UNITED
POWER
SERVICES
INCORPORATED

817 Fesslers Pkwy ▪ Nashville, TN 37210
615-255-3700 ▪ 1-800-873-8774 ▪ FAX: 615-256-0915

February 8, 2017

Your Contact
Your Facility
Your Address
Your City, State and Postal Code

Dear Mr./ Mrs.:

I would like to thank you for the opportunity to provide this infrared survey. I have reviewed the thermographic survey conducted by our Thermographer, John Smith, and your associate, Bill Smith, on February 2, 2017. This report is based on the areas that they were instructed to survey. There may be areas of your facility not scanned and this report should not be assumed conclusive of your entire facility. Upon completion of your survey, an exit interview was done with Mr. Charles Smith.

Each problem on the report is identified by its specific location, individual component, and severity rating. Also included is one infrared photo showing the temperature rise (intensity and contrast have been adjusted for condition and scale for photography) obtained from our FLIR or FLUKE P or T series cameras.

Since there are many variables in electrical apparatus such as ambient temperature, load, conductor size and material type, the following should be used as a guideline; however, you may need to review each problem and determine how it would affect your facilities operation.

THE INTERNATIONAL ELECTRICAL TESTING ASSOCIATION INC. (NETA) RECOMMENDS THE FOLLOWING GUIDELINES.

SEVERITY RATING 1 = 16 DEG C - OR GREATER IMMEDIATE ATTENTION REQUIRED

SEVERITY RATING 2 = 4-15 DEG C - ATTENTION REQUIRED WITH IN 90 DAYS

SEVERITY RATING 3 = 1-3 DEG C - ATTENTION AT YOUR NEXT SCHEDULED MAINTENANCE OUTAGE

If you require assistance or have any questions, feel free to call 1-800-873-8774. Again thank you for the opportunity to be of service. We hope to be of further assistance in the future.

Sincerely,

Ron Passmore
Certified Thermographer II

Enclosures

cc:

UNITED POWER SERVICES, INC
817 FESSLERS PARKWAY
NASHVILLE, TN 37210
1(615) 255-3700

Thermal Inspection at

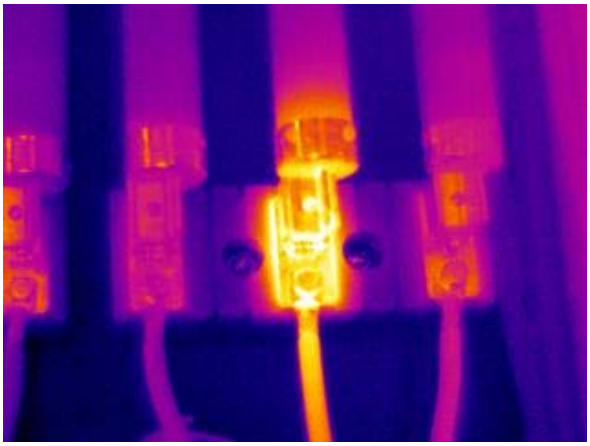
Your Company

Your Address

2 February 2017

By

Our Termographer



Thermal Inspection At Your Company	Date: 02/02/2017

Inspection Site Information	
Customer	Your Company
Address	Your Address
Contact person	Your Plant Contact
Phone number	Your Phone Number
E-mail address	Your Email Address
Thermographer	Our Thermographer

INFORMATION

This is the final report from the thermographic survey performed by our thermographer, on February 2, 2017. Thermal imaging was done with the FLIR Model T630 camera. Current measurements were taken, When possible to verify loads in problem areas.

Repeat problems:

Photo 1 – Main Sub Severity 1. Photo 4 - Bar Line Packaging Severity 1.

PROBLEM HISTORY

	Number of Issues Found						Repeat Issues			
YEAR	SEVERITY RATING 1	SEVERITY RATING 2	SEVERITY RATING 3	Total	# of points surveyed	total # of points	SEVERITY RATING 1	SEVERITY RATING 2	SEVERITY RATING 3	Total
2011	11	15	0	26	314		0	1	0	1
2012	8	14	0	22	327	344	2	1	0	3
2013	11	10	1	22	339	359	0	0	0	0
2014	11	8	0	19	348	369	0	0	0	0
2015	8	7	0	15	490	553	0	1	0	1
2016	5	1	1	7	511	560	1	0	0	1

