1090.0	1084.0	1089.0	1093.2	1124.3	--	1087.5
	7-11		1090.0	1074.8	1074.3	1071.0	1107.6	--	1078.0
	av.		1088.3	1077.5	1082.4	1085.8	1113.2	--	1083.8

TABLE VII (cont.)

Line			Date: 2/26/78 Time: 0900 T ₁ /T ₂ /T ₃ Comment: Steam @ 25 Source @ 24 in.	2/25/78 0945 126/126/126 Steam @ 25 Source @ 24 in.	2/26/78 0914 128/131/131 Steam @ 25 Source @ 24 in. Steam to 10 @ 0740	2/27/78 0937 104/106/108 Steam @ 10 Source @ 24 in.	2/28/78 0929 107/115/116 Steam @ 10 Source @ 24 in.	2/27/78 0950 107/116/116 Steam @ 10 Source @ 24 in.	3/2/78 1109 107/109/107 Steam @ 10 Source @ 24 in.
Panel 1	1-3	C	-0945.0	-0955.0	--	-0930.0	--	-0980.0	--
	3-5		-0955.0	-0960.0	--	-0930.0	--	-0960.0	--
	1-5		-0935.0	-0925.0	--	-0920.0	--	-0970.0	--
	av.		-0951.7	-0946.7	--	-0928.7	--	-0976.7	--
Panel 2	1-3	C	-1030.0	-0965.0	--	-0920.0	--	-1000.0	--
	3-5	Bend	-1040.0	-0965.0	--	-0930.0	--	-1000.0	--
	1-5		-0975.0	-0905.0	--	-0870.0	--	-0940.0	--
	av.		-1015.0	-0945.0	--	-0906.7	--	-0980.0	--
	7-9	B	0827.0	0818.5	--	-0825.0	--	1004.7	-0900.0
	9-11	Bend	0879.0	0896.8	--	1053.0	--	1008.2	0966.3
	7-11		0847.0	0857.0	--	1060.5	--	0996.4	0960.7
	av.		0851.0	0857.4	--	-1028.2	--	1003.1	-0955.7
	13-15	B	0847.3	0808.5	--	0852.5	--	0873.5	--
	15-17	Straight	-0850.0	0818.5	--	0851.2	--	0880.7	--
	13-17		-0825.0	-0785.0	--	-0780.0	--	-0940.0	--
	av.		-0840.8	-0787.3	--	-0827.9	--	0864.7	--
Panel 3	1-3	A	-0785.0	-0786.0	--	-0830.0	--	-0855.0	--
	3-5		-0775.0	-0789.0	--	-0825.0	--	-0845.0	--
	1-5		-0790.0	-0782.0	--	-0840.0	--	-0850.0	--
	av.		-0788.7	-0778.7	--	-0831.7	--	-0850.0	--
	7-9	A	-0735.0	0733.0	--	0765.5	--	0781.0	--
	9-11	Bend	-0735.0	-0739.0	--	0774.2	--	-0790.0	--
	7-11		-0730.0	-0734.0	--	0767.0	--	0763.5	--
	av.		-0733.3	-0735.3	--	0768.9	--	0764.8	--
	13-15	A	-0685.0	-0662.0	--	-0700.0	--	-0710.0	--
	15-17	Straight	-0680.0	-0660.0	--	-0690.0	--	-0700.0	--
	13-17		-0670.0	-0673.0	--	-0700.0	--	-0715.0	--
	av.		-0665.0	-0665.0	--	-0696.7	--	0708.3	--
Panel 4	1-3	A	0978.7	0945.0	--	0921.6	--	0953.6	--
	3-5		1018.2	0985.5	--	0965.5	--	0996.6	--
	1-5		0978.5	0946.5	--	0930.5	--	0960.7	--
	av.		0991.1	0959.0	--	0939.2	--	0970.3	--
	7-9	C	1123.3	1087.0	--	1068.5	--	1095.4	--
	9-11		1130.0	1096.7	--	1076.8	--	1104.0	--
	7-11		1119.2	1088.7	--	1069.5	--	1093.5	--
	av.		1124.2	1081.5	--	1072.2	--	1097.6	--

TABLE VII (cont)

Lines		Date:	3/3/78	3/4/78	3/4/78	3/4/78	3/6/78	3/7/78	3/8/78
		Time:	1105	0945	2142	0715	0910	0846	0905
		$T_1/T_2/T_3$	109/111/109	52/43/46	109/110/108	108/114/115	108/110/108	111/112/112	109/111/108
		Comment:	Steam @ 10 Source @ 24 in.	Steam @ 0 24 in. Boiler off ~1400 2/3/78	Steam @ 10 24 in. Boiler On ~1100 3/4/78	Steam @ 10 Source @ 24 in.	Steam @ 10 Source @ 24 in.	Steam @ 10 Source @ 24 in.	Steam @ 10 Source @ 24 in.
Panel 1	1-3 3-5 1-5 av.	C ↓	-- -- -- --	~1125.0 ~1130.0 ~1100.0 ~1118.3	~1450.0 ~1000.0 ~1000.0 ~1016.7	-- -- -- --	~1100.0 -- ~1100.0 ~1100.0	-- -- -- --	1596.0 1579.0 Could not read 1587.5
Panel 2	1-3 3-5 1-5 av.	C Bend ↓	~1040.0 ~1040.0 ~0980.0 ~1020.0	~1208.0 1218.0 1152.0 1192.7	~1040.0 ~1063.0 ~0990.0 ~1030.0	-- -- -- --	~1080.0 ~1100.0 ~1050.0 ~1076.7	-- -- -- --	1030.0 1034.0 ~0960.0 1008.0
	7-9 9-11 7-11 av.	B Bend ↓	1016.2 0907.8 1018.8 1010.7	1015.8 1019.0 1012.3 1015.7	1007.6 1004.0 0955.0 1002.0	-- -- -- --	0999.0 1008.0 ~0982.0 0996.3	-- -- -- --	~0980.0 0988.0 0965.3 0977.8
	13-15 15-17 13-17 av.	B Straight ↓	0896.4 0898.2 ~0835.1 ~0872.5	0893.4 0888.1 0890.0 0870.5	~0890.0 0890.7 ~0890.0 ~0876.9	-- -- -- --	0905.5 0903.1 ~0850.0 ~0906.2	-- -- -- --	0898.8 0893.8 ~0825.0 0872.5
Panel 3	1-3 3-5 1-5 av.	A ↓	-- -- -- --	0879.7 0864.3 0881.7 0875.2	~0840.0 ~0820.0 ~0840.0 ~0833.3	-- -- -- --	~0835.0 ~0820.0 ~0840.0 ~0831.7	-- -- -- --	~0820.0 ~0810.0 ~0830.0 ~0820.0
	7-9 9-11 7-11 av.	A Bend ↓	-- -- -- --	0802.0 0808.4 0801.8 0804.1	0772.0 0783.0 0776.2 0777.1	-- -- -- --	~0780.0 ~0787.6 0779.8 ~0712.5	-- -- -- --	0776.5 0778.8 ~0774.7 0776.3
	13-15 15-17 13-17 av.	A Straight ↓	-- -- -- --	0700.6 0691.1 0702.8 0698.2	0612.9 ~0610.0 ~0615.0 ~0612.3	-- -- -- --	~0610.0 ~0600.0 ~0610.0 ~0606.7	-- -- -- --	~0580.0 ~0570.0 ~0580.0 ~0576.7
Panel 4	1-3 3-5 1-5 av.	A ↓	-- -- -- --	0915.6 0953.7 0916.3 0928.5	0847.4 0983.5 0950.5 0960.5	-- -- -- --	0859.2 1001.7 0858.2 0973.1	-- -- -- --	0956.1 1001.2 0960.8 0972.7
	7-9 9-11 7-11 av.	C ↓	-- -- -- --	1055.5 1065.0 1056.2 1058.9	1077.0 1087.4 1076.7 1080.4	-- -- -- --	1009.6 1107.4 1100.6 1102.5	-- -- -- --	1093.8 1102.0 1095.1 1097.0

TABLE VII (cont)

	Lines		Date:	3/9/78	3/10/78	3/10/78	3/13/78
			Time:	0719	0835	1413	1000
			$T_1/T_2/T_3$	109/118/119	66/57/60	27/22/24	ND/20/19
			Comment:	Steam @ 10 Source @ 24 in. ST. off 0825 Sk. Dn 0756	Steam @ 0 Source Dn Pwr. off @ 0800	Steam @ 0 Source Dn	To Determine Annealing
Panel 1	1-3	C ↓		1313.0	1304.0	1366.0	1394.0
	3-5			1317.0	1395.0	1372.0	1404.0
	1-5			1293.0	1361.0	1337.5	1367.0
	av.			1307.7	1390.0	1358.5	1388.3
Panel 2	1-3	C Bend ↓		1220.0	1231.0	1171.5	1270.0
	3-5			1240.0	1253.0	1189.0	1284.0
	1-5			1167.0	1204.0	1117.5	1212.5
	av.			1209.0	1229.3	1159.3	1257.7
	7-9	B Bend ↓		1076.2	1060.8	~0945.0	1084.0
	9-11			1074.3	1069.0	1026.1	1089.5
	7-11			1050.7	1044.0	1003.5	1072.0
	av.			1067.1	1057.9	~0991.5	1081.8
	13-15	B Straight ↓		0949.5	0950.2	0898.1	0948.0
	15-17			0936.7	0941.1	0884.1	0935.3
	13-17			0937.0	~0895.0	~0782.3	0935.1
	av.			0941.7	~0928.8	~0854.8	0939.5
Panel 3	1-3	A ↓		~0894.5	0852.0	0879.9	0886.2
	3-5			~0873.5	0838.8	~0862.9	~0889.0
	1-5			~0890.0	0853.4	0880.0	~0890.0
	av.			~0896.0	0847.4	0874.3	~0881.7
	7-9	A Bend ↓		0820.8	0804.9	0788.6	0811.6
	9-11			0825.6	0812.0	0809.3	0815.8
	7-11			0815.2	0801.0	0802.6	0809.2
	av.			0820.5	0806.0	0799.5	0812.2
	13-15	A Straight ↓		~0628.0	~0630.0	~0635.0	~0640.0
	15-17			~0613.0	~0640.0	~0631.0	~0630.0
	13-17			~0620.0	~0622.0	~0633.0	~0640.0
	av.			~0620.3	~0630.7	~0633.0	~0656.7
Panel 4	1-3	A ↓		0975.1	0948.7	0914.8	~0983.0
	3-5			1025.7	0960.9	0955.0	1008.4
	1-5			0979.3	~0950.8	0921.7	0967.1
	av.			0993.4	0953.4	0930.5	~0969.8
	7-9	C ↓		1113.8	1075.7	1056.5	1112.6
	9-11			1124.4	1086.1	1068.4	1123.3
	7-11			1158.0	1075.1	1062.3	1113.1
	av.			1132.1	1079.1	1062.4	1116.3

