Page 9

Hot Collar Tests

Phase A

Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	3	8.000	0.0520	0.0040	G	
	L	GROUND	3	8.001	0.0510	0.0050	G	
	SL	GROUND	3	8.000	0.0610	0.0060	G	

Phase B

Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	3	8.000	0.0510	0.0070	G	
	L	GROUND	3	8.001	0.0530	0.0080	G	
	SL	GROUND	3	8.000	0.0510	0.0090	G	

Phase C

Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	3	8.001	0.0540	0.0070	G	
	L	GROUND	3	8.000	0.0550	0.0060	G	
	SL	GROUND	3	8.001	0.0550	0.0070	G	

DE 19-064 Exhibit 44 Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 19 of 242

United Power Group, Inc.

Liberty Utilities 9 Lowell Road Salem, NH 03079

August 21 & 24, 2018 Project No. U081837

Project Location:

Salem Depot Substation

Scope:

Perform testing and maintenance on the following equipment:

- 1. 9L2 Transformer
- 2. 9L2 Vacuum Recloser and Form 3 Controller
- 3. 9L2 Voltage Regulators

Remarks:

- 1. The 9L2 transformer test results were acceptable.
- 2. 9L2 Vacuum breaker and form 3 controller test results are acceptable for service.
- 3. 9L2 voltage regulator test results are acceptable for service. The C Phase regulator motor capacitor is temporarily wired in the controller. This will cause the regulator to get stuck in the 16L or 16R position. The regulator needs to be untanked to repair this issue.

Submitted by:

James Fazio

DE 19-064 Exhibit 44 Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 20 of 242

United Power Group, Inc.

			Page No.	2
Customer	Liberty Utilities	Date 8/21/2018	Project No.	U081837
Address	Salem, NH	Air Temp. 70F	Rel. Humidity	38%
Owner	Liberty Utilities	Date Last Inspection	1/22/15	
Address	Salem, NH	Last Inspection Report No.		

Equipment Location	Salem Depot Substation
Owner Identification	9L2T

Nameplate Information

Manufacturer	GE	KVA 5	5000/5600	/7000	Phase	e <u>3</u>	<u>(</u>	Cycle	60		
Serial No.	G-859810	Туре	Au	to	Form		(Class	OA/FA		
Primary Voltage	22.9kV	Delta	Wye	Х	Rated	Current			141	Ampe	res
Secondary Voltage	7.62kV	Delta	Wye	Х	Rated	Current			245	Ampe	res
Coolant Oil	X Askare		Air		_	Nitrogen			Other		
Coolant Capacity - U	nits	N	lain Tank	69	0UG	_LTC			Switch		
Temperature Rise		D	Date of Mar	nufactu	ure		Impeda	ance	3.40%		
No Load Tap Change	er Voltages	24100/2	23500/229	00/223	300/217	700					
Gauges and Counters	Measured	Maximu	um Reset	Trip	Alarm	LTC		Ме	asured	Max.	Min.
Oil Temperature						Тар			NA		

duugoo una oountoro	Wiedgaloa	Maximani	1,0001	i iip	,		Wieddaloa	max.	
Oil Temperature						Тар	NA		
Wdg. Temperature	20C	60C				Counter	NA		
Pressure								-	
Oil Level	25C			1					

Visual Inspection			
Primary Connection	OK	Secondary Connections	ОК
Tap Connections	OK	Leaks	NA
Gas Regulator	NA	Paint	Rust
Infra-Red Inspection	NA	Grounds	ОК

Fans and Controls	Oil Temp.	Wdg. Temp.	Manual	Auto	Lubrication Date
Stage 1					
Stage 2					

Accessory Inspection	Alarm	Trip
Pressure Relief Device - Main Tank		
Pressure Relief Device - LTC		
Sudden Pressure Device		

Additional Tests

Remarks All bushings need to be replaced.

JF

Submitted By



9L2T

Page 3

Two Winding Transformer 8/21/2018 8:17:24 AM **Report Source**

Session Test Date

	plate - I w	o-winding	Transforme	71							
Compan	ıy		UPG			Serial N	о.		G-859810		
Locatior	n		Salem Depot	Substation		Special	ID		Transformer	r - 92T	
Division	1 I I I I I I I I I I I I I I I I I I I		Liberty Utilitie	es		Circuit	Designation				
Manufac	cturer		General Elec	tric		Configu	ration		Y_Y		
Year Ma	nufactured					Tank T	pe		Other		
Mfr Loca	ation		USA			Coolan			Oil		
Phases			Three			Class			OA/FA		
Oil Volu	ime		690 UG			BII			150 kV		
Weight			18600 000 L F	3		512			100 100		
kV			22 9 13 8	-		VA Rati	na		* * * 5000	000 KVA	
Test Dat	to	8/21/2018	To:	st Time:	8.17	AM	Woa	ther	Partly (Cloudy	
Air Tem	nerature	21°C	Δn	naratus	*	/	Hum	nidity	64 %	cloudy	
Tostor	perature	IF	We	ork Order			Date	Last Tested	1/22/20	115	
Verified		01	Te	st Set Type	M40	00	Date	Retested	1/22/20		
Verificat	tion Date		Set	t Ton Serial #	•	00	Pag	son			
Lact She	oot #		Set	Bottom Sori	ial#		Trav	ol Timo			
Durchas	cel #		Ine	Book #	ai #		Dur	ation			
Conjes	e order		Sh	. DOOR #			Crev				
Buchir	na Nomon	lata	511				Cier	W 5126			
Bushin	ng Namep			4	T	04		0		Deter d Lav	A
Desigr	nation	Serial No.	Manuta	acturer	туре	C1	%PF C1			ар катески	Amps
H1	1-	15-292453	PCORE E	lectric Co.		0	65 4	158		25	400
	2-	15-292438	PCORE E	lectric Co.		0	65 4	109		25	400
H	3-	15-291996	PCORE E	lectric Co.		0	63 4	101		25	400
	0-	15-292464	PCORE E	lectric Co.		0	65 4	156		25	400
	.1	15-292475	PCORE E	lectric Co.		0	65 4	160		25	400
	2-	15-292452	PCORE E	lectric Co.		0	65 4	156		25	400
X3	3-	15-292445	PCORE E	lectric Co.		0	65 4	166 '	*	25	400
Overal	II Tests										
			Insulation	on Test k	V mA	Watts	% PF cor	r Corr Fctr	Cap(pF)	FRANK™	Manual
4									,		
11			CH+CH	IL 8.003	30.818	3 1.207	*	1	8174.7		
1 2			CH+CH CH	IL 8.003 8.002	3 30.818 2 30.813	3 1.207 3 1.203	* 0.39	1 1	8174.7 8173.5	Good	
2 Bushir	ng C1		CH+CH CH	IL 8.003 8.002	3 30.818 2 30.813	3 1.207 3 1.203	* 0.39	1 1	8174.7 8173.5	Good	
2 Bushir	ng C1 Serial No	. NP %PF	CH+CH CH	IL 8.003 8.002 Test kV	3 30.818 2 30.813 mA	3 1.207 3 1.203 Watts	* 0.39 % PF corr	1 1 Corr Fctr	8174.7 8173.5 Cap(pF)	Good FRANK™	Manual
Bushir	ng C1 Serial No 15-292453	•. NP %PF 3 0.65	CH+CH CH • NP Cap 458	IL 8.003 8.002 Test kV 8	3 30.818 2 30.813 mA 1.725	3 1.207 3 1.203 Watts 0.099	* 0.39 % PF corr 0.57	1 1 Corr Fctr 1	8174.7 8173.5 Cap(pF) 457.63	Good FRANK™ Good	Manual
1 2 Bushir ID H1- H2-	ng C1 Serial No 15-292453 15-292433	. NP %PF 3 0.65 3 0.65	CH+CH CH • NP Cap 458 469	IL 8.003 8.002 Test kV 8 10.004	3 30.818 2 30.813 mA 1.725 1.779	3 1.207 3 1.203 Watts 0.099 0.103	* 0.39 % PF corr 0.57 0.58	1 1 Corr Fctr 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87	Good FRANK™ Good Good	Manual
1 2 Bushir ID H1- H2- H3-	ng C1 Serial No 15-29245: 15-29243: 15-291990	. NP %PF 3 0.65 8 0.65 6 0.63	CH+CH CH • NP Cap 458 469 461	IL 8.003 8.002 Test kV 8 10.004 10.004	3 30.818 2 30.813 mA 1.725 1.779 1.742	3 1.207 3 1.203 Watts 0.099 0.103 0.097	* 0.39 % PF corr 0.57 0.58 0.56	1 1 Corr Fctr 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13	Good FRANK™ Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0-	ng C1 Serial No 15-29245: 15-29243: 15-291990 15-292464	. NP %PF 3 0.65 8 0.65 6 0.63 4 0.65	CH+CH CH • NP Cap 458 469 461 456	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099	* 0.39 % PF corr 0.57 0.58 0.56 0.57	1 1 Corr Fctr 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51	Good FRANK™ Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1	ng C1 Serial No 15-29245 15-29243 15-29199 15-29246 15-29247	NP %PF 3 0.65 3 0.65 6 0.63 4 0.65 5 0.65	CH+CH CH • NP Cap 458 469 461 456 460	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58	1 1 Corr Fctr 1 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35	Good FRANK™ Good Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2-	ng C1 Serial No 15-29243 15-29243 15-29199 15-29246 15-29246 15-29245	NP %PF 3 0.65 6 0.63 4 0.65 5 0.65 2 0.65	CH+CH CH * NP Cap 458 469 461 456 460 456	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06	Good FRANK™ Good Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3-	ng C1 Serial No 15-29243 15-29243 15-29199 15-29246 15-29246 15-29245 15-29244	NP %PF 3 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 6 0.65	CH+CH CH * NP Cap 458 469 461 456 460 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.103 0.0101	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat	ng C1 Serial No 15-29245 15-29243 15-29246 15-29246 15-29247 15-29245 15-29244 tion Resis	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.103 0.101	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat	ng C1 Serial No 15-29245 15-29243 15-29246 15-29246 15-29247 15-29244 tion Resis	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.103 0.101	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 1 1 1 1	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat	ng C1 Serial No 15-29245: 15-29243: 15-29246: 15-29245: 15-29245: 15-29244: tion Resis	NP %PF 3 0.65 3 0.65 6 0.63 4 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.742 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.103 0.103	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Groups	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir ID H1- H2- H3- X0- X1 X2- X3- Insulat Manufac	ng C1 Serial No 15-29245: 15-29243; 15-29199; 15-29246; 15-29245; 15-29244; tion Resis	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 460 456	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 10.004 8.005 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 1 Core Gree	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir ID H1- H2- H3- X0- X1 X2- X3- Insulat Manufao Serial No	ng C1 Serial No 15-29245: 15-29243: 15-29246: 15-29246: 15-29245: 15-29244: tion Resis	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 6 0.65 7 0.65 8 0.65	CH+CH CH 458 469 461 456 460 456 460 456	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gra	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 Cound Test *	Good FRANK™ Good Good Good Good Good Good	Manual
1 2 Bushir ID H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial Ne Connect	ng C1 Serial No 15-29245: 15-29243: 15-29246: 15-29246: 15-29244: 15-29244: tion Resise cturer o. tions to Earth	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 460	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000 (* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gravest State	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 ound Test * * *	Good FRANK™ Good Good Good Good Good Good Good Bood FI	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial Ne Connect Hi / Low	ng C1 Serial No 15-29243 15-29243 15-29246 15-29246 15-29245 15-29244 tion Resis cturer o. tions to Earth	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 460	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58	1 1 1 1 1 1 1 1 1 5 Core Gro 65200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 bund Test * * ms)	Good FRANK™ Good Good Good Good Good Good FI 1.55	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial Ne Connect Hi / Low Turns	ng C1 Serial No 15-29243 15-29243 15-29199 15-29246 15-29247 15-29245 15-29244 tion Resis cturer o. tions to Earth Ratio Tes	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 460	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 8.002	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58	1 1 1 1 1 1 1 1 1 5200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 Dund Test * * ms)	Good FRANK™ Good Good Good Good Good Good FI 1.55	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial No Connect Hi / Low	ng C1 Serial No 15-29243 15-29199 15-29246 15-29247 15-29245 15-29244 tion Resis cturer o. tions to Earth Ratio Tes	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 Volts 5000.00 Serial No.	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gro 10 min (Mohi 65200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 Dund Test * * ms)	Good FRANK™ Good Good Good Good Good Good HI 1.55	Manual
1 2 Bushir HD H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial No Connect Hi / Low	ng C1 Serial No 15-29243 15-29199 15-29246 15-29247 15-29245 15-29244 tion Resis cturer o. tions to Earth Ratio Tes	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 Volts 5000.00 Serial No.	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gro 65200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 cound Test * * ms)	Good FRANK™ Good Good Good Good Good Good H 1.55	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial No Connect Hi / Low	ng C1 Serial No 15-29243 15-29243 15-29199 15-29246 15-29245 15-29244 tion Resis cturer o. tions to Earth Ratio Tes tions	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65 2 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.002 8.003 8.004 10.004 1	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gro 65200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 cound Test * * ms)	Good FRANK™ Good Good Good Good Good Good H 1.55 LV Winding Wye H3 - H0	Manual
I Bushir ID H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial No Connect Hi / Low	ng C1 Serial No 15-29245: 15-29243: 15-29246: 15-29247: 15-29247: 15-29247: 15-29244: tion Resis to Earth Ratio Tes tions	NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.65	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.732 1.743 1.731 1.763	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gro 65200.00	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 Dund Test * * ms)	Good FRANK™ Good Good Good Good Good Good Good HI 1.55 LV Winding Wye H3 - H0 X3 - X0	Manual
1 2 Bushir H1- H2- H3- X0- X1 X2- X3- Insulat Manufac Serial Ne Connect Hi / Low Turns	ng C1 Serial No 15-29245: 15-29243: 15-29246: 15-29247: 15-29247: 15-29244: tion Resise to Earth Ratio Tes tions to Earth Ratio Tes	. NP %PF 3 0.65 8 0.65 6 0.63 4 0.65 5 0.	CH+CH CH 458 469 461 456 460 456 466	IL 8.003 8.002 Test kV 8 10.004 10.004 10.004 8.005 8.002 8.002 8.002 Volts 5000.00 Serial No. H1 - H0 X1 - X0 Cal	3 30.818 2 30.813 mA 1.725 1.779 1.742 1.742 1.743 1.731 1.763 Ratio 1	3 1.207 3 1.203 Watts 0.099 0.103 0.097 0.099 0.101 0.101 0.101 0.103 1 min (Mol 42000.0 Ratio 2	* 0.39 % PF corr 0.57 0.58 0.56 0.57 0.58 0.58 0.58 0.58 0.58 0.58 0.58 0.58	1 1 Corr Fctr 1 1 1 1 1 1 Core Gro 65200.00 mg Min. Lim	8174.7 8173.5 Cap(pF) 457.63 471.87 462.13 459.51 462.35 459.06 467.73 cound Test * * ms)	Good FRANK™ Good Good Good Good Good Good Good H 1.55 LV Winding Wye H3 - H0 X3 - X0 FRANK™	Manual

United Power Group, Inc.

		VACUUM RECI	LOSER TEST AND	INSPECTI	ON REPO	ORT	Docl Attachm	ket No. DE 1 ent Staff 6-4	9-064 0 b i 2
						Page No.	4	Page 22	of 242
Customer	Liberty Ut	ilities	Date	8/21/2018		Project No.	U081837		
Address	Salem, N	n, NH Air Temp.		78F		Rel. Humidity			
Owner	Liberty Ut	ilities	Date La	st Inspection	1/22/2015				
Address	Salem, N	Н	Last Inspec	Last Inspection Report No.					
Equipment	Location	Salem Depot							
Owner Identification Recloser 9L2									

			Breaker Nameplat	e Data:				
Manufacturer	McGrav	w Edison	Туре	VSA				
Serial No.	2586		Type Operating Mecha	anism	Coil Spring			
Amperes	800	Age <u>1976</u>	Interrupt. Rating	12kA		KV	15.5	

Adjustment	Mfr's	As	As
Checks	Rec.	Found	Left
Latch Wipe		Х	Х
Latch Clearance		Х	Х
Stop Clearance		Х	Х
Prop. Clearance		Х	Х
Phase Checked	Α	В	С
Contact Gap	Х	Х	Х
Contact Travel	Х	Х	Х
Contact Wipe	Х	Х	Х
Erosion Indicator	Х	Х	Х

Α

В1

100,000+

B2

100,000+

B1 & B2

100,000+

241

1

Ρ

Ρ

K = Number Entered Above X 1000 Visual OK

HIPOT Tests Microamps 1 Minute Test

В

B3

100,000+

B4

100,000+

B3 & B4

100,000+

233

2

Ρ

Ρ

С

В5 100,000+

B6

100,000+

B5 & B6 100,000+

236

3

Ρ

Ρ

Spec	ified Tolerances (If Applicable)
Latch Wipe	NA
Latch Clearance	NA
Stop Clearance	NA
Prop. Clearance	NA
Contact Gap	NA
Contact Travel	NA
Contact Wipe	NA
Erosion Indicator	NA

	Inspection a	nd Maintena	ance:		
Checked	Insp.	Found	Cleaned	See	
Items:	ltem	Dirty	& Lubed	Remarks	
Vacuum Bottles	Х				
Primary Stabs	Х				
Ground Stab	Х				
Structural Checks	Х				
Mech. Conn.	Х				
Charging Motor	Х				
Closing Springs	Х				
Opening Springs	Х				
Operation Coils	Х				
Auxiliary Devices	Х				
Insulating Memb.	Х				
Recloser Wiring	Х				
Racking Device					
Heater & Lights	Х				
Cubicle Wiring	Х				
	X = Yes F	or This Entr	у		
Counter Found	709				
Counter Left	712				

Remarks:	Results are accentable
ricinarita.	

