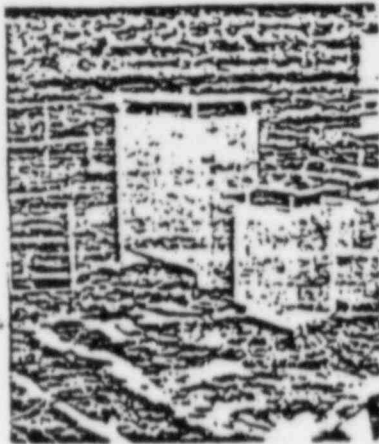


Test Report



REPORT NO. 45000-1

WYLE JOB NO. 45999

CUSTOMER
P. O. NO. 28214

PAGE 1 OF 307 PAGE REPORT

DATE March 23, 1982

SPECIFICATION (S) See References
in Section 7.0

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10090, C.O. #6299

1.0 CUSTOMER Power Conversion Products

ADDRESS 42 East Street, Crystal Lake, Illinois 60014

2.0 TEST SPECIMEN AC Line Regulators, 5, 10 and 15 KVA (Model Numbers RTF-480/125-5,
RTF-480/120-10, RTF-480/120-15, respectively)

3.0 MANUFACTURER Power Conversion Products

4.0 SUMMARY

Three (3) AC Line Regulators, hereinafter called the specimens, were subjected to a Seismic and Environmental Test Program as required by the Power Conversion Products (PCP) Purchase Order No. 28214 and Wyle Laboratories' Test Procedure 543/3148-6/WB, Revision A, dated January 21, 1982. The test program was performed on February 8, 9, 17-21, 23, 25 and 26 and March 8, 9, 11 and 12, 1982.

The test program consisted of radiation exposure (10 and 15 KVA only), a 100-hour Burn-In Test (50 hours unloaded and 50 hours at full load), a Pre- and Post-Seismic Stress Test (8 hours at 122°F, 95% relative humidity and 8 hours at 32°F), and a Seismic Simulation Test. Functional tests were conducted by the PCP Technical Representative before and after each phase of testing.

STATE OF ALABAMA }
COUNTY OF MADISON }

Ala. Professional Eng.
Reg. No. 8256

Flavious B. Johnson

Being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

SUBSCRIBED and sworn to before me this 13 day of March, 19 82
Flavious B. Johnson

Notary Public in and for the State of Alabama's large.

My Commission expires June 13, 19 83

Wyle Laboratories has liability for damages of any kind to person or property, including contents of electric business equipment, resulting from failure to provide the services covered by this report.

PREPARED BY E. D. Swanson

APPROVED BY H. D. Jordan

H. D. Jordan

WYLE Q. A. T. Stinson

T. Stinson

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP
HUNTSVILLE, ALABAMA

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY F. Wilson

DATE 6/21/83

CUSTOMER Duquesne Light

PCP JOB 21102

MODEL RTF-120/120-5 SERIAL 21102-301

1st XX SUBSQ

TAG: REGAVITRS2-3C

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN291, IN281</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288, IN259</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>168.4</u> TO <u>35.4</u>
4.4	REGULATION	SEE REVERSE SIDE
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>60.0</u> OUTPUT VOLTAGE <u>98.1</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>52.0</u> INPUT CURRENT <u>45.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED - YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u> Audiable noise at 5 feet: <u>55 db</u> , amb. <u>55 db</u>

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

* I Hereby Certify That This Test Data Is Correct And Is Authorized To Ship.
successor to rectifier products division of Fansteel Inc. Michael B. G. Date 6/23/83

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #28V-337
 O.F.E. #10080, C.O. #6289

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson

DATE 6/21/83

CUSTOMER: Duquesne Light

PCP JOB 21102

MODEL RTF-120/120-5 SERIAL 21102-501

1st XX SUBSC

TAG: REG*VLTBS2-3C

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN295, IN297</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN291, IN281</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288, IN259</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1.	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>168.4</u> TO <u>85.4</u>
4.4	REGULATION	
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>60.0</u> OUTPUT VOLTAGE <u>98.1</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>52.0</u> INPUT CURRENT <u>45.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