TABLE VIII
Capacitance (Picofarads) - 1 kHz on ESI - Model 253 Bridge

			Date:	2/15/78	2/15/78	2/16/78	2/16/78	2/17/78	2/18/78	2/19/78
			Time:	1115	1250	1017	1045	0831	1000	1015
			$T_1/T_2/T_3$	23°C	128/128/126	127/129/125	127/129/125	127/129/125	129/130/127	129/132/129
			(comment:	Predict	Start Age Source @ 24 in.	Aging Source DN (Temporary)	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.
Lines										
Panel 1	1-3	C		1020.0	-	-	-	1018.0	1011.0	1001.3
	3-5	↓		1022.0	-	-	-	1015.0	1104.0	900.5
	1-5			1000.0	-	-	-	1001.0	981.8	906.5
	av.			1014.0	-	-	-	1006.0	1035.6	992.4
Panel 2	1-3	C Bend		1071.0	-	-	-	1052.0	1044.0	1018.5
	3-5	↓		1091.0	-	-	-	1070.0	1060.0	1033.0
	1-5			1079.0	-	-	-	1004.0	995.8	970.6
	av.			1081.7	-	-	-	1042.0	1013.3	1007.4
	7-9	B Bend		645.3	-	-494.0	-410.0	627.1	633.4	615.5
	9-11			639.0	-	-620.0	0620.7	610.0	633.6	624.3
	7-11			620.0	-	-601.0	0601.0	610.5	612.8	603.2
	av.			634.8	-	-612.6	0610.6	622.5	626.6	615.7
	13-15	B Straight		651.8	625.5	-670.0	0630.0	647.5	650.5	641.1
	15-17			646.2	-	-675.0	0625.0	638.9	642.9	635.2
	13-17			643.5	-	-670.0	0626.0	628.4	615.8	627.7
	av.			647.8	-	-626.0	0626.0	639.3	643.2	634.7
Panel 3	1-3	A		800.0	-	-	0775.8	792.6	796.6	782.7
	3-5	↓		787.0	-	-	-	774.7	771.7	763.0
	1-5			796.8	-	-	0765.6	784.8	784.1	773.3
	av.			796.5	-	-	-774.1	784.0	784.9	772.2
	7-9	A Bend		737.0	714.5	-	0656.7	720.8	717.0	709.1
	9-11	↓		733.0	-	-	-	716.6	716.1	709.7
	7-11			731.0	-	-	-	714.0	709.5	703.4
	av.			733.7	-	-	-656.7	717.1	714.2	707.4
	13-15	A Straight		708.0	663.0	-	0660.0	650.0	658.8	640.5
	15-17			696.0	-	-	-	686.0	683.3	663.1
	13-17			700.1	-	-	0671.6	680.0	674.8	659.3
	av.			695.4	-	-	-668.8	712.0	676.6	673.1
Panel 4	1-3	A		0921.0	-	-	0877.0	883.3	895.6	876.4
	3-5	↓		0947.8	-	-	-	911.7	917.5	899.6
	1-5			0916.0	-	-	-	881.0	880.8	874.2
	av.			0928.3	-	-	877.0	892.0	901.6	883.2
	7-9	C		1034.0	-	-	-	995.0	1001.0	995.7
	9-11	↓		1045.0	-	-	-	1003.0	1027.0	1002.0
	7-11			1038.0	-	-	-	992.3	999.3	991.6
	av.			1037.7	-	-	-	996.8	1000.1	996.4

TABLE VIII (cont)

Lines		Date: Time: $T_1/T_2/T_3$ Comment:	2/20/78 0830 129/133/129	2/20/78 1045 127/130/127	2/20/78 1338 ~ 25°C	2/21/78 1430 157/159/159	2/21/78 1783 157/159/156	2/21/78 1990 157/159/156	2/21/78 2158 155/156/155
			Aging Source @ 24 in.	Heat Aging Only Source DN @ 9501	Post Aging Source DN	Prepressure Source DN	St. air @ 70 @ 15 in. Source @ 16 in. @ 1647	Steam @ 70 Source 19 in. @ 1647	Steam @ 70 Source @ 19 in. Following Steps to @ pas 4 10 sec Ramp Up
Panel 1	1-3	C ↓	1008.1	969.2	1008.0	1030.0	826.5	822.4	~ 840.0
	3-5		1005.0	972.6	1003.0	1022.0	827.1	820.0	~ 840.0
	1-5		982.6	919.4	982.8	999.9	852.0	799.5	910.0
	av.		998.2	963.7	997.9	1017.1	868.6	817.1	~ 827.7
Panel 2	1-3	C Bend ↓	1026.0	1001.0	1012.2	1044.0	947.0	933.6	915.6
	3-5		1013.0	1014.5	1025.0	1053.0	942.1	913.9	927.6
	1-5		973.4	850.4	988.0	996.6	896.6	885.7	881.1
	av.		1014.1	968.6	999.1	1031.2	935.2	924.5	921.4
	7-9	B Bend ↓	840.4	~ 614.0	~ 620.0	657.6	612.0	614.5	648.5
	9-11		839.9	~ 620.0	~ 632.2	652.4	615.2	616.0	651.1
	7-11		818.9	579.3	612.7	636.4	598.0	620.6	620.6
	av.		833.4	~ 611.1	~ 623.0	648.8	609.7	631.7	641.1
	12-15	B Straight ↓	860.0	636.3	~ 630.0	673.8	626.0	652.5	669.1
	15-17		851.7	630.3	639.4	659.8	624.4	656.0	664.3
	13-17		612.5	622.0	615.0	~ 57.0	616.8	647.1	657.5
	av.		652.4	620.6	640.8	664.2	622.1	651.9	661.1
Panel 3	1-3	A ↓	799.4	780.7	771.6	787.0	703.0	709.4	691.8
	1-5		778.4	759.5	748.1	762.5	688.5	697.1	671.0
	1-5		765.6	768.7	756.8	771.5	688.1	706.4	681.0
	av.		767.8	769.6	754.9	773.7	697.3	701.1	681.3
	7-9	A Bend ↓	722.8	705.3	699.4	718.3	623.2	638.7	624.5
	9-11		726.3	701.6	697.6	714.5	642.1	642.8	625.2
	7-11		717.4	599.0	682.1	706.7	631.1	638.5	~ 620.0
	av.		722.2	703.0	696.4	713.2	635.6	637.2	621.2
	13-15	A Straight ↓	691.3	678.0	671.6	686.8	612.2	647.5	608.1
	15-17		677.9	661.0	652.7	669.1	600.0	601.4	591.0
	13-17		680.3	665.6	658.0	671.7	602.8	603.5	564.0
	av.		683.2	668.2	664.9	675.6	605.0	606.8	571.7
Panel 4	1-3	A ↓	991.7	874.1	879.4	913.6	891.4	907.7	882.0
	1-5		939.3	899.6	904.7	944.9	895.5	919.4	915.0
	1-5		909.0	871.2	875.4	915.0	882.9	912.0	879.2
	av.		946.7	882.4	886.2	924.5	901.6	921.0	894.7
	7-9	C ↓	1027.0	993.0	991.5	1041.0	990.2	1010.0	989.0
	9-11		1038.0	1003.0	1001.0	1051.0	1005.0	1029.0	1000.0
	7-11		1024.0	991.5	990.0	1018.0	991.5	1014.7	987.2
	av.		1029.7	995.8	994.5	1043.3	995.6	1019.0	992.1

TABLE VIII (Cont.)

Lines		Date: Time: $T_1/T_2/T_3$ Comment:	2/21/78 2345 155/156/155 Stream # Tu Source 18 in.	2/22/78 0147 149/140/140 Stream # 40 Source 21 1/2 St. # 0110 So. # 0047	2/22/78 0550 138/140 148 Stream # 40 Source 21 1/2	2/22/78 0748 128/129/129 Stream # 25 Source 21 1/2 # 0140	2/22/78 1555 128/129/128 Stream # 25 Source 21 1/2 Source # 24 in. # 1047	2/22/78 0846 125/127/126 Stream # 25 Source 18 in. # 1047	2/22/78 0905 122/126/126 Stream # 24 in.
Panel 1 1-3 3-5 1-5 av.	C ↓		814.6 812.5 809.0 825.4	855.0 ~ 80.0 ~ 80.0 ~ 841.7	~ 850.0 ~ 850.0 ~ 820.0 ~ 840.0	~ 860.0 ~ 860.0 ~ 840.0 ~ 851.1	874.0 870.0 841.2 861.1		~ 875.0 ~ 875.0 ~ 875.0 ~ 875.0
Panel 2 1-3 3-5 1-5 av. 7-9 9-11 7-11 av. 13-15 15-17 13-17 av.	C Bend ↓		941.2 952.4 887.4 927.0	958.8 967.4 903.8 941.1	949.0 962.5 896.6 946.0	957.4 974.5 906.0 946.0	985.4 981.0 909.0 952.1		~ 985.0 ~ 980.0 ~ 955.0 ~ 971.0
	B Bend ↓		654.3 658.0 635.4 648.0	664.4 665.1 644.0 657.8	668.1 674.7 650.4 664.4	675.4 679.8 656.5 670.5	698.0 700.1 668.6 689.2		~ 722.0 ~ 677.0 ~ 677.0 ~ 725.0
	B Straight ↓		682.0 674.1 666.6	693.9 686.6 679.8	700.5 695.1 680.6	710.1 706.4 700.7	714.7 710.0 726.4		718.0 710.0 710.0
			av.	674.9	686.8	695.4	705.7	710.1	710.0
Panel 3 1-3 3-5 1-5 av. 7-9 9-11 7-11 av. 13-15 15-17 13-17 av.	A ↓		655.0 670.8 681.5 682.4	685.7 672.8 685.0 684.5	689.7 668.4 678.4 679.2	655.9 677.4 688.4 687.2	705.1 683.1 690.8 698.0	747.4 752.7 774.1 774.1	747.0 740.0 740.0 740.0
	A Bend ↓		625.6 622.7 614.4 620.5	624.9 626.2 619.6 621.6	611.4 614.7 605.4 610.7	622.1 615.2 618.2 620.1	628.4 612.2 614.4 628.7		628.0 628.0 628.0 628.0
	A Straight ↓		605.0 590.0 591.1	605.8 588.1 592.6	599.9 582.5 586.8	606.2 588.1 594.0	611.0 592.9 601.2		611.0 611.0 611.0
			av.	595.4	595.5	589.9	596.4	604.4	611.0
Panel 4 1-3 3-5 1-5 av. 7-9 9-11 7-11 av.	A ↓		903.1 917.5 904.1 915.6	905.6 914.7 903.4 914.5	896.9 890.4 897.8 908.1	902.6 896.1 903.4 914.1	914.1 949.1 917.0 925.1	942.4 945.4 967.4 920.4	942.0 940.0 940.0 940.0
	C ↓		1016.4 1027.6 1016.0 1020.0	1017.8 1029.2 1017.5 1021.5	1014.0 1026.5 1014.6 1018.4	1017.4 1020.1 1018.0 1021.9	999.8 1017.1 1010.1 1019.4		999.0 999.0 999.0 999.0

TABLE VIII (cont.)

