

United Power Group, Inc.

Liberty Utilities
9 Lowell Road
Salem, NH 03079

Date. 8/27/14
Project No.

Project Location:

Barron Ave. Substation

Scope:

Perform testing & maintenance on the following equipment:

1. 10L1 Transformer
2. 10L1 Recloser and Form 3A Controller
3. 10L1 Voltage Regulators
4. Substation Perimeter Fence Grounding

Remarks:

1. Transformer 10L1's bushings are showing signs of deterioration. UPG would like to see past test data for the transformer.
The transformer is over 40 years old. UPG recommends retesting the transformer in 1 year to see if the condition worsens.
2. Recloser 10L1 and form 3A controller test results are acceptable for service.
3. Voltage regulators 10L1 test results are acceptable for service.
4. UPG was asked to inspect the ground on the perimeter fence. It was discovered that most of the fence was ungrounded;
a 2-point test was used to find this issue. UPG recommends adding grounds to the fence posts and adding a ground wire along the chain link.

Submitted by: James Fazio

United Power Group, Inc.

Customer Liberty Utilities Date 8/26/2014 Page No. _____
Address Salem, NH Air Temp. 25C Project No. _____
Owner Liberty Utilities Date Last Inspection _____ Rel. Humidity 32%
Address Salem, NH Last Inspection Report No. _____ By Others _____

Equipment Location Barron Ave. Substation
Owner Identification Transformer 10L1

Nameplate Information

Manufacturer GE KVA 5000/5600/7000 Phase 3 Cycle 60
Serial No. F-959759 Type Power Form _____ Class QA
Primary Voltage 13.2kV Delta Wye X Rated Current 141 Amperes
Secondary Voltage 7.62kV Delta Wye X Rated Current 245 Amperes
Coolant Oil X Askarel _____ Air _____ Nitrogen _____ Other _____
Coolant Capacity - Units _____ Main Tank 690UG LTC _____ Switch _____
Temperature Rise _____ Date of Manufacture _____ Impedance 3.58%
No Load Tap Changer Voltages 24100/23500/22900/22300/21700

Gauges and Counters	Measured	Maximum	Reset	Trip	Alarm	LTC	Measured	Max.	Min.
Oil Temperature	40C	60C	X			Tap	NA		
Wdg. Temperature			X			Counter	NA		
Pressure	1+								
Oil Level	25C								

Visual Inspection

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

Fans and Controls

	Oil Temp.	Wdg. Temp.	Manual	Auto	Lubrication Date
Stage 1	60C		X	X	
Stage 2					

Accessory Inspection

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

Additional Tests

Remarks (1) Cooling fan is missing.

Submitted By JF

Transformer 10L1 – Doble Test

Company	UPG	Serial Number	F-959759		
Location	Barron Ave. Substation	Special ID	Transformer - 10L1		
Division	Liberty Utilities	Circuit Designation			
Manufacturer	GE	Configuration	Y-Y		
Year Mfg.		Tank Type	OTHER		
Mfr. Location	USA	Coolant	OIL		
Phases	3	Class	OA/FA		
Oil Volume	690 UG	BIL	110 kV		
Weight	18600 LB	Winding Config.	Wye-Wye		
kV	22.9, 7.62	VA Rating	, 5000, 5600, 7000 kVA		
Note					
Test Date	8/26/2014	Test Time	7:54:38 AM	Weather	SUNNY
Air Temperature	23 °C	Tank Temp.	23°C	RH.	61 %
Tested by	JF/RB	Work Order #		Last Test Date	7/31/2014
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	2

Bushing Nameplate

Dsg	Serial	Mfr	Type	C1 %PF	C1 Cap	C2 %PF	C2 Cap	kV	Amps	Year
H2	1629051	GE	U	0.25	433			25	400	1967
H3	1629067	GE	U	0.31	446			25	400	1967
X1	1629055	GE	U	0.27	432			25	400	1967
X2	1629526	GE	U	0.27	439			25	400	1967
XO	1629093	GE	U	0.26	460			25	400	1967
X3	1629060	GE	U	0.27	431			25	400	1967
H1	1629061	GE	U	0.28	449			25	400	1967

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
CH + CHL	8.005	28.401	1.007		1.00	7533.6		
CH	8.004	28.362	1.002	0.35	1.00	7523.1	G	

Bushing C1

ID	Serial	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
H1	1629061	0.28	449	10.005	1.722	0.1360	0.79	1.00	456.73	D	
H2	1629051	0.25	433	10.005	1.642	0.0920	0.56	1.00	435.61	D	
H3	1629067	0.31	446	10.010	1.695	0.1050	0.62	1.00	449.49	D	
X1	1629055	0.27	432	10.006	1.630	0.0690	0.42	1.00	432.28	G	
X2	1629526	0.27	439	10.006	1.745	0.0530	0.30	1.00	462.82	D	
X3	1629060	0.27	431	10.005	1.758	0.0640	0.36	1.00	466.21	D	
XO	1629093	0.26	460	10.006	1.738	0.0540	0.31	1.00	460.91	G	

Insulation Resistance

Mfr.	Serial #			
Connection	Volts	T1(Mohms)	T2(Mohms)	PI
Hi / Lo to Earth	5000	9500	21000	2.2105

Exciting Current Tests

			Mfr.	Type	Steps	Boost %	Buck %	Position Found			Position Left		Oil Volume
De-Energized Tap Changer													
On-Load Tap Changer													
			H1 - H0			H2 - H0			H3 - H0				
DETC	LTC	Test kV	mA	Watts	X	mA	Watts	X	mA	Watts	X	IR _{auto}	IR _{man}
	3	8.045	113.84	949.85	L	74.934	657.28	L	114.32	956.31	L	G	

Turns Ratio (H-L) Tests

Mfr		Serial #		HV Winding				LV Winding			
Connections		H1 - H0		H2 - H0				H3 - H0			
		X1 - X0		X2 - X0				X3 - X0			
Tap	Np Volt	Tap	Np Volt	Cal	Ratio 1	Ratio 2	Ratio 3	Min Lim	Max Lim	IR _{auto}	IR _{man}
3	13220		7620	1.735	1.732	1.737	1.734	1.726	1.744	G	

United Power Group, Inc.

VACUUM RECLOSER TEST AND INSPECTION REPORT

Customer Liberty Utilities Date 8/26/2014 Page No. _____
Address Salem, NH Air Temp. 88F Project No. _____
Owner Liberty Utilities Date Last Inspection _____
Address Salem, NH Last Inspection Report No. _____
Equipment Location Barron Ave.
Owner Identification Recloser 10L1

Breaker Nameplate Data:

Manufacturer McGraw Edison Type VSA
Serial No. 1896 Type Operating Mechanism Coil Spring
Amperes 800 Age _____ Interrupt. Rating 12kA KV 15.5

Adjustment Checks	Mfr's Rec.	As Found	As Left
Latch Wipe		X	X
Latch Clearance		X	X
Stop Clearance		X	X
Prop. Clearance		X	X
Phase Checked	A	B	C
Contact Gap	X	X	X
Contact Travel	X	X	X
Contact Wipe	X	X	X
Erosion Indicator	X	X	X

Specified 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

Phase Test Data	A	B	C
5 KV Bottle Megohms			
5 KV Open CB	B1	B3	B5
Megohms To Ground	100,000+	100,000+	100,000+
<i>Bushings not under test were grounded.</i>	B2	B4	B6
	100,000+	100,000+	100,000+
5 KV Closed CB	B1 & B2	B3 & B4	B5 & B6
Megohms To Ground	100,000+	100,000+	100,000+
<i>K = Number Entered Above X 1000</i>			
Closing/Opening Speed	Visual OK		
Contact Rest. Microhms	239	237	241

HIPOT Tests Microamps 1 Minute Test			
Phase tested	1	2	3
37.5 KV AC. Bottle Test	P	P	P
37.5 KV Closed CB Test	P	P	P
<i>Bottle Test is a Go No Go Test (P = Pass) (F = Fail)</i>			
<i>Closed Test Energize a Phase & Grd. All Others</i>			

Inspection and Maintenance:				
Checked Items:	Insp. Item	Found Dirty	Cleaned & Lubed	See Remarks
Vacuum Bottles	X			
Primary Stabs	X			
Ground Stab	X			
Structural Checks	X			
Mech. Conn.	X			
Charging Motor	X			
Closing Springs	X			
Opening Springs	X			
Operation Coils	X			
Auxiliary Devices	X			
Insulating Memb.	X			
Recloser Wiring	X			
Racking Device				
Heater & Lights	X			
Cubicle Wiring	X			
<i>X = Yes For This Entry</i>				
Counter Found	644			
Counter Left	670			

Remarks: Results are acceptable.

Submitted by: J Fazio Equipment Used: DLRO, Megger, HIPOT

10L1 - Vacuum Recloser

Company	UPG	Serial Number	1896
Location	Barron Ave Substation	Special ID	Breaker 10L1
Division	Liberty Utility	Circuit Designation	
Manufacturer	MC-ED	Type	VSA
Yr. Manufactured		Class	
Mfr. Location	USA	Mechanism Type	
Interrupting Rating	12.0 kA	Mechanism Design	COIL SPRING
Weight		BIL	110 kV
Total Weight	525 LB	Control Volts	125
Counter		Amps	800
kV	15.5		
Note			
Test Date	8/26/2014	Test Time	11:05:30 AM
Air Temperature	35 °C	Tank Temp.	°C
Tested by	JF	Work Order #	
Checked by		Test Set Type	M4K
Checked Date		Set Top S/N	
Last Sheet #		Set Bottom S/N	
P.O. #		Ins. Book #	
Copies		Sheet #	
		Crew Size	

Overall Tests

Test Mode	Ph.	Test kV	mA	Watts	IR _{auto}	IR _{man}
GND	1	10.003	0.1820	0.0070	G	
GND	1	10.003	0.1750	0.0110	G	
GND	2	10.004	0.1900	0.0110	G	
GND	2	10.003	0.1840	0.0160	G	
GND	3	10.003	0.1920	0.0060	G	
GND	3	10.005	0.1760	0.0090	G	
UST	1	10.004	0.0370	0.0010	G	
UST	2	10.004	0.0390	0.0050	G	
UST	3	10.003	0.0380	0.0010	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	1	GROUND	1	10.005	0.0610	0.0080	G	
	2	GROUND	1	10.007	0.0610	0.0050	G	
	3	GROUND	1	10.006	0.0660	0.0060	G	
	4	GROUND	1	10.006	0.0620	0.0060	G	
	5	GROUND	1	10.007	0.0650	0.0050	G	
	6	GROUND	1	10.007	0.0610	0.0050	G	

United Power Group, Inc.

PROTECTIVE RELAY TEST REPORT

DE 19-064
Exhibit 43
Docket No. DE 19-064
Attachment Staff 6-40.b.i.1
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Customer Liberty Utilities Date 8/26/14 Page No. _____
Address Salem, NH Air Temp. 88F Proj. No. _____
Owner Liberty Utilities Date Last Inspection _____ Rel. Hum. 35%
Address Salem, NH Last Inspection Report No. _____
Equipment Location Barron Ave. Substation
Owner Identification 10L1 Recloser

Circuit Identification 10L1 C.T.Ratio 1000/1 P.T.Ratio _____

Visual Inspection					Routine Maintenance									
Cover Gasket		X			Glass Cleaned		X			Mfr:	Cooper			
Glass		X			Case Cleaned		X			Type Ph:	Form 3A			
Foreign Material		X			Relay Cleaned		X			Cat No:				
Moisture		X			Connections Tight		X			Tap Range Ph:				
Spiral Spring					Taps Tightened					Tap Range Grd:				
Bearing Condition					Contacts Cleaned					Inst. Range Ph:				
Bearing End-Play					Insulation Resistance		X			Inst Range Grd:				
Disc Clearance					Trip Circuit		X			Use:	51P/51G/79			
Rust		X								S/N =				

Remarks: Results are acceptable.

Relay Settings															
	Reclosing			Inst. Element Setting		Tap Setting		Curve Setting				Time Dial Setting			
	1st	2nd	3rd	50P-1	50G-1	51P	51G	50P-1	50G-1	51P	51G	51P Fast	51G Fast	51P	51G
Specified	5	15	LO			560A	200A					A	1	D	3
As Found	5	15	LO			560A	200A					A	1	D	3
As Left	5	15	LO			560A	200A					A	1	D	3

Test Operations - As Found - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U.	Tap 1	Tap 2	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.588		X	X2	X4			X	X				
B Phase		0.586			1.13	0.247			X	X	5	15	LO	
C Phase		0.587			1.15	0.248			X	X				
GRD		0.203			6.26	2.36			X	X				

Test Operations - As Left - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U. X	Tap 1 X2	Tap 2 X4	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.588			1.16	0.254			X	X				
B Phase		0.586			1.13	0.247			X	X	5	15	LO	
C Phase		0.587			1.15	0.248			X	X				
GRD		0.203			6.26	2.36			X	X				

Submitted By JF Equipment Used Doble 2253

10L1 - A Phase Voltage Regulator

Company	UPG	Serial Number	M168839 PVC
Location	Barron Ave. Substation	Special ID	10L1Regulators
Division	Liberty Utilities	Circuit Designation	A Phase
Manufacturer	GE	Type	VR-1
Yr. Manufactured	2000	Class	OA
Mfr. Location	USA		
Tank Type	N2 BLANKETED	Coolant	OIL
Phases	1	BIL	95 kV
Weight	2790 LB	Oil Volume	95 UG
kV	7.96	Amps	313
Impedance	%	VA Rating	250 kVA
Catalog #		LTC Counter	98624
Design	Step	Ctrl Wire Diameter	
Catalog/Style		Crew Size	
Note			

Test Date	8/27/2014	Test Time	7:35:00 AM	Weather	SUNNY
Air Temperature	24 °C	Tank Temp.	24°C	RH.	59 %
Tested by		Work Order #		Last Test Date	8/1/2014
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}
CH	8.003	15.928	3.775	2.37	1.00	4223.8	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.012	0.0690	0.0240	G	
	L	GROUND	3	10.014	0.0690	0.0310	G	
	SL	GROUND	3	10.012	0.0650	0.0210	G	

Insulation Resistance

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	3200	6100	1.9062	G	

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.500	504.32	792.04						
N	2.500	852.15	856.43						
1R	2.501	501.95	824.77						
2R	2.500	851.27	871.76						
3R	2.501	502.12	816.97						
4R	2.502	852.36	900.32						
5R	2.502	849.18	922.24						
6R	2.502	852.70	905.43						
7R	2.500	502.95	820.01						
8R	2.502	853.18	907.52						
9R	2.503	504.92	847.34						
10R	2.500	853.11	891.57						
11R	2.500	503.78	824.60						
12R	2.503	853.83	919.61						
13R	2.500	850.87	902.72						
14R	2.501	853.13	902.59						
15R	2.499	504.35	819.84						
16R	2.501	853.06	893.12						

10L1 – B Phase Voltage Regulator

Company	UPG	Serial Number	M168838 PVC		
Location	Barron Ave. Substation	Special ID	10L1Regulators		
Division	Liberty Utilities	Circuit Designation	B Phase		
Manufacturer	GE	Type	VR-1		
Yr. Manufactured	2000	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	2790 LB	Oil Volume	95 UG		
kV	7.96	Amps	313		
Impedance	%	VA Rating	250 kVA		
Catalog #		LTC Counter	98624		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	8/27/2014	Test Time	7:35:00 AM	Weather	SUNNY
Air Temperature	24 °C	Tank Temp.	24°C	RH.	59 %
Tested by	JF	Work Order #		Last Test Date	8/1/2014
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}
CH	8.009	15.110	2.741	1.81	1.00	4007.2	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.011	0.0720	0.0260	G	
	L	GROUND	3	10.014	0.0660	0.0310	G	
	SL	GROUND	3	10.012	0.0660	0.0300	G	

Insulation Resistance

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	8600	13400	1.5581	G	

Exciting Current Tests

		Mfr.	Type	Steps	Position Found	Position Left			
	De-Energized Tap Changer								
	On-Load Tap Changer								
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR_{auto}	IR_{man}
1L	2.501	513.71	784.42						
N	2.502	863.16	883.66						
1R	2.500	510.79	801.35						
2R	2.502	862.19	889.40						
3R	2.503	512.35	835.33						
4R	2.500	862.91	869.66						
5R	2.501	859.01	897.53						
6R	2.502	862.84	899.14						
7R	2.504	513.60	845.59						
8R	2.501	863.50	895.13						
9R	2.500	512.98	813.39						
10R	2.502	863.31	897.76						
11R	2.500	513.21	813.64						
12R	2.501	863.61	889.59						
13R	2.501	862.06	910.00						
14R	2.502	863.77	912.19						
15R	2.500	514.03	816.40						
16R	2.502	863.93	902.15						

10L1 – C Phase Voltage Regulator

Company	UPG	Serial Number	M168837 PVC		
Location	Barron Ave. Substation	Special ID	10L1Regulators		
Division	Liberty Utilities	Circuit Designation	C Phase		
Manufacturer	GE	Type	VR-1		
Yr. Manufactured	2000	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	2790 LB	Oil Volume	95 UG		
kV	7.96	Amps	313		
Impedance	%	VA Rating	250 kVA		
Catalog #		LTC Counter	98624		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	8/27/2014	Test Time	7:46:31 AM	Weather	SUNNY
Air Temperature	23 °C	Tank Temp.	23°C	RH.	59 %
Tested by		Work Order #		Last Test Date	8/27/2014
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}
CH	8.004	16.483	4.126	2.50	1.00	4371.0	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.011	0.0730	0.0380	G	
	L	GROUND	3	10.014	0.0680	0.0280	G	
	SL	GROUND	3	10.010	0.0640	0.0360	G	

Insulation Resistance

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	4890	7220	1.4765		G

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.515	531.36	845.75						
N	2.509	892.74	923.63						
1R	2.500	526.14	787.71						
2R	2.502	888.78	876.65						
3R	2.500	526.26	789.59						
4R	2.500	888.19	853.04						
5R	2.500	884.38	874.44						
6R	2.503	889.94	893.95						
7R	2.501	527.56	807.78						
8R	2.501	889.12	867.20						
9R	2.500	527.55	792.53						
10R	2.502	889.62	882.03						
11R	2.501	528.06	807.26						
12R	2.501	889.55	872.37						
13R	2.500	887.03	870.17						
14R	2.500	889.19	852.58						
15R	2.501	528.70	807.44						
16R	2.500	889.34	853.53						

United Power Group, Inc.

Customer Liberty Utilities Date 8/27/2014 Page No. _____
 Address Salem, NH Air Temp. 85F Proj. No. _____
 Owner Liberty Utilities Date Last Inspection By Others Rel. Hum. 54%
 Address Salem, NH Last Inspection Report No. _____

Equipment Location Barron Ave.
 Owner Identification 10L1

Manuf. GE Type VR1 Test Set# TTR-JF
 Gallons 95 Oil Levels OK KVA 250

Nameplate Voltage	7960	Ser # A	M168839 PVC
Line to Line Voltage		Ser # B	M168838 PVC
Percent Regulation	5/8%	Ser # C	M168837 PVC

Doble Factor	Power Results
Test KV	8
Position	N

Tap Position	Tap Voltage	TTR Ratio	TTR MEASURED VALUES:		
			S-SL A	S-SL B	S-SL C
16R	8756	0.909	0.904	0.906	0.906
15R	8706	0.914	0.912	0.912	0.912
14R	8657	0.920	0.917	0.917	0.917
13R	8607	0.925	0.923	0.923	0.923
12R	8557	0.930	0.929	0.929	0.929
11R	8507	0.936	0.934	0.934	0.934
10R	8458	0.941	0.941	0.941	0.941
9R	8408	0.947	0.946	0.946	0.946
8R	8358	0.952	0.951	0.951	0.951
7R	8308	0.958	0.957	0.957	0.957
6R	8259	0.964	0.962	0.962	0.962
5R	8209	0.970	0.969	0.969	0.969
4R	8159	0.976	0.976	0.976	0.976
3R	8109	0.982	0.982	0.982	0.982
2R	8060	0.988	0.988	0.988	0.988
1R	8010	0.994	0.994	0.994	0.994
N	7960	1.000	1.000	1.000	1.000
1L	7910	1.006	1.006	1.006	1.006
2L	7861	1.013	1.013	1.013	1.013
3L	7811	1.019	1.019	1.019	1.019
4L	7761	1.026	1.025	1.025	1.025
5L	7711	1.032	1.033	1.033	1.033
6L	7662	1.039	1.041	1.041	1.041
7L	7612	1.046	1.047	1.047	1.047
8L	7562	1.053	1.054	1.054	1.054
9L	7512	1.060	1.061	1.061	1.061
10L	7463	1.067	1.068	1.068	1.068
11L	7413	1.074	1.075	1.075	1.075
12L	7363	1.081	1.082	1.082	1.082
13L	7313	1.088	1.091	1.091	1.091
14L	7264	1.096	1.099	1.099	1.099
15L	7214	1.103	1.107	1.107	1.107
16L	7164	1.111	1.115	1.115	1.115

Remarks: Regulator test results are acceptable.

United Power Group, Inc.

Liberty Utilities
9 Lowell Road
Salem, NH 03079

Date. 9/5/14
Project No.

Project Location:

Barron Ave. Substation

Scope:

Perform testing & maintenance on the following equipment:

1. 10L2 Transformer
2. 10L2 Recloser and Form 6 Controller
3. 10L2 Voltage Regulators

Remarks:

1. Transformer 10L2 test results are acceptable for service.
2. Breaker 10L2 initially would not close. The breaker would trip free. The breaker was cleaned and lubricated.
After maintenance was performed the breaker was able to close. Periodically the 120 volt control circuit breaker would trip when the breaker operated. UPG recommends replacing the 20 amp control circuit breaker. If the issue continues, further investigation of the circuit breaker's operating mechanism should be performed.
3. Voltage regulators 10L2 test results are acceptable for service.

Submitted by: James Fazio

10L2 - Two-winding Transformer

Company	UPG	Serial Number	HAO08863-002		
Location	Barron Ave. Substation	Special ID	10L2 Transformer		
Division	Liberty Utilities	Circuit Designation			
Manufacturer	A-BB	Configuration	D-ZZY		
Year Mfg.	2002	Tank Type	SEALED		
Mfr. Location	USA	Coolant	OIL		
Phases	3	Class	OA/FA		
Oil Volume	1323 UG	BIL	110 kV		
Weight	46709 LB	Winding Config.			
kV	22.9, 7.62	VA Rating	, , 7500, 9375 kVA		
Note					
Test Date	9/4/2014	Test Time	8:59:16 AM	Weather	SUNNY
Air Temperature	26 °C	Tank Temp.	26°C	RH.	48 %
Tested by	JF/FD	Work Order #		Last Test Date	
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	

Bushing Nameplate

Dsg	Serial	Mfr	Type	C1 %PF	C1 Cap	C2 %PF	C2 Cap	kV	Amps	Year
H1	1S03864505	A-BB	O+C	0.35	538	0.30	416	16	1200	2002
H2	1S03864521	A-BB	O+C	0.35	536	0.31	411	16	1200	2002
H3	1S03864550	A-BB	O+C	0.35	533	0.31	411	16	1200	2002
X1	1S03864545	A-BB	O+C	0.34	537	0.33	408	16	1200	2002
X2	1S03864538	A-BB	O+C	0.36	540	0.30	407	16	1200	2002
X3	1S03864549	A-BB	O+C	0.34	538	0.30	417	16	1200	2002
X0	1S03864547	A-BB	O+C	0.35	533	0.30	421	16	1200	2002

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
CH + CHL	10.003	77.562	2.534		1.00	20573.9		
CH	10.001	26.020	0.8750	0.34	1.00	6901.9	G	
CHL(UST)	10.002	51.523	1.660	0.32	1.00	13666.6	G	
CHL		51.542	1.659	0.32	1.00	13672.000	G	
CL + CHL	8.002	107.91	3.899		1.00	28623.9		
CL	8.002	56.385	2.244	0.40	1.00	14956.4	G	
CHL(UST)	8.001	51.510	1.658	0.32	1.00	13663.5	G	
CHL		51.525	1.655	0.32	1.00	13667.500	G	

Bushing C1

ID	Serial	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
H1	1S03864505	0.35	538	10.002	2.019	0.0680	0.34	1.00	535.48	G	
H2	1S03864521	0.35	536	10.003	2.037	0.0710	0.35	1.00	540.21	G	
H3	1S03864550	0.35	533	10.004	2.040	0.0760	0.37	1.00	541.09	G	
X1	1S03864545	0.34	537	10.003	2.031	0.0670	0.33	1.00	538.85	G	
X2	1S03864538	0.36	540	10.003	2.045	0.0710	0.35	1.00	542.39	G	
X3	1S03864549	0.34	538	10.003	2.030	0.0660	0.33	1.00	538.53	G	
X0	1S03864547	0.35	533	10.004	2.016	0.0660	0.33	1.00	534.72	G	

Bushing C2

ID	Serial #	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
H1	1S03864505	0.30	416	0.5000	1.543	0.0300	0.19	1.00	409.37	G	
H2	1S03864521	0.31	411	0.5000	1.538	0.0250	0.16	1.00	407.96	G	
H3	1S03864550	0.31	411	0.5000	1.587	0.0380	0.24	1.00	420.94	G	
X1	1S03864545	0.33	408	0.5000	1.531	0.0370	0.24	1.00	406.08	G	
X2	1S03864538	0.30	407	0.5000	1.524	0.0280	0.18	1.00	404.37	G	
X3	1S03864549	0.30	417	0.5000	1.568	0.0340	0.22	1.00	415.95	G	
X0	1S03864547	0.30	421	0.5000	1.584	0.0540	0.34	1.00	420.05	G	

Insulation Resistance

Mfr.	AVO		Serial #		
Connection	Volts	T1(Mohms)	T2(Mohms)	PI	
Hi to Earth Guard Lo	5000	2300	6400	2.7826	
Lo to Earth Guard Hi	5000	6700	8900	1.3284	
Hi to Lo Guard Earth	5000	12300	42000	3.4146	

Exciting Current Tests

			Mfr.	Type	Steps	Boost %	Buck %	Position Found			Position Left			Oil Volume	
De-Energized Tap Changer															
On-Load Tap Changer															
			H1 - H3			H2 - H1			H3 - H2						
DETC	LTC	Test kV	mA	Watts	X	mA	Watts	X	mA	Watts	X	IR _{auto}	IR _{man}		
3	8	8.017	56.681	492.00	L	53.409	485.15	L	27.927	254.52	C	G			

Turns Ratio (H-L) Tests

Mfr				Serial #		HV Winding			LV Winding		
Connections				H1 - H2		H2 - H3			H3 - H1		
				X1 - X2		X2 - X3			X3 - X1		
Tap	Np Volt	Tap	Np Volt	Cal	Ratio 1	Ratio 2	Ratio 3	Min Lim	Max Lim	IR _{auto}	IR _{man}
3	22900		13200	1.735	1.734	1.735	1.734	1.726	1.744	G	

United Power Group, Inc.

Customer Liberty Utilities Date 9/4/2014 Page No. _____
Address Salem, NH Air Temp. 88F Project No. _____
Owner Liberty Utilities Date Last Inspection _____ Rel. Humidity 48%
Address Salem, NH Last Inspection Report No. _____
By Others _____

Equipment Location Barron Ave. Substation
Owner Identification Transformer 10L2

Nameplate Information

Manufacturer ABB KVA 7500/9375 Phase 3 Cycle 60
Serial No. HA08863-002 Type Power Form _____ Class OA
Primary Voltage 22.9kV Delta X Wye _____ Rated Current 236 Amperes
Secondary Voltage 13.2kV Delta _____ ZWye X Rated Current 410 Amperes
Coolant Oil X Askarel _____ Air _____ Nitrogen _____ Other _____
Coolant Capacity - Units _____ Main Tank 1323UG LTC _____ Switch _____
Temperature Rise _____ Date of Manufacture _____ Impedance 5.85%
No Load Tap Changer Voltages 24050/23470/22900/22330/21760

Gauges and Counters	Measured	Maximum	Reset	Trip	Alarm	LTC	Measured	Max.	Min.
Oil Temperature	30C	40C	X			Tap	NA		
Wdg. Temperature	30C	40C	X			Counter	NA		
Pressure	1+								
Oil Level	25C								

Visual Inspection

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

Fans and Controls	Oil Temp.	Wdg. Temp.	Manual	Auto	Lubrication Date
Stage 1	70C		X	X	
Stage 2					

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

Additional Tests

Remarks _____

Submitted By JF

10L2 - Vacuum Breaker

Company	UPG		Serial Number	003092	
Location	Barron Ave Substation		Special ID	Breaker 10L2	
Division	Liberty Utility		Circuit Designation		
Manufacturer	KYLE		Type	OTHER	
Yr. Manufactured			Class		
Mfr. Location	USA		Mechanism Type		
Interrupting Rating	12.0 kA		Mechanism Design	COIL SPRING	
Weight			BIL	110 kV	
Total Weight	525 LB		Control Volts	125	
Counter			Amps	800	
kV	15.5				
Note					
Test Date	9/4/2014	Test Time	10:38:21 AM	Weather	
Air Temperature	28 °C	Tank Temp.	°C	RH.	39 %
Tested by	JF	Work Order #		Last Test Date	8/26/2014
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

Test Mode	Ph.	Test kV	mA	Watts	IR _{auto}	IR _{man}
GND	1	10.001	0.2270	0.0240		G
GND	1	10.002	0.2180	0.0200		G
GND	2	10.002	0.2280	0.0270		G
GND	2	10.002	0.2210	0.0230		G
GND	3	10.001	0.2210	0.0220		G
GND	3	10.001	0.2220	0.0200		G
UST	1	10.001	0.0490	0.0010		G
UST	2	10.000	0.0480	0.0030		G
UST	3	10.000	0.0480	0.0010		G

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	1	GROUND	1	10.007	0.0800	0.0100	G	
	2	GROUND	1	10.005	0.0760	0.0070	G	
	3	GROUND	1	10.006	0.0810	0.0090	G	
	4	GROUND	1	10.007	0.0810	0.0100	G	
	5	GROUND	1	10.007	0.0800	0.0120	G	
	6	GROUND	1	10.007	0.0840	0.0090	G	

United Power Group, Inc.