Overview of Fault Ratings Based on The International Electrical Testing Association Inc. (NETA) Guidelines:

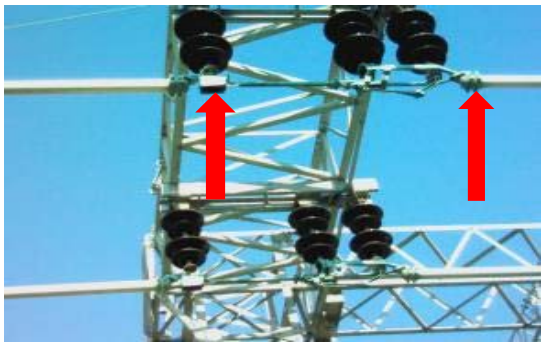
1: Severe Fault +16°C — Repair immediately. Plan new inspection.
2: Medium grade fault 4-15°C — Repair in 90 days. Plan new inspection.
3: Low grade fault 1-3°C — Monitor and repair at your next scheduled shut down.

Thermal Inspection At Your Location	Date: 02/02/2017

Summary of Inspection

Image Date	Photo Number	Priority Rating	Location	Equipment	Sp1 Temperature	Dt1
02/02/2017	1	1	Main Substation	Switch(SO-22)	75.3 °C	35.0 °C
02/02/2017	2	1	Main Substation Primary Switch For Regulator	Switch (SO-21)	78.3 °C	40.7 °C
02/02/2017	3	1	Main Substation Switch For Breaker 9214	Switch (SO29)	61.2 °C	24.5 °C
02/02/2017	4	1	Bar Line Packaging	Bagging 1 Control Panel	97.3 °C	43.6 °C
02/02/2017	5	2	Waste Water Treatment MCC	Main Disconnect For Bay 3	54.1 °C	8.8°C
02/02/2017	6	1	Waste Water Treatment MCC	Bay 6 Transformer	85.5 °C	45.0 °C
02/02/2017	7	3	Boiler Room	Boiler 1 Fused Disconnect	45.0°C	2.1°C

Photo 1.



Location	Main Substation
Equipment	Switch (SO-22)
Priority Rating	1
Date	8/9/2016
Sp1 Temperature	75.3°C
Sp2 Temperature	40.3 °C
Dt1	35.0 °C

AMP READINGS

No amp readings were taken at the time of inspection.

Analysis & Recommended Action:

Description:	**Probable Cause:**
Line 2. Left side of switch right terminal connections. Note: Appears to be the same problem as scan performed in 2016 where fault temp was 14.5º C. The severity rating has increased.	Loose and/or corroded switch contacts, pivot point and/or terminal connection. Possible unbalanced load.

Recommended Repair:

Test load. Clean and reset all connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

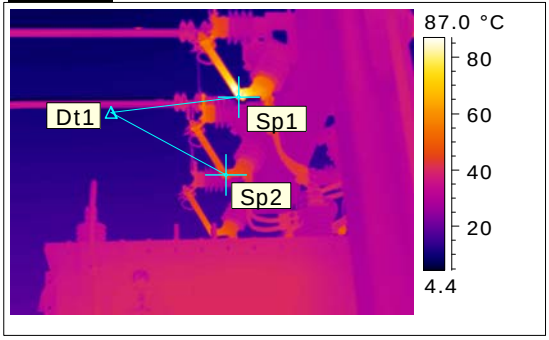
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 2.



Location	Main Substation Primary Switch For Regulator
Equipment	Switch (SO-21)
Priority Rating	1
Date	8/9/2016
Sp1 Temperature	89.3 °C
Sp2 Temperature	48.6 °C
Dt1	40.7 °C

AMP READINGS

No amp readings were taken at the time of inspection.

Analysis & Recommended Action:

Description:	**Probable Cause:**
Right disconnect on road side.	Possible loose and/or corroded switch contacts, terminal connection, and/or pivot point. Possible unbalanced load.