* I Hereby Certify That This Test Data Is Correct And Is Authorized To Ship.

successor to rectifier products division of Fansteel Inc. Michael A. [Signature] Date 6/23/83

Duquesne Light Company - 2
 Beaver Valley Power Station - 2
 J.O. 12241 P.O. #28V-337
 O.P.E. #10680, C.O. #6289

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson

DATE 6/21/83

CUSTOMER Duquesne Light

PCP JOB 21102

MODEL RTF-120/120-5 SERIAL 21102-601

1st SUBSO

TAG: REG*VITBS2-4C

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN297</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN291, IN281</u>		
OUTPUT VOLTS	<u>IN295</u>		
OUTPUT AMPS	<u>IN288, IN259</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>165.2</u> TO <u>88.3</u>
4.4	REGULATION	
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>55.5</u> OUTPUT VOLTAGE <u>104.4</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>60.0</u> INPUT CURRENT <u>32.4</u>
4.8	SURGE WITHSTAND TEST	PERFORMED - YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #28V-337
 O.P.E. #10080, C.O. #6289

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

" I Hereby Certify That This Test Data Is Correct And Is Authorized To Ship.

successor to rectifier products division of Fansteel Inc. Michael [Signature] Date 6/23/83

HEAT RISE TEST DATA



power conversion products inc. BY K. Wilson DATE 6/22/83

CUSTOMER Duquesne Light PCF JOB 21102

MODEL RTF-120/120-5 SERIAL NO. 21102-601 TAG NO. REG*VITBS2-4C

INSTRUMENT USED IN298 THERMOCOUPLE TYPE Iron US. Constantan

TEMPERATURES ARE IN °C RISE ABOVE AMBIENT

TIME	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	TC1	TC2	TC3	TC4	TC5	TC6	AMB °C
0930	120	121	46	10	17	21	35			24.8
1030				21	22	22	54			25.3
1130				30	28	39	67			25.5
1230				36	33	42	76			25.0
1330				38	34	43	80			25.0
1430				41	36	45	84			31.0
1530				41	36	44	84			30.1
1630				41	37	44	84			27.0
1645				39	34	42	83			26.2
1700				39	33	41	83			26.6

THERMOCOUPLE LOCATION
 TC1= Reactor
 TC2= CR4
 TC3= Choke
 TC4= Transformer
 TC5=
 TC6=

AUTHORITY TO SHIP BY Michael P. A. H. DATE 6/23/83

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #2BV-337
 O.F.E. #10080, C.O. #6289

HEAT RISE TEST DATA



power conversion products inc. BY K. Wilson DATE 6/22/83

CUSTOMER Duquesne Light PCP JOB 21102

MODEL RTF-120/120-5 SERIAL NO. 21102-601 TAG NO. REG*VITBS2-4C

INSTRUMENT USED IN298 THERMOCOUPLE TYPE

TEMPERATURES ARE IN °C RISE ABOVE AMBIENT

6/22 TIME	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	TC1	TC2	TC3	TC4	TC5	TC6	AMB °C
17:50	120	120	0	---	START	---				25
6/23 6:00	120	120	0	110	53	43	45			25
6:50	"	"	0	110	53	43	45			25
7:00	"	"	0	110	53	43	45			25

THERMOCOUPLE LOCATION

TC1= Reactor	TC4= Transformer
TC2= CR4	TC5=
TC3= Choke	TC6=

AUTHORITY TO SHIP BY Michael P. B... DATE 6/23/83

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 122-1, P.O. #2BV-337
 O.F.E. #10080, C.O. #6289

STONE & WEBSTER ENGINEERING CORPORATION

SUPPLIER'S DOCUMENT DATA FORM

BEAVER VALLEY POWER STATION - UNIT 2
DUQUESNE LIGHT COMPANY
J.O. 12241

REVIEW & RETURN TO SUPPLIER REQUIRED (E1)