VACUUM RECLOSER TEST AND INSPECTION REPORT

Customer Liberty Utilities Date 9/4/2014 Page No. _____
Address Salem, NH Air Temp. 85F Project No. _____
Owner Liberty Utilities Date Last Inspection _____
Address Salem, NH Last Inspection Report No. _____
Equipment Location Barron Ave.
Owner Identification Recloser 10L2

Breaker Nameplate Data:
Manufacturer Kyle Type VSA-12
Serial No. 3092 Type Operating Mechanism Coil Spring
Amperes 800 Age ? Interrupt. Rating 12kA KV 15.5

Adjustment Checks	Mfr's Rec.	As Found	As Left
Latch Wipe		X	X
Latch Clearance		X	X
Stop Clearance		X	X
Prop. Clearance		X	X
Phase Checked	A	B	C
Contact Gap	X	X	X
Contact Travel	X	X	X
Contact Wipe	X	X	X
Erosion Indicator	X	X	X

Phase Test Data	A	B	C
5 KV Bottle Megohms			
5 KV Open CB	B1	B3	B5
Megohms To Ground	100.000+	100.000+	100.000+
<i>Bushings not under test were grounded.</i>	B2	B4	B6
	100.000+	100.000+	100.000+
5 KV Closed CB	B1 & B2	B3 & B4	B5 & B6
Megohms To Ground	100.000+	100.000+	100.000+
K = Number Entered Above X 1000			
Closing/Opening Speed	Visual OK		
Contact Rest. Microhms	178	189	174

HIPOT Tests Microamps 1 Minute Test			
Phase tested	1	2	3
37.5 KV AC. Bottle Test	P	P	P
37.5 KV Closed CB Test	P	P	P
<i>Bottle Test is a Go No Go Test (P = Pass) (F = Fail)</i>			
<i>Closed Test Energize a Phase & Grd. All Others</i>			

Specified 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 and Maintenance:				
Checked Items:	Insp. Item	Found Dirty	Cleaned & Lubed	See Remarks
Vacuum Bottles	X			
Primary Stabs	X			
Ground Stab	X			
Structural Checks	X			
Mech. Conn.	X			
Charaina Motor	X			X
Closing Springs	X			X
Opening Springs	X			
Operation Coils	X			X
Auxiliary Devices	X			
Insulating Memb.	X			
Recloser Wiring	X			
Racking Device				
Heater & Lights	X			
Cubicle Wiring	X			
X = Yes For This Entry				
Counter Found			120	
Counter Left			154	

Remarks: The recloser randomly trips the control 120V circuit breaker. UPG recommends replacing the breaker to see if the problem corrects.
If issue continues further investigation is required.

Submitted by: J Fazio Equipment Used: DLRO. Meaer. HIPOT

United Power Group, Inc.

PROTECTIVE RELAY TEST REPORT

Customer	Liberty Utilities	Date	9/4/14	Page No.	
Address	Salem, NH	Air Temp.	88F	Proj. No.	
Owner	Liberty Utilities	Date Last Inspection	By Others	Rel. Hum.	30%
Address	Salem, NH	Last Inspection Report No.			
Equipment Location	Barron Ave. Substation				
Owner Identification	10L2 Recloser				

Circuit Identification 10L2 C.T.Ratio 1000/1 P.T.Ratio

Visual Inspection					Routine Maintenance									
Cover Gasket		X			Glass Cleaned		X			Mfr:	Cooper			
Glass		X			Case Cleaned		X			Type Ph:	Form F6			
Foreign Material		X			Relay Cleaned		X			Cat No:				
Moisture		X			Connections Tight		X			Tap Range Ph:	5-3200A			
Spiral Spring					Taps Tightened					Tap Range Grd:	2-1600A			
Bearing Condition					Contacts Cleaned					Inst. Range Ph:				
Bearing End-Play					Insulation Resistance		X			Inst Range Grd:				
Disc Clearance					Trip Circuit		X			Use:	51P/51G/79			
Rust		X								S/N =				

Remarks: Results are acceptable.

Relay Settings															
	Reclosing			Inst. Element Setting		Tap Setting		Curve Setting				Time Dial Setting			
	1st	2nd	3rd	50P-1	50G-1	51P	51G	50P-1	50G-1	51P	51G	50P-1	50G-1	51P	51G
Specified	5	12/5	LO			720A	280A							133	140
As Found	5	12/5	LO			720A	280A							133	140
As Left	5	12/5	LO			720A	280A							133	140

Test Operations - As Found - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U. X	Tap 1 X3	Tap 2 X5	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.723			1.34	0.524			X	X				
B Phase		0.725			1.35	0.523			X	X	5	12	LO	
C Phase		0.724			1.36	0.524			X	X				
GRD		0.284			3.32	1.90			X	X	5	5	LO	

Test Operations - As Left - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U. X	Tap 1 X3	Tap 2 X5	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.723			1.34	0.524			X	X				
B Phase		0.725			1.35	0.523			X	X	5	12	LO	
C Phase		0.724			1.36	0.524			X	X				
GRD		0.284			3.32	1.90			X	X	5	5	LO	

Submitted By JF Equipment Used Doble 2253

10L2 -A Phase - Voltage Regulator

Company	UPG	Serial Number	Q521597-TRM		
Location	Barron Ave. Substation	Special ID	10L2 Regulators		
Division	Liberty Utilities	Circuit Designation	A Phase		
Manufacturer	GE	Type	VR-1		
Yr. Manufactured	1997	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	3078 LB	Oil Volume	112 UG		
kV	7.96	Amps	418		
Impedance	%	VA Rating	333 kVA		
Catalog #		LTC Counter	118984		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	9/5/2014	Test Time	7:58:40 AM	Weather	SUNNY
Air Temperature	23 °C	Tank Temp.	°C	RH.	67 %
Tested by	JF	Work Order #		Last Test Date	8/27/2014
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}
CH	8.002	19.345	2.067	1.07	1.00	5131.0	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.012	0.0740	0.0180	G	
	L	GROUND	3	10.015	0.0770	0.0370	G	
	SL	GROUND	3	10.012	0.0650	0.0160	G	

Insulation Resistance

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	17800	37900	2.1292		

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.500	706.44	876.23						
R	2.503	1190.9	1008.3						
1R	2.503	1182.7	1031.1						
2R	2.500	1189.1	992.37						
3R	2.499	704.59	891.64						
4R	2.501	1189.2	988.50						
5R	2.499	705.44	891.15						
6R	2.501	1189.7	988.61						
7R	2.500	1185.5	1012.1						
8R	2.500	1189.6	988.34						
9R	2.500	1186.2	1014.0						
10R	2.500	1190.1	989.01						
11R	2.500	1187.2	1015.3						
12R	2.500	1190.6	989.73						
13R	2.499	707.39	895.14						
14R	2.501	1190.4	989.97						
15R	NIS								
16R	NIS								

10L2 - B Phase - Voltage Regulator

Company	UPG		Serial Number	Q584906-TTV	
Location	Barron Ave. Substation		Special ID	10L2 Regulators	
Division	Liberty Utilities		Circuit Designation	B Phase	
Manufacturer	GE		Type	VR-1	
Yr. Manufactured	2003		Class	OA	
Mfr. Location	USA				
Tank Type	N2 BLANKETED		Coolant	OIL	
Phases	1		BIL	95 kV	
Weight	3078 LB		Oil Volume	112 UG	
kV	7.96		Amps	418	
Impedance	%		VA Rating	333 kVA	
Catalog #			LTC Counter	72009	
Design	Step		Ctrl Wire Diameter		
Catalog/Style			Crew Size		
Note					
Test Date	9/5/2014	Test Time	7:58:40 AM	Weather	SUNNY
Air Temperature	24 °C	Tank Temp.	°C	RH.	66 %
Tested by		Work Order #		Last Test Date	8/27/2014
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}
CH	8.002	19.353	1.881	0.97	1.00	5133.3	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.012	0.0720	0.0190	G	
	L	GROUND	3	10.015	0.0790	0.0230	G	
	SL	GROUND	3	10.012	0.0750	0.0220	G	

Insulation Resistance

Mfr.:	AV0	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	18000	40000	2.2222		

Exciting Current Tests

		Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer								
On-Load Tap Changer								
	Connections	SA - SL		SB - SL		SC - SL		
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR_{auto} IR_{man}
1L	2.502	708.94	898.71					
R	2.503	1188.3	1019.1					
1R	2.500	1179.7	1025.8					
2R	2.499	1186.6	1000.3					
3R	2.502	707.65	931.33					
4R	2.499	1187.8	1011.5					
5R	2.500	707.13	916.55					
6R	2.499	1188.2	1011.8					
7R	2.499	1184.5	1034.1					
8R	2.501	1189.2	1023.0					
9R	2.505	1185.9	1063.5					
10R	2.500	1189.1	1022.7					
11R	2.500	1186.1	1045.6					
12R	2.500	1189.4	1019.6					
13R	2.501	710.76	927.27					
14R	2.500	1190.1	1020.2					
15R	NIS							
16R	NIS							

10L2 – C Phase - Voltage Regulator

Company	UPG		Serial Number	Q552510-TSM	
Location	Barron Ave. Substation		Special ID	10L2 Regulators	
Division	Liberty Utilities		Circuit Designation	C Phase	
Manufacturer	GE		Type	VR-1	
Yr. Manufactured	1997		Class	OA	
Mfr. Location	USA				
Tank Type	N2 BLANKETED		Coolant	OIL	
Phases	1		BIL	95 kV	
Weight	3078 LB		Oil Volume	112 UG	
kV	7.96		Amps	418	
Impedance	%		VA Rating	333 kVA	
Catalog #			LTC Counter	121174	
Design	Step		Ctrl Wire Diameter		
Catalog/Style			Crew Size		
Note					
Test Date	9/5/2014	Test Time	7:58:40 AM	Weather	SUNNY
Air Temperature	25 °C	Tank Temp.	°C	RH.	61 %
Tested by	JF	Work Order #		Last Test Date	8/27/2014
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}
CH	8.001	19.445	1.901	0.98	1.00	5157.7	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.010	0.0750	0.0180	G	
	L	GROUND	3	10.014	0.0790	0.0280	G	
	SL	GROUND	3	10.012	0.0660	0.0480	G	

Insulation Resistance

Mfr.:		Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	14800	31800	2.1486		

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.500	675.73	868.64						
R	2.501	1138.2	988.48						
1R	2.500	1130.1	1000.5						
2R	2.501	1137.0	1003.9						
3R	2.500	673.30	887.74						
4R	2.501	1137.0	996.91						
5R	2.503	674.60	905.22						
6R	2.501	1137.7	993.65						
7R	2.500	1133.7	1017.8						
8R	2.507	1139.1	1026.4						
9R	2.507	1135.4	1045.5						
10R	2.500	1138.7	999.05						
11R	2.500	1135.8	1019.6						
12R	2.500	1139.1	992.59						
13R	2.499	677.01	899.73						
14R	2.501	1138.9	992.26						
15R	NIS								
16R	NIS								

United Power Group, Inc.

Customer	Liberty Utilities	Date	9/5/2014	Page No.	
Address	Salem, NH	Air Temp.	78F	Proj. No.	
Owner	Liberty Utilities	Date Last Inspection	By Others	Rel. Hum.	52%
Address	Salem, NH	Last Inspection Report No.			

Equipment Location	Barron Ave.
Owner Identification	10L2 Regulators

Manuf.	GE	Type	VR1	Test Set#	TTR-JF
Gallons	112	Oil Levels	OK	KVA	333

Nameplate Voltage	7960
Line to Line Voltage	
Percent Regulation	5/8%

Ser # A	Q521597-TRM
Ser # B	Q584906-TTV
Ser # C	Q522510-TSM

Doble Factor	Power Results
Test KV	8
Position	N

Tap Position	Tap Voltage	TTR Ratio	TTR MEASURED VALUES:		
			S-SL A	S-SL B	S-SL C
			L-SL A	L-SL B	L-SL C
16R	8756	0.909	NIS		
15R	8706	0.914	NS		
14R	8657	0.920	0.916	0.916	0.916
13R	8607	0.925	0.921	0.921	0.921
12R	8557	0.930	0.926	0.927	0.927
11R	8507	0.936	0.932	0.933	0.933
10R	8458	0.941	0.938	0.938	0.938
9R	8408	0.947	0.944	0.945	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	0.968	0.969
4R	8159	0.976	0.974	0.974	0.974
3R	8109	0.982	0.981	0.981	0.981
2R	8060	0.988	0.986	0.986	0.986
1R	8010	0.994	0.993	0.993	0.993
N	7960	1.000	1.000	1.000	1.000
1L	7910	1.006	1.005	1.005	1.006
2L	7861	1.013	1.011	1.011	1.011
3L	7811	1.019	1.018	1.018	1.017
4L	7761	1.026	1.024	1.024	1.024
5L	7711	1.032	1.031	1.031	1.031
6L	7662	1.039	1.036	1.037	1.036
7L	7612	1.046	1.045	1.044	1.044
8L	7562	1.053	1.053	1.052	1.052
9L	7512	1.060	1.061	1.061	1.059
10L	7463	1.067	1.067	1.066	1.067
11L	7413	1.074	1.075	1.075	1.075
12L	7363	1.081	1.083	1.083	1.082
13L	7313	1.088	1.091	1.091	1.091
14L	7264	1.096	1.097	1.097	1.097
15L	7214	1.103	1.105	1.105	1.105
16L	7164	1.111	1.112	1.112	1.112

Remarks: Regulator test results are acceptable.

United Power Group, Inc.

Liberty Utilities
9 Lowell Road
Salem, NH 03079

Date. 9/18/14
Project No.

Project Location:

Barron Ave. Substation

Scope:

Perform testing & maintenance on the following equipment:

1. 10L4 Transformer
2. 10L4 Recloser and Form 6 Controller
3. 10L4 Voltage Regulators

Remarks:

1. Transformer 10L4's X1 and X2 bushings are showing signs of deterioration. UPG would like to see past test data for the transformer. There is also signs of oil leaking around the bottom valve. A closer look will be taken when the oil sample is extracted.
2. Recloser 10L4 and form 6 controller test results are acceptable for service.
3. Voltage regulators 10L4 test results are acceptable for service.

Submitted by: James Fazio

Transformer 10L4 – Doble Test

Company	UPG	Serial Number	G-853504		
Location	Barron Ave. Substation	Special ID	Transformer - 10L4		
Division	Liberty Utilities	Circuit Designation			
Manufacturer	GE	Configuration	Y-Y		
Year Mfg.		Tank Type	OTHER		
Mfr. Location	USA	Coolant	OIL		
Phases	3	Class	OA/FA		
Oil Volume	1010 UG	BIL	110 kV		
Weight	35700 LB	Winding Config.	Wye-Wye		
kV	22.9, 7.97	VA Rating	, , 5000, 6250 kVA		
Note					
Test Date	9/17/2014	Test Time	9:31:01 AM	Weather	
Air Temperature	22 °C	Tank Temp.	°C	RH.	40 %
Tested by	JF/MH	Work Order #		Last Test Date	8/26/2014
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	

Bushing Nameplate

Dsg	Serial	Mfr	Type	C1 %PF	C1 Cap	C2 %PF	C2 Cap	kV	Amps	Year
H2	8T01120505	A-BB	O+C	0.36	535	0.30	431	25	400	1998
H3	8T01120509	A-BB	O+C	0.37	530	0.33	425	25	400	1998
X1	1715668	GE	U	0.30	444			16	400	1971
X2	1715669	GE	U	0.31	446			16	400	1971
XO	1715667	GE	U	0.32	447			16	400	1971
X3	1583864	GE	U	0.28	439			16	400	1965
H1	8T01120504	A-BB	O+C	0.36	533	0.42	430	25	400	1998

Overall Tests

Meas.	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
CH + CHL	8.001	31.693	1.101		1.00	8406.7		
CH	8.001	31.689	1.102	0.35	1.00	8405.6	G	

Bushing C1

ID	Serial	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
H1	8T01120504	0.36	533	10.002	2.016	0.0790	0.39	1.00	534.65	G	
H2	8T01120505	0.36	535	10.002	1.923	0.0710	0.37	1.00	537.03	G	
H3	8T01120509	0.37	530	10.002	1.905	0.0740	0.39	1.00	531.98	G	
X1	1715668	0.30	444	8.001	1.684	0.1120	0.67	1.00	446.74	D	
X2	1715669	0.31	446	8.002	1.598	0.0950	0.59	1.00	446.09	D	
X3	1583864	0.28	439	8.001	1.577	0.0550	0.35	1.00	440.27	G	
XO	1715667	0.32	447	8.002	1.598	0.0570	0.36	1.00	446.19	G	

Bushing C2

ID	Serial #	NP %PF	NP Cap	Test kV	mA	Watts	%PF corr	Corr Fctr	Cap(pF)	IR _{auto}	IR _{man}
H1	8T01120504	0.42	430	0.5000	1.568	0.0480	0.31	1.00	437.81	G	
H2	8T01120505	0.30	431	0.5000	1.566	0.0360	0.23	1.00	437.33	G	
H3	8T01120509	0.33	425	0.5000	1.553	0.0350	0.23	1.00	433.74	G	

Insulation Resistance

Mfr.	Serial #			
Connection	Volts	T1(Mohms)	T2(Mohms)	PI
Hi to Lo/Earth	5000	4900	11900	2.4286

Exciting Current Tests

			Mfr.	Type	Steps	Boost %	Buck %	Position Found			Position Left		Oil Volume
De-Energized Tap Changer													
On-Load Tap Changer													
			H1 - H0			H2 - H0			H3 - H0				
DETC	LTC	Test kV	mA	Watts	X	mA	Watts	X	mA	Watts	X	IR _{auto}	IR _{man}
	3	8.024	122.55	1051.2	L	83.382	736.15	L	118.43	1032.3	L	G	

Turns Ratio (H-L) Tests

Mfr				Serial #		HV Winding			LV Winding		
						L-N			L-N		
Connections				H1 - H0		H2 - H0			H3 - H0		
				X1 - X0		X2 - X0			X3 - X0		
Tap	Np Volt	Tap	Np Volt	Cal	Ratio 1	Ratio 2	Ratio 3	Min Lim	Max Lim	IR _{auto}	IR _{man}
2	13570		7970	1.703	1.745	1.745	1.744				G

United Power Group, Inc.

Customer Liberty Utilities Date 9/17/2014 Page No. _____
Address Salem, NH Air Temp. 14C Project No. _____
Owner Liberty Utilities Date Last Inspection _____ Rel. Humidity 37%
Address Salem, NH Last Inspection Report No. _____
By Others _____

Equipment Location Barron Ave. Substation
Owner Identification Transformer 10L4

Nameplate Information

Manufacturer GE KVA 5000/6250 Phase 3 Cycle 60
Serial No. G-853504 Type Power Form _____ Class OA
Primary Voltage 13.57kV Delta Wye X Rated Current _____ 123 Amperes
Secondary Voltage 7.97kV Delta Wye X Rated Current _____ 209 Amperes
Coolant Oil X Askarel _____ Air _____ Nitrogen _____ Other _____
Coolant Capacity - Units _____ Main Tank 1010UG LTC _____ Switch _____
Temperature Rise _____ Date of Manufacture _____ Impedance 3.21%
No Load Tap Changer Voltages 24100/23500/22900/22300/21700

Gauges and Counters	Measured	Maximum	Reset	Trip	Alarm	LTC	Measured	Max.	Min.
Oil Temperature	25C	60C	X			Tap	NA		
Wdg. Temperature			X			Counter	NA		
Pressure	1+								
Oil Level	25C								

Visual Inspection

Primary Connection	OK	Secondary Connections	OK
Tap Connections	OK	Leaks	Bottom Valve
Gas Regulator	NA	Paint	OK
Infra-Red Inspection	NA	Grounds	OK

Fans and Controls	Oil Temp.	Wdg. Temp.	Manual	Auto	Lubrication Date
Stage 1	60C		X	X	
Stage 2					

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

Additional Tests

Remarks Oil leak on bottom valve.

Submitted By JF

10L4 - Vacuum Recloser

Company		UPG		Serial Number		CP571172094	
Location		Barron Ave Substation		Special ID		Breaker 10L4	
Division		Liberty Utility		Circuit Designation			
Manufacturer		KYLE		Type		OTHER	
Yr. Manufactured				Class			
Mfr. Location		USA		Mechanism Type			
Interrupting Rating		12.0 kA		Mechanism Design		COIL SPRING	
Weight				BIL		110 kV	
Total Weight		525 LB		Control Volts		125	
Counter				Amps		800	
kV		15.5					
Note							
Test Date		9/17/2014	Test Time	12:36:43 PM	Weather		
Air Temperature		26 °C	Tank Temp.	°C	RH.		26 %
Tested by			Work Order #		Last Test Date		8/26/2014
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

Test Mode	Ph.	Test kV	mA	Watts	IR _{auto}	IR _{man}
GND	1	10.002	0.2240	0.0030		G
GND	1	9.306	0.2010	0.0080		G
GND	2	10.002	0.2230	0.0030		G
GND	2	10.002	0.2060	0.0090		G
GND	3	10.002	0.2230	0.0020		G
GND	3	10.001	0.2000	0.0080		G
UST	1	10.001	0.0490	0.0000		G
UST	2	10.001	0.0490	0.0000		G
UST	3	10.002	0.0490	0.0000		G

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	1	GROUND	1	10.007	0.0730	0.0140	G	
	2	GROUND	1	10.008	0.0780	0.0150	G	
	3	GROUND	1	10.007	0.0770	0.0100	G	
	4	GROUND	1	10.008	0.0720	0.0150	G	
	5	GROUND	1	10.007	0.0640	0.0170	G	
	6	GROUND	1	10.007	0.0730	0.0130	G	

United Power Group, Inc.

VACUUM RECLOSER TEST AND INSPECTION REPORT

Customer Liberty Utilities Date 9/17/2014 Page No. _____
 Address Salem, NH Air Temp. 70F Project No. _____
 Owner Liberty Utilities Date Last Inspection _____ Rel. Humidity 38%
 Address Salem, NH Last Inspection Report No. _____
 Equipment Location Barron Ave.
 Owner Identification Recloser 10L4

Breaker Nameplate Data:

Manufacturer Kyle Type VSA-12
 Serial No. CP571172094 Type Operating Mechanism Coil Spring
 Amperes 800 Age _____ Interrupt Rating 12kA KV 15.5

Adjustment Checks	Mfr's Rec.	As Found	As Left
Latch Wipe		X	X
Latch Clearance		X	X
Stop Clearance		X	X
Prop. Clearance		X	X
Phase Checked	A	B	C
Contact Gap	X	X	X
Contact Travel	X	X	X
Contact Wipe	X	X	X
Erosion Indicator	X	X	X

Phase Test Data	A	B	C
5 KV Bottle Megohms			
5 KV Open CB	B1	B3	B5
Megohms To Ground	100.000+	100.000+	100.000+
<i>Bushings not under test were grounded.</i>	B2	B4	B6
	100.000+	100.000+	100.000+
5 KV Closed CB	B1 & B2	B3 & B4	B5 & B6
Megohms To Ground	100.000+	100.000+	100.000+
<i>K = Number Entered Above X 1000</i>			
Closing/Opening Speed	Visual OK		
Contact Rest. Microhms	169	166	168

HIPOT Tests Microamps 1 Minute Test			
Phase tested	1	2	3
37.5 KV AC. Bottle Test	P	P	P
37.5 KV Closed CB Test	P	P	P
<i>Bottle Test is a Go No Go Test (P = Pass) (F = Fail)</i>			
<i>Closed Test Energize a Phase & Grd. All Others</i>			

Specified 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 and Maintenance:				
Checked Items:	Insp. Item	Found Dirty	Cleaned & Lubed	See Remarks
Vacuum Bottles	X			
Primary Stabs	X			
Ground Stab	X			
Structural Checks	X			
Mech. Conn.	X			
Charaina Motor	X			
Closing Springs	X			
Opening Springs	X			
Operation Coils	X			
Auxiliary Devices	X			
Insulating Memb.	X			
Recloser Wiring	X			
Racking Device				
Heater & Lights	X			
Cubicle Wiring	X			
<i>X = Yes For This Entry</i>				
Counter Found			58	
Counter Left			74	

Remarks: Results are acceptable.

Submitted by: J Fazio Equipment Used: DLRO. Meaer. HIPOT

United Power Group, Inc.

PROTECTIVE RELAY TEST REPORT

Customer	Liberty Utilities	Date	9/17/14	Page No.	
Address	Salem, NH	Air Temp.	70F	Proj. No.	
Owner	Liberty Utilities	Date Last Inspection	By Others	Rel. Hum.	30%
Address	Salem, NH	Last Inspection Report No.			
Equipment Location	Barron Ave. Substation				
Owner Identification	10L4 Recloser				

Circuit Identification 10L4 C.T.Ratio 1000/1 P.T.Ratio

Visual Inspection					Routine Maintenance									
Cover Gasket		X			Glass Cleaned		X			Mfr:	Cooper			
Glass		X			Case Cleaned		X			Type Ph:	Form F6			
Foreign Material		X			Relay Cleaned		X			Cat No:				
Moisture		X			Connections Tight		X			Tap Range Ph:	5-3200A			
Spiral Spring					Taps Tightened					Tap Range Grd:	2-1600A			
Bearing Condition					Contacts Cleaned					Inst. Range Ph:				
Bearing End-Play					Insulation Resistance		X			Inst Range Grd:				
Disc Clearance					Trip Circuit		X			Use:	51P/51G/79			
Rust		X								S/N =				

Remarks: Results are acceptable.