Bottle Test is a Go No Go Test (P = Pass) (F= Fail) Closed Test Energize a Phase & Grd. All Others

Phase Test Data

KV Open CB

KV Closed CB

Phase tested

37.5 KV AC. Bottle Test

37.5 KV Closed CB Test

Megohms to Ground

Bushings not under

test were grounded.

Megohms To Ground

Closing/Opening Speed Contact Rest. Microhms

5 5

5

KV Bottle Megohms

Submitted by: J Fazio Equipment Used:

DLRO, Megger, HIPOT

9L2 - Recloser

Page 5

Report Source Vacuum Breaker

Session Test Date 8/21/2018 10:22:51 AM



Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 23 of 242

Nameplate - Vac	uum Break	lei								
Company		UPG			Serial No.		2586			
Location		Salem D	epot		Special ID		Breaker	9L2		
Division		Liberty U	Itility		Circuit Design	ation				
Manufacturer		McGraw-	-Edison		Туре		OTHER			
Year Manufactured		1976			Class		vacuum_breaker			
Mfr Location		USA			Mechanism Ty	/pe				
Interrupting Rating		12.0 kA			Mechanism De	esign	Coil Spr	ing		
Weight		*			BIL		110 kV			
Total Weight		525 LB			Control Volts		125			
Counter					Amps		800			
kV		15.5								
Test Date	8/21/2018		Test Time:	10:22 AN	Л	Weather				
Air Temperature	23°C		Apparatus	*		Humidity	54	%		
Tester	JF		Work Order			Date Last Tested	1/2	22/2015		
Verified			Test Set Type	M4000		Date Retested				
Verification Date			Set Top Serial #			Reason				
Last Sheet #			Set Bottom Serial #			Travel Time				
Purchase Order			Ins. Book #			Duration				
Copies			Sheet #			Crew Size				
Overall Tests										
Overall Tests Test Mode		Phase	Test kV		mA	Watts	FRAN	K™	Manual	
Overall Tests Test Mode GND RB		Phase A	Test kV 10.003	0	mA).314	Watts 0.023	FRAN	K™	Manual	
Overall Tests Test Mode GND RB GND RB		Phase A A	Test kV 10.003 10.003	C	mA).314).181	Watts 0.023 0.019	FRAN	Κ [™]	Manual	
Overall Tests Test Mode GND RB GND RB GND RB		Phase A A B	Test kV 10.003 10.003 10.002	C C C	mA).314).181).304	Watts 0.023 0.019 0.023	FRAN	K™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB		Phase A A B B	Test kV 10.003 10.003 10.002 10.003	C C C	mA).314).181).304 0.18	Watts 0.023 0.019 0.023 0.018	FRAN	Ктм	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB		Phase A A B B C	Test kV 10.003 10.003 10.002 10.003 10.003		mA 0.314 0.181 0.304 0.18 0.301	Watts 0.023 0.019 0.023 0.018 0.02	FRAN	Ктм	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB		Phase A A B C C C	Test kV 10.003 10.003 10.002 10.003 10.003 10.002		mA).314).181).304 0.18).301 0.18 0.301 0.18	Watts 0.023 0.019 0.023 0.018 0.02 0.018	FRAN	К™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB		Phase A A B C C C A	Test kV 10.003 10.003 10.002 10.003 10.003 10.002 10.003		mA).314).181).304 0.18).301 0.18).042	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004	FRAN	К™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB		Phase A B B C C A B	Test kV 10.003 10.003 10.002 10.003 10.003 10.002 10.003 10.002		mA).314).181).304 0.18).301 0.18).042).042	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004	FRAN	К™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB		Phase A B C C A B C C	Test kV 10.003 10.003 10.002 10.003 10.003 10.002 10.003 10.002 10.002		mA).314).181).304 0.18).301 0.18).042).042).042).041	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.004 0.003	FRAN	К™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB		Phase A A B C C C A B C	Test kV 10.003 10.002 10.003 10.003 10.003 10.002 10.003 10.002 10.002		mA).314).181).304 0.18).301 0.18).042).042).042).041	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.004	FRAN	Кт	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB ID	Serial No.	Phase A A B C C C A B C	Test kV 10.003 10.002 10.003 10.002 10.003 10.003 10.003 10.002 10.003 10.002 10.003 10.002 10.002 10.002 10.002 10.002 10.002	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	mA).314).181).304 0.18).301 0.18).301 0.18).042).042).042).042).041 Test kV	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.002 0.018 0.004 0.004 0.004 0.003	FRAN	K™ FRANK™	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB Thot Collar Tests	Serial No. HC-SN-1	Phase A A B C C C A B C	Test kV 10.003 10.003 10.002 10.003 10.003 10.003 10.003 10.003 10.002 10.003 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	mA).314).181).304 0.18).301 0.18).301 0.18).042).042).042).042).041 Test kV 10.009	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.003	FRAN Watts 0.014	K™ FRANK™ Good	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB 1 1 2	Serial No. HC-SN-1 HC-SN-3	Phase A A B C C C A B C	Test kV 10.003 10.003 10.002 10.003 10.003 10.003 10.003 10.003 10.002 10.003 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	mA).314).181).304 0.18).301 0.18).301 0.18).042).042).042).042).041 Test kV 10.009 10.01	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.003	FRAN Watts 0.014 0.009	K™ FRANK™ Good Good	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB UST RB 1 1 2 3	Serial No. HC-SN-1 HC-SN-3 HC-SN-5	Phase A A B C C C A B C	Test kV 10.003 10.003 10.002 10.003 10.003 10.003 10.003 10.003 10.003 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002 10.002	C C C C C C C C C C C C C C C C C C C	mA).314).314).304 0.18).301 0.18).301 0.18).042).042).042).042).042).041 Test kV 10.009 10.01 9.999	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.003	FRAN Watts 0.014 0.009 0.013	K™ FRANK™ Good Good Good	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB 1 1 2 3 4	Serial No. HC-SN-1 HC-SN-3 HC-SN-5 HC-SN-7	Phase A A B C C C A B C	Test kV 10.003 10.003 10.002 10.003 10.003 10.003 10.003 10.003 10.002 10.003 10.002 10.003 10.004 10.005 10.005 10.005 10.005 10.005 1	C C C C C C C C C C C C C C C C C C C	mA).314).314).304 0.18).301 0.18).301 0.18).042).042).042).042).042).041 Test kV 10.009 10.01 9.999 10.003	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.004 0.003 mA 0.028 0.027 0.027 0.027 0.027	FRAN Watts 0.014 0.009 0.013 0.013	K™ FRANK™ Good Good Good Good	Manual	
Overall Tests Test Mode GND RB GND RB GND RB GND RB GND RB UST RB UST RB UST RB UST RB 1 1 2 3 4 5	Serial No. HC-SN-1 HC-SN-3 HC-SN-5 HC-SN-7 HC-SN-9	Phase A A B C C C A B C	Test kV 10.003 10.003 10.002 10.003 10.003 10.003 10.003 10.003 10.002 10.003 10.002 10.003 10.004 10.005 10.005 10.005 10.005 1	00 00 00 00 00 00 00 00 00 00 00 00 00	mA 0.314 0.314 0.18 0.304 0.18 0.301 0.18 0.042 0.042 0.042 0.041 Test kV 10.009 10.01 9.999 10.003 9.999	Watts 0.023 0.019 0.023 0.018 0.02 0.018 0.004 0.004 0.004 0.003 mA 0.028 0.027 0.027 0.027 0.027 0.027 0.027	FRAN Watts 0.014 0.009 0.013 0.013 0.013	K™ FRANK™ Good Good Good Good Good Good	Manual	

Docket No. DE 19-064

United Power Group, Inc.

			PROTECTIV	E RELAY TES	ST REPORT	Γ		Attachmer	t Staff 6-40.b.i.2
							Page No.	6	Page 24 of 242
Customer	Liberty Utilitie	es			Date	8/21/18	Proj. No.	U08183	7
Address	Salem, NH				Air Temp.	70F	Rel. Hum. 35%		
Owner	Liberty Utilities				Date Last	Inspection	1/22/15		
Address	Salem, NH				Last Inspe	ction Report	No		
Equipment	t Location	Salem Depot							
Owner Identification 9L2 Recloser									

Circuit Identification	9L2		P.T.Ratio		
Visual In	spection	Routine Maint	enance	1	
Cover Gasket	X	Glass Cleaned	x		Mfr: Cooper
Glass	X	Case Cleaned	х		Type Ph: Form 3A
Foreign Material	X	Relay Cleaned	Х		Cat No:
Moisture	X	Connections Tight	Х		Tap Range Ph:
Spiral Spring		Taps Tightened			Tap Range Grd:
Bearing Condition		Contacts Cleaned			Inst. Range Ph:
Bearing End-Play		Insulation Resistance	Х		Inst Range Grd:
Disc Clearance		Trip Circuit	Х		Use: 51P/51G/79
Rust	X				S/N =
Remarks: Results are	e acceptable.				

	Relay Settings														
	Re	eclosi	ing	Inst. Eler	nent Setting	Tap S	Setting		Curve	e Setting		Time Dial Setting			
	1st 2nd				50G-1	51P	51G	50P-1	50G-1	51P	51G	51P Fast	51G Fast	51P	51G
Specified	5	15	LO			560A	200A					Α	17	D	3
As Found	5	15	LO			560A	200A					А	17	D	3
As Left	5	15	LO			560A	200A					А	17	D	3

Test Operations - As Found - Time in Seconds

		Time E	Element	С	urrent Vo	ltage	Inst. E	lement						
		P. U.		Time		Current/Voltage		Targets		Reclosing				
	Zero	1.0.		P. U.	Tap 1	Tap 2	Pick							
	Set	Tap 1	Tap 2	Х	X2	X4	Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.540			1.27	0.273			Х	Х				
B Phase		0.540			1.28	0.271			Х	Х	5	15	LO	
C Phase		0.540			1.27	0.272			Х	Х				
GRD		0.200			6.42	2.39			Х	Х				

Test Operations - As Left - Time in Seconds

		Time E	Element	С	urrent Vo	ltage	Inst. E	lement						
		P. U.		Time		Current/Voltage		Targets		Reclosing				
	Zero			P. U.	Tap 1	Tap 2	Pick							
	Set	Tap 1	Tap 2	Х	X2	X4	Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.540			1.27	0.273			Х	Х				
B Phase		0.540			1.28	0.271			Х	Х	5	15	LO	
C Phase		0.540			1.27	0.272			Х	Х				
GRD		0.200			6.42	2.39			Х	Х				

Submitted By JF

Equipment Used Doble 2253

		Uni	ted P	ower Gr	oup, In	C.	Atta	DE 19-064 Exhibit 44 Docket No. DE 19-064 achment Staff 6-40.b.i.2
					• •		Page No.	7 Page 25 of 242
Customer	Liberty Utilities			Date	8/24/2018		Proj. No.	U081837
Address	Salem, NH			Air Temp.	60F		Rel. Hum.	50%
Owner	Liberty Utilities			Date Last Ins	pection		-	
Address	Salem, NH			Last Inspectio	n Report No.			
Equipmen Owner Ide	t Location Intification	Salem D 9L2 Re)epot gulator Bar	nk				
Monuf	сг.		Turne			Test Set		
Manuf.	GE		Type			lest Set	IIR-JF	
Gallons	112		OII Levels	UK		KVA	<u>333</u>	Dowor
Namonlat	Voltago	7060	Sor A	0562027 TV			Doble	Power
		7900	Sor B	0521500_TE	2M			Results 8
Dercent R		5/8%	Ser C	05/8/907-T			Position	0 N
Feiceni	egulation	J/0 /0	Sel. C	Q3404907-1	1 V		FUSILION	IN
Тар	Тар	TTR	TTR	MEASURED V	ALUES		Phase	А
Position	Voltage	Ratio	S-SLA	S-SL B	S-SLC		Milli_A	19 404
1 0311011	Voltage	riadio		L-SL B			Watts	1 661
16P	8756	0 0001	0 007	0.907	0 907		% D F	0.86
150	8750	0.9091	0.907	0.907	0.907		$\frac{70}{10}$ F. F.	51/6 8
1/D	8700	0.9143	0.912	0.912	0.912		C (pr) Poting	G G
14N 12D	8607	0.9195	0.917	0.917	0.917		Raung	G
120	8557	0.9249	0.922	0.922	0.922		Dhaco	В
110	8507	0.9302	0.920	0.920	0.927			10.827
108	8458	0.9337	0.933	0.933	0.933		Watte	19.637
	8408	0.9412	0.939	0.935	0.935		Walls % P F	0.84
8R	8358	0.9407	0.343	0.943	0.943		C(pE)	5261.6
78	8308	0.0024	0.001	0.957	0.957		Bating	G
6R	8259	0.0001	0.007	0.965	0.964		rtating	u .
5R	8209	0.9697	0.969	0.969	0.969		Phase	C
4R	8159	0.9756	0.000	0.975	0.975		Milli_A	19 396
38	8109	0.9816	0.970	0.970	0.970		Watts	2 433
2R	8060	0.9877	0.986	0.986	0.986		% P F	1 25
1R	8010	0.9938	0.993	0.993	0.993		C(pF)	5144.6
N	7960	1.0000	1.000	1.000	1.000		Rating	G
1L	7910	1.0063	1.006	1.006	1.006			<u></u>
<u>.</u>								
	Inspection		Α	В	С		Meaohms	1 Minute
	Bushinas		OK	OK	OK		Test KV	5
	Connections		OK	OK	OK		Phase A	19,500
	Grounds		OK	OK	OK		Phase B	21,300
	Oil Level		OK	OK	OK		Phase C	24,300
	Position Ind.		OK	OK	OK		Tests Bv	JF
	Operations Ctr.	AL	98745	143723	122653			<u></u>
	Drag Hands	Min	5L	6L	6L			
	Drag Hands	Max	3R	4R	4R			
	Drag Hands	Reset	OK	OK	OK			
	Control	Man	OK	OK	OK			
	Control	Auto	OK	OK	OK			
	Drag Hands Drag Hands Drag Hands Control Control	Min Max Reset Man Auto	5L 3R OK OK OK	6L 4R OK OK OK	6L 4R OK OK OK			

Remarks

Page 8

Hot Collar Tests

Phase A

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 26 of 242

							1 ago 20 01	
Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	3	8.001	0.0420	0.0040	G	
	L	GROUND	3	8.001	0.0440	0.0040	G	
	SL	GROUND	3	8.000	0.0400	0.0030	G	

Phase B

Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	8.000	0.0410	0.0040	G	
	L	GROUND	3	8.001	0.0410	0.0040	G	
	SL	GROUND	3	8.000	0.0420	0.0050	G	

Phase C

Term ID	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	3	8.000	0.0500	0.0070	G	
	L	GROUND	3	8.000	0.0480	0.0060	G	
	SL	GROUND	3	8.001	0.0470	0.0070	G	

United Power Group, Inc.

Liberty Utilities 9 Lowell Road Salem, NH 03079 September 25, 2014 Project No. U091435

Project Location:

Salem Depot Substation

Scope:

Perform testing and maintenance on the following equipment:

- 1. 9L1 Oil Circuit Breaker and Protective Relays
- 2. 9L1 Voltage Regulators

Remarks:

- 1. 9L1 oil circuit breaker and protective relay test results are acceptable for service.
- 2. 9L1 Voltage regulator test results are acceptable for service.

Submitted by:

James Fazio

9L1 - Oil Circuit Breaker

Page 2

Company	UPG		Serial No.			282572	
Location	Salem Depo	t Substation	Spe	ecial ID		9L1 OCB	
Division	Liberty Utili	ties	Circuit Designation				
Manufacturer	A-C		Ty	ре		OZ-110	
Yr. Manufactured	1951		Cla	ISS			
Mfr. Location	USA		Me	ch. Type			
Oil Volume	11 UG		BI	L		110 kV	
Weight			Int	errupting Rat	ing		
# of Tanks			Co	unter			
Control Volts	125		Amps			600	
kV	14.4						
Note							
Test Date	9/25/2014	Test Time		8:41:25 AM	Weath	er	
Air Temperature	15 °C	Tank Temp.		°C	RH.		72 %
Tested by	JF	Work Order #			Last T	est Date	
Checked by		Test Set Type		M4K	Retest	Date	
Checked Date		Set Top S/N			Reaso	n	ROUTINE
Last Sheet #		Set Bottom S/N			Trave	l Time	
P.O. #		Ins. Book #			Durat	ion	
Copies		Sheet #			Crew	Size	

Overall Tests

Energize	Bus Ft	Ins. #	Ph.	Test kV	mA	Watts	%PF corr	Corr Fctr	TLI	IR _{auto}	IR _{man}
1			1	10.002	0.3430	0.1260	3.67	1.00		Q	
2			1	10.001	0.3380	0.1300	3.85	1.00		Q	
3			2	10.002	0.3430	0.1230	3.59	1.00		Q	
4			2	10.002	0.3410	0.1550	4.55	1.00		Q	
5			3	10.002	0.3440	0.1140	3.31	1.00		Q	
6			3	10.001	0.3410	0.1200	3.52	1.00		Q	
1,2			1	10.002	0.7450	0.1790	2.40	1.00	-0.077	G	
3,4			2	10.001	0.7490	0.2000	2.67	1.00	-0.078	G	
5,6			3	10.001	0.7470	0.1610	2.16	1.00	-0.073	G	

Page 3

Hot Collar Tests

Serial No.	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	1	GROUND	1	10.003	0.0800	0.0640	G	
	2	GROUND	1	10.005	0.0800	0.0420	G	
	3	GROUND	1	10.005	0.0770	0.0250	G	
	4	GROUND	1	10.005	0.0770	0.0260	G	
	5	GROUND	1	10.001	0.0840	0.0900	G	
	6	GROUND	1	10.008	0.0780	0.0380	G	

Insulation Resistance

Mfr.	AVO	Serial #		
Open Breaker Te	sts			
Volts	Connection	T1	T2	PI
5000	Tank 1	22000	76000	3.45
5000	Tank 2	18000	24000	1.33
5000	Tank 3	46000	89000	1.93

Contact Resistance

Mfr.		AVO	Ser	ial #	
Closed B	reaker Tests				
Volts	Connection	T1(Mohms)	T2(Mohms)	PI	Contact Res.(µOhms)
5000	Tank 1	22000	76000	3.4545	192
5000	Tank 2	18000	24000	1.3333	187
5000	Tank 3	46000	89000	1.9348	193
Note					

United Power Group, Inc.