Lines		Date: Time: $T_1/T_2/T_3$ Comment:	2/24/78	2/25/78	2/26/78	2/27/78	2/28/78	3-1-78	3-2-78
			0827 126/128/128 Steam @ 25 Source 24 in.	0914 126/126/124 Steam @ 25 Source 24 in.	0714 126/131/131 Steam @ 25 Source 24 in. Steam to 10 @ 0740	0812 107/108/107 Steam @ 10 Source 24 in.	0929 107/115/116 Steam @ 10 Source 24 in.	0930 107/116/116 Steam @ 10 Source 24 in.	1100 107/106/107 Steam @ 10 Source 24 in.
Panel 1	1-3	C ↓	~1055.0	~1100.0	1147.0	~1180.0	1120.0	1182.1	~1100.0
	3-5		~1055.0	~1110.0	1151.0	~1165.0	1197.0	~1183.0	~1110.0
	1-5		~1035.0	~1080.0	1110.0	~1140.0	1161.0	~1182.5	~1085.0
	av.		~1048.3	~1096.7	1136.0	~1155.0	1159.3	1182.5	~1098.3
Panel 2	1-3	C Bend ↓	~1050.0	~1096.0	1137.0	~1100.0	1148.0	1149.9	1050.0
	3-5		~1112.0	~1112.0	1155.0	~1115.0	1144.0	1164.4	1065.0
	1-5		~1095.0	1047.0	1056.0	~1050.0	1084.0	1091.9	~1000.0
	av.		~1033.3	~1053.0	1126.0	~1068.3	1125.3	1135.4	~1036.3
	7-9	B Bend ↓	709.8	872.2	941.4	995.7	1015.0	1030.5	985.0
	0-11		802.2	876.7	942.5	1007.1	1017.0	1029.0	1001.0
	7-11		761.3	851.0	917.0	985.6	1006.4	1006.4	980.6
	av.		704.4	866.6	933.6	996.2	1009.2	1022.1	991.5
	13-15	B Straight ↓	827.4	840.3	859.4	875.2	878.9	894.9	874.7
	15-17		819.2	837.4	855.0	868.5	874.0	884.4	871.1
	13-17		811.6	832.1	851.0	864.0	871.1	880.4	864.4
	av.		810.1	836.6	854.1	867.7	874.7	886.1	869.2
Panel 3	1-3	A ↓	808.0	836.0	856.6	871.3	886.3	901.0	882.6
	3-5		780.3	812.1	840.0	854.2	877.2	890.0	849.4
	1-5		792.7	826.5	853.4	869.0	884.4	904.6	866.2
	av.		793.7	824.5	850.7	864.8	880.1	895.5	857.6
	7-9	A Bend ↓	729.0	~749.0	764.6	774.7	794.8	~812.7	771.6
	0-11		732.4	749.8	774.7	777.7	800.2	814.5	771.5
	7-11		726.9	746.7	766.0	774.2	791.7	801.9	774.8
	av.		729.4	~748.5	766.8	774.2	795.6	812.9	776.6
	13-15	A Straight ↓	692.1	706.5	720.1	726.7	744.4	757.0	722.5
	15-17		673.7	689.5	710.0	~710.0	728.0	746.5	711.1
	13-17		680.3	698.1	718.7	719.7	741.0	753.4	723.4
	av.		682.0	698.7	715.7	719.8	737.3	752.4	719.0
Panel 4	1-3	A ↓	904.4	935.5	902.5	894.4	895.9	917.7	859.4
	3-5		934.2	934.5	940.4	922.1	916.2	944.4	914.6
	1-5		902.1	901.2	903.8	891.4	900.7	907.7	911.6
	av.		913.6	913.7	915.6	902.6	904.4	921.4	886.3
	7-9	C ↓	1015.4	1013.0	1006.8	1006.1	1007.6	1011.1	~922.4
	0-11		1025.5	1023.4	1022.7	956.0	1013.2	1029.7	~910.1
	7-11		1016.0	1012.0	1012.2	947.4	1024.0	1010.2	711.1
	av.		1019.0	1016.1	1013.4	969.5	1014.9	1017.8	~744.8

TABLE VIII (cont.)

Lines		Date: Time: $T_1/T_2/T_3$ Comment:	3/3-78	3/4-78	3/4-78	3-5-78	3/6-78	3-7-78	3-8-78
			1045 109/111/108 Steam # 10 Source 24 in.	0910 05/57/64 Steam # 10 Source 24 in. Boiler (H) -1400 2/3/78	2125 108/112/108 Steam # 10 Source 24 in. Boiler (H) -1100 3/4/78	0725 108/114/115 Steam # 10 Source 24 in.	0817 108/113/112 Steam # 10 Source 24 in.	0846 111/112/112 Steam # 10 Source 24 in.	0849 108/112/111 Steam # 10 Source 24 in.
Panel 1	1-3	C ↓	-1170.0	-1170.0	-1200.0	-1274.0	-1261.4	-1265.0	-1400.0
	3-5		-1100.0	-1177.0	-1210.0	-1262.5	-1264.8	-1114.0	-1407.0
	1-5		-1150.0	-1150.0	-1187.0	-1214.5	-1217.0	-1260.0	-1272.0
	av.		-1144.7	-1155.7	-1195.9	-1267.0	-1255.9	-1271.0	-1276.8
Panel 2	1-3	C Bend ↓	1137.5	1184.5	1140.0	1172.5	1156.8	1145.0	1140.0
	3-5		1152.3	1200.0	1157.0	1170.0	1171.0	1155.0	1155.0
	1-5		1084.0	1135.0	1040.0	1170.0	1106.0	1071.0	1040.0
	av.		1124.6	1173.2	1122.0	1160.8	1145.3	1110.8	1121.7
	7-9	H Bend ↓	1019.2	1015.0	1015.9	1036.5	1023.8	1016.0	1023.0
	9-11		1019.7	1020.4	1013.9	1035.0	1021.4	1025.0	1025.0
	7-11		1021.0	1007.5	1022.2	1010.0	1002.0	1000.0	1004.0
	av.		1012.0	1017.6	1009.7	1027.2	1016.4	1012.5	1018.7
	13-15	H Straight ↓	884.1	881.5	885.2	880.5	884.0	887.1	886.9
	15-17		887.4	878.1	879.1	884.3	880.3	880.5	881.2
	13-17		888.8	878.2	877.5	885.9	888.0	885.4	887.8
	av.		889.4	875.7	880.6	883.3	881.4	882.1	881.0
Panel 3	1-3	A ↓	889.5	881.3	879.0	881.4	884.6	876.7	874.7
	3-5		875.4	880.0	880.5	871.9	882.0	881.8	880.6
	1-5		147.0	886.0	876.3	885.2	882.8	877.1	871.4
	av.		884.0	880.1	878.6	884.8	879.7	881.2	872.1
	7-9	A Bend ↓	785.8	783.0	785.8	786.6	783.6	785.0	781.1
	9-11		801.7	785.4	780.5	803.1	789.0	784.2	787.4
	7-11		792.4	788.0	784.0	782.5	782.8	788.1	781.1
	av.		796.6	785.8	786.4	791.4	785.1	790.5	781.2
	13-15	A Straight ↓	-700.0	701.6	-670.0	704.4	685.7	640.0	647.0
	15-17		686.5	686.3	665.0	687.0	675.8	-670.0	678.0
	13-17		-693.0	702.1	-640.0	701.1	671.7	-640.0	-646.0
	av.		-693.8	696.7	-671.7	697.6	681.8	-676.2	683.7
Panel 4	1-3	A ↓	888.4	875.4	885.4	882.4	887.5	886.8	882.2
	3-5		933.5	908.4	918.8	926.2	928.6	925.8	927.6
	1-5		888.2	877.8	886.0	882.8	884.8	885.0	882.7
	av.		910.0	887.2	896.7	903.8	907.0	907.2	904.2
	7-9	C ↓	1009.0	1003.1	1001.8	1006.9	1004.0	1010.0	1004.2
	9-11		1021.4	1016.0	1016.0	1021.6	1022.3	1023.0	1015.8
	7-11		1009.2	1007.0	1006.5	1011.7	1041.0	1012.0	1009.7
	av.		1013.2	1008.7	1008.1	1013.4	1027.4	1015.0	1011.1

TABLE VIII (cont)

			Date:	3/9/78	3/10/78	3/10/78	3/13/78
			Time:	0755	0820	1428	0915
			$T_1/T_2/T_3$	109/111/109	75/71/75	27/22/24	NIM 19/18
Lines			Comment:	Beam # 10 Source 24 (a) % CH 9825 So. ON 0756	Beam # 0 Source ON Par. CH @ 0000	Beam # 0 Source IN	To determine Annealing
Panel 1	1-3	C ↓		1300.4	1370.0	1369.0	1374.0
	3-5			1313.0	1393.0	1374.0	1381.0
	1-5			1271.0	1350.0	1342.0	1347.0
	av.			1294.8	1367.7	1361.7	1367.3
Panel 2	1-3	C Bend ↓		1138.6	1217.0	1186.0	1176.6
	3-5			1155.5	1238.0	1198.0	1207.0
	1-5			1092.9	1170.0	1136.0	1151.1
	av.			1128.3	1207.7	1172.7	1174.4
	7-9	B Bend ↓		1020.0	1064.6	1025.0	1046.1
	9-11			1025.4	1070.0	1036.6	1046.3
	7-11			1003.5	1049.0	1015.9	1026.7
	av.			1016.2	1062.9	1025.8	1039.5
	13-15	B Straight ↓		904.6	937.4	901.1	910.7
	15-17			897.0	927.6	896.5	899.8
	13-17			894.9	929.2	897.3	901.4
	av.			896.0	921.4	892.3	904.0
Panel 3	1-3	A ↓		877.4	906.6	883.3	892.8
	3-5			890.0	906.1	887.2	875.3
	1-5			879.0	903.0	883.7	893.9
	av.			872.1	901.8	876.1	887.3
	7-9	A Bend ↓		783.7	817.3	786.2	809.0
	9-11			798.4	812.0	802.1	810.0
	7-11			784.2	815.3	798.3	806.5
	av.			785.4	814.3	798.0	805.5
	13-15	A Straight ↓		688.3	704.4	707.3	710.0
	15-17			675.7	700.9	692.3	699.0
	13-17			680.0	711.9	703.8	710.0
	av.			681.2	707.1	701.1	706.3
Panel 4	1-3	A ↓		875.6	897.5	868.1	876.8
	3-5			872.9	890.7	860.4	867.0
	1-5			896.7	897.6	870.0	876.1
	av.			888.7	894.6	879.5	886.6
	7-9	C ↓		1016.6	1007.1	1009.1	1012.0
	9-11			1023.5	1022.0	1012.7	1027.0
	7-11			1015.1	1012.7	1000.7	1017.0
	av.			1018.7	1013.8	1002.8	1019.0