Relay Settings															
	Reclosing			Inst. Element Setting		Tap Setting		Curve Setting				Time Dial Setting			
	1st	2nd	3rd	50P-1	50G-1	51P	51G	50P-1	50G-1	51P	51G	50P-1	50G-1	51P	51G
Specified	5	5	LO			720A	280A							133	140
As Found	5	5	LO			720A	280A							133	140
As Left	5	5	LO			720A	280A							133	140

Test Operations - As Found - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U. X	Tap 1 X3	Tap 2 X5	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.723			1.35	0.528			X	X				
B Phase		0.725			1.36	0.524			X	X	5	5	LO	
C Phase		0.726			1.35	0.529			X	X				
GRD		0.284			3.30	1.89			X	X	5	5	LO	

Test Operations - As Left - Time in Seconds

		Time Element		Current Voltage			Inst. Element		Targets		Reclosing			
		P. U.		Time			Current/Voltage							
	Zero Set	Tap 1	Tap 2	P. U. X	Tap 1 X3	Tap 2 X5	Pick Up	Delay	LED	Reset	1st	2nd	3rd	4th
A Phase		0.723			1.35	0.528			X	X				
B Phase		0.725			1.36	0.524			X	X	5	5	LO	
C Phase		0.726			1.35	0.529			X	X				
GRD		0.284			3.30	1.89			X	X	5	5	LO	

Submitted By JF Equipment Used Doble 2253

10L4 - A Phase Voltage Regulator

Company	UPG	Serial Number	M044407PFN		
Location	Barron Ave. Substation	Special ID	10L4 Regulators		
Division	Liberty Utilities	Circuit Designation	A Phase		
Manufacturer	GE	Type	ML-32		
Yr. Manufactured	1986	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	2790 LB	Oil Volume	95 UG		
kV	7.96	Amps	313		
Impedance	%	VA Rating	250 kVA		
Catalog #		LTC Counter	258007		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	9/18/2014	Test Time	8:33:18 AM	Weather	SUNNY
Air Temperature	16 °C	Tank Temp.	°C	RH.	60 %
Tested by	JF	Work Order #		Last Test Date	8/27/2014
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}
CH	8.001	11.093	1.172	1.06	1.00	2942.4	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.013	0.0670	0.0130	G	
	L	GROUND	3	10.014	0.0680	0.0130	G	
	SL	GROUND	3	10.013	0.0610	0.0100	G	

Insulation Resistance

Mfr.:	AV0	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	14500	26700	1.8414	G	

Exciting Current Tests

		Mfr.	Type	Steps	Position Found		Position Left		
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR_{auto}	IR_{man}
1L	2.500	402.14	1045.1						
N	2.499	1377.1	1286.8						
1R	2.500	401.39	1046.8						
2R	2.498	1376.7	1285.4						
3R	2.500	805.25	1161.8						
4R	2.499	1376.9	1286.7						
5R	2.500	401.82	1046.7						
6R	2.500	1376.4	1286.3						
7R	2.499	805.09	1162.6						
8R	2.499	1376.5	1286.8						
9R	2.500	402.09	1048.4						
10R	2.499	1376.4	1287.5						
11R	2.499	805.57	1164.9						
12R	2.499	1376.5	1288.1						
13R	2.500	402.34	1050.6						
14R	2.499	1377.4	1289.6						
15R	2.500	805.67	1169.1						
16R	2.499	1376.7	1290.4						

10L4 – B Phase Voltage Regulator

Company	UPG	Serial Number	M046769PCP		
Location	Barron Ave. Substation	Special ID	10L4 Regulators		
Division	Liberty Utilities	Circuit Designation	B Phase		
Manufacturer	GE	Type	MLT-32		
Yr. Manufactured	1986	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	2790 LB	Oil Volume	95 UG		
kV	7.96	Amps	313		
Impedance	%	VA Rating	250 kVA		
Catalog #		LTC Counter	533046		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	9/18/2014	Test Time	8:54:10 AM	Weather	SUNNY
Air Temperature	17 °C	Tank Temp.	°C	RH.	55 %
Tested by	JF	Work Order #		Last Test Date	8/27/2014
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}
CH	8.001	12.151	2.242	1.85	1.00	3222.6	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR _{auto}	IR _{man}
	S	GROUND	3	10.011	0.0680	0.0100	G	
	L	GROUND	3	10.015	0.0720	0.0100	G	
	SL	GROUND	3	10.012	0.0590	0.0150	G	

Insulation Resistance

Mfr.:	AV0	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	6320	14500	2.2943		

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.500	380.98	1048.9						
N	2.500	1287.6	1303.2						
1R	2.500	380.11	1046.7						
2R	2.500	1287.2	1303.8						
3R	2.500	754.57	1166.3						
4R	2.500	1287.6	1304.0						
5R	2.500	380.64	1045.7						
6R	2.500	1288.2	1305.0						
7R	2.500	755.29	1167.3						
8R	2.500	1287.8	1306.0						
9R	2.500	381.08	1048.7						
10R	2.500	1288.2	1307.2						
11R	2.499	755.66	1170.6						
12R	2.499	1288.2	1308.5						
13R	2.500	381.37	1051.2						
14R	2.500	1288.6	1310.5						
15R	2.499	756.11	1176.7						
16R	2.500	1288.8	1314.2						

10L4 – C Phase Voltage Regulator

Company	UPG	Serial Number	M044399PFN		
Location	Barron Ave. Substation	Special ID	10L4 Regulators		
Division	Liberty Utilities	Circuit Designation	C Phase		
Manufacturer	GE	Type	ML-32		
Yr. Manufactured	1986	Class	OA		
Mfr. Location	USA				
Tank Type	N2 BLANKETED	Coolant	OIL		
Phases	1	BIL	95 kV		
Weight	2790 LB	Oil Volume	95 UG		
kV	7.96	Amps	313		
Impedance	%	VA Rating	250 kVA		
Catalog #		LTC Counter	426012		
Design	Step	Ctrl Wire Diameter			
Catalog/Style		Crew Size			
Note					
Test Date	9/18/2014	Test Time	9:20:05 AM	Weather	SUNNY
Air Temperature	19 °C	Tank Temp.	°C	RH.	47 %
Tested by	JF	Work Order #		Last Test Date	8/27/2014
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}
CH	8.001	12.102	2.191	1.81	1.00	3209.6	G	

Hot Collar Tests

Serial #	ID	Test Mode	Skirt #	Test kV	mA	Watts	IR_{auto}	IR_{man}
	S	GROUND	3	10.011	0.0650	0.0060	G	
	L	GROUND	3	10.015	0.0670	0.0080	G	
	SL	GROUND	3	10.012	0.0580	0.0050	G	

Insulation Resistance

Mfr.:	AVO	Serial #:				
kV	Connection	T1(Mohms)	T2(Mohms)	PI	IR_{auto}	IR_{man}
5000	Src/Load to Earth	12700	27800	2.189		

Exciting Current Tests

			Mfr.	Type	Steps	Position Found		Position Left	
De-Energized Tap Changer									
On-Load Tap Changer									
	Connections	SA - SL		SB - SL		SC - SL			
LTC	Test kV	mA	Watts	mA	Watts	mA	Watts	IR _{auto}	IR _{man}
1L	2.501	411.41	1059.7						
N	2.500	1376.3	1303.3						
1R	2.500	410.61	1059.3						
2R	2.499	1376.3	1303.8						
3R	2.500	810.33	1176.6						
4R	2.500	1376.6	1303.8						
5R	2.500	411.25	1059.1						
6R	2.500	1376.6	1303.1						
7R	2.500	810.99	1176.9						
8R	2.499	1377.0	1303.9						
9R	2.499	411.57	1060.8						
10R	2.500	1376.6	1304.1						
11R	2.500	810.99	1179.2						
12R	2.500	1376.7	1305.7						
13R	2.500	411.88	1063.7						
14R	2.500	1376.8	1307.3						
15R	2.499	811.02	1183.2						
16R	2.500	1376.6	1308.5						

United Power Group, Inc.

Customer	Liberty Utilities	Date	9/18/2014	Page No.	
Address	Salem, NH	Air Temp.	55F	Proj. No.	
Owner	Liberty Utilities	Date Last Inspection	By Others	Rel. Hum.	37%
Address	Salem, NH	Last Inspection Report No.			

Equipment Location	Barron Ave.
Owner Identification	10L4 Regulators

Manuf.	GE	Type	VR1	Test Set#	TTR-JF
Gallons	95	Oil Levels	OK	KVA	250

Nameplate Voltage	7960
Line to Line Voltage	
Percent Regulation	5/8%

Ser # A	M044407PFN
Ser # B	M046769PCP
Ser # C	M044399PFN

Doble Factor	Power Results
Test KV	8
Position	N

Tap Position	Tap Voltage	TTR Ratio	TTR MEASURED VALUES:		
			S-SL A	S-SL B	S-SL C
			L-SL A	L-SL B	L-SL C
16R	8756	0.909	0.904	0.905	0.905
15R	8706	0.914	0.912	0.912	0.912
14R	8657	0.920	0.917	0.918	0.917
13R	8607	0.925	0.925	0.921	0.923
12R	8557	0.930	0.929	0.928	0.929
11R	8507	0.936	0.934	0.933	0.933
10R	8458	0.941	0.941	0.941	0.939
9R	8408	0.947	0.945	0.946	0.946
8R	8358	0.952	0.951	0.952	0.951
7R	8308	0.958	0.957	0.956	0.957
6R	8259	0.964	0.964	0.962	0.963
5R	8209	0.970	0.969	0.968	0.969
4R	8159	0.976	0.975	0.976	0.976
3R	8109	0.982	0.982	0.982	0.981
2R	8060	0.988	0.987	0.989	0.988
1R	8010	0.994	0.994	0.995	0.994
N	7960	1.000	1.000	1.001	1.000
1L	7910	1.006	1.007	1.007	1.006
2L	7861	1.013	1.013	1.013	1.013
3L	7811	1.019	1.02	1.019	1.019
4L	7761	1.026	1.025	1.024	1.025
5L	7711	1.032	1.032	1.034	1.033
6L	7662	1.039	1.041	1.041	1.042
7L	7612	1.046	1.047	1.047	1.048
8L	7562	1.053	1.055	1.055	1.054
9L	7512	1.060	1.061	1.061	1.062
10L	7463	1.067	1.069	1.068	1.068
11L	7413	1.074	1.076	1.076	1.075
12L	7363	1.081	1.083	1.082	1.082
13L	7313	1.088	1.092	1.092	1.093
14L	7264	1.096	1.099	1.101	1.099
15L	7214	1.103	1.109	1.107	1.107
16L	7164	1.111	1.117	1.116	1.115

Remarks: Regulator test results are acceptable.

Barron Ave. – 10L1 Transformer



Report Source Two Winding Transformer

Session Test Date 2/2/2016 11:03:01 AM

Nameplate - Two-winding Transformer

Company	UPG	Serial Number	F-959759
Location	Barron Ave. Substation	Special ID	Transformer - 10L1
Division	L berty Utilities	Circuit Designation	
Manufacturer	General Electric	Configuration	Y_Y
Year Manufactured		Tank Type	Other
Mfr Location	USA	Coolant	Oil
Phases	Three	Class	OA/FA
Oil Volume	690 UG	BIL	110 kV
Weight	18600.000 LB		
kV	22.9, 7.62	VA Rating	*, 5000.000, 5600.000, 7000.000, KVA

Test Date	2/2/2016	Test Time:	11:03 AM	Weather	Sunny
Air Temperature	10°C	Apparatus Temperature	*	Humidity	32 %
Tester	JF/RB	Work Order		Date Last Tested	8/26/2014
Verified		Test Set Type	M4000	Date Retested	
Verification Date		Set Top Serial #		Reason	BUSHING REPL.
Last Sheet #		Set Bottom Serial #		Travel Time	
Purchase Order		Ins. Book #		Duration	
Copies		Sheet #		Crew Size	

Bushing Nameplate

Designation	Serial #	Manufacturer	Type	C1 %PF	C1 Cap	C2 %PF	C2 Cap	Rated kV	Amps
H1	15-292439	PCORE Electric Co.	PRC	0.66	471	*	*	25	400
H2	15-295315	PCORE Electric Co.	PRC	0.59	473	*	*	25	400
H3	15-292463	PCORE Electric Co.	PRC	0.65	466	*	*	25	400
X1	1629055	General Electric	U	0.27	432	*	*	25	400
X2	1629526	General Electric	U	0.27	439	*	*	25	400
X3	1629060	General Electric	U	0.27	431	*	*	25	400
XO	1629093	General Electric	U	0.26	460	*	*	25	400

Overall Tests

	Insulation	Test kV	mA	Watts	% PF corr	Corr Fctr	Cap(pF)	FRANK™	Manual
1	CH+CHL	8.005	28.466	1.089	*	1	7550.8		
2	CH	8.002	28.468	1.089	0.38	1	7551.2	Good	

[Header]

Bushing C1

ID	Serial #	NP %PF	NP Cap	Test kV	mA	Watts	% PF corr	Corr Fctr	Cap(pF)	FRANK™	Manual
H1	15-292439	0.66	471	8.003	1.778	0.103	0.58	1	471.53	Good	
H2	15-295315	0.59	473	8.003	1.771	0.109	0.62	1	469.88	Good	
H3	15-292463	0.65	466	8.004	1.754	0.117	0.67	1	465.21	Good	

Insulation Resistance

Core Ground Test				
Manufacturer *				
Serial # *				
Connections	Volts	T1 (Mohms)	T2 (Mohms)	PI
Hi/Lo to Earth	5000.00	115000.00	269000.00	*

Exciting Current Tests

Manufacturer		Type	Steps	Boost %	Buck %	Position Found	Position Left	Oil Volume
DETC						0	0	*
On-line (LTC)								*

			H1 H0			H2 H0			H3 H0			FRANK™	Manual
DETC	LTC	Test kV	mA	Watts	X	mA	Watts	X	mA	Watts	X		
	3	8.026	115.15	973.2	L	76.475	673.42	L	115.74	979.93	L	Good	

Turns Ratio Tests

Serial Number						HV Winding				LV Winding		
Connections						Wye				Wye		
						H1 - H0				H3 - H0		
						X1 - X0				X3 - X0		
Tap	NP Volt	Tap	NP Volt	Cal	Ratio 1	Ratio 2	Ratio 3	Min. Lim	Max. Lim	FRANK™	Manual	
3	13220.000		7620.000	1.735	1.732	1.737	1.735	1.726	1.744	Good		

United Power Group, Inc.

Liberty Utilities
9 Lowell Road
Salem, NH 03079

May 19, 2016
Project No. U061613

Project Location:

Barron Avenue Substation

Scope:

Troubleshoot and test capacitor bank

Remarks:

United Power Group, Inc. was commissioned to troubleshoot and test the Barron Avenue Substation's capacitor bank. The capacitor bank protective relay was found tripped and locked out. During testing, it was discovered that multiple capacitors were bad. The system had eight capacitors per phase. After testing was performed, five capacitors per phase were placed back into service. The other issue was that the S & C Bankgard Relay (59N) was faulty. The relay was acting erratic during testing. UPG recommends replacing the relay and adjusting the relay pick up setting for five capacitors per phase. If you have any questions or concerns, please contact us at any time.

Capacitor Relay Info:

S & C
Bankgard
Cat. No. 38220-D
120VAC
0-20V / 0-30 SEC.

Submitted by:

James Fazio, EET

United Power Group, Inc.

Contact Resistance Test Report

Customer Liberty Utilities Date 5/19/16 Page No. 2
 Address Salem, NH Air Temp. 80F Proj. No. U061613
 Owner Liberty Utilities Date Last Inspection _____ Rel. Hum. 40%
 Address Salem, NH Last Inspection Report No. _____
 Equipment Location Barron Ave. Substation
 Owner Identification Capacitor Bank

Device	Type	Amp Rating	IC Rating	S No.	Contact Resistance Results in Milli Ohms			See Remark No.
					A Phase	B Phase	C Phase	
Vacuum Switch	S&C - VBM	400	34.5	AH87040	298	303	296	OK
Hipot				60kV	Pass	Pass	Pass	OK

Device	kV	kVar Rating	IC Rating	S No.	Results in Micro Farads			See Remark No.
					A Phase	B Phase	C Phase	
Capacitors	23	300			4.68uF	4.65uF	4.66uF	OK
					4.72uF	4.71uF	4.66uF	OK
					4.64uF	4.71uF	4.68uF	OK
					4.65uF	4.62uF	4.63uF	OK
					4.72uF	4.70uF	4.74uF	OK

Remarks: All results are acceptable.

Submitted By JF

000052

Customer	Liberty Utilities	Date	5/19/2016	Page No.	3
Address	Salem, NH	Air Temp.	80F	Proj. No.	U061613
Owner	Liberty Utilities	Date Last Inspection		Rel. Hum.	40%
Address	Salem, NH	Last Inspection Report No.			

Equipment Location	Barron Ave. Substation - Capacitor Bank
Owner Identification	Voltage Sensor - Capacitor Imbalance Protection

Location of C.T. or P.T.	Capacitor Bank Structure

[illegible]

Remarks	Mfg. = S & C CAT. NO. 8162R1-B 14.4-17.0KV
Submitted By:	JF



Barron Ave 102T Phase A fuse

Measurements °F

Ar1	Max	218.0
	Min	69.6
	Average	102.5
Sp1		96.7
Difference		121.4
Ar1.Max - Sp1		

Parameters

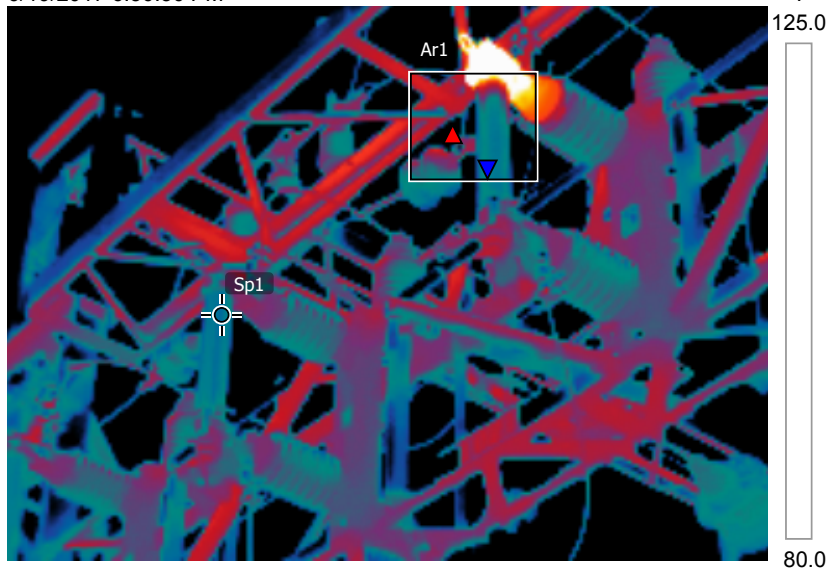
Emissivity	0.95
Refl. temp.	50 °F

Note

102T fuse Barron Ave phase A

Hot spot on Saddle of fuse protection for high side of the transformer phase A.
Recommmend taking out of service and cleaning the contacts.

6/19/2017 6:30:30 PM



IR_0676.jpg

FLIR E50

49020728

6/19/2017 6:30:30 PM



DC_0677.jpg



Refer to SMP 200.14.1 for temperature reference guide

Barron Ave Substaion 2018 Inspection

**102T Phase A Fuse
101T Phase B Fuse
2-3 Phase B
10L1 2-1 Phase B**



Refer to SMP 200.14.1 for temperature reference guide

Measurements

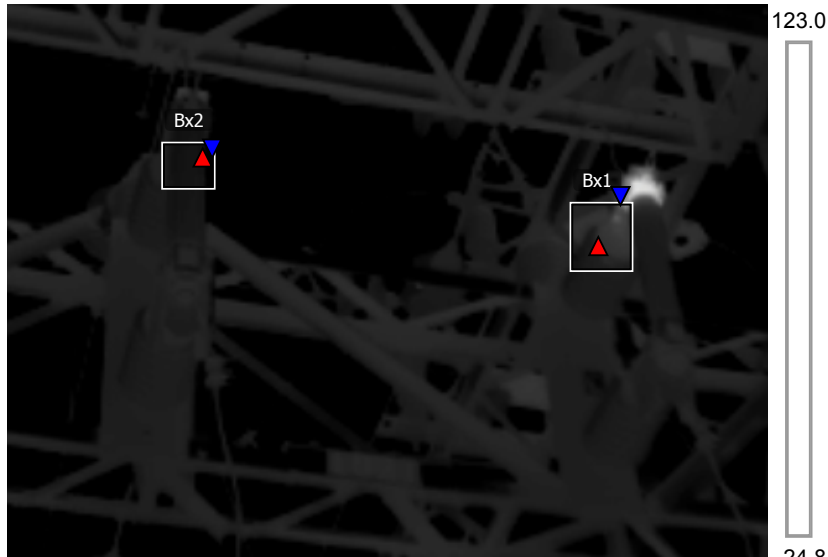
Bx1	Max	114.8 °C
	Min	4.2 °C
	Average	52.1 °C
Bx2	Max	54.1 °C
	Min	3.7 °C
	Average	36.0 °C
Dt1 Bx1.Max - Bx2.Max		60.6 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C
Distance	20 ft
Atmospheric temp.	22.8 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Due to a difference of 60.0 replacement of all 3 fuses inside and cleaning of the contacts is recommended. This is considered an EMERGENCY REPAIR WITHIN 1 WEEK!

7/5/2018 11:32:29 AM



IR_0868.jpg

FLIR E50

49020728

7/5/2018 11:32:29 AM



DC_0869.jpg

Text annotations

Location	Barron Ave
Circuit	10L2
Equipment	102T
Phase	A



Refer to SMP 200.14.1 for temperature reference guide

Measurements

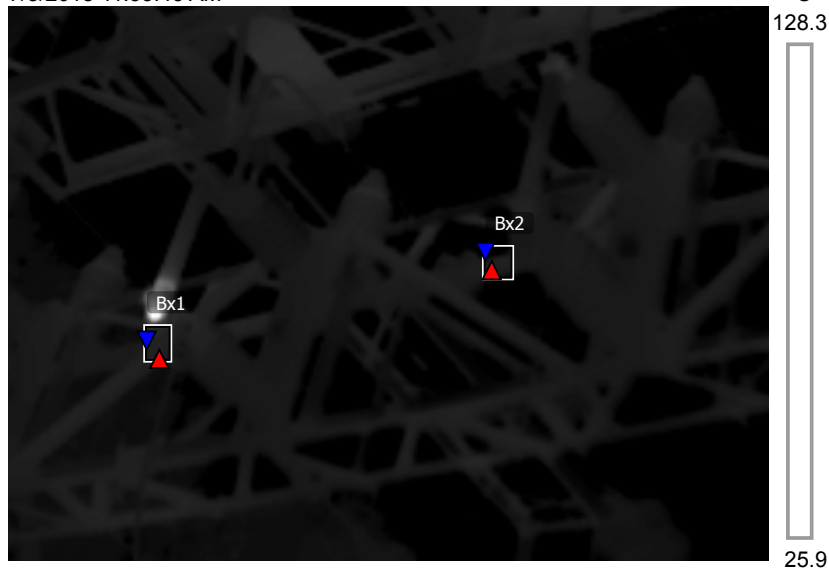
Bx1	Max	145.8 °C
	Min	32.7 °C
	Average	77.8 °C
Bx2	Max	46.6 °C
	Min	39.0 °C
	Average	42.9 °C
Dt2	Bx1.Max - Bx2.Max	99.2 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C
Distance	20 ft
Atmospheric temp.	35 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

Due to a difference of 60.0 replacement of all 3 fuses inside and cleaning of the contacts is recommended. This is considered an EMERGENCY REPAIR WITHIN 1 WEEK!

7/5/2018 11:33:43 AM



IR_0870.jpg

FLIR E50

49020728

7/5/2018 11:33:43 AM



DC_0871.jpg



Refer to SMP 200.14.1 for temperature reference guide

Measurements

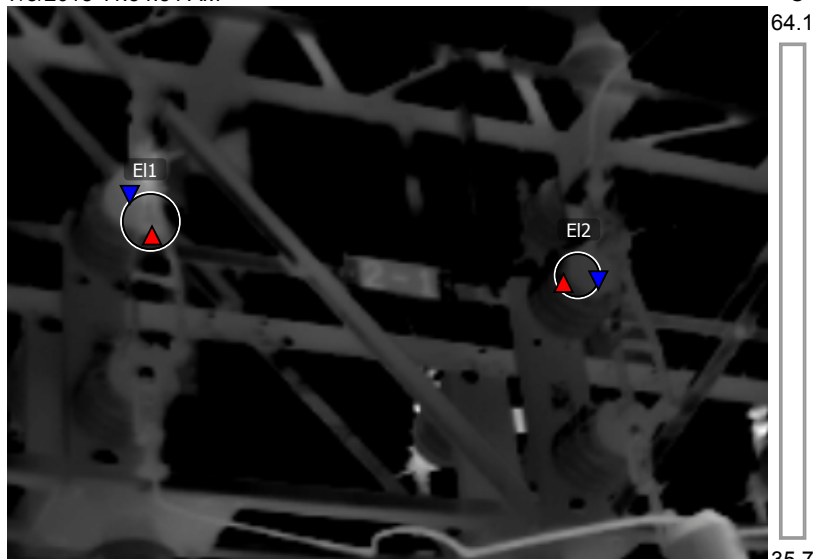
EI1	Max	55.1 °C
	Min	25.3 °C
	Average	46.1 °C
EI2	Max	43.5 °C
	Min	11.1 °C
	Average	37.8 °C
Dt1	EI1.Max - EI2.Max	11.6 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C
Distance	20 ft
Atmospheric temp.	22.8 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

**No Issues continue to
moniter next year.**

7/5/2018 11:34:51 AM



IR_0872.jpg

FLIR E50

49020728

7/5/2018 11:34:51 AM



DC_0873.jpg

Text annotations

Location	Barron Ave
Circuit	10L2
Equipment	10L2-1
Phase	B

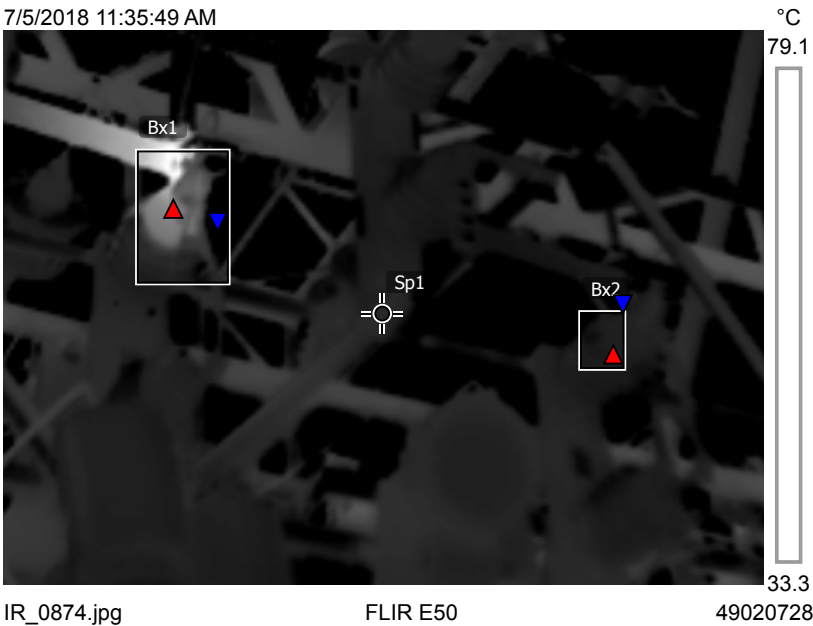


Refer to SMP 200.14.1 for temperature reference guide

Measurements		
Bx1	Max	84.9 °C
	Min	7.9 °C
	Average	44.6 °C
Bx2	Max	41.6 °C
	Min	17.4 °C
	Average	37.4 °C
Sp1		40.4 °C
Dt1	Bx1.Max - Bx2.Max	43.3 °C

Parameters	
Emissivity	0.95
Refl. temp.	10 °C
Distance	2.8 ft
Atmospheric temp.	22.8 °C
Ext. optics temp.	20 °C
Ext. optics trans.	1
Relative humidity	50 %

**Difference of 43.0
degrees repair at next
routine maintenance.**



Text annotations	
Location	Barron Ave
Circuit	10L2
Equipment	10L2-3
Phase	B

Liberty Utilities	Serial#: HA08863002	Mfr: ABB	Control#: 7044984
	Location: BARRON AVENUE 10	kV: 22.9	Order#: 541715
	Equipment: TRANSFORMER	kVA: 9375	Account: 110710
LONDONDERRY, NH 03053 US	Compartment: MAIN(BOTTOM)	Year Mf'd: 2002	Received: 07/28/2017
ATTN: MARIO BARONE	Breathing: SEAL	Syringe ID: 53003534	Reported: 08/14/2017
PO#: MARIO BARONE	Bank: Phase:	Bottle ID:	
Project ID:	Fluid: MIN USGal: 1323	Sampled By: AF	
Customer ID: REF# 024304			

Lab Control Number:			7044984	7035705 ⁷
Date Sampled:			06/14/2017	12/17/2014
Order Number:			541715	539662
Oil Temp:			45	50
Dissolved Gas Analysis (DGA) ASTM D-3612¹	Hydrogen (H2) (µL/L):		347	<2
	Methane (CH4) (µL/L):		17	16
	Ethane (C2H6) (µL/L):		6	4
	Ethylene (C2H4) (µL/L):		1	<1
	Acetylene (C2H2) (µL/L):		<1	<1
	Carbon Monoxide (CO) (µL/L):		531	431
	Carbon Dioxide (CO2) (µL/L):		1681	1320
	Nitrogen (N2) (µL/L):		74393	98100
	Oxygen (O2) (µL/L):		2549	14600
	Total Dissolved Gas (TDG) (µL/L):		79525	114471
	Total Dissolved Combustible Gas (TDCG) (µL/L):		902	451
	Equivalent TCG (%):		1.2905	0.2979
DGA Diagnostics	DGA Keys Gas / Interpretive Method:	Hydrogen: Condition 2 Indications of partial discharge activity (100 µL/L).		
	PER IEEE C57.104-2008	Methane within condition 1 limits (120 µL/L).		
	(most recent sample)	Ethane within condition 1 limits (65 µL/L).		
		Ethylene within condition 1 limits (50 µL/L).		
		Acetylene within condition 1 limits (1 µL/L).		
		Carbon Monoxide: Condition 2 Indications of overheated cellulose insulation (350 µL/L).		
		Carbon Dioxide within condition 1 limits (2500 µL/L).		
	DGA TDCG Rate Interpretive Method:	Retest Quarterly.		
	PER IEEE C57.104-2008	Exercise caution. Analyze for individual gases. Determine load dependence.		
	(two most recent sample)			
	DGA Cellulose (Paper) Insulation:	CO2/CO Ratio not applicable - at least one gas doesn't exceed its limit.		
	WDS DGA Condition Code:	CAUTION		
	WDS Recommended Action:	Resample within 6 months for testing.		
Comment:				
General Oil Quality (GOQ)				
ASTM D-1533¹	Moisture in Oil	(mg/kg):	12	5
ASTM D-971¹	Interfacial Tension	(mN/m):	38.17	36.0
ASTM D-974¹	Acid Number	(mg KOH/g):	0.014	0.005
ASTM D-1500¹	Color Number	(ASTM):	L1.0	1
ASTM D-1524¹	Visual Exam.	(Relative):	PASS	PASS
			CLR&BRIGHT	CLR&BRIGHT
ASTM D-1524¹	Sediment Exam.	(Relative):	TRACE	
ASTM D-877¹	Dielectric Breakdown	(kV):	54	52
ASTM D-1816¹	Dielectric Breakdown 1 mm	(kV °C):	34 (25°C)	23 (50°C)
ASTM D-924¹	Power Factor @ 25°C (Routine)	(%):	0.099	0.056
ASTM D-924	Power Factor @ 100°C (Routine)	(%):		1.052
ASTM D-1298	Density @15°C	(g/mL):		0.891

