### TEST REPORT

# THE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
OUR JOB NO	NDQ 26304
CONTRACT	
YOUR P. O. NO	6600-M-2308
100111.01140.	

BECHTEL POWER CORPORATION 50 Beale Street San Francisco, California 94119 163 - Page Report

DATE 12 Decemb er 1978

THIS DOCUMENT CONTAINS POOR QUALITY PAGES

#### ENVIRONMENTAL QUALIFICATION TEST PROGRAM

ON

ONE ELECTRONIC TRANSMITTE FOXBORO MODEL NO. Ellah, ONE PRESSURE TRANSMITTER, FISHER . PORTER MODEL NO. 50EP1041BCXA, ONE D. P. TRANSMITTER, FISHER & PORTER MODEL NO. 13D24960B,

ONE ALPHALINE TRANSMITTER, ROSEMOUNT MODEL NO. 115 3GA9 FOR

BECHTEL POWER CORPORATION

7902020256

STATE OF CA	LIFORNIA S.S.
	Roy C. Sadlier , being duly sworr
deposes and sa	ys: That the information contained in this report is the result of
complete and	carefully conducted tests and is to the best of his knowledge tru
and correct in	
	Lore led rolling
	136 0
SUBSCRIBED	and sworn to before me this 13ths of December, 19 7
a the	ena (Ville
	n and for the County of Riverside, State of California
	and the county of Annapole, State of California
~	the Commission expires 14 July , 19 79
10	OFFICIAL SEAL
1/10	CATHERNIA C. MELTY
W 4777	NOTARY PUBLIT - CALIFORNIA

My comm. expires JUL 14, 1979

DEPARTMENT	DYNAMICS
DEPT. MGR.	J. J. Anderson
TEST ENGINEER .	W. R. Franz
Registered Professional	S.D. Musmy
Engineer	Geo. D. Shipway

QUALITY CONTROL

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304	
PAGE NO.	2	

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304	
PAGE NO	3	

#### TABLE OF CONTENTS

	<u>P</u>	age Number
PROPRIETA	ARY INFORMATION	2
TABLE OF	CONTENTS	3
1.0	REFERENCES	5
2.0	SCOPE	5
3.0	SPECIMEN DESCRIPTION	5
4.0	TEST PROGRAM	6
5.0	TEST PROCEDURES	6
5.1	Receiving Inspection	6
5.2	Functional Test (Base-Line Test)	6
5.3	Irradiation Test	7
5.4	Seismic Test	8
5.5	Loss of Coolant Accident Simulation Test (LOCA)	9
6.0	TEST RECULTS	10
6.1	Receivi , Inspection	10
6.2	Functional Test (Base-Line Test)	10
6.3	Irradiation Test	11
6.4	Seismic Tests	11
6.5	Loss of Coolant Accident Test (LOCA)	12
TABLE I	SPECIMEN IDENTIFICATION INFORMATION	16
TABLE II	TIME/PRESSURE INPUT DATA - LOCA TEST	17
FIGURE 1	Calibration and Test Panel for Pressure Transmitter	s 18
FIGURE 2	A A CONTRACTOR OF THE PARTY OF	19
FIGURE 21		20
FIGURE 3	LOCA Test Profile	21
FIGURE 4	Seismic Test Setup Schematic	22
FIGURE 5	The state of the s	23
FIGURE 6	Required Response Spectra: Vertical Axis	24
TEST DATE	A SHEETS	25 - 100
PHOTOGRAI	PHS 1 through 26	101 - 126

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPO	RT NO	26304	
PAGE	NO	.4	

### CONTENTS (continued)

		Page Number
NOTICES OF	DEVIATION NOS. 1 through 5	127 - 131
EXHIBIT I	Isomedix, Inc. Letter dated 8 September 1978	132
APPENDIX I	Environmental Qualification Test Procedure 6600-M-2308, Revision 1.	133
APPENDIX II	Irradiation Charts (Recorder)	157
APPENDIX II	I Seismic Test Response Spectra	158
APPENDIX IV	Seismic Test Charts (Recorder)	159
APPENDIX V	LOCA Pressure and Temperature Charts (Recorder)	160
APPENDIX VI	Transmitter Output Recorder Charts During LOCA	161
APPENDIX VI	I Response Time Recorder Charts	162
APPENDIX VI	II Log	163

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO. 26304

1.0	REFERENCES

- 1.1 Bechtel Power Corporation Purchase Order No. 6600-M-2308, Amendment 3, dated 8 August 1978.
- 1.2 Bechtel Power Corporation Environmental Qualification Test Procedure for Transmitter, Specification 6600-M-2308, Revision 1.\*
- 1.3 IEEE Document 323(1971), "IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations", modified to include sequential testing including seismis testing.
- 1.4 IEEE Document 344(1971), "IEEE Standard for Seismic Qualification", augmented to include biaxial, random simulation, phase incoherent seismic input motion.

#### 2.0 SCOPE

2.1 This report documents the environmental qualification test procedures and results for four pressure transmitters as described in Paragraph 3.0.

#### 3.0 SPECIMEN DESCRIPTION

Test specimen identification information is presented on Table I (Pagel5) of this report.

The range of the specimens and other performance specifications are listed in Appendix I, Pages 3 through 6.

<sup>\*</sup> Included in this report as Appendix I.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304	
PAGE NO.	6	

#### 4.0 TEST PROGRAM

The test program consisted of the following tests:

- o Receiving Inspection
- o Functional Test (Base-line test)
- o Irradiation Test
- o Functional Test
- o Seismic Test
- o Functional Test
- o LOCA Test
- o Functional Test

#### 5.0 TEST PROCEDURES

A detailed Test Procedure is enclosed as Appendix I. Following is the brief outline of the test procedures.

#### 5.1 Receiving Inspection

Upon receipt at Wyle Laboratories, and prior to testing, each test specimen was visually examined for evidence of damage which may have been incurred in shipping. The test specimen identification information, as well as result of the visual examination, were recorded on the receiving inspection data sheets included in this report.

#### 5.2 Functional Test (Base-Line Test)

#### 5.2.1 Calibrations

The pressure transmitters were set up for functional testing per Figures 1 and 2. The transmitters were supplied with 24vdc and increasing and decreasing pressure steps as follows: (Figures 1 and 2 are Pages 18 and 19 of this report.)

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT !	NO	26304	
PAGE NO_		7	

- 5.2 Functional Test (Base-Line Test)
- 5.2.1 (continued)

Input (psig/"Hg/water column)	Output across 250 ohm resistor

08	range	vdc
25%	range	vdc
50%	range	vdc
75%	range	vdc
1008	range	vdc
75%	range	vdc
50%	range	vdc
25%	range	vdc
0%	range	vdc

5.2.2 Response Time Test

The 25% (of full scale) input condition was first established, then step-changed to 75% of full scale. The output changes were recorded and the time constants (time to reach 63% of design output) were calculated. The temperature and humidity were logged.

A sketch of the setup schematic is shown in Figure 2A, Page 20. A typical chart record is shown on Page 29.

5.2.3 Test Equipment

The test equipment, including calibration due dates and accuracy, is listed on Pages 70, 71, 98, 99, and 100.

- 5.3 Irradiation Test
- 5.3.1 Pre-Irradiation Test

Prior to irradiation, a functional test was performed, per Par. 5.2.1.

5.3.2 Irradiation Test

A pressure input of 75% of the span was first applied to each specimen and held continuously during the irradiation time. The specimen outputs were recorded continuously and the input pressures logged periodically during irradiation. The transmitters were irradiated at a rate of 1 (10<sup>6</sup>) rads per hour to a total dose of 3.7 (10<sup>7</sup>) rads. The irradiation was performed at Isomedix, Inc., Parsippany, N. J. A more detailed procedure is presented in Exhibit I, Page 132.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO	8

- 5.3 Irradiation Test (continued)
- 5.3.3 Post Irradiation Test

After completion of the irradiation tests, the functional tests of Par. 5.2.1 were again performed.

- 5.4 Seismic Test
- 5.4.1 Pre-Seismic Test

The functional tests of Par. 5.2.1 and the response time test of Par. 5.2.2 were conducted on each test specimen.

5.4.2 Mounting

All transmitters were mounted on a rigid bookend type fixture. Mounting simulated in-plant installation, mechanical and electrical. Mounting conforms to Figures 3, 4, 5, 8, 9, and Sheets 19 and 20 of Reference 1.2 (Appendix I of this report). Mounting bolts were torqued in accordance with torquing requirements of the test procedure.

5.4.3 Monitoring

During the OBE and SSE testing the following input pressures were applied to the transmitters and the outputs were continuously recorded during testing.

E11AH Atmospheric 50EP1041 2200 psia 13D2496 150 inches of water 1153GA9 1200 psia

### 5.4.4 Seismic Random

The seismic random motion was synthesized by applying a random signal to a group of parallel one-third octave filters centered at one-third octave frequency intervals over the frequency range of 1.25 to 35 Hz. Each filter incorporated an amplitude control which was adjusted such that the analysis of the resulting table motion enveloped the required spectra shown in Figures 5 and 6, Pages 23 and 24.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT	NO	26304	
PAGE NO	)	9	

- 5.4 Seismic Test
- 5.4.4 (continued)

The seismic random motion for each horizontal axis was excited separately, but each one was excited simultaneously with the vertical axis. Independent signal sources were used for the horizontal and vertical axes so that input phasing was random. Five OBE tests and one SSE test were performed in each axis. After completing all five OBE tests in each biaxial plane, the SSE tests were conducted in each plane. The duration of each test was thirty seconds.

5.4.5 Response Analysis

The seismic response spectra analysis was performed by a shock spectrum analyzer generating the maximum response amplitudes at one-sixth octave intervals over the frequency range of 1.1 to 100 Hz. Damping ratios of 1% and 5% were utilized in the analysis of the table motion.

5.4.6 Post Seismic Functional Test

The functional test of Par. 5.2.1, and the response time test of Par. 5.5.2 were conducted on each specimen.

- 5.5 Loss of Coolant Accident Simulation Test (LOCA)
- 5.5.1 Transmitter Mounting

The transmitters were mounted in a suitable LOCA test chamber. The transmitter covers were torqued to the manufacturer's specifications.

5.5.2 Pre-LOCA Functional Test

Functional tests were performed per Par. 5.2.1 and response time test per Par. 5.2.2 on each specimen.

5.5.3 Soak Test

The test chamber was closed and the temperature of the test chamber was raised to 120F and held for two hours. During this soak period input pressures as shown in Table II (Page 17) were applied to the transmitters. Transmitter outputs were continuously recorded.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304	
PAGE NO	10	

# 5.5 Loss of Coolant Accident Simultation Test (LOCA) (continued)

#### 5.5.4 LOCA Test

The LOCA test was started by a sudden rise of temperature and pressure (saturated steam). The required temperature and pressure profiles are shown in Figure 3. The actual profiles attained during the test are shown on Page 30. The pressure was allowed to conform to that of the saturated steam. The duration of the test was thirty days. During the first 24 hours of the test profile, the transmitters were subjected to a chemical spray consisting of 0.28 holar  $H_3BO_3$  and NAOH to make a pH of  $11.0 \pm 0.5$  at 25C. The spray was 0.15 gpm per foot of the area of the test chamber projected onto a horizontal plane. During the LOCA test input pressures as shown in Table II were supplied to each transmitter. The transmitter outputs were continuously recorded.

5.5.5 Post LOCA Functional Test

Functional tests were performed per Par. 5.2.1 and response time test per Par. 5.2.2 on each test specimen.

6.0 TEST RESULTS

Note that in the following pages data sheets are presented corresponding to each of the sub-paragraphs listed below. Deviations are detailed in the attached Notices of Deviation Nos. 1 through 5. (Pages 127 through 131.)

6.1 Receiving Inspection

Visual examination of the test specimens upon receipt at Wyle Laboratories revealed no apparent damage had occurred due to shipping. (See Pages 25 through 28.) However, in attempting the functional tests of Par. 5.2.1, the Foxboro EIIAH showed non-linear output. This unit was repaired using new base plate and force motor frame. All instruments were adjusted as required, for zero and span to specified ranges. (See Par. 3.0.)

6.2 Functional Test (Base-line test)

Initial functional tests established base-line data and revealed no anomalies. The data are presented in Pages 37 through 40.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT N	26304	
		-
PAGE NO	11	

6.3 Irradiation Test

6.3.1 Pre-Irradiation Functional Test

Baseline functional tests performed on all transmitters prior to irradiation revealed no apparent anomalies. The data are presented in Pages 41 through 44. Acceptability criteria generation for the data is a responsibility of the Bechtel Power Corporation.

6.3.2 Irradiation Test

Data recorded and/or manually measured during irradiation test have been tabulated in the data sheets, Pages 45 through 52. The 13D2496 Fisher & Porter unit displayed possibly excessive non-linearity during irradiation. Other data were apparently acceptable; however, again the failure criteria must be generated and applied by the Bechtel Power Corporation itself.

6.3.3 Post Irradiation Functional Tests

The 13D2496 Fisher & Porter unit again showed apparently nonlinear output as a result of irradiation and as a consequence was dropped from the test program after the seismic tests were conducted. (Reference Notice of Deviation No. 1, Page 127.) Other reported data appeared acceptable, with the previous failure criterion statements again applicable, however.

The post-irradiation functional test data is tabulated on Pages 53 through 56.

6.4 Seismic Tests

6.4.1 Pre and Post-Seismic Functionals

None of the four devices showed apparently significant changes due to seismic testing. Again, the previous statements pertaining to failure critera are applicable. Functional test data are shown on Pages 57 through 60 and 76 through 79.

6.4.2 Seismic Test

No structural or electrical anomalies were noted. Electrical measurements before and after each of the OBE and SSE tests are presented in data sheets Pages 72 through 75. The electrical outputs during the seismic testing are shown on the charts, Pages 31 through 36.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO.	26304	
PAGE NO.	12	

6.4 Seismic Tests

#### 6.4.2 (continued)

Additional information, such as axis definition, test response spectra, test equipment used, and calibration dates, is shown on Pages 22 and 61 through 71. Test setups and accelerometer locations are shown the photographs included in this report.

Post-seismic inspection revealed the torque values had decreased.

### 6.5 Loss of Coolant Accident Test (LOCA)

### 6.5.1 Pre-LOCA Functional and Response Test

Pre-LXCA functional and response time data is shown on Page: 80 through 82.

The pre-LOCA functional test data were apparently acceptable with the exception of the 228" W.C. Fisher & Porter unit, which was not LOCA tested. (Reference Notice of Deviation No. 1, Page 127.)

The two-hour soak test, input pressure and data recorded are shown on Page 83.

#### 6.5.2 LOCA Test

The units were mounted inside the tank utilizing their standard pipe or flat surface (Rosemount) brackets. The input/output wires were spliced to extension leads inside the chamber. The splices of two units were protected by sealing them in a box. The wires of the third (Fisher & Porter) were spliced but not enclosed in a box-type protector.

After two hours of LOCA testing, the output of the 50EP1041 Fisher & Porter unit became erratic and unresponsive to pressure changes and was considered inoperative. (See Notice of Deviation No. 2, Page 128.)

After twelve days the Foxboro unit became erratic for a few minutes and then clipped to a high value, and (output signal) was thought to be malfunctioning; however, it was later shown, after completing

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
	13
PAGE NO.	

### 6.5 Loss of Coolant Accident Test (LOCA)

#### 6.5.2 (continued)

the test, that a shorted wire 'n the external (outside the chamber) instrumentation wires was the cause, not the unit itself. The defective wire was dissected and indeed found defective. (Reference Notice of Deviation No. 4, Page 130.)

Data recorded for the Rosemount unit was consistent throughout testing. The input and output data at the specified intervals shown on Pages 83 through 87. . Continuous recording of the output is in Appendix VI. Output chart recording of EllAH and 50EP5041 was discontinued after a number of days. Data from the recorder chart is tabulated on Pages 88 through 92 for the first six hours of LOCA testing.

#### 6.5.3 Post-LOCA Test

All the units were functionally tested in place after LOCA testing. The test data on EllAH, 50EP1041, and 1153 are shown on Pages 93 through 97.

#### 6.5.4.1 Post LOCA Inspection

The chamber was opened up, transmitter covers were removed, and the housing inspected for water/chemical seepage. None was found in the Foxboro or Fisher & Porter transmitter housing. The Rosemount unit showed presence of a small quantity of liquid and terminals were corroded. See the attached photographs for details.