FOR INFORMATION ONLY - NO REVIEW REQUIRED (E1)

SUPERSEDES S & W FILE NO. (E1) (25-34) (35-38)

N
A
M
E
RESP. ENG. S. KAMPANELLAS DEPT./DIV. 39 (E1)
REVIEWER G. FLAGG DEPT./DIV. 39 (E1)

REMARKS (LIMIT TO 22 CHARACTERS & BLANKS) (53-74)
(CODES OR SPECIAL REQUIREMENTS)

S & W EQUIP. I.D. CODE (E1) (25-38) AREA DESIGNATION CODES (E1) (75-80)

DATE TO REVIEWER (E1) 6/28/83 REQUIRED RETURN DATE (E1) 7/13/83

MFR'S DOC. NO. (E1) (LIMIT TO 24 CHARACTERS & BLANKS) (37-60)
(INCLUDE DOC. REV. OR DATE)

REVIEW STATUS (R)

21102-101, 201, 301, 401

APPROVED AS DEFINED IN SPECIFICATION
APPROVED AS REVISED
UNACCEPTABLE

MFR'S NAME (E1) (LIMIT TO 20 CHARACTERS & BLANKS) (61-80)
POWER CONVERSION PROD.

DATE MONTH DAY YR(25-30) DOC TYPE (31) MAX DAYS (32-33)
REC'D (C) 06 24 83 (E1) E (E1) 15

REVIEWER'S SIGNATURE (R) DATE 7-12-83
G.O. Flagg

FUNCTIONAL TITLE (E1) (LIMIT TO 44 CHARACTERS & BLANKS) (37-80)

RESPONSIBLE ENGINEER'S DATE STAMP (E2)

TEST DATA
10KVA ISOLATING VOLT. REG.

NOTED JUL 12 1983
(C) PROJECT CLERK (R) REVIEWER
(E1) RESPONSIBLE ENGINEER PRIOR TO REVIEW
(E2) RESPONSIBLE ENGINEER AFTER REVIEW

S & W FILE NO. (E1) (C) (11-20) (21-24)

TYPE CODE SEQUENCE NO. (C)
A3-220^{E1} FL8307130007

2701340337009A
JOB ORDER NO. 12241 00

REVIEWER COMMENTS:

NO COMMENT

JUL 12 1983

FILMED



power conversion products inc.

Stone & Webster Engineering Corporation	
<input checked="" type="checkbox"/>	APPROVED AS DEFINED IN THE SPECIFICATIONS
<input type="checkbox"/>	UNACCEPTABLE
<input type="checkbox"/>	APPROVED AS REVISED AS DEFINED IN THE SPEC.
<input checked="" type="checkbox"/>	REVIEWED
I.O. No.	<u>12241</u>
SPEC. No.	<u>2BV-337</u>
DATE	<u>7/12/83</u>
BY <u>S. Kamporelly</u>	

CERTIFICATE OF CONFORMANCE

DATE June 23, 1983

TO Duquesne Light Company (Stone & Webster Eng.)

ADDRESS P.O. Box 186

CITY Shippingport STATE P.A. ZIP 15077

It is hereby certified that all the materials in the quantities as called for in purchase order 2BV-337 PCP FO# 21102 are in conformance with the requirements, specifications, and drawings listed on this order.

Part #	Quantity	Description
RTF-120/120-10	4	INSULATION TRANSFORMER
		S/N: 21102-101 Tag: REG*VITBS2-1B
		S/N: 21102-201 Tag: REG*VITBS2-2B
		S/N: 21102-301 Tag: REG*VITBS2-3B
		S/N: 21102-401 Tag: REG*VITBS2-4B

Linda D. Kasprzak

Linda D. Kasprzak
Notary Public

My Commission Expires
5-14-86

Michael Bahr

Michael Bahr
Manager, Quality Assurance

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289



power conversion products inc.

WELDING CERTIFICATE OF COMPLIANCE

This is to certify that the SEISMIC CABINETS ordered by Duquesne Light Company on Purchase Order #2BV-337 have been fabricated using the same type of base material and weld filler material as that which was used on the qualification unit. The welding procedures and acceptance criteria are also the same as that used on the qualification unit.