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 = ppm, µg/L = ppb, mN/m = dynes/cm, mm²/s = cSt

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Liberty Utilities	Serial#: HA08863002	Mfr: ABB	Control#: 7044984
	Location: BARRON AVENUE 10	kV: 22.9	Order#: 541715
	Equipment: TRANSFORMER	kVA: 9375	Account: 110710
LONDONDERRY, NH 03053 US	Compartment: MAIN(BOTTOM)	Year Mf'd: 2002	Received: 07/28/2017
ATTN: MARIO BARONE	Breathing: SEAL	Syringe ID: 53003534	Reported: 08/14/2017
PO#: MARIO BARONE	Bank: Phase:	Bottle ID:	
Project ID:	Fluid: MIN USGal: 1323	Sampled By: AF	
Customer ID: REF# 024304			

Lab Control Number:			7044984	7035705 ⁷
Date Sampled:			06/14/2017	12/17/2014
Order Number:			541715	539662
Oil Temp:			45	50
ASTM D-4052	Density @15°C	(g/mL):	0.891	
ASTM D-445	Viscosity @40°C	(mm²/s):	8.93	
ASTM D-2668 ^{5, 6}	Oxidation Inhibitor	(wt. %)	0.183	0.251
GOQ Diagnostics			Moisture in Oil: Acceptable for in-service oil (35 mg/kg max).	
PER IEEE C57.106-2006			Interfacial Tension: Acceptable for in-service oil (25 mN/m min).	
(most recent sample)			Acid Number: Acceptable for in-service oil (0.2 mg KOH/g max).	
			Color Number and Visual: Diagnostic not applicable. Diagnostic not applicable.	
			Dielectric Breakdown ASTM D-877: Diagnostic not applicable.	
			Dielectric Breakdown ASTM D-1816: Acceptable for in-service oil (23 kV min @ 1mm).	
			Power Factor @ 25°C (Routine): Acceptable for in-service oil (0.5% max).	
			Oxidation Inhibitor: Diagnostic not applicable for type 1 oil. Acceptable for in-service oil type 2 (0.09% min).	
Comment:				
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 will typically have a Degree of Polymerization (DP) of 1000-1300. "Middle Aged" paper is approximately 500 and paper with less than 250 is in its "Old Age." Severely degraded insulation with a DP of 150 or less will have very little mechanical strength and may result in a transformer failure. The above estimations are based on a study by Chendong of GSU transformers filled with mineral oil.				
Estimated Average Degree of Polymerization (DP): >1003				
Estimated Operating Age of the Equipment: <1.0				
Notations:				
Comment:				
PCB		Concentration (mg/kg):	< 1.0 mg/kg	
EPA Method 8082 ^{5, 6}		PCB Type (Arocolor):	ND	
		Reporting Limit:	1	
Comment:				

End of Test Report

Authorized By: _____



KENNETH COCCIA
LABORATORY SUPERVISOR

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Liberty Utilities	Serial#: G853504	Mfr: GENERAL ELECTRIC	Control#: 7044985
	Location: BARRON AVENUE 10	kV: 22.9	Order#: 541715
	Equipment: TRANSFORMER	kVA: 6250	Account: 110710
LONDONDERRY, NH 03053 US	Compartment: MAIN(BOTTOM)	Year Mfd: 1971	Received: 07/28/2017
ATTN: MARIO BARONE	Breathing: SEAL	Syringe ID: 53004824	Reported: 08/14/2017
PO#: MARIO BARONE	Bank: Phase:	Bottle ID:	
Project ID:	Fluid: MIN USGal: 1010	Sampled By: AF	
Customer ID: REF# 021649			

Lab Control Number:			7044985	7035685 ⁷	7035706 ⁷	7035686 ⁷
Date Sampled:			06/14/2017	08/11/2016	12/17/2014	12/17/2014
Order Number:			541715	539642	539663	539643
Oil Temp:			50	40	50	50
Dissolved Gas Analysis (DGA) ASTM D-3612 ¹	Hydrogen (H2) (µL/L):		5	6	7	7
	Methane (CH4) (µL/L):		118	121	113	113
	Ethane (C2H6) (µL/L):		75	88	78	78
	Ethylene (C2H4) (µL/L):		39	41	41	41
	Acetylene (C2H2) (µL/L):		<1	<1	<1	<1
	Carbon Monoxide (CO) (µL/L):		610	580	497	497
	Carbon Dioxide (CO2) (µL/L):		15075	16700	15700	15700
	Nitrogen (N2) (µL/L):		77466	81800	93000	93000
	Oxygen (O2) (µL/L):		1803	4360	12000	12000
	Total Dissolved Gas (TDG) (µL/L):		95191	103696	121436	121436
Total Dissolved Combustible Gas (TDCG) (µL/L):			847	836	736	736
Equivalent TCG (%):			0.6028	0.54	0.3989	0.3989
DGA Diagnostics	DGA Keys Gas / Interpretive Method: PER IEEE C57.104-2008 (most recent sample)		Hydrogen within condition 1 limits (100 µL/L). Methane within condition 1 limits (120 µL/L). Ethane: Condition 2 Indications of overheated (>250°C) oil (65 µL/L). Ethylene within condition 1 limits (50 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 2 Levels exceed normal concentrations. Fault may be present (720 µL/L).			
	DGA TDCG Rate Interpretive Method: PER IEEE C57.104-2008 (two most recent sample)		Retest Quarterly. Exercise caution. Analyze for individual gases. Determine load dependence.			
	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):	18	11	12	12
ASTM D-971 ¹	Interfacial Tension	(mN/m):	34.22	30.0	34.0	34.0
ASTM D-974 ¹	Acid Number	(mg KOH/g):	0.054	0.03	0.02	0.02
ASTM D-1500 ¹	Color Number	(ASTM):	L1.5	1.5	2.5	1.5
ASTM D-1524 ¹	Visual Exam.	(Relative):	PASS	PASS	PASS	PASS
			CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT
ASTM D-1524 ¹	Sediment Exam.	(Relative):	ND			
ASTM D-877 ¹	Dielectric Breakdown	(kV):	38	64	61	61
ASTM D-1816 ¹	Dielectric Breakdown 1 mm	(kV °C):	33 (24°C)	34 (40°C)	35 (50°C)	35 (50°C)

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Liberty Utilities
Serial#: G853504
Mfr: GENERAL ELECTRIC
Control#: 7044985
Location: BARRON AVENUE 10
kV: 22.9
Order#: 541715
Equipment: TRANSFORMER
kVA: 6250
Account: 110710
Compartment: MAIN(BOTTOM)
Year Mfd: 1971
Received: 07/28/2017
Breathing: SEAL
Syringe ID: 53004824
Reported: 08/14/2017
Bank: Phase:
Bottle ID:
Fluid: MIN USGal: 1010
Sampled By: AF
Project ID:
Customer ID: REF# 021649

Lab Control Number:			7044985	7035685 ⁷	7035706 ⁷	7035686 ⁷
Date Sampled:			06/14/2017	08/11/2016	12/17/2014	12/17/2014
Order Number:			541715	539642	539663	539643
Oil Temp:			50	40	50	50
ASTM D-924 ¹	Power Factor @ 25°C (Routine)	(%):	0.205	0.148	0.008	0.008
ASTM D-924	Power Factor @ 100°C (Routine)	(%):		4.140	0.595	0.595
ASTM D-1298	Density @15°C	(g/mL):		0.888	0.888	0.888
ASTM D-4052	Density @15°C	(g/mL):		0.888	0.888	0.888
ASTM D-445	Viscosity @40°C	(mm²/s):		9.11	9.07	9.07
ASTM D-2668 ^{5, 6}	Oxidation Inhibitor	(wt. %)	0.109	0.163	0.176	0.176
GOQ Diagnostics			Moisture in Oil: Acceptable for in-service oil (35 mg/kg max).			
PER IEEE C57.106-2006			Interfacial Tension: Acceptable for in-service oil (25 mN/m min).			
(most recent sample)			Acid Number: Acceptable for in-service oil (0.2 mg KOH/g max).			
			Color Number and Visual: Diagnostic not applicable. Diagnostic not applicable.			
			Dielectric Breakdown ASTM D-877: Diagnostic not applicable.			
			Dielectric Breakdown ASTM D-1816: Acceptable for in-service oil (23 kV min @ 1mm).			
			Power Factor @ 25°C (Routine): Acceptable for in-service oil (0.5% max).			
			Oxidation Inhibitor: Diagnostic not applicable for type 1 oil. Acceptable for in-service oil type 2 (0.09% min).			
Comment: DIELECTRIC RESULT WAS VERIFIED BY REANALYSIS.						
Furanic Compound			2-Furaldehyde (µg/L):	117		
ASTM D-5837 ⁵			5-Hydroxy-methyl-furaldehyde (µg/L):	< 10		
			2-Acetylfuran (µg/L):	< 10		
			5-Methyl-2-furaldehyde (µg/L):	53		
			2-Furyl alcohol (µg/L):	< 10		
Furanic Compound Diagnostics (most recent sample):						
New insulation with a high degree of mechanical strength will typically have a Degree of Polymerization (DP) of 1000-1300. "Middle Aged" paper is approximately 500 and paper with less than 250 is in its "Old Age." Severely degraded insulation with a DP of 150 or less will have very little mechanical strength and may result in a transformer failure. The above estimations are based on a study by Chendong of GSU transformers filled with mineral oil.						
Estimated Average Degree of Polymerization (DP): 698						
Estimated Operating Age of the Equipment: 15.5						
Notations:						
Comment:						
PCB			Concentration (mg/kg):	6.18 mg/kg		
EPA Method 8082 ^{5, 6}			PCB Type (Arocolor):	1254		
			Reporting Limit:	1		
Comment:						

End of Test Report

Authorized By:



KENNETH COCCIA
LABORATORY SUPERVISOR

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000063

Liberty Utilities	Serial#: F959759	Mfr: GENERAL ELECTRIC	Control#: 7044991
	Location: BARRON AVENUE 10	kV: 22.9	Order#: 541715
	Equipment: TRANSFORMER	kVA: 7000	Account: 110710
LONDONDERRY, NH 03053 US	Compartment: MAIN(BOTTOM)	Year Mfd: 1970	Received: 07/28/2017
ATTN: MARIO BARONE	Breathing: SEAL	Syringe ID: 53003912	Reported: 08/14/2017
PO#: MARIO BARONE	Bank: Phase:	Bottle ID:	
Project ID:	Fluid: MIN USGal: 739	Sampled By: AF	
Customer ID: REF# 023486			

Lab Control Number:			7044991	7035681 ⁷	7035704 ⁷	7035682 ⁷
Date Sampled:			06/14/2017	01/11/2016	01/17/2014	01/17/2014
Order Number:			541715	539638	539661	539639
Oil Temp:			65	60	60	60
Dissolved Gas Analysis (DGA) ASTM D-3612 ¹	Hydrogen (H2) (µL/L):		37	36	53	53
	Methane (CH4) (µL/L):		8	10	11	11
	Ethane (C2H6) (µL/L):		3	2	2	2
	Ethylene (C2H4) (µL/L):		1	1	1	1
	Acetylene (C2H2) (µL/L):		<1	<1	<1	<1
	Carbon Monoxide (CO) (µL/L):		435	439	585	585
	Carbon Dioxide (CO2) (µL/L):		3966	4600	5220	5220
	Nitrogen (N2) (µL/L):		64457	68900	77200	77200
	Oxygen (O2) (µL/L):		21425	22700	20900	20900
	Total Dissolved Gas (TDG) (µL/L):		90332	96688	103972	103972
	Total Dissolved Combustible Gas (TDCG) (µL/L):		484	488	652	652
	Equivalent TCG (%):		0.4982	0.4686	0.5812	0.5812
DGA Diagnostics	DGA Keys Gas / Interpretive Method:		Hydrogen within condition 1 limits (100 µL/L).			
	PER IEEE C57.104-2008		Methane within condition 1 limits (120 µL/L).			
	(most recent sample)		Ethane within condition 1 limits (65 µL/L).			
			Ethylene within condition 1 limits (50 µL/L).			
			Acetylene within condition 1 limits (1 µL/L).			
			Carbon Monoxide: Condition 2 Indications of overheated cellulose insulation (350 µL/L).			
			Carbon Dioxide: Condition 2 Indications of overheated cellulose insulation (2500 µL/L).			
			TDCG within condition 1 limits (720 µL/L).			
	DGA TDCG Rate Interpretive Method:		Retest Annually.			
	PER IEEE C57.104-2008		1-Continue normal operation.			
	(two most recent sample)					
	DGA Cellulose (Paper) Insulation:		CO2/CO Ratio not applicable - at least one gas doesn't exceed its limit.			
	WDS DGA Condition Code:		NORMAL			
	WDS Recommended Action:		Continue normal operation. Resample for testing within one year.			
Comment:						
General Oil Quality (GOQ)						
ASTM D-1533 ¹	Moisture in Oil	(mg/kg):	16	10	9	9
ASTM D-971 ¹	Interfacial Tension	(mN/m):	37.72	41.0	42.0	42.0
ASTM D-974 ¹	Acid Number	(mg KOH/g):	0.022	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
			CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT	CLR&BRIGHT
ASTM D-1524 ¹	Sediment Exam.	(Relative):	TRACE			
ASTM D-877 ¹	Dielectric Breakdown	(kV):	47	62	59	59
ASTM D-1816 ¹	Dielectric Breakdown 1 mm	(kV °C):	30 (27°C)	37 (60°C)	36 (60°C)	36 (60°C)
ASTM D-924 ¹	Power Factor @ 25°C (Routine)	(%):	0.016	0.002	0.002	0.002
ASTM D-924	Power Factor @ 100°C (Routine)	(%):		0.014	0.412	0.412

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 = ppm, µg/L = ppb, mN/m = dynes/cm, mm²/s = cSt

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Liberty Utilities

Serial#: F959759

Mfr: GENERAL ELECTRIC

Control#: 7044991

Location: BARRON AVENUE 10

kV: 22.9

Order#: 541715

Equipment: TRANSFORMER

kVA: 7000

Account: 110710

LONDONDERRY, NH 03053 US

Compartment: MAIN(BOTTOM)

Year Mfd: 1970

Received: 07/28/2017

ATTN: MARIO BARONE

Breathing: SEAL

Syringe ID: 53003912

Reported: 08/14/2017

PO#: MARIO BARONE

Bank: Phase:

Bottle ID:

Project ID:

Fluid: MIN USGal: 739

Sampled By: AF

Customer ID: REF# 023486

Lab Control Number:			7044991	7035681 ⁷	7035704 ⁷	7035682 ⁷
Date Sampled:			06/14/2017	01/11/2016	01/17/2014	01/17/2014
Order Number:			541715	539638	539661	539639
Oil Temp:			65	60	60	60
ASTM D-1298	Density @15°C	(g/mL):		0.896	0.896	0.896
ASTM D-4052	Density @15°C	(g/mL):		0.896	0.896	0.896
ASTM D-445	Viscosity @40°C	(mm²/s):		10.05	10.02	10.02
ASTM D-2668 ^{5, 6}	Oxidation Inhibitor	(wt. %)	0.179	0.235	0.237	0.237
GOQ Diagnostics			Moisture in Oil: Acceptable for in-service oil (35 mg/kg max).			
PER IEEE C57.106-2006			Interfacial Tension: Acceptable for in-service oil (25 mN/m min).			
(most recent sample)			Acid Number: Acceptable for in-service oil (0.2 mg KOH/g max).			
Color Number and Visual:			Diagnostic not applicable. Diagnostic not applicable.			
Dielectric Breakdown ASTM D-877:			Diagnostic not applicable.			
Dielectric Breakdown ASTM D-1816:			Acceptable for in-service oil (23 kV min @ 1mm).			
Power Factor @ 25°C (Routine):			Acceptable for in-service oil (0.5% max).			
Oxidation Inhibitor:			Diagnostic not applicable for type 1 oil. Acceptable for in-service oil type 2 (0.09% min).			
Comment:						
Furanic Compound			2-Furaldehyde (µg/L):	69		
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 will typically have a Degree of Polymerization (DP) of 1000-1300. "Middle Aged" paper is approximately 500 and paper with less than 250 is in its "Old Age." Severely degraded insulation with a DP of 150 or less will have very little mechanical strength and may result in a transformer failure. The above estimations are based on a study by Chendong of GSU transformers filled with mineral oil.						
Estimated Average Degree of Polymerization (DP): 763						
Estimated Operating Age of the Equipment: 11.5						
Notations:						
Comment:						
PCB			Concentration (mg/kg):	4.23 mg/kg		
EPA Method 8082 ^{5, 6}			PCB Type (Arocolor):	1242		
			Reporting Limit:	1		
Comment:						

End of Test Report

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/g, 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, 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: 7035686

Imported sample. No results: 7035682

Imported sample. No results: 7035704

Imported sample. No results: 7035705

Imported sample. No results: 7035706

Imported sample. No results: 7035685

Imported sample. No results: 7035681

112-2.00.1 0-02

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Substation <u>Barron Ave</u>	Sheet <u>1</u> of <u>1</u>	Date <u>12-17-15</u>	Time _____	Page <u>1</u> of <u>24</u>
Inspected By <u>AME</u>	Ambient Temp _____		Control House Temp _____	
CONTROL HOUSE (3)		SECURITY (5)		
Log Book <u>✓</u>	Heavy Duty Ground <u>✓</u>	Vandalism <u>✓</u>		
Control Panels <u>✓</u>	Switch Sticks <u>✓</u>	Fence & Barbed Wire <u>✓</u>		
Annunciator/Test Switches <u>✓</u>	Fire Equipment <u>✓</u>	Gates <u>✓</u>		
Station Alarms <u>✓</u>	SPOC Plan Posted <u>✓</u>	Gate Locks & Chains <u>✓</u>		
Tags & Switching Order Pads <u>✓</u>	SPOC Equipment Checklist <u>✓</u>	Warning Signs <u>✓</u>		
Lighting <u>✓</u>	Phone Lists <u>✓</u>	Yard Lights <u>✓</u>		
Heaters <u>✓</u>	Clean & General Condition <u>✓</u>	Vegetation <u>✓</u>		
Station Service and Transfer <u>✓</u>	YARD INSPECTION (6)			
Preferred _____ Emer _____	Checklist <u>✓</u>	Leaks *C = Clean L = Leaks R = Repaired M = Moderate Leaks		

01 - CIRCUIT BREAKERS & RECLOSERS (7)

[illegible]

04 - VOLTAGE REGULATORS & LTC (8)

[illegible]

SUBSTATION - V&O INSPECTION REPORTSubstation Barron Ave Inspected By Cine Sheet 1 of 1 Date 12-17-15**TRANSFORMERS (9)** If Transformer is an LTC, note LTC operation under V.R. section

Circuit Design	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
10L1		1	✓	30° & 45°				✓	H	✓	✓	
10L2		-1	✓	29° & 45°	29° & 34°			✓	24	✓	✓	
10L4		-1	✓	41° & 59°					25	✓	✓	Slow leak

08 - CAPACITORS (10)

Circuit Design	SW Pos	Counters		Control Operation	Time Clock			Bulldges	Leak*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												Out of Service

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Milliamps	Counter	Milliamps	Counter	Milliamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Push Reset	Elev	Closed	Open	Auto	Manual	Gas Ind	Checklist	Remarks
2293	609					✓		✓				
2253	N/A					✓		✓				
24	545						✓	✓				

06 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Chg	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

CHECKLIST

BUSESSES

LINE TRAPS/REACTORS

CABLE & TERMINATIONS

INSTRUMENT TRANSFORMER
(CT, PT, CCVT)

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
1 Trees					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u> J. Baker </u>					

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 12-17-15**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4 "	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

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Docket No. DE 19-064
Attachment Staff 6-40.6.i.1

CONTROL HOUSE (3)				SECURITY (5)	
Log Book	<u> </u>	Heavy Duty Ground	<u> </u>	Vandalism	<u> </u>
Control Panels	<u> </u>	Switch Sticks	<u> </u>	Fence & Barbed Wire	<u> </u>
Annunciator/Test Switches	<u> </u>	Fire Equipment	<u> </u>	Gates	<u> </u>
Station Alarms	<u> </u>	SPOC Plan Posted	<u> </u>	Gate Locks & Chains	<u> </u>
Tags & Switching Order Pads	<u> </u>	SPOC Equipment Checklist	<u> </u>	Warning Signs	<u> </u>
Lighting	<u> </u>	Phone Lists	<u> </u>	Yard Lights	<u> </u>
Heaters	<u> </u>	Clean & General Condition	<u> </u>	Vegetation	<u> </u>
Station Service and Transfer	<u> </u>				
Preferred _____ Eerner _____					
		YARD INSPECTION (6)			
		Checklist <u> </u>			
				Leaks * C = Clean L = Leaks	
				R = Repaired M = Moderate Leaks	

[illegible][illegible]

SUBSTATION - V&O INSPECTION REPORTSubstation Shelton Ave Inspected By C. Cook Sheet of Date 12-15-15**TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Design	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
		1	✓	41					H	✓		
		1	✓	37		35			75	✓		
		2	✓	40					30	✓		

08 - CAPACITORS (10)

Circuit Design	SW Pos	Counters		Control Operation	Time Clock			Bulldges	Leak*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												Out of service

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Milliamps	Counter	Milliamps	Counter	Milliamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Preload	Eject	Closed	Open	Auto	Manual	Gas Ind	Checklist	Remarks
2343	6054											
2353	N/A											
24	545											

08 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell			Charger			Grounds		Over All		Eq Olig	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

CHECKLIST

BUSSES _____

LINE TRAPS/REACTORS _____

CABLE & TERMINATIONS _____

INSTRUMENT TRANSFORMER
(CT, PT, CCVT) _____

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.			
3	☒	Visually inspect cable potheads and terminators	6	☒	Listen for unusual noises and report if found
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
1 Trees growth					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash			
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.	7	☒	Oil filled apparatus must be inspected for leaks
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: _____					

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 10-6-18**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical
2	✓	Fabric is taut	8	✓	Barbed wire (BW) strands intact (unbroken)
3	✓	Fabric attached to each post	9	✓	BW strands are taut
4	✓	Post (metal) connected to ground grid	10	✓	BW strands grounded/connected to ground grid
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	Gap between bottom of fence and ground < 2"
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	
Comments/Corrective Action (note item number above, followed by comment)					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4 "	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

112-2.00.1 9.02

Note in red any abnormalities.

01 - CIRCUIT BREAKERS & RECLOSERS (7)

04 - VOLTAGE REGULATORS & LTC (8)000081

SUBSTATION - V&O INSPECTION REPORTSubstation Barron Inspected By Ransom Sheet of Date 9/1/15**TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Desig	Nitro Press		Fans & Pumps	Temp ° C (max/ind)					Oil		Checklist	Remarks
	Cylidr	Trans		Top Oil	WDG			Reset	Level	Leaks*		
					H	X	Y					
1011		0	✓	50		60			✓	✓		Slow oil Leak
1012		1	✓	25		40			✓	✓		
1014		1	✓	50		25			✓	✓		

08 - CAPACITORS (10)

Circuit Design	Sw Pos	Counters		Control Operation	Time Clock			Bulldges	Leak*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												Out of service

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Milliamps	Counter	Milliamps	Counter	Milliamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Prefused	Eater	Closed	Open	Auto	Manual	Gas Ind	Checklist	Remarks
2393	609											
2354	NA											
24	544											
15												

06 - BATTERIES & CHARGERS (4)

Rel No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Chg	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

CHECKLIST

BUSES _____

LINE TRAPS/REACTORS _____

CABLE & TERMINATIONS _____

INSTRUMENT TRANSFORMER
(CT, PT, COVT) _____

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment) vegetation growing on side fence					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>Person</u>					

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 9/7/15**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4 "	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

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0.02

Note in red any abnormalities Docket No. DE 19-064

Attachment Staff 6-40.b.i.1

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01 - CIRCUIT BREAKERS & RECLOSERS (7)

04 - VOLTAGE REGULATORS & LTC (8)[illegible]

SUBSTATION - V&O INSPECTION REPORTSubstation BarronInspected By Jim ThibaultSheet of Date 07/01/15**TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Desig	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
10L1		+1	✓	High	80	50			H			
10L2		+2	✓	25	40	30						
10L4		+1	✓	25	58	50						

08 - CAPACITORS (10)

Circuit Design	Sw Pos	Counters		Control Operation	Time Clock			Bulldges	Leak*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												Grounded

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Milliamps	Counter	Milliamps	Counter	Milliamps		
											N/A

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Preload	Error	Closed	Open	Auto	Manual	Gas Ind	Checklist	Remarks
2393	609											
2353												NO Counter
24	543											

06 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Olig	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			
														N/A

REMARKS:

CHECKLIST

BUSESSES

LINE TRAPS/REACTORS

CABLE & TERMINATIONS

INSTRUMENT TRANSFORMER
(CT, PT, OCTV)

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment) <i>Trees on west side of sub are tall enough to fall into equipment. Insulators on the 10kV structure are flashed burn.</i>					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>Jim Thibault</u>					

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron AveDate: 07/01/15**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4 "	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

602

Note in red any appearance of

Leaks * C = Clean L = Leaks
R = Repaired M = Moderate Leaks

000089

SUBSTATION - V&O INSPECTION REPORTSubstation BARON AVE Inspected By M. PARKER Sheet of Date 5-15-15**TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Design	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
10 L 2		+ 1	✓	40°					25	✓		
10 L 1		+ 1	✓	45°					30	✓	LEVEL IS EXIMATE	
10 L 4		0	✓	48°					25	✓	EXISTING LEAK w/AD	

08 - CAPACITORS (10)

Circuit Design	Sw Pos	Counters		Control Operation	Time Clock			Bulldges	Leak	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Milliamps	Counter	Milliamps	Counter	Milliamps		

08 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Preload	Eject	Closed	Open	Auto	Manual	Gas Ind	Checked	Remarks
2393AB		✓				✓						
24AB		✓				✓						
2353AB		✓				✓						

08 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq'l Ong	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS: * 10L4 circuit breaker shows alarm, control is non responsive. spoke w/mike Cooper at control He shows no trouble but says control disconnected.

* * * GAD nest in structure above 10L4
* * * Bird nest above 10L1 xfmr on structure.