		I	PROTECTIVE RELAY TES	ST REPORT		/ Page No	Docket Attachment 4	No. DE 19-064 Staff 6-40.b.i.2 Page 30 of 242
Customer	Liberty Utility			Date	9/25/2014	Proj. No.	U09143	5
Address	Salem, NH			Air Temp.	55 F	Rel. Hum.	45%	
Owner	Liberty Utility			Date Last	Inspection	By Others		
Address	Salem, NH			Last Inspe	ction Report I	No		
Equipment	Location	Salem Depot Substation						
Owner Ider	ntification	Overcurrent Relay 9L1		Dev #	51P/51G			

C.T.Ratio 600/5 P.T.Ratio Circuit Identification 9L1 Visual Inspection Routine Maintenance A B C GRD А B C GRD Cover Gasket Х Х Х Glass Cleaned Х Х Х Mfr: GE Glass Х Х Х Case Cleaned x x x Type Ph: IAC77B4A Х Х Х Х ХХ Foreign Material Relay Cleaned Type Grd: IAC51B2A Х Х Х Х X X Moisture Connections Tight Tap Range Ph: 4.0-8.0 х Х Х Х Х Х Spiral Spring Taps Tightened Tap Range Grd: Х Х х Bearing Condition Х Х Contacts Cleaned Х Inst. Range Ph: NIS Х Х Х Bearing End-Play Х Insulation Resistance X X Inst Range Grd: Disc Clearance Х Х Х Trip Circuit x x x Use: 51P/51G Rust Х Х Х Remarks:

* Inst eleme	inst elements are not used.												
	Relay Settings												
	ICS Inst. Element Setting Tap Setting Time Dial Setting												
		А	В	С	GRD	А	В	С	GRD	А	В	С	GRD
Specified	2	*	*	*		5.0	5.0	5.0	1.5	1.0	1.0	1.0	4.0
As Found	2	*	*	*		5.0	5.0	5.0	1.5	1.0	1.0	1.0	4.0
As Left	2	*	*	*		5.0	5.0	5.0	1.5	1.0	1.0	1.0	4.0

Test Operations - As Found - Time in Seconds

		Time Element		Current Voltage			Inst. E	Inst. Element			
		P.	. U.	Time		Current/Voltage		ICS AMPS			
	Zero			P. U.	Tap 1	Tap 2	Pick	Drop	Pick	Drop	
	Set	Tap 1	Tap 2	<u>X2</u>	<u>X4</u>		Up	Out	Up	Out	
A Phase		5.0		1.54	0.343				2	Х	
B Phase		5.0		1.55	0.344				2	Х	
C Phase		5.0		1.54	0.342				2	Х	
GRD		1.5		2.83	1.59				2	Х	

Test Operations - As Left - Time in Seconds

		Time E	Element	С	urrent Vo	ltage	Inst. E	lement			
		P.	P. U.		Time		Current/Voltage		ICS AMPS		
	Zero			P. U.	Tap 1	Tap 2	Pick	Drop	Pick	Drop	
	Set	Tap 1	Tap 2	<u>X2</u>	<u>X4</u>		Up	Out	Up	Out	
A Phase		5.0		1.54	0.343				2	Х	
B Phase		5.0		1.55	0.344				2	х	
C Phase		5.0		1.54	0.342				2	Х	
GRD		1.5		2.83	1.59				2	Х	

Submitted By JF

Equipment Used	F2253
Equipmont occu	1 2200

9L1 – A Phase Voltage Regulator

Page 5

Company	1	UPG		Se	rial No.		Q775050-U	JDD
Location		Salem D	epot Substation	Sp	ecial ID		9L1 Regula	ators
Division]	Liberty U	Jtilities	Ci	rcuit Designatio	n	A Phase	
Manufacturer		GE		Ту	pe		VR-1	
Yr. Manufactured	ĺ	2009			ass		OA	
Mfr. Location	İ	USA						
Tank Type		N2 BLANKETED		Co	oolant		OIL	
Phases		1		BI	L		95 kV	
Weight		3079 LE	3	Oi	il Volume		112 UG	
kV	ľ	7.96		A	mps		418	
Impedance		%			A Rating		333 kVA	
Catalog #					FC Counter		186279	
Design		Step			trl Wire Diamet	er		
Catalog/Style				Cı	rew Size			
Note								
Test Date	9/25	5/2014	Test Time		10:52:45 AM	Weather		
Air Temperature	18 °	°C	Tank Temp.		°C	RH.		51 %
Tested by			Work Order #			Last 7	Fest Date	8/1/2014
Checked by			Test Set Type		M4K	Retest	t Date	
Checked Date			Set Top S/N			Reaso	n	ROUTINE
Last Sheet #			Set Bottom S/N			Trave	l Time	
P.O. #			Ins. Book #			Durat	ion	
Copies			Sheet #			Crew	Size	

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto} I	R _{man}
СН	10.002	21.830	2.152	0.99	1.00	5790.2	G	

Hot Collar Tests

Serial No.	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	2	10.004	0.0730	0.0060	G	
	L	GROUND	2	10.010	0.0630	0.0020	G	
	SL	GROUND	2	10.007	0.0630	0.0020	G	

Insulation Resistance

Page 6

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR _{auto}	IR _{man}
5000	Src/Load to Earth	12400	26700	2.1532		

Exciting Current Tests

			Mfr.	Туре	e Ste	eps	Po	osition]	Found	Position Left	
De-Ener	gized Tap Changer										
On-Load	l Tap Changer										
	Connections	SA	A - SL		SB - SL		Ĺ	SC	C - SL		
LTC	Test kV	mA	Watts		mA	nA Watts		mA	Watts	IRauto	IR _{man}
1L	2.500	647.32	100)7.3							
N	2.502	1085.8	111	18.6							
1R	2.507	1079.4	115	52.8							
2R	2.500	1083.8	111	13.2							
3R	2.500	645.69	102	21.9							
4R	2.500	1084.0	110)9.5							
5R	2.499	645.81	101	17.8							
6R	2.501	1083.5	110)5.9							
7R	2.499	1080.1	112	23.9							
8R	2.499	1083.8	110)5.3							
9R	2.500	1080.9	112	23.7							
10R	2.499	1084.1	110)3.2							
11R	2.500	1081.9	112	26.7							
12R	2.500	1084.8	110)4.8							
13R	2.500	647.90	101	19.0							
14R	2.499	1084.7	110)4.2							
15R	2.499	647.92	102	20.0							
16R	2.499	1085.0	110)5.2							

9L1 – B Phase Voltage Regulator

Page 7

Company		UPG		Se	erial No.		Q76598-UBD	
Location		Salem D	epot Substation	Sp	oecial ID		9L1 Regul	ators
Division		Liberty U	Utilities	Ci	rcuit Designatio	on	B Phase	
Manufacturer		GE		Ty	vpe		VR-1	
Yr. Manufactured		2009		Cl	ass		OA	
Mfr. Location		USA						
Tank Type		N2 BLANKETED			oolant		OIL	
Phases		1		BI	L		95 kV	
Weight		3079 LE	3	Oi	il Volume		112 UG	
kV		7.96			mps		418	
Impedance		%			A Rating		333 kVA	
Catalog #					FC Counter		186279	
Design		Step		Ct	trl Wire Diamet	er		
Catalog/Style				C	rew Size			
Note								
Test Date	9/2	5/2014	Test Time	11:41:02 AM		Weather		
Air Temperature	19	°C	Tank Temp.		°C	RH.		50 %
Tested by	JF		Work Order #			Last 7	Fest Date	9/25/2014
Checked by			Test Set Type		M4K	Retes	t Date	
Checked Date			Set Top S/N			Reaso	n	ROUTINE
Last Sheet #			Set Bottom S/N			Trave	l Time	
P.O. #			Ins. Book #			Duration		
Copies			Sheet #			Crew	Size	

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
СН	8.002	19.306	1.704	0.88	1.00	5120.7	G	

Hot Collar Tests

Serial No.	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	2	10.004	0.0660	0.0030	G	
	L	GROUND	2	10.011	0.0720	0.0040	G	
	SL	GROUND	2	10.008	0.0650	0.0030	G	

Insulation Resistance

Page 8

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR _{auto}	IR _{man}
5000	Src/Load to Earth	13400	34500	2.5746		

Exciting Current Tests

			Mfr.	Туре	e Ste	eps	Po	osition l	Found	Position Left		
De-Ener	gized Tap Changer											
On-Load	l Tap Changer											
	Connections	SA	A - SL		SB - SL			SC	C - SL	_		
LTC	Test kV	mA	Wa	atts	mA	Wa	tts	mA	Watts	IRauto	IR _{man}	
1L	2.501	646.61	911	.60								
N	2.501	1087.2	100)2.6								
1R	2.500	1080.1	101	7.7								
2R	2.500	1085.6	100)4.2								
3R	2.500	644.19	909	9.34								
4R	2.500	1086.5	100	0.9								
5R	2.500	1086.8	996	5.85								
6R	2.500	1086.8	100	08.2								
7R	2.500	1083.2	102	20.5								
8R	2.500	1086.7	996	5.99								
9R	2.500	1083.6	101	7.8								
10R	2.502	1086.7	998	3.19								
11R	2.501	1083.9	101	7.9								
12R	2.500	1086.8	997	7.61								
13R	2.500	646.22	910).51								
14R	2.501	1087.0	999	9.64								
15R	2.500	646.57	913	3.83								
16R	2.501	1087.2	100)4.9								

9L1 – C Phase Voltage Regulator

Page 9

Company	UPG		Se	rial No.		Q774165-ULC		
Location	Salem Depo	Salem Depot Substation				9L1 Regulators		
Division	Liberty Util	ities	Ci	rcuit Designati	on	C Phase		
Manufacturer	GE	GE				VR-1		
Yr. Manufactured	2009		Cl	ass		OA		
Mfr. Location	USA		_					
Tank Type	N2 BLANK	ETED	C	oolant		OIL		
Phases	1		BI	L		95 kV		
Weight	3079 LB	3079 LB		il Volume		112 UG		
kV	7.96			nps		418		
Impedance	%		V	A Rating		333 kVA		
Catalog #				FC Counter		186279		
Design	Step			rl Wire Diame	ter			
Catalog/Style			Crew Size					
Note								
Test Date	9/25/2014	Test Time		12:13:45 PM	Weather		SUNNY	
Air Temperature	21 °C	Tank Temp.		°C	RH.		44 %	
Tested by		Work Order #			Last 7	Fest Date	9/25/2014	
Checked by		Test Set Type		M4K	Retest Date			
Checked Date		Set Top S/N			Reason		ROUTINE	
Last Sheet #		Set Bottom S/N			Travel Time			
P.O. #		Ins. Book #			Duration			
Copies		Sheet #			Crew	Size		

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
СН	8.002	21.642	2.785	1.29	1.00	5740.2	G	

Hot Collar Tests

Serial No.	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	2	10.003	0.0630	0.0050	G	
	L	GROUND	2	10.011	0.0680	0.0050	G	
	SL	GROUND	2	10.009	0.0650	0.0080	G	

Insulation Resistance

Page 10

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR _{auto}	IR _{man}
5000	Src/Load to Earth	24900	45600	1.8313		

Exciting Current Tests

		Mfr.	fr. Type Step		eps	Po	sition]	Found	Position Left		
De-Energized Tap Changer											
On-Load Tap Changer											
	Connections	SA	A - SL		SB - SL		1	SC - SL			
LTC	Test kV	mA	W	atts	mA	Wa	tts	mA	Watts	IR _{auto}	IR _{man}
1L	2.501	652.89	953	3.44							
N	2.501	1095.3	105	53.6							
1R	2.501	1088.5	107	70.1							
2R	2.500	1094.0	105	50.0							
3R	2.500	650.77	944	4.42							
4R	2.502	1094.4	105	53.0							
5R	2.500	650.99	945	5.48							
6R	2.501	1094.4	105	54.5							
7R	2.501	1091.0	107	75.2							
8R	2.501	1094.8	105	50.6							
9R	2.502	1091.2	106	53.9							
10R	2.501	1094.5	104	42.1							
11R	2.500	1091.8	106	53.1							
12R	2.500	1094.6	104	42.8							
13R	2.500	652.69	947	7.98							
14R	2.502	1095.0	105	51.0							
15R	2.499	652.89	950).48							
16R	2.501	1095.0	104	45.2							
								DE 19-064 Exhibit 44			
-------------	-------------------	---------	-------------	-----------------	-------------	-----------	------------	---------------------------			
		Uni	ited Pati	ower Gr	oun Ir	າດ		Docket No. DE 19-064			
					oup, n	10.	At	tachment Staff 6-40.b.i.2			
•				-			Page No.	11 Page 37 of 242			
Customer	Liberty Utilities			Date	9/25/2014		Proj. No.	0091435			
Address	Salem, NH			Air Temp.	55F		_Rel. Hum.	44%			
Owner	Liberty Utilities			_Date Last Insp	pection	By Others					
Address	Salem, NH			Last Inspectio	n Report No).					
Fauinment	t Location	Salem [Denot								
Owner Ide	ntification	9L1 Re	gulator Bar	nk							
			J								
Manuf.	GE		Туре	VR1		Test Set#	TTR-JF				
Gallons	112		Oil Levels	OK		KVA	333	}			
-		_				_	Doble	Power			
Nameplate	e Voltage	7960	Ser # A	Q775050-UE	D	_	Factor	Results			
Line to Lin	e Voltage		Ser # B	Q776598-UE	3D		Test KV	8			
Percent Re	egulation	5/8%	Ser # C	Q774165-UL	.C	_	Position	Ν			
-		_	-			-					
Тар	Тар	TTR	TTR MEAS	SURED VALUE	S:						
Position	Voltage	Ratio	S-SL A	S-SL B	S-SL C						
			L-SL A	L-SL B	L-SL C						
16R	8756	0.909	0.907	0.906	0.907						
15R	8706	0.914	0.911	0.911	0.911						
14R	8657	0.920	0.914	0.915	0.915						
13R	8607	0.925	0.921	0.922	0.921						
12R	8557	0.930	0.925	0.925	0.926						
11R	8507	0.936	0.931	0.932	0.931						
10R	8458	0.941	0.936	0.937	0.936						
9R	8408	0.947	0.945	0.944	0.944						
8R	8358	0.952	0.951	0.951	0.951						
7R	8308	0.958	0.957	0.957	0.957						
6R	8259	0.964	0.963	0.963	0.963						
5R	8209	0.970	0.969	0.969	0.969						
4R	8159	0.976	0.974	0.974	0.975						
3R	8109	0.982	0.981	0.981	0.981						
2R	8060	0.988	0.986	0.985	0.986						
1R	8010	0.994	0.994	0.995	0.995						
N	7960	1.000	1.000	1.000	1.000	1					
1L	7910	1.006	1.007	1.006	1.006						
2L	7861	1.013	1.013	1.013	1.013						
3L	7811	1.019	1.016	1.017	1.017	1					
4L	7761	1.026	1.023	1.023	1.024	1					
5L	7711	1.032	1.031	1.031	1.031						
6L	7662	1.039	1.037	1.037	1.037	1					
7L	7612	1.046	1.045	1.044	1.044						
8L	7562	1.053	1.052	1.052	1.053						
9L	7512	1.060	1.061	1.061	1.061						
10L	7463	1.067	1.067	1.067	1.067						
11L	7413	1.074	1.075	1.075	1.075						
121	7363	1.081	1.082	1.083	1.082						
131	7313	1.088	1.091	1.091	1.091	1					
141	7264	1.096	1.097	1.097	1.097	1					
151	7214	1,103	1,106	1,105	1,106						
16	7164	1.111	1.111	1,112	1,112	1					
102	, 104	1		1.114	1 1.1.16	1					

Remarks: Regulator test results are acceptable.

United Power Group, Inc.

Liberty Utilities 9 Lowell Road Salem, NH 03079 January 23, 2015 Project No. U011512

Project Location:

Salem Depot Substation

Scope:

Perform testing and maintenance on the following equipment:

- 1. 9L2 Transformer
- 2. 9L2 Vacuum Recloser and Form 3 Controller
- 3. 9L2 Voltage Regulators
- 4. Station Batteries

Remarks:

- 1. 9L2 bushings tested poorly. The bushings need to be replaced before the transformer is placed back into service.
- 2. 9L2 vacuum breaker and Form 3 controller test results are acceptable for service.
- 3. 9L2 voltage regulator test results are acceptable for service. The A Phase regulator source bushing is chipped. Repairing the bushing is recommended.
- 4. The station battery test results are acceptable for service.

Submitted by:

James Fazio

9L2T- Transformer

Company	UPG		Se	rial Number		G-859810		
Location	Salem Depor	t Substation	Sp	ecial ID		Transformer - 92T		
Division	Liberty Utili	ties	Ci	rcuit Designatio	n			
Manufacturer	GE		Co	onfiguration		Y-Y		
Year Mfg.			Ta	ink Type		OTHER		
Mfr. Location	USA		Co	oolant		OIL		
Phases	3		Cl	ass		OA/FA		
Oil Volume	690 UG		BI	L		150 kV		
Weight	18600 LB		W	inding Config.		Wye-Wye		
kV	22.9, 13.8		VA	A Rating		5000 kVA		
Note								
Test Date	1/22/2015	Test Time		10:00:24 AM	Weath	ner	SUNNY	
Air Temperature	2 °C	Tank Temp.		°C	RH.		35 %	
Tested by	JF	Work Order #			Last 7	Test Date	7/31/2014	
Checked by		Test Set Type		M4K	Retest	. Date		
Checked Date		Set Top S/N			Reaso	n	ROUTINE	
Last Sheet #		Set Bottom S/N			Trave	l Time		
P.O. #		Ins. Book #			Durat	ion		
Copies		Sheet #			Crew	Size		

Bushing Nameplate

Dsg	Serial	Mfr	Туре	C1 %PF	C1 Cap	C2 %PF	C2 Cap	kV	Amps	Year
X1	1546605	GE	U	0.35	470			25	400	1963
X2	1694128	GE	U	0.35	469			25	400	1970
X3	1694124	GE		0.35	470	0.27	411	25	400	1970
X0	1694127	GE	U	0.36	477			25	400	1970
H1	1694140	GE	U	0.34	463			25	400	1970
H2	1694129	GE	U	0.34	451	0.24	875	25	400	1970
H3	1698617	GE	U	0.34	446			25	400	1970

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
CH + CHL	8.004	31.097	1.973		1.00	8248.4		
СН	8.001	31.096	1.967	0.63	1.00	8248.3	Ι	

Bushing C1

ID	Serial	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IRauto	IR _{man}
X0	1694127	0.36	477	8.002	1.780	0.0660	0.37	1.00	472.13	G	
H1	1694140	0.34	463	8.003	1.787	0.2670	1.49	1.00	474.06	Ι	
H2	1694129	0.34	451	8.003	1.712	0.1840	1.07	1.00	454.20	Ι	
H3	1698617	0.34	446	8.003	1.854	0.7220	3.89	1.00	491.48	B	
X3	<mark>1694124</mark>	<mark>0.35</mark>	<mark>470</mark>	<mark>8.003</mark>	<mark>1.647</mark>	<mark>0.1170</mark>	<mark>0.71</mark>	<mark>1.00</mark>	<mark>436.83</mark>	D	
<mark>X1</mark>	<mark>1546605</mark>	<mark>0.35</mark>	<mark>470</mark>	<mark>8.006</mark>	<mark>1.621</mark>	<mark>0.0760</mark>	<mark>0.47</mark>	<mark>1.00</mark>	<mark>429.90</mark>	D	
<mark>X2</mark>	<mark>1694128</mark>	<mark>0.35</mark>	<mark>469</mark>	<mark>8.003</mark>	<mark>1.764</mark>	<mark>0.1180</mark>	<mark>0.67</mark>	1.00	<mark>467.89</mark>	D	

Insulation Resistance

Mfr.		Serial No.		
Connection	Volts	T1(Mohms)	T2(Mohms)	PI
HI/LO - Ground	5000	32800	48500	1.47

Exciting Current Tests

			Mfr.	Туре	Steps	B	oost %	Buck %	Position Found		Posit Le	Position Left		Oil olume
De-Energized Tap Changer														
On-Load Tap Changer														
				H1 -	HO		H	12 - H0		H3	8 - HO			
DETC	DETC LTC Test kV 1		m	4 I V	Watts	X	mA	Wat	s X	mA	Watts	X	IR _{auto}	IR _{man}
	3	5.018	141.	.93 1	194.9	L	101.37	839.5	5 L	140.31	1170.5	L	G	

Turns Ratio (H-L) Tests

	Mfr				Seria	l No.	I	IV Windi	ing	LV W	/inding		
Com	Connections				H1 -	HO		H2 - H0		H3 - H0			
Com	lections			X1 - X0				X2 - X0		X3 - X0			
Tap Np Volt Tap Np		Np V	olt	Cal	Ratio 1	Ratio 2	Ratio 3	Min Lim	Max Lim	IRauto	IR _{man}		
3	13220	762		20	1.735	1.732	1.734 1.733 1.726		1.744	G			

DE 19-064 Exhibit 44 Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 41 of 242

United Power Group, Inc.

Customer Address Owner	Liberty Utilit Salem, NH Liberty Utilit	ies				Date Air Te Date	<u>1/22/</u> emp. Last Ins	2015 5C pection	Page N Project Rel. Hu By Oth	lo. No. umidity ers	4 U011 32%	512
Equipment L Owner Ident	Location	Salem Depo 9L2T	ot Subs	statio	n	Lasti						
Nameplate	Information											
Manufacture Serial No. Primary Volt Secondary V Coolant Coolant Cap Temperature No Load Tap	er <u>GE</u> G tage <u>22.</u> Voltage <u>7.6</u> Oil <u>X</u> pacity - Units e Rise p Changer V	859810 9kV 2kV Askarel 	KVA Type Delta Delta	500 Main Date	0/5600 Au Wye Wye Air Tank of Mar 00/229	/7000 tto X X 69 nufacti 00/223	Phase Form Rated (Rated (00UG ure 300/217(3 Current Litrogen LTC 00	Cycle Class	60 OA/FA 141 245 Other Switch 3.40%	Ampe Ampe	eres eres
Gauges and C	ounters	Measured	Maxir	num	Reset	Trip	Alarm	LTC	Mea	asured	Max.	Min.
Oil Tempera	ature							lap		NA		
Wdg. Tempe	erature	35C	60	С				Counter		NA		
Pressure Oil Level		25C										
								Ш				
Visual Insp	ection											
Primary Cor	nnection	OK		Sec	ondary	Conne	ections	OK				
Tap Conne	ctions	OK		Leal	٢S			NA				
Gas Regula	tor	NA		Pair	ıt			OK				
Infra-Red In	spection	NA		Gro	unds			OK				
Fans and C	ontrols	Oil Temp.	Wdg.	Tem	р.	Manu	ıal	Auto	Lubrica	ation Date	•	
Stage 1												
etage 1			I									
Accessory	Inspection			Alar	m	Trip						
Pressure Re	elief Device -	Main Tank										
Pressure Re	elief Device -	LTC										
Sudden Pre	ssure Device	9										
Additional	Tests											

Remarks All bushings need to be replaced.

JF

Submitted By

9L2 – A Phase Voltage Regulator

Page 9

Company	UPG		Sei	rial Number		Q562027-TWR		
Location	Salem Depot	Substation	Sp	ecial ID		9L2 Regul	ators	
Division	Liberty Utili	ties	Ci	rcuit Designati	on	A Phase		
Manufacturer	GE		Ty	ре		VR-1		
Yr. Manufactured	2000		Cla	ass		OA		
Mfr. Location	USA							
Tank Type	N2 BLANKI	ETED	Co	olant		OIL		
Phases	1		BI	Ĺ		95 kV		
Weight	3079 LB		Oil	Volume		112 UG		
kV	7.96		An	nps		418		
Impedance	%		VA Rating			333 kVA		
Catalog #			LT	C Counter		81535		
Design	Step		Ctrl Wire Diameter					
Catalog/Style			Cr	ew Size				
Note								
Test Date	1/23/2015	Test Time		8:02:21 AM	Weath	ier	SUNNY	
Air Temperature	2 °C	Tank Temp.		2°C	RH.		35 %	
Tested by	JF	Work Order #			Last T	est Date	9/25/2014	
Checked by		Test Set Type		M4K	Retest	Date		
Checked Date		Set Top S/N			Reaso	n	ROUTINE	
Last Sheet #		Set Bottom S/N			Trave	l Time		
P.O. #		Ins. Book #			Durat	ion		
Copies		Sheet #			Crew	Size		

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
СН	8.004	19.255	1.657	0.86	1.00	5107.2	Q	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	2	10.004	0.062	0.022	G	
	L	GROUND	2	10.011	0.056	0.021	G	
	SL	GROUND	2	10.008	0.068	0.025	G	

Insulation Resistance

Mfr.:		Serial No.:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR _{auto}	IR _{man}
5000	Src/Load to Earth	23400	45600	1.9487		

Exciting Current Tests

			Mfr.	Туре	e Steps		Position Found			Position Left	
De-Ener	gized Tap Changer										
On-Load	l Tap Changer										
Connections SA		SA	- SL		SB - SL		Ĺ	SC - SL			
LTC	Test kV	mA	Wa	atts	mA	W	atts	mA	Watts	IRauto	IR _{man}
1R	2.502	1157.4	988	3.70							
N	2.501	1166.1	965	5.02							
1L	2.500	692.43	877	7.50							
2L	2.501	1166.4	963	3.94							
3L	2.500	692.59	873	3.11							
4L	2.500	1166.1	963	3.33							
5L	2.499	692.48	871	.54							
6L	2.501	1166.4	961	.81							
7L	2.501	1163.1	984	1.03							
8L	2.500	1166.3	961	.96							
9L	2.501	1162.7	983	3.47							
10L	2.500	1166.4	961	.37							
11L	2.500	1162.1	981	.06							
12L	2.500	1166.0	961	.10							
13L	2.500	690.72	868	3.54							
14L	2.501	1165.9	961	.36							
15L	2.500	690.46	867	7.14							
16L	2.501	1165.6	960).14							

9L2 – B Phase Voltage Regulator

Page 11

Company	UPG		Sei	rial Number		Q521599-TRM		
Location	Salem Dep	oot Substation	Sp	ecial ID		9L2 Regul	ators	
Division	Liberty Ut	ilities	Ci	rcuit Designati	ion	B Phase		
Manufacturer	GE		Ty	ре		VR-1		
Yr. Manufactured	1997		Cla	ass		OA		
Mfr. Location	USA	USA				1		
Tank Type	N2 BLAN	2 BLANKETED		olant		OIL		
Phases	1			Ĺ		95 kV		
Weight	3079 LB	LB		l Volume		112 UG		
kV	7.96			nps		418		
Impedance	%			Rating		333 kVA		
Catalog #			LT	C Counter		121575		
Design	Step		Ctrl Wire Diameter					
Catalog/Style			Crew Size					
Note								
Test Date	1/23/2015	Test Time		8:30:15 AM	Weath	ier	SUNNY	
Air Temperature	3 °C	Tank Temp.		3°C	RH.		36 %	
Tested by	JF	Work Order #			Last T	est Date	1/23/2015	
Checked by		Test Set Type		M4K	Retest	Date		
Checked Date		Set Top S/N			Reaso	n	ROUTINE	
Last Sheet #		Set Bottom S/N	I		Trave	l Time		
P.O. #		Ins. Book #			Duration			
Copies		Sheet #				Size		

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
СН	8.005	22.116	1.950	0.88	1.00	5866.1	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IRauto	IR _{man}
	S	GROUND	2	10.004	0.076	0.034	G	
	L	GROUND	2	10.011	0.065	0.031	G	
	SL	GROUND	2	10.008	0.089	0.082	G	

Insulation Resistance

Mfr.:		Serial No.:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IRauto	IR _{man}
5000	Src/Load to Earth	32400	41200	1.2716		

Exciting Current Tests

			Mfr.	Туре	Ste	eps	Po	osition 1	Found	Positio	n Left
De-Ener	gized Tap Changer										
On-Load	l Tap Changer										
Connections S.		SA	- SL		SB - SL		Ĺ	SC - SL			
LTC	Test kV	mA	Wa	atts	mA	W	atts	mA	Watts	IRauto	IR _{man}
1R	2.502	1062.0	103	39.7							
N	2.500	1068.8	102	23.5							
1L	2.503	638.08	100)4.5							
2L	2.508	1073.7	112	23.4							
3L	2.500	636.35	974	1.34							
4L	2.503	1071.8	108	38.2							
5L	2.508	640.70	103	31.2							
6L	2.503	1073.9	110)6.0							
7L	2.511	1074.3	116	51.8							
8L	2.500	1070.5	105	54.6							
9L	2.509	1072.5	115	57.5							
10L	2.502	1070.8	107	79.7							
11L	2.504	1068.2	111	8.7							
12L	2.511	1077.0	116	53.6							
13L	2.500	635.85	100)1.2							
14L	2.499	1070.6	107	71.5							
15L	2.501	635.80	100)3.3							
16L	2.508	1074.3	113	37.9							

9L2 – C Phase Voltage Regulator

Page 13

Company	UPG		Ser	ial Number		Q5484907-TTV		
Location	Salem Depo	t Substation	Spe	ecial ID		9L2 Regula	itors	
Division	Liberty Util	ities	Cir	·cuit Designati	on	C Phase		
Manufacturer	GE		Туре			VR-1		
Yr. Manufactured	2003		Cla	ISS		OA		
Mfr. Location	USA							
Tank Type	N2 BLANK	2 BLANKETED		olant		OIL		
Phases	1		BII	Ĺ		95 kV		
Weight	3079 LB		Oil	Volume		112 UG		
kV	7.96		An	ips		418		
Impedance	%		VA Rating			333 kVA		
Catalog No.			LT	C Counter		96772		
Design	Step		Ctrl Wire Diameter					
Catalog/Style			Crew Size					
Note								
Test Date	1/23/2015	Test Time		8:57:29 AM	Weath	er	SUNNY	
Air Temperature	2 °C	Tank Temp.		2°C	RH.		38 %	
Tested by	JF	Work Order #			Last T	'est Date	1/23/2015	
Checked by		Test Set Type		M4K	Retest	Date		
Checked Date		Set Top S/N			Reaso	n	ROUTINE	
Last Sheet #		Set Bottom S/N			Trave	l Time		
P.O. #		Ins. Book #			Duration			
Copies		Sheet #			Crew Size			

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
СН	8.005	19.239	2.334	1.21	1.00	5103.0	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	2	10.004	0.032	0.078	G	
	L	GROUND	2	10.011	0.044	0.089	G	
	SL	GROUND	2	10.008	0.034	0.067	G	

Insulation Resistance

Page 14

Mfr.:						
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR _{auto}	IR _{man}
5000	Src/Load to Earth	12300	34320	2.7902		

Exciting Current Tests

			Mfr.	Туре	e Steps		Position Found			Position Left	
De-Ener	gized Tap Changer										
On-Load	l Tap Changer										
Connections		SA	A - SL		SB - SL		_	SC - SL			
LTC	Test kV	mA	Wa	atts	mA	Wa	atts	mA	Watts	IR _{auto}	IR _{man}
1R	2.502	1045.9	103	34.4							
N	2.501	1055.0	108	34.9							
1L	2.504	626.31	102	28.2							
2L	2.499	1054.6	105	54.2							
3L	2.499	623.31	978	3.55							
4L	2.500	1054.4	107	0.7							
5L	2.507	626.86	103	37.3							
6L	2.516	1061.6	116	55.9							
7L	2.509	1056.4	116	52.9							
8L	2.500	1053.8	105	55.5							
9L	2.506	1054.5	115	50.9							
10L	2.515	1061.9	117	70.4							
11L	2.516	1059.0	119	92.4							
12L	2.516	1063.3	118	32.4							
13L	2.501	624.81	103	35.1							
14L	2.502	1054.6	108	31.2							
15L	2.506	625.04	103	36.4							
16L	2.500	1055.9	109	97.1							

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2

United Power Group, Inc.

BATTERY & CHARGER INSPECTION

	BATT	ERT & CHARG	ERINSPECTION			Page 52 o
					Page No.	15
Customer	Liberty Utilities		Date	1/22/2015	Proj. No.	U011512
Address	Salem, NH		Air Temp.	30 F	_Rel. Hum.	35%
Owner	Liberty Utilities		Date Last In	spection		
Address	Salem, NH		Last Inspect	ion Report No.		
Equipment L	ocation Salem Depot					
Owner Ident	ification Main Battery					
		0				26.04
CON	STANTIOAD 4 America					20.94
CON	TANTLOAD 4 Amps			NEG		ND 05 5
PILO	I CELL NO. 8	VOLIS 2	2.226	SP GR 1.21.	SIE	MP <u>35 F</u>
ELEC	CIROLYTE LEVEL HI	LO	NORMAL X	ROO	MIEMP	30 F
STAT	EMENT OF GENERAL CONDITION					
CHARGER S	S/N GPSU880342	B	ATTERY			
(EACH I	NSPECTION)		EACH CELL		ОК	COMMENTS
OPE	RATING TEMP HI	NORM X	FLECTROL	YTE I EVEI	OK	
GPD		<u></u>			OK	
		01/			OK	
ALAF	IVID. LUSSAU IESTED		SEPERATO	5		
	BATT VOLIS TESTED	UK	SEDIMENT			
			JARS CLEA	N & DRY	OK	
CALI	BRATE:		VENT PLUG	iS	OK	
	DC VOLTMETER OK		FLAME ARF	RESTOR	OK	
	DC AMMETER OK					
SET	EQUALIZE VOLT 28		TERMINALS			
SET	FLOAT VOLTAGE 26.6		COR	ROSION	OK	
SET	CUBRENT LIMIT 6.6		TIGH	TNESS	OK	
02.					on	
		ĸ	ACK			
(EVERY	FIVE YEARS)		o. =			
HI - V	OLT SHUTDOWN LEVEL 30		CLEAN		OK	
HI - V	OLT RELAY		INSULATIO	N	ОК	
F	PICK UP 29 DROP OUT		GROUND C	ONNECTION	OK	
LOW	VOLT RELAY		PAINT		OK	
F	VICK UP 24 DROP OUT					
			(WRITE ADI	DITIONAL COM	MENTS BE	ELOW)
Manu	ıf C&D	E	YE WASH			
Mode	ARE24AC6E					
Input	120/208/240 Volts 2/1 1/1	Amps	CONDITION	ΙΝΑ		
Outo	ut 26.4 Volts 6	Amns	EXPIRATIO			
Outp		/ impo		DATE		
		0			000	00.04
OVE	ALL VOLTAGE <u>26.94</u>	G	ROUND INDICAT	ION POS		26.94
CON	STANT LOAD 4 Amps			NEG	- GRD	
PILO	T CELL NO. 8	VOLTS 2	2.226	SP GR <u>1.213</u>	<u>3</u> TE	MP <u>35</u> F
				_		
ELEC	TROLYTE LEVEL HI	LO	NORMAL X	ROO	M TEMP	30 F
STAT	EMENT OF GENERAL CONDITION					
oad Bank						
	YES NO	JF				
	x		•			
L			•			
	e Diete lefe	Demend.				
sattery Nam	e Plate Into	Remarks:				
Manuf Excid	e					
Гуре <u>3CC</u> -	3					
Cat # 6101	21					
Rating 50 Ar	אר <u>י</u>					
-						000050
						000052

United Power Group, Inc.

CELL IMPEDENCE TEST SHEET

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 16 Page 53 of 242

				Page No.	16 ^{Pa} (
Customer	Liberty Utilities	Date	1/22/2015	Proj. No.	U011512
Address	Salem, NH	Air Temp.	30F	Rel. Hum.	35%
Owner	Liberty Utilities	Date Last Inspec	tion	_	
Address	Salem, NH	Last Inspection F	eport No.		

Equipment Location Salem Depot

Owner Identification Main Battery

			Ŭ						Ŭ		
Call			P	Ctron	Chron	Call	Call		P	Chron	Ctron
Cell			R	Strap	Strap	Cell	Cell		R	Strap	Suap
1NO.			(X)	MOHIMS	UK/HI/LU	1NO.	mOHMS	UK/HI/LU	(X)	MOHINS	UK/HI/LU
1	0.241	UK OK				31					
2	0.242	OK OK		0.050	01/	32					
3	0.241	OK OK		0.050	UK	33					
4	0.240	OK				34					
5	0.253	OK				35					
6	0.243	OK		0.080	OK	36					
7	0.249	OK				37					
8	0.246	OK				38					
9	0.235	OK		0.080	OK	39					
10	0.248	OK				40					
11	0.247	OK				41					
12	0.251	OK				42					
13						43					
14						44					
15						45					
16						46					
17						47					
18						48					
19						49					
20						50					
21						51					
22						52					
23						53					
24						54					
25						55					
26						56					
27						57					
28						58					
20						50					
29						60					
30		-				60					

Average cell impedance	1.9900 mOhms	Average strap impedance	0.0700 mOhms
Impedance high limit +20%	2.3880 mOhms	Impedance high limit +30%	0.0910 mOhms
Impedance low limit -20%	1.5920 mOhms	Impedance low limit -30%	0.0490 mOhms

Remarks Results are acceptable.

JF

Submitted by

Equipment Used

MEGGER Bite-2

United Power Group, Inc.

CELL VOLTAGE TEST SHEET

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 17 Page 54 of 242

			Page No.	17 Page 54 of
Customer	Liberty Utilities	Date 1/22/2015	Proj. No.	U011512
Address	Salem, NH	Air Temp. 30F	Rel. Hum.	35%
Owner	Liberty Utilities	Date Last Inspection ???		
Address	Salem, NH	Last Inspection Report No.		

Equipment Location Salem Depot Owner Identification Main Battery (Before 30m load Test)

Cell	Cell	Cell Voltage	Specific	Water
No.	Voltage	OK/HI/LO	Gravity	Added(x)
1	2.242	OK	1.211	
2	2.204	OK	1.209	
3	2.315	OK	1.212	
4	2.254	OK	1.212	
5	2.264	OK	1.211	
6	2.244	OK	1.210	
7	2.212	OK	1.211	
8	2.209	OK	1.212	
9	2.213	OK	1.209	
10	2.268	OK	1.209	
11	2.258	OK	1.212	
12	2.256	OK	1.210	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

_				
Cell	Cell	Cell Voltage	Specific	Water
No.	Voltage	OK/HI/LO	Gravity	Added(x)
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Average cell voltage	2.2449 Volts
Voltage high limit +10%	2.4694 Volts
Voltage low limit -10%	2.0204 Volts

Remarks

Submitted by

JF

Equipment Used

MEGGER Bite-2

United Power Group, Inc.

CELL VOLTAGE TEST SHEET

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 18 Page 55 of 242

			Page No.	18 Page 55 of 2
Customer	Liberty Utilities	Date 1/22/2015	Proj. No.	U011512
Address	Salem, NH	Air Temp. 30F	Rel. Hum.	35%
Owner	Liberty Utilities	Date Last Inspection ???		
Address	Salem, NH	Last Inspection Report No.		

Equipment Location Salem Depot Owner Identification Main Battery (Before 30m load Test)

Cell	Cell	Cell Voltage	Specific	Water
No.	Voltage	OK/HI/LO	Gravity	Added(x)
1	1.989	OK	1.211	
2	1.987	OK	1.209	
3	1.987	OK	1.212	
4	1.981	OK	1.212	
5	1.980	OK	1.211	
6	1.981	OK	1.210	
7	1.974	OK	1.211	
8	1.973	OK	1.212	
9	1.971	OK	1.209	
10	1.972	OK	1.209	
11	1.982	OK	1.212	
12	1.984	OK	1.210	
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Cell	Cell	Cell Voltage	Specific	Water
No.	Voltage	OK/HI/LO	Gravity	Added(x)
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Average cell voltage	1.9801 Volts
Voltage high limit +10%	2.1781 Volts
Voltage low limit -10%	1.7821 Volts

Remarks Results after 30m load test are acceptable.

Submitted by

JF

Equipment Used

MEGGER Bite-2

01-7044978-541715-00

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2

Control#: 7044978

Page 56 of 242

Page 1 of 2

WEIDMANN	WEIDMANN ELECTRICAL TECHNOLOGY 3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA	+ 19020
	215 639 8599 + 215 639 8577 WWW.WEIDMANN-DIAGNOSTICS.COM	01-70
Liberty Utilities	Serial#: F965618C M	fr: GENERAL ELECTRIC
	Location: SALEM DEPOT 9	V: 22.9

PA + 19020 TEST REPORT

		Location: S	ALEM DEPOT 9		kV: 22.9	Order	#: 541715
		Equipment: ⊤	RANSFORMER		kVA: 7000	Accoun	t: 110710
LONDONDERRY,	NH 03053 US Co	mpartment: N	IAIN(BOTTOM)	Year	Mf'd: 1968	Received	d: 07/28/2017
ATTN: MARIO BA	RONE	Breathing: S	EAL	Syring	e ID: 53005667	Reported	d: 08/14/2017
PO#: MARIO BAR	ONE	Bank: P	hase:	Bottl	e ID:		
Project ID:		Fluid: MIN U	ISGal: 730	Sampleo	d By: AF		
Customer ID: RE	F# 020402						
	Lab Con	trol Number:	7044978	7035695 ⁷	7035707 ⁷	7035696 ⁷	
	D	ate Sampled:	06/14/2017	09/01/2016	12/16/2014	12/16/2014	
	0	der Number:	541715	539652	539664	539653	
		Oil Temp:	62	70	80	80	
Dissolved Gas A	nalysis (DGA) Hydroge	n (H2) (µL/L):	93	80	86	86	
ASTM	Methane	(CH4) (µL/L):	20	22	15	15	
D-36121	Ethane (C2H6) (µL/L):	4	4	2	2	
	Ethylene (C2H4) (µL/L):	20	22	21	21	
	Acetylene (C2H2) (µL/L):	<1	<1	<1	<1	
	Carbon Monoxide	϶ (CO) (μL/L):	1060	947	918	918	
	Carbon Dioxide	(CO2) (µL/L):	6555	7660	7000	7000	
	Nitroge	n (N2) (µL/L):	73568	74400	6610	66100	
	Oxyge	n (O2) (µL/L):	2410	6140	3160	3160	
	Total Dissolved Gas	(TDG) (µL/L):	83730	89275	17812	77302	
Tota	I Dissolved Combustible Gas (1	DCG) (µL/L):	1197	1075	1042	1042	
	Equival	ent TCG (%):	1.2282	1.0527	8.4496	1.1866	
DGA	DGA Keys Gas / Interpre	etive Method:	Hydrogen within con	dition 1 limits (100	μL/L).		
Diagnostics	PERIEEE	C57.104-2008	Methane within cond	lition 1 limits (120 i	μL/L).		
U	(most r	ecent sample)	Ethane within conditi	ion 1 limits (65 µL/	, L).		
	Ύ,	. ,	Ethylene within cond	lition 1 limits (50 µl	, _/L).		
			Acetvlene within con	dition 1 limits (1 µL	, _/L).		
			Carbon Monoxide: C	Condition 3 Indication	ons of significantly	overheated cellulose	insulation (570
			μL/L).		0 ,		
			Carbon Dioxide: Cor	ndition 3 Significan	t Indications of ove	rheated cellulose ins	ulation (4000
			μL/L).	C C			,
			TDCG: Condition 2 L	_evels exceed norr	nal concentrations.	Fault may be prese	nt (720 μL/L).
	DGA TDCG Bata Internet	tive Method:					
			Evercise caution Ar	aalvze for individus	l asses Determin	a load dependence	
	fer ieee	cont comple)	Exercise caution. Ai		a gases. Determin	e load dependence.	
		ecent sample)	Normal decomposition	on of cellulose insu	lation		
		ary mounton.					
	WDS DGA Cor	ndition Code:	NORMAL				
	WDS Recomme	nded Action:	Continue normal ope	eration. Resample	for testing within or	e year.	
Comment:							
General Oil Quali	ity (GOQ)	(00	40	10	
ASTM D-1533		(mg/kg):	57	30	12	12	
ASTM D-971	Interfacial Tension	(mN/m):	19.95	21.0	16.0	16.0	
ASTM D-974	Acid Number	(mg KOH/g):	0.216	0.13	0.1	0.1	
ASTM D 1500'		(ASIM):	L2.0	3.5	4	4	
ASTN D-1524	visual Exam.	(Relative):	PASS		PASS	PASS	
AOTH D 45041			CLR&BRIGHT	PARTICLES	CLR&BRIGHT	CLK&BRIGHT	
ASTM D-1524	Sediment Exam.	(Relative):		<i>_ ,</i>	- /		
ASTM D-877	Dielectric Breakdown	(kV):	49	54	51	51	
ASTM D-1816 ¹	Dielectric Breakdown 1 mm	(kV °C):	18 (25°C)	26 (70°C)	35 (80°C)	36 (80°C)	
Notations: 1. Analysis is ISO, This test is conducted by We accreditation status does not	/IEC 17025:2005 accredited, L-A-B Accredited Certifi idmann Laboratory other than Primary Lab. 6. Weidm apply to these results. 8. Imported Equipment 10. mg	icate Number L2303.02 ann Laboratory has rec /kg , µg/g, µg/mL, µL/L	 2. This test is conducted by a served ISO Standard 17025 accred = ppm, µg/L = ppb, mN/m = dyne 	ubcontracted laboratory. 3. So ditation for this test. 7. Importe es/cm, mm ² /s = cSt	ubcontracted laboratory has re d Sample: WEIDMANN Electri	ceived ISO Standard 17025 ac cal Technology accepts no resp	creditation for this test. 5. onsibility for these results;

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANNE Electrical Technology assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, productivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

WEID	ΙΛΙΛΔΝΙ	v	VEIDMANN ELECTR	ICAL TECHNOLOGY		Docke	t No. DE 19-064
		3430 PRO	GRESS DRIVE, UNI	Г В + BENSALEM, PA +	¹⁹⁰²⁰ TEST	REPORT Attachmer	nt Staff 6-40.b.i.2
			+ 215 639 8599 WWW.WEIDMANN-I	- 215 639 8577 DIAGNOSTICS.COM	01-70	044978-541715-00	Page 57 of 242 Page 2 of 2
Liberty Utilities		Serial#:	F965618C	Mfr:	GENERAL	Control#:	7044978
		Location:	SALEM DEPOT 9	kV:	22.9	Order#:	541715
		Equipment:	TRANSFORMER	kVA:	7000	Account:	110710
LONDONDERRY,	NH 03053 US Co	ompartment:	MAIN(BOTTOM)	Year Mf'd:	1968	Received:	07/28/2017
ATTN: MARIO BA	RONE	Breathing:	SEAL	Syringe ID:	53005667	Reported:	08/14/2017
PO#: MARIO BAR	ONE	Bank:	Phase:	Bottle ID:	:		
Project ID:		Fluid: MIN	USGal: 730	Sampled By:	AF		
Customer ID: RE	F# 020402						
	Lab Co	ntrol Number	7044978	7035695 ⁷	7035707 ⁷	7035696 ⁷	
	I	Date Sampled	l: 06/14/2017	09/01/2016	12/16/2014	12/16/2014	
	C	Order Number	541715	539652	539664	539653	
		Oil Temp	62	70	80	80	
ASTM D-9241	Power Factor @ 25°C (Routi	ne) (%): 0.155	0.086	0.097	0.097	
ASTM D-924	Power Factor @ 100°C (Rout	ine) (%):	7.280	4.890	4.890	
ASTM D-1298	Density @15°C	(g/mL)):	0.888	0.887	0.887	
ASTM D-4052	Density @15°C	(g/mL)):	0.888	0.887	0.887	
ASTM D-445	Viscosity @40°C	(mm²/s)):	9.42	9.35	9.35	
ASTM D-2668 ^{5, 6}	Oxidation Inhibitor	(wt. %	o) < 0.020	0.027	< 0.020	< 0.020	
GOQ Diagnostics	s N	loisture in Oi	Exceeds limit for in	-service oil (35 mg/kg ma	ax).		
PER IEEE C57.10	6-2006 Interf	acial Tension	Exceeds limit for in	-service oil (25 mN/m mi	n).		
(most recent samp	ble)	Acid Number	Exceeds limit for in	-service oil (0.2 mg KOH	/g max).		
	Color Numb	er and Visua	I: Diagnostic not app	licable. Diagnostic not ap	plicable.		
	Dielectric Breakdowr	ASTM D-877	: Diagnostic not app	licable.			
	Dielectric Breakdown	ASTM D-1816	Exceeds limit for in	-service oil (23 kV min @	2 1mm).		
	Power Factor @ 2	5°C (Routine): Acceptable for in-s	ervice oil (0.5% max).			
-	Oxida	tion Inhibitor	: Diagnostic not app	licable for type 1 oil. Exce	eeds limit for i	n-service oil type 2 (0.0)9% min).
Comment: DIELEO	CTRIC RESULT WAS VERIFIED BY REAN	IALYSIS.					
Furanic Compou	nd 2-Fural	dehyde (µg/L)	649				
ASTM D-5837°	5-Hydroxy-methyl-fural	dehyde (µg/L)): 17				
	2-Acet	ylfuran (µg/L)): < 10				
	5-Methyl-2-fural	dehyde (µg/L)	58				
Europia Compour	2-Furyl a	alcohol (µg/L) ampla):	: < 10				
Furanic Compou	nd Diagnostics (most recent s	ampie):	ill tunically have a De	area of Dalymorization (D) of 1000 1	200 "Middle Aged" po	
approximatel strength and	y 500 and paper with less than 2 may result in a transformer failu	50 is in its "Ol e. The above	d Age." Severely deg estimations are base	raded insulation with a D d on a study by Chendon	P of 150 or le of GSU trar	ss will have very little n sformers filled with mi	nechanical neral oil.
Estir	nated Average Degree of Poly	merization (D	P): 485		0		
Estir	mated Operating Age of the Ec	uipment: 28.	3				
Notations:							
Comment:							
РСВ	Concentr	ation (mg/kg)	: 56.77 mg/kg				
EPA Method 8082	2 ^{5, 6} PCB Ty	pe (Arocolor)	1260/54/42				
	Re	porting Limit	: 1				

Comment:

End of Test Report

2 10

Authorized By:

KENNETH COCCIA LABORATORY SUPERVISOR

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory, 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory as received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation apply to these results. 8. Imported Equipment 10. mg/kg, µg/g, µg/m, µL/L = pm, µg/L = ppm, µg/L = ppm, µg/L = ppm, µg/L = ppm, µg/L = pm, g/L =

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, productivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

WEIDMANN

WEIDMANN ELECTRICAL TECHNOLOGY

3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA + 19020 TEST REPORT

Libery Utilities Seriais: G89810.4 Constraimed of the constrained of t				WWW.WEIDMANN-	DIAGNOSTICS.CO	VI 01-70	044979-541715-00	Page 1 of 2
Location: SALEM DEPOT 9 KV: Z2 9 Ordert: String LONDONDERRY. NH 03053 US Compartment: MAIN(BOTTOM) Year Mrd: Received: 0728/2017 TATE: MARIO BARONE Brank: Phan: Bottin: Sorging: DI: <	Liberty Utilities		Serial#:	G859810A		Mfr: GENERAL ELECTRIC	Control#:	7044979
Equipment: TRANSPORMER MV3: 7000 Account: 110710 CUNCONDERTY, NH 0305 US Compartorment: MANIPOBATOM) Year MR10: BARONE Benetive:::728/017 Reported:::8/14/2017 P00: MARID BARONE Benetive:::728/017 Reported:::8/14/2017 P00: MARID BARONE Benetive:::728/017 Reported:::8/14/2017 P00: 10: 200087 Reported:::8/14/2017 P00: 12/16/2014 12/16/20			Location:	SALEM DEPOT 9		kV: 22.9	Order#:	541715
LONDONDERRY, NH (3083 US Compartment: MAIN(80TTOM) Year Mfd: Syntige DI: 3000657 Received: 10/28/2017 ATTN: MARIO BARONE Bank: Phase: Bottle DI: Syntige DI: 3000577 Reported: 08/14/2017 Poit: MARIO BARONE Fluid: MIN USGal: 1010 Sampled By: AF 7035697' 7035696' Castomer DI: KEF# 023068 Lab Control Number: 5141715 5336654 5336655 Old Control Number: 541715 5336644 5336655 60 60 Dissolved Gas Analysis (DGA) Hydrogen (122) (LL); 448 226 649 649 ASTM Methane (CH4) (LL/L); 121 122 135 133 D3612' Ethane (C2H6) (LL/L); 175 194 183 183 Carbon Monoxide (CO) (LL/L); 1283 773 1320 1320 Carbon Dioxie (CO) (LL/L); 1282 76300 72700 72700 Oxygen (O2) (LL/L); 1285 74300 7270 72700 Carbon Dioxie (CO) (LL/L); 1285 11414 96511 96511 Disoloved Carbon (Equipment:	TRANSFORMER		kVA: 7000	Account	110710
ATTN: MARIO BARONE Breathing: SEAL Syringe ID: 300067 Reported: 08/14/2017 Project ID: Fluid: MIN USGA: 1010 Sampled By: AF Customer ID: REF# 023069 Lab Control Number: 7/04/97 7/035897' 7/035808' 7/035808' Date Sampled: 0/01/12/016 12/16/2014 12/16/2014 12/16/2014 12/16/2014 Date Sampled: 0/01/12/016 12/16/2014 12/16/2014 12/16/2014 12/16/2014 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µL/L): 488 226 649 649 AsTM Methane (CH4) (µL/L): 175 184 183 183 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µL/L): 121 122 136 136 Acetynen (CZH4) (µL/L): 121 122 136 136 136 Carbon Mionxide (CO) (µL/L): 1293 773 1320 1320 1320 Carbon Dixide (CO) (µL/L): 1293 773 1320 1320 1276 Total Dissolved Cas (TDCO) (µL/L): 12432 1614 2661 <th>LONDONDERRY,</th> <th>NH 03053 US</th> <th>Compartment:</th> <th>MAIN(BOTTOM)</th> <th>Year</th> <th>Mf'd:</th> <th>Received</th> <th>07/28/2017</th>	LONDONDERRY,	NH 03053 US	Compartment:	MAIN(BOTTOM)	Year	Mf'd:	Received	07/28/2017
POI:: MARIO BARONE Bank: Phase: Butte ID: Project ID: Fluid: MIN USGal: 1010 Sampled By: AF Customer ID: REF# 022066 Control Number: 7044773 7035697 7035709 70356967 Date Sampled: 06/14/2017 0901/2016 12/16/2014 12/16/2014 12/16/2014 Date Sampled: 06/14/2017 0901/2016 12/16/2014 12/16/2014 12/16/2014 ASTM Order Number: 54/1715 538664 539665 539665 Date Sampled: 06/14/2017 0901/2016 60 60 60 ASTM Methane (CH4) (µ/L); 148 226 649 649 ASTM Methane (CH4) (µ/L); 141 122 136 136 Carbon Dioxide (CO2) (µ/L); 173 144 1320 1320 Carbon Dioxide (CO2) (µ/L); 19237 14400 17200 17200 Total Dissolved Gas (TO2) (µ/L); 1725 14400 1414 96511 9611 Carbon Dioxide (CO2) (µ/L); 1705 2.783 2.783 2.783 DGA DGA Keys Gas / Interprotive	ATTN: MARIO BAI	RONE	Breathing:	SEAL	Syring	ge ID: 3000657	Reported:	08/14/2017
Project ID: Customer ID: REF# 023068 Fluid: MIU USGai: 1010 Sampled By: AF Customer ID: REF# 023068 Lab Control Number: Date Sample: 06(14/2017 70356967 70356967 70356967 Date Sample: 07044 Number: 07044 Number: 07045 Number: 07045 Number: 0817 Number: 0818 Numb	PO#: MARIO BAR	ONE	Bank:	Phase:	Bott	le ID:		
Customer ID: REF# 023068 Lab Control Number: 7044979 70356897 7035708 70355687 Date Sampled: 06/14/2017 08/01/2016 12/16/2014 12/16/2014 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µLL): 488 226 649 649 ASTM Methane (CH4) (µLL): 148 183 183 D-3612' Ethane (C2H6) (µLL): 175 194 183 183 Carbon Monoxide (CO) (µLL): 1723 173 1320 1320 Carbon Monoxide (CO) (µLL): 1923 773 1320 1320 Total Dissolved Gas (TDO) (µLL): 1923 11414 96511 2661 Equivalent TGG (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: <t< th=""><th>Project ID:</th><th></th><th>Fluid: MIN</th><th>USGal: 1010</th><th>Sample</th><th>d By: AF</th><th></th><th></th></t<>	Project ID:		Fluid: MIN	USGal: 1010	Sample	d By: AF		
Lab Control Number: 7044979 70356897 70356897 70356897 Data Sampled: 00rder Number: 60/14/2017 539654 539665 539665 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µLL); 535 299 373 373 D-3612' Ethane (C2H4) (µLL); 112 121 122 138 138 Active (C2H4) (µLL); 121 122 138 138 132 Active (C2H4) (µLL); 121 122 138 138 132 Carbon Moxxide (C0) (µLL); 1233 773 1320 1320 1320 Carbon Moxxide (C02) (µLL); 1925 14100 3950 3950 1151 Total Dissolved Cas / Interpretive Method: Hydrogen: Condition 2 Indications of partial discharge activity (100 µLL). 2.783 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of segnificantity overheated (>250°C) oil (150 µLL). Carbon Moroxide: Condition 1 Andications of segnificantity overheated (>250°C) oil (150 µLL). Carbon Moroxide: Condition 3 Indications of segnificantity overheated (>250°C) oil (150 µLL).	Customer ID: REF	F# 023068						
Date Sampled: Order Number: 006/4/2017 090/1/2016 12/16/2014 12/16/2014 Old remp: 56 50 60 60 60 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µLL): 488 226 649 649 ASTM Methane (CH4) (µLL): 175 194 183 183 D-3612' Ethylene (C2H6) (µLL): 121 122 136 136 Accetylene (C2H4) (µLL): 121 122 136 136 Accetylene (C2H4) (µLL): 121 122 136 136 Carbon Dioxide (C0) µLL): 19237 19400 17200 17200 Nitrogen (N2) µLL): 78625 76500 72700 72700 Oxygen (O2) µLL): 19237 19400 17200 17200 Total Dissolved Combustible Gas (PCG) µLL): 101589 11141 96511 96511 DGA DGA keys Gas Interpretive Method: Hydrogen: Condition 2 Indications of apartial discharge activity (100 µLL). Ignostics PER IEEE C57.104-2008 Hehane: Condition 3		Lab (Control Number	r: 7044979	7035697 ⁷	7035708 ⁷	7035698 ⁷	
Order Number: 541715 538654 538655 538656 Dissolved Gas Analysis (DGA) Hydrogen (H2) (µL/L); 488 226 649 649 ASTM Methane (CH4) (µL/L); 335 299 373 373 D-3612' Ethane (C2H6) (µL/L); 175 194 183 183 Ethylene (C2H2) (µL/L); 1 1 1 1 1 1 Carbon Monoxide (CO) (µL/L); 19237 19400 17200 17200 Carbon Dioxide (CO2) (µL/L); 19237 19400 17200 17200 Total Dissolved Gas (TDO) (µL/L); 17855 76300 72700 72700 Oxygen (O2) (µL/L); 17255 14100 39850 3850 Total Dissolved Gas (TDO) (µL/L); 2452 1614 2661 2661 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (-550°C) oil (120 µL/L). (most recent sample) Ethylen: Condition 3 Indications of significantly overheated (-520°C) oil (120 µL/L). Caton Monoxid:: Condition 3 Indications of			Date Sampled	l: 06/14/2017	09/01/2016	12/16/2014	12/16/2014	
Oli Temp: 56 60 60 Dissolved Gas Analysis (DGA) Hydrogen (H2) (LL). 488 226 649 649 ASTM Methane (CH4) (LL). 355 299 373 373 D-3612' Ethylene (C2H2) (LL). 175 194 183 183 Carbon Monoxide (CO) (LL). 123 773 1320 1320 Carbon Monoxide (CO) (LL). 19237 19400 17200 17200 Oxygen (O2) (LL). 1785 76300 72700 72700 Oxygen (O2) (LL). 1795 14100 3950 3950 Total Dissolved Gas (TDG) (LL). 101589 111141 2661 2661 Equivalent TGC (VS). 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition a Indications of avertaeted (>150°C) oil (120 µL). (most recent sample) Ethate: Condition 4 Indications of averleated (>150°C) oil (120 µL). Ethylene: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/J. Carbon Monoxide: Condition 4 Severe Indicatio			Order Numbe	r: 541715	539654	539665	539655	
Dissolved Gas Analysis (DGA) Hydrogen (H2) (µLL): 488 226 649 649 ASTM Methane (CH4) (µLL): 555 299 373 373 D-3612' Ethane (CH4) (µLL): 175 194 183 183 Ethylene (CH4) (µLL): 175 194 183 183 Acetylene (CH4) (µLL): 121 122 136 136 Acetylene (CH4) (µLL): 121 122 136 136 Carbon Monoxide (CO) (µLL): 1237 19400 17200 17200 Nitrogen (N2) (µLL): 1785 76300 72700 72700 Oxygen (C2) (µLL): 101589 11141 96511 96511 Total Dissolved Gas (TDG6) (µLL): 101589 11141 96511 96511 Equivalent TG6 (%): 2.2693 1.195 2.783 2.783 DGA DGA keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>150°C) oil (120 µLL). (most recent sample) (most recent sample) Ethane: Condition 1 limits (1 µLL). Carbon Moxide: Condition 1 limits (1 µLL). Carbon Moxide: Condition 1 limits (1 µLL). Carbon Moxide: Condition 3 Indications of significantly overheated cellulose insulation (700 µL/). Carbon Moxide: Condition 1 limits (1 µLL). Carbon Moxide: Condition 1 limits (1 µLL). DGA Cellulose (Faper) Insulation: (C2/CO >= 10: Indications of significantly overheated cellulose insulation (10000 µLL). MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS Acommended Action: (C2/CO >= 10: Indication of thermal decomposition of cellulose insulation. MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS DGA Condition Code: CAUTION MDS DGA Co			Oil Temp): 56	60	60	60	
ASTM Methane (CH4) (µLL): 355 299 373 373 D-3612' Ethane (C2H6) (µLL): 175 194 183 183 D-3612' Ethylene (C2H4) (µLL): 121 122 136 136 Acceptione (C2H2) (µLL): 123 773 1320 1320 1320 Carbon Monxide (C0) (µLL): 1923 773 1320 1320 1320 Carbon Monxide (C0) (µLL): 1925 14100 3950 3950 17700 17200 180 <td< th=""><th>Dissolved Gas Ar</th><th>nalysis (DGA) Hydro</th><th>ogen (H2) (µL/L</th><th>): 488</th><th>226</th><th>649</th><th>649</th><th></th></td<>	Dissolved Gas Ar	nalysis (DGA) Hydro	ogen (H2) (µL/L): 488	226	649	649	
D-3612 ¹ Ethylene (C2H6) (µLL): 175 194 183 183 Ethylene (C2H4) (µLL): 121 122 136 136 Acetylene (C2H2) (µLL): 123 773 1220 1320 Carbon Monxide (C0) (µLL): 1237 19400 17200 17200 72700 Oxygen (C2) (µLL): 1237 19400 17200 7270 7270 7270 Oxygen (C2) (µLL): 101589 11141 96511 96511 7011 Dissolved Gas (TDC6) (µLL): 101589 11141 9651 9651 Carbon Boxide (C0 (µLL): 101589 1141 9651 9651 Carbon Boxide (C2 (µLL): 101589 11414 9651 9651 Carbon Boxide (C2 (µLL): 101589 11414 9651 9651 Carbon Boxide (C2 (µLL): 101589 11414 9651 965 1 Carbon Boxide (C2 (µLL): 101589 11414 9651 965 1 Carbon Boxide (C2 (µLL): 101589 11414 9651 9651 Carbon Boxide (C2 (µLL): 101589 11414 9651 961 2.783 2.783 2.783 2.783 2.783 2.783 2.783 2.783 Carbon Boxide (Carbon Minh) Carbon Boxide: Condition 2 Indications of partial discharge activity (100 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated (>550°C) oil (150 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (700 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (1000 µLL). Carbon Dixide: Condition 3 Levels indicate a high level of decomposition. Fulls are probably present (1920 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation. WDS D6A Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM 0-1524' Misual Exam. (Relative): ND ASTM 0-577' Diedetric Texakow (KV): Carbon Mon	ASTM	Metha	ine (CH4) (µL/L): 355	299	373	373	
Ethylene (C2H4) (µL/L): 121 122 136 136 Acetylene (C2H2) (µL/L): 1	D-3612 ¹	Ethar	ie (C2H6) (µL/L): 175	194	183	183	
Acetylene (C2H2) (µL/L): <1 <1 <1 <1 Carbon Mioxide (C0) (µL/L): 19237 19400 17200 17200 Nitrogen (N2) (µL/L): 19237 19400 17200 17200 Oxygen (O2) (µL/L): 17255 76300 72700 72700 Oxygen (O2) (µL/L): 17255 1100 3950 3950 Total Dissolved Gas (TDG) (µL/L): 101589 111414 96511 96511 Equivalent TGC (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of partial discharge activity (100 µL/L). (most recent sample) Ethane: Condition 4 Indications of severely overheated (-250°C) oil (150 µL/L). (most recent sample) Ethane: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Mioxide: Condition 3 Levels Indicate a high level of decomposition. Faults are probably present (1920 µL/L). Carbon Mioxide: Condition 3 Levels Indicate a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: Retest Monthy. PER IEEE C57.104-2008 Exercise extreme		Ethyler	ie (C2H4) (µL/L): 121	122	136	136	
Carbon Monoxide (CO2) (µL/L): 1233 773 1320 1320 Carbon Dioxide (CO2) (µL/L): 19237 19400 17200 17200 Nitrogen (N2) (µL/L): 178625 76300 72700 72700 Oxygen (O2) (µL/L): 1295 14100 3950 3950 Total Dissolved Gast (TOG) (µL/L): 101589 111414 96611 96611 Equivalent TCG (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>150°C) oil (120 µL/L). (most recent sample) Ethane: Condition 3 Indications of overheated (>250°C) oil (150 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated (>250°C) oil (100 µL/L). Acetylene within condition 3 Indications of significantly overheated (>250°C) oil (100 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Monoxide: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). Carbon Monoxide: Condition 4 Severe Indications of orellouise insulation. Moles insulation. VL/L). Carbon Monoxide: Condition 3 Indication of cellulose insulation.		Acetyler	ie (C2H2) (µL/L): <1	<1	<1	<1	
Carbon Dioxide (CO2) (µL/L): 19237 19400 17200 17200 Nirrogen (N2) (µL/L): 78625 76300 72700 72700 Total Dissolved Gas (TDC3) (µL/L): 1295 14100 3950 3950 Total Dissolved Gas (TDC3) (µL/L): 101589 111414 96511 96511 Total Dissolved Combustible Gas (TDC3) (µL/L): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>50°C) oil (100 µL/L). (most recent sample) Ethane: Condition 1 Indications of overheated (>50°C) oil (100 µL/L). Acetylene within condition 1 limits (1 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Dioxide: Condition 3 Indicates a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: Retest Monthly. Retest Monthly. PER IEEE C57.104-2008 Retern caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) <tr< th=""><th></th><th>Carbon Mono</th><th>kide (CO) (µL/L</th><th>): 1293</th><th>773</th><th>1320</th><th>1320</th><th></th></tr<>		Carbon Mono	kide (CO) (µL/L): 1293	773	1320	1320	
Nitrogen (N2) (µLL): 78625 76300 72700 72700 Total Dissolved Gas (TDG) (µLL): 1295 14100 3950 3950 Total Dissolved Combustible Gas (TDG) (µLL): 101589 111414 96511 96511 Total Dissolved Combustible Gas (TDG) (µLL): 2432 1614 2661 2661 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of partial discharge activity (100 µLL). Diagnostics PER IEEE C57.104-2006 Methane: Condition 1 Indications of severely overheated (>250°C) oil (150 µLL). Ethylene: Condition 3 Indications of severely overheated (>250°C) oil (100 µLL). Ethylene: Condition 3 Indications of significantly overheated (>350°C) oil (100 µLL). Acetylene within condition 1 limits (1 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µLL). UpLL). Carbon Dioxide: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µLL). DGA TDCG Rate Interpretive Method: Retest Monthly. Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment:		Carbon Diox	de (CO2) (µL/L): 19237	19400	17200	17200	
Oxygen (02) (µLL): 1295 141/10 3950 3950 Total Dissolved Combustible Gas (TDCG) (µLL): 101589 1111414 96511 96511 Total Dissolved Combustible Gas (TDCG) (µLL): Equivalent TCG (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>150°C) oil (120 µLL). (100 µLL). (most recent sample) Ethane: Condition 3 Indications of severely overheated (>526°C) oil (100 µLL). Ethylene: Condition 3 Indications of significantly overheated (>526°C) oil (100 µLL). (most recent sample) Ethylene: Condition 3 Indications of significantly overheated (>526°C) oil (100 µLL). Carbon Monoxide: Condition 3 Indications of significantly overheated (>526°C) oil (100 µLL). Carbon Dioxide: Condition 3 Indications of significantly overheated (>526°C) oil (100 µLL). Carbon Dioxide: Condition 1 limits (1 µLL). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µLL). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µLL). DGA TDCG Rate Interpretive Method: Retest Monthly. Retest Monthly. TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µLL). DGA Collulose (Paper) Insulation:<		Nitro	ogen (N2) (µL/L): 78625	76300	72700	72700	
Total Dissolved Gas (TDG) (µL/L): 101589 111414 96511 96511 Total Dissolved Combustible Gas (TDG) (µL/L): 2432 1614 2661 2661 Equivalent TGG (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>150°C) oil (120 µL/L). (most recent sample) Ethere: Condition 3 Indications of significantly overheated (>250°C) oil (100 µL/L). Ethylene: Condition 3 Indications of significantly overheated (>250°C) oil (100 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated (<250°C) oil (100 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Dioxide: Condition 3 Indications of significantly overheated cellulose insulation (1000 µL/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (1000 µL/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2006 Very UL/L). Condition Code: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Collition Code: CAUTION CAUTION XMD >= 37.0 39.0 39.0 STM D-1533' Moisture in Oil (m/kg): 91		Oxy	/gen (O2) (μL/L): 1295	14100	3950	3950	
Total Dissolved Combustible Gas (TDCG) (µL/L): Equivalent TCG (%): 2.432 1614 2661 2661 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of partial discharge activity (100 µL/L). Diagnostics PER IEEE C57.104-2008 Methane: Condition 2 Indications of overheated (>150°C) oil (120 µL/L). (most recent sample) Ethane: Condition 2 Indications of severely overheated (>250°C) oil (150 µL/L). Carbon Monoxide: Condition 1 limits (1 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Acteylene within condition 1 limits (1 µL/L). Carbon Monoxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). Acteylene within condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Cellulose (Paper) Insulation CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS Recommended Action: Resample within 6 months for testing. Comment: Garcal Unality (GOO) ASTM D-1524' Noisture in Oil (mg/kg): 91 <2 <		Total Dissolved G	as (TDG) (µL/L): 101589	111414	96511	96511	
Equivalent TCG (%): 2.2693 1.195 2.783 2.783 DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of overheated (>150°C) oil (120 µL/L). Diagnostics PER IEEE C57.104-2008 Methane: Condition 2 Indications of severely overheated (>250°C) oil (150 µL/L). Ethane: Condition 3 Indications of severely overheated (>50°C) oil (100 µL/L). Ethane: Condition 3 Indications of severely overheated (>50°C) oil (100 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Dioxide: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: PER IEEEE C57.104-2008 Retest Monthly. PER IEEEE C57.104-2008 PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION Resample within 6 months for testing. Comment: General Oil Quality (GOQ) 37.21 37.0 39.0 39.0 39.0 ASTM D-9	Total	Dissolved Combustible Ga	s (TDCG) (µL/L): 2432	1614	2661	2661	
DGA DGA Keys Gas / Interpretive Method: Hydrogen: Condition 2 Indications of partial discharge activity (100 μL/L). Diagnostics PER IEEE CS7.104-2008 Methane: Condition 2 Indications of overheated (>150°C) oil (120 μL/L). Ethane: Condition 2 Indications of severely overheated (>150°C) oil (100 μL/L). Ethane: Condition 3 Indications of significantly overheated (>250°C) oil (100 μL/L). Acceptene within condition 3 Indications of significantly overheated (>350°C) oil (100 μL/L). Acceptene within condition 3 Indications of significantly overheated cellulose insulation (570 μL/L). Carbon Monoxide: Condition 3 Locations of overheated cellulose insulation (10000 μL/L). Carbon Dioxide: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μL/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE CS7.104-2008 PER IEEE CS7.104-2008 Retest Monthly. Evercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Collulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. Comment: General Oil Quality (GOQ) Rest Monthly: 37.21 ASTM D-971' Interfacial Tension (m/Wm): 37.21 37.0 39.0 ASTM D-974' Acid Number (mg KOH); U.1.0 1.5 1.5 1.5		Equ	ivalent TCG (%	2.2693	1.195	2.783	2.783	
Diagnostics PER IEEE C57.104-2008 Methane: Condition 2 Indications of overheated (>150°C) oil (120 µL/L). (most recent sample) Ethane: Condition 4 Indications of severely overheated (>250°C) oil (120 µL/L). Ethylene: Condition 3 Indications of significantly overheated (>350°C) oil (100 µL/L). Ethylene: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Monoxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). Eversite extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) Eversite extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: Color Number (mg/kg): 91 <2 4 4 ASTM D-974' Acid Number (mg/Kg): 0.021 0.005 0.005 0.005 ASTM D-974' Acid Number (mg/Kg): 0.021 0.005 0.005 0.005 0.005	DGA	DGA Keys Gas / Inter	pretive Method	I: Hydrogen: Conditi	on 2 Indications of p	artial discharge ac	tivity (100 μL/L).	
(most recent sample) Ethane: Condition 4 Indications of severely overheated (>250°C) oil (150 µL/L). Ethylene: Condition 1 Indications of significantly overheated (>350°C) oil (100 µL/L). Acetylene within condition 1 limits (1 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (10000 µL/L). Carbon Monoxide: Condition 3 Indications of overheated cellulose insulation (10000 µL/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). Carbon Monoxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: Codor Number (mg/Kg): 91 <2 4 4 ASTM D-1531 Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-974 ¹ Acid Number (mg KOHg): 0.005 0.005 0.005 0.005 ASTM D-1500 ¹ Color Number (Retative): PASS PASS PASS	Diagnostics	PER IEI	EE C57.104-200	8 Methane: Conditio	on 2 Indications of o	verheated (>150°C	;) oil (120 μL/L).	
Ethylene: Condition 3 Indications of significantly overheated (>350°C) oil (100 µL/L). Acetylene within condition 1 limits (1 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: Conterface (mg KOH/g): 91< <2 4 4 ASTM D-15331 Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS		(mo	st recent sample	e) Ethane: Condition	4 Indications of sev	erely overheated (>	>250°C) oil (150 µL/L).	
Acetylene within condition 1 limits (1 µL/L). Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (570 µL/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µL/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: (two most recent sample) Retext Monthly. Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Collulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: Cation J 1.5 1.5 1.5 General Oil Quality (GOQ) 91 <-2 4 4 ASTM D-971 ⁴ Acid Number (mg KOH/g): ASTM D-971 ⁴ Acid Number (mg KOH/g): 0.021 0.005 0.005 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-1524 ¹ Sediment Exam. (Relative): ND ASTM D-757 ¹ Dielectric Breakdown (kV): 48				Ethylene: Conditio	on 3 Indications of sig	gnificantly overheat	ted (>350°C) oil (100 μ	IL/L).
Carbon Monoxide: Condition 3 Indications of significantly overheated cellulose insulation (570 μ/L/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 μ/L/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. WDS DGA Condition Code: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. Comment: Commente decition: General Oil Quality (GOQ) Reset Monthy: ASTM D-971' Interfacial Tension (mN/m): ASTM D-974' Acid Number (mg KOH/g): 0.021 0.005 0.005				Acetylene within c	ondition 1 limits (1 µ	L/L).		
μ/L). Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 μ/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Reasample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-1533 ¹ Moisture in Oil (mg/kg): 0.021 0.005 0.005 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-7524 ¹ Sediment Exam. (Relative): ND ASS PASS PASS ASTM D-7524 ¹				Carbon Monoxide	: Condition 3 Indicati	ons of significantly	overheated cellulose i	insulation (570
Carbon Dioxide: Condition 4 Severe Indications of overheated cellulose insulation (10000 µ/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µ/L). DGA TDCG Rate Interpretive Method: PER IEEE C57.104-2008 Retest Monthly. PER IEEE C57.104-2008 COJCO >= 10: Indication of thermal decomposition of cellulose insulation. MDS DGA Condition Code: COJCO >= 10: Indication of thermal decomposition of cellulose insulation. MDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): ASTM D-971 ¹ Interfacial Tension (mN/m): ASTM D-974 ¹ Acid Number (mg KOH/g): ND ASTM D-1500 ¹ Color Number (ASTM): L1.0 1.5 1.5 1.5 ASTM D-1524 ¹ Visual Exam. (Relative): Relative: PASS PASS PASS PASS CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-1524 ¹ Sediment Exam. (Relative): ND				μL/L).				
μ/L/L). TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 μ/L). DGA TDCG Rate Interpretive Method: Retest Monthly. PER IEEE C57.104-2008 Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-971 ¹ Interfacial Tension (mN/m): 37.21 37.0 39.0 39.0 ASTM D-1500 ¹ Color Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS PASS ASTM D-1524 ¹ Sediment Exam. (Relative): ND CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-1524 ¹ Sediment Exam. (Relative): ND ND ASTM 65 61 61				Carbon Dioxide: C	Condition 4 Severe Ir	dications of overhe	eated cellulose insulati	on (10000
TDCG: Condition 3 Levels indicate a high level of decomposition. Faults are probably present (1920 µL/L). DGA TDCG Rate Interpretive Method: PER IEEE C57.104-2008 (two most recent sample) DGA Cellulose (Paper) Insulation: (two most recent sample) DGA Cellulose (Paper) Insulation: (two most recent sample) CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <22 4 4 A A 4 A cid Number (mg/kg): 91 <22 4 4 Comment: Comment: Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ A cid Number (mg/kg): 91 <22 4 4 A cid Number (mg/kg): 93.0 A cid Number (mg/kGH/g): 93.0 A cid Number (mg/kGH/g): 93.0 Colspan= (mg/kGH/g): 93.0 Colspan= (mg/kGH/g): 93.0 Colspan= (mg/kGH/g): 93.0 Colspan= (mg/kGH/g): 93.0				μL/L).				
Image: display blue display="blue displ				TDCG: Condition	3 Levels indicate a h	igh level of decom	position. Faults are pro	bably present
DGA TDCG Rate Interpretive Method: PER IEEE C57.104-2008 (two most recent sample) Retest Monthly. DGA Cellulose (Paper) Insulation: OGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. MDS DGA Condition Code: WDS DGA Condition Code: WDS Recommended Action: CAUTION Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): ASTM D-971 ¹ Interfacial Tension (mN/m): ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1524 ¹ Visual Exam. (Relative): ASTM D-1524 ¹ Visual Exam. (Relative): ASTM D-1524 ¹ Sediment Exam. (Relative): ASTM D-1524 ¹ Sediment Exam. (Relative): ASTM D-877 ¹ Dielectric Breakdown (kV): Retest Monthly. Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation.				(1920 µL/L).				
PER IEEE C57.104-2008 (two most recent sample) Exercise extreme caution. Analyze for individual gases. Plan outage. Advise manufacturer. (two most recent sample) DGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: WDS Recommended Action: CAUTION Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): (mg/KOH/g): 91 <2		DGA TDCG Rate Inter	pretive Method	I: Retest Monthly.				
(two most recent sample) DGA Cellulose (Paper) Insulation: CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation. WDS DGA Condition Code: CAUTION WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2		PER IEI	EE C57.104-200	8 Exercise extreme	caution. Analyze for	r individual gases.	Plan outage. Advise m	nanufacturer.
DGA Cellulose (Paper) Insulation:CO2/CO >= 10: Indication of thermal decomposition of cellulose insulation.WDS DGA Condition Code: WDS Recommended Action:CAUTIONComment:Comment:General Oil Quality (GOQ)ASTM D-15331Moisture in Oil (mg/kg): (mg/Kq):91<2		(two mo	st recent sample	e)				
WDS DGA Condition Code: WDS Recommended Action:CAUTION Resample within 6 months for testing.Comment:General Oil Quality (GOQ)ASTM D-15331Moisture in Oil (mg/kg):91<2		DGA Cellulose (P	aper) Insulatior	1: CO2/CO >= 10: In	dication of thermal of	lecomposition of ce	ellulose insulation.	
WDS Recommended Action: Resample within 6 months for testing. Comment: General Oil Quality (GOQ) 91 <2		WDS DGA	Condition Code					
Comment: 0 General Oil Quality (GOQ) ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-1533 ¹ Moisture in Oil (mg/kg): 91 <2 4 4 ASTM D-971 ¹ Interfacial Tension (mN/m): 37.21 37.0 39.0 39.0 ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1500 ¹ Color Number (ASTM): L1.0 1.5 1.5 1.5 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS ASTM D-1524 ¹ Sediment Exam. (Relative): ND ND 1 65 61 61		WDS Recom	mended Action	: Resample within 6	months for testing.			
General Oil Quality (GOQ) Moisture in Oil (mg/kg): 91 <2	Comment:			·				
ASTM D-15331Moisture in Oil(mg/kg):91<2	General Oil Quali	ty (GOQ)						
ASTM D-971 ¹ Interfacial Tension (mN/m): 37.21 37.0 39.0 39.0 ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1500 ¹ Color Number (ASTM): L1.0 1.5 1.5 1.5 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS PASS ASTM D-1524 ¹ Sediment Exam. (Relative): ND ND CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-877 ¹ Dielectric Breakdown (kV): 48 65 61 61	ASTM D-15331	Moisture in Oil	(mg/kg): 91	<2	4	4	
ASTM D-974 ¹ Acid Number (mg KOH/g): 0.021 0.005 0.005 0.005 ASTM D-1500 ¹ Color Number (ASTM): L1.0 1.5 1.5 1.5 ASTM D-1524 ¹ Visual Exam. (Relative): PASS PASS PASS PASS PASS ASTM D-1524 ¹ Sediment Exam. (Relative): ND CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-1524 ¹ Sediment Exam. (Relative): ND ND Example MD ASTM D-877 ¹ Dielectric Breakdown (kV): 48 65 61 61	ASTM D-9711	Interfacial Tension	(mN/m): 37.21	37.0	39.0	39.0	
ASTM D-15001Color Number(ASTM):L1.01.51.51.5ASTM D-15241Visual Exam.(Relative):PASSPASSPASSPASSASTM D-15241Sediment Exam.(Relative):NDCLR&BRIGHTCLR&BRIGHTCLR&BRIGHTASTM D-8771Dielectric Breakdown(kV):48656161	ASTM D-9741	Acid Number	(mg KOH/g	0.021	0.005	0.005	0.005	
ASTM D-15241Visual Exam.(Relative):PASSPASSPASSCLR&BRIGHTCLR&BRIGHTCLR&BRIGHTCLR&BRIGHTCLR&BRIGHTASTM D-15241Sediment Exam.(Relative):NDNDASTM D-8771Dielectric Breakdown(kV):48656161	ASTM D-15001	Color Number	(ASTM): L1.0	1.5	1.5	1.5	
CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT CLR&BRIGHT ASTM D-15241 Sediment Exam. (Relative): ND ASTM D-8771 Dielectric Breakdown (kV): 48 65 61 61	ASTM D-15241	Visual Exam.	(Relative	PASS	PASS	PASS	PASS	
ASTM D-1524 ¹ Sediment Exam. (Relative): ND ASTM D-877 ¹ Dielectric Breakdown (kV): 48 65 61 61				CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT	
ASTM D-877 ¹ Dielectric Breakdown (kV): 48 65 61 61	ASTM D-15241	Sediment Exam.	(Relative): ND				
	ASTM D-877 ¹	Dielectric Breakdown	(kV): 48	65	61	61	

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory. 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory has received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation status does not apply to these results. 8. Imported Equipment 10. mg/kg, µg/g, µg/mL, µL/L = pph, mV/m = dynes/cm, mm²/s = cSt

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, protessed represent the best judgment of which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

VVEIDIVIANN	3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA
	215 639 8599 + 215 639 8577

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 59 of 242

VVCIU	IVIAININ	3430 PRC	GRESS DRIVE, UNI	T B + BENSALEM, PA +	19020 TEST	Attachmer	nt Staff 6-40.b.i
			215 639 8599 -	+ 215 639 8577	1231		Page 59 01 24
			WWW.WEIDMANN-	DIAGNOSTICS.COM	01-704	4979-541715-00	Page 2 of 2
Liberty Utilities		Serial#:	G859810A	Mfr:	GENERAL FI FCTRIC	Control#:	7044979
		Location:	SALEM DEPOT 9	kV:	22.9	Order#:	541715
		Equipment:	TRANSFORMER	kVA:	7000	Account:	110710
LONDONDERRY,	NH 03053 US	Compartment:	MAIN(BOTTOM)	Year Mf'd:		Received:	07/28/2017
ATTN: MARIO BAI	RONE	Breathing:	SEAL	Syringe ID:	3000657	Reported:	08/14/2017
PO#: MARIO BAR	ONE	Bank:	Phase:	Bottle ID:			
Project ID:		Fluid: MIN	USGal: 1010	Sampled By:	AF		
Customer ID: REF	F# 023068						
		Lab Control Numbe	r: 7044979	7035697 ⁷	7035708 ⁷	7035698 ⁷	
		Date Sampled	l: 06/14/2017	09/01/2016	12/16/2014	12/16/2014	
		Order Numbe	r: 541715	539654	539665	539655	
		Oil Tem	b: 56	60	60	60	
ASTM D-1816 ¹	Dielectric Breakdow	vn 1 mm (kV °C): 27 (25°C)	40 (60°C)	42 (60°C)	42 (60°C)	
ASTM D-924 ¹	Power Factor @ 25°	C (Routine) (%): 0.021	0.006	0.004	0.004	
ASTM D-924	Power Factor @ 100	°C (Routine) (%):	0.195	0.238	0.238	
ASTM D-1298	Density @15	°C (g/mL):	0.887	0.887	0.887	
ASTM D-4052	Density @15	°C (g/mL):	0.887	0.887	0.887	
ASTM D-445	Viscosity @40)°C (mm²/s):	9.34	9.31	9.31	
ASTM D-2668 ^{3, 0}	Oxidation Innit	oitor (Wt. %	b) 0.066	0.095	0.098	0.098	
GOQ Diagnostics	6 2006	Moisture in Oi	Exceeds limit for in	i-service oii (35 mg/kg ma	x).		
(most recent same	0-2000		Acceptable for in-s	$\frac{1}{2} = \frac{1}{2} = \frac{1}$	max)		
	ne) Col	or Number and Visua	Diagnostic not ann	licable. Diagnostic not an	nlicable		
	Dielectric Br	eakdown ASTM D-87	Diagnostic not app	licable. Diagnostic not ap	plicable.		
	Dielectric Bre	akdown ASTM D-181	: Acceptable for in-s	ervice oil (23 kV min @ 1	mm).		
	Power Fa	ctor @ 25°C (Routine): Acceptable for in-s	ervice oil (0.5% max).).		
		Oxidation Inhibito	r: Diagnostic not app	licable for type 1 oil. Exce	eds limit for in	-service oil type 2 (0.	09% min).
Comment: DIELEO	TRIC RESULT WAS VERIFIE	D BY REANALYSIS.					,
Furanic Compour	nd	2-Furaldehyde (µg/L): 38				
ASTM D-5837⁵	5-Hydroxy-metl	nyl-furaldehyde (µg/L): < 10				
		2-Acetylfuran (µg/L): < 10				
	5-Methy	l-2-furaldehyde (µg/L	28				
	-	2-Furyl alcohol (µg/L): < 10				
Furanic Compour	nd Diagnostics (most	recent sample):					
New insulatio approximately strength and i	n with a high degree of 500 and paper with le may result in a transfor	mechanical strength w ss than 250 is in its "O mer failure. The above	vill typically have a De d Age." Severely deg estimations are base	egree of Polymerization (E graded insulation with a D d on a study by Chendon	0P) of 1000-13 P of 150 or les g of GSU trans	00. "Middle Aged" pa s will have very little r sformers filled with mi	per is nechanical neral oil.
Fetin	nated Operating Age	of the Equinment 7					
Notations:	nated operating Age						
Comment:							
РСВ	(Concentration (ma/ka): 265.02 ma/ka				
EPA Method 8082	5, 6	PCB Type (Arocolor	1260/54/42				
		Reporting Limi	t: 1				
Comment:		• •	ł				
			End of Test	Report			
						Veron	ra

Authorized By:

KENNETH COCCIA LABORATORY SUPERVISOR

(

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory. 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory has received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation status does not apply to these results. 8. Imported Equipment 10. mg/kg, µg/mL, µL/L = ppm, µg/L = ppb, mN/m = dynes/cm, mm²/s = cSt

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, protessed or implied as to the condition, protectivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

WEIDMANN

WEIDMANN ELECTRICAL TECHNOLOGY

3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA + 19020 TEST REPORT

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 60 of 242

Liberty Utilities Serial#: M160691	EIDMANN-DI			4000 644746 00	
Liberty Utilities Serial#: M160691		AGNOSTICS.COM	01-702	4980-541715-00	Page 1 of 2
Location: SALEM		Mfr:	GENERAL ELECTRIC	Control#:	7044980
	DEPOT #9	kV:	23	Order#:	541715
Equipment: TRANSF	ORMER	kVA:	9300	Account:	110710
LONDONDERRY, NH 03053 US Compartment: MAIN(BC	OTTOM)	Year Mf'd:	1989	Received:	07/28/2017
ATTN: MARIO BARONE Breathing: SEAL		Syringe ID:	53005166	Reported:	08/14/2017
PO#: MARIO BARONE Bank: Phase:		Bottle ID:			
Project ID: Fluid: MIN USGal: 1	250	Sampled By:	AF		
Customer ID: REF# 022772					
Lab Control Number:	7044980	7035699 ⁷	7035709 ⁷	7035700 ⁷	
Date Sampled:	06/14/2017	09/01/2016	12/16/2014	12/16/2014	
Order Number:	541715	539656	539666	539657	
Oil Temp:	55	90	80	80	
Dissolved Gas Analysis (DGA) Hydrogen (H2) (µL/L):	51	50	50	50	
ASTM Methane (CH4) (µL/L):	56	54	51	51	
D-3612 ¹ Ethane (C2H6) (µL/L):	44	48	39	39	
Ethylene (C2H4) (μL/L):	4	4	4	4	
Acetylene (C2H2) (µL/L):	<1	<1	<1	<1	
Carbon Monoxide (CO) (µL/L):	495	477	447	447	
Carbon Dioxide (CO2) (µL/L):	14360	14800	14200	14200	
Nitrogen (N2) (μL/L):	80509	89000	83300	83300	
Oxygen (O2) (μL/L):	1194	4950	6500	6500	
Total Dissolved Gas (TDG) (µL/L):	96713	109383	104591	104591	
Total Dissolved Combustible Gas (TDCG) (μL/L):	650	633	591	591	
Equivalent TCG (%):	0.5587	0.4794	0.4804	0.4804	
DGA Keys Gas / Interpretive Method: Hydrog	en within con	dition 1 limits (100 µl /l.)			
Diagnostics PER IEEE C57 104-2008 Methan	e within cond	ition 1 limits (120 μ L/L)			
(most recent sample) Ethane	within conditi	on 1 limits (65 μ /L).			
(most recent sample) Ethale	within cond	ition 1 limits (50 μ L/L).			
	ne within con	dition 1 limits $(1 \mu / L)$			
Carbon	Monoxide: C	ondition 2 Indications of	f overheated o	ellulose insulation (35	0 ul /l)
Carbon	Dioxide: Con	dition 4 Severe Indicati	ons of overhe	ated cellulose insulatio	ο με/ε).
					10000
	within conditio	n 1 limits (720 µl /l)			
DGA TDCG Rate Interpretive Method: Retest	Annually				
PER IEEE C57 104-2008 1-Conti	inue normal o	peration			
(two most recent sample)					
DGA Cellulose (Paper) Insulation: CO2/C	O Ratio not ar	oplicable - at least one o	as doesn't ex	ceed its limit.	
			,		
WDS DGA Condition Code: CAUTIO	UN	and a fam to atim a			
WDS Recommended Action: Resam	pie within 6 m	ionths for testing.			
Comment:					
ASTM D 45221 Mointure in Oil (maffer)	22	50	C	C	
ASTM D-1555 Moisture in Oil (ing/kg):	23	50 25 0	28.0	29.0	
ASTM D-971 Interfactal Tension (IntVIII):	37.02	35.0	36.0	30.0	
ACIU NUMBER (mg KOH/g):	0.010	0.005	0.005	0.005	
ASTM D-1500 ¹ Color Number (ASTM)-1	LU.J	0.0	0.0		
ASTM D-1500 ¹ Color Number (ASTM):	E H.D.D	FA00	PA33	FASS	
ASTM D-1500 ¹ Color Number (ASTM): ASTM D-1524 ¹ Visual Exam. (Relative):			DREDICUT		
ASTM D-1500 ¹ Color Number (ASTM): ASTM D-1524 ¹ Visual Exam. (Relative): CLF	R&BRIGHT	CLR&BRIGHT CL	R&BRIGHT	CLR&BRIGHT	
ASTM D-1500 ¹ Color Number (ASTM): ASTM D-1524 ¹ Visual Exam. (Relative): CLF ASTM D-1524 ¹ Sediment Exam. (Relative):	R&BRIGHT TRACE	CLR&BRIGHT CL	R&BRIGHT	CLR&BRIGHT	
ASTM D-1500 ¹ Color Number (ASTM): ASTM D-1524 ¹ Visual Exam. (Relative): ASTM D-1524 ¹ Sediment Exam. (Relative): ASTM D-877 ¹ Dielectric Breakdown (kV): ASTM D 1846 ¹ Dielectric Breakdown 1 mm (kV):	R&BRIGHT TRACE 51	CLR&BRIGHT CL	R&BRIGHT 63	CLR&BRIGHT	
ASTM D-1500 ¹ Color Number (ASTM): ASTM D-1524 ¹ Visual Exam. (Relative): ASTM D-1524 ¹ Sediment Exam. (Relative): ASTM D-1524 ¹ Sediment Exam. (Relative): ASTM D-1524 ¹ Dielectric Breakdown (kV): ASTM D-877 ¹ Dielectric Breakdown 1 mm (kV °C): ASTM D-924 ¹ Bower Easter @ 25°C (Partition) (%):	R&BRIGHT TRACE 51 25 (24°C)	CLR&BRIGHT CL 55 42 (90°C)	R&BRIGHT 63 39 (80°C)	CLR&BRIGHT 63 39 (80°C)	

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory. 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory has received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation status does not apply to these results. 8. Imported Equipment 10. mg/kg, µg/g, µg/mL, µL/L = pph, mJ/m = dynes/cm, mm²/s = cSt

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology wassumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, protessed is to be condition, protective or implied as to be condition, productivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

WEIDMANN

WEIDMANN ELECTRICAL TECHNOLOGY

3430 DROGRESS DRIVE LINIT B + RENSALEM DA + 10020

	215 639 8599 +	215 639 8577	TES1	REPORT	Page 61 of 242
	WWW.WEIDMANN-D	IAGNOSTICS.COM	01-70	44980-541715-00	Page 2 of 2
Liberty Utilities Serial	#: M160691	Mfr:	GENERAL ELECTRIC	Control#:	7044980
Location	n: SALEM DEPOT #9	kV:	23	Order#:	541715
Equipmen	t: TRANSFORMER	kVA:	9300	Account:	110710
LONDONDERRY, NH 03053 US Compartmen	t: MAIN(BOTTOM)	Year Mf'd:	1989	Received:	07/28/2017
ATTN: MARIO BARONE Breathing	g: SEAL	Syringe ID:	53005166	Reported:	08/14/2017
PO#: MARIO BARONE Ban	c: Phase:	Bottle ID:			
Project ID: Fluid: MI	N USGal: 1250	Sampled By:	AF		
Customer ID: REF# 022772					
Lab Control Numb	ber: 7044980	7035699 ⁷	7035709 ⁷	7035700 ⁷	
Date Samp	ed: 06/14/2017	09/01/2016	12/16/2014	12/16/2014	
Order Num	ber: 541715	539656	539666	539657	
Oil Tei	np: 55	90	80	80	
ASTM D-924 Power Factor @ 100°C (Routine)	%):	0.340	0.324	0.324	
ASTM D-1298 Density @ 15°C (g/n	1L):	0.874	0.873	0.873	
ASIM D-4052 Density @ 15°C (g/n	1L):	0.874	0.873	0.873	
ASTM D-445 Viscosity @40°C (mm ²	/s):	8.52	8.46	8.46	
ASTM D-2668% OXIdation Inhibitor (Wt.	<u>%) 0.033</u>	0.059	0.069	0.069	
GOQ Diagnostics Moisture in	OII: Acceptable for in-se	ervice oil (35 mg/kg max)	•		
(most recent comple)	on: Acceptable for in-se				
(most recent sample) Acid Nume	er: Acceptable for in-se	ince oil (0.2 mg KOH/g	max). Nicoblo		
Dielectrie Breekdeum ASTM D	77: Diagnostic not appl	icable. Diagnostic not ap	plicable.		
Dielectric Breakdown ASTM D-0	16: Acceptable for in-se	ICADIE. Invice oil (23 kV min $@ 1$	mm)		
Bower Eactor @ 25°C (Pouti	10. Acceptable for in-se				
	re: Diagnostic not annu	icable for type 1 oil Exce	ads limit for i	n-service oil type 2 (0)	09% min)
Comment: DIELECTRIC RESULT WAS VERIFIED BY REANALYSIS.					00 /0 mmj.
Furanic Compound 2-Furaldehyde (µg	/L): < 10				
ASTM D-5837 ⁵ 5-Hydroxy-methyl-furaldehyde (µg	/L): < 10				
2-Acetylfuran (μg	/L): < 10				
5-Methyl-2-furaldehyde (µg	/L): < 10				
2-Furyl alcohol (µg	/L): < 10				
Furanic Compound Diagnostics (most recent sample):					
New insulation with a high degree of mechanical strength approximately 500 and paper with less than 250 is in its ' strength and may result in a transformer failure. The above	will typically have a Deg Old Age." Severely degr e estimations are based	gree of Polymerization (E aded insulation with a D d on a study by Chendon	P) of 1000-1 P of 150 or le g of GSU trar	300. "Middle Aged" pa ss will have very little r nsformers filled with mi	per is nechanical neral oil.
Estimated Average Degree of Polymerization	(DP): >1003				
Estimated Operating Age of the Equipment: <	1.0				
Comment:					
PCB Concentration (mg/l	(g): < 1.0 mg/kg				
EPA Method 8082 ^{5, 6} PCB Type (Arocol	or): ND				
Reporting Li	nit: 1				
Comment:					
	End of Test F	Report			
		- 1		$ \land$	1

e orra (

Authorized By:

KENNETH COCCIA LABORATORY SUPERVISOR

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory. 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory as received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation apply to these results. 8. Imported Equipment 10. mg/st, pg/st, pg/ft, pl/L = pm, gg/L = pp, m, gg/L = pp, gg/L

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, productivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

Imported sample. No results: 7035707

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 62 of 242

Imported sample. No results: 7035708

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 63 of 242

Imported sample. No results: 7035709

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 64 of 242

Imported sample. No results: 7035696

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 65 of 242

Imported sample. No results: 7035700

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 66 of 242

Imported sample. No results: 7035698

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 67 of 242

Imported sample. No results: 7035695

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 68 of 242

Imported sample. No results: 7035697

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 69 of 242

Imported sample. No results: 7035699

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 70 of 242

Substation Yard Visual and Operational (V&O) Inspection Checklist

Substation: Salem Depot

Date: -

Docket No. DE 19-064 Attachment Staff 6-40.b.i.2 Page 71 of 242

1S TO CHECK:

.

- For items inspected, place $\sqrt{}$ in box following number for item If item does not apply place NA in box •
- .

a of barbed wire angled out @ approx. 45° le) or vertical wire (BW) strands intact (unbroken) inds are taut inds grounded/connected to ground grid ween bottom of fence and ground < 2" ved by comment) abric + barbed wire ≥ 7' int wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
le) or vertical wire (BW) strands intact (unbroken) inds are taut inds grounded/connected to ground grid ween bottom of fence and ground < 2"
wire (BW) strands intact (unbroken) hds are taut hds grounded/connected to ground grid ween bottom of fence and ground < 2" wed by comment) abric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
ads are taut ads grounded/connected to ground grid ween bottom of fence and ground < 2" wed by comment) abric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
ads grounded/connected to ground grid ween bottom of fence and ground < 2" wed by comment) abric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
ween bottom of fence and ground < 2" wed by comment) abric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
abric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
fabric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
fabric + barbed wire ≥ 7' aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
aut wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
wire - 3 strands, taut & grounded mechanism on gate. mechanism is not a climbing aid wed by comment)
mechanism on gate. mechanism is not a climbing aid wed by comment)
mechanism is not a climbing aid wed by comment)
wed by comment)
substation name/designation and emergen
phone number on/near main entrance gate
The Contract of the Second Street
e easily readable (not faded, damaged or
f fence fabric)
wed by comment)
wed by comme