Recommended Repair:

Test load. Clean and reset all connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

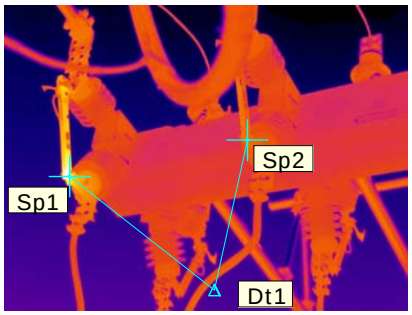
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

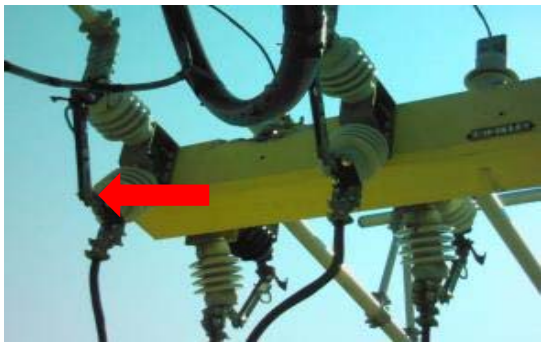
Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 3.





Location	Main Substation Switch For Breaker 9214
Equipment	Breaker 9214
Priority Rating	1
Date	8/9/2016
Sp1 Temperature	61.2 °C
Sp2 Temperature	36.7 °C
Dt1	24.5 °C

AMP READINGS

No amp readings were taken at the time of inspection.

Analysis & Recommended Action:

Description:	**Probable Cause:**
Left switch. Back side pivot.	Loose and/or corroded pivot point and/or terminal connection. Possible unbalanced load.

Recommended Repair:

Test load. Clean and reset all connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

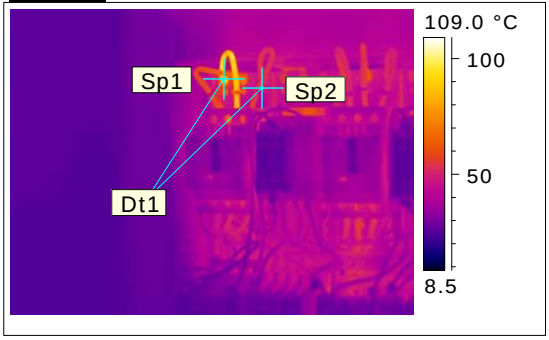
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

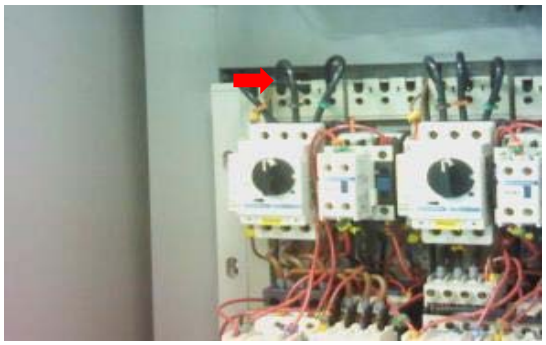
Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 4





Location	Bar Line Packaging
Equipment	Bagging 1 Control
Priority Rating	1
Date	10/17/2016
Sp1 Temperature	97.3 °C
Sp2 Temperature	53.7 °C
Dt1	43.6 °C

AMP READINGS

Left	14.2
Middle	14.3
Right	14.6

Analysis & Recommended Action:

Description:	**Probable Cause:**
25-amp circuit breaker F-540102. Top middle phase rear terminal connection. Note: Appears to be the same problem as scan performed in 2016 where fault temperature was 35.3º C.	Loose and/or corroded terminal connection. Possible deteriorating breaker. Possible conductor damage.

Recommended Repair:

Test breaker and inspect conductor. Replace breaker and conductor if needed. Clean and tighten all terminal connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

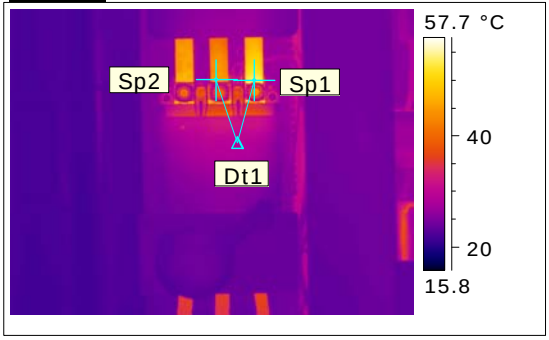
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 5



Location	Waste Water Treatment MCC
Equipment	Main Disconnect For Bay
Priority Rating	2
Date	10/18/2016
Sp1 Temperature	54.1 °C
Sp2 Temperature	45.3 °C
Dt1	8.8 °C

AMP READINGS

Left	142.8
Middle	143.0
Right	140.6

Analysis & Recommended Action:

Description:	**Probable Cause:**
250-amp main disconnect F0. Top right bus bar connection.	Loose and/or corroded bus bar connection.