#### 6.5.4.2 Megger Test

Megger tests were conducted after lifting off the terminations inside the transmitter housing. The Crouse Hinds junction box used on the Foxboro installation (see Figure 4, Appendix I) was opened. This junction box was found to contain water/chemicals. One conductor from the transmitter was inadvertently severed during inspection and the other conductor was pulled out. (Severe mechanical handling during installation might have caused this failure.) The Fisher & Porter transmitter showed acceptable leakage resistance on 500 vdc megger tests. Others showed high leakage.

SCIENTIFIC SERVICES & SYSTEMS GROUP
WESTERN OPERATIONS, NORCO FACILITY

REPORT	NO _	25304
PAGE NO		14

### 6.5 Loss of Coolant Accident Test (LOCA)

#### 6.5.4.3 Diagnosis

Transmitters were removed from the chamber. Failure diagnosis of the Foxboro transmitter was conducted. Replacing the detector coil and amplifier did not restore the transmitter performance to its normal level. The replacement of the external Wyle cable (from chamber to the power supply) restored the transmitter performance to its normal level. Later on an ohmmeter test on this cable indicated insulation breakdown. This cable was then dissected. Examination confirmed insulation breakdown and presence of moisture. (See Notice of Deviation No. 4, Page 130.) Since removing the electronics can cause a zero shift, the old electronics package was re-zeroed and then functionally tested. These data are shown on Page 94. Full functional test data with original parts, per Par. 5.2.1 and 5.2.2 are shown on Page 95.

The Fisher & Porter transmitter failure diagnosis showed loose (unglued) detector coil and faulty amplifier assembly. Replacing these components restored the transmitter performance to its normal level. (See Notice of Deviation No. 3, Page 129.)

The Rosemount transmitter circuit-side showed no traces of water/chemicals. No further diagnosis was conducted on the Rosemount transmitter.

Each subsection of the cable assemblies starting from outside the test chamber and up to the terminals inside the transmitter housing was megger tested. By now the Crouse Hinds junction box was dry. No unacceptable leakage was found. Subsections examined were:

- Conax connector at the test chamber wall. (This was supplied by Wyle.)
- Conax connector supplied by Foxboro (integral to the transmitter).
   See Figure 4.
- Conax connector supplied by Bechtel on Foxboro installation and associated cable up to Wyle-supplied Conax connector.
- Conax connector on the Rosemount transmitter and the associated cable up to Wyle-supplied Conax connector.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT	NO	26304	
PAGE NO		15	

- 6.5 Loss of Coolant Accident Test (LOCA)
- 6.5.4.3 (continued)

No additional megger tests were run on the cable connected to the Fisher & Porter transmitter.

6.5.4.5 Rosemount Removed

Checked performance of the Rosemount transmitter using direct cabling from power supply to the transmitter without using Conax connector. No significant differences were observed compared to the in-place performance check performed in Step 6.5.3 (See Page 97). One terminal screw broke while attempting reconnections.

At Bechtel request, the Rosemount transmitter and the associated Conax connector were shipped to Bechtel for further investigation.

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT	NO	26304	
PAGE NO		16	

# TABLE I

### TEST SPECIMEN IDENTIFICATION

Unit No.	Specimen	Manufacturer	Model/Serial No. from Name Plate	Model/Serial No. from T.P.2308/1
1	Electronic Transmitter (0 to 70 psia)	Foxboro	Ellah 2847188	Ellan-ISAA-2 2847188
2	Pressure Transmitter (0 to 3000 psia)	Fisher & Porter	50EP1041 7612A4337A13	50EP1041BCXA (NS) 7612A437A13
3	D. P. Transmitter (Level) (0 to 288" W.C.)	Fisher & Porter	3D2496QB R7210A5503A58 <sup>2</sup>	13D2496QBBCBBB(NS) 7210A5503A58
4	Alphaline Transmitter (0 to 1600 psia)	Rosemount	1153GA9 105996	1153AA9 105996

Test Procedure model numbers are based on manufacturer's specification sheets. Manufacturer confirms that not all suffixes will appear on the nameplate due to lack of space. Therefore, model numbers listed under T.P. are valid numbers and represent actual instruments tested.

Item 3 serial number is Fxxxx; R represents certain repairs at Fisher & Porter prior to the testing.

3			20
ຄົ		1	9
m		- 1	Õ
		- 1	×
ð			-4
ſ.			,
		3	۶
		7	u
		4	
		1	
		3	
		- 1	

26304

TABLE II

#### TIME/PRESSURE INPUT DATA - LOC. TEST

	F&P 50EP1041	F&P 13D2496	Foxboro EllAH	Rosemount 1153GA9	Continuous Recording
0 to 2 hours (soak)	2200 psia	150" WC	14.7 psia		
LOCA TEST begins he	re				
2H-0 sec	ADMIT STEAM	AND CHEMICAL	SPRAY, ETC.		
2H-15 sec 2H-25 sec	1000 psia	150" WC 50" WC	14.7 psia	1200 psia	
2H-35 sec 2H-45 sec	"		60.0 psia	900 psia	
2H- 5 min 2H-10 min					
2H-15 min 2H-20 min		n.	0	n n	и и
2H-25 min 2H-30 min		N	11	0	
3 hours 312 hours				D.	
4 hours					
5 hours 7 hours			"		
10 hours 14 hours	"		"		"
22 hours 27 hours			"		
2 days 3 hours 3 days 2 hours	2200 psia 1000 psia	150" WC 50" WC	14.7 psia 60.0 psia	1200 ps.a 900 psia	
4 days 2 hours 5 days 2 hours	2200 psia 1000 psia	150" WC 50" WC	14.7 psia 60.0 psia	1200 psia Ma 900 psia	**
30 days 2 hours	2200 psia	150" WC	14.7 psia	1200 psia	

DATA SHEET

Report No. 26304

Page No.

18

INEP

CUSTOMER BECHTEL SF.

Specimen TRANSMITTERS

Part No. SER REC. INSP.

Job No. 26304 S/N SES PEC

# DATA SHEET

Report No.

26304

Page No.

19

CUSTOMER BECHTEL POWER CORPORATION

Specimen TRANSMITTERS

Port No. SEE REC INSP.

Job No. 36304 S/N SEE REC. INSP. Date 10/20/78

# DATA SHEET

Report No. 26304

Page No.

20

CUSTOMER BECHTEL POWER CORPORATION
Test Title: RESPONSE TIME

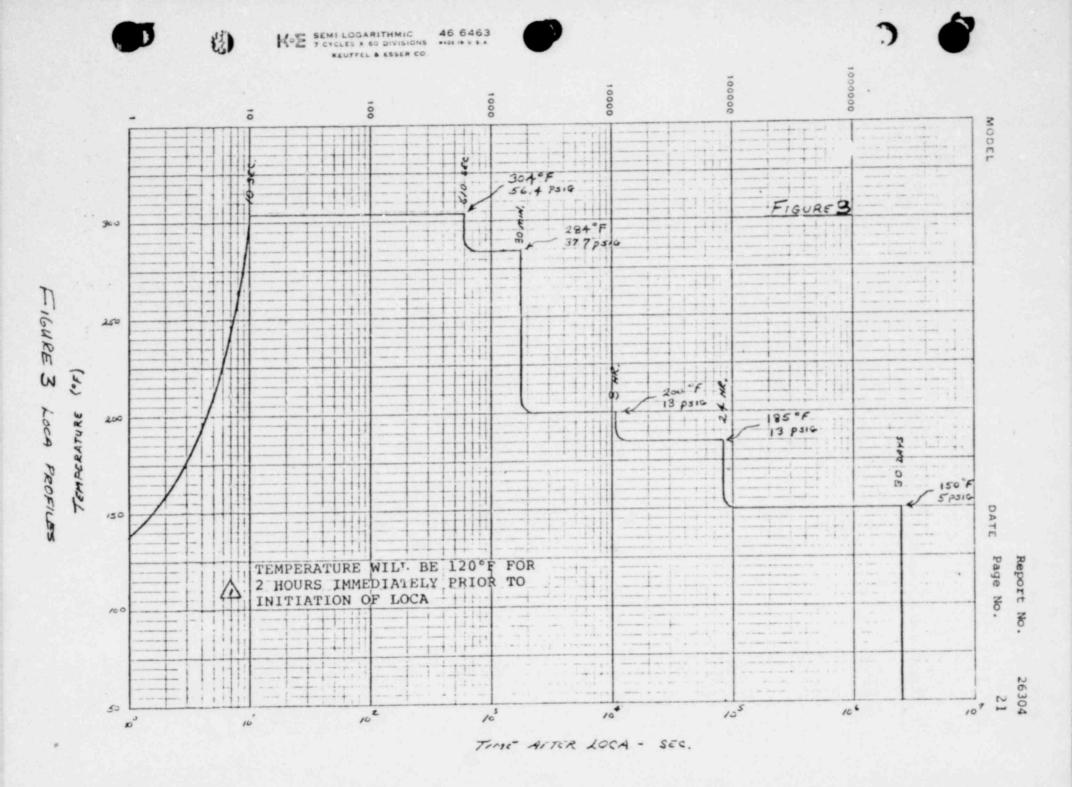
Specimen LESSURE TERNSMITTER

Part No. SEE RECEIVING INSP.

Job No. 26304 SIN SEE RECEIVING INSP. Date\_10/20/28

GC Form Approval

SHEE!\_\_\_\_ UP\_\_\_



# DATA SHEET

Report No.

26304

Page No.

22

CUSTOMER RELATED

Test Title: SECOND ANDON

Specimen PRESSURE TRANSMITTERS Job No. 26 TO Y

Part No. See RESULTINED

S/N See Resulting

Date 8-25-78 TYP. SPECIMEN BOOKEND STRUCTURE TEST TABLE -FIGURE 4 SEISMIC TEST SETUP SCHEMATIC (FOR AXIS DEFINITION ONLY).

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_\_

26304

Page No.

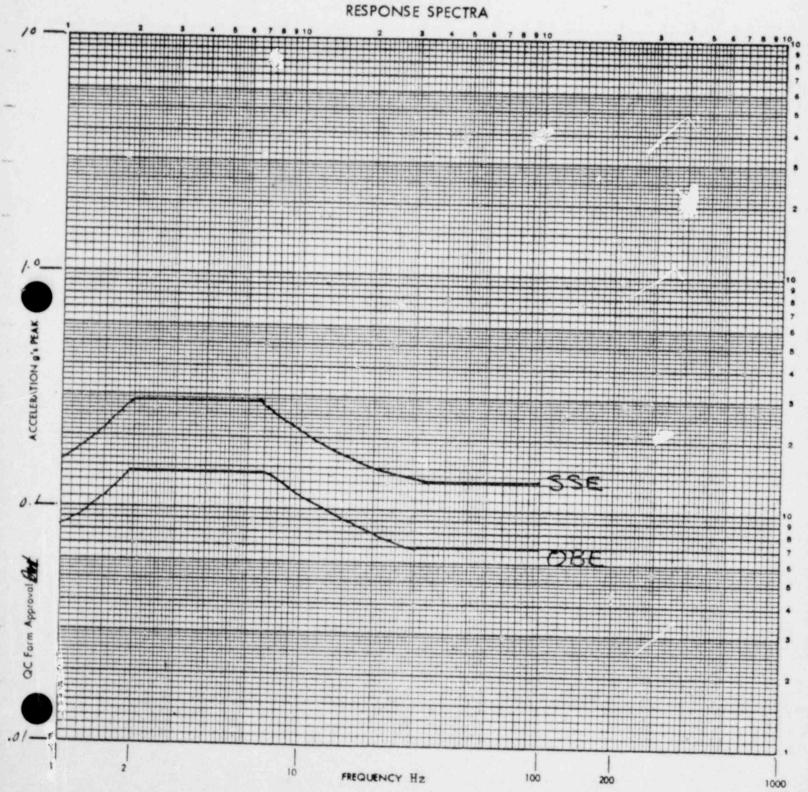
23

FIGURE 5

REQUIRED RESPONSE SPECTRA

5% Damping

# VERTICAL AXIS



26304

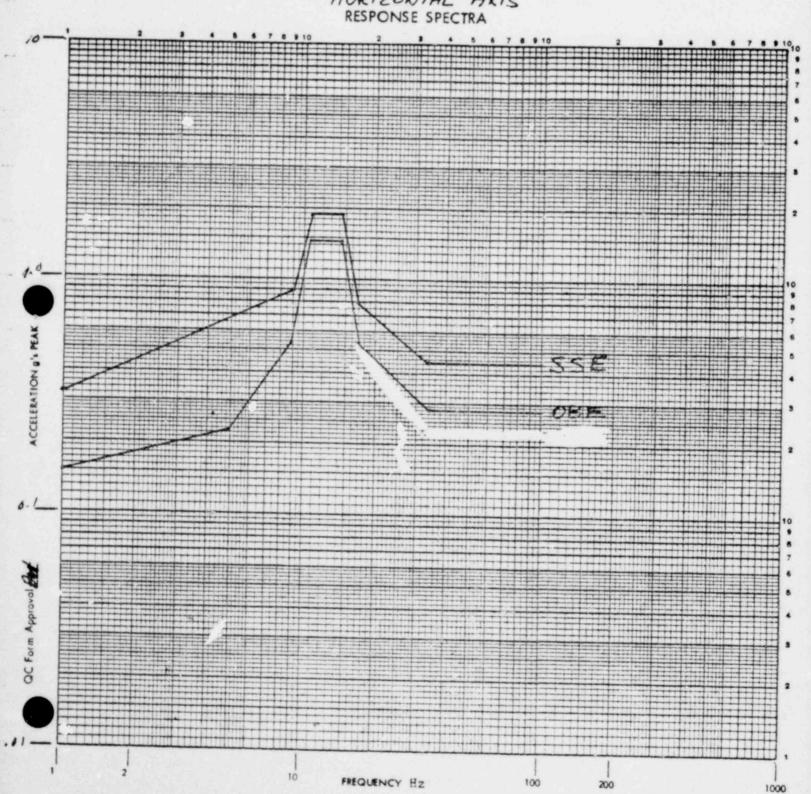
Page No.

24

FIGURE 6 REQUIRED RESPONSE SPECTRA

5% Damping

HORIZONTAL AXIS



Page No

25

## **DATA SHEET**

Customer BECHTEI Pow	ER JOD NO. 26304
CORPORATION	Date 8-15-78
Specimen Elec	TRONIC TRANSMITTER
(0	7-70 PSIA)

RECEIVING INSPECTION

UNIT #1

	s Received:ONE	technical Springs
Record identific	ation information exactly as it appears on the tag or specimen:	
Manufacti	rer Foxboro	
Part Numb	ers MODEL EILAH	
How does identi	ication information appear: (name plate, tag, painted, imprinted, etc.)	
	NAME PLATE	
Serial Numbers:	2847198	
Serial Numbers:	2847188	
Serial Numbers:	2847188	
Serial Numbers:	2847188	
Examination: V	sual, for evidence of damage, poor workmanship, or other defects, and completene	ss of identification
Examination: V		ss of identification
Examination: V	sual, for evidence of damage, poor workmanship, or other defects, and completeness: There was no visible evidence of damage to the specimens unless noted below.	
Examination: V	sual, for evidence of damage, poor workmanship, or other defects, and completeness: There was no visible evidence of damage to the specimens unless noted below.	
Examination: V	sual, for evidence of damage, poor workmanship, or other defects, and completeness: There was no visible evidence of damage to the specimens unless noted below.	
Examination: V	sual, for evidence of damage, poor workmanship, or other defects, and completeness: There was no visible evidence of damage to the specimens unless noted below.	

Inspected By Table Sheet No.

Page No.

26

# DATA SHEET

Customer BECHTE / POW	ER JOD NO.	26304	
CORPORATION	Date	8-15-78	
Specimen TRA	NSMITT.	ER (PRESSURE)	
		DO PSIAL	

RECEIVING INSPECTION UNIT 2

No. of Specimens	Received: ONE
Record identificat	ion information exactly as it appears on the tag or specimen:
Manufacture	FISHER AND PORTER COMPANY
Part Number	MODEL 50 EP 10 41
How does identifie	cation information appear: (name plate, tag, painted, imprinted, etc.)
Serial Numbers: *_	
Serial Numbers: *_  	
Examination: Vis	

Approved G. Butter

ReportNo.

26304 27

Page No.

### DATA SHEET

Customer BECHTEL BWER JODNO. 26304

CORPORATION Date 8-15-78

	RECEIVING INSPECTION UNIT #3
No. of Specin	nens Received: ONE
Record ident	ification information exactly as it appears on the tag or specimen:
Manufa	ecturer FISHER AND PORTER
Part Nu	mbers MODE / 13D2496QB
How does ide	entification information appear: (name plate, tag, painted, imprinted, etc.)  Name Plate
Serial Numbe	ers:* <u>R72/0 A55</u> 0 3 <u>A58</u>
	: Visual, fce evidence of damage, poor workmanship, or other defects, and completeness of identification esults: There was no visible evidence of damage to the specimens unless noted below.

Approved

W-614 Q.C. Form Approval

Report No. 26304

28

Page No.

## DATA SHEET

Customer BECHTE! Power	2 Job No.	26304	
Corporation	Date	8-15-78	
	haling	TRANSMITTER PSIA)	

RECEIVING INSPECTION

	411 #4
No. of Specimens Re	ceived:ONE
	information exactly as it appears on the tag or specimen:
Trocord duritingation	information exactly as it appears on the tag or specimen:
Manufacturer	ROSEMOUNT
Part Numbers	115 3449
How does identificati	on information appear: (name plate, tag, painted, imprinted, etc.)
	./ 2/
	NAME PLATE
Serial Numbers: *	5996
10 m 20 m	
-	
examination: Visual,	for evidence of damage, poor workmanship, or other defects, and completeness of ident lication
inspection results: 1	here was no visible evidence of damage to the specimens unless noted below.
If additional space i	s required for serial numbers, use an additional page, or reference first functional test deta

Inspected By A Bruget of\_ Oate: 8-15-78 Approved\_

# DATA SHEET

Report No.

26304

Page No.

29

CUSTOMER BECHTEL

Test Title: RESPONSE TIME

Specimen TRANSMITTERS - Job No. 26304

PRESSURE S/N SEE REC INSP

Port No. SEE REC. INSP. Date 8/25/78

W 414 B

QC Form Approval

SHERT\_\_\_\_ OF\_\_\_\_

QC Form Approval

# DATA SHEET

CUSTOMER BECHTEL

Report No.

SHEET\_\_\_\_ OF\_\_\_

26304

Page No.

31

Test Title:	Specimen PRESSURE	ht v. 2/24//
	Specimen PRESSURE TRANSMITTERS Part No. SEE REC. INSP.	Job No. 26.304 S/N SEE REC. INSP. Date 2/25/18
		+++++++++++++++++++++++++++++++++++++++

W 414 B

QC Form Approval

## DATA SHEET

Report No.

26304

Page No.

32

SHEET\_\_\_\_ OF\_\_

CUSTOMER BECHTEL Test Title: SEISMIC -SSE Specimen PRESSURE Job No. 26304 S/N SEE REC. INSP. TRANSMITTERS Date 5/25/78 Part No. SEE REC. INSP.

# DATA SHEET

Part No. SEE REC. INSP.

Report No.

Date 8/25/29

26304

Page No. 33

CUSTOMER BECHTEL Test Title: \_SEISHIC OBE Specimen PRESSURE 106 No. 26304 S/N SEE REC. INSP. TRANSMITTERS

QC Form Approval

# DATA SHEET

Report No.

26304

Page No.

34

SHEET\_\_\_\_ OF\_\_\_

CUSTOM Test Title	BECH	HTEL	08-						
Teat Time	Specimen TR	SPEISMIC OBE Specimen PRESSURE TRANSMITTERS Part No. SEE REC. INSP				Job No. 26304 S/N 3FF REC. MSF Date 8/25/78			
	ran No	255	REC.	(N.5)-		Date	8/2	25/28	
					-				
						++-			
						1.41			
-									
		*							
				-			-		
			-				<del></del> -		
	1						-	-	
)									

# DATA SHEET

Report No.

26304

Page No.

35

CUSTOMER BECHTEL

Tool Title: SE/SM/C SSE

Specimen PRESSURE Job No. 26304

TRANSMITTERS S/N SEE REC. (NSP.

Part No. SEE REC. (NSP.

Dete B/25/78

# DATA SHEET

Report No.

26304

Page No.

36

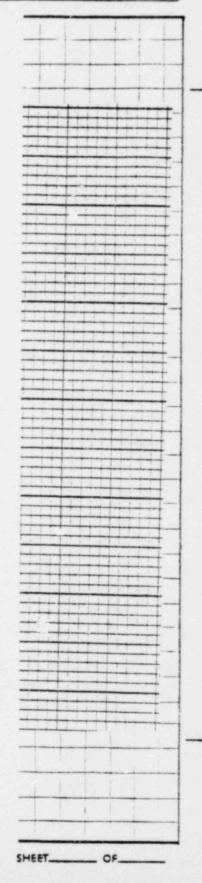
CUSTOMER BECHTEL
Test Title: 55E - JEISMIC

Specimen PRESSURE TRANSMITTERS

Part No. SEE REC. INSP

Job No. 26304 S/N SEE REC. INSP.

Date 8-25-78



DATA SHEET

Report No.

26304

Page No

37

CUSTOMER BECHTEL POWER CORPORATION

Test Title: BASELING & RESPONSE - INITIAL

Specimen ELECTRONIC Job No. 2630 4

TRANSMITTER LEVEL 0-70 PSIA SIN 2847188

Part No. EII AH Date 8-17-78

DATA SHEET

ReportNo

26304

Page No.

38

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELING & RESPONSE

Specimen PRESSURG TRANSANITIER 0-3000 PSIA Part No. 50 EPIOSIBCXA

Job No. 36304 S/N 7612A4337A13 Date 8-16-78

UNITEZ FOR

A. I BASELINE TEST

### DATA SHEET

Report No.

26304

Page No.

39

CUSTOMER BECHTEL POWER CORPORATION)
Tost Title: BASELINE & RESPONSE

Specimen TRANSMITTER (D.P.) LEVEL 0-288" H30 Part No. 1302496 03

Job No. 26304 S/N R7210A5503A58

Date 8-16-78

UNIT #3-F+P

A.I BASELINE TEST

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_\_

DATA SHEET

Report No.

26304

Page No.

49

CUSTOMER BESHTEL POWER CORPORATION
Test Title: BASELING & RESPONSE

Specimen ALPHHLINE TRANSMITTER 0-1600 PSIA Part No. 1153649

Job No. 26304 S/N 105996 Date 8-16-78

UNIT # 4 - ROSEMOUNT A. I BASEWINE TEST

W 814 8

### DATA SHEET

Report No.

26304

Page No.

41

CUSTOMER BECHTER POWER CORPORTION
Test Title: BASELINE PRE TREDUATION Test Title: \_\_

Specimen ELECTRONIC Job No. 26304
TRANSMITTER LEVEL 0-70 PSIA SIN 2847188
Part No. E 11 AH Date 8-19-78

Date 8-19-78

UNIT # 1 - FOYBORD A.I BASENNE TEST

W 414 B

#### DATA SHEET

Report no.

26304

Page No.

42

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELING - PRE IRRADIATION

Specimen PRESSURG Part No. 50 6P/04/BCXA Job No. 26304 S/N 76/2A 4337 A/3 Date 8-19-78

UNIT #2 - F+P
A.I BASELING TEST

### DATA SHEET

Report No.

26304

Page Ni.

43

BECHTEL POWER CORPORATION PRE IRRADIATION

Specimen TRANSMITTER (D.P.) Job No. 26304 LEVEL 0-288 H<sub>2</sub> 0 S/N R7210A5503A58 Part No. /302496 QB Date 8-19-78

Date 8-19-78

UNIT #3 F+P

A.I BASELINE

QC Form Approval

W 414 8

SHEET\_\_\_

#### DATA SHEET

Report No.

26304

Page No

44

CUSTOMER BECHTTEL DOWER CORDORATION
Test Title: BASELING - PAR IRRADIATION

Specimen ALPHALINE
TRANSMITTER Q-1600 PSIA
Part No. 1153 GA9

Job No. 26304 5/N 103992 Data 8-19-76

UNIT #4 ROSEMOUNT

A.I BASELINE TEST

SHEET\_\_\_\_\_ OF\_\_\_\_

# DATA SHEET

Report No.

26304

Page No.

45

CUSTOMER BECHTEL POWER CORPORATION
TOST THE: IRRADIATION

Specimen ELECTRONIE

TAHNSANITTER LEVEL D. 70 PSIA
Part No. ELLAH

Job No. 26304 S/N 2847/88 Date 9-11-78

SUPPLY VOLTAGE 45 VDC

### DATA SHEET

Report No.

26304

Page No

46

TOST TIME: IRRADIATION

Part No. E. II AH DIE GOLD OF SIA SIN 2847188

UNIT# / FOXBORD EILAH

# DATA SHEET

Report No.

26304

Page No.

47

CUSTOMER BECHTEL POWER CORPORATION

Specimen PRESSURE
TRANSMITTER 0-3000 PSIA
Part No. 50EP1041BCXA

Job No. 26309 S/N 7612A4337A13 Date 9-11-78

UNITED FXP SOEPIDAL SUPPLY VOLTAGE 45VDC

#### DATA SHEET

ReportNo.

26304

Page No.

48

CUSTOMER BECHTER POWER CORPORATION

Specimen PIZESSURE
TRANSMITTER 0-3000 PSIA
Part No. 50EPIQUIBCXA

Job No. 26304 S/N 76/2A 4337 A/3 Date 10-6-78

UNIT#2 FAP 50EP1041

W 414 B

#### DATA SHEET

Report No.

26304

Page No.

49

CUSTOMER BECHTEL POWER CORNESTION

Specimen TRANSMITTER (D.P.)
LEVEL Q-288" H2Q
Part No. 1302496 QB

Job No. 26304 S/N 87210A5503A 58 Date 9-11-78

QC Form Approval

W 414 8

SHEET\_\_\_\_ OF\_\_\_

### DATA SHEET

Report No.

26304

Page No.

50 \*

CUSTOMER BECKETT POWER CORPORATION

Specimen TRANSMITTER (0.P) LEVEL 0-288 H20 Part No. 1322496 03

Job No. 26304 S/N 27210A 5503A58 Date 10-6-78

UNIT #3 FAP 1302496

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

#### DATA SHEET

Report No.

26304

Page No.

51

CUSTOMER BECHTER POWER CORPORATION

Specimen ALPHALINE
TRANSMITTOR 0-1600 PSIA
Part No. 11536A9

Job No. 26304 S/N 105996 Date 9-11-78

UNIT#4 ROSEMOUNT 1153 SUPPLY VOUTES 45 VDC

### DATA SHEET

Report No.

26304

Page No.

52

TOUR TIHO: IRRADIATION

Specimen ALPHALUNE
TRANSMITTER 0-1600 PSIA
Part No. 1153619

Job No. 26304 S/N 105996 Date 2-2/-78

UNIT#4 ROSEMOUNT 1153

W 414 8

## DATA SHEET

Report No.

26304

Page No.

53

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASEWNE POST IRRADIATION

Specimen ELECTRONIC TENUSMITTER LEVEL 0-70PSIA Part No. Ell Atl

Job No. 26304 S/N 2847188

Data 8-21-78

A. I BASELING TEST

#### DATA SHEET

Report No.

26304

Page No.

54

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELINE - POST IRRADIATION

Specimen PRESSURG

Job No. 26304

TRANSMITTER 0-3000 PSIA

S/N 76/2A4337 A13

Part No. 50EPIDALBOXA

Date 8-21-78

UNIT #2 F+P A.I BASGLING TEST

QC Form Approval

SHEET\_\_\_\_ OF\_\_

# DATA SHEET

Report No.

26304

PageNo.

55

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELING POST INTERNATION

Specimen TRANSMITTER (D.P.) LEVEL 0-288 HO Part No. 1302496 08

Job No. 26304

SIN R. 72/04 5503 458

Date 8-21-78

UNIT #3 F. F.P.
A. I BASELINE TEST

QC Form Approval

SHEET\_\_\_\_OF\_\_

### DATA SHEET

Report No.

26304

Page No.

56

CUSTOMER BECHTEL POWER CORPORATION Test Title: BASELING - POST IRRADIATION

Specimen ALPHALINE TRANSMITTER 0-1600 PSIA SIN 105996
Port No. 11539A9

Date\_ 8-21-78

UNIT # 4 ROSEMOUNT

A. I BASENNE TEST

#### DATA SHEET

Report No.

26304

Page No.

57

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELING & RESPONSE - PRE SEISMIC

Specimen ELECTRONIE
TRANSMITTER LEVEL 0-70 PSIA
Port No. EllAH

Job No. 26304 S/N 2847/88

Date 8-24-78

UNIT #1 FOXBORD

A. I BASEWNE TEST

QC Form Approval

....

SHEET\_\_\_\_ OF\_\_\_

#### DATA SHEET

Report No.

26304

Page No.

58

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELINE & RESPONSE - PRE SEISMIC

Specimen PRESSURE Specimen PRESSURE Job No. 26304
TRANSMITTER D-3000 PSIA SIN 7612A 4337A13 Part No. 50 EP 1041 BCXA

Date 8-24-78

UNIT # 2 FTP A.I BASELINE TEST

W 614 B

DATA SHEET

Report No.

26304

PageNo.

59

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELINE & RESPONSE - PRE SEISMIC

Specimen TRANSMITTER (D.P) LEVEL 0-288" H20 Part No. 1302496 QB

Job No. 26304 S/N R7210A5503A58

Date 8-24-78

UNIT #3 F+P
A.I BASELINE TEST

QC Form Approval

W 414 B

SHEET\_\_\_\_ OF\_\_\_

DATA SHEET

Report No.

26304

Page No.

60

CUSTOMER BECHTEL PONGE CORPORATION

Test Title: BASELING & RESPONSE - PRE SEISMIC

Specimen ALPHHLING Job No. 26304

TRANSMITTER 0-1600 PSIASIN 105996

Part No. 11536A9

Date 8-24-78

UNIT # 4 ROSEMOUNT A. I BASELING TOST

### Report No. 26304

Page No.

61

DATA SHEET

CUSTOMER BELATEL Too THO: SEISON RANGON

Specimen ARESSURE TRANSMITTERS

Job No. 26304 S/N SEEREL INSP Date 8-25-78

Part No. SEE REC INSP

DATE	TIME	AXIS	TEST	COMMENTS
978	NOTES	X-Y- 2	Noree	30 SELOND RUNS
8-25	//38	X-3	Istode	
8-25	1146	x- 2	Zugage	
8-25	1147	X- 2	Broose	
8-25	1148	x-2	41H 00t	
8-25	1149	X-2	STNOOL	
		-		BOOK END STRUCTURE ROTATED 900
				IN HORIZONTHE PLANS
8-25	/345	Y-7	IST ONE	
H-25	1349	Y-2	200 000	
8-25	1350	Y-8	30000	
8-25	1351	Y- &	45×08+	
8-25	1352	Y- 2	STNORE	
8-25	1356	Y-2	556	
TYLE		-		BOOK END STRUCTURE ROTHING 900
8-25	1425	X-3	516	IN HORIZONTAL PLANE
THE W	0			
	1 100	1	The state of	
	The second	1		
			1	an I
	-	+	+	Philos Hose

WYLE LABORATORIES		Report No.	26304
CUSTOMER BELATEL	Job No. 26304	Page No.	62
Full Scale 10 g	Accel. No Cont Specimen	rol () Resp	onse ( )
Date 8-25-78	Damping 5 % Axis	of Test Hone	X-2 9m
10 1 2 3 4 6 6 7			5 6 7 8 9 10 HIJIMIT T T T T T T T T T T T T T T T T T T
			8181
10			
2./			
1			
1			
·/			
	10 FRECIENCY Hz 100	1	

WYLE LABORATO	RIES		Report N	26304
CUSTOMER BECH		Job No. 2630	Y Page No.	63
- Full Scale //	g Accel	. No		
Operator Mth		men Transmittees	And a of Mank	WAT
Date 8-25-78	Dampi	ng _5 _% 5 \$ 170 TRS)	Zer ode	X.7 Pm
		SPONSE SPECTRUM		-
10, 2 ,	4 5 6 7 8 9 10		8 . 10 2	8 4 5 5 7 8 9 10 10
-				8 7
				•
				2
				10
				7
PEAK				
				•
ACCELERATION				3
*CCEI				2
0.1				10
* 1				6
				,
75				
				2
.01				
1 2	10	FREQUENCY Hz	100 200	1000

Report No. 26304 WYLE LABORATORIES CUSTOMER RECATEL Job No. 26304 Page No. 64 Full Scale 10 g Accel. No. ( Control () Response () Operator MEGHAN Specimen TRANSMITTEES Date 8-25-78 Damping \_\_\_\_ % Axis of Test Hour X.7 (5\$19.TRS) 55E RESPONSE SPECTRUM 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 ACCELERATION 9's PEAK 10 2 10 100 200 1000 FREQUENCY HZ

WYLE LABORATORIES			26304
CUSTONER DECHTEL	Job No. 26304	Page No	65
	Accel. No. Z Con	atrol (1)	Response (
Date 8-25-78	Damping 5 % Axi (5%+1% TR5)	s of Test VEA	T X-7
1 2 3 4 5 4 7 4	RESPONSE SPECTRUM	2 1	7 .
		2	

CHETOMED A	1.1	.,	66
CUSTOMER BECHTEL	Job No. 2630	✓ Page No.	00
Full Scale // g	Accel. No/	Control (1)	Response ( )
Operator MctHAN	Specimen TRANSMITTERS	5	
Date 8-25-19	Damping		Q2 Y-2
	RESPONSE SPECTRUM		
10.	110 2 3 4 8 6 7	10 2	
9/			
1/.			
/			

Full Opera	Scale 10 8 tor MEENAN 8-25-78	Accel. No.  Specimen _  Damping _  (5+/  RESPON	TRANSA  5 % 7. TRS	m, , , , , Ax	ontrol ()	st Ven	esponse (
Opera	8-25-78	Damping	5 % TRS	RUM	is of Tes	st <u>Vén</u>	
Date	8-25-78	Damping	5 % TRS	Ax ) TRUM	257	086	- y.z
		(5+) RESPON	12 TRS	) TRUM	257	086	- Y.z
		RESPON	SE SPECT	RUM			
1							

Report No. \_\_\_\_\_26304 WYLE LABORATORIES 68 Job No. 26304 Page No. CUSTOMER BECNTEL Full Scale /o g Accel. No. / Control () Response () Operator MECHAN Specimen TRANSMITTERS Date 8-25.78 Damping 5 % Axis of Test Hoars Y-9 (5+19,TRS) SSE RESPONSE SPECTRUM 2 3 4 5 5 7 8 9 10 2 5 4 5 6 7 8 9 10 101 ACCELERATION 9's PEAK 10 100 200 FREQUENCY HZ 1000

WYLE LABORATORIES			. 26304
CUSTOMER BELATEL	Job No. 26304	Page No.	69
Full Scale 10 g	Accel No. 2	Control (1)	Response ( )
Operator MEENAN	Specimen TRA USM. 17625		
Date 8.25.78	Damping 5 % (5+1% TRS)	Axis of Test VE	er Y-7
	RESPONSE SPECTRUM		
10.			
7.0			
).1			
//			
*			
0/ 1			

SPECIMEN PRESSURE TRANSMITTERS

CUSTOMER BECATEL

PART NO. SEE REC INSP

S/N SEE REC INSP

W 614 C

Q.C. Approval Aut

SHEET OF

Report No.

26304

500
7
w
0
4

PECMEN	Pressure	TRANSMITTERS	JOB NO.	20304	
	BELATEL			8-25.78	
	SEE REC INSP		TEST BY	J.Muhr	
	see REL INSP		WITNESS .		
CT. CZ.C	MII PO. 10				

Report No.

26304

DATA SHEET

Page No.

72

CUSTOMER	BECHTEL	POWER	CORPO	RATION
Test Title:	SEISMIC	RANDOM		
	Specimen ELE		THE RESERVE TO SHARE THE PARTY OF THE PARTY	Job No. 26304 S/N 2847188
	Port NoE	IAH		Date 8-25-78

	a make the second of the secon
	ALTERNATION AND AND AND AND AND AND AND AND AND AN
[18] [18] [18] [18] [18] [18] [18] [18]	
경영, 이번 경우 아이는 나는 나는 이 점점 중심한 경험되었다.	
	The second second second second
[4] 사람들은 열면 내가 되었다. 그 사람들은 사람들이 되었다. 그 사람들은 모든	

SHEET\_\_\_\_\_ OF\_\_\_\_

....

DATA SHEET

Report No.

26304

Page No.

73

CUSTOMER	BECHTEL SEISMIS	POWER	CORPORATION
		RANDOM	

Specimen PRESSURE
TRANSMITTER 0-3000 PSIA
Part No. 50 EP 1041 BCXA

Job No. 26304 S/N 7612 A4337A13 Data 8-25-78

#### DATA SHEET

Report No.

26304

Page No.

74

TOST THE: SEISMIC BANDOM

Specimen TRANSMITTER (D.P.) LEVEL 0-288 H20 Part No. 1302496 QB Job No. 26304 S/N R 7210A 5503A 58 Date 8-25-78

QC Form Approval

# DATA SHEET

Report No.

26304

Page No.

75

	RECHIEL	Power (	CORPORATION	
Tart Title:	SEISMIG.	Call II a Action	Job No. 26304	_

TRANSMITTER 0-16001 Date 8-25-78 Part No. 1153 9.99

SHEET\_\_\_\_ OF\_\_\_ QC Form Approval

### DATA SHEET

Report No. 26304

Page No.

76

CUSTOMER BECHTEL POWER CORPORATION Part No. Eli AH

Det 8-25-25

UNIT \$ 1 FOXBORD A. I BASELINE TEST

DATA SHEET

Report No.

Page No.

26304 77

BECHTER POWER CORPORATION
BASELING - POST JEISMIC CUSTOMER \_ Test Title: ..

Specimen PRESSURE D. 3000 PSIA SIN 7612 A 4337 A 13 Specimen PRESSURG Part No. 506P1041 BCXA

Date 8-25-78

UNIT #2 FtP

A.I BASELING TEST

BAROMETRIC PRESSURG: 29.206 Hg : 87°F TEMPERATURE SUPPLY VOLTAGE

45 VDC

DATA SHEET

Report No.

26304

PageNo.

78

CUSTOMER BECHTEL POWER CORPORATION

Specimen TRANS ANITTER (D.P.) LEVEL 0-288"H20 Part No. 1302496 08 Job No. 26309 S/N R7210A5503A58

Date 8-25-78

A.I BASELINE TEST

W 414 8

DATA SHEET

Report No.

26304

Page No.

79

CUSTOMER BECHTER POWER CORPORATION

Test Title: BASELING - POST SEISMIC

Specimen ALPHALING Job No. 26304

Specimen ALPHALING TRANSMITTER 0-1600 PSIA S/N 105996 Part No. 11536A9 Date 8-25-78

A.1 BASEMULAT

#### DATA SHEET

Report No.

26304

PageNo.

80

CUSTOMER BECHTEL POWER CORPORATION

Test Title: BASELINE & RESPONSE PRE-LOCA

Specimen ELECTRONIC Job No. 26304

TRANSMITTER LEVEL 0-70PSIA S/N 2847188

Part No. E 11 AH Date 8-30-78

A. I BASELING TEST

DATA SHEET

Report No.

Page No.

81

26304

CUSTOMER BECHTER POWER CORPORATION
Test Title: BASELING & RESPONSE PRE-LOCA

Specimen PRESSURE Job No. 26304
TRANSMITTER 0-3000 PSIA S/N 7612 A 4337 A 13
Part No. 50 EP 1041BCXA Date 8-30-78

UNIT # 2 F+P
AIL BASSLINE TEST

SHEET\_\_\_\_\_ OF\_\_\_\_

#### DATA SHEET

Report No.

26304

Page No.

82

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASGLING & RESPONSE PRE-LOCA

Specimen ALPHA KINE
TRANSMITTER 0-1600 PSIA
Part No. 1153 GA9

Job No. 26304 S/N \_105996

Date 8-30-78

UNIT #4 ROSEMOUNT
A. I BASELING TEST

w ela m

#### DATA SHEET

83

CUSTOMER BECHTEL POWER CORPORATION

Specimen SEERECEIVING INSP.

Part No. SEE RECEIVING INEP.

JOB NO. 26304 SIN SEERECEIVING WER Date 8-31-78

DATA SHEET

Report No. 26304

PageNo.

84

CUSTOMER BECHTEL POWER CORPORATION
Test Title: LOCA TEST JOB NO. 26304 SIN SEE RECEIVING INSP. Specimen SEE RECEIVING INSP. Part No. SEE RECEIVING INF. (UNIT 4) (UNIT 2) (UNIT 1)

QC Form Approval

SHEET\_\_\_\_ OF\_\_

DATA SHEET

Report No.

26304

85

CUSTOMER BECHTEL POWER CORPORATION

Specimen SEE RECEIVING INSP.

JOB No. 26304. S/N SEE RECEIVING INSP

SEE RECEIVING INST. Date [UNIT 4] Part No. SEE RECEIVING INSM.

Page No.

W 414 8 QC Form Approval SHEET\_\_\_\_ OF\_\_

DATA SHEET

ReportNo.

263 04

Page No.

8£

CUSTOMER DECHTER POWER CORPORATION

Test Title: LOCA TEST

Specimen SEE RECEIVING JOB No. 26304

INSPECTION SIN SEE RECEIVING INSP

Part No. SEE RECEIVING INSP. Date

(UNIT 2) (UNIT 1) (UNIT 4)

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

# DATA SHEET

Report No.

26304

Page No.

87

CUSTOMER Test Title:	BECHTEL PONER CORPORATION			
	Specimen SEE RECEIVING INSP.	Job No. 26304 S/N SEE RECEIVING INS		
	Port No. SEE RECEIVING INSP.	Date (UNIT 4)		

w 414 0

DATA SHEET

Report No.

26304

Page No

88

CUSTOMER BECHTEL POWER CORPORATION

Test Title: LOCH

Specimen ELECTRONIC Job No. 26304

TRANSMITTER LEVEL 0-70 PSIA S/N 2847188

Part No. EII AH Dete 10-7-78

W 614 8 QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

## DATA SHEET

Report No.

26304

Page No.

89

CUSTOMER BECHTEL POWER CORPORATION
TOST TIME: LOCA

Specimen ELESTIZONIC TRANSMITTER LEVEL 0-70851A Part No. ELIAH Job No. 26304 S/N 3847188 Date 10-7-78

W 614 8

DATA SHEET

Report No.

26304

Page No.

90

CUSTOMER BECHTER POWER CORPORATION

Part No. 50 EP 1041 BCXA Date 10-7-78

DATA SHEET

Report No.

26304

Page No.

91

CUSTOMER BECHTEL POWER CORPORATION

Test Title: LOCA

Specimen ALPHALINE Job No. 26304

TRANSANITIER 0-1600 PSIA S/N 105996

Part No. 11536A9 Date 10-7-78

QC Form Approval

....

SHEET\_\_\_\_\_ OF\_\_\_\_

DATA SHEET

Repart No.

26304

Page No.

9

CUSTOMER BECHTEL POWER CORPORATION

Specimen ALPHALINE
TRANSMITTER 0-1600 PSIA
Part No.

Job No. 26304 S/N 105996 Date 10-7-78

w ... .

QC Form Approval

SHEET\_\_\_\_\_ OF\_\_\_\_

#### DATA SHEET

Report No.

26304

Page No.

93

CUSTOMER BECHTEL POWER (IORDORATION)
Test Title: BASELING POST LOCA

Specimen ELECTRONIC Job No. 26304

TRANSMITTER LEVEL 0-70PS/A S/N 2847188

Part No. EIIAH Date 10-2-78

W 414 B

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

DATA SHEET

Report No. 26304

Page No.

CUSTOMER BECHTEL POWETT CORPORATION

Specimen ELECTRONIC Part No. Ell AH Date 10-2-70

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

# DATA SHEET

Report No.

26304

Page No.

95

CUSTOMER BECHTEL POWER CORPORATION

Test Title: BASELING & RESPONSE POST LOGA

Specimen ELECTRONIC JOB No. 26304

TRANSMITTER LEVEL 0-70PSIA SIN 2847188

Port No. EIIAH Date 10-3-78

QC Form Approval

SHEET\_\_\_\_\_ OF\_\_\_\_

DATA SHEET

ReportNo.

26304

Page No.

CUSTOMER BECHTEL POWER CORPORATION
Test Title: BASELINE POST LOCA

Specimen PRESSURG 100 No. 26309 TRANSMITTER 0-3000 PSIA S/N 7612A4337A13

Part No. 50 671041 BCXA

Date\_10-2:78

QC Form Approval

....

SHEET\_\_\_\_ OF\_

DATA SHEET

Report No.

26304

Page No

97

CUSTOMER BECHTEL POWER CORPERATION

Test Title: BASGNUE & RESPONSE POST LOCA

Specimen ALPHANINE Job No. 26304

TRANSMITTER 0-1600PSIA S/N 105996

Part No. 11536A9 Date 10-2-78

W 414 B

QC Form Approval

SHEET\_\_\_\_ OF\_\_\_

SPECIMEN TRANSMITTERS

CUSTOMER BECHTEL POWER CORP.

PART NO. SEE RECEIVING INSPECTION

S/N SEE RECEIVING INSPECTION

DATE 8-15-78
TEST BY Gutter

WYLE LABORATORIES

TEST: BASELINE & RESPONSE TIME

175

Report No.

**99** 26304

15

8-21-78 JOB NO. -58352 TEST BY WITNESS DATE

PART NO. SEE RECEIVING INSpection SEE RECEIVING INSpection CUSTOMER BECNTEL POWER CORP. SPECIMEN TRANSMITTERS

N/S

CUSTOMER BETCHFEL POWER GORP.
PART NO. SEE RECEIVEDS 1487

JOB NO. 26304 DATE 8-31-78 TEST BY ASTAU

SPECIMEN A

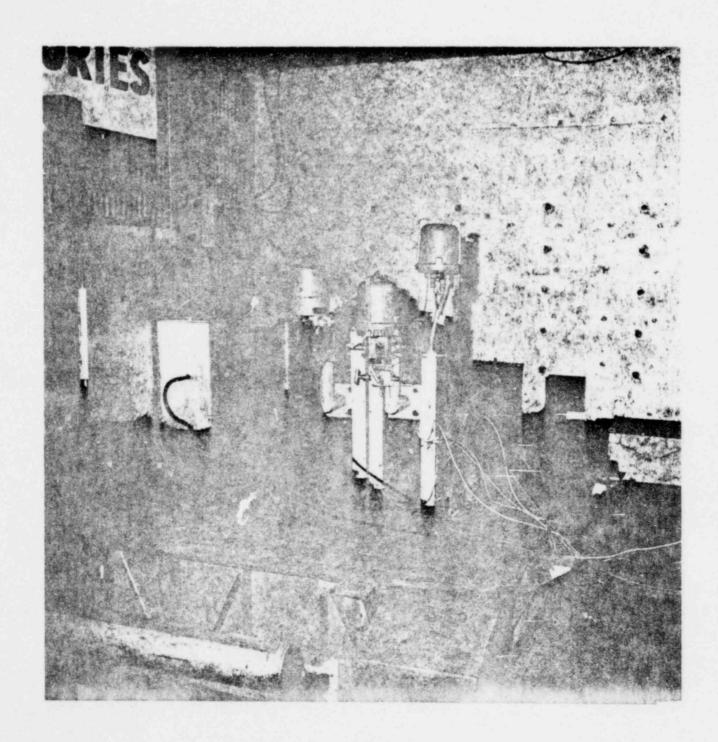
WYLE LABORATORIES

TEST. SEISMIC & LOOA



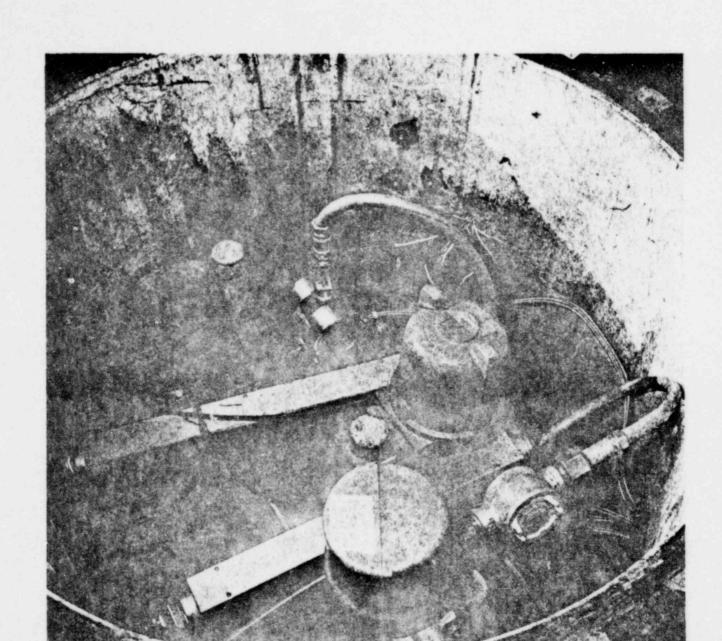
PHOTOGRAPH 1

SEISMIC TEST SETUP Y-Z BIAXIAL PLANE



PHOTOGRAPH 2

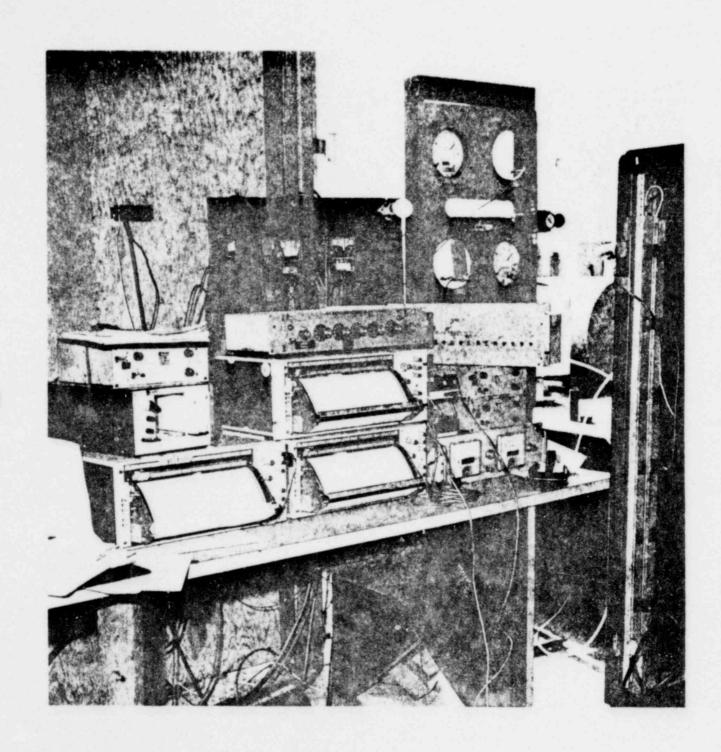
SEISMIC TEST SETUP X-Z BIAXIAL PLANE



PHOTOGRAPH 3

LOCA TEST SETUP

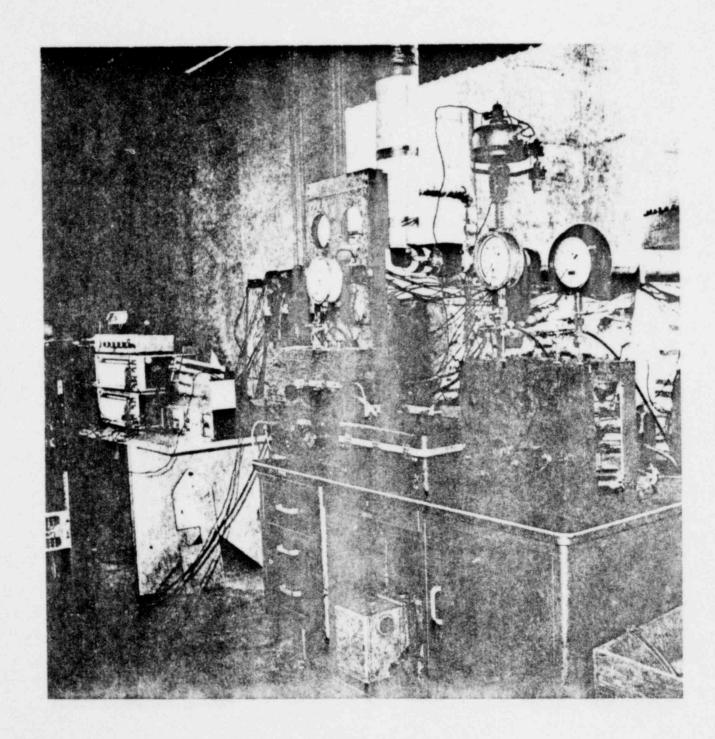




PHOTOGRAPH 4

LOCA TEST INSTRUMENTATION

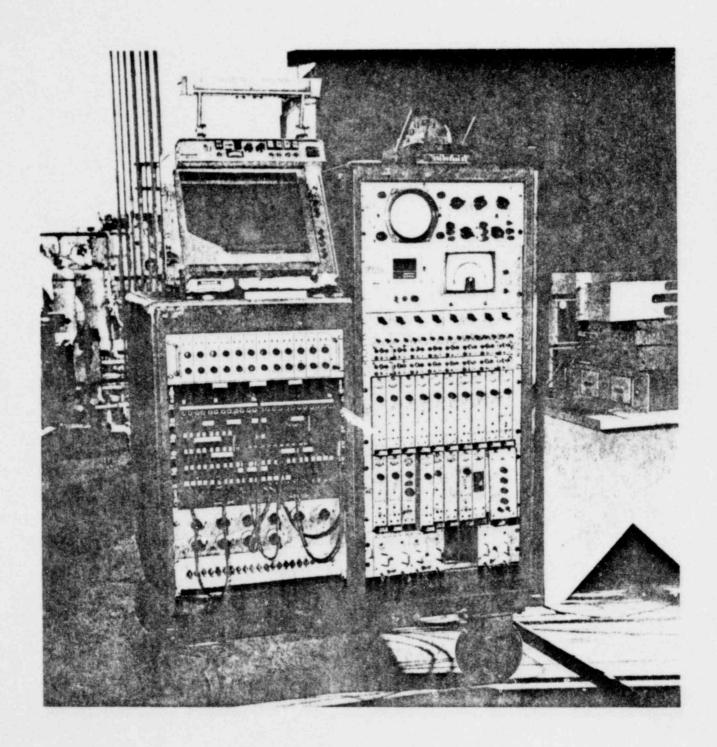




PHOTOGRAPH 5
FUNCTIONAL TEST AFPARATUS

Page No.





PHOTOGRAPH 6
FUNCTIONAL TEST INSTRUMENTATION

Report No.

26304

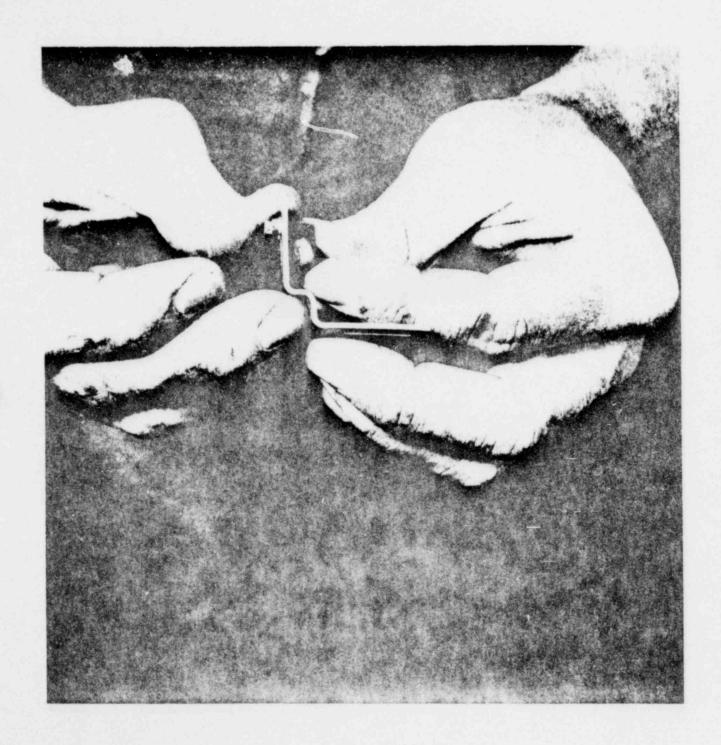
Page No.

107

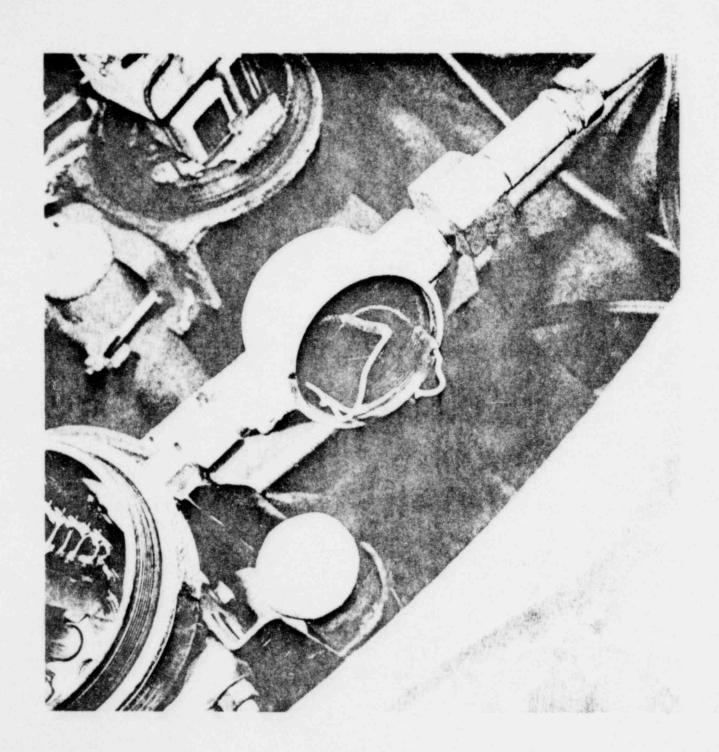
Report No. 26304 Page No. 108

112

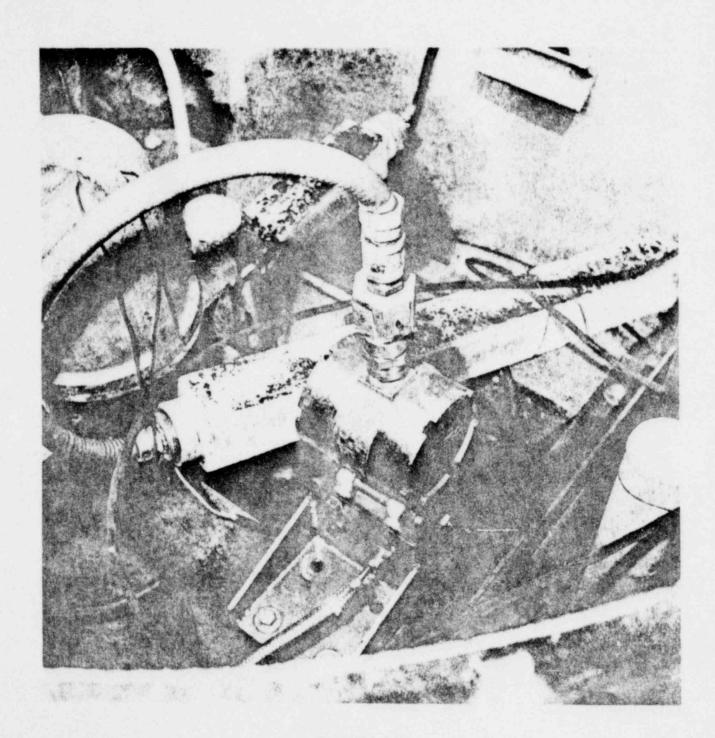
26304 Report No. 115 Page No.



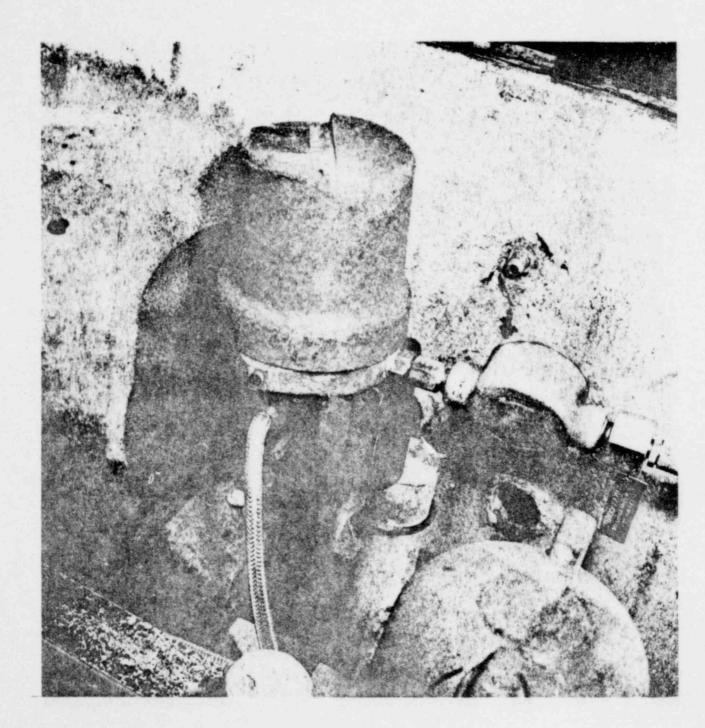
PHOTOGRAPH 19
POST LOCA TEST DETAILS



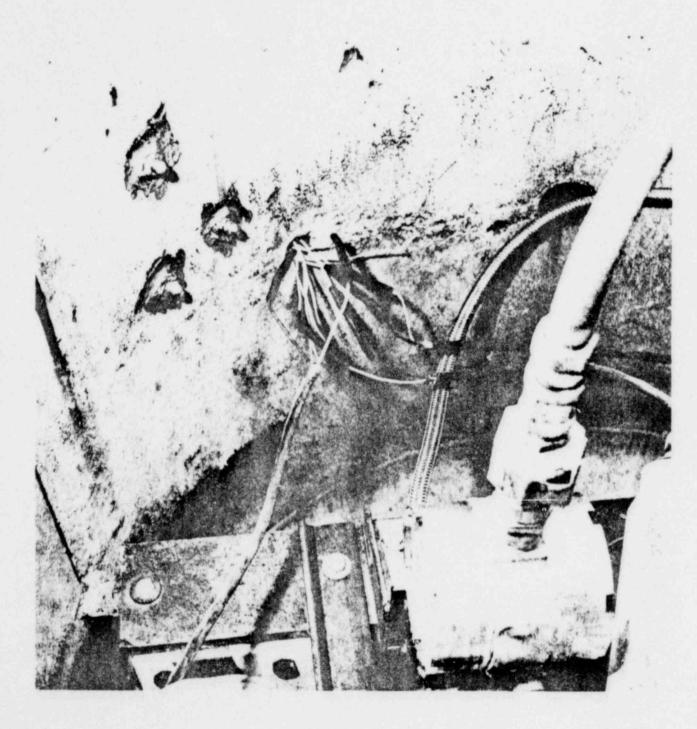
PHOTOGRAPH 20
POST LOCA TEST DETAILS



PHOTOGRAPH 21
POST LOCA TEST DETAILS



PHOTOGRAPH 22 POST LOCA TEST DETAILS



PHOTOGRAPH 26
POST LOCA TEST DETAILS

REPORT NO.

26304

PAGE NO:

127

26304
1
6600-M-2308
18 October 1978

70	DECUMENT FOLIAN CORPORATION		GOV'T, CONT, NO.
то:	BECHTEL POWER CORPOR	ATION	
ATTN:	Fred Kellogg		
PART NAME	Pressure Transmitter	. 0 to 288" W.C. (Fish	er & Porter)
PART NO.	13D24960B	SERIAL NO.	R7210A5503A58
TEST:	Post Irradiation Fun	ctional Test	
SPECIFICATION	6600-M-2308	PARAGRAPH NO	
NOTIFIED CUSTOMER:	Fred Kellogg	DATE:	VIA: This NOD
NOTIFIED DCAS-QAR:		DATE:	

SPECIFICATION REQUIREMENTS:

WYLE LABORATORIES

The specification and the industry practice implies that the input-output relationship be linear over the range of the transmitter.

DATE OF DEVIATION

21 August 1978

TYPE OF DEVIATION:

Specimen anomaly

DESCRIPTION OF DEVIATION:

The electrical output of the pressure transmitter showed incorrect calibration with respect to the input pressure. Inspection conducted after seismic revealed fractured amplifier housing and severed bus bars.

SPECIMEN DISPOSITION: Removed from the test program after seismic testing; therefore, no LOCA test was performed.

COMMENTS - RECOMMENDATIONS:

	ST		101	1.70		B. T.
1.21	125 1	- 100	190		16.3	TV:

ORIGINAL: DEPARTMENT

3. COPIES: CUSTOMER
1 COPY : DEPARTMENT
1 COPY : QUALITY COFFROL

1 COPY CONTRACTS

TEST WITNESS:

REPRESENTING.

TEST ENGINEER

DEP

A. Ander

QUALITY CONTROL Alkeesema

A. Heeseman

26304 REPORT NO. PAGE NO

PAGE NO:	263	204	
WYLE JOB NO	200	304	
NOD NO	660	00-M-2308	3
PO NO	18	October	1978

WYLE	LABORATORIE	=

ro:	BECHTEL POWER CORPORATION			
	Fred Kellogg			
	Electronic Transmitter (Fisher	er & Porter)		
PART NO	50EP1041	SERIAL NO	7612A4337A13	
TEST:	Loss of Coolant Accident			
SPECIFICATION _	6600-M-2308	PARAGRAPH NO.		
NOTIFIED CUSTOMER:		DATE:	12 Sep 78 VIA: _	Telecon
NOTIFIED DCAS-QAR:		DATE:		

## SPECIFICATION REQUIREMENTS:

Proper electrical output for given input pressure shall be noted.

DATE OF DEVIATION:

12 September 1978 Specimen anomaly

TYPE OF DEVIATION: DESCRIPTION OF DEVIATION:

The electrical output, recorded on a chart recorder, became very erratic after the second hour of testing.

A change of input pressure did not affe. the electrical output.

SPECIMEN DISPOSITION: Continued testing; however, chart recording was discontinued.

COMMENTS - RECOMMENDATIONS:

DISTRIBUTION:

ORIGINAL: DEPARTMENT 3 COPIES: CUSTOMER 1 COPY DEPARTMENT

QUALITY CONTROL 1 COPY O COPIES DEAS-OAR

TEST WITNESS:

REPRESENTING\_

TEST ENGINEER\_

Leeseman

QUALITY CONTROL.

A. Heeseman

WL-109A

OC FORM APPROVAL

REPORT NO.

26304

GE	

129

WYLE JOB NO.	26304
NOD NO.	3
PO NO.	6600-M-3308
DATE	18 October 1978

то:	BECHTEL POWER CORPORATION	GOVT, CONT. NO.
ATTN:	Fred Kellogg	
PART NAME	Pressure Transmitter (Fish	ner & Porter) (3000 psia)
PART NO.	50EP1041	SERIAL NO761214337A13
TEST:	Post IOCA Functional Test	
SPECIFICATION	6600-M-2308	PARAGRAPH NO.
NOTIFIED CUSTOMER:	Arjun Karadi	DATE: 2 Oct. 1978 VIA: Telecon
NOTIFIED DCAS-QAR:		DATE:
SPECIFICATION REQU	JIREMENTS:	

The specimen shall fulfill the requirement of the post

DATE OF DEVIATION:

2 October 1978

TYPE OF DEVIATION:

Specimen anomaly

LOCA functional test

DESCRIPTION OF DEVIATION:

WYLE LABORATORIES

The enrical output of the pressure transmitter did not correspond to the input pressure. The unit was opened and samined. The detector card and the amplifier were damaged. The damaged parts were replaced. The functional test was not performed on the unit after replacement of parts, at the request of the Bechtel representative, however enough input-output data was taken to demonstrate that the transmitter would function properly after the parts were replaced.

Unit was restored to original condition; i.e., defective oil and SPECIMEN DISPOSITION: amplifier were reinstalled and stored; shipped to AP&L for possible future diagnosis.

COMMENTS - RECOMMENDATIONS:

D	ISTRIBUT	TION:
0	RIGINAL:	DEPARTMENT
3	COPIES:	CUSTOMER
1	COPY :	DEPARTMENT
- 3	COPY	QUALITY CONTROL
4	COPY	CONTRACTS
0	COPIES	DCAS-QAR

		APPROVAL	2011
QC	FORM	APPROVAL	140

TEST WITNESS:

REPRESENTING

DEPT MANAGERY anderson

QUALITY CONTROL Af Heeseman

TEST ENGINEER

A. Heeseman

REPORT NO.

26304

P			

130

WYLE JOB NO.	26304
NOD NO.	4
PO NO.	6600-M-2308
DATE	18 October 1978
GOV'T. CONT. NO.	

то:	BECHTEL POWER CORPORATION	1	GOV 1, GON	1, NO.
ATTN:	Fred Kellogg			
PART NAME	Electronic Transmitter (	Foxboro)		
PART NO.	Ellah	SERIAL NO	2847188	
TEST:	LOCA			
SPECIFICATION	6600-M-2308	PARAGRAPH NO.		
NOTIFIED CUSTOMER:	Arjun Karati	DATE:12 Se	pt. 78	VIA: Verbal
NOTIFIED DCAS-QAR:		DATE:		
SPECIFICATION REQUIR	EMENTS:			

DATE OF DEVIATION: TYPE OF DEVIATION: 12 September 1978

Equipment malfunction

Proper electrical output.

DESCRIPTION OF DEVIATION:

WYLE LARCRATORIES

On the 12th day of the LOCA test, the specimen's output was reported erratic. It was later determined, after the test, that the problem was a faulty external instrumentation wire, not the specimen. The specimen was successfully calibrated following repair of the wire.

SPECIMEN DISPOSITION:

Testing completed

COMMENTS - RECOMMENDATIONS:

DISTRIBUTION:
ORIGINAL: DEPARTMENT
3\_COPIES: CUSTOMER
1 COPY : DEPARTMENT
1 COPY : QUALITY CONTROL
1 COPY : CONTRACTS
\_\_COPIES: DCAS-QAR

TEST WITNESS:	TEST ENGINEER WS
REPRESENTING	DEPT MAGER 9 9 Linderson
	QUALITY CONTROL AP Helse man

A. Heeseman

REPORT NO. PAG

26304

	-	_	~	
E NO:		1	3	

WYLE JOB NO	26304	
NOD NO.	5	
PO NO	6600-M-2308	
DATE	18 October 19	78
GOV'T CONT. NO		

		GOVT. CO	NT. NO	
BECHTEL POWER CORPORATIO	DN .			
Fred Kellogg				
Alphaline Transmitter (F	losemount)			
1153GA9	SERIAL NO.	105996		
Irradiation Test				
6600-M-2308	PARAGRAPH NO.			
Fred Kellogg	DATE:		_VIA: _Thi	s NOD
40 pt 40 40 40 40	DATE:			
	Fred Kellogg  Alphaline Transmitter (F  1153GA9  Irradiation Test  6600-M-2308  Fred Kellogg	1153GA9 SERIAL NO.  Irradiation Test  6600-M-2308 PARAGRAPH NO.  Fred Kellogg DATE:	BECHTEL POWER CORPORATION  Fred Kellogg  Alphaline Transmitter (Rosemount)  1153GA9 SERIAL NO. 105996  Irradiation Test  6600-M-2308 PARAGRAPH NO.  Fred Kellogg DATE:	Alphaline Transmitter (Rosemount)  1153GA9 SERIAL NO. 105996  Irradiation Test  6600-M-2308 PARAGRAPH NO. VIA: Thi

DATE OF DEVIATION: TYPE OF DEVIATION: DESCRIPTION OF DEVIATION:

SPECIFICATION REQUIREMENTS:

MYLE LABORATORIES

The Conax connector and the cable were not installe, during the irradiation tests. However they were installed prior to seismic tests.

SPECIMEN DISPOSITION: Testing completed

COMMENTS - RECOMMENDATIONS:

DISTRIBUTION:

ORIGINAL: DEPARTMENT 1 COPY : DEPARTMENT 1 COPY : QUALITY CONTROL

CONTRACTS 1 COPY Q COPIES DOAS-OAR

TEST WITNESS:

REPRESENTING

TEST ENGINEER

OC FORM APPROVAL

EXHIBIT I



REAGE NO. 26304

REAGE NO BORATORIES

SEN 15 1978

ALAN GORMLEY

September 8, 1978

Mr. Ted Tassone Wyle Laboratories 1841 Hillside Drive Norco, California 91760

Dear Mr. Tassone:

This will summarize parameters pertinent to the irradiation of four (4) pressure transmitters, per your job #26304.

The four (4) pressure transmitters were placed in a Cobalt-60 gamma field such that the dose rate was 1 megarad per hour. The units were exposed for 37 hours, yielding a total dose of 37 megarads. The units were not rotated during the test.

Dosimetry was performed using an Atomic Energy of Canada, Ltd. (AECL), Red Perspex system with Type BC-2 readout. Calibration of the Perspex is made by AECL using Ceric dosimetry traceable to the U.S. National Bureau of Standards. Isomedix regularly cross-calibrates its AECL system with an in-house Harwell Perspex system, and makes semi-annual calibrations directly with NBS, using the NBS Radiochromic Dye system. A copy of the dosimetry correlation report is available upon request.

Irradiation was conducted in air at ambient temperature and pressure. Radiant heat from the source heated the samples somewhat, but the temperature did not exceed 85°F, as indicated by previous measurements on an oil solution in the same relative position.

Irradiation was initiated on August 20, 1978, and was completed on August 21, 1978.

Very truly yours,

David P. Constantine Production Manager

id Plantate

DPC:km

# WYLE LABORATORIES

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304		
PAGE NO	133		

### APPENDIX I

ARKANSAS POWER & LIGHT COMPANY
ENVIRONMENTAL QUALIFICATION TEST PROCEDURE
NUMBER 6600-M-2308, REV. 1
FOR
TRANSMITTERS

(23 Pages)

ENVIRONMENTAL QUALIFICATION TEST

PROCEDURE

FOR

TRANSMITTERS

余	1-/2/29	REVISED + SE	ISSUED FOR SUPERANCHET REFLECTS ACTUAL TEST	. All		Cinc.
10	8/12/		or Subcontract	ATL		
No.	DATE	SLEEKS NO.	REVISIONS	BY	CH.K	APPR
	ORIGIN	0	ENVIRONMENTAL QUALIFICATION	108 No. (	5600-2	
		4	TEST PROCEDURE	SPEC/D	ES GUIDE No.	REV
	SFPD		ARKANSAS POWER & LIGHT COMPANY ARKANSAS NUCLEAR ONE, UNIT #2	6600-	M-2308	0

#### TABLE OF CONTENTS

	TITLE			PAGE
	SCOPE			3
	STANDARI	DS		3
	IDENTIF:	ICATO	N OF EQUIPMENT	3
	PERFORM	ANCE	SPECIFICATIONS	3
	ACCEPTA	NCE C	RITERIA	5
	TEST PL	AN ME	THOD	5
	MOUNTIN	G		5
	TEST SE	QUENC	E	6
			Baseline Test	
			Irradiation	
			Post Irradiation Test	
			Seismic Test LOCA Test	
	TEST RE	PORT		9
	FIGURE	1.	LOCA Profile	11
	FIGURE		Transmitter Piping and	12
	FIGURE	3.	Electrical Set-up Transmitter Mounting Details	13
			(Foxboro & F. & P.)	
	FIGURE	12.	Reactor Building Internals, Acceleration Response Spectru EL. 391 FT, North-South and East-West direction, OBE.	14
	FIGURE	25.	Reactor Building Internals, Acceleration Response Spectrum El. 391 FT, North-South and East-West direction, DBE.	15
	FIGURE	28.	Reactor Building Vertical Accerleration Response Spectrum Base Slab EL. 336'-6", OBE.	16
	FIGURE	4.	Seismic & Post-LOCA cabling	17
	FIGURE	5.	installation - Foxboro Transmitter Seismic & Post-LOCA cabling installation - Fischer & Porter	18
			Foxboro Transmitter Mounting Details	19
			F&P Transmitter Mounting Detail	20
1	FIGURE	7.	Modification to Foxboro Mounting Bracket	21
	FIGURE	8.	Rosemount Transmitter Mounting Details	22
	FIGURE	9.	Seisic and Post LOCA cabling installation for Rosemount Transmitter	23

#### Scope

Environmental qualification test program for the transmitters listed under "Identification of the equipment".

### Standards

#### Industry Standards

- 1. IEEE 323-1971
- IEEE 344-1971 augmented to include biaxial, random, simultaneous, phase incoherent seismic input motion.

#### Bechtel Specifications

- 1. .6600-C-2101 Response spectra for cont. building
- 2. 6600-G-2005 Seismic Qualification requirements
- 3. 6600-M-2308 Environmental Qualification test procedure

## Identification of the Equipment

- 1. Foxboro transmitter (Bechtel furnished)
   Model # EllAH-ISAA-2
   Serial # 2847188
   P.O. M2204A use item #1, 2PT-5609
- 2. F&P transmitter, CE furnished, P.O. 6600-M-2001AC
  Rev. 39. P.O. item, CE item #099
  Model # 50EP1041BCXA(NS)
  Serial # 7612A437A13
- 3. F&P transmitter P.O. 6600-M-2001AC,
   Tag #LT-103/2LT-4625
   Model # 13D2496QBBCBBB (NS)
   Serial # 7210A5503A58
- 4. Rosemount Transmitter
  P.O. by AP&L
  Model 1153AA9
  Serial # 105996

# Performance Specification

1. Foxboro Model EllAH, D.P. cell type absolute pressure transmitter
Output 4 to 20MA linear into 0-650 ohms load.
Supply voltage: 24VDC + 2/0 V
Calibration Range: 0 to 70, PSIA
Temperature (operating): 60°to 120°F, post LOCA, see Figure 1.
Humidity (operating): 50% to 90% R.H., post LOCA: 100% Chemical spray (operating): none, post LOCA, see para. E5 of test sequence.
Radiation: 3.7x10<sup>7</sup> Rads integrated, with Co60 source.
Dose rate: 1x10<sup>6</sup> Rads/Hr. nominal

- 2. F&P Model 50 EP1041BCXA(NS) Absolute pressure transmitter (bourdon-tube type)
  Calibration range: 0 to 3000 PSIA
  Output: 2985 PSIG = 20MA
  Output: (-) 14.7PSIG=4MA
  Supply voltage: 24 + 2/0 VDC
  Load: 260 + 0/100 ohms
  Temperature: Operating, 60° to 120° F, Post
  LOCA: See Figure 1.
  Humidity: Operating, 50% to 90% R.H., Post LOCA: 100%
  Chemical spray: (operating) none. Post LOCA, see para. E-5.
  Radiation: 3.7x10<sup>7</sup> Rads, intergrated, gamma with
  Co60 source
  Dose rate 1x10<sup>6</sup> Rd/Hr. nominal
- 3. F&P Model 13D2496QBBCBBB (NS) D.P. cell type Level transmitter Calibration Range: 0 to 288" W/C Zero Suppression: None Elevation Suppression: None Output: Hi tap open to atmosphere. Lotap: 0 w/c 20MA 200" W/C 4MA Supply voltage: 24+ 2/0V D.C. Load: 260 + 0/100 ohms Temp. operating: 60° to 120° F, Post LOCA see Figure 1. Humidity operating: 50% to 90% RH, Post LOCA: 100% Chemical spray operating: none, Post LOCA: 100% Radiation: 3.7x107 Rads integrated, gamma from Co60 Source Dose Rate: 1x106 R/Hr nominal
- 4. Rosemount Model 1153AA9 Absolute Pressure Transmitte, deHa cell type Calibration Range: 0 to 1600 PSIA Zero Suppression: None Output: 0 PSIA = 4 MA : 1600 PSIA = 20 MA Supply Voltage: 24V D.C. + 2V Load: 650 ohms Temperature: Normal operating, 60° to 120° F Humidity: Normal operating, 50% to 90% RH Normal operating, Atmospheric Pressure: Temperature and Pressure: Design Basis Accident, see Figure 1. Humidity: Design basis accident, 100%

Chemical Spray: Normal operating, none See para. E-5 for D.B.A. conditions. Radiation:  $3.7 \times 10^7$  ads integrated Co60 source Dose Rate:  $1\times10^6$  R/Hr nominal

## Acceptance Criteria

#### A. Basis:

1

Containment Pressure Transmistter - Trip Function

- o Radiation dose equivalent to one year operating do se, i.e., 1000R
- o Plant vibration effect as evidanced by one O.B.E. test.
- LOCA effect of 5 seconds to account for trip functions committed in the FSAR

Pressurizer Pressure, and Steam Generator Pressure and Level Trip Functions:

- O Radiation dose equivalent to one year operating dose combined with 60 seconds of radiation dose during LOCA, i.e.,  $\bullet 86 \times 10^5 \, \mathrm{R}$
- o Plant vibration effect as evidanced by one O.B.E. test.
- c LOCA effect of up to and including 60 seconds performance to account for trip functions committed in the FSAR

Long-Term Post-Accident Monitoring:

- o Radiation effect of  $3.7 \times 10^7 R$
- O Plant vibration effect as evidanced by 5 OBEs and 1 SSE test
- o LOCA effect of 30 days

#### B. Criteria:

The cummulative (RSS) errors for the above three categories shall be equal or better than:

Containment Pressure Trip Function + No Limit

- 2.3% F.S.

S.G. Level Trip Function + 3.7% F.S.

- No Limit

Pressurizer and S.G. Pressure Trip + 3.16% F.S. Function

- No Limit

Post Accident Monitoring Function + 20% F.S.

Mounting:

Test plan: Elected method: type test Simulate normal wall mounting. See Figures 3, 4, 5, 6, 8 and 9 for details. Also see sheets 19 and

Test sequence

## A. Base Line Test:

Set up the calibration equipment similar to that shown in Figure 2. Optionally use Mansfield Sceen air deadweight tester. Also use a vacuum pump and a precision vacuum gage for -14.7 PSIG input. Use isolation valves and solenoid valves in each line for rapid isolation. During calibration and testing, leave F&P level transmitter high tap open to atmosphere. Suitable air supply can be obtained from pressurized bottles with pressure regulators to supply 0 to 3000 PSIG, 0 to 75 PSIG and 0 to 20 PSIG for F&P Model 50EP1041 & Rosemount Model 1153AA9, Foxboro EllAH & F.P. Model 13D2496 respectively. Set zero and span within + 1/4% accuracy. Once set do not readjust zero or span during subsequent testing. Vary input as shown below. Record the input, output and ambient conditions. Caution: Use load impedances previously specified.

#### 1. Baseline Test:

Input PSIC/PSIA

Ambient Temp 75°F or prevailing room conditions Ambient Humidity 50% or prevailing room conditions Power supply voltage: (24 + 2/0V) Record actual voltage.

tilpdt PSIG/PSIA	Outpu
Inches of mercury/Water Column 0 % range	MA
25 % range	"
00 % range	**
75 % range	
.00 % range	
5 % range	n
0 % range	
25 % range	**
0 % range	"

Record Barometric pressure, inches of mercury.

Above test is to be performed three times (total)

## 2. Response time test:

Establish 25% input condition. Step change input to 75% of span. Trigger the recorder. Record input change, output change and time constant (time required to reach 63% of design output change). Record temperature and humidity. Above tests to be conducted at Wyle.

### B. Irradiation:

Prior to irradition perform baseline test (A.1) described above. Energize the equipment. Apply input of 75% of span. Continuously record input and output during irradiation. Irradiate at 1x106 Rads or lower per hour to integrated dose of 3.7x10 Rads. Record date, time, input, output, time after test commenced and integrated dose.

1

### C. Post Irradiation Test:

Conduct baseline test (A.1) above at Radiation Laboratory. Analyze data to determine if any gross failures occured during irradiation/ shipment.

### D. Seismic Test:

Conduct seismic test in accordance with the test procedure outlined below.

- Preseismic test: Conduct baseline test (A.1 above) and Response Time Test (A.2 above).
- 2. Mounting See Figures 3, 4, 5, 7, 8 and 9 and sheets 19 and 20 for mounting. See Figure 2 for electric and plumbing hook-up. Torque cover, etc., to manufacturer's specifications.
  A See Figure 3 for details.
- 3. Input and output monitoring: The setup shall be the same as used in baseline test except only one input shall be applied (as shown below). Record input output before, during and after each of the seismic tests described below.

Foxboto, EllAH: 14.7 PSIA F&P, 50EP1041: 2200 PSIA F&P, 13D2496: 150 inches of W.C. Rosemount, 1153: 1200 PSIA

- 4. Frequency coverage shall be 1 to 35 Hz.
- 5. Mount two accelerometers on the table.
- Analyze table motion using 5% and 1% critical damping at 1/6 octave interval.
- OBE tests: Use response spectra given in Figures 12 and 28 for these tests. Acceleration levels generated by Test Response Spectra (TRS)

shall envelope the prescribed Required Response Spectra (RRS). Conduct 5 OBE tests in each of the X-Z and Y-Z directions (Z = Vertical). Note pressure input and current output. Input motion shall be independent, random, biaxial, phase incoherent. One input at 45 degree angle is not acceptable. Record Response Acceleration Spectra.

- 8. SSE test: Conduct one full SSE test in each of the X-Z and Y-Z combination axis using the same type of input motion prescribed above. SSE Required Response Spectra is given in Figures 25 and 28. Use Figure 28 multiplied by 2 for vertical acceleration levels. TRS shall envelop RRS. Record input, output and response spectra.
- 9. Conduct baseline test (A.l above) at the conclusion of the SSE test.
- Visually inspect the transmitters for damage and record findings.

## E. LOCA Test:

- Mount all the transmitters in the LOCA chamber. Torque transmitter cover to manufacturer's specifications.
- Pre-LOCA Test: Conduct baseline test (A.1 above) and response time test (A.2 above).
- Soak Test: Establish input pressure listed in the table, raise chamber temperature to 120 F and hold for 2 hours. Continuoulsy record input and output.
- 4. Begin LOCA test to the temperature and pressure profile of Figure 1. Input level shall be as shown in the table. Record output at various intervals per the table.
- 5. The duration of the test will be 30 days. The temperature profile shall be maintained and the pressure allowed to conform to saturated steam conditions. During the first 24 hours of the test profile the transmitter shall be subjected to a chemical spray consisting of .28 molar H3B03 (2500 parts per million Boron) and NaOH to make a pH of 11.0 + .5 at 25 C (77°F). The spray shall be .15 GPM/Ft of the area of the test chamber projected onto a horizontal plane. The chemistry shall be varified before tests. The transmitters shall remain

operational throughout the entire test. Record input, output, time and pressure and temperature in the chamber. Also record barometric pressure at the beginning of the test.

- 6. Conduct baseline test (A.1 described earlier) and response time test (A.2 described earlier) (do not adjust zero or span) at the conclusion of the LOCA test.
- Disassemble mounting. Remove cover. Visually inspect and record findings.
- 8. Attest the test results.

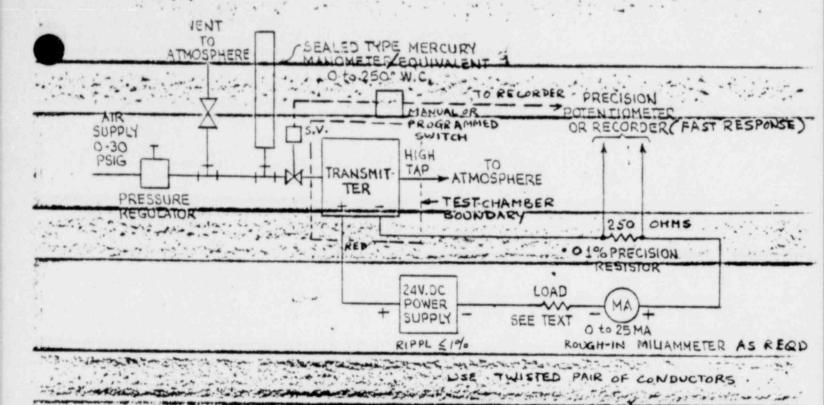
Test Report - Submit certified test report in accordance with IEEE Standard 323-1971 within 30 days.

TABLE

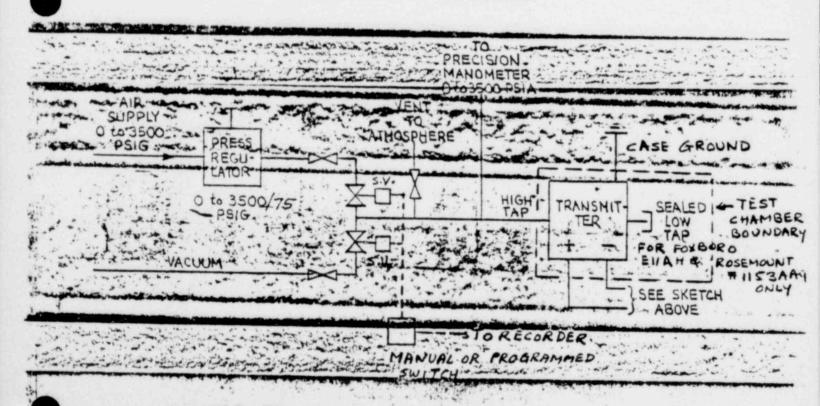
TIME	INPUT			REMARKS
	F&P 50EP1041	F&P 13D2496	Foxboro EllAH	
0 to 2 Hrs (soak)	2200 PSIA	150" WC	14.7 PSIA	Continuous
LOCA TEST begins	here			Recording
2H-0 Sec.			ida Salue S	
	ADMIT STEAM	& CHEMICAL SPI	RAY, ETC.	
2H-15 Sec.	1000 PSIA	150" WC	14.7 PSIA	
2H-25 Sec.		50" WC	" " " " " " " " " " " " " " " " " " " "	
2H-35 Sec.			60 PSIA	
2H-45 Sec.			" " " " " " " " " " " " " " " " " " " "	
2H-5 Min.				
2H-10 Min.	*	"		
2H-15 Min.				
2H-20 Min.			n	
2H-25 Min.				
2H-30 Min.				
3 Hours			11	
3-1/2 Hrs.	5 (	n n		
4 Hours	*	m m	"	
1-1/2 Hrs.				
5 Hours				
7 Hours			и	
10 Hours				
14 Hours				0
22 Hours				
27 Hours				
*2 Days 3 Hours	2200 PSIA	150" WC	14.7 PSIA	
3 Days 2 Hours	1000 PSIA	50" WC	60 PSIA	
*4 Days 2 Hours	2200 PSIA	150" WC	14.7 PSIA	Manual
5 Davis 2				Record
5 Days 2 Hours	1000 PSIA	50" WC	60 PSIA	"
30 Days 2 Hrs.	2200 PSIA	150" WC	14.7 PSIA	
			a	

<sup>\*</sup> Changes inputs at suitable interval.

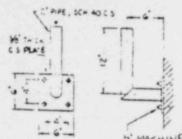
<sup>\*\*</sup> Timing is approximate from this point on. Alternate inputs daily. Manually (or continuous) record at least twice daily at a suitable interval, e.g. 8 hours. Establis' surveillance to detect abnormal performance of the transmitter input and output, chamber pressure and temperature etc. Increase monitoring activities if failures are observed.



LEVEL TRANSMITTER PIPING



ABSOLUTE PRESSURE TRANSMITTER PIPING



COLT TO BOOK END TYPE FIXTURE TORGE TO 50 to 55 FT. LBS.

DETAIL 4
WALL CR COLUMN MOUNTING

MOUNT INSTRUMENTS USING U BOLT SUPPORT PROVIDED BY VENDOR, WHEN POSITIONED, WELD 'U' BOLT TO 2' PIPE

FOXBORO : USE MODIFIED MOUNTING : BRACKET SHOWN IN FIGURE-7.

# FIGURE 3

TORQUE REGMTS

ROSEMOUNT TRANSMITTER SEE FIG. 8

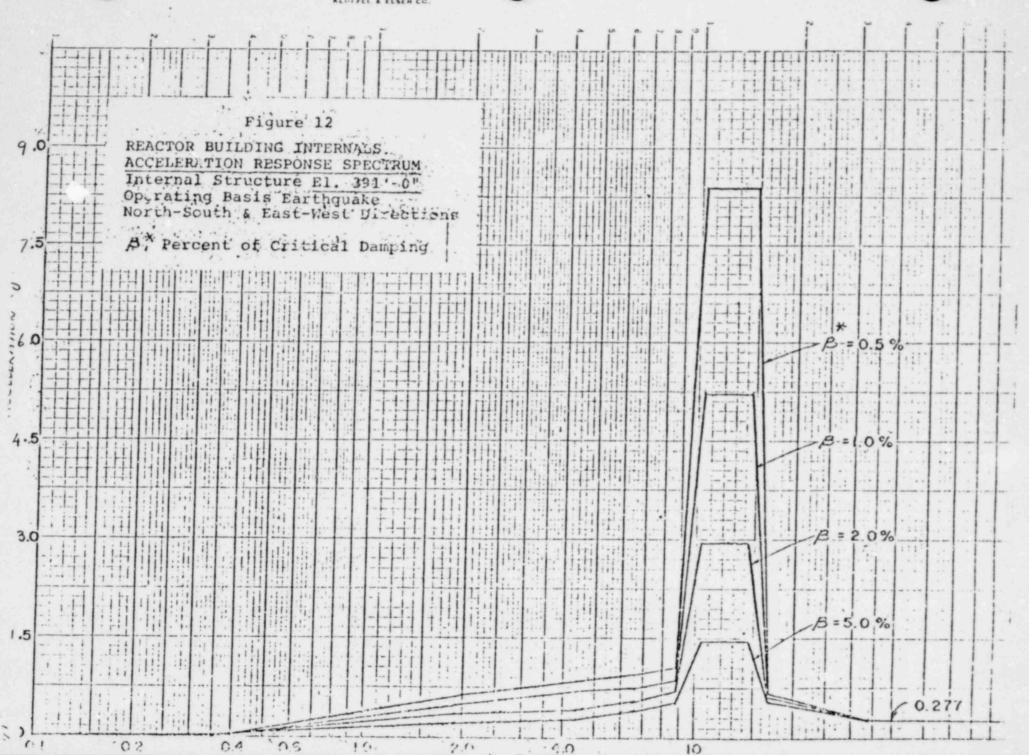
FOXBORD TRANSMITTER STRAP WELKH TIGHTEN. 19 FELLS
F & P TRANSMITTER SECURELY TIGHTEN NOT APPLICABLE

\* USE SILICONE VACUUM GREASE FOR CEALING O'RING AND COVER WHENEVER COVER IS REMOVED & REINSTALLED

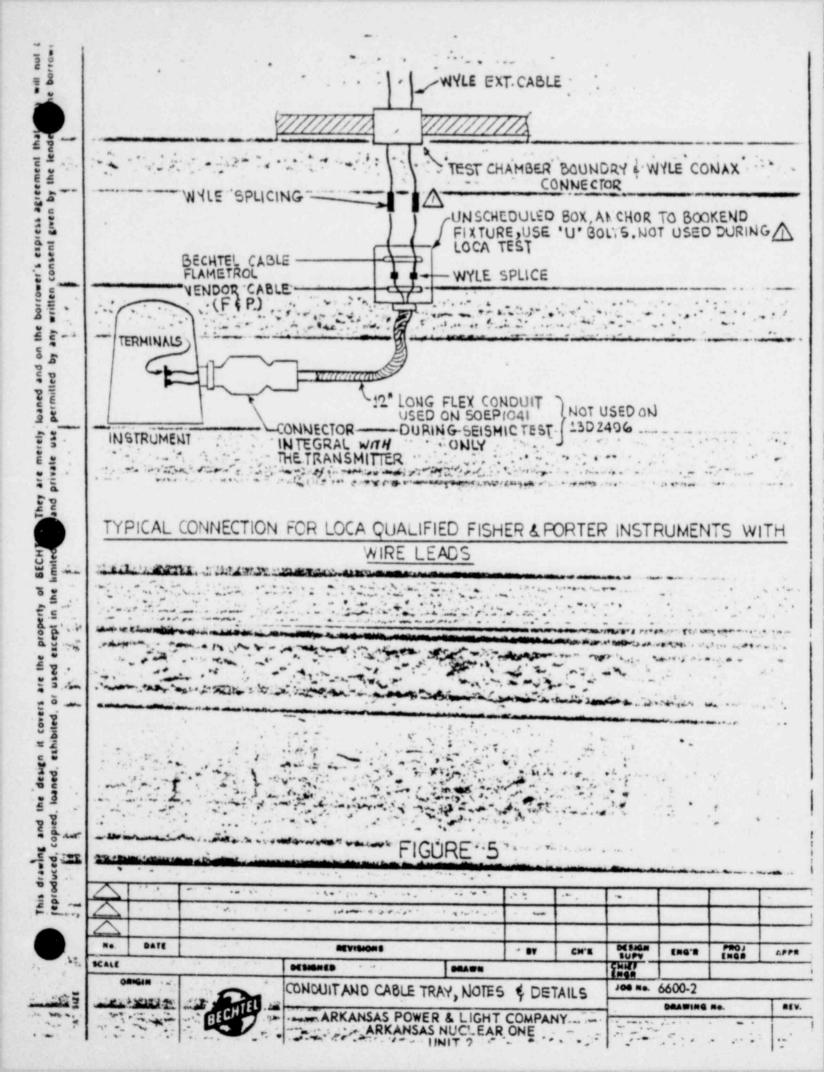
THRU BOLTS

N.A.

19 Ft Lbs



REUFFEL & LINIA CO.						
F						
Figure 28						
REACTOR BUILDING VERTICAL ACCELERATION MESPONSE						
Base Giab El 336'-6"						
Operating Basis Earthquake						
©4 ************************************						
E RATION	# 0.5 %					
WO3	/ B = 1.0%					
ACC	A = 2.0%					
, oz	B = 5.0%					
	0.067					
0.1	0.067					



(with minor zero correction) but to meet the electrical requirements the breather drain must be at the bottom

Overhead clearance for cover removal is required. Also, clearance on the left side of the Transmitter is required to remove the oscillator-amplifier module (additional space for ease in servicing is preferred). The electrical and pressure connections enter the bottom of the instrument as shown in Figure 3.

If a diaphragm seal is required, it is factory connected to the Transmitter. Dimensions of the more common type seals are shown in Figure 4 (extracted from F&P drawing OD-50-1030). Care must be exercised when handling a Transmitter with a protector. Be careful to; 1) uncoil the tubing without kinking it or bending it sharply; and, 2) support the tubing to protect it from foreign objects. Do not cut the capillary tubing; coil excess tubing and tie it adjacent to the Transmitter. Do not run the tubing thru temperature extremes as this could affect the accuracy of the Transmitter.

If the general purpose Transmitter is to be mounted on the face of a panel or on the surface of a wall, use the four holes referenced on the outline and mounting dimension drawing. If the bracket for 2 inch horizontal or vertical pipe mounting is furnished, refer to Figure 5 for the method of installation. The bracket and attaching hardware are packaged separately from the Transmitter. Insert the two carriage bolts in the appropriate bracket holes before attaching it to the Transmitter.

For both wall and bracket mounting of the general purpose Transmitter, the electrical terminal block cover must be removed to expose two of the mounting holes. The mounting holes in the terminal block area are counterbored and require the use of fillister head screws.

### NOTE

When attaching the pipe mounting bracket to the general purpose Transmitter, enter the bolts under the pressure connection from the back of the bracket; the bolts in the electrical terminal block area enter from the front.

When the pipe mounting bracket is attached to the rear of the explosion proof Transmitter, use the four 1/4-28 tapped holes on the rear of the casting for attachment.

### III. Electrical

Both the general purpose and the explosion proof Transmitter have a 1/2 inch NPT (Internal) conduit entrance connection on the bottom of the instrument. Each has a terminal barrier strip internally mounted for connection of the transmission lines and an equipment ground. To expose the terminals of the general purpose Transmitter, the gasketed metal cover secured by four screws must be removed. The terminals of the explosion proof Transmitter are exposed by removing the main cover. Wiring in either case should conform to the applicable electrical code.

The Transmitter may, when specifically ordered, be furnished in a general purpose enclosure for intrinsically safe systems for Class I, Groups C&D,

Division 1. For this service, the oscillator-amplifier is sealed in a potting compound, the capacitor normally used across the + and — terminals is removed and diodes are connected across the force motor terminals. Connections in this Transmitter are made directly to the terminal barrier strip.

The Transmitter is essentially a current regulating device. If a voltage measuring device is to be mated to the Transmitter, provide resistance across the input terminals of the receiving device to convert the current to a voltage.

Refer to Figure 6 for three typical interconnection diagrams. Illustration A shows the Transmitter connected to an F&P Model 51-1320 Recorder that has an internal 24v dc power supply. The Recorder is essentially a voltage sensitive device, thus a resistor, labeled Rx. is connected across the input terminals to convert the current flow to a voltage. The control loop requires a single signal earth ground. Terminal G in the Transmitter is an equipment ground only.

Illustration B shows the Transmitter connected to a piece of equipment manufactured by other than F&P. Consult the manufacturers' instructions for their terminal identification. Notice that an external power supply is required. A signal earth ground may or may not be required.

### NOTE

Normally a power supply is included as an integral component of F&P electronic receiving equipment to operate a 4-20 ma system. Check the specification of the instruments in the loop for the load requirements.

The Transmitter normally operates above the ground potential with only the metal frame being grounded. If the control loop is made up of all F&P equipment, a single signal earth ground is required as indicated. When used with other manufacturer's equipment, either side of the Transmitter output may be grounded.

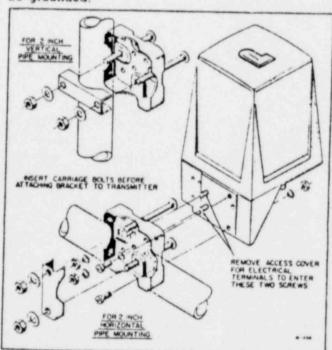


FIGURE 5 ATTACHING THE TRANSMITTER
MOUNTING BRACKET
FISCHER & PORTE

### Standard Specifications

Measurement Range:

Capsule	psi Absolute			MPa Absolute		
Designation	Min.	Max.	Range Limits	Min.	Max.	Range Limits
A B C	10 20 40	80 200 400	0 to 100 0 to 350 0 to 750	0.07 0.14 0.3	0.56 1.4 2.8	0 to 0.7 0 to 2.4 0 to 5

Optional spring attachment permits pressure span to be elevated. Elevation plus span cannot exceed upper range limit of capsule (100, 350, or 750 psia; or 0.7, 2.4, or 5 MPa abs.).

Process Connection:

Accuracy:

1/2 NPT female

Output Range:

t0.5% of span 10-50 mA dc into 600 n +10%, -20% 4-20 mA de into 0 to 650 n at 24 V de (for loop resistance at other supply voltages, see Instruction MI 20-126)

Working Temperature Limits

for Transmitter Body: Ambient Temperature Limits

-40 to +250°F (-40 to +120°C)

for Amplifier:

Power Supply:

-40 to +180°F (-40 to +80°C) 63-100 velts de (10-50 mA output) 24-50 volts de (4-20 mA output)

5 W maximum

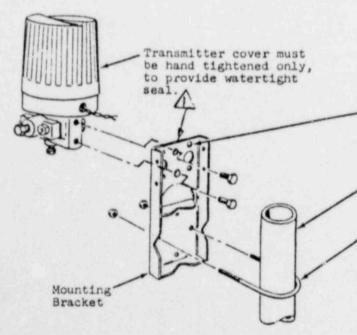
Power Consumption: Electrical Connection:

Two 5 ft. (1.5 m) leads from conduit hole tapped for 1/2 NPT (standard), or transmitter-mounted junction box (optional)
20 pounds (9 kg)

Weight: Wetted Parts:

Wetted Parts: Type 316 stainless steel Topworks Cover: Cast aluminum, watertight, NEMA IV construction

### - INSTALLATION -FOXBORO Transmitter Mounting



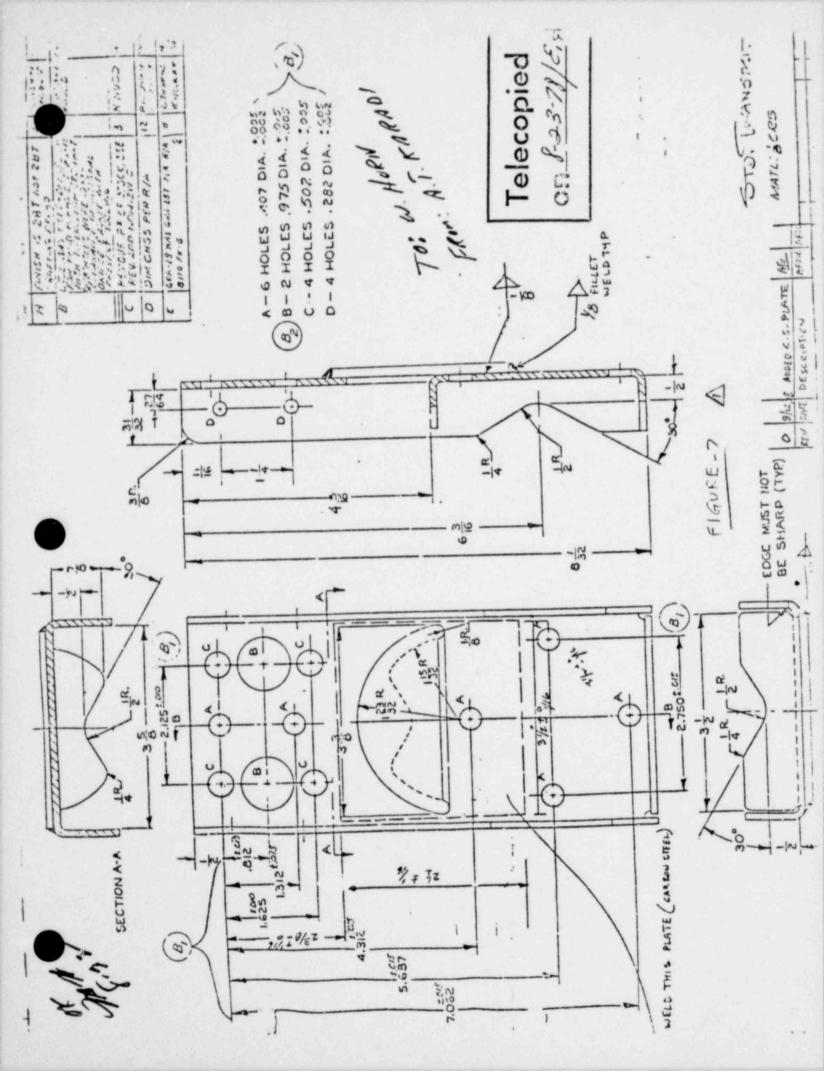
Transmitter may be mounted in any position.

Either set of mounting holes can be used.

After transmitter is mounted, tighten all bolts.

Pipe can be clamped to another pipe, or flanged and bolted to floor or wall.

U-bolt se. es assembly to 2" pipe. U-bolt can be revolved 90 for use with horizontal for use with horizontal pipe.



# PANEL MOUNTING BRACKET SHOWN IN TYPICAL MOUNTING CONFIGURATION

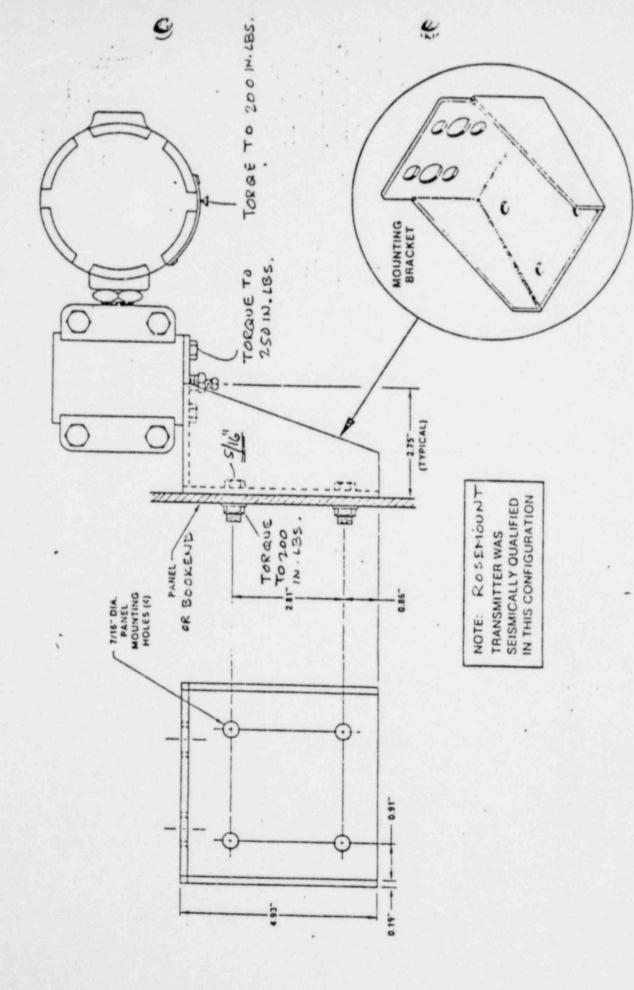
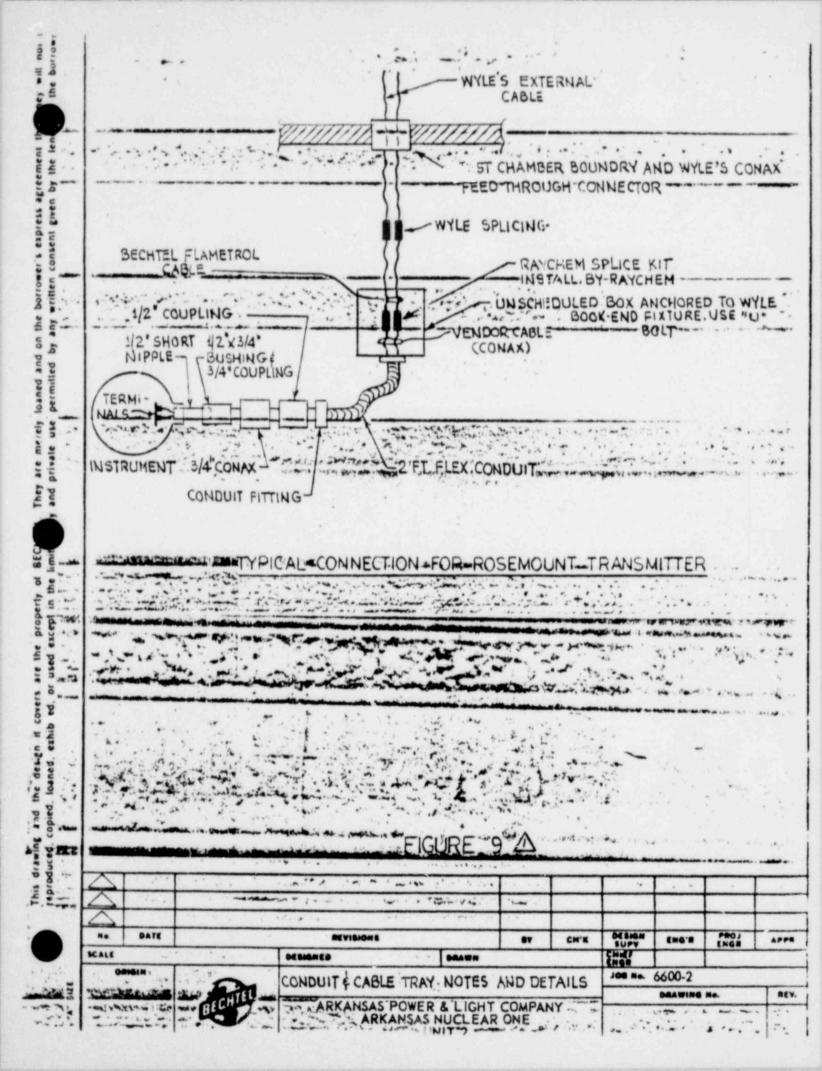


FIGURE & A



SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO.	157
PAGE NO.	

### APPENDIX II

CHART RECORDS DURING IRRADIATION TEST

	-	-	_			-		-		
	SCIE	NT	IFIC	SERV	ICES		SYST	EMS	GRO	QUE
d	WES	TES	NO O	PERA	TION	45,	NO	CO	FAC	ILITY

REPORT NO	26304
PAGE NO	158

### APPENDIX III

CHART RECORDS DURING SEISMIC TEST

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO	159

APPENDIX IV

CHART RECORDS DURING SEISMIC TEST

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT	NO	26304
PAGE NO		160

### APPENDIX V

CHART RECORDS DURING SEISMIC TEST

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO.	161

APPENDIX VI

CHART RECORDS DURING SEISMIC TEST

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO	162

APPENDIX VII

CHART RECORDS DURING SEISMEC TEST

(Not included in this test report; transmitted separately to Bechtel)

SCIENTIFIC SERVICES & SYSTEMS GROUP WESTERN OPERATIONS, NORCO FACILITY

REPORT NO	26304
PAGE NO	163
PAGE NO.	

APPENDIX VIII

CHART RECORDS DURING SEISMIC TEST

(Not included in this test report; transmitted separately to Bechtel)