CHECKLIST

BUSES

LINE TRAPS/REACTORS

CABLE & TERMINATIONS

INSTRUMENT TRANSFORMER
(CT, PT, CCVT)

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>M. PARKER</u>					

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 5/15/15**MS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4 "	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

123-2.00.1 9.02

Note in red any amendments

01 - CIRCUIT BREAKERS & RECLOSERS (7)

04 - VOLTAGE REGULATORS & LTC (8)

000093

SUBSTATION - V&O INSPECTION REPORTSubstation BARON Ave

Inspected By _____

Sheet _____ of _____

Date 2-19-15**02 - TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Desig	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
10L1		+1	✓	30		NA			25	C		
10L2		0	✓	42		27			25	C		
10L3 4		0	✓	50		NA			25	C		

08 - CAPACITORS (10)

Circuit Design	Sw Pos	Counters		Control Operation	Time Clock			Buidges	Leads*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Millamps	Counter	Millamps	Counter	Millamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Preferred	Emer	Closed	Open	Auto	Manual	Gas Ind	Checklist	Remarks
2393AB		✓				✓		✓				
24AB		✓				✓		✓				
2353AB		✓				✓		✓				

06 - BATTERIES & CHARGERS (4)

Rel No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Chg	Checklist	Remarks
		Cell #	Temp	Spgr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

CHECKLISTBUSES ✓LINE TRAP&REACTORS ✓CABLE & TERMINATIONS ✓INSTRUMENT TRANSFORMER
(CT, PT, CCVT) ✓

Note in red any abnormalities

01 - CIRCUIT BREAKERS & RECLOSERS (7)

04 - VOLTAGE REGULATORS & LTC (8)

000095

SUBSTATION - V&O INSPECTION REPORTSubstation Brown Ave Inspected By DP VRS Sheet of Date 1-28-15**02 - TRANSFORMERS (9)** If Transformer is an LTC, note LTC operation under V.R. section

Circuit Desig	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks	
	Cylidr	Trans		Top Oil	WDG			Reset	Level			Leaks*
					H	X	Y					
10L1		1	✓	31					26	C		No Fan
10L2		-1	✓	41		41			25	C		
10L3		-1	✓	50					25	C		

08 - CAPACITORS (10)

Circuit Design	SW Pos	Counters		Control Operation	Time Clock			Bulldges	Leads*	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
1	✓	✓	At 1. closed	10 min					✓	✓		

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Diaphragm			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Millamps	Counter	Millamps	Counter	Millamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind											Checklist	Remarks
			Time	Reset	Preferred	Enter	Closed	Open	Auto	Manual	Gas Ind			
235315		✓							✓					
24106		✓							✓					
2353106		✓							✓					

06 - BATTERIES & CHARGERS (4)

Rel No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Chg	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

Fresh 2ft switch**CHECKLIST**BUSES LINE TRAPS/REACTORS CABLE & TERMINATIONS INSTRUMENT TRANSFORMER
(CT, PT, CVT)

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

8.8 Vegetation/Climbing Aids (not present)			
1	Trees, vegetation encroachment or growth	5	Other encroachments
2	Stored material (either side of fencing)	6	From outside perimeter fence/wall
3	Adjacent structures/buildings	7	From inside substation
4	Neighbors fences, walls, etc.		
8.9 Substation Bus and Structures			
1	Record missing or damaged animal guards	5	Visually inspect CTs & PTs for damage or overheating
2	Inspect insulators for damage, tracking, etc.	6	Listen for unusual noises and report if found
3	Visually inspect cable potheads and terminators		
4	Visually inspect arresters		
Comments/Corrective Action (note item number above, followed by comment)			
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	Inspect equipment and structure foundations
2	Inspect static wires	5	Inspect cableways
3	Inspect Station Service Transformers	6	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)			
Miscellaneous			
1	No signs of unauthorized entry	5	Yard Security Lighting working
2	Transgard Electric Fence, energized & secure	6	Unattended vehicles or equipment parked inside substation
3	Clean up substation yard of debris and trash	7	Oil filled apparatus must be inspected for leaks
4	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		
Comments/Corrective Action (note item number above, followed by comment)			
INSPECTED BY: _____			

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 1-28-15**ITEMS TO CHECK:**

- For items inspected, place $\checkmark$ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	Overall height of fence at least 7'	7	3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical
2	Fabric is taut	8	
3	Fabric attached to each post	9	Barbed wire (BW) strands intact (unbroken)
4	Post (metal) connected to ground grid	10	BW strands are taut
5	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	BW strands grounded/connected to ground grid
6	Tension wire or bar at bottom of fence fabric is secure and intact	12	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) 25' from fence			
8.3 Entrance Gates			
1	Gate sections grounded	6	Height: fabric + barbed wire $\geq$ 7'
2	Barbed wire grounded	7	Fabric taut
3	Gap between gate leafs & fence < 4"	8	Barbed wire - 3 strands, taut & grounded
4	Gap between gate leafs < 4 "	9	Locking mechanism on gate.
5	Gap between gate and ground < 4"	10	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)			
8.4 Substation Signs			
1	Safety signs are properly sized and meet ANSI Z535 specifications	6	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	Safety sign on main entrance gate	7	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	Safety signs are on all sides of substation		
4	Safety signs are properly spaced – 50 feet max		
5	Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 1-31-16**WHAT TO CHECK:**

- For items inspected, place ☒ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	☒ Overall height of fence at least 7'	7	☒ 3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical
2	☒ Fabric is taut	8	☒ Barbed wire (BW) strands intact (unbroken)
3	☒ Fabric attached to each post	9	☒ BW strands are taut
4	☒ Post (metal) connected to ground grid	10	☒ BW strands grounded/connected to ground grid
5	☒ Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	☒ Gap between bottom of fence and ground < 2"
6	☒ Tension wire or bar at bottom of fence fabric is secure and intact	12	
Comments/Corrective Action (note item number above, followed by comment) <i>4-11 No Visible Fence Ground or BW at Gates</i>			

8.3 Entrance Gates			
1	☒ Gate sections grounded	6	☒ Height: fabric + barbed wire $\geq$ 7'
2	☒ Barbed wire grounded	7	☒ Fabric taut
3	☒ Gap between gate leafs & fence < 4"	8	☒ Barbed wire - 3 strands, taut & grounded
4	☒ Gap between gate leafs < 4"	9	☒ Locking mechanism on gate.
5	☒ Gap between gate and ground < 4"	10	☒ Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) <i>1-2 Gates + BW Ground not visible</i>			

8.4 Substation Signs			
1	☒ Safety signs are properly sized and meet ANSI Z535 specifications	6	☒ Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	☒ Safety sign on main entrance gate		
3	☒ Safety signs are on all sides of substation	7	☒ Signs are easily readable (not faded, damaged or inside of fence fabric)
4	☒ Safety signs are properly spaced – 50 feet max		
5	☒ Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)			
1	Trees, vegetation encroachment or growth	5	Other encroachments
2	Stored material (either side of fencing)	6	From outside perimeter fence/wall
3	Adjacent structures/buildings	7	From inside substation
4	Neighbors fences, walls, etc.		
8.9 Substation Bus and Structures			
1	Record missing or damaged animal guards	5	Visually inspect CTs & PTs for damage or overheating
2	Inspect insulators for damage, tracking, etc.		
3	Visually inspect cable potheads and terminators	6	Listen for unusual noises and report if found
4	Visually inspect arresters		
Comments/Corrective Action (note item number above, followed by comment)			
1 Vegetation surrounding sub 2 X Arms + switch gear stored inside fence			
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	Inspect equipment and structure foundations
2	Inspect static wires	5	Inspect cableways
3	Inspect Station Service Transformers	6	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)			
SSI x FOUR no animal guards			
Miscellaneous			
1	No signs of unauthorized entry	5	Yard Security Lighting working
2	Transgard Electric Fence, energized & secure	6	Unattended vehicles or equipment parked inside substation
3	Clean up substation yard of debris and trash	7	Oil filled apparatus must be inspected for leaks
4	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		
Comments/Corrective Action (note item number above, followed by comment)			
INSPECTED BY: <u>Kelly</u>			

SUBSTATION - V&O INSPECTION REPORT

Substation Barton Ave Inspected By KL Sheet 1 of 1 Date 1-31-16

TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section

Circuit Design	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks
	Cylidr	Trans		Top Oil	WDG			Level	Leaks*		
					H	X	Y				
10L1	—	+1	✓	about 25°							Liquid Temp 35-35
10L2	—	+1	✓	25°	30	30					30-30
10L4	—	0	✓	25°							slow leak 40° 60°

08 - CAPACITORS (10)

Circuit Design	SW Pos	Controls		Control Operation	Time Clock			Bulldges	Leak	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												out of service couple blown fuses

19 - SURGE ARRESTERS (11)

Circuit Design	Relief Discharge			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Millamps	Counter	Millamps	Counter	Millamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Clock	Check List	Check List	Check List	Check List	Check List	Check List	Check List	Check List	Remarks
2353							X		X			
24								X	X			
2393							X		X			

06 - BATTERIES & CHARGERS (4)

Rel No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eq Ong	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

10L2 XFMR - No Annunciator It's
Working

CHECKLIST

BUSES

LINE TRAPS/REACTORS

CABLE & TERMINATIONS

INSTRUMENT TRANSFORMER
(OT, PT, COVT)☒
☒
☒
☒

01 - CIRCUIT BREAKERS & RECLOSERS (7)

04 - VOLTAGE REGULATORS & LTO (8)

[illegible]

Will need to test battery

SUBSTATION - V&O INSPECTION REPORTSubstation LARROW AUC Inspected By M. PARKER Sheet 1 of 1 Date 2-25-16**TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section**

Circuit Design	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checked	Remarks	
	Cylidr	Trans		Top Oil	WDG			Pressure	Level			Leaks*
					H	X	Y					
10L4		0	✓	25L°	45/50					Y	OLD LEAK (WEARING)	
10L2		0	✓	25L	45/50 30/50	Wind 30/30			Y	N		
10L1		+1		30L	45/50 35/35				Y	N	WET WELDS ON CYL	

08 - CAPACITORS (10)

Circuit Design	Sw Pos	Controls		Control Operation	Time Clock			Bridges	Leads	Fuses	Checklist	Remarks
		Controls	Switch		Indicating	Actual	Current					
C1		002784										locked out + grounded @ STRUCTURE

10 - SURGE ARRESTERS (11)

Circuit Design	Relay Diagram			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Millamps	Counter	Millamps	Counter	Millamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Close Elect	Open Elect	Close Open	Auto	Manual	Close Ind	Checklist	Remarks
2355										CLOSED
2393										CLOSED
24										OPEN
12										CLOSED

06 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Bq1 Chg	Checklist	Remarks
		Cell #	Temp	Sp gr	Volta	Load Amps	Float Voltage	P-G	N-G	Volta	Liq Lev			

REMARKS:

CHECKLIST

BUSSES _____
LINE TRAPS/REACTORS _____
CABLE & TERMINATIONS _____
INSTRUMENT TRANSFORMER
(OT, PT, COVT) _____

01 - CIRCUIT BREAKERS & REclosERS (7)

04 - VOLTAGE REGULATORS & LTC (8)

000104

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 2-29-16**WHAT TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	✓ Overall height of fence at least 7'	7	✓ 3 strands of barbed wire angled out @ approx. 45°
2	✓ Fabric is taut	8	(if possible) or vertical
3	✓ Fabric attached to each post	9	✓ Barbed wire (BW) strands intact (unbroken)
4	✓ Post (metal) connected to ground grid	10	✓ BW strands are taut
5	✓ Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓ BW strands grounded/connected to ground grid
6	✓ Tension wire or bar at bottom of fence fabric is secure and intact	12	✓ Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) No visible fence grounds			
8.3 Entrance Gates			
1	✓ Gate sections grounded	6	✓ Height: fabric + barbed wire ≥ 7'
2	✓ Barbed wire grounded	7	✓ Fabric taut
3	✓ Gap between gate leaves & fence < 4"	8	✓ Barbed wire - 3 strands, taut & grounded
4	✓ Gap between gate leaves < 4"	9	✓ Locking mechanism on gate.
5	✓ Gap between gate and ground < 4"	10	✓ Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) GAP BETWEEN FENCE AND GATE MORE THAN 4"			
8.4 Substation Signs			
1	✓ Safety signs are properly sized and meet ANSI Z535 specifications	6	✓ Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓ Safety sign on main entrance gate	7	✓ Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓ Safety signs are on all sides of substation		
4	✓ Safety signs are properly spaced – 50 feet max		
5	✓ Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)			
1	☒ Trees, vegetation encroachment or growth	5	☒ Other encroachments
2	☒ Stored material (either side of fencing)	6	☒ From outside perimeter fence/wall
3	☒ Adjacent structures/buildings	7	☒ From inside substation
4	☒ Neighbors fences, walls, etc.		
8.9 Substation Bus and Structures			
1	☐ Record missing or damaged animal guards	5	☐ Visually inspect CTs & PTs for damage or overheating
2	☐ Inspect insulators for damage, tracking, etc.	6	☐ Listen for unusual noises and report if found
3	☐ Visually inspect cable potheads and terminators		
4	☐ Visually inspect arresters		
Comments/Corrective Action (note item number above, followed by comment) OLD RISER CONDUIT STORED INSIDE FENCE. VEGETATION CLIPPINGS INSIDE FENCE. COILED WIRE INSIDE ANIMAL FENCE. CANS GROUNDING. * SSI XPMR MISSING ANIMAL GUARD.			
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	☒ Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒ Inspect equipment and structure foundations
2	☒ Inspect static wires	5	☒ Inspect cableways
3	☒ Inspect Station Service Transformers	6	☒ Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment) 			
Miscellaneous			
1	☒ No signs of unauthorized entry	5	☒ Yard Security Lighting working
2	☒ Transgard Electric Fence, energized & secure	6	☒ Unattended vehicles or equipment parked inside substation
3	☒ Clean up substation yard of debris and trash	7	☒ Oil filled apparatus must be inspected for leaks
4	☒ If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		
Comments/Corrective Action (note item number above, followed by comment) * VEG. CLIPPINGS INSIDE FENCED AREA. - SPARE SECTION OF ANIMAL FENCE IN YARD - ARMORED CONTROL WIRE LAYING ON GROUND NEXT TO CONTROL HOUSE.			
INSPECTED BY: <u>M. PARKER 2.25.16</u>			

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 4/26/16**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) <i>New part of fence allows easy climbing access inside sub.</i>					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leaves & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leaves < 4"	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) <i>grounds?</i>					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)			
1	☒ Trees, vegetation encroachment or growth	5	☒ Other encroachments
2	☒ Stored material (either side of fencing)	6	☒ From outside perimeter fence/wall
3	☒ Adjacent structures/buildings	7	☒ From inside substation
4	☒ Neighbors fences, walls, etc.		
8.9 Substation Bus and Structures			
1	☒ Record missing or damaged animal guards	5	☒ Visually inspect CTs & PTs for damage or overheating
2	☒ Inspect insulators for damage, tracking, etc.	6	☒ Listen for unusual noises and report if found
3	☒ Visually inspect cable potheads and terminators		
4	☒ Visually inspect arresters		
Comments/Corrective Action (note item number above, followed by comment) <i>Trees @ front fence</i>			
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	☒ Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒ Inspect equipment and structure foundations
2	☒ Inspect static wires	5	☒ Inspect cableways
3	☒ Inspect Station Service Transformers	6	☒ Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment) <i>Birds nest in frame in front of 10kV Trns.</i>			
Miscellaneous			
1	☒ No signs of unauthorized entry	5	☒ Yard Security Lighting working
2	☒ Transguard Electric Fence, energized & secure	6	☒ Unattended vehicles or equipment parked inside substation
3	☒ Clean up substation yard of debris and trash	7	☒ Oil filled apparatus must be inspected for leaks
4	☒ If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		
Comments/Corrective Action (note item number above, followed by comment)			
INSPECTED BY: <i>P. Blake / J. Thibault</i>			

SUBSTATION - V&O INSPECTION REPORT

Substation *Barton Ave*

Inspected By

Sheet *1* of *1*Date *4/26/16*

TRANSFORMERS (9) If Transformer is an LTC, note LTC operation under V.R. section

Circuit Desig	Nitro Press		Fans & Pumps	Temp ° C (max/ind)				Oil		Checklist	Remarks
	Cylidr	Trans		Top Oil	WDG			Level	Leaks°		
					H	X	Y				
10L1		+1	✓	38°	45			✓	✓		
10L2		-1	✓	30°	40			✓	✓		
10L4		-1	✓	40°	50°						

08 - CAPACITORS (10)

Circuit Desig	SW Pos	Controls		Control Operation	Time Clock			Bridges	Leak ^s	Fuses	Character	Remarks
		Controls	Switch		Indicating	Actual	Correct					
												off line / grounded

19 - SURGE ARRESTERS (11)

Circuit Design	Relay Diagram			A phase		B phase		C phase		Checklist	Remarks
	A	B	C	Counter	Millamps	Counter	Millamps	Counter	Millamps		

09 - MOTOR OPERATED DISCONNECTS AND CIRCUIT SWITCHERS (12)

Circuit Design	Counters	Live Line Ind	Time Reset	Trip Reset	Close	Open	Auto	Manual	Gas Ind	Checklist	Remarks
<i>24</i>	<i>547</i>					<i>✓</i>					
<i>2353</i>						<i>✓</i>					
<i>2393</i>	<i>610</i>					<i>✓</i>					

06 - BATTERIES & CHARGERS (4)

Ref No/ Design	Voltage Rating	Pilot Cell				Charger		Grounds		Over All		Eqg Ong	Checklist	Remarks
		Cell #	Temp	Sp gr	Volts	Load Amps	Float Voltage	P-G	N-G	Volts	Liq Lev			

REMARKS:

CHECKLIST

BUSSES _____
LINE TRAPS/REACTORS _____
CABLE & TERMINATIONS _____
INSTRUMENT TRANSFORMER
(OT, PT, OCTV) _____

01 - CIRCUIT BREAKERS & REclosERS (7)

04 - VOLTAGE REGULATORS & LTC (8)

cracked face counts	
stars	

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 5-31-16**IS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(if possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) BW strands are loose around yard Grounds aren't visible on fence					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leaves & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leaves < 4"	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) Ground not visible on gate BW strands are loose on gate					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
Trees, vegetation are growing over and through fence New fence is a easy climbing aid Missing animal guard on 551 Transformer					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Couple bird nests in structure					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>CLB</u>					

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *C. Calk*

Date: *5-31-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	<i>S</i>	Control Panels	<i>S</i>	Station Alarms	<i>S</i>
Annunciators	<i>S</i>	Tags and Switching Order	<i>S</i>	Lighting	<i>S</i>
Heaters/Fans/Vents	<i>S</i>	Station Service and Transfer	<i>Norm</i>	Heavy Duty Grounds	<i>S</i>
Switch Sticks	<i>S</i>	Fire Extinguisher	<i>S</i>	SPCC Plan	<i>S</i>
Phone List	<i>S</i>	Eye Wash	<i>NA</i>	Clean & General Condition	<i>S</i>
Ambient Temperature	<i>72°</i>	Control House temperature	<i>72°</i>		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *N/A*

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
<i>C1</i>	<i>OPEN</i>										

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	686	S	S			Closed	N/A	N/A	S
10L2	96/163	S	S	25.1	26.7	Closed	N/A	N/A	S
10L4	4/85	S	S	25.4	26.9	Closed	N/A	N/A	S

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING DAMAGE	S, S, S	FANS & PUMPS	S, S, S	PRESSURE RELIEF	S, S, S
BUSHING OIL LEVEL	S, U, S	CABINET HEATER	S, S, S	NOISE LEVEL	S, S, S
TANK GROUNDS	S, S, S	CABINET VENTS	N/A, N/A, N/A	ARRESTORS	S, S, S

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+1	63°	63°	✓	N/A	N/A	N/A	35°	C	oil level
10T2	+1	50°	40°	✓	52°	40°	✓	26°	C	
10T4	+1	56°	48°	✓	N/A	N/A	N/A	26°	W	

COMMENTS:

10T2 Bushing oil is below half on sight glass

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S, S, S</u>	CABINET CONDITION	<u>U, S, U</u>
TANK GROUNDS	<u>S, S, S</u>	ARRESTERS	<u>S, S, S</u>
NOISE LEVEL	<u>S, S, S</u>	ANIMAL GUARDS	<u>S, S, S</u>

Regulator Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.6	109918	-16	-1	✓	good	Clear	C
10L1	Ø B	120.9	252380	-16	0	✓	good	Clear	C
10L1	Ø C	120.5	179363	-16	-1	✓	good	Clear	C
10L2	Ø A	120	131992	-16	0	✓	good	Clear	C
10L2	Ø B	120.2	080723	-16	-1	✓	good	Clear	C
10L2	Ø C	119.9	133372	-16	-1	✓	good	Clear	C
10L4	Ø A	123.4	413908	-9	+2	✓	N/A	N/A	C
10L4	Ø B	124.4	536041	-8	+2	✓	N/A	N/A	C
10L4	Ø C	119.6	443274	-6	-1	✓	N/A	N/A	C

COMMENTS:

10L1, 10L4 need new control boxes

Mod and Switches

2353	N/A	Closed	open	Auto	Manual
24	547	✓	✓	✓	✓
12	N/A	✓			✓
2393	610	✓		✓	

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 6-29-16**IS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(If possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) Barbed wire strands on fence are loose around yard Ground aren't visible on fence					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leafs & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leafs < 4"	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) Grounds aren't visible on gate Barbed wire strands on gate are loose					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
Trees, vegetation are growing over and through fence New fence is a easy climbing aid Station transformer SS is missing animal guard					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>C Cook</u>					

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *C Cook*

Date: *6-24-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	<i>S</i>	Control Panels	<i>S</i>	Station Alarms	<i>S</i>
Annunciators	<i>S</i>	Tags and Switching Order	<i>S</i>	Lighting	<i>S</i>
Heaters/Fans/Vents	<i>S</i>	Station Service and Transfer	Norm	Emer	<i>S</i>
Switch Sticks	<i>S</i>	Fire Extinguisher	<i>S</i>	Heavy Duty Grounds	<i>S</i>
Phone List	<i>S</i>	Eye Wash	<i>N/A</i>	SPCC Plan	<i>S</i>
Ambient Temperature	<i>71°</i>	Control House temperature	<i>71°</i>	Clean & General Condition	<i>S</i>

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *N/A*

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open										

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	686	S	S		25	Closed	N/A	N/A	S
10L2	163	S	S	25	26.8	Closed	N/A	N/A	S
10L4	85	S	S	25	26.6	Closed	N/A	N/A	S

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S/S</u>	FANS & PUMPS	<u>S/S</u>	PRESSURE RELIEF	<u>S/S</u>
BUSHING OIL LEVEL	<u>205</u>	CABINET HEATER	<u>S/S</u>	NOISE LEVEL	<u>205</u>
TANK GROUNDS	<u>S/S</u>	CABINET VENTS	<u>N/A N/A N/A</u>	ARRESTORS	<u>205</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+2	62°	62°	✓	N/A	N/A	N/A	205	C	Oil level
10T2	+2	50°	40°	✓	49°	40°	✓	205	C	
10T4	0	50°	40°	✓	N/A	N/A	N/A	205	W	

COMMENTS:

10T2 Max Winding Temp is below half of 300°F

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S, S, S</u>	CABINET CONDITION	<u>U, S, U</u>
TANK GROUNDS	<u>S, S, S</u>	ARRESTERS	<u>S, S, S</u>
NOISE LEVEL	<u>S, S, S</u>	ANIMAL GUARDS	<u>S, S, S</u>

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.6	110659	-10	+2	✓	good	Clear	C
10L1	Ø B	120.1	253059	-8	+2	✓	good	Clear	C
10L1	Ø C	120.2	180072	-9	+2	✓	Good	Clear	C
10L2	Ø A	120.4	132779	-12	-1	✓	good	Clear	C
10L2	Ø B	120.4	081484	-12	-1	✓	good	Clear	C
10L2	Ø C	120.4	134155	-12	-1	✓	Good	Clear	C
10L4	Ø A	122.8	414112	-4	+4	✓	N/A	N/A	C
10L4	Ø B	123.4	536244	-3	+4	✓	N/A	N/A	C
10L4	Ø C	119.3	443274	-2	-2	✓	N/A	N/A	C

COMMENTS:

10L1, 10L4 need new control boxes

M/G and Switches

	Counter	Closed	Open	Auto	Manual
2383	N/A	✓		✓	
24	547		✓		✓
12	N/A	✓			✓
2393	610	✓		✓	

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 7-31-16**AS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence					
1	✓	Overall height of fence at least 7'	7	✓	3 strands of barbed wire angled out @ approx. 45°
2	✓	Fabric is taut	8	✓	(If possible) or vertical
3	✓	Fabric attached to each post	9	✓	Barbed wire (BW) strands intact (unbroken)
4	✓	Post (metal) connected to ground grid	10	✓	BW strands are taut
5	✓	Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓	BW strands grounded/connected to ground grid
6	✓	Tension wire or bar at bottom of fence fabric is secure and intact	12	✓	Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment) BW Loose around yard GRD'S not visible on fence					
8.3 Entrance Gates					
1	✓	Gate sections grounded	6	✓	Height: fabric + barbed wire ≥ 7'
2	✓	Barbed wire grounded	7	✓	Fabric taut
3	✓	Gap between gate leaves & fence < 4"	8	✓	Barbed wire - 3 strands, taut & grounded
4	✓	Gap between gate leaves < 4"	9	✓	Locking mechanism on gate.
5	✓	Gap between gate and ground < 4"	10	✓	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) GRD'S not visible on gate BW loose on Gate Gap at Walk in Gate > 4"					
8.4 Substation Signs					
1	✓	Safety signs are properly sized and meet ANSI Z535 specifications	6	✓	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓	Safety sign on main entrance gate	7	✓	Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓	Safety signs are on all sides of substation			
4	✓	Safety signs are properly spaced – 50 feet max			
5	✓	Company sign and phone # on entrance gate			
Comments/Corrective Action (note item number above, followed by comment)					

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)			
1	✓ Trees, vegetation encroachment or growth	5	✓ Other encroachments
2	✓ Stored material (either side of fencing)	6	✓ From outside perimeter fence/wall
3	✓ Adjacent structures/buildings	7	✓ From inside substation
4	✓ Neighbors fences, walls, etc.		

8.9 Substation Bus and Structures			
1	✓ Record missing or damaged animal guards	5	✓ Visually inspect CTs & PTs for damage or overheating
2	✓ Inspect insulators for damage, tracking, etc.	6	✓ Listen for unusual noises and report if found
3	✓ Visually inspect cable potheads and terminators		
4	✓ Visually inspect arresters		

Comments/Corrective Action (note item number above, followed by comment)

Trees too close to fence
New fence is climbing
551 XFRM missing Animal Guard

8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	✓ Inspect Ground Connections to Apparatus, Structures, and guy wires	4	✓ Inspect equipment and structure foundations
2	✓ Inspect static wires	5	✓ Inspect cableways
3	✓ Inspect Station Service Transformers	6	✓ Inspect junction boxes, structures for paint condition

Comments/Corrective Action (note item number above, followed by comment)

Miscellaneous			
1	✓ No signs of unauthorized entry	5	✓ Yard Security Lighting working
2	✓ Transgard Electric Fence, energized & secure	6	✓ Unattended vehicles or equipment parked inside substation
3	✓ Clean up substation yard of debris and trash	7	✓ Oil filled apparatus must be inspected for leaks
4	✓ If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		

Comments/Corrective Action (note item number above, followed by comment)

INSPECTED BY: KLang

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: **KL**

Date: **7-30-16**

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	S	Control Panels	S	Station Alarms	S
Annunciators	S	Tags and Switching Order	S	Lighting	S
Heaters/Fans/Vents	S	Station Service and Transfer	(Norm)	Emer	S
Switch Sticks	S	Fire Extinguisher	S	SPCC Plan	S
Phone List	S	Eye Wash	N/A	Clean & General Condition	S
Ambient Temperature	70	Control House temperature	80		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage S Grounds S Animal Guards N/A

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open										

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	280	S	S		24.8	Closed	N/A	N/A	✓
10L2	163	S	S			Closed	N/A	N/A	✓
10L4	85	S	S			Closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>SSS</u>	FANS & PUMPS	<u>SSS</u>	PRESSURE RELIEF	<u>SSS</u>
BUSHING OIL LEVEL	<u>SUS</u>	CABINET HEATER	<u>SSS</u>	NOISE LEVEL	<u>SSS</u>
TANK GROUNDS	<u>SSS</u>	CABINET VENTS	<u>N/A</u>	ARRESTORS	<u>SSS</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	41	61	34	✓	N/A	N/A	N/A	✓	C	0.760/1.5
10T2	4.5	60	40	✓	58	40	✓	✓	L	
10T4	4.5	50	40	✓	N/A	N/A	N/A	✓	C	

COMMENTS:

10T2 bushing oil level low

10T2 Annunciator R1 do not light

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>SSS</u>	CABINET CONDITION	<u>SSU</u>
TANK GROUNDS	<u>SSS</u>	ARRESTERS	<u>SSS</u>
NOISE LEVEL	<u>SSS</u>	ANIMAL GUARDS	<u>SSS</u>

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/Dark)	Oil Leaks*
10L1	Ø A	120.1	111541	-8	+4	✓	G	Dark	C
10L1	Ø B	121	353965	-8	+3	✓	G	Dark	C
10L1	Ø C	120.3	180960	-8	+4	✓	G	Dark	C
10L2	Ø A	120.8	133805	-12	+4	✓	G	Amber	C
10L2	Ø B	120.9	82456	-11	+4	✓	G	Amber	C
10L2	Ø C	120.8	135137	-11	+4	✓	G	Amber	C
10L4	Ø A	123.7	414409	-2	+4	✓	N/A	N/A	C
10L4	Ø B	123.9	536523	-2	+4	✓	N/A	N/A	C
10L4	Ø C	121.4	443274	-2	-2	✓	N/A	N/A	C

COMMENTS:

10L1, 10L4 need new control boxes
 10L4 CØ had not moved since last reset ??
 2 Bird nest in structure above 10L4
 MOD + switches