Recommended Repair:

Clean and reset all terminal connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

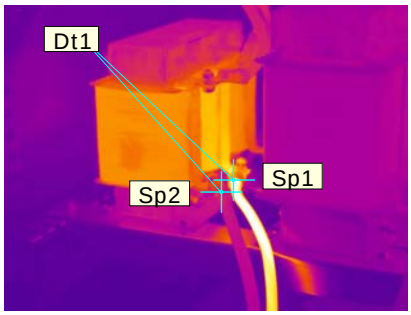
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

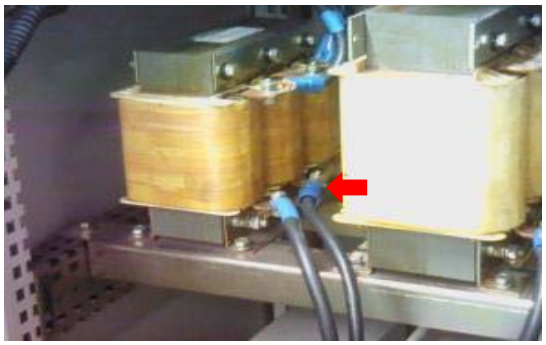
Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 6





Location	Waste Water Treatment MCC
Equipment	Bay 6 Transformer
Priority Rating	1
Date	10/18/2016
Sp1 Temperature	85.5 °C
Sp2 Temperature	40.5 °C
Dt1	45.0 °C

AMP READINGS

Left	76.6
Middle	76.8
Right	77.4

Analysis & Recommended Action:

Description:	**Probable Cause:**
Transformer. Bottom middle phase crimp terminal connection.	Loose and/or corroded terminal connection and possibly the crimp connection.

Recommended Repair:

Clean, tighten and recrimp all terminal connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

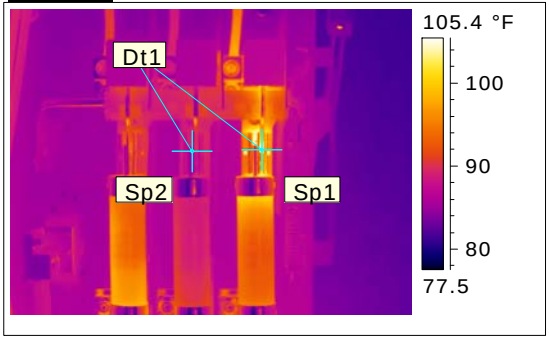
FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

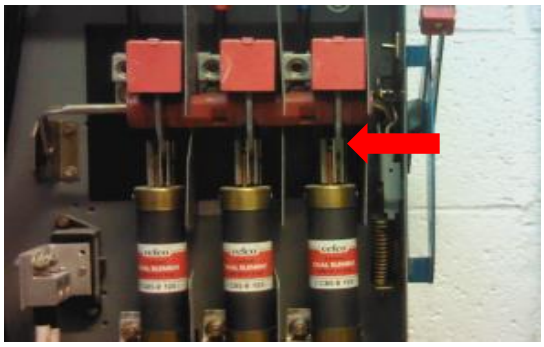
Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

Photo 7





Location	Boiler Room
Equipment	Boiler 1 Fused Disconnect)
Priority Rating	3
Date	12/12/2016
Sp1 Temperature	45.0 °C
Sp2 Temperature	42.9 °C
Dt1	2.1 °C

AMP READINGS

Left **53.3**

Middle **24.0**

Right **34.6**

Analysis & Recommended Action:

Description:	**Probable Cause:**
125-amp right phase fuse. Top fuse clip, switch contacts, pivot point and/or terminal connection.	Unbalanced load. Loose and/or corroded fuse clip, switch contacts, pivot point and/or terminal connection.

Recommended Repair:

Balance load if possible. Clean and reset all connections associated with this unit.

The reason we recommend to clean and reset all connections is because high fault temperatures can mask other issues in surrounding connections.