Model	Quantity	Description
RTF-120/120-10	4	INSULATION TRANSFORMER
		S/N: 21102-101 Tag: REG*VITBS2-1B
		S/N: 21102-201 Tag: REG*VITBS2-2B
		S/N: 21102-301 Tag: REG*VITBS2-3B
		S/N: 21102-401 Tag: REG*VITBS2-4B

POWER CONVERSION PRODUCTS

By Michael Behr
Michael Behr
Manager, Quality Assurance

Linda D. Kasprzak
Linda D. Kasprzak
Notary Public

My commission expires 5/14/86

Duquesne Light Company
Beaver Valley Power Station - Unit 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289



423 Denniston Court
Wentz, Illinois 60090
312/537-5065

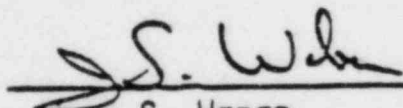
Fabricators of Metal Products

**Weber
Industries, Inc.**

CERTIFICATE OF COMPLIANCE

This is to certify that the SEISMIC CABINETS
ordered by POWER CONVERSION PRODUCTS, INC.
on Purchase Order # 27309 has been welded by a
welder certified in accordance with the American Welding
Society Specification #D1.1. The test weld has been
x-rayed and approved by the Magnetic Inspection Laboratories,
Rosemont, Illinois. Records of this test are available from
Weber Industries, Inc. All material appropriated for the
noted purchase order meets or exceeds POWER CONVERSION
PRODUCTS INC specifications for Dwg. # F55-2992-02.

WEBER INDUSTRIES, INC.

By 
JOHN S. WEBER

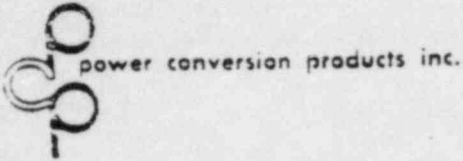
Title PRESIDENT

Date 9-23-82

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289

JSW/mp

10/81




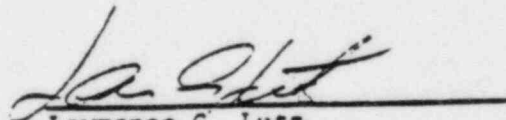
June 1, 1993

REF: Duquesne Light Company
Beaver Valley Power Station - Unit 2
J.O. 12241
P.O. 2EV-337
O.F.E. #10080
C.O. #6289

It is hereby certified that this equipment conforms to Power Conversion Products Inc. Qualification Report No. 45999-1 from Wyle Laboratories dated March 23, 1982.

MODEL	QTY	DESCRIPTION
RTF-120/120-10	4	ISOLATION TRANSFORMER
		S/N: 21102-101 Tag: REG*VITBS2-1B
		S/N: 21102-201 Tag: REG*VITBS2-2B
		S/N: 21102-301 Tag: REG*VITBS2-3B
		S/N: 21102-401 Tag: REG*VITBS2-4B


Michael Bear
Manager, Quality Assurance


Lawrence G. Lutz
Manager, Product Design

Test Report



REPORT NO. 45000-1

WYLE JOB NO. 45099

CUSTOMER
P. O. NO. 28214

PAGE 1 OF 307 PAGE REPORT

DATE March 23, 1982

SPECIFICATION(S) See References

in Section 7.0

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289

1.0 CUSTOMER Power Conversion Products

ADDRESS 42 East Street, Crystal Lake, Illinois 60014

2.0 TEST SPECIMEN AC Line Regulators 5, 10 and 15 KVA (Model Numbers RTF-480/125-5, RTF-480/120-10, RTF-480/120-15, respectively)

3.0 MANUFACTURER Power Conversion Products

4.0 SUMMARY

Three (3) AC Line Regulators, hereinafter called the specimens, were subjected to a Seismic and Environmental Test Program as required by the Power Conversion Products (PCP) Purchase Order No. 28214 and Wyle Laboratories' Test Procedure 543/3148-6/WB, Revision A, dated January 21, 1982. The test program was performed on February 8, 9, 17-21, 23, 25 and 26 and March 8, 9, 11 and 12, 1982.