TABLE IX

Insulation Resistance (Ohms) 500 v. Megger

Line	Date:	2/15/78	2/15/78	2/16/78	2/16/78	2/17/78	2/18/78	2/19/78
	Time:	0935	1340	1017	0925	0820	0900	0935
	T ₁ /T ₂ /T ₃	23°	129/131/127	127/129/125	127/129/126	128/132/128	129/132/131	129/132/129
	Comment:	Pretest	Start Age Source @ 24 in.	Aging Source On (Temporary)	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.
Panel 1								
1-3	C	> 5x10 ⁹	> 5x10 ⁹	-	4.5 x10 ⁸	1.8x10 ⁸	2.5 x10 ⁸	4.0 x10 ⁸
3-5		"	"	-	5.0 x10 ⁸	2.4x10 ⁸	3.5 x10 ⁸	4.5 x10 ⁸
1-5		"	"	-	4.75x10 ⁸	1.8x10 ⁸	3.0 x10 ⁸	4.5 x10 ⁸
av.		"	"	-	4.75x10 ⁸	2.0x10 ⁸	1.00x10 ⁸	4.3x10 ⁸
1-G		"	"	-	"	"	"	"
3-G		"	"	-	"	"	"	"
5-G		"	"	-	"	"	"	"
av.		"	"	-	"	"	"	"
7-G	D/Single	"	"	-	"	"	"	"
9-G	C/Single	"	"	-	"	"	"	"
11-G	A/Single	"	"	-	"	"	"	"
	Bend Splice	"	"	-	"	"	"	"
13-G	A/Single	"	"	-	"	"	"	"
	St. Splice	"	"	-	"	"	"	"
Line	Date:	2/20/78	2/20/78	2/20/78	2/21/78	2/21/78	2/21/78	2/21/78
	Time:	0820	1005	1242	1345	1655	1830	2132
	T ₁ /T ₂ /T ₃	126/133/129	129/133/129	44/41/43	19/20/19	157/159/156	157/159/156	156/157/155
	Comment:	Aging Source @ 24 in.	Heat Aging Only Source Down @ 0931	Post aging Source Down	Prepressure Source Down	Steam @ 70 # 1635 Source @ 16 in. @ 1647	Steam @ 70 Source @ 19 in. @ 1847	Steam @ 70 Source @ 19 in. Following Tests To 0 psi @ 10 sec Ramp up
Panel 1								
1-3	C	5.5x10 ⁸	5x10 ⁸	> 5x10 ⁹	> 5x10 ⁹	2.5x10 ⁸	4x10 ⁹	5x10 ⁹
3-5		4x10 ⁸	7x10 ⁸	"	"	3x10 ⁸	3.5x10 ⁹	5x10 ⁹
1-5		7x10 ⁸	8x10 ⁸	"	"	3x10 ⁸	5x10 ⁹	5x10 ⁹
av.		6.83x10 ⁸	6x10 ⁸	"	"	2.83x10 ⁸	3.83x10 ⁹	5x10 ⁹
1-G		"	"	"	②	"	"	"
3-G		"	"	"	"	"	"	"
5-G		"	"	"	"	"	"	"
av.		"	"	"	"	"	"	"
7-G	D/Single	"	"	"	"	"	"	"
9-G	C/Single	"	"	"	"	"	"	"
11-G	A/Single	"	"	"	"	"	"	"
	Bend Splice	"	"	"	"	"	"	"
13-G	A/Single	"	"	"	"	"	"	"
	St. Splice	"	"	"	"	"	"	"

• = > 5x10⁹Ω
 ○ = Loads Instrument

TABLE IX (cont)

Line		Date:	2/21/78	2/22/78	2/22/78	2/22/78	2/22/78	2/23/78	2/23/78
		Time:	2335	0130	0543	0750	1615	0830	0852
Panel 1	C	T ₁ /T ₂ /T ₃	155/156/155	139/140/140	139/140/138	128/129/129	128/129/128		127/128/126
		Comment:	Steam @ 70 Source @ 19 in.	Steam @ 40 Source 21-1/2 St. @ 0110 So. @ 0047	Steam @ 40 Source 21-1/2	Steam @ 25 Source 21-1/2 St. @ 0740	Steam @ 25 Source 21-1/2 Source C 24 in. @ 1647		Steam @ 25 Source 24 in.
1-3	•	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹		> 5x10 ⁹
3-5	•	•	•	•	•	•	•		•
1-5	•	•	•	•	•	•	•		•
av.	•	•	•	•	•	•	•		•
1-G	•	•	•	•	•	•	•		•
3-G	•	•	•	•	•	•	•		•
5-G	•	•	•	•	•	•	•		•
av.	•	•	•	•	•	•	•		•
7-G	D/Single	•	•	•	•	•	•		•
9-G	C/Single	•	•	•	•	•	•		•
11-G	A/Single	•	•	•	•	•	•		•
13-G	Bend Splice	•	•	•	•	•	•		•
	A/Single	•	•	•	•	•	•		•
	St. Splice	•	•	•	•	•	•		•
Line		Date:	2/24/78	2/25/78	2/26/78	2/27/78	2/28/78	3/1/78	3/2/78
		Time:	0615	0900	0738	0801	0948	1015	1038
Panel 1	C	T ₁ /T ₂ /T ₃	121/131/127	128/130/131	128/131/131	111/115/115	107/108/108	107/108/106	107/109/107
		Comment:	Steam @ 25 Source 24 in.	Steam @ 25 Source 24 in.	Steam @ 25 Source 24 in. Steam to 19 @ 0740	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
1-3	•	2.5x10 ⁹	2.5x10 ⁹	5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹		> 5x10 ⁹
3-5	•	3x10 ⁹	4x10 ⁹	•	•	•	•		•
1-5	•	2.5x10 ⁹	3x10 ⁹	•	•	•	•		•
av.	•	2.67x10 ⁹	3.17x10 ⁹	•	•	•	•		•
1-G	•	•	•	•	•	•	•		•
3-G	•	•	•	•	•	•	•		•
5-G	•	•	•	•	•	•	•		•
av.	•	•	•	•	•	•	•		•
7-G	D/Single	•	•	•	•	•	•		•
9-G	C/Single	•	•	•	•	•	•		•
11-G	A/Single	•	•	•	•	•	•		•
13-G	Bend Splice	•	•	•	•	•	•		•
	A/Single	•	•	•	•	•	•		•
	St. Splice	•	•	•	•	•	•		•

• = > 5x10⁹
 ○ = Load Instrument

TABLE IX (cont)

Lines		Date:	3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		Time:	1035	0855	2118	0734	0828	0839	0840
Panel 1		$T_1/T_2/T_3$	107/116/116	70/70/70	114/117/118	108/109/109	109/116/116	113/118/117	111/118/118
		Comment:	Steam @ 10 Source 24 in.	Steam @ 0 Source 24 in. Boiler OFF ~1400 3/3/78	Steam @ 10 Source 24 in. Boiler ON ~1100 3/4/78	Steam @ 12 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
1-3	C ↓		$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$< 5 \times 10^9$	$> 5 \times 10^9$	2.5×10^9	3×10^9
3-5			•	•	•	•	•	5×10^9	(3.5×10^9)
1-5			•	•	•	•	•	$> 5 \times 10^9$	$> 5 \times 10^9$
av.			•	•	•	•	•	4.17×10^9	2.78×10^9
1-G			•	•	•	•	•	•	•
3-G			•	•	•	•	•	•	•
5-G			•	•	•	•	•	•	•
av.			•	•	•	•	•	•	•
7-G	D/Single		•	•	•	•	•	•	•
9-G	C/Single		•	•	•	•	•	•	•
11-G	A/Single		•	•	•	•	•	•	•
13-G	Bend Splice		•	•	•	•	•	•	•
	A/Single St. Splice		•	•	•	•	•	•	•

Lines		Date:	3/9/78	3/10/78	3/10/78	3/11/78
		Time:	0750	0814	1444	0845
Panel 1		$T_1/T_2/T_3$	106/110/108	75/71/75	25/23/23	ND 19/18
		Comment:	Steam @ 10 Source 24 in. St. OFF 0825 So. Dn 0758	Steam @ 0 Source Dn Per. OFF @ 0800	Steam @ 0 Source Dn	To Determine Annealing
1-3	C ↓		4×10^9	8×10^9	$< 5 \times 10^9$	$> 5 \times 10^9$
3-5			5×10^9	7×10^9	•	•
1-5			$> 5 \times 10^9$	3×10^9	•	•
av.			1.85×10^9	1.5×10^9	•	•
1-G			•	•	•	•
3-G			•	•	•	•
5-G			•	•	•	•
av.			•	•	•	•
7-G	D/Single		•	•	•	•
9-G	C/Single		•	•	•	•
11-G	A/Single		•	•	•	•
13-G	Bend Splice		•	•	•	•
	A/Single St. Splice		•	•	•	•

+ • = $> 5 \times 10^9$ C.