FOLLOW UP INFORMATION: Amp readings: A Phase B phase C Phase

Temperature readings: Spot 1 Spot 2 Delta T

Repaired by: _____Date:_____

Rescanned by: _____Date:_____

JOB #: UPSI SAMPLE **YOUR COMPANY** **SURVEYED: 2/2/17**

EQUIPMENT LOCATION	ITEM OF CONCERN	STATUS CONDITION	RISE TEMP	SEVERITY RATING
FIRE PUMP MCC 1	RAW WATER PUMP #3	OK		
	RAW WATER PUMP #2	OK		
	RAW WATER PUMP #1	OK		
	ELEC FIRE WATER PUMP CONTROLLER	OK		
	PRIMARY COOLING TOWER FAN #3	OK		
	PRIMARY COOLING TOWER FAN #2:	OK		
	PRIMARY COOLING TOWER FAN #1	OK		
	SECONDARY CIRC WATER PUMP #1	OK		
	SECONDARY CIRC WATER PUMP #2:	OK		
	INCOMING LINES	OK		
	480V MCC #5 FEED	OK		
	JOCKEY PUMP CONTROLLER	OK		
	RETENTION POND SUMP PUMP	OK		
	CIRC WATER BLOW DOWN PUMP #1	LOCKED OUT		
	CIRC WATER BLOW DOWN PUMP #2	OK		
WASTE WATER TREATMENT MCC	AGING TANK PUMP #1	OK		
	AGING TANK PUMP #2	OK		
	WATER TREAT AREA SUMP PUMP	OK		
	MAGNESIUM OXIDE PANEL FEED	LOCKED		
	DEMIN WATER MAKEUP PUMP #1	OK		
	DEMIN WATER MAKEUP PUMP #2	OK		
	BIG MOTOR SERVICE	OK		
	LITTLE MOTOR CIP	OK		
	HVAC UNIT WATER TREATMENT	LOCKED		
	HVAC HEATER	NO LOAD		
	DISTRIBUTION TRANSFORMER DT-6	OK		
	LIGHTING TRANSFORMER LT-6	OK		
	WEAK WASTE PUMP #1	OK		
	CLARIFIER DRIVE	OK		
	EQUALIZATION TANK MIXER	NO LOAD		
	SLURRY DILUTION TANK PUMP #1	OK		
	SLURRY DILUTION TANK PUMP #2	OFF		
	MAIN DISCONNECT BAY 3:			
	TOP LEFT TERMINAL CONNECTION	PHOTO 5	8.8°C	2
	INCOMING LINES	OK		
	BAT 6 TRANSFORMER:			
	BOTTOM MIDDLE PHASE TERMINAL CONNECTION	PHOTO 6	40.5°C	1
BOILER ROOM	PANEL LP-6	OK		
	PANEL DP-6	OK		
	BOILER 1 DISCONNECT:			
	TOP TIGHT FUSE CLIP	PHOTO 7	2.1°C	3
	BOILER 2 DISCONNECT	OK		
	BOILER 1 CONTROL PANEL			
	BOILER 2 CONTROL PANEL			

JOB #: UPSI SAMPLE **YOUR COMPANY** **SURVEYED: 2/2/17**

EQUIPMENT LOCATION	ITEM OF CONCERN	STATUS CONDITION	RISE TEMP	SEVERITY RATING
BAR LINE PACKAGING	009D410 TIRE PULSATION DAMPER #2	OK		
	008D100 BOTTOM ASH CONVEYOR	OK		
	003D619 SOOTBLOWER #20	OK		
	003L633 SOOTBLOWERS	OK		
	BAGGING 1 CONTROL:	PHOTO 4	43.6°C	1
	25 AMP CIRCUIT BREAKER F-540102 TOP-MIDDLE-REAR TERMINAL CONNECTION			
MAIN SUBSTATION	SWITCH (S0-22):			
	LINE 2 OR CENTER PHASE CONTACTS AND TERMINAL CONNECTION	PHOTO 1	35.0°C	1
	SWITCH (SO-21) - PRIMARY SWITCH FOR REGULATOR			
	RIGHT DISCONNECT BOTTOM	PHOTO 2	40.7°C	1
	MAIN TRANSFORMER: ALL CONNECTIONS	OK		
	BREAKER 9214:			
	LEFT SWITCH. BACK SIDE PIVOT	PHOTO 3	24.5°C	1