Counter	closed	open	Auto	Manual
2353	N/A	✓	✓	
24			✓	
12	N/A	✓		✓
2393		✓	✓	

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 8-27-16**ITEMS TO CHECK:**

- For items inspected, place ✓ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	✓ Overall height of fence at least 7'	7	✓ 3 strands of barbed wire angled out @ approx. 45°
2	✓ Fabric is taut	8	✓ (if possible) or vertical
3	✓ Fabric attached to each post	9	✓ Barbed wire (BW) strands intact (unbroken)
4	✓ Post (metal) connected to ground grid	10	✓ BW strands are taut
5	✓ Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	✓ BW strands grounded/connected to ground grid
6	✓ Tension wire or bar at bottom of fence fabric is secure and intact	12	✓ Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)			
8.3 Entrance Gates			
1	– Gate sections grounded	6	Height: fabric + barbed wire ≥ 7'
2	Barbed wire grounded	7	Fabric taut
3	Gap between gate leafs & fence < 4"	8	Barbed wire - 3 strands, taut & grounded
4	Gap between gate leafs < 4"	9	Locking mechanism on gate.
5	Gap between gate and ground < 4"	10	Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)			
No Visible Grounds on Fence - Gates or BW			
8.4 Substation Signs			
1	✓ Safety signs are properly sized and meet ANSI Z535 specifications	6	✓ Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	✓ Safety sign on main entrance gate	7	✓ Signs are easily readable (not faded, damaged or inside of fence fabric)
3	✓ Safety signs are on all sides of substation		
4	✓ Safety signs are properly spaced – 50 feet max		
5	✓ Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)			
1	☒ Trees, vegetation encroachment or growth	5	☒ Other encroachments
2	☒ Stored material (either side of fencing)	6	☒ From outside perimeter fence/wall
3	☒ Adjacent structures/buildings	7	☒ From inside substation
4	☒ Neighbors fences, walls, etc.		
8.9 Substation Bus and Structures			
1	☒ Record missing or damaged animal guards	5	☒ Visually inspect CTs & PTs for damage or overheating
2	☒ Inspect insulators for damage, tracking, etc.	6	☒ Listen for unusual noises and report if found
3	☒ Visually inspect cable potheads and terminators		
4	☒ Visually inspect arresters		
Comments/Corrective Action (note item number above, followed by comment) Trees too close to Fence Wood Fence is climbing Aid SSI XFMR missing Animal Guard			
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)			
1	☒ Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒ Inspect equipment and structure foundations
2	☒ Inspect static wires	5	☒ Inspect cableways
3	☒ Inspect Station Service Transformers	6	☒ Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)			
Miscellaneous			
1	☒ No signs of unauthorized entry	5	☒ Yard Security Lighting working
2	☒ Transgard Electric Fence, energized & secure	6	☒ Unattended vehicles or equipment parked inside substation
3	☒ Clean up substation yard of debris and trash	7	☒ Oil filled apparatus must be inspected for leaks
4	☒ If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.		
Comments/Corrective Action (note item number above, followed by comment)			
INSPECTED BY: <u>Klang</u>			

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *Kevin Lang*

Date: *8-27-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	N/A	Station Alarms	
Annunciators	N/A	Tags and Switching Order	N/A	Lighting	
Heaters/Fans/Vents	N/A	Station Service and Transfer	Norm	Heavy Duty Grounds	
Switch Sticks		Fire Extinguisher	✓	SPCC Plan	
Phone List	✓	Eye Wash		Clean & General Condition	
Ambient Temperature	85	Control House temperature	100		

COMMENTS: *Fire Ext out of date - gauge reads overcharge*

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *N/A*

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	?	1784		✓					S	L	S

COMMENTS:

1 Fuse not connected?

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	686	S	S		24.8	Closed	N/A	N/A	✓
10L2	164	S	S			Closed	N/A	N/A	✓
10L4	87	S	S			Closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S</u>	FANS & PUMPS	<u>S</u>	PRESSURE RELIEF	<u>S</u>
BUSHING OIL LEVEL	<u>U</u>	CABINET HEATER	<u>S</u>	NOISE LEVEL	<u>S</u>
TANK GROUNDS	<u>S</u>	CABINET VENTS	<u>S</u>	ARRESTORS	<u>S</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments	
		MAX	INST	Reset	MAX	INST	Reset				
10T1	+1	62	62	8000	N/A	N/A	N/A	225	C		
10T2	+1.5	62	52	✓	60	50	✓	25	C		
10T4	+1.5	60	55	✓	N/A	N/A	N/A	25	U	10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000	

COMMENTS:

ANNUNCIATORS for 10T2 not done yet
Bird Nest above 10T1 - REPAIR
10T2
10L2 Oil level - Brown/1 milking



Substation Monthly Visual and Operational (V&O) Inspection Sheet

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING CONDITION

S

CABINET CONDITION

S

TANK GROUNDS

S

ARRESTERS

S

NOISE LEVEL

S

ANIMAL GUARDS

S

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	121.4	112304	-8	+5	✓	G	Dark	C
10L1	Ø B	121.0	254931	-8	+6	✓	G	Dark	C
10L1	Ø C	120.8	181716	-8	+4	✓	G	Dark	C
10L2	Ø A	122.0	134687	-10	+6	✓	G	Amber	C
10L2	Ø B	121.8	82971	-10	+4	✓	G	Amber	C
10L2	Ø C	121.6	135978	-10	+6	✓	G	Amber	C
10L4	Ø A	122.9	414657	-4	+4	✓	N/A	N/A	N/A
10L4	Ø B	123.7	536747	-3	+4	✓	N/A	N/A	N/A
10L4	Ø C	121.6	443394	-6	+1	✓	N/A	N/A	N/A

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *Kevin Lang*

Date: *10-30-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	<i>S</i>	Control Panels	<i>-</i>	Station Alarms	<i>-</i>
Annunciators	<i>-</i>	Tags and Switching Order	<i>S</i>	Lighting	<i>S</i>
Heaters/Fans/Vents	<i>-</i>	Station Service and Transfer	<i>Normal</i>	Heavy Duty Grounds	<i>S</i>
Switch Sticks	<i>S</i>	Fire Extinguisher	<i>S</i>	SPCC Plan	<i>S</i>
Phone List	<i>S</i>	Eye Wash	<i>-</i>	Clean & General Condition	<i>S</i>
Ambient Temperature	<i>55</i>	Control House temperature	<i>55</i>		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *-*

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
<i>C1</i>	<i>Open?</i>								<i>S</i>	<i>S</i>	<i>S</i>

COMMENTS:

1 unit not connected?

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	686	S	S			Closed	N/A	N/A	✓
10L2	164	S	S			Closed	N/A	N/A	✓
10L4	27	S	S			Closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>SSS</u>	FANS & PUMPS	<u>SSS</u>	PRESSURE RELIEF	
BUSHING OIL LEVEL	<u>SSS</u>	CABINET HEATER	<u>SS</u>	NOISE LEVEL	<u>SSS</u>
TANK GROUNDS	<u>SSS</u>	CABINET VENTS	<u>SS</u>	ARRESTORS	<u>SSS</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	4.5	62	58	✓	—	—	—	✓	C	
10T2	4.5	42	33	✓	40	30	✓	✓	C	
10T4	0	50	45	✓	—	—	—	✓	W	

COMMENTS:

10T1 Fan Running - Auto?

10T2 Arrived about 10°C low on work
Reset to 10°C (Reset 10°C)

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	S	S	S	CABINET CONDITION	S	S	S
TANK GROUNDS	S	S	S	ARRESTERS	-	-	-
NOISE LEVEL	S	S	S	ANIMAL GUARDS	S	S	S

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.6	113366	-12	-5	✓	G	D	L
10L1	Ø B	120.3	256590	-12	-3	✓	G	A	L
10L1	Ø C	119.8	182757	-12	-4	✓	G	D	L
10L2	Ø A	120.3	135901	-13	-6	✓	G	A	L
10L2	Ø B	120.5	83286	-15	-6	✓	G	A	L
10L2	Ø C	120	137175	-14	-6	✓	G	A	L
10L4	Ø A	122.7	444992	-3	0	✓	-	-	L
10L4	Ø B	123.2	537022	-3	-1	✓	-	-	L
10L4	Ø C	121.7	447378	-5	-3	✓	-	-	L

COMMENTS:

Substation Yard Visual and Operational (V&O) Inspection ChecklistSubstation: Barron Ave Date: 10-30-16**ITEMS TO CHECK:**

- For items inspected, place ☒ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	☒ Overall height of fence at least 7'	7	☒ 3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical
2	☒ Fabric is taut	8	☒ Barbed wire (BW) strands intact (unbroken)
3	☒ Fabric attached to each post	9	☒ BW strands are taut
4	☒ Post (metal) connected to ground grid	10	☒ BW strands grounded/connected to ground grid
5	☒ Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	☒ Gap between bottom of fence and ground < 2"
6	☒ Tension wire or bar at bottom of fence fabric is secure and intact	12	
Comments/Corrective Action (note item number above, followed by comment) 11 - BW not visibly connected to GND			
8.3 Entrance Gates			
1	☒ Gate sections grounded	6	☒ Height: fabric + barbed wire $\geq$ 7'
2	☒ Barbed wire grounded	7	☒ Fabric taut
3	☒ Gap between gate leaves & fence < 4"	8	☒ Barbed wire - 3 strands, taut & grounded
4	☒ Gap between gate leaves < 4"	9	☒ Locking mechanism on gate.
5	☒ Gap between gate and ground < 4"	10	☒ Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment) 1, 2 - Gate leaves & BW not visibly grounded			
8.4 Substation Signs			
1	☒ Safety signs are properly sized and meet ANSI Z535 specifications	6	☒ Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	☒ Safety sign on main entrance gate	7	☒ Signs are easily readable (not faded, damaged or inside of fence fabric)
3	☒ Safety signs are on all sides of substation		
4	☒ Safety signs are properly spaced – 50 feet max		
5	☒ Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

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 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *Karen Long*

Date: *10-2-18*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	S	Control Panels	N/A	Station Alarms	
Annunciators	N/A	Tags and Switching Order	S	Lighting	S
Heaters/Fans/Vents	N/A	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	S
Switch Sticks	S	Fire Extinguisher	S	SPCC Plan	S
Phone List	S	Eye Wash	N/A	Clean & General Condition	S
Ambient Temperature	50	Control House temperature	50		

COMMENTS: *Fire Ext out of Date*

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *N/A*

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	<i>closed 2/18/18</i>								S	S	S

COMMENTS:

1. T12E Disconnected in CAP Bank

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	086	S	U		21.9	Closed	N/A	N/A	✓
10L2	164	S	S			Closed	N/A	N/A	✓
10L4	87	S	S			Closed	N/A	N/A	✓

COMMENTS:

10L1 Gen light didn't work on lamp test

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	333	FANS & PUMPS	333	PRESSURE RELIEF	333
BUSHING OIL LEVEL	333	CABINET HEATER	333	NOISE LEVEL	333
TANK GROUNDS	333	CABINET VENTS	333	ARRESTORS	333

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	0	52	62	✓	N/A	N/A	✓	✓	C	
10T2	0	55	30	✓	50	30	✓	✓	C	
10T4	0	55	40	✓	N/A	N/A	✓	✓	C	

COMMENTS:

10T1 Fan on unit - running - normal
10T2 - Bushing oil level low
- Annular seal - work on it



Substation Monthly Visual and Operational (V&O) Inspection Sheet

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING CONDITION

SS

CABINET CONDITION

SS

TANK GROUNDS

SS

ARRESTERS

SS

NOISE LEVEL

SS

ANIMAL GUARDS

SS

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1 4	Ø A	120.5	444862	-4	+2	✓	N/A	N/A	C
10L1 4	Ø B	123.7	536918	-3	+3	✓	N/A	N/A	C
10L1 4	Ø C	121.8	445666	-4	+1	✓	N/A	N/A	C
10L2	Ø A	122.6	135454	-10	+2	✓	G	A	C
10L2	Ø B	125.6	82971	0	0	✓	G	A	C
10L2	Ø C	120.5	136746	-10	+2	✓	G	C	C
10L4 1	Ø A	122.5	112993	-10	+5	✓	G	D	C
10L4 1	Ø B	121.4	358122	-8	+6	✓	G	A	C
10L4 1	Ø C	120.3	132388	-8	+4	✓	G	D	C

COMMENTS:

10L2 Ø A has not moved in 6 months

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

Substation: Barron Ave Date: 10-2-16

ITEMS TO CHECK:

- For items inspected, place ☒ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	☒	Overall height of fence at least 7'	
2	☒	Fabric is taut	
3	☒	Fabric attached to each post	
4	☒	Post (metal) connected to ground grid	
5	☒	Horizontal support bar or tension wire at top of fence fabric is secure and intact	
6	☒	Tension wire or bar at bottom of fence fabric is secure and intact	
7	☒	3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical	
8	☒	Barbed wire (BW) strands intact (unbroken)	
9	☒	BW strands are taut	
10	☒	BW strands grounded/connected to ground grid	
11	☒	Gap between bottom of fence and ground < 2"	
12	☒		

Comments/Corrective Action (note item number above, followed by comment)

8.3 Entrance Gates			
1	☒	Gate sections grounded	
2	☒	Barbed wire grounded	
3	☒	Gap between gate leafs & fence < 4"	
4	☒	Gap between gate leafs < 4 "	
5	☒	Gap between gate and ground < 4"	
6	☒	Height: fabric + barbed wire ≥ 7'	
7	☒	Fabric taut	
8	☒	Barbed wire - 3 strands, taut & grounded	
9	☒	Locking mechanism on gate.	
10	☒	Locking mechanism is not a climbing aid	

Comments/Corrective Action (note Item number above, followed by comment)

No visible birds on Fence - Gates - BW

8.4 Substation Signs			
1	☒	Safety signs are properly sized and meet ANSI Z535 specifications	
2	☒	Safety sign on main entrance gate	
3	☒	Safety signs are on all sides of substation	
4	☒	Safety signs are properly spaced – 50 feet max	
5	☒	Company sign and phone # on entrance gate	
6	☒	Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate	
7	☒	Signs are easily readable (not faded, damaged or inside of fence fabric)	

Comments/Corrective Action (note Item number above, followed by comment)

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)					
1	☒	Trees, vegetation encroachment or growth	5	☒	Other encroachments
2	☒	Stored material (either side of fencing)	6	☒	From outside perimeter fence/wall
3	☒	Adjacent structures/buildings	7	☒	From inside substation
4	☒	Neighbors fences, walls, etc.			
8.9 Substation Bus and Structures					
1	☒	Record missing or damaged animal guards	5	☒	Visually inspect CTs & PTs for damage or overheating
2	☒	Inspect insulators for damage, tracking, etc.	6	☒	Listen for unusual noises and report if found
3	☒	Visually inspect cable potheads and terminators			
4	☒	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
Trees too close to fence Wood Fence is a climbing aid SS1 - FMR missing animal guard					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	☒	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	☒	Inspect equipment and structure foundations
2	☒	Inspect static wires	5	☒	Inspect cableways
3	☒	Inspect Station Service Transformers	6	☒	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
Miscellaneous					
1	☒	No signs of unauthorized entry	5	☒	Yard Security Lighting working
2	☒	Transgard Electric Fence, energized & secure	6	☒	Unattended vehicles or equipment parked inside substation
3	☒	Clean up substation yard of debris and trash	7	☒	Oil filled apparatus must be inspected for leaks
4	☒	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>Kenneth</u>					

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *KL*

Date: *10-2-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book		Control Panels		Station Alarms	
Annunciators		Tags and Switching Order		Lighting	
Heaters/Fans/Vents		Station Service and Transfer	Norm Emer	Heavy Duty Grounds	
Switch Sticks		Fire Extinguisher		SPCC Plan	
Phone List		Eye Wash		Clean & General Condition	
Ambient Temperature		Control House temperature			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage _____ Grounds _____ Animal Guards _____

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1											

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	687				25.2	CL	N/A	N/A	✓
10L2	97			25.5	25.5	CC	N/A	N/A	✓
10L4	2				25.2	CL	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	S	FANS & PUMPS	S	PRESSURE RELIEF	S
BUSHING OIL LEVEL	S	CABINET HEATER	S	NOISE LEVEL	S
TANK GROUNDS	S	CABINET VENTS	S	ARRESTORS	S

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	0		58			0		30°	✓	
10T2	-1		30			28		25°	✓	
10T4	-1		40			0			✓	old leak

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S</u>
TANK GROUNDS	<u>S</u>
NOISE LEVEL	<u>S</u>
CABINET CONDITION	<u>S</u>
ARRESTERS	<u>S</u>
ANIMAL GUARDS	<u>S</u>

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120	113685	-10	-4	✓	G ✓	AM	N
10L1	Ø B	120	256896	-3	-8	✓	G	AM	N
10L1	Ø C	120	183100	-3	-8	✓	G	AM	N
10L2	Ø A	120.4	136293	-6	-11	✓	G	AM	N
10L2	Ø B	119.8	083673	-6	-12	✓	G	AM	N
10L2	Ø C	120.3	137533	-5	-11	✓	G	AM	N
10L4	Ø A	120	415109	+1	-4	✓	-	-	N
10L4	Ø B	120	537084	+1	-3	✓	-	-	N
10L4	Ø C	120	450818	-1	-6	✓	G	AM	N
COMMENTS:									

6/1/20

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

Substation: Barron Ave Date: 11-25-16

ITEMS TO CHECK:

- For items inspected, place ☒ in box following number for item
- If item does not apply – place NA in box

8.2 Walk and Inspect Perimeter Fence			
1	☒ Overall height of fence at least 7'	7	☒ 3 strands of barbed wire angled out @ approx. 45° (if possible) or vertical
2	☒ Fabric is taut	8	
3	☒ Fabric attached to each post	9	☒ Barbed wire (BW) strands intact (unbroken)
4	☒ Post (metal) connected to ground grid	10	☒ BW strands are taut
5	☒ Horizontal support bar or tension wire at top of fence fabric is secure and intact	11	☒ BW strands grounded/connected to ground grid
6	☒ Tension wire or bar at bottom of fence fabric is secure and intact	12	☒ Gap between bottom of fence and ground < 2"
Comments/Corrective Action (note item number above, followed by comment)			
8.3 Entrance Gates			
1	☒ Gate sections grounded	6	☒ Height: fabric + barbed wire $\geq$ 7'
2	☒ Barbed wire grounded	7	☒ Fabric taut
3	☒ Gap between gate leaves & fence < 4"	8	☒ Barbed wire - 3 strands, taut & grounded
4	☒ Gap between gate leaves < 4"	9	☒ Locking mechanism on gate.
5	☒ Gap between gate and ground < 4"	10	☒ Locking mechanism is not a climbing aid
Comments/Corrective Action (note item number above, followed by comment)			
8.4 Substation Signs			
1	☒ Safety signs are properly sized and meet ANSI Z535 specifications	6	☒ Sign w/ substation name/designation and emergency contact phone number on/near main entrance gate
2	☒ Safety sign on main entrance gate	7	☒ Signs are easily readable (not faded, damaged or inside of fence fabric)
3	☒ Safety signs are on all sides of substation		
4	☒ Safety signs are properly spaced – 50 feet max		
5	☒ Company sign and phone # on entrance gate		
Comments/Corrective Action (note item number above, followed by comment)			

Continued on reverse side

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

8.8 Vegetation/Climbing Aids (not present)					
1	/	Trees, vegetation encroachment or growth	5	/	Other encroachments
2	/	Stored material (either side of fencing)	6	/	From outside perimeter fence/wall
3	/	Adjacent structures/buildings	7	/	From inside substation
4	/	Neighbors fences, walls, etc.			
8.9 Substation Buses and Structures					
1	/	Record missing or damaged animal guards	5	/	Visually inspect CTs & PTs for damage or overheating
2	/	Inspect insulators for damage, tracking, etc.			
3	/	Visually inspect cable potheads and terminators	6	/	Listen for unusual noises and report if found
4	/	Visually inspect arresters			
Comments/Corrective Action (note item number above, followed by comment)					
8.10 Structures and Apparatus Ground Connections (8.11, 8.12, 8.13, & 8.14)					
1	/	Inspect Ground Connections to Apparatus, Structures, and guy wires	4	/	Inspect equipment and structure foundations
2	/	Inspect static wires	5	/	Inspect cableways
3	/	Inspect Station Service Transformers	6	/	Inspect junction boxes, structures for paint condition
Comments/Corrective Action (note item number above, followed by comment)					
SSI still missing 95.					
Miscellaneous					
1	/	No signs of unauthorized entry	5	/	Yard Security Lighting working
2	/	Transgard Electric Fence, energized & secure	6	/	Unattended vehicles or equipment parked inside substation
3	/	Clean up substation yard of debris and trash	7	/	Oil filled apparatus must be inspected for leaks
4	/	If laydown or storage area in yard or adjacent to substation make sure not a hazardous condition.			
Comments/Corrective Action (note item number above, followed by comment)					
INSPECTED BY: <u>Parker</u>					

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *Parker*

Date: *11-25-16*

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book		Control Panels		Station Alarms	
Annunciators		Tags and Switching Order		Lighting	
Heaters/Fans/Vents		Station Service and Transfer	Norm	Emer	Heavy Duty Grounds
Switch Sticks		Fire Extinguisher			SPCC Plan
Phone List		Eye Wash			Clean & General Condition
Ambient Temperature		Control House temperature			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *NA* Animal Guards

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1											

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1							N/A	N/A	
10L2							N/A	N/A	
10L4							N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	FANS & PUMPS	PRESSURE RELIEF
BUSHING OIL LEVEL	CABINET HEATER	NOISE LEVEL
TANK GROUNDS	CABINET VENTS	ARRESTORS

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1										
10T2										
10T4										

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Barron Substation: AF Inspected By: W/25/17 Date:

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	✓	Dead Animals	✓	Vandalism	✓
Station Alarms	✓	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	✓	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	✓	Ground Connections	✓	Warning Signs	✓
Preferred	✓	Evidence of Heating	✓	Yard Lights	✓
Alternate		Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness		Tracking	
Oil Level	✓	Support Insulators		Overheating	
Leaks	✓	Connections		Leaks	
Porcelain	✓	Concrete			
Overheating	✓	Winding Distortion			
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS: all demand they have floating past instantaneous

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	(Norm) Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	✓	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	✓		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open			✓		—			✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	Pass	27.2	closed	N/A	N/A	✓
10L2	164	✓	✓	Pass	27.1	closed	N/A	N/A	✓
10L4	91	✓	✓	Pass	26.2	closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	#1	50	50	✓				✓	C	C
10T2	~.5#	40	30	✓	41	30	✓	✓	✓	✓
10T4	0#	50	40	✓				✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION
TANK GROUNDS
NOISE LEVEL

✓
✓
✓

CABINET CONDITION
ARRESTERS
ANIMAL GUARDS

✓
✓
✓

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	121	115405	-11	-4		good	amber	
10L1	Ø B	120.7	258520	-8	-3		good	amber	
10L1	Ø C	121.1	184854	-8	-3		good	amber	
10L2	Ø A	120.5	138541	-11	-4	✓	good	clear	
10L2	Ø B	120.5	85463	-10	-5	✓	good	clear	
10L2	Ø C	120.4	139613	-11	-5	✓	good	clear	
10L4	Ø A	121.3	415738	-4	-10	✓			
10L4	Ø B	121.4	53833	-3	+4	✓			
10L4	Ø C	121.	465415	-6	+2	✓	good	clear	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Inspected By: SC Date: 7/24/17
 Ambient Temp: 73 ACROSS AVE Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	<u>S</u>	Dead Animals	<u>S</u>	Vandalism	<u>S</u>
Station Alarms	<u>S</u>	Avian/Bat Incident Report	<u>S</u>	Fence & Barbed Wire	<u>S</u>
Lighting	<u>S</u>	All Broken Porcelain	<u>S</u>	Gates	<u>S</u>
Heaters/Fans/Vents	<u>S</u>	Noise Level	<u>S</u>	Gate Locks/Chains	<u>S</u>
Station Service and Transfer	<u>S</u>	Ground Connections	<u>S</u>	Warning Signs	<u>S</u>
Preferred	<u>S</u>	Evidence of Heating	<u>S</u>	Yard Lights	<u>S</u>
Alternate	<u>S</u>	Disconnects, Switches & Fuses	<u>S</u>	Vegetation (Trees)	<u>S</u>
Fire Equipment	<u>S</u>	Station Service TRF	<u>S</u>	Vegetation (Weeds)	<u>S</u>
Clean & General Condition	<u>S</u>	Clean and General Condition	<u>S</u>	Vegetation (Vines)	<u>S</u>
		Switch Sticks	<u>S</u>	Any Danger to Public	<u>S</u>
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☒ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level		Cleanliness		Tracking	<u>S</u>
Oil Level		Support Insulators		Overheating	
Leaks		Connections		Leaks	
Porcelain		Concrete			
Overheating		Winding Distortion			
BUSSES ☐ NA					
Noise Level	<u>S</u>				
Overheating	<u>S</u>				
Insulators	<u>S</u>				
Structures	<u>S</u>				
Connections	<u>S</u>				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: SC

Date: 7/24/17

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	<u>S</u>	Control Panels	<u>S</u>	Station Alarms	<u>S</u>
Annunciators	<u>S</u>	Tags and Switching Order	<u>S</u>	Lighting	<u>S</u>
Heaters/Fans/Vents	<u>S</u>	Station Service and Transfer	<u>Norm</u>	Emer	<u>S</u>
Switch Sticks	<u>S</u>	Fire Extinguisher	<u>S</u>	SPCC Plan	<u>S</u>
Phone List	<u>S</u>	Eye Wash	<u>NA</u>	Clean & General Condition	<u>S</u>
Ambient Temperature	<u>S</u>	Control House temperature	<u>S</u>		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage S Grounds S Animal Guards NA

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	<u>OPEN</u>	<u>2748</u>		<u>✓</u>					<u>S</u>	<u>S</u>	<u>S</u>

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	689	BCG	S	23	23	Closed	N/A	N/A	7
10L2	164	NA	S	24.7	27	Closed	N/A	N/A	N
10L4				29.2	22.2	Closed	N/A	N/A	

COMMENTS: Check 10L1 Counter

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S</u>	FANS & PUMPS	<u>S</u>	PRESSURE RELIEF	<u>S</u>
BUSHING OIL LEVEL	<u>S</u>	CABINET HEATER	<u>S</u>	NOISE LEVEL	<u>S</u>
TANK GROUNDS	<u>S</u>	CABINET VENTS	<u>S</u>	ARRESTORS	<u>S</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	0	100°	65°	X	N/A			25°C	C	
10T2	0	55°	35°	Y	55°	35°	Y	25°C	C	
10T4	0	60°	45°	Y	N/A			25°C	W	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S</u>	CABINET CONDITION	<u>S</u>
TANK GROUNDS	<u>S</u>	ARRESTERS	<u>NA</u>
NOISE LEVEL	<u>S</u>	ANIMAL GUARDS	<u>S</u>

Regulator Test & Verification Worksheet										
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*	
10L1	Ø A	121.3	116929	-9	+4	-7	Y	GOOD	AMBER	C
10L1	Ø B	120	260066	-8	+4	-7	Y	GOOD	CLEAR	C
10L1	Ø C	120	186372	-8	+4	-6	Y	GOOD	AMBER	C
10L2	Ø A	120.2	140401	-10	+4	-9	Y	GOOD	CLEAR	C
10L2	Ø B		86145					GOOD	CLEAR	C
10L2	Ø C	120.5	141398	-16	+4	-8	Y	GOOD	CLEAR	C
10L4	Ø A	119.2	416369	-4	+3	-2	Y	NA		C
10L4	Ø B	123.6	538113	-3	+3	-1	Y	NA		C
10L4	Ø C	121	466358	-6	+1	-4	Y	GOOD	CLEAR	C

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: *Barison Ave* Substation: *AF* Inspected By: *AF* Date: *6/20/17*

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	☒	Dead Animals	☒	Vandalism	☒
Station Alarms	☒	Avian/Bat Incident Report	☒	Fence & Barbed Wire	☒
Lighting	☒	All Broken Porcelain	☒	Gates	☒
Heaters/Fans/Vents	☒	Noise Level	☒	Gate Locks/Chains	☒
Station Service and Transfer	☒	Ground Connections	☒	Warning Signs	☒
Preferred	☒	Evidence of Heating	☒	Yard Lights	☒
Alternate	☒	Disconnects, Switches & Fuses	☒	Vegetation (Trees)	☒
Fire Equipment	☒	Station Service TRF	☒	Vegetation (Weeds)	☒
Clean & General Condition	☒	Clean and General Condition	☒	Vegetation (Vines)	☒
		Switch Sticks	☒	Any Danger to Public	☒
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☐ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	☒	Cleanliness		Tracking	☒
Oil Level	☒	Support Insulators		Overheating	☒
Leaks	☒	Connections		Leaks	☒
Porcelain	☒	Concrete			
Overheating	☒	Winding Distortion			
BUSSES ☐ NA					
Noise Level	☒				
Overheating	☒				
Insulators	☒				
Structures	☒				
Connections	☒				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	✓	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	✓		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet										
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*
		Controls	Switch	Auto	Remote	Indicating	Actual			
C1	open 2764			✓					✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	688	✓	✓	23	25	closed	N/A	N/A	✓
10L2	164	✓	✓	25.5	26.7	closed	N/A	N/A	✓
10L4	91	✓	✓	25.4	26.9	closed	N/A	N/A	✓