The test program consisted of radiation exposure (10 and 15 KVA only), a 100-hour Burn-In Test (50 hours unloaded and 50 hours at full load), a Pre- and Post-Seismic Stress Test (8 hours at 122°F, 95% relative humidity and 8 hours at 32°F), and a Seismic Simulation Test. Functional tests were conducted by the PCP Technical Representative before and after each phase of testing.

STATE OF ALABAMA }
COUNTY OF MADISON }

Ala. Professional Eng.
Reg. No. 8256

Flavours R. Johnson

, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

SUBSCRIBED AND sworn to before me this 10 day of April, 19 82

Therianth. Dent

Notary Public in and for the State of Alabama

My Commission expires June 13, 19 83

Wyle shall have no liability for damages of any kind to persons or property, including losses or consequential damages, resulting from Wyle's providing the services covered by this report.

PREPARED BY E. D. Sweetney

APPROVED BY H. D. Jordan
H. D. Jordan

WYLE Q. A. T. Stinson
T. Stinson

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP
HUNTSVILLE, ALABAMA

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson DATE 6/22/83

CUSTOMER Duquesne Light PCP JOB 21102

MODEL RTF-120/120-10 SERIAL 21102-101 1st SUBSO XX

TAG: REC*VITDS2-1B

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN281</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>147.9</u> TO <u>86.0</u>
4.4	REGULATION	
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>124.0</u> OUTPUT VOLTAGE <u>103.2</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>124.2</u> INPUT CURRENT <u>116.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	15 min. short circuit test Reactor 6°, Transformer 14°, Amb. 30° SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #28V-337
 O.F.E. #10080, C.O. #6289

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

" I Hereby Certify That This Test Data Is Correct And Is Authorized To Ship.
 successor to rectifier products division of Fanssteel Inc. Michael [Signature] Date 6/23/83

HEAT RISE TEST DATA



power conversion products inc.

BY WK

DATE 6/3/83

CUSTOMER Duquesne Light

PCP JOB 21102

MODEL RTF 120/120/10

SERIAL NO. 21102 -101

TAG NO. REC*VITBS2-1B

INSTRUMENT USED IN298

THERMOCOUPLE TYPE Iron & Constantan

TEMPERATURES ARE IN °C RISE ABOVE AMBIENT

TIME	Start 8:00am INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	TC1	TC2	TC3	TC4	TC5	TC6	AMB °C
1:30	120	120	82	79	45	64	43			29
2:30				85	44	62	43			32
3:30				89	44	63	43			33
4:30				92	46	65	45			28
5:00				92	45	66	45			26
5:30				92	45	66	45			26
5:45						66	45			26

THERMOCOUPLE
LOCATION

TC1= T1

TC4= CR4

TC2= L2 Choke

TC5=

TC3= L1 Reactor

TC6=

AUTHORITY TO SHIP BY

Michael P. Baker

DATE

6/6/83

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289

HEAT RISE TEST DATA



power conversion products inc. BY MT DATE 6/3/83

CUSTOMER Duquesne Light PCP JOB 21102

MODEL RTF 120-120-10KVA SERIAL NO. 21102-101 TAG NO. REG*VITBS2-1B

INSTRUMENT USED IM290 THERMOCOUPLE TYPE Iron & Constantan

TEMPERATURES ARE IN °C RISE ABOVE AMBIENT

Start 9:00am No Load

TIME	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	TC1	TC2	TC3	TC4	TC5	TC6	AMB °C
8:00	120	120	NL							23°
9:00	137.5			13	23	32	51			22°
9:30	137.5			18	30	36	55			22
10:00	132			22	34	104	54			22
10:30	132			26	36	109	56			22
11:00	132			29	41	115	57			23
11:30				32	41	116	59			23
12:00				33	41	118	60			23
12:30				35	42	121	60	6°		23
1:00				37	42	121	60			24
1:30				39	43	123	61			23
2:00				41	43	123	61			23
2:30				42	44	124	61	7°		23
3:00				43	44	124	61	7°		24
3:30				44	44	124	61	7°		24
4:00				44	44	124	61	7°		24