○ = Load Instrument

TABLE IX (cont)

Line	Date: Time: $T_1/T_2/T_3$ Comment:	2/15/78	2/15/78	2/16/78	2/16/78	2/17/78	2/18/78	2/19/78
		0935 23°C	1240 13°/131/127	1017 127/129/125	0923 127/129/126	0820 128/132/128	0900 129/132/131	0933 129/132/129
		Start Age Source @ 24 in.	Start Age Source @ 24 in.	Aging Source On (Temporary)	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.	Aging Source @ 24 in.
Panel 2								
1-3	C	> 5×10^9	> 5×10^9	-	4.5×10^9	1.7×10^9	1.8×10^9	1.4×10^9
3-5	Bend Splice	•	•	-	4.5×10^9	1.7×10^9	1.8×10^9	1.5×10^9
1-5	•	•	•	-	4.4×10^9	1.5×10^9	1.7×10^9	1.35×10^9
av.	•	•	•	-	4.5×10^9	1.63×10^9	1.77×10^9	1.42×10^9
1-G	•	•	•	-	•	•	•	•
3-G	•	•	•	-	•	•	•	•
5-G	•	•	•	-	•	•	•	•
av.	•	•	•	-	•	•	•	•
7-9	B	•	•	-	•	•	•	•
9-11	Bend Splice	•	•	-	•	•	•	•
7-11	•	•	•	-	•	•	•	•
av.	•	•	•	-	•	•	•	•
7-G	•	•	•	-	•	•	•	•
9-G	•	•	•	-	•	•	•	•
11-G	•	•	•	-	•	•	•	•
av.	•	•	•	-	•	•	•	•
13-15	B	•	•	-	•	•	•	•
15-17	Straight Splice	•	•	-	•	•	•	•
13-17	•	•	•	-	•	•	•	•
av.	•	•	•	-	•	•	•	•
13-G	•	•	•	-	•	•	•	•
15-G	•	•	•	-	•	•	•	•
17-G	•	•	•	-	•	•	•	•
av.	•	•	•	-	•	•	•	•

• = $> 5 \times 10^9 \Omega$

○ = Load Instrument

TABLE IX (cont)

Line	Date: Time: $T_1/T_2/T_3$ Comment:	2/20/78 0820 129/133/129 Aging Source @ 24 in.	2/20/78 1005 129/133/129 Heat Aging Only Source Down @ 0931	2/20/78 1242 44/41/43 Post Aging Source Down	2/21/78 1345 19/20/19 Prepressure Source Down	2/21/78 1655 157/159/155 Steam @ 70 @ 1835 Source @ 16 in. @ 1647	2/21/78 1850 157/159/156 Steam @ 70 Source @ 19 in. @ 1847	2/21/78 2125 156/157/155 Steam @ 70 Source @ 19 in. Following Steps To 0 psi & 10 sec Ramp Up
Panel 2								
1-3	C Bend Splice ↓	1.3×10^8	1.5×10^8	$> 5 \times 10^8$	$> 5 \times 10^8$	5.5×10^7	9×10^7	3.6×10^7
3-8		1.3×10^8	1.5×10^8	"	"	5×10^7	1×10^8	1.3×10^8
1-8		1.3×10^8	1.4×10^8	"	"	5×10^7	7×10^7	8.5×10^7
av.		1.3×10^8	1.47×10^8	"	"	5.17×10^7	8.67×10^7	1.24×10^8
1-G		"	"	"	"	"	"	⊙
3-G	B Bend Splice ↓	"	"	"	"	"	"	⊙
8-G		"	"	"	"	"	"	⊙
av.		"	"	"	"	"	"	"
7-8		"	"	$> 5 \times 10^8$	"	"	"	"
8-11		"	"	2.5×10^8	"	"	"	"
7-11	B Straight Splice ↓	"	"	2.5×10^8	"	"	"	"
av.		"	"	2.5×10^8	"	"	"	"
7-G		"	"	2.5×10^8	"	"	"	"
8-G		"	"	"	"	"	"	"
11-G		"	"	"	"	"	"	"
av.		"	"	⊙	"	"	"	"
13-15	B Straight Splice ↓	"	"	1.3×10^8	"	"	"	"
15-17		"	"	2.5×10^8	"	"	"	"
13-17		"	"	2.5×10^8	"	"	"	"
av.		"	"	2.1×10^8	"	"	"	"
13-G		"	"	⊙	"	"	"	"
15-G		"	"	⊙	"	"	"	"
17-G		"	"	⊙	"	"	"	"
av.		"	"	"	"	"	"	"

* = $> 5 \times 10^8$

⊙ = Loads Instrument

TABLE IX (cont)

Line	Date:	2/21/78	2/22/78	2/22/78	2/22/78	2/22/78	2/23/78
	Time:	2335	0130	0543	0750	1615	0952
	$T_1/T_2/T_3$	155/150/155	139/140/140	139/140/130	128/129/129	128/129/128	127/126/126
	Comment:	Steam @ 70 Source @ 10 in.	Steam @ 40 Source 21-1/2 SL @ 0110 So. @ 0047	Steam @ 40 Source 21-1/2	Steam @ 25 Source 21-1/2 SL @ 0740	Steam 25 Source 21-1/2 Source to 24 in. @ 1647	Steam @ 25 Source 24 in.
Panel 2							
1-3	C	7.4x10 ⁸	1.8x10 ⁸	1.8x10 ⁸	3.5x10 ⁸	5x10 ⁸	5x10 ⁸
3-5	Bend Splice	5.1x10 ⁸	2.3x10 ⁸	2.1x10 ⁸	4.4x10 ⁸	5x10 ⁸	6x10 ⁸
1-5		6.2x10 ⁸	1.25x10 ⁸	1.2x10 ⁸	2.2x10 ⁸	3x10 ⁸	3.6x10 ⁸
av.		7.8x10 ⁸	1.78x10 ⁸	1.70x10 ⁸	3.37x10 ⁸	4.33x10 ⁸	4.87x10 ⁸
1-G		⊙	⊙	⊙	•	•	⊙
3-G		⊙	⊙	⊙	•	•	⊙
5-G		⊙	⊙	⊙	•	•	⊙
av.		•	•	•	•	•	•
7-9	B	•	•	•	•	•	•
9-11	Bend Splice	•	•	•	2.5x10 ⁸	•	1.5x10 ⁸
7-11		•	•	•	5x10 ⁸	•	2 to 20x10 ⁸
av.		•	•	•	>4.2x10 ⁸	•	•
7-G		•	•	•	•	•	•
9-G		•	•	•	•	•	•
11-G		•	•	•	⊙	•	⊙
av.		•	•	•	•	•	•
13-15	B	•	•	•	•	•	•
15-17	Straight Splice	•	•	•	•	4x10 ⁸	5 to 25x10 ⁸
13-17		•	•	•	•	3x10 ⁸	2.5x10 ⁸
av.		•	•	•	•	3x10 ⁸	7
13-G		•	•	•	•	2.2x10 ⁸	•
15-G		•	•	•	•	•	⊙
17-G		•	•	•	•	•	⊙
av.		•	•	•	•	•	•

• = > 5x10⁸ Ω

⊙ = Load Instrument

TABLE IX (cont)

Lanes		Date:	2/24/78	1/25/78	2/26/78	2/27/78	2/28/78	3/1/78	3/2/78
		Time:	0815	0800	0738	0801	0848	1015	1038
		$T_1/T_2/T_3$	121/131/127	128/130/131	128/131/131	111/115/115	107/108/108	107/108/108	107/109/107
		Comment:	Steam 25 Source 24 in.	Steam @ 25 Source 24 in.	Steam @ 25 Source 24 in. Steam to 10 @ 0740	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
Panel 2									
1-3	C Bend Splice ↓		2.6×10^8	1.45×10^8	5×10^8	1×10^9	2×10^9	2.5×10^9	1.4×10^9
3-5			3.5×10^8	1.45×10^8	6×10^8	1.2×10^9	2×10^9	4×10^9	1.6×10^9
1-6			1.9×10^8	1.2×10^8	3.5×10^8	7.0×10^8	1.7×10^9	2×10^9	1×10^9
av.			2.73×10^8	1.37×10^8	4.83×10^8	9.67×10^8	1.75×10^9	2.83×10^9	1.35×10^9
1-G			⊙	⊙	•	•	•	•	•
3-G			⊙	⊙	•	•	•	•	•
5-G			⊙	⊙	•	•	•	•	•
av.			•	•	•	•	•	•	•
7-8	B Bend Splice ↓		1.25×10^9	2.5×10^8	2.5×10^9	$1 \text{ to } 25 \times 10^8$	$1 \text{ to } 25 \times 10^8$	1×10^9	4.5×10^9
9-11			1.5×10^9	$\sim 2.5 \times 10^8$	2×10^9	$2 \text{ to } 10 \times 10^7$	$2 \text{ to } 2.5 \times 10^8$	1.2×10^9	2×10^9
7-11			$2.5 \text{ to } 5.5 \times 10^8$	1.25×10^9	1.5×10^9	1.0×10^9	1×10^9	1.5×10^9	6×10^8
av.			?	?	1.4×10^9	?	?	8.5×10^8	2.17×10^9
7-G			•	•	•	•	•	•	•
9-G			•	•	•	•	•	•	•
11-G			•	•	⊙	•	⊙	⊙	⊙
av.			•	•	•	•	•	•	•
13-15	B Straight Splice ↓		$1 \text{ to } 2 \times 10^8$	1×10^8	5×10^8	$1.5 \text{ to } 2 \times 10^8$	2.5×10^8	2×10^8	$\sim 3.5 \times 10^8$
15-17			5×10^8	$\sim 3 \times 10^8$	1×10^9	6.0×10^8	5×10^8	5×10^8	2×10^9
13-17			•	2.5×10^8	2.5×10^9	5×10^8	2.5×10^9	2.5×10^9	1.6×10^9
av.			?	?	1.33×10^9	?	1.68×10^9	1.07×10^9	1.32×10^9
13-G			•	•	•	•	•	•	•
15-G			•	•	•	•	⊙	⊙	⊙
17-G			•	•	•	•	⊙	•	•
av.			•	•	•	•	•	•	•

• • $> 5 \times 10^9 \Omega$
 ⊙ • Loads Instrument

TABLE 1X (cont)

Lines		Date: 3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		Time: 1035	0855	2118	0734	0828	0839	0940
		$T_1/T_2/T_3$	107/116/118	70/70/70	114/117/118	108/109/109	109/116/116	113/118/117
		Comment:	Steam @ 10	Steam @ 0	Steam @ 10	Steam @ 10	Steam @ 10	Steam @ 10
			Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.	Source 24 in.
				Boiler OFF	Boiler ON			
			~1400 3/3/78	~1100 3/4/78				
Panel 2								
1-S								
3-S								
1-S								
av.								
1-G								
3-G								
5-G								
av.								
7-9								
9-11								
7-11								
av.								
7-G								
9-G								
11-G								
av.								
13-15								
15-17								
13-17								
av.								
13-G								
15-G								
17-G								
av.								

• = $> 5 \times 10^8$

○ = Load Instrument

TABLE IX (cont)

Lines		Date: 3/9/78 Time: 0750 $T_1/T_2/T_3$ Comment: Steam @ 10 Source 24 in. St. OFF 0825 So. Dn 0758	3/10/78 0814 75/71/75 Steam @ 0 Source Dn Pwr. OFF @ 0800	3/10/78 1444 23/23/23 Steam @ 0 Source Dn	3/13/78 0847 ND/19/18 To Determine Annealing
Panel 2					
1-3	C	1.9×10^8	2×10^8	$> 5 \times 10^8$	$> 5 \times 10^8$
3-5	Bend Splice	1.5×10^8	2×10^8	"	"
1-5		1.1×10^8	2×10^8	"	"
av.		1.5×10^8	2×10^8	"	"
1-G		"	"	"	⊙
3-G		"	"	"	"
5-G		"	"	"	"
av.		"	"	"	"
7-9	B	5×10^8	5×10^8	5×10^8	5×10^8
9-11	Bend Splice	3×10^8	1.5×10^8	2.5×10^8	$8 \text{ to } 100 \times 10^7$
7-11		3×10^8	2×10^8	4×10^8	$1 \text{ to } 2 \times 10^8$
av.		3.87×10^8	2.83×10^8	3.5×10^8	"
7-G		"	"	"	"
9-G		"	"	"	"
11-G		⊙	"	⊙	"
av.		"	"	"	"
13-15	B	2.5×10^8	2.5×10^8	4.5×10^8	$8 \text{ to } 30 \times 10^7$
15-17	Straight Splice	6×10^8	2×10^8	2×10^8	2.5×10^8
13-17		1.5×10^9	"	3×10^8	4×10^8
av.		7.83×10^8	8.17×10^8	1.82×10^8	"
13-G		"	"	"	"
15-G		⊙	"	⊙	"
17-G		⊙	"	"	"
av.		"	"	"	"

" = $> 5 \times 10^8 \Omega$

⊙ = Loads Instrument

TABLE IX (cont.)

Lines	Date: Time: $T_1/T_2/T_3$ Comment:	2/15/78 0835 23°C Pretest	2/15/78 1340 129/131/127 Start Age Source @ 24 in.	2/16/78 1017 137/129/125 Aging Source On (Temporary)	2/16/78 0925 127/129/128 Aging Source @ 24 in.	2/17/78 0820 128/132/128 Aging Source @ 24 in.	2/18/78 0900 129/132/131 Aging Source @ 24 in.	2/19/78 0935 129/132/129 Aging Source @ 24 in.
Panel 3								
1-3	↑	$> 5 \times 10^9$	$> 5 \times 10^9$	-	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$
3-5		*	*	-	*	*	*	*
1-5		*	*	-	*	*	*	*
av.		*	*	-	*	*	*	*
1-G		*	*	-	*	*	*	*
3-G		*	*	-	*	*	*	*
5-G		*	*	-	*	*	*	*
7-9	↓	*	*	-	*	*	*	*
8-11	A	*	*	-	*	*	*	*
7-11	Bend Splice	*	1.25×10^9	-	*	*	*	*
av.		*	2.50×10^9	-	*	*	*	*
7-G		*	2.92×10^9	-	*	*	*	*
9-G		*	*	-	*	*	*	*
11-G		*	*	-	*	*	*	*
av.		*	*	-	*	*	*	*
13-15	↓	*	⊙	-	*	*	*	*
15-17	A	*	5.5×10^9	-	*	*	*	*
13-17	Straight Splice	*	3.52×10^9	-	*	*	*	*
av.		*	*	-	*	*	*	*
13-G		*	*	-	*	*	*	*
15-G		*	*	-	*	*	*	*
17-G		*	*	-	*	*	*	*
av.	↓	*	*	-	⊙	*	*	*

* = $> 5 \times 10^{12}$
 ⊙ = Load Instrument

TABLE IX (cont)

Lines		Date:	2/20/78	2/20/78	2/20/78	2/21/78	2/21/78	2/21/78	2/21/78
		Time:	0820	1005	1242	1345	1655	1850	2152
		$T_1/T_2/T_3$	128/133/129	128/133/129	44/41/43	19/20/18	157/159/158	157/159/156	156/157/155
		Comment:	Aging Source @ 24 in.	Heat Aging Only Source Down @ 9951	Portaging Source Down	Prepressure Source Down	Steam @ 70 @ 1635 Source @ 16 in. @ 1:47	Steam @ 70 Source @ 19 in. @ 1847	Steam @ 70 Source @ 19 in. Following Steps To 10 psi & 10 sec Ramp 1 p
Panel 3									
1-3	A		> 5×10^8	> 5×10^8	> 5×10^8	> 5×10^8	> 5×10^8	> 5×10^8	> 5×10^8
3-5			.	.	.	.	.	.	.
1-5			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
1-G			.	.	.	⊙	.	.	.
3-G			.	.	.	.	.	.	.
5-G			.	.	.	.	.	.	.
7-9	A		.	.	.	.	.	.	.
9-11	Bend Splice		.	.	.	.	.	.	.
7-11			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
7-G			.	.	.	.	.	.	.
9-G			.	.	.	.	.	.	.
11-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
13-15	A		.	.	.	.	.	.	.
15-17	Straight Splice		.	.	.	.	.	.	.
13-17			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
13-G			.	.	.	.	.	.	.
15-G			.	.	.	.	.	.	.
17-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.

• > $5 \times 10^8 \Omega$

⊙ = Load Instrument

TABLE IX (cont)

Lines		Date: 2/21/78	2/22/78	2/22/78	2/22/78	2/22/78	2/23/78	2/23/78
		Time: 2335	0130	0545	0750	1615	0830	0852
		$T_1/T_2/T_3$ 155/154/155	138/140/140	132/140/138	128/129/129	128/128/128		137/126/126
		Comment: Steam @ 70	Steam @ 40	Steam @ 40	Steam @ 25	Steam @ 25		Steam @ 25
		Source @ 18 in.	Source 21-1/2	Source 21-1/2	Source 21-1/2	Source 21-1/2		Source 24 in.
			St. @ 0110		St. @ 0740	Source to		
			So. @ 0047			24 in. @ 1647		
Panel 3								
1-5		> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	-	> 5×10^9
3-5		.	.	.	.	.	-	.
1-6		.	.	.	.	.	-	.
av.		.	.	.	.	.	-	.
1-G		.	.	.	.	.	-	.
3-G		.	.	.	.	.	-	.
5-G		.	.	.	.	.	-	.
7-9		.	.	.	.	.	-	.
8-11	A	5×10^9	5×10^9	3×10^9	5×10^9	5×10^9	-	4×10^9
7-11	Bend Splice	.	.	.	.	.	-	.
av.		.	.	.	.	.	-	.
7-G		.	.	.	.	.	-	.
9-G		.	.	.	.	.	-	.
11-G		.	.	.	.	.	-	.
av.		.	.	.	.	.	-	.
13-15		.	.	.	.	.	-	.
15-17	A	.	.	.	.	.	-	.
13-17	Straight Splice	.	.	.	.	.	-	.
av.		.	.	.	.	.	-	.
13-G		.	.	.	.	.	-	.
15-G		.	.	.	.	.	-	.
17-G		.	.	.	.	.	-	.
av.		.	.	.	.	.	-	.

• = $5 \times 10^9 \Omega$

○ = Load Instrument

TABLE IX (cont)

Lines	Date: Time: T ₁ /T ₂ /T ₃ Comment:	2/24/78 0815 131/131/127 Steam @ 25 Source 24 in.	2/25/78 0900 128/130/131 Steam @ 25 Source 24 in.	2/26/78 0738 128/131/131 Steam @ 25 Source 24 in. Steam to 10 @ 0700	2/27/78 0801 111/115/115 Steam @ 10 Source 24 in.	2/28/78 0948 107/108/108 Steam @ 10 Source 24 in.	3/1/78 1015 107/108/106 Steam @ 10 Source 24 in.	3/2/78 1038 107/109/107 Steam @ 10 Source 24 in.
Panel 3								
1-3	A	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹
3-5	↓	•	•	•	•	•	•	•
1-5		•	•	•	•	•	•	•
av.		•	•	•	•	•	•	•
1-G		•	•	•	•	•	•	•
3-G		•	•	•	•	•	•	•
5-G		•	•	•	•	•	•	•
7-8	A	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹
9-11	Bend Splice	2.5x10 ⁹	2.5x10 ⁹	2.5x10 ⁹	5x10 ⁹	5x10 ⁹	5x10 ⁹	5x10 ⁹
7-11		5x10 ⁹	5x10 ⁹	4x10 ⁹	5x10 ⁹	5x10 ⁹	> 5x10 ⁹	5x10 ⁹
av.		4.17x10 ⁹	4.17x10 ⁹	3.83x10 ⁹	5x10 ⁹	5x10 ⁹	> 5x10 ⁹	5x10 ⁹
7-G	↓	•	•	•	•	•	•	•
9-G		•	•	•	•	•	•	•
11-G		•	•	•	•	•	•	•
av.		•	•	•	•	•	•	•
13-15	A	•	5x10 ⁹	5x10 ⁹	•	•	•	•
15-17	Straight Splice	•	5x10 ⁹	5x10 ⁹	•	•	•	•
13-17		•	5x10 ⁹	5x10 ⁹	•	•	•	•
av.		•	5x10 ⁹	5x10 ⁹	•	•	•	•
13-G	↓	•	•	•	•	•	•	•
15-G		•	•	•	•	•	•	•
17-G		•	•	•	•	•	•	•
av.		•	•	•	•	•	•	•

• = > 5x10⁹ ft

○ = Load Instrument

TABLE IX (cont)

Lines	Date: Time: $T_1/T_2/T_3$ Comment:	3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		1035 107/116/116 Steam @ 10 Source 24 in.	0855 70/70/70 Steam @ 0 Source 24 in. Boiler OFF ~ 1400 3/3/78	2118 114/117/118 Steam @ 10 Source 24 in. Boiler ON ~ 1100 3/4/78	0734 106/109/109 Steam @ 10 Source 24 in.	0628 109/116/116 Steam @ 10 Source 24 in.	0839 113/118/117 Steam @ 10 Source 24 in.	0840 111/118/118 Steam @ 10 Source 24 in.
Panel 3								
1-3	A ↓	> 5×10^9	5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9
3-5		.	.	.	.	.	.	.
1-5		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
1-G		.	.	.	.	.	.	.
3-G		.	.	.	.	.	.	.
5-G		.	.	.	.	.	.	.
7-9	A Bend Splice ↓	> 5×10^9	.	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	5×10^9
9-11		5×10^9	.	4.5×10^9	5×10^9	4×10^9	4×10^9	4×10^9
7-11		5×10^9	.	5×10^9	5×10^9	5×10^9	5×10^9	5×10^9
av.		> 5×10^9	.	4.63×10^9	5×10^9	4.67×10^9	4.67×10^9	4.67×10^9
7-G		.	.	.	.	.	.	.
9-G		.	.	.	.	.	.	.
11-G	A Straight Splice ↓	.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
13-15		.	.	.	.	> 5×10^9	> 5×10^9	5×10^9
15-17		.	.	.	.	5×10^9	5×10^9	5×10^9
13-17		.	.	.	.	5×10^9	5×10^9	5×10^9
av.		.	.	.	.	5×10^9	5×10^9	4.33×10^9
13-G	A ↓	.	.	.	.	.	.	.
15-G		.	.	.	.	.	.	.
17-G		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.