COMMENTS: 10L1 needs replacement battery

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	7#	65	65	✓	—	—	—	✓	✓	✓
10T2	41#	59	45	✓	59	35	✓	✓	✓	✓
10T4	0#	60	50	✓	—	—	—	✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	✓
TANK GROUNDS	✓
NOISE LEVEL	✓
CABINET CONDITION	✓
ARRESTERS	✓
ANIMAL GUARDS	✓

Regulator Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	121.3	116261	-8	+7	-1	good	dark	✓
10L1	Ø B	120.6	259467	-8	+5	N	good	dark	✓
10L1	Ø C	120.9	185718	-8	+7	N	good	dark	✓
10L2	Ø A	121.4	139593	-11	+5	-2	good	amber	✓
10L2	Ø B	124.6	86145	-10	+2	+2	good	amber	✓
10L2	Ø C	121.1	140633	-10	+3	-3	good	amber	✓
10L4	Ø A	123.2	416124	-5	+3	+1	—	—	✓
10L4	Ø B	123.3	537878	-4	+3	+2	—	—	✓
10L4	Ø C	121.7	466051	-6	+1	-1	—	—	✓

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC:

Substation:

Inspected By:

AF

Date: 11/28/17

Ambient Temp:

BARBANE

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	✓	Dead Animals	✓	Vandalism	✓
Station Alarms	✓	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	✓	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	✓	Ground Connections	✓	Warning Signs	✓
Preferred	✓	Evidence of Heating	✓	Yard Lights	✓
Alternate		Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness		Tracking	
Oil Level	✓	Support Insulators		Overheating	
Leaks	✓	Connections		Leaks	
Porcelain	✓	Concrete			
Overheating	✓	Winding Distortion			
BUSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	✓	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	✓		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open			✓		✓			✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	693	✓	✓	20	24	Closed	N/A	N/A	
10L2	101	✓	✓	26	28	Closed	N/A	N/A	
10L4	9	✓	✓	20	27	Closed	N/A	N/A	

COMMENTS: Replaced Batteries on 10L1 Breaker

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	0#	45	30	✓	—	—	—	✓	✓	
10T2	-1#	37	25	✓	25/40	25	✓	✓	✓	
10T4	-2#	30	43	✓	—	—	—	✓	✓	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>✓</u>	CABINET CONDITION	<u>✓</u>
TANK GROUNDS	<u>✓</u>	ARRESTERS	<u>✓</u>
NOISE LEVEL	<u>✓</u>	ANIMAL GUARDS	<u>✓</u>

Regulator Test & Verification Worksheet
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Max	Present	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	121	118696	-16	-5	+2	✓	good	amber	✓
10L1	Ø B	120.6	262709	-13	-5	+2	✓	good	amber	✓
10L1	Ø C	120	188137	-16	-5	+2	✓	good	amber	✓
10L2	Ø A	120	97999	-16	-8	+2	✓	good	amber	✓
10L2	Ø B	120.9	142830	-18	-8	+7	✓	good	amber	✓
10L2	Ø C	120.7	143738	-16	-8	+7	✓	good	amber	✓
10L4	Ø A	121.1	119696	-16	-8	+16	✓	good	amber	✓
10L4	Ø B	120.6	262709	-13	-5	+2	✓	good	amber	✓
10L4	Ø C	120	188137	-16	-5	+2	✓	good	amber	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Barron Ave Substation: AF/KC Inspected By: 3/31/17 Date: 3/31/17

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	<u>NA</u>	Dead Animals	<u>✓</u>	Vandalism	<u>✓</u>
Station Alarms	<u>✓</u>	Avian/Bat Incident Report	<u>✓</u>	Fence & Barbed Wire	<u>✓</u>
Lighting	<u>✓</u>	All Broken Porcelain	<u>✓</u>	Gates	<u>✓</u>
Heaters/Fans/Vents	<u>✓</u>	Noise Level	<u>✓</u>	Gate Locks/Chains	<u>✓</u>
Station Service and Transfer	<u>✓</u>	Ground Connections	<u>✓</u>	Warning Signs	<u>✓</u>
Preferred		Evidence of Heating	<u>✓</u>	Yard Lights	<u>✓</u>
Alternate		Disconnects, Switches & Fuses	<u>✓</u>	Vegetation (Trees)	<u>✓</u>
Fire Equipment	<u>✓</u>	Station Service TRF	<u>✓</u>	Vegetation (Weeds)	<u>✓</u>
Clean & General Condition	<u>✓</u>	Clean and General Condition	<u>✓</u>	Vegetation (Vines)	<u>✓</u>
		Switch Sticks	<u>✓</u>	Any Danger to Public	<u>✓</u>
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☐ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	<u>✓</u>	Cleanliness		Tracking	
Oil Level	<u>✓</u>	Support Insulators		Overheating	
Leaks	<u>✓</u>	Connections		Leaks	
Porcelain	<u>✓</u>	Concrete			
Overheating	<u>✓</u>	Winding Distortion			
BUSESSES ☐ NA					
Noise Level	<u>✓</u>				
Overheating	<u>✓</u>				
Insulators	<u>✓</u>				
Structures	<u>✓</u>				
Connections	<u>✓</u>				

COMMENTS: Fence grounds

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: Barron Ave

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	i
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	✓			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ☒ Grounds ☒ Animal Guards ☒

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	✓	✓		—	✓	—	—	—	D	S	S

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	689	6BC	✓	Pass	25.1	closed	N/A	N/A	✓
10L2	64	✓	✓	25.6	27.5	closed	N/A	N/A	✓
10L4	91	✓	✓	25.2	27.7	closed	N/A	N/A	✓

COMMENTS: 10L1 Batteries need Replacement

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	1.5#	40	40	✓	NA	NA	NA	✓	S	
10T2	1.5#	28	28	✓	30	30	✓	✓	S	
10T4	1.5#	40	45		42	45	✓	✓	✓	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit Designation	Phase	Volts	Counter	Min	Max	Present	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.6	115101	-10	-4	-7	✓	good	clear	S
10L1	Ø B	120.7	258222	-8	-2	-5	✓	good	amber	S
10L1	Ø C	119.6	184562	-8	-2	-4	✓	good	amber	S
10L2	Ø A	119.5	139158	-12	-5	-10	✓	good	amber	S
10L2	Ø B	120.3	85175	-10	-5	-8	✓	good	amber	S
10L2	Ø C	119.3	139254	-12	-5	-10	✓	good	amber	S
10L4	Ø A	122.6	415638	-3	4	-2	✓	good	dark	S
10L4	Ø B	122.8	537169	-2	-1	-1	✓	good	dark	S
10L4	Ø C	120.7	48633	-3	4	-2	✓	good	dark	S
			460074	-5	-4	-2	✓			

COMMENTS:

 Liberty Utilities WATER • GAS • ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Inspected By: *SC* Date: *9/15/17*
 Ambient Temp: *BARRON AVE* Control House Temp:

GENERAL INSPECTIONS

(S= Satisfactory, U= Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	<i>SV</i>	Dead Animals	<i>S</i>	Vandalism	<i>S</i>
Station Alarms	<i>SV</i>	Avian/Bat Incident Report	<i>S</i>	Fence & Barbed Wire	<i>S</i>
Lighting	<i>SV</i>	All Broken Porcelain	<i>S</i>	Gates	<i>✓</i>
Heaters/Fans/Vents	<i>S</i>	Noise Level	<i>S</i>	Gate Locks/Chains	<i>S</i>
Station Service and Transfer	<i>SV</i>	Ground Connections	<i>S</i>	Warning Signs	<i>S</i>
Preferred	<i>SV</i>	Evidence of Heating	<i>S</i>	Yard Lights	<i>S</i>
Alternate	<i>SV</i>	Disconnects, Switches & Fuses	<i>S</i>	Vegetation (Trees)	<i>S</i>
Fire Equipment	<i>SV</i>	Station Service TRF	<i>S</i>	Vegetation (Weeds)	<i>U</i>
Clean & General Condition	<i>SV</i>	Clean and General Condition	<i>S</i>	Vegetation (Vines)	<i>S</i>
		Switch Sticks	<i>S</i>	Any Danger to Public	<i>S</i>
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level		Cleanliness		Tracking	
Oil Level		Support Insulators		Overheating	
Leaks		Connections		Leaks	
Porcelain		Concrete			
Overheating		Winding Distortion			
BUSSES ☐ NA					
Noise Level	<i>S</i>				
Overheating	<i>S</i>				
Insulators	<i>S</i>				
Structures	<i>S</i>				
Connections	<i>S</i>				

COMMENTS: *YARD WEEDY*
WOODEN PART OF GATE NEEDS REPAIR

 Liberty Utilities WATER GAS HEAT	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: *oc*

Date: *9/15/17*

Control House

(S= Satisfactory, U= Unsatisfactory, NA= Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	<i>S</i>	Control Panels	<i>S</i>	Station Alarms	<i>S</i>
Annunciators	<i>S</i>	Tags and Switching Order	<i>S</i>	Lighting	<i>S</i>
Heaters/Fans/Vents	<i>S</i>	Station Service and Transfer	<i>Norm</i>	Emer	<i>S</i>
Switch Sticks	<i>S</i>	Fire Extinguisher	<i>S</i>	SPCC Plan	<i>S</i>
Phone List	<i>S</i>	Eye Wash	<i>NA</i>	Clean & General Condition	<i>S</i>
Ambient Temperature	<i>S</i>	Control House temperature	<i>S</i>		

COMMENTS:

CAPACITORS

(S= Satisfactory, U= Unsatisfactory, NA= Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage *S* Grounds *S* Animal Guards *NA*

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
<i>C1</i>	<i>OPEN</i>	<i>2784</i>		<i>✓</i>				<i>S</i>	<i>S</i>	<i>S</i>	<i>S</i>

COMMENTS:

 Liberty Utilities WORKING TOGETHER	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S= Satisfactory, U= Unsatisfactory, NA= Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	689	S	S	22.5	25	CLOSED	N/A	N/A	N
10L2	165	S	S	25.1	26.1	CLOSED	N/A	N/A	Y
10L4	91	S	S	25.2	29.9	CLOSED	N/A	N/A	N

COMMENTS:

TRANSFORMERS

(S= Satisfactory, U= Unsatisfactory, NA= Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S</u>	FANS & PUMPS	<u>S</u>	PRESSURE RELIEF	<u>S</u>
BUSHING OIL LEVEL	<u>S</u>	CABINET HEATER	<u>S</u>	NOISE LEVEL	<u>S</u>
TANK GROUNDS	<u>S</u>	CABINET VENTS	<u>S</u>	ARRESTORS	<u>S</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	1/2 PSI +	60°	60°	N	-	-	-	25°C	C	
10T2	1 PSI +	50°	42°	Y	50	40	Y	25°C	C	
10T4	1/2 PSI +	55	50	X	-	-	-	25°C	W	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S= Satisfactory, U= Unsatisfactory, NA= Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S</u>	CABINET CONDITION	<u>S</u>
TANK GROUNDS	<u>S</u>	ARRESTERS	<u>S</u>
NOISE LEVEL	<u>S</u>	ANIMAL GUARDS	<u>S</u>

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit Designation	Phase	Volts	Counter	Min	Max	Present	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	119.9	187222	-8	0	-4	Y	GOOD	AMBER	CLEAN
10L1	Ø B	120.6	261036	-8	0	-3	Y	GOOD	AMBER	CLEAN
10L1	Ø C	121.2	117826	-10	+1	-4	Y	GOOD	AMBER	CLEAN
10L2	Ø A	120.9	141558	-11	0	-6	Y	GOOD	CLEAR	CLEAN
10L2	Ø B	120.8	86830	-11	-3	-7	Y	GOOD	CLEAR	CLEAN
10L2	Ø C	120.5	142556	-12	-1	-6	Y	GOOD	CLEAR	CLEAN
10L4	Ø A	123.5	416726	-4	+3	+1	Y	-	-	CLEAN
10L4	Ø B	123.2	538193	-3	+2	+1	Y	-	-	CLEAN
10L4	Ø C	121.7	466723	-4	0	-1	Y	GOOD	CLEAR	CLEAN

COMMENTS:


**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

DOC: Substation: Baron Ave AF Inspected By: Date: 8/18/17

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	☒	Dead Animals	☒	Vandalism	☒
Station Alarms	☒	Avian/Bat Incident Report	☒	Fence & Barbed Wire	☒
Lighting	☒	All Broken Porcelain	☒	Gates	☒
Heaters/Fans/Vents	☒	Noise Level	☒	Gate Locks/Chains	☒
Station Service and Transfer	☒	Ground Connections	☒	Warning Signs	☒
Preferred	☒	Evidence of Heating	☒	Yard Lights	☒
Alternate	☒	Disconnects, Switches & Fuses	☒	Vegetation (Trees)	☒
Fire Equipment	☒	Station Service TRF	☒	Vegetation (Weeds)	☒
Clean & General Condition	☒	Clean and General Condition	☒	Vegetation (Vines)	☒
		Switch Sticks	☒	Any Danger to Public	☒
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	☒	Cleanliness		Tracking	☒
Oil Level	☒	Support Insulators		Overheating	☒
Leaks	☒	Connections		Leaks	☒
Porcelain	☒	Concrete			
Overheating	☒	Winding Distortion			
BUSESSES ☐ NA					
Noise Level	☒				
Overheating	☒				
Insulators	☒				
Structures	☒				
Connections	☒				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	✓	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	✓		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open			✓					✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	1689	✓	✓		2.18		N/A	N/A	
10L2	165	✓	✓	25	27	closed	N/A	N/A	
10L4	91	✓	✓	25	27	closed	N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	5.58	65	65	✓						
10T2	0.4	67	47	✓	69	39	✓			
10T4	0.25	55	49	✓				✓		

COMMENTS:

10T4 62/78/74 114/148/134
 F.W. 1168/594/506 157/170/153
 10L2 157/120/121 371/321/312
 E.W. 1024/999/922 - 829/515/-105.5
 10 L1 50/75/75 100/115/95

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	✓	CABINET CONDITION	✓
TANK GROUNDS	✓	ARRESTERS	✓
NOISE LEVEL	✓	ANIMAL GUARDS	✓

Regulator Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.5	117387	-9	-7	+8	-	-	✓
10L1	Ø B	121.6	260610	-8	-7	+3	-	-	✓
10L1	Ø C	123.5	186665	-8	-6	+3	-	-	✓
10L2	Ø A	120.4	141001	-11	-7	+10	-	-	✓
10L2	Ø B	122.5	146548	-11	-3	+2	-	-	✓
10L2	Ø C	121.0	141996	-11	-6	+2	-	-	✓
10L4	Ø A	121.5	1116544	-4	-1	+3	-	-	✓
10L4	Ø B	122.9	538269	-3	-1	+2	-	-	✓
10L4	Ø C	123.7	466555	-5	-4	-1	-	-	✓
							-	-	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Inspected By: Date: 5/24/17
 Ambient Temp: 67° BALLEN STEVE Control House Temp: 67°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	S	Dead Animals	S	Vandalism	S
Station Alarms	S	Avian/Bat Incident Report	S	Fence & Barbed Wire	S
Lighting	S	All Broken Porcelain	S	Gates	S
Heaters/Fans/Vents	S	Noise Level	S	Gate Locks/Chains	S
Station Service and Transfer	S	Ground Connections	S	Warning Signs	S
Preferred	S	Evidence of Heating	S	Yard Lights	S
Alternate	S	Disconnects, Switches & Fuses	S	Vegetation (Trees)	S
Fire Equipment	S	Station Service TRF	S	Vegetation (Weeds)	S
Clean & General Condition	S	Clean and General Condition	S	Vegetation (Vines)	S
		Switch Sticks	S	Any Danger to Public	S
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	S	Cleanliness		Tracking	
Oil Level	NA	Support Insulators		Overheating	
Leaks	NA	Connections		Leaks	
Porcelain	NA	Concrete			
Overheating	S	Winding Distortion			
BUSSES ☐ NA					
Noise Level	S				
Overheating	S				
Insulators	S				
Structures	S				
Connections	S				

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

STEVE

Date:

5/24/12

Control House(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	S	Control Panels	S		Station Alarms	S
Annunciators	S	Tags and Switching Order	S		Lighting	S
Heaters/Fans/Vents	S	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	S
Switch Sticks	S	Fire Extinguisher	S		SPCC Plan	S
Phone List	S	Eye Wash	Not		Clean & General Condition	S
Ambient Temperature	S	Control House temperature	S			

COMMENTS:

CAPACITORS(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.Bushing Damage S Grounds S Animal Guards NA

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	OPEN	2748	U	S				S	S	U	S

COMMENTS:

SWITCH COUNTERS ARE NOT LEDGABLE
C1 CAP APPEARS TO HAVE A SMALL LEAK

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	688	S	S	23	25	CLOSED	N/A	N/A	N
10L2	164	S	S	25.2	26.8	CLOSED	N/A	N/A	N
10L4	91	S	S	25.2	26.6	CLOSED	N/A	N/A	N

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S</u>	FANS & PUMPS	<u>S</u>	PRESSURE RELIEF	<u>S</u>
BUSHING OIL LEVEL	<u>S</u>	CABINET HEATER	<u>S</u>	NOISE LEVEL	<u>S</u>
TANK GROUNDS	<u>S</u>	CABINET VENTS	<u>S</u>	ARRESTORS	<u>S</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+ 1/2 PSI	60	42°	Y						
10T2	+ 1/2 PSI	50°	40°	Y	50°	38°	Y	250L	S	
10T4	0	60°	48°	Y				250L	W	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	_____	CABINET CONDITION	_____
TANK GROUNDS	_____	ARRESTERS	_____
NOISE LEVEL	_____	ANIMAL GUARDS	_____

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Phase	Volts	Counter	Min	Max	Reset	Oil Level (Good/Low)	Oil Color (Clear/Amber/ Dark)	Oil Leaks*
10L1	Ø A	120.3	115829	-16	+7	-5 Y	GOOD	AMBER	N
10L1	Ø B	120	258955	-16	+6	-4 Y	GOOD	AMBER	N
10L1	Ø C	120	185274	-16	+6	-4 Y	GOOD	DARK	N
10L2	Ø A	120	139075	-16	+6	-7 Y	GOOD	CLEAR	N
10L2	Ø B	120	85875	-16	+6	-6 Y	GOOD	CLEAR	N
10L2	Ø C	120	140127	-16	+5	-7 Y	GOOD	CLEAR	N
10L4	Ø A	123.3	415938	-9	+4	+1 Y	NA	NA	N
10L4	Ø B	123.3	537757	-16	+4	+1 Y	NA	NA	N
10L4	Ø C	121.4	465897	-12	+2	-1 Y	NA GOOD	NA CLEAR	N

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Barron Ave Inspected By: Date:

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	✓	Cleanliness	NA	Tracking	✓
Oil Level	✓	Support Insulators	NA	Overheating	✓
Leaks	✓	Connections	NA	Leaks	✓
Porcelain	✓	Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	NA	Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	closed	NA	NA	✓		NA	NA	NA	✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699		✓	—	—	closed	N/A	N/A	✓
10L2	106		✓	25.5	27.4	closed	N/A	N/A	✓
10L4	10		✓	26.3	27.3	closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	81	350	30	✓	NA	NA	NA	✓	✓	
10T2	1	35	30	✓	32	29	✓	✓	✓	
10T4	0	45	40	✓	NA	NA	NA	✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	✓	CABINET CONDITION	✓
TANK GROUNDS	✓	ARRESTERS	✓
NOISE LEVEL	✓	ANIMAL GUARDS	✓

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	121.1	124628	-9	-7	-5	✓	✓	Auto	Int	✓	✓
10L1	Ø B	120.7	268799	-8	-5	-2	✓	✓	Auto	Int	✓	✓
10L1	Ø C	120.3	19421	-7	-5	-3	✓	✓	Auto	Int	✓	✓
10L2	Ø A	121.0	150309	-10	-7	-4	✓	✓	Auto	Int	✓	✓
10L2	Ø B	120.7	094732	-9	-7	-4	✓	✓	Auto	Int	✓	✓
10L2	Ø C	120.6	150971	-9	-7	-4	✓	✓	Auto	Int	✓	✓
10L4	Ø A	124.8	419557	-4	-2	+1	✓	✓	Auto	Int	-	✓
10L4	Ø B	123.1	54131	-4	-3	-1	✓	✓	Auto	Int	-	✓
10L4	Ø C	121.1	554905	-7	-6	-3	✓	✓	Auto	Int	-	✓

COMMENTS:



Substation:

Date: 2/16/18

Control House Temp:

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ☒ Grounds ☒ Animal Guards ☒

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	2784		✓					✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking **NEEDS** comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10LR 4	9	✓	✓	25.7	27.3	closed	N/A	N/A	
10L2	101	✓	✓	25	27	closed	N/A	N/A	
10L 2	694	✓	✓	pass	28	closed	N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking **NEEDS** comments below.

BUSHING DAMAGE	FANS & PUMPS	PRESSURE RELIEF
BUSHING OIL LEVEL	CABINET HEATER	NOISE LEVEL
TANK GROUNDS	CABINET VENTS	ARRESTORS

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	11#	45	40	✓				✓	✓	✓
10T2	10#	30	30	✓	30	30	✓	✓	✓	✓
10T4	10#	40	40	✓						

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet												
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Max	Present	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	120.9	143844	-10	-8	-6	✓	Good	✓	✓	✓	✓
10L1	Ø B	121	262944	-8	-4	-2	✓	✓	✓	✓	✓	✓
10L1	Ø C	120.9	1488876	-8	-2	-4	✓	✓	✓	✓	✓	✓
10L2	Ø A	120.3	1438850	-12	-10	-6	✓	✓	✓	✓	✓	✓
10L2	Ø B	119.4	89000	-11	-10	-6	✓	✓	✓	✓	✓	✓
10L2	Ø C	120.2	144692	-12	-10	-6	✓	✓	✓	✓	✓	✓
10L4	Ø A	121	417333	-3	-2	+2	✓	Good	✓	✓	✓	✓
10L4	Ø B	123.8	538910	-2	-2	+2	✓	Good	✓	✓	✓	✓
10L4	Ø C	121.8	492654	-5	-4	-1	✓	Good	✓	✓	✓	✓

COMMENTS:

11/14



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

DOC: Barron Ave Substation: AF Date: 1/24/18

Ambient Temp:

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	✓	Dead Animals	✓	Vandalism	✓
Station Alarms	✓	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	✓	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	✓	Ground Connections	✓	Warning Signs	✓
Preferred	✓	Evidence of Heating	✓	Yard Lights	✓
Alternate		Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☐ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	✓	Cleanliness		Tracking	
Oil Level	✓	Support Insulators		Overheating	
Leaks	✓	Connections		Leaks	
Porcelain	✓	Concrete			
Overheating	✓	Winding Distortion			
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

1461 & 1463
OB .95
1462 & 1464
OB .49
1463
1.72
-.35
1464
1.40
-.10

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage _____ Grounds _____ Animal Guards _____

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open			✓					✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	693	✓	✓	26	27	closed	N/A	N/A	
10L2	101	✓	✓	26	27	closed	N/A	N/A	
10L4	9	✓	✓	26	27	closed	N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	4.5#	45	45	✓				✓	✓	✓
10T2	10#	35	25	✓	32	28	✓	✓	✓	✓
10T4	1.5#	45	40	✓				✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

2 ✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	120.9	119172	-8	-8	-4	✓	✓	✓	✓	✓	✓
10L1	Ø B	124.3	136203	-10	-10	-4	✓	✓	✓	✓	✓	✓
10L1	Ø C	120.5	188080	-10	-10	-3	✓	✓	✓	✓	✓	✓
10L2	Ø A	120.5	143566	-11	-10	-3	✓	✓	✓	✓	✓	✓
10L2	Ø B	120.2	20727	-12	-10	-3	✓	✓	✓	✓	✓	✓
10L2	Ø C	120.3	144444	-11	-10	-2	✓	✓	✓	✓	✓	✓
10L4	Ø A	123.9	417275	-5	-2	-1	✓	✓	✓	✓	✓	✓
10L4	Ø B	124.0	539841	-4	-1	+1	✓	✓	✓	✓	✓	✓
10L4	Ø C	121.7	482668	-7	-4	-2	✓	✓	✓	✓	✓	✓

COMMENTS:



**Substation Monthly Visual and
(V&O) Inspection Sheet**

DOC: Barron Substation: AF Inspected By: AF Date: 3/6

Ambient Temp: _____

C

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEE
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have
the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY
Control Panels	☒	Dead Animals	☒	Vandalism
Station Alarms	☒	Avian/Bat Incident Report	☒	Fence & Barbed Wire
Lighting	☒	All Broken Porcelain	☒	Gates
Heaters/Fans/Vents	☒	Noise Level	☒	Gate Locks/Chains
Station Service and Transfer	☒	Ground Connections	☒	Warning Signs
Preferred	☒	Evidence of Heating	☒	Yard Lights
Alternate	☒	Disconnects, Switches & Fuses	☒	Vegetation (Tree)
Fire Equipment	☒	Station Service TRF	☒	Vegetation (Weeds)
Clean & General Condition	☒	Clean and General Condition	☒	Vegetation (Vines)
		Switch Sticks	☒	Any Danger to
MISCELLANEOUS APPARATUS (4.6)				
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TRACING
Noise Level	☒	Cleanliness	☒	Tracking
Oil Level	☒	Support Insulators		Overheating
Leaks	☒	Connections		Leaks
Porcelain	☒	Concrete		
Overheating	☒	Winding Distortion		
BUSESSES ☐ NA				
Noise Level	☒			
Overheating	☒			
Insulators	☒			
Structures	☒			
Connections	☒			

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	121	119626	-10	-6	-7	✓	✓	✓	✓	✓	✓
10L1	Ø B	121.2	263099	-8	-3	-4	✓	✓	✓	✓	✓	✓
10L1	Ø C	121.5	189229	-8	-5	-4						
10L2	Ø A	120	144267	-11	-7	-6	✓	✓	✓	✓	✓	✓
10L2	Ø B	120	89402	-12	-7	-6	✓	✓	✓	✓	✓	✓
10L2	Ø C	120.1	145083	-11	-7	-5	✓	✓	✓	✓	✓	✓
10L4	Ø A	120.1	146272	-6	-4	-2	✓	✓	✓	✓	✓	✓
10L4	Ø B	121	538994	-10	-2	+1	✓	✓	✓	✓	✓	✓
10L4	Ø C	121.1	417445	-4	-2	+1	✓	✓	✓	✓	✓	✓

COMMENTS:



**Substation Monthly Visual and
(V&O) Inspection Sheet**

Substation: **Barron Ave**

Inspected By:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS correction

CONTROL HOUSE				
Log Book	✓	Control Panels	✓	Station Alarms
Annunciators	✓	Tags and Switching Order	✓	Lighting
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm	Heavy Duty Grounds
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan
Phone List	✓	Eye Wash	NA	Clean & General Condi
Ambient Temperature	✓	Control House temperature	NA	

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS correction

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges
		Controls	Switch	Auto	Remote	Indicating	Actual		
C1	Open					✓			✓

COMMENTS:



Liberty Utilities
WATER GAS ELECTRIC

**Substation Moni
(V&O)**

Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" mark

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repairs)						
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed
10L1	697	✓	✓	26	26.27	closed
10L2	101	✓	✓	26	27	closed
10L4	9	✓	✓	26	27	closed

COMMENTS: 10L1 100/110/50
10L2 160/151/140 FW 1140/1049/96
10L4 94/102/93 FW 647/784/710

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" mark

BUSHING DAMAGE	✓	FANS & PUMPS	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓
TANK GROUNDS	✓	CABINET VENTS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repairs)							
Circuit/Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge "C"			Winding Temp Gauge "C"		
		MAX	INST	Reset	MAX	INST	Reset
10T1	11.5	50	30	✓			
10T2	0.5	40	30	✓	30	30	✓
10T4	0.5	50	40				

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Barron Ave Inspected By: Date: 11/29/2018
 Ambient Temp: 48° Control House Temp: 48°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.
 NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	✓	Cleanliness	NA	Tracking	✓
Oil Level	✓	Support Insulators	NA	Overheating	✓
Leaks	✓	Connections	NA	Leaks	✓
Porcelain		Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	✓
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	40°	Control House temperature	NA			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ☒ Grounds ☒ Animal Guards ☐

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	NA	NA	✓		NA	NA	NA	✓	✓	✓

COMMENTS:

change wording →

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	25.5	27.2	close ✓	N/A	N/A	✓
10L2	186	✓	✓	25.5	27.4	close ✓	N/A	N/A	✓
10L4	10	✓	✓	24.7	27.3	close ✓	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	.5	30	28	✓	NA	NA	NA	✓	✓	
10T2	-.5	30	30	✓	30	30	✓	✓	✓	
10T4					NA	NA	NA			

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	✓
TANK GROUNDS	✓
NOISE LEVEL	✓
CABINET CONDITION	✓
ARRESTERS	✓
ANIMAL GUARDS	✓