THERMOCOUPLE LOCATION

TC1= T1

TC4= CR4

TC2= L2 Choke

TC5= A2 Heatsink

TC3= L1 Reactor

TC6=

AUTHORITY TO SHIP BY

Michael B. ...

DATE 6/6/83

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #2BV-337
 O.F.E. #10080, C.O. #6289

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson DATE 6/21/83
 CUSTOMER Duquesne Light PCP JOB 21102
 MODEL RTF-120/120-5 SERIAL 21102-201 1st XX SUBSQ XX
 TAG # REG *VITBS2-2B TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN291, IN281</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288, IN259</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>1-7.6</u> TO <u>90.3</u>
4.4	REGULATION	SEE REVERSE SIDE
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>122.0</u> OUTPUT VOLTAGE <u>104.1</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>122.0</u> INPUT CURRENT <u>108.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

" I Hereby Certify That This Test Data Is Correct And Is Authorized To Ship.
 successor to rectifier products division of Fans'el Inc. Michael [Signature] Date 6/23/83

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 122-1, P.O. #28V-337
 O.P.E. #10080, C.O. #6289

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson

DATE 6/22/83

CUSTOMER Duquesne Light

PCP JOB 21102

MODEL RTF-120/120-10 SERIAL 21102-301

1st SUBSQ XX

TAG: REG*BITDST-3B

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

<u>DESCRIPTION</u>	<u>INSPECTION NO.</u>	<u>DESCRIPTION</u>	<u>INSPECTION NO.</u>
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN281</u>		
OUTPUT VOLTS	<u>IN297</u>		
OUTPUT AMPS	<u>IN288</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN241</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

<u>SPEC. PARA.</u>	<u>DESCRIPTION</u>	<u>TEST DATA</u>
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>149.0</u> TO <u>85.1</u>
4.4	REGULATION	
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>122.0</u> OUTPUT VOLTAGE <u>107.7</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>116.0</u> INPUT CURRENT <u>104.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED - YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

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Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #2BV-337
 O.F.E. #10080, C.O. #6289

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson

DATE 6/20/83

CUSTOMER Duquesne Light

PCP JOB 21102

MODEL RTE-120/120-10 SERIAL 21102-401

1st SUBSQ XX

TAG: REC*VITES2-4B

TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

<u>DESCRIPTION</u>	<u>INSPECTION NO.</u>	<u>DESCRIPTION</u>	<u>INSPECTION NO.</u>
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN281</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

<u>SPEC. PARA.</u>	<u>DESCRIPTION</u>	<u>TEST DATA</u>
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> - OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>150.0</u> TO <u>36.7</u>
4.4	REGULATION	SEE REVERSE SIDE
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>120</u> OUTPUT VOLTAGE <u>103.0</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>120</u> INPUT CURRENT <u>109.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED . YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u> Audible noise at 5 feet: <u>56 db</u> , ambient 56 db INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

Duquesne Light Company
 Beaver Valley Power Station - 2
 J.O. 12241, P.O. #28V-337
 O.P.E. #10080, C.O. #6289

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 successor to rectifier products division of Fans'el Inc. Michael P. [Signature] Date 6/22/83

FINAL INSPECTION DATA - PS-79-3



power conversion products inc. BY K. Wilson DATE 6/20/83

CUSTOMER Duquesne Light PCP JOB 21102

MODEL RTF-120/120-5 SERIAL 21102-401 1st XX SUBSC

TAG: REC*VITBS2-4B TESTED ON BENCH # 2

DESCRIPTION OF INSTRUMENTATION

DESCRIPTION	INSPECTION NO.	DESCRIPTION	INSPECTION NO.
INPUT VOLTS	<u>IN295</u>	WATTMETER	<u>IN114</u>
INPUT AMPS	<u>IN291</u>		
OUTPUT VOLTS	<u>IN294</u>		
OUTPUT AMPS	<u>IN288</u>	CURRENT TRANSFORMER	<u>IN241</u>
HI-POT TESTER	<u>IN178</u>		<u>IN240</u>
DISTORTION ANALYZER	<u>IN272</u>		

TEST DATA

SPEC. PARA.	DESCRIPTION	TEST DATA
4.1	DIELECTRIC STRENGTH	INPUT TO GROUND <u>1500</u> , INPUT TO OUTPUT <u>1500</u> OUTPUT TO GROUND <u>1500</u>
4.2	CIRCUIT OPERATION	VERIFIED <u>XX</u>
4.3	ADJUSTMENT RANGE	OUTPUT VOLTS <u>150.0</u> TO <u>96.7</u>
4.4	REGULATION	
4.5	HARMONIC DISTORTION	SEE REVERSE SIDE
4.6	MAXIMUM OUTPUT CURRENT TEST	MAXIMUM CURRENT <u>120</u> OUTPUT VOLTAGE <u>103.0</u>
4.7	SHORT CIRCUIT TEST	OUTPUT CURRENT <u>120</u> INPUT CURRENT <u>108.0</u>
4.8	SURGE WITHSTAND TEST	PERFORMED YES <u>XX</u> NO <u> </u>
4.9	CONVERSION EFFICIENCY AND POWER FACTOR	SEE REVERSE SIDE
4.10	HIGH VOLTAGE SHUTDOWN	TRIP VOLTAGE <u>N/A</u>

INPUT CONDITIONS FOR TESTS 4.3, 4.6, 4.7, 4.8, 4.9

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successor to rectifier products division of Fansteel Inc. Michael B. L. Date 6/22/83

Duquesne Light Company
Beaver Valley Power Station - 2
J.O. 12241, P.O. #2BV-337
O.F.E. #10080, C.O. #6289

ATTACHMENT 12

Response to Outstanding Issue 197 of the
Beaver Valley Power Station Unit No. 2
Draft Safety Evaluation Report

Draft SER Section 8.3.3.3.2: Separation of Containment Electrical Penetrations

Section 8.3.1.4 (part 2, Item 2b[5]) of the FSAR stated that containment electrical penetrations meet separation requirements of currently approved design procedures which comply with the intent of IEEE Standard 384-1981 for limited hazard areas. Section 5.5 of IEEE Standard 384-1974 (which is the currently approved NRC guideline for this subject) requires that redundant penetrations be widely dispersed around the circumference of the containment. Recent designs, approved by NRC on this subject, locate redundant electrical penetrations in different rooms or on opposite sides of containment. The Beaver Valley design, however, locates redundant penetrations in a single room in a 21 by 5 matrix with eight feet (center-to-center) between redundant penetrations. The Beaver Valley design does not meet the requirements nor the intent of IEEE Standard 384-1974 (or IEEE Standard 384-1981) as stated in the FSAR.

In response, the applicant, by Amendment 3 to the FSAR, stated that containment electrical penetrations are physically separated over a 120-degree arc of the containment and are located on two distinct building elevations. This statement contradicts the above design description for Beaver Valley Penetrations. This item will be pursued with the applicant and the results of the staff review will be reported in a supplement to this report.

Response:

Refer to revised Section 8.3.1.4 for a description of the electrical penetration cable separation. The electrical penetrations are designed with a minimum 4'-0" horizontal and vertical separation on centerlines as they are arranged in a 120 degree arc of the containment on two elevations starting with 735'-6" and 755'-6".

The penetrations are also arranged (outside containment) in separate cable vault room groupings defined by distinct fire areas:

CV-1 735'-6" Class 1E (orange, red, and blue) and non-Class 1E penetrations

CV-2 735'-6" Class 1E (purple and green) and non-Class 1E penetrations

CV-3 755'-6" Class 1E (yellow and white) and non-Class 1E penetrations

This arrangement (outside containment) provides for distinctive groupings of Class 1E penetrations to their redundant counterparts.

a different color safety tray, with the exception of O to R and P to W, which are classified within the same safety zone, respectively.

b. Class 1E equipment

- 1) Redundant dc system components (O, P, B, Y) are located in separate, independent areas of the service building (safety class structure). These components include the batteries, battery chargers, dc switchgear, and dc switchboards.
- 2) Redundant vital bus (120 V ac) system components (R, W, B, Y) are located in independent areas of the service building. Components include inverters, static switches, and distribution panels.
- 3) Safety class switchgear (4,160 V and 480 V) are physically separated and are located in separate rooms in the service building.
- 4) Safety class MCCs and distribution panels are physically separated and located in independent areas of safety class structures.
- 5) Containment electrical penetrations are physically separated over a 120-degree arc of the containment, and are located on two distinct building elevations 0, el. 735ft-6in and 755ft-6in
- 6) Wiring within control switchboards and instrumentation cabinets has been specified to meet the requirements of IEEE Standard 384-1974.

in the southwest quadrant of the reactor containment building, facing the cable vault and rod control building. Refer to FSAR Section 8.3.1.1.16 for a detailed physical layout description

3. The following provisions are implemented in plant hazard areas (external fires, pipe failure, high energy missiles) where the minimum spacing required is reduced. The principal plant areas are the auxiliary building, the reactor containment, the safeguards areas, the turbine building, and the main steam valve area.

a. Safety class raceways and cables

1) Turbine building

Class 1E instrument circuits routed within this building that provide the following functions.

- a) Output contacts from auxiliary racks provide interlocks for the condenser steam dump valves.

BVPS-2 FSAR

The penetrations are also arranged (outside containment) in separate cable vault groupings defined (refer to the FPER) by distinct fire areas:

- CV-1 735'-6" Class IE (orange, red, and blue) and non-class IE (black)
- CV-2 735'-6" Class IE (purple and green) and non-class IE (black)
- CV-3 755'-6" Class IE (yellow and white) and non-class IE (black)

This arrangement (outside containment) provides for distinctive groups of Class IE penetrations to their redundant counterparts

- a. Equipment hardware, exposed surfaces, and potential induced-voltage hazards are adequately protected to minimize danger to BVPS-2 personnel.
- b. A low impedance ground return path is provided to facilitate the operation of ground fault detection or protective devices in the event of a ground fault or insulation failure on any 4,160 V electrical circuits.

Large electrical loads, including motors larger than 20 hp, are solidly grounded to the BVPS-2 grounding grid by means of a suitably sized cable connection to the motor housing.

Motors of 20 hp and below, and other miscellaneous electrical devices such as solenoid operators and lighting fixtures, are grounded in one of two ways. Conduit connections are used as grounding ties to conduit-fed equipment. Other equipment is grounded either directly to the BVPS-2 grounding grid or to the building steel which in turn is connected to the BVPS-2 grounding grid.

Containment Electrical Penetrations

Electrical penetration assemblies are located in the southwest quadrant of the reactor containment building, facing the cable vault and rod control building, above el 735 ft-6 in and 755 ft-6 in. The penetrations are housed in reactor containment sleeves (nozzles) fabricated from 12-inch diameter and 18-inch diameter schedule 80 steel pipes and installed with a minimum center-to-center separation of 4 feet.

There are eighty six 12-inch diameter and ten 18-inch diameter sleeves occupied by a total of 84 (77 active, 7 spare) penetrations. The remaining 12 sleeves are capped.

The penetration locations form a matrix which consists of 21 columns by 5 rows. Minimum vertical and horizontal separation (center-to-center) is maintained as follows:

- a. Four feet between related channels (white to yellow and red to blue),
- b. Eight feet between redundant trains, (orange to purple), and
- c. Eight feet between train and channel.

Each penetration is identified by a matrix number and a letter, and by a type number, which designates it as an instrument, control, or power penetration.