• = > $5 \times 10^9 \Omega$

○ = Loads Instrument

TABLE IX (cont)

Line		Date: Time: $T_1/T_2/T_3$ Comment:	3/9/78 0750 108/110/106 Steam @ 10 Source On St. OFF 0825 So. On 0758	3/10/78 0814 75/71/75 Steam @ 0 Source On Per. OFF @ 0800	3/10/78 1444 25/23/23 Steam @ 0 Source On	3/15/78 0845 ND/19/18 To Determine Annealing
Panel 3						
1-3	A		5×10^8	$> 5 \times 10^8$	$> 5 \times 10^8$	$> 5 \times 10^8$
3-5			$> 5 \times 10^8$	.	.	.
1-6			$> 5 \times 10^8$	.	.	.
av.			5×10^8	.	.	.
1-G			.	.	.	.
3-G			.	.	.	⊙
5-G			.	.	.	.
7-9	A		$> 5 \times 10^8$	$> 5 \times 10^8$	.	.
9-11	Bend Splice		5×10^8	5×10^8	.	.
7-11			5×10^8	$> 5 \times 10^8$	.	.
av.			5×10^8	5×10^8	.	.
7-G			.	.	.	.
9-G			.	.	.	.
11-G			.	.	.	.
av.			.	.	.	.
13-15	A		$> 5 \times 10^8$	.	.	.
15-17	Straight		5×10^8	.	.	.
13-17			5×10^8	.	.	.
av.			5×10^8	.	.	.
13-G			.	.	.	.
15-G			.	.	.	.
17-G			.	.	.	.
av.			.	.	.	.

* = $> 5 \times 10^8 \Omega$
 ⊙ = Loads Instrument

TABLE IX (cont)

Line	Date: Time: $T_1/T_2/T_3$ Comment:	2/15/78 0838 25°C Pretest	2/15/78 1340 129/131/127 Start Age Source @ 24 in.	2/16/78 1017 127/129/125 Aging Source Dn (Temporary)	2/16/78 0925 127/129/125 Aging Source @ 24 in.	2/17/78 0430 128/132/126 Aging Source @ 24 in.	2/18/78 0806 129/133/131 Aging Source @ 24 in.	2/19/78 0935 129/132/129 Aging Source @ 24 in.
Panel 4								
1-3	A ↑	> 5x10 ⁹	> 5x10 ⁹	-	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹	> 5x10 ⁹
3-5		•	•	-	•	•	•	•
1-5		•	•	-	•	•	•	•
av.		•	•	-	•	•	•	•
1-G		•	•	-	•	•	•	•
3-G	C ↓	•	•	-	•	•	•	•
5-G		•	•	-	•	•	•	•
av.		•	•	-	•	•	•	•
7-8		•	•	-	•	•	•	•
9-11		•	•	-	•	•	•	•
7-11	C ↓	•	•	-	•	•	•	•
av.		•	•	-	•	•	•	•
7-G		•	•	-	•	•	•	•
9-G		•	•	-	•	•	•	•
11-G		•	•	-	•	•	•	•
av.		•	•	-	•	•	•	•
13-G	C/Single	•	⊙	-	•	•	•	•
15-G	D/Single	•	⊙	-	⊙	•	•	•
17-G	A/Single	•	•	-	•	•	•	•
	Bend Splice	•	⊙	-	•	•	•	•

• = > 5x10⁹
 ⊙ = Load Instrument

TABLE IX (cont)

Lines		Date:	2/20/78	2/20/78	2/20/78	2/21/78	2/21/78	2/21/78	2/21/78
		Time:	0620	1005	1242	1345	1655	1850	2150
		$T_1/T_2/T_3$	129/133/129	129/133/129	44/41/43	19/20/18	157/159/156	157/159/156	157/157/155
		Comment:	Aging Source @ 24 in.	Heat Aging Only Source Down @ 0951	Post Aging Source Down	Prepressure Source Down	Steam @ 70 @ 1635 Source @ 16 in. @ 1847	Steam @ 70 Source @ 19 in. @ 1847	Steam @ 70 Following Steps to 10 psi & 10 sec Ramp Up
Panel 4									
1-3	A		> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9
3-8			.	.	.	.	.	.	.
1-5			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
1-G			.	.	.	.	.	.	.
3-G			.	.	.	.	.	.	.
5-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
7-8	C		.	.	.	.	.	.	.
8-11			.	.	.	.	.	.	.
7-11			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
7-G			.	.	.	.	.	.	.
8-G			.	.	.	.	.	.	.
11-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
13-G	C/Single		.	.	.	.	.	.	.
16-G	D/Single		.	.	.	.	.	.	.
17-G	A/Single		.	.	.	.	.	.	.
	Bond Splice		.	.	.	.	.	.	.

• • • > $5 \times 10^9 \Omega$

○ • Leads Instrument

TABLE IX (cont)

Lines		Date:	2/21/78	2/22/78	2/22/78	2/22/78	2/22/78	2/23/78	2/23/78
		Time:	1335	0130	0543	0750	1015	0930	0052
Panel 4		$T_1/T_2/T_3$	155/156/155	139/146/140	139/140/138	128/129/129	128/129/128		127/136/126
		Comment:	Steam @ 70 Source @ 19 in.	Steam @ 40 Source 21-1/2 St. @ 0110 So. @ 0047	Steam @ 40 Source 21-1/2	Steam @ 25 Source 21-1/2 St. @ 0740	Steam @ 25 Source 21-1/2 Source to 24 in. @ 1647		Steam @ 25 Source 24 in.
1-3	A ↓		> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	-	> 5×10^9
3-5			•	•	•	•	•	-	•
1-5			•	•	•	•	•	-	•
av.			•	•	•	•	•	-	•
1-G			•	•	•	•	•	-	•
3-G	C ↓		•	•	•	•	•	-	•
5-G			•	•	•	•	•	-	•
av.			•	•	•	•	•	-	•
7-9			•	•	•	•	•	-	•
9-11			•	•	•	•	•	-	•
7-11			•	•	•	•	•	-	•
av.			•	•	•	•	•	-	•
7-G			•	•	•	•	•	-	•
9-G			•	•	•	•	•	-	•
11-G			•	•	•	•	•	-	•
av.			•	•	•	•	•	-	•
13-G	C/Single		•	•	•	•	•	-	•
15-G	D/Single		•	•	•	•	•	-	•
17-G	A/Single		•	•	•	•	•	-	•
	Load Splice		•	•	•	•	•	-	•

• = > $5 \times 10^9 \Omega$
 ○ = Load instrument

TABLE IX (cont)

Line	Date: Time: $T_1/T_2/T_3$ Comment:	2/24/78	2/25/78	2/26/78	2/27/78	2/28/78	3/1/78	3/2/78
		0615 121/131/127 Steam @ 25 Source 24 in.	0900 128/130/131 Steam @ 25 Source 24 in.	0750 128/131/131 Steam @ 25 Source 24 in. Steam to 10 @ 0740	0801 131/115/115 Steam @ 10 Source 24 in.	0948 107/106/108 Steam @ 10 Source @ 24 in.	1015 107/106/106 Steam @ 10 Source @ 20 in.	1038 107/109/107 Steam @ 10 Source @ 24 in.
Panel 4								
1-3	A	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9
3-5		.	.	.	.	.	.	.
1-5		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
1-G		.	.	.	.	.	.	.
3-G		.	.	.	.	.	.	.
5-G		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
7-8	C	.	.	.	.	.	.	.
9-11		.	.	.	.	.	.	.
7-11		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
7-G		.	.	.	.	.	.	.
9-G		.	.	.	.	.	.	.
11-G		.	.	.	.	.	.	.
av.		.	.	.	.	.	.	.
13-G	C/Single	.	.	.	.	.	.	.
15-G	D/Single	.	.	⊙	.	⊙	⊙	⊙
17-G	A/Single	.	.	.	.	.	.	.
	Bend Splice	.	.	.	.	.	.	.

* * * > 5×10^9

⊙ = Load Instrument

TABLE IX (cont)

Lines		Date:	3/3/78	3/4/78	3/4/78	3/5/78	3/6/78	3/7/78	3/8/78
		Time:	1035	0855	2118	0734	0628	0639	0840
		$T_1/T_2/T_3$	107/116/116	70/70/70	114/117/118	100/109/109	109/116/116	113/116/117	111/116/118
		Comment:	Steam @ 10 Source 24 in.	Steam @ 0 Source 24 in. Boiler OFF ~ 1000 3/3/78	Steam @ 10 Source 24 in. Boiler ON ~ 1100 3/4/78	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.	Steam @ 10 Source 24 in.
Panel 4									
1-3	A ↓		> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9	> 5×10^9
3-5			.	.	.	.	.	.	.
1-5			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
1-G			.	.	.	.	.	.	.
3-G	C ↓		.	.	.	.	.	.	.
5-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
7-9			.	.	.	.	.	.	.
9-11			.	.	.	.	.	.	.
7-11			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
7-G			.	.	.	.	.	.	.
8-G			.	.	.	.	.	.	.
11-G			.	.	.	.	.	.	.
av.			.	.	.	.	.	.	.
13-G	C/Single		.	.	.	.	.	.	.
15-G	D/Single		.	.	.	⊙	.	.	.
17-G	A/Single		.	.	.	.	.	.	.
	Bend Splice		.	.	.	.	.	.	.

* = $> 5 \times 10^9 \Omega$

⊙ = Load Instrument

TABLE IX (cont)

Lanes		Date:	3/9/78	3/10/78	3/10/78	3/13/78
		Time:	0730	0814	1444	0845
		$T_1/T_2/T_3$	100/110/108	75/71/75	25/23/23	ND/19/18
		Comment:	Steam @ 10 Source 24 in. St. OFF 0825 So. Dn 0756	Steam @ 0 Source 24 in. Pwr. OFF @ 0800	Steam @ 0 Source Dn	To Determine Annealing
Panel 4						
1-S	A ↓		$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$	$> 5 \times 10^9$
3-S			.	.	.	.
1-B			.	.	.	.
av			.	.	.	.
1-G			.	.	.	⊙
3-G	C ↓		.	.	.	.
5-G			.	.	.	.
av.			.	.	.	.
7-B			.	.	.	.
8-11			.	.	.	.
7-11			.	.	.	.
av.			.	.	.	.
7-G			.	.	.	.
8-G			.	.	.	.
11-G			.	.	.	.
av.			.	.	.	.
13-G	C/Single		.	.	.	.
16-G	D/Single		⊙	.	⊙	⊙
17-G	A/Single		.	.	.	.
	Bend Splice		.	.	.	.

• • • $> 5 \times 10^9 \Omega$
 ⊙ = Load Instrument

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APPENDIX A
QA APPRAISAL OF SPLICED CABLE SAMPLES

Sandia Laboratories

Albuquerque, New Mexico
Livermore, California

date: February 13, 1978
to: Lloyd L. Bonzon, 5432

from: John Kirby, Jr., 9511

subject: QA Appraisal of Spliced Cable Samples

In general the control of materials from procurement to use, although informal, and the procedures used in the fabrication of the spliced cable samples appear to be satisfactory.

The splicing was performed by an individual trained by
using detailed instructions.

Further, the inspection of the splicing was by a second person, not the assembler.

Two minor deviations from the fabricating instructions were noted:

- a. The instructions specify the use of 120 grit or similar abrasive was used.
- b. Instruction/Maintenance/Inspection Sheet number 1542 is applicable to the crimping tool and indicates that a tool certification program should be used.

The tool is new and has been used less than 100 times, and it was assumed that the tool supplier's adjustments and settings were sufficiently accurate.

No tool certification has been performed.

It is judged that the samples are probably typical of spliced cable being used and produced in the nuclear power industry.

JK:9511:sb

APPENDIX B
CLASS 1E CABLE SPLICING PROCEDURE

1. Scope

This procedure applies to the splicing and sleeving of #12 AWG size wire electrical cable, single and multi-conductor, to produce Class 1E splices representative of typical field splices used in the nuclear electric-power industry. Additional limitations on the applicability of this procedure are inherent in the procedure itself; these include specific references to crimping tools, splices, sleeves and cable types.

2. Discussion

The qualification testing of Class 1E components requires faithful duplication of the component as installed in nuclear power plants. In the case of Class 1E field splices, which are not off-the-shelf purchasable items, this requires the development of, and adherence to, specific detailed procedures. This specific procedure is patterned after "Browns Ferry Nuclear Plant-Restoration Procedure-BF-17R, Repair of Fire Damaged Cables, Rev. 0".

and/or butt splices and crimping tools will be used in the conductor-to-conductor splices. series, heat-shrinkable tubing will be used to insulate the spliced joints and to jacket the individual conductors in multi-conductor cables. While the quality of the butt splice is important, the primary item to be tested is the sleeving and sleeving/jacket bond; is the only known manufacturer of qualified Class 1E sleeving for electrical cable splices.

"Instruction/Maintenance/Inspection Sheet, " dated 2/6/74, will serve as the primary guidance for the adequate assembly of the conductor-to-conductor splices; that document is an attachment to, and an integral part of, these procedures.

Corporation personnel have reviewed these procedures to determine their adequacy and typicality. In addition, they have prepared those sections on Cables Surface Preparation and Cleaning and Sleeve Selection. Prior to actual assembly of the splices, one designated Sandia employee will receive training on the preparation and assembly of Class 1E field splices; all splices will be performed by that individual.

3. Butt Splice Preparation

butt splices will be assembled in accordance with

3.1 Tools, Components

A , Model wire stripper will be used to cut (i.e., circle) the wire insulation at slightly greater than the correct (stripped) length. The insulation, to be removed, will be cut with a sharp knife and then removed. The insulation will not be stripped with the strippers directly. Hinging of the insulation with a knife will not be acceptable.

A hollow gauge, cut in length to the correct length to accommodate the butt splice, will be slipped over the stripped conductor and the conductor cut to the correct length.

butt splices , will be used in the conductor-to-conductor splice.

crimping tool, will be used in crimping all splices/conductors. The tool's mechanism assures an accurate crimp since it cannot be disengaged from the splice until sufficient pressure (i.e., crimp compaction is achieved to complete the crimp.

The jacket of the multiconductor cable must be removed sufficiently to allow for proper lengths of sleeving on the individual conductor cable splices.

3.2 Inspection

The inspection of all crimps/splices will be performed by a second person in accordance with in no case will the certification inspection be performed by the assembler.

The designated inspector will monitor each phase of the assembly process. Any rejected items will be immediately destroyed to prevent inadvertent inclusion in a finished splice, thus assuring only inspected and approved splices are produced.

4. Cables Surface Preparation and Cleaning

4.1 Cable

Refer to Appendix B-1.

4.1.1.1 Single-Conductor

Refer to Appendix B-1.

4.1.2 Multi- (3-) Conductor

Refer to Appendix B-1.

4.2 Multi- (3-) Conductor Cable

Refer to Appendix B-1.

4.3 Inspection

The inspection of all cable surfaces and cleaning will be performed by a second person in accordance with Sections 4.1 and 4.2 and "Heat-Shrinkable Cable Insulation Sleeves" product line description brochure, dated 3/75; in no case will the certification inspection be performed by the assembler.

The designated inspector will monitor each phase of the preparation/cleaning process. Any rejected items will be immediately destroyed or reprepared and recleaned to prevent inadvertent inclusion in a finished splice, thus assuring only inspected and approved splices are produced.

5. Splice Sleeve Selection

5.1 Cable

Refer to Appendix B-1.

5.1.1 Single-Conductor

Refer to Appendix B-1.

5.1.2 Multi- (3-) Conductor

Refer to Appendix B-1.

5.2 Multi- (3-) Conductor Cable

Refer to Appendix B-1.

5.3 Inspection

The inspection of all sleeve sizes/lengths will be performed by a second person in accordance with Sections 5.1 and 5.2, "Nuclear Splicing Capabilities Outline"; in no case will the certification inspection be performed by the assembler.

The designated inspector will monitor each phase of the sleeve selection process. Any rejected items will be immediately removed to prevent inadvertent inclusion in a finished splice, thus assuring only inspected and approved splices are produced.

6. Splice Assembly

6.1 Assembly Procedure

The splice will be prepared in the step-by-step manner outlined below. Methods for accommodating necessary deviations in the standard procedure, or within specific steps in the procedure, are discussed in Section 6.4.

1. The wire will be stripped and cut to length as outlined in Section 3.1; the wire will be inspected per Section 3.2.
2. All cable surfaces will be prepared and cleaned as outlined in Section 4.1 or 4.2; these will be inspected per Section 4.3.
3. The splice sleeves will be selected and cut as outlined in Section 5.1 or 5.2 and inspected per Section 5.3.
4. If necessary, the appropriate sleeves will be slipped over the cable prior to completing the conductor-to-conductor butt splice.
5. The butt splice will be prepared as outlined in Section 3.1 and inspected per Section 3.2.
6. Each sleeve, individually, will be positioned and heated in place using a electrical heat gun, Model _____, as outlined in Section 5.1 or 5.2; inspection will be per Section 5.3, _____ product line description brochure, and "Nuclear Splicing Capabilities Outline."
7. For multi-conductor cable, the individual conductor splices will be allowed to cool for at least one hour before the outer (jacket) splice is formed. That sleeve splice is then formed and inspected as discussed in step 6 above.

6.2 Assembly of Bends; Multi-Conductor Cable

For multi-conductor cables with bends in the spliced area, steps 1-6 are completed, as described above, for the individual conductor splices. The individual conductor splices will be allowed to cool for at least one hour before the outer (jacket) splice is formed.

With the (jacket) splice in place, the cable/splice is positioned and formed around an appropriate bend-radius mandrel. The sleeve is then heated in place, allowed to cool, and inspected as discussed in step 6 above. The splice may be temporarily removed from the mandrel to complete the heat shrinking, but will be returned to the mandrel to cool in the fixed radius position.

6.3 Acceptance Tests

All spliced cable and one cable of each type, used in the splices, will be immersed in water for 24 hours. During this period, capacitance (multi-conductor cable) and (500-volt) insulation-resistance measurements will be made. Any spliced cable which is significantly different, in measurement response, from the standard cable will be rejected. The cables will not be electrically loaded so as to allow maximum water absorption; only the significant few feet of all cables will be immersed in water.

6.4 Splice Assembly Deviations

All deviations from these procedures will be documented and discussed with the Nuclear Regulatory Commission program manager; deviations that are judged non-significant will be acceptable.

APPENDIX B-1

Sandia Laboratories Cable/Splice Systems Test

Method

The attached assembly sequence for single and three-conductor cables is intended to insulate crimp in-line splices and to restore multi-conductor cable jackets. Normal field craft methods are assumed, with assembly tolerances given on the "splicing layout sketch." Type heat shrinkable sleeves, as listed in the attached component selection table, are commercially available from

*Prepared by

, in coordination with Sandia staff.

Type
Heat Shrinkable Field Splice Kit
Assembly Sequence

A. Single Conductor

1. Using 120 grit or similar abrasive, lightly abrade wire jacket for three (3) inches on each side of stripped conductor.

NOTE: Non-conducting abrasive must be used.
2. Using a lint free cloth and 111 trichlorethane type solvent, wipe each wire end for eight (8) inches on each side of stripped conductor.
3. Position sleeving over one of the cleaned wires and make up crimped connection.
4. Center the sleeve over the crimp connection and shrink, using a suitable electric heat gun to achieve a 125°C nominal shrinking temperature. Heating uniformly around the sleeve circumference, begin shrinking at center of the sleeve and work first toward one end and then the other. A visible bead of adhesive at each end of the sleeve indicates sufficient heat has been applied to for an adhesive seal.

B. Multiconductor Cable

1. Strip cable jacket and trim the conductors to the lengths shown in the attached sketch.
2. Using 120 grit or similar abrasive, lightly abrade cable jacket for three (3) inches on each end.

NOTE: Use nonconducting abrasive.
3. Using a lint free cloth and 111 trichlorethane type solvent, wipe abraded area on one cable end and a distance of thirty (30) inches on the other cable end.
4. Slide outer sleeve over cleaned portion of cable jacket.
5. Maintaining proper cable lay, make up individual conductor splices per Section "A".
6. Center outer sleeve over splice area and shrink, using a suitable electric heat gun to achieve a 125°C nominal shrinking temperature. Heating uniformly around the sleeve circumference, begin shrinking at the center of the sleeve and work first toward one end and then the other. A visible bead of adhesive at each end of the sleeve indicates sufficient heat has been applied to form an adhesive seal.

Actual Sandia Splicing Layout for
Three Conductor Cable-AWG 10-14

- 1. Inner Sleeves (3)
- 2. Build-up Sleeves (2)
- 3. Outer Sleeve (1)

**Recommended Three Conductor
Cable-AWG 10-14 Splicing Layout
Sketch**

NOTES:

1. All dimensions are nominal; sleeve must overlap 2 inches.
2. Splices (1/C) can be stacked as required.

SPLICE KIT COMPONENTS

1. Inner sleeves (3)
2. Outer sleeve (1)

ASSEMBLY ASSUMPTIONS

1. Maximum crimp length 1.25"
2. Inner sleeve positioning tolerance - $\pm 1/4$ "
3. Outer sleeve positioning tolerance - $\pm 1/2$ "

SANDIA LABORATORIES

TEST CABLE DIMENSIONS AND SPLICING COMPONENT SELECTION

<u>Cable Manufacturer</u>	<u>Cable O. D.</u>	<u>Conductor O. D.</u>	<u>Conductor Splice Sleeve</u>	<u>Cable Jacketing Sleeve</u>
1. 1/C - #12 AWG #1	--	0.200"		--
2. 1/C - #12 AWG #2	--	0.223"		--
3. 3/C - #12 "OLD"	0.575	0.200		
4. 3/C - #12 "NEW"	0.528	0.185		
<u>Cable Manufacturer</u>				
1. 3/C - #12	0.442	0.157		