Regulator Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	120.8	124296	-9	-6	-4	✓	✓	A	Inte	✓	✓
10L1	Ø B	120.4	268911	-8	-3	-1	✓	✓	A	Inte	✓	✓
10L1	Ø C	119.8	193967	-8	-5	-4	✓	✓	A	Inte	✓	✓
10L2	Ø A	120.4	149221	-10	-7	-4	✓	✓	A	Inte	✓	✓
10L2	Ø B	120.5	094336	-10	-7	-4	✓	✓	A	Inte	✓	✓
10L2	Ø C	120.4	150521	-8	-7	-4	✓	✓	A	Inte	✓	✓
10L4	Ø A	123.2	419389	-5	-2	-1	✓		A	Inte		
10L4	Ø B	123.2	54972	-4	-2	-1	✓		A	Inte		
10L4	Ø C	120.6	554621	-6	-5	-3	✓		A	Inte		

COMMENTS:

**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

DOC: Substation: Barron Ave Inspected By: Date: 11/5/2019
Ambient Temp: 45° Control House Temp: 45°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	✓	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer		Ground Connections	✓	Warning Signs	✓
Preferred	✓	Evidence of Heating	✓	Yard Lights	✓
Alternate		Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level		Cleanliness	NA	Tracking	
Oil Level		Support Insulators	NA	Overheating	
Leaks		Connections	NA	Leaks	
Porcelain		Concrete	NA		
Overheating		Winding Distortion	NA		
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels		Station Alarms	
Annunciators		Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Normal	Heavy Duty Grounds	
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	
Phone List		Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	45	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards NA

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	27.84		man					✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓			closed	N/A	N/A	✓
10L2	105	✓	✓	25.3	27.2	closed	N/A	N/A	✓
10L4	10	✓	✓	22.6	27.2	closed	N/A	N/A	✓

COMMENTS:

10L4 Batt alarm

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	7.5	40	30	✓	NA	NA	NA	✓	✓	
10T2	7.5	35	30	✓	40	30	✓	✓	✓	
10T4	7.1	52	40	✓	NA	NA	NA	✓	✓	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	121.3	124043	-16	-5	-1	✓	✓	Auto	Int	Clear	✓
10L1	Ø B	120.6	268330	-11	-2	+3	✓	✓	Auto	Int	Clear	✓
10L1	Ø C	120.2	193724	-11	-4	-1	✓	✓	Auto	Int	Clear	✓
10L2	Ø A	121.0	149470	-16	-6	-2	✓	✓	Auto	Int	Clear	✓
10L2	Ø B	121.9	94007	-16	-6	-1	✓	✓	Auto	Int	Clear	✓
10L2	Ø C	120.6	150225	-16	-6	-2	✓	✓	Auto	Int	Clear	✓
10L4	Ø A	123.5	419283	-10	-2	+1	✓		Auto	Int		✓
10L4	Ø B	123.4	540878	-12	-2	-1	✓		Auto	Int		✓
10L4	Ø C	120.2	534903	-13	-5	-3	✓		Auto	Int		

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Barron Ave Inspected By: D. Kikter Date: 8-31-18
 Ambient Temp: 77°F Control House Temp: N/A

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	<u>N/A</u>	Dead Animals	<u>S</u>	Vandalism	<u>S</u>
Station Alarms	<u>N/A</u>	Avian/Bat Incident Report	<u>N/A</u>	Fence & Barbed Wire	<u>S</u>
Lighting	<u>S</u>	All Broken Porcelain	<u>S</u>	Gates	<u>S</u>
Heaters/Fans/Vents	<u>S</u>	Noise Level	<u>S</u>	Gate Locks/Chains	<u>S</u>
Station Service and Transfer	<u>S</u>	Ground Connections	<u>S</u>	Warning Signs	<u>S</u>
Preferred		Evidence of Heating	<u>S</u>	Yard Lights	<u>U</u>
Alternate		Disconnects, Switches & Fuses	<u>S</u>	Vegetation (Trees)	<u>S</u>
Fire Equipment	<u>S</u>	Station Service TRF	<u>S</u>	Vegetation (Weeds)	<u>S</u>
Clean & General Condition	<u>S</u>	Clean and General Condition	<u>S</u>	Vegetation (Vines)	<u>S</u>
		Switch Sticks	<u>S</u>	Any Danger to Public	
				<u>Paneling Falling of front gate</u>	
				<u>2 floodlights bulbs burnt out</u>	
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☐ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	<u>S</u>	Cleanliness	<u>S</u>	Tracking	<u>S</u>
Oil Level	<u>S</u>	Support Insulators	<u>S</u>	Overheating	<u>S</u>
Leaks	<u>U 10/24</u>	Connections	<u>S</u>	Leaks	<u>S</u>
Porcelain	<u>S</u>	Concrete	<u>S</u>		
Overheating	<u>S</u>	Winding Distortion	<u>S</u>		
BUSESSES ☐ NA					
Noise Level	<u>S</u>				
Overheating	<u>S</u>				
Insulators	<u>S</u>				
Structures	<u>S</u>				
Connections	<u>S</u>				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By: **D. Kikter**

Date: **8-31-18**

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	S	Control Panels	N/A	Station Alarms	N/A
Annunciators		Tags and Switching Order	S	Lighting	S
Heaters/Fans/Vents	S	Station Service and Transfer	Norm	Emer	S
Switch Sticks	S	Fire Extinguisher	S	SPCC Plan	
Phone List	S	Eye Wash	NA	Clean & General Condition	S
Ambient Temperature	77.5	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage S Grounds S Animal Guards S

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	OFF	NA	NA	NA	NA	NA	NA	S	S	S	U

one fuse open

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet									
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	10		S	S	25.5	Closed	N/A	N/A	
10L2	105		S	S	26.8	Closed	N/A	N/A	
10L4	699		S	N/A	27.9	Closed	N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	<u>S</u>	FANS & PUMPS	<u>S</u>	PRESSURE RELIEF	<u>S</u>
BUSHING OIL LEVEL	<u>S</u>	CABINET HEATER	<u>S</u>	NOISE LEVEL	<u>S</u>
TANK GROUNDS	<u>S</u>	CABINET VENTS	<u>S</u>	ARRESTORS	<u>S</u>

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	0	60°C	50°C	U	N/A			S	W	
10T2	0	40°C	40°C	S	60	40	S	S	L	
10T4	0	60°	60°	S	N/A			S	L	

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>S</u>	CABINET CONDITION	<u>S</u>
TANK GROUNDS	<u>S</u>	ARRESTERS	<u>S</u>
NOISE LEVEL	<u>S</u>	ANIMAL GUARDS	<u>S</u>

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	123.3	418840	-5	-3	+2	S	N/A	Auto	In	N/A	C
10L1	Ø B	123	54041	-4	-3	+2	S	N/A	Auto	In	N/A	C
10L1	Ø C	121.5	52466	-7	-5	+1	S	Good	Auto	In	clear	C
10L2	Ø A	121	148211	-11	-9	+4	S	Good	Auto	In	clear	C
10L2	Ø B	121.2	92835	-11	-8	+5	S	Good	Auto	In	clear	C
10L2	Ø C	120.7	149000	-11	-10	+3	S	Good	Auto	In	clear	C
10L4	Ø A	120.1	123070	-11	-10	+4	S	Good	Auto	In	clear	C
10L4	Ø B	119.9	206999	-10	-9	+2	S	Good	Auto	In	clear	C
10L4	Ø C	119.8	192767	-10	-9	+4		Good	Auto	In	clear	C

COMMENTS:

**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

DOC:

Substation:

Inspected By:

Date:

AF 1/7/5/18

Ambient Temp:

Barron 40°

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	✓	Dead Animals	✓	Vandalism	✓
Station Alarms	✓	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	✓	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	✓	Ground Connections	✓	Warning Signs	✓
Preferred		Evidence of Heating	✓	Yard Lights	✓
Alternate		Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☐ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	✓	Cleanliness		Tracking	✓
Oil Level	✓	Support Insulators		Overheating	✓
Leaks	✓	Connections		Leaks	✓
Porcelain	✓	Concrete			
Overheating	✓	Winding Distortion			
BUSSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: Barron Ave

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order		Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher		SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	Open										

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	10	✓	✓	25	26	Close	N/A	N/A	
10L2	105	✓	✓	25	27	Close	N/A	N/A	
10L4	107	✓	✓	26	27	Close	N/A	N/A	

COMMENTS: 106 100/110/80

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	41#	61	55	✓				✓	✓	✓
10T2	41.5#	50	50		60	40		✓	✓	✓
10T4	41#	60	50					✓	✓	✓

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	121.2	121417	-12	-1	+1	✓	✓	✓	✓	✓	✓
10L1	Ø B	121.5	265165	-12	-3	+2	✓	✓	✓	✓	✓	✓
10L1	Ø C	121.4	11125	-12	-1	-1	✓	✓	✓	✓	✓	✓
10L2	Ø A	121.8	146288	-12	+2	+2	✓	✓	✓	✓	✓	✓
10L2	Ø B	121.7	14153	-12	+2	+2	✓	✓	✓	✓	✓	✓
10L2	Ø C	121.5	141075	-10	-1	+2	✓	✓	✓	✓	✓	✓
10L4	Ø A	121.5	14226	-10	-1	+1	✓	✓	✓	✓	✓	✓
10L4	Ø B	121.7	53428	-10	+2	+3	✓	✓	✓	✓	✓	✓
10L4	Ø C	121.5	48354	-7	-3	+1	✓	✓	✓	✓	✓	✓

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Inspected By: *AF* Date: *5/30/18*

Ambient Temp:

Barton Ave

Control House Temp:

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	☒	Dead Animals	☒	Vandalism	☒
Station Alarms	☒	Avian/Bat Incident Report	☒	Fence & Barbed Wire	☒
Lighting	☒	All Broken Porcelain	☒	Gates	☒
Heaters/Fans/Vents	☒	Noise Level	☒	Gate Locks/Chains	☒
Station Service and Transfer	☒	Ground Connections	☒	Warning Signs	☒
Preferred	☒	Evidence of Heating	☒	Yard Lights	☒
Alternate	☒	Disconnects, Switches & Fuses	☒	Vegetation (Trees)	☒
Fire Equipment	☒	Station Service TRF	☒	Vegetation (Weeds)	☒
Clean & General Condition	☒	Clean and General Condition	☒	Vegetation (Vines)	☒
		Switch Sticks	☒	Any Danger to Public	☒
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☐ NA	
Noise Level	☒	Cleanliness	☒	Tracking	☒
Oil Level	☒	Support Insulators	☒	Overheating	☒
Leaks	☒	Connections	☒	Leaks	☒
Porcelain	☒	Concrete	☒		☒
Overheating	☒	Winding Distortion	☒		☒
BUSES ☐ NA					
Noise Level	☒				
Overheating	☒				
Insulators	☒				
Structures	☒				
Connections	☒				

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	✓	Station Alarms	✓
Annunciators	✓	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	✓	Station Service and Transfer	Norm ✓ Emer ✓	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	✓	Control House temperature	NA		

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	—		✓		—		—	✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	697	04/13	✓	26	27.4	close	N/A	N/A	
10L2	103	—	✓	26	27	close	N/A	N/A	
10L4	10	—	✓	26	27	close	N/A	N/A	

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+1.5#	55	55	✓				✓	✓	✓
10T2	.5#	45	40	✓	50	45	✓	✓	✓	✓
10T4	1#	45	40					✓	✓	✓

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	120.6	120521	-16	-8	+1	—	—	—	—	—	✓
10L1	Ø B	120.5	263708	-10	-7	+1	✓	—	—	—	✓	✓
10L1	Ø C	119.9	190195	-12	-7	+2	—	—	—	—	—	—
10L2	Ø A	120.6	145216	-16	-8	+1	✓	✓	✓	✓	✓	✓
10L2	Ø B	119.9	90192	-9	-8	+2	✓	✓	✓	✓	✓	✓
10L2	Ø C	120.5	146060	-16	-8	+1	✓	✓	✓	✓	✓	✓
10L4	Ø A	123.5	417901	-10	-2	+4	✓	✓	✓	✓	✓	✓
10L4	Ø B	123.4	539540	-16	-2	+3	—	—	✓	✓	✓	✓
10L4	Ø C	121.7	48326	-13	-4	+3	—	—	✓	✓	✓	✓

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Barron Ave Inspected By: Date: 04/19/2019
 Ambient Temp: 69° Control House Temp: 69°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.
 NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level	✓	Support Insulators	NA	Overheating	
Leaks	✓	Connections	NA	Leaks	
Porcelain		Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	✓
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	69°	Control House temperature	NA			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ☒ Grounds ☒ Animal Guards ☐

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	NA	NA			NA	NA	NA	✓	✓	✓

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	25.5	27.5	closed	N/A	N/A	✓
10L2	106	✓	✓	25.0	26.8	closed	N/A	N/A	✓
10L4	11	✓	✓	25.1	26.9	closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge " C			Winding Temp Gauge " C			Oil Level 25 " C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+1	45	45	✓	NA	NA	NA	✓	✓	
10T2	+0.5	35	33	✓	32	32	✓	✓	✓	
10T4	+0.5	50	45	✓	NA	NA	NA	✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet												
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	121.2	125582	-10	-4	-4	✓	✓	A	I	✓	✓
10L1	Ø B	120.7	268999	-8	-3	-2	✓	✓	A	I	✓	✓
10L1	Ø C	120.6	195321	-8	-3	-3	✓	✓	A	I	✓	✓
10L2	Ø A	120.0	151710	-10	-6	-2	✓	✓	A	I	✓	✓
10L2	Ø B	121.5	95928	-10	-3	-1	✓	✓	A	I	✓	✓
10L2	Ø C	120.3	152327	-10	-5	-2	✓	✓	A	I	✓	✓
10L4	Ø A	123.6	420191	-4	0	+2	✓					
10L4	Ø B	123.3	541726	-16	0	0	✓					
10L4	Ø C	120.8	555578	-8	-3	-2	✓	✓	A	I	✓	✓

COMMENTS:


**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

DOC: Substation: Barron Ave Inspected By: MD Date: 3-7-19
 Ambient Temp: 16° Control House Temp: N/A

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report	✓	Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF		Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level	✓	Support Insulators	NA	Overheating	
Leaks	✓	Connections	NA	Leaks	
Porcelain	✓	Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

Fire ext. Purchased for Feb 2019.
 Vines growing into outside fencing.
 yard lights. - Flood light burned out

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	✓
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	16°	Control House temperature	NA			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ☒ Grounds ☒ Animal Guards ☒

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	7/10/19	NA	NA		✓	NA	NA	NA	✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	678	✓	✓	26.3	28.3	closed	N/A	N/A	✓
10L2	106	✓	✓	26.3	28.4	closed	N/A	N/A	✓
10L4	11	✓	✓	26.0	28.2	closed	N/A	N/A	✓

COMMENTS: 10L2 Battery date 6-12 out of date

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+1	36	35	✓	NA	NA	NA	✓	✓	
10T2	-1.5	36	35	✓	30	24	✓	✓	✓	
10T4	-1	45	32	✓	NA	NA	NA	✓	✓	

COMMENTS: Fan on 10T1 Does not work. Also, one fan motor missing



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	<u>✓</u>	CABINET CONDITION	<u>✓</u>
TANK GROUNDS	<u>✓</u>	ARRESTERS	<u>✓</u>
NOISE LEVEL	<u>✓</u>	ANIMAL GUARDS	<u>✓</u>

Regulator Test & Verification Worksheet
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	121.0	125235	-8	-5	-4	✓	✓	Auto	Int	✓	✓
10L1	Ø B	121.2	268998	-7	-4	-4	✓	✓	Auto	Int	✓	✓
10L1	Ø C	119.8	194522	-1	-4	-4	✓	✓	Auto	Int	✓	✓
10L2	Ø A	120.9	151146	-10	-6	-4	✓	good	Auto	Int	✓	✓
10L2	Ø B	120.5	95539	-10	-6	-4	✓	✓	Auto	Int	✓	✓
10L2	Ø C	119.9	151759	-10	-7	-4	✓	✓	Auto	Int	✓	✓
10L4	Ø A	120.6	555423	-6	-5	-4	✓	✓	Auto	Int	✓	✓
10L4	Ø B	122.3	419800	-5	-3	-1	✓	✓	Auto	Int	✓	✓
10L4	Ø C	123.0	541308	-4	-2	-1	✓	✓	Auto	Int	✓	✓

COMMENTS:

No M.O.D section, But all equip is good

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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DOC: Substation: Barron Ave Inspected By: Date: 7/29/19
 Ambient Temp: 10° Control House Temp: 90°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level	✓	Support Insulators	NA	Overheating	
Leaks	✓	Connections	NA	Leaks	
Porcelain		Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSESSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: Barron Ave

Inspected By: _____

Date: _____

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	✓
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	90°	Control House temperature	NA			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage _____ Grounds _____ Animal Guards _____

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	closed	NA	NA	✓	✓	NA	NA	NA	✓	✓	✓

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	25.5	28	closed	N/A	N/A	✓
10L2	109	✓	✓	24.8	26.3	closed	N/A	N/A	✓
10L4	11	✓	✓	24.9	26.4	closed	N/A	N/A	✓

COMMENTS:

10L2 Battery out of date

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	71	60	60		NA	NA	NA	✓	✓	
10T2	41.5	59	49	—	59	48	✓	✓	✓	
10T4	40.5	57	53		NA	NA	NA	✓	✓	

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION _____

CABINET CONDITION _____

TANK GROUNDS _____

ARRESTERS _____

NOISE LEVEL _____

ANIMAL GUARDS _____

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks
10L1	Ø A	121.0	127459	-11	-5	N	✓	✓	A	I	✓	✓
10L1	Ø B	121.2	270609	-11	-5	N	✓	✓	A	I	✓	✓
10L1	Ø C	121.0	197105	-12	-6	N	✓	✓	A	I	✓	✓
10L2	Ø A	121.3	154041	-12	-5	+4	✓	✓	A	I	✓	✓
10L2	Ø B	121.5	96699	-10	-4	+3	✓	✓	A	I	✓	✓
10L2	Ø C	121.3	154572	-12	-6	+2	✓	✓	A	I	✓	✓
10L4	Ø A	124.0	421226	-6	-1	+2	✓	✓	A	I	✓	✓
10L4	Ø B	124.5	542619	-16	-1	+2	✓	✓	A	I	✓	✓
10L4	Ø C	121.3	559792	-11	-5	N	✓	✓	A	I	✓	✓

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Barron Ave Inspected By: Date: 06/27/2019
 Ambient Temp: 78° Control House Temp: 78°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level		Support Insulators	NA	Overheating	
Leaks		Connections	NA	Leaks	
Porcelain		Concrete	NA		
Overheating		Winding Distortion	NA		
BUSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

Vines on fence
 Wood falling off fence

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	NA	Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Normal Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	80 °	Control House temperature	NA		

COMMENTS:

CAPACITORS(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.Bushing Damage ✓ Grounds ✓ Animal Guards ✓

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	open	NA	NA			NA	NA	NA	✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	25.5	27.5	closed	N/A	N/A	✓
10L2	108	✓	✓	24.9	26.5	closed	N/A	N/A	✓
10L4	11	✓	✓	25.0	26.7	closed	N/A	N/A	✓

COMMENTS:

10L2 Battery out of Date

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	10.5	50	50	✓	NA	NA	NA	✓	✓	
10T2	+ 1	50	40	✓	50	40	✓	✓	✓	
10T4	10.5	55	50	✓	NA	NA	NA	✓	✓	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	120.8	66684	-16	-6	-1	✓	✓	A	I	A	✓
10L1	Ø B	120.9	269175	-16	-3	-1	✓	✓	A	I	A	✓
10L1	Ø C	120.6	196347	-16	-3	N	✓	✓	A	I	A	✓
10L2	Ø A	120.9	153122	-16	-6	-1	✓	✓	A	I	✓	✓
10L2	Ø B	121.7	695978	-3	-3	-3	✓	✓	Regule	I	A	✓
10L2	Ø C	120.3	153676	-16	-6	-1	✓	✓	A	I	✓	✓
10L4	Ø A	123.8	420500	-11	-1	+2	✓	✓	A	I	✓	✓
10L4	Ø B	121.6	542114	-13	N	N	✓	✓	A	I	✓	✓
10L4	Ø C	121.2	559415	-13	-4	-2	✓	✓	A	I	✓	✓

COMMENTS:

dw 275
Mn 16 10L2 BØ Reg Auto 13:31
13:31



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Barron Ave Inspected By: *Sub* Date: *03/21/2019*
 Ambient Temp: *37°* Control House Temp: *37°*

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.
NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in **TSS-M-01**.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	<i>out of date</i>	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	<i>on fence</i>
		Switch Sticks	✓	Any Danger to Public	✓
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level	✓	Support Insulators	NA	Overheating	
Leaks	✓	Connections	NA	Leaks	
Porcelain		Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE					
Log Book	✓	Control Panels	NA	Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓	Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm Emer	Heavy Duty Grounds	✓
Switch Sticks	✓	Fire Extinguisher	✓	SPCC Plan	✓
Phone List	✓	Eye Wash	NA	Clean & General Condition	✓
Ambient Temperature	37°	Control House temperature	NA		

COMMENTS:

CAPACITORS(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards _____

Capacitor Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	Open	NA	NA	Man	Auto	NA	NA	NA	✓	✓	✓
		2784									

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	26.0	27.0	closed	N/A	N/A	✓
10L2	106	✓	✓	25.6	27.6	closed	N/A	N/A	✓
10L4	11	✓	✓	25.6	27.6	closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge °C			Winding Temp Gauge °C			Oil Level 25 °C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	7.5	40	40	✓	NA	NA	NA	✓	✓	
10T2	5.5	30	25	✓	30	30	✓	✓	✓	
10T4	5.5	46	40	✓	NA	NA	NA	✓	✓	

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION	✓	CABINET CONDITION	✓
TANK GROUNDS	✓	ARRESTERS	✓
NOISE LEVEL	✓	ANIMAL GUARDS	✓

Regulator Test & Verification Worksheet												
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)												
Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	121.1	125335	-8	-7	-5	✓	✓	A	I	✓	✓
10L1	Ø B	120.9	268999	-7	-6	-4	✓	✓	A	I	✓	✓
10L1	Ø C	120.4	195022	-7	-6	-4	✓	✓	A	I	✓	✓
10L2	Ø A	120.8	151314	-10	-8	-6	✓	✓	A	I	✓	✓
10L2	Ø B	120.7	95707	-10	-8	-4	✓	✓	A	I	✓	✓
10L2	Ø C	120.5	151928	-10	-8	-4	✓	✓	A	I	✓	✓
10L4	Ø A	123.4	419939	-6	-4	-2	✓		A	I		
10L4	Ø B	123.8	541345	-4	-3	-1	✓		A	I		
10L4	Ø C	121.2	555464	-8	-6	-4	✓	✓	A	I	-	✓

COMMENTS:



Substation Monthly Visual and Operational (V&O) Inspection Sheet

DOC: Substation: Barron Ave Inspected By: Date: 2/4/2019
 Ambient Temp: 45° Control House Temp: 45°

GENERAL INSPECTIONS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) NOTE: Any "U" marking NEEDS comments below.
 NOTE: Before completing any of the following checklists and worksheets, **MAKE SURE** you have read and are familiar with the requirements for each checkbox called out in TSS-M-01.

CONTROL HOUSE (4.3) ☐ NA		YARD INSPECTION (4.4)		SECURITY/PUBLIC SAFETY (4.5)	
Control Panels	NA	Dead Animals	✓	Vandalism	✓
Station Alarms	NA	Avian/Bat Incident Report		Fence & Barbed Wire	✓
Lighting	✓	All Broken Porcelain	✓	Gates	✓
Heaters/Fans/Vents	NA	Noise Level	✓	Gate Locks/Chains	✓
Station Service and Transfer	NA	Ground Connections	✓	Warning Signs	✓
Preferred	NA	Evidence of Heating	✓	Yard Lights	✓
Alternate	NA	Disconnects, Switches & Fuses	✓	Vegetation (Trees)	✓
Fire Equipment	✓	Station Service TRF	✓	Vegetation (Weeds)	✓
Clean & General Condition	✓	Clean and General Condition	✓	Vegetation (Vines)	✓
		Switch Sticks	✓	Any Danger to Public	
MISCELLANEOUS APPARATUS (4.6)					
INSTRUMENT TRANSFORMERS ☐ NA		REACTORS ☒ NA		CABLE & TERMINATIONS ☒ NA	
Noise Level	✓	Cleanliness	NA	Tracking	
Oil Level	✓	Support Insulators	NA	Overheating	
Leaks	✓	Connections	NA	Leaks	
Porcelain	✓	Concrete	NA		
Overheating	✓	Winding Distortion	NA		
BUSES ☐ NA					
Noise Level	✓				
Overheating	✓				
Insulators	✓				
Structures	✓				
Connections	✓				

COMMENTS:

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Substation: **Barron Ave**

Inspected By:

Date:

Control House

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

CONTROL HOUSE						
Log Book	✓	Control Panels	NA		Station Alarms	NA
Annunciators	NA	Tags and Switching Order	✓		Lighting	✓
Heaters/Fans/Vents	NA	Station Service and Transfer	Norm	Emer	Heavy Duty Grounds	
Switch Sticks	✓	Fire Extinguisher	✓		SPCC Plan	
Phone List	✓	Eye Wash	NA		Clean & General Condition	✓
Ambient Temperature	450	Control House temperature	NA			

COMMENTS:

CAPACITORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Bushing Damage ✓ Grounds ✓ Animal Guards NA

Capacitor Test & Verification Worksheet											
(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)											
Circuit Designation	Switch Position	Counters		Control Operation		Clock Time		Alarm Indication	Bulges	Leaks*	Fuses
		Controls	Switch	Auto	Remote	Indicating	Actual				
C1	Open	NA	NA	X		NA	NA	NA	✓	✓	✓

COMMENTS:

Manual

 Liberty Utilities WATER GAS ELECTRIC	Substation Monthly Visual and Operational (V&O) Inspection Sheet
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Breakers

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

Circuit Breakers & Reclosers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)									
Circuit Designation / Location	Counter	Relay Targets	Indicating lights	Battery Load Test	Battery Voltage Reading	Breaker Position Open/Closed	Oil		Counter Card Updates
							Level	Leaks*	
10L1	699	✓	✓	26.0	27.5	closed	N/A	N/A	✓
10L2	106	✓	✓	25.4	27.2	closed	N/A	N/A	✓
10L4	10	✓	✓	25.3	27.2	closed	N/A	N/A	✓

COMMENTS:

TRANSFORMERS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING DAMAGE	✓	FANS & PUMPS	✓	PRESSURE RELIEF	✓
BUSHING OIL LEVEL	✓	CABINET HEATER	✓	NOISE LEVEL	✓
TANK GROUNDS	✓	CABINET VENTS	✓	ARRESTORS	✓

Transformers Test & Verification Worksheet (Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)										
Circuit/ Transformer Designation	Nitrogen Pressure	Top Oil Liquid Temp Gauge ° C			Winding Temp Gauge ° C			Oil Level 25 ° C	Oil Leaks*	Comments
		MAX	INST	Reset	MAX	INST	Reset			
10T1	+1	35	35	—	NA	NA	NA	✓	✓	
10T2	0	30	30	—	30	30	—	✓	✓	
10T4	0	43	43	—	NA	NA	NA	✓	✓	

COMMENTS:



**Substation Monthly Visual and Operational
(V&O) Inspection Sheet**

REGULATORS

(S=Satisfactory, U=Unsatisfactory, NA=Not Applicable) **NOTE:** Any "U" marking NEEDS comments below.

BUSHING CONDITION

✓

CABINET CONDITION

✓

TANK GROUNDS

✓

ARRESTERS

✓

NOISE LEVEL

✓

ANIMAL GUARDS

✓

Regulator Test & Verification Worksheet

(Leak Codes: C=Clean, L=Leaks, W=Weeps, R=Repaired)

Circuit Designation	Phase	Volts	Counter	Min	Present	Max	Reset	Oil Level (Good/Low)	Auto/Manual	Internal/External	Oil Color (Clear/Amber/Dark)	Oil Leaks *
10L1	Ø A	120.9	124944	-9	-6	-4	✓	✓	✓	✓	✓	✓
10L1	Ø B	121.1	263999	-9	-5	-3	✓	✓	✓	✓	✓	✓
10L1	Ø C	120.6	194603	-7	-5	-2	✓	✓	✓	✓	✓	✓
10L2	Ø A	120.7	158777	-3	-7	-4	✓	✓	Auto	Int	✓	✓
10L2	Ø B	120.0	95155	-9	-8	-3	✓	✓	Auto	Int	✓	✓
10L2	Ø C	120.7	151361	-9	-7	-7	✓	✓	Auto	Int	✓	✓
10L4	Ø A	125.1	419700	-4	-1	0	✓	✓	Auto	Int	✓	✓
10L4	Ø B	127.9	541209	-4	-3	0	✓	✓	Auto	Int	✓	✓
10L4	Ø C	121.8	555292	-7	-5	-3	✓	✓	Auto	Int	✓	✓

COMMENTS: