

Industrial Production Co.

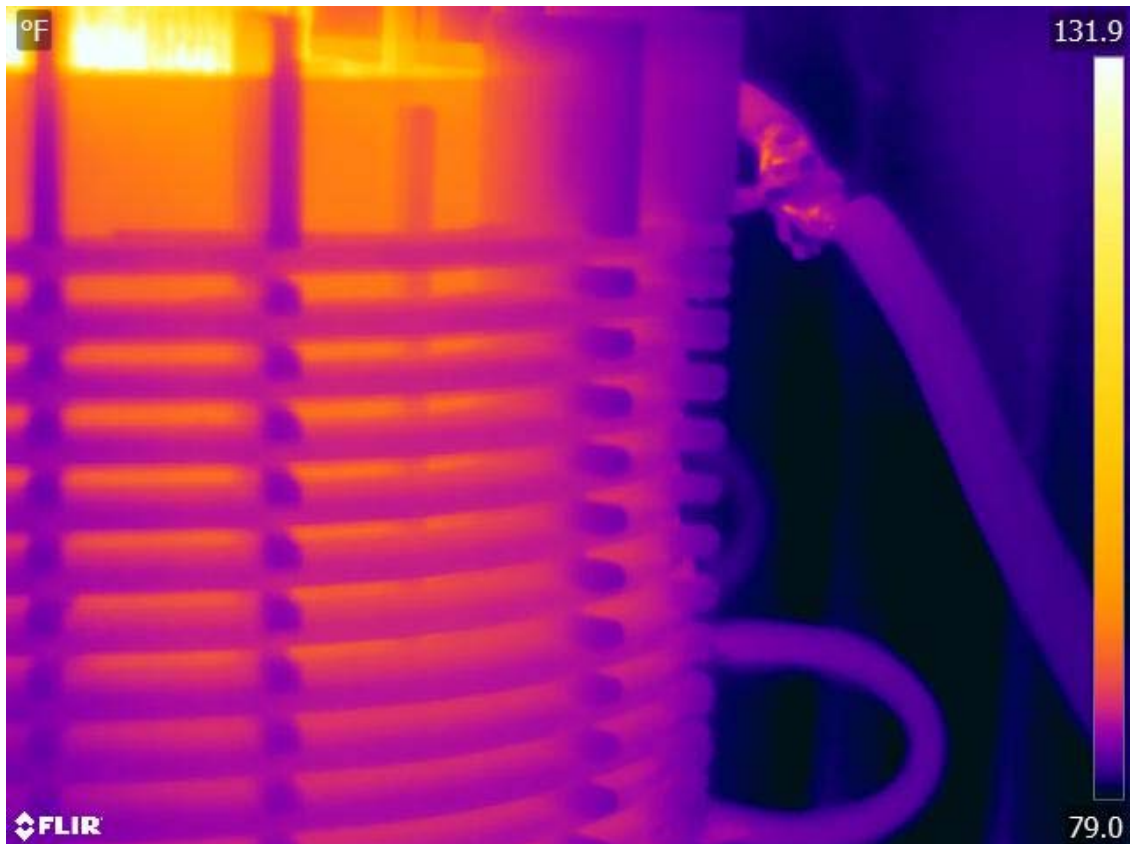
Anytown, PA

Infrared Thermography Inspection Report

Date

**SAMPLE
REPORT**

Normal Dry-Type Transformer Core
and Tap Connections Seen Through IR Window



Report Summary

Industrial Production Company
Anytown, PA

Date

**SAMPLE
REPORT**

The electrical distribution and control equipment was surveyed with an infrared imaging camera, while in operation, to identify abnormal heating. Equipment that was not running at the time of the survey was started to allow circuits to come up in temperature. Equipment that could not be run is noted as “not running”.

A summary of the report is given here.

All thermal anomalies that were found are documented on the Data Pages. These include infrared images and photographs, descriptions, and a recommendation.

A list of the equipment that was inspected is included at the beginning of the report.

Please read over the page entitled “About the Report” for information on how all IRIS Associates infrared thermography reports are arranged.

Do not hesitate to contact us if you have a question.

Thank you!

Maury Confer
IRIS Associates

ABOUT THE REPORT

EACH PAGE DOCUMENTS AN EXCEPTION

The pages of this report are formatted to document "**exceptions**" (abnormally warm or cool components) observed during the survey. Each page documents an exception.

The **thermogram** is the "**heat picture**" that shows the problem. Accompanying this is a photograph of the same item with an arrow or circle to identify the "**hot spot**".

The text of the page identifies the **date**, **area**, piece of **equipment**, and the **problem**. A **recommendation** is also made; however, the actual repair procedure will be the decision of the owners and maintainers of the equipment. This should be based on what is found once the problem is investigated.

A "**priority**" of each problem is given based on the temperature rise of the hot spot above a reference, which is usually a similar component under the same conditions. This can be useful in determining the immediacy of the needed repair. The table below is used as a **GUIDE** for severity. Considerations such as safety, criticality of the equipment, and availability of spares must also be taken into consideration by plant personnel when determining severity.

<u>Severity</u>	<u>Degrees F Above reference</u>	<u>Comments</u>	
1	zero to 25	Low Priority	A problem exists, schedule action as convenient
2	25 to 100	Medium Priority	Schedule action soon
3	over 100	High Priority	Schedule action immediately

At the bottom right of the page is a "**Repair Comments**" box to record when the problem was addressed, along with any comments.

Note: Sometimes sample images are included in the report to show equipment in normal condition. These are marked as "sample" or "informational" images and do not follow the format of documented problems.

Near the beginning of the report is an **equipment list**, which lists the equipment that was inspected, whether any problems were found, and on which page a problem is documented, if applicable. This is useful in knowing what was checked. It also serves as a checklist for the next survey, thus maximizing the use of time on future inspections.

ABOUT THE THERMOGRAPH

Along the right of the thermograph is a scale showing the temperature range, and the corresponding color.

The area of concern is usually outlined with a rectangle or circle. The maximum temperature within the area appears in the upper left corner of the thermograph. A reference temperature is marked with a "spot" (crosshair) and this reference temperature also appears in the upper left corner. The difference between the two temperatures is the rise of the hot spot above the reference.

Industrial Production Company

Anytown, PA

Infrared Thermography Inspection Equipment List
Date

As Found

Outdoor 138 kV Substation

The 138 kV Substation equipment inspected includes the lines, line connections, switches, bushing connections, capacitors, and any other visible connections

See Data Pages 1 and 2

Station battery charger cabinet (in block building)

Ok

Electrical Room No. 1

MCC A controls
MCC B controls

See Data Page 4

Ok

Safety switch A
Safety switch B
Safety switch C

Ok

Ok

Ok

Electrical Room No. 2

MCC "H" control buckets
Dry-type Transformer (through IR windows)

See Data Page 5

Ok

Safety switch D
Safety switch E
Safety switch F

Ok

Ok

Ok

Utility Equipment Room

No. 1 Air Compressor – safety switch and controls
No. 2 Air Compressor – safety switch and controls
Air separator controls

Ok

Ok

Ok

Baghouse Main Blower controls
Baghouse auxiliary controls

See Data Page 3

Ok

**SAMPLE
REPORT**

Industrial Production Company

Anytown, PA

Infrared Thermography Inspection Equipment List
Date

	As Found
Electrical Room No. 3	
MCC "C" controls	Ok
MCC "D" controls	Ok
Safety switch A	Ok
Safety switch B	Ok
Safety switch C	Ok
Dry-type transformer through IR windows	Ok
Boiler Room	
Boiler control panel	Ok
Phase protection contactor cabinet	Ok
Water Pump controls	Ok
Hydraulic Unit controls and safety switch	Ok
Admin Building Electrical Room	
Elevator controls	Ok
Main panelboard (cover is hinged)	Ok

**SAMPLE
REPORT**

**Industrial Production Company
Anytown, PA**

**SAMPLE
REPORT**

Date:

Area: Outdoor High Voltage Substation - Gas Turbine Generator No. 2

Equipment: Gas Circuit Breaker Line-Side north phase bushing connection

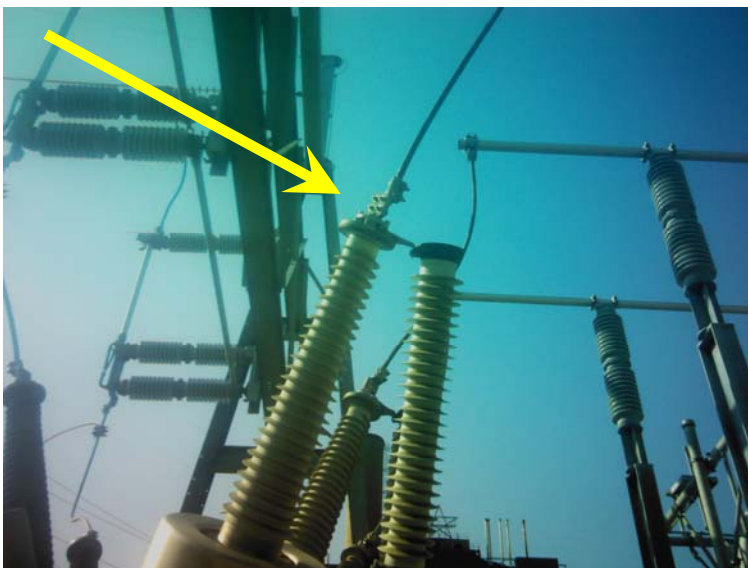


Problem:

The connection on the north phase (right phase facing the breaker) line-side bushing is hot. The cable connection is ok. The heat is coming from where the terminal bolts to the bushing.

Recommendation:

Disassemble the connection. Check the condition of the contacting surfaces and hardware. Clean or repair as necessary. Make sure the connection is clean and tight. See more pictures next page.



Severity: 3 high priority

- 1: Schedule action as convenient
- 2: Schedule action soon
- 3: Schedule action immediately

<u>Temperatures:</u>	Ambient:	70 °F
	Hot Spot:	225 °F
	Reference:	122 °F
	Minimum Degree Rise:	103 °F

Repair Comments:

Repaired By:

Repair Date:

Industrial Production Company

Anytown, PA

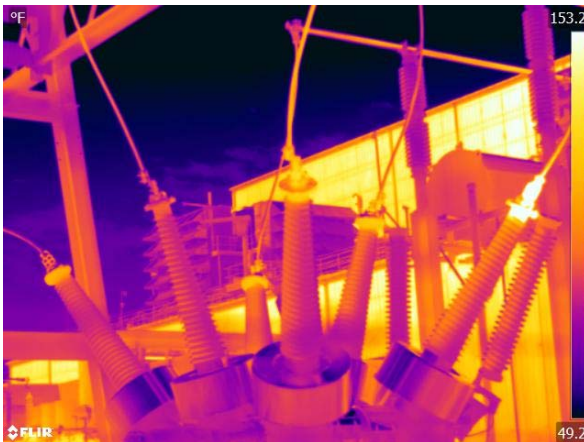
**SAMPLE
REPORT**



Outdoor High Voltage Substation
Gas Turbine Generator No. 2

This is the same circuit breaker as shown on
Data Page 1

Gas Circuit Breaker Line-Side bushing connection on
the north phase



This is the same breaker as shown above and on
Data Page 1. The hot connection is shown with the
normal connections.



This is the same breaker as shown above and on
Data Page 1. The exact source of the heat can be
seen by using a different color pallet.

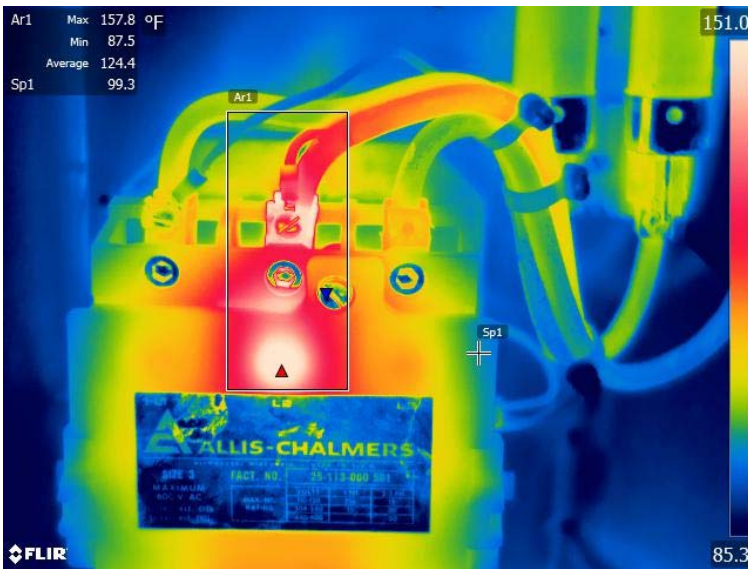
**Industrial Production Company
Anytown, PA**

**SAMPLE
REPORT**

Date:

Area: Utility Equipment Room

Equipment: Starter for the Baghouse Main Blower / internal hot connection (inside the starter)



Problem:

The starter has a hot spot on the center phase coming from inside the starter. The highest temperature is not known because it's inside the case.

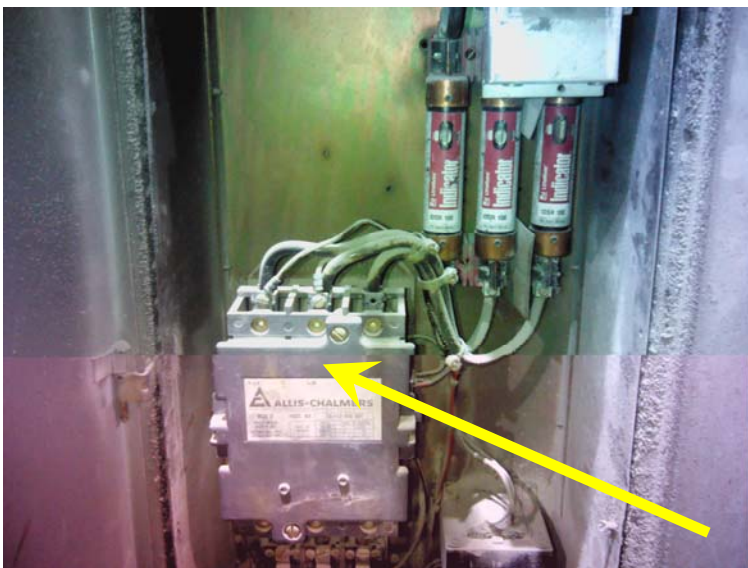
Recommendation:

Remove the starter cover and check the center phase near the top for a high resistance connection or bad contacts.

Severity: Unknown

- 1: Schedule action as convenient
- 2: Schedule action soon
- 3: Schedule action immediately

<u>Temperatures:</u>	Ambient:	70 °F
	Hot Spot:	158 °F
	Reference:	124 °F
	Minimum Degree Rise:	>34 °F



Repair Comments: _____

Repaired By:

Repair Date:

**Industrial Production Company
Anytown, PA**

Date:

Area: Electrical Room No. 1

Equipment: MCC "A" / Ventilation Fan No. 3 motor control

**SAMPLE
REPORT**



Problem:

The center phase hinge joint is very hot. The metal is discolored from the heat.

Recommendation:

Exercise the switch. Clean and tighten the hinge contact area and the main contact area if possible.

It may require replacing the switch



Severity: 3 high priority

- 1: Schedule action as convenient
- 2: Schedule action soon
- 3: Schedule action immediately

<u>Temperatures:</u>	Ambient:	90 °F
	Hot Spot:	437 °F
	Reference:	253 °F
	Minimum Degree Rise:	184 °F

Repair Comments:

Repaired By:

Repair Date:

**Industrial Production Company
Anytown, PA**

Date:

Area: No. 2 Electrical Room

Equipment: MCC "H" – circuit breaker for Air Compressor No. 2

**SAMPLE
REPORT**



Problem:

The bottom front cable on the left phase of the main circuit breaker is very hot.

The insulation is burnt and crispy.

Recommendation:

Disconnect the cable and inspect the cable and breaker. Cut off the heat-damaged end of the cable and make a new connection.

Severity: 3 high priority

- 1: Schedule action as convenient
- 2: Schedule action soon
- 3: Schedule action immediately



<u>Temperatures:</u>	Ambient:	55 °F
	Hot Spot:	357 °F
	Reference:	94 °F
	Minimum Degree Rise:	263 °F

Repair Comments:

Repaired By:
Repair Date:

Industrial Production Company

Anytown, PA

Date

**SAMPLE
REPORT**

Informational Images

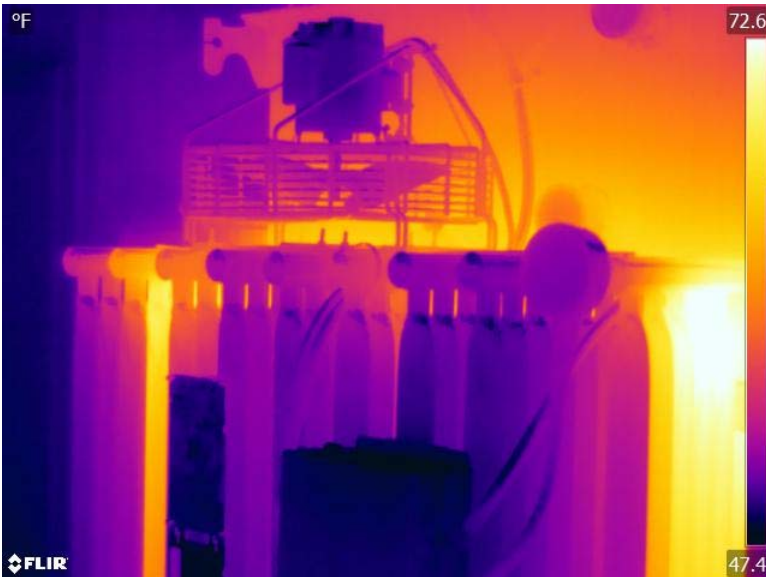
South 13.8 kV Substation

East Transformer

Transformer before and after adding oil to bring it to the correct level.

Low oil level – oil not making it into most of the radiator tubes.

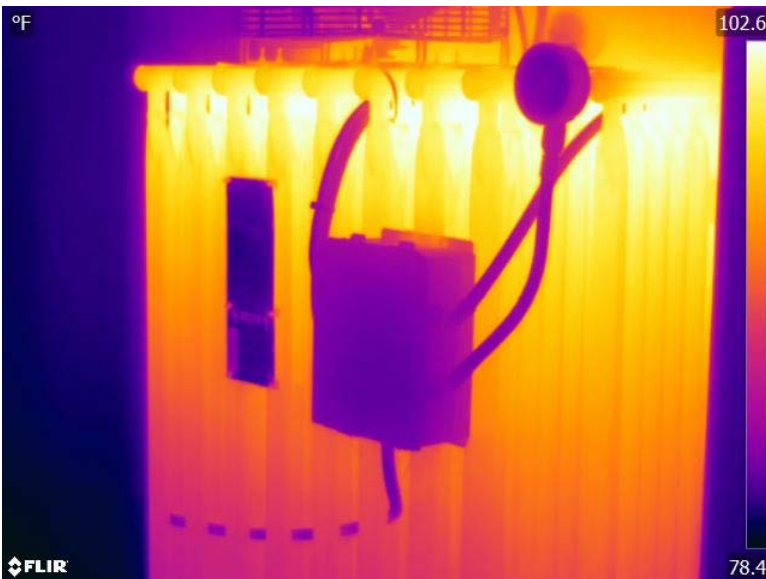
Dark radiator tubes are cold therefore no oil and no cooling.



Same transformer after adding oil to the correct level.

All radiator tubes are warm, have oil moving through them, transformer is being cooled normally.

No further action is necessary.



Industrial Production Company

Anytown, PA

Date

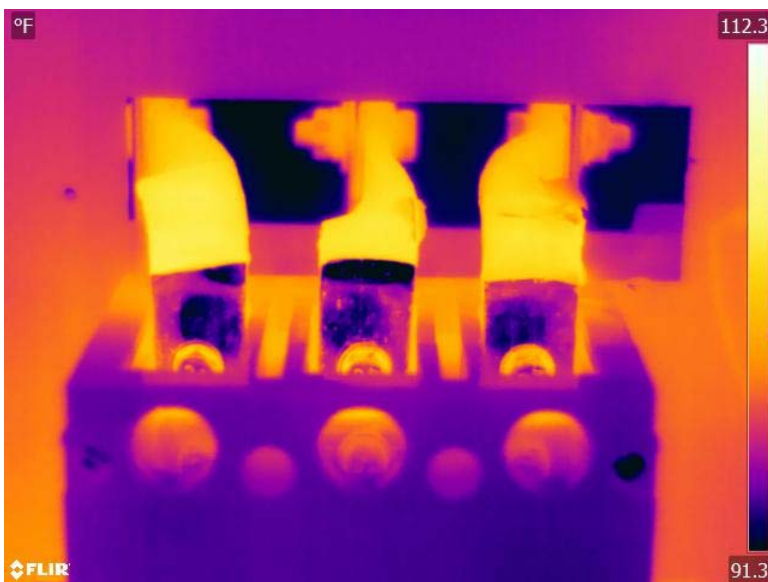
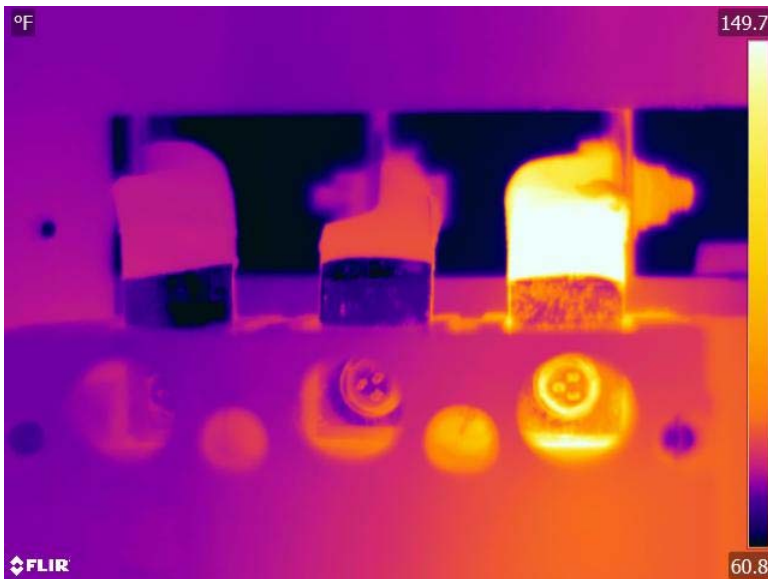
**SAMPLE
REPORT**

Informational Images

Electrical Room No. 3

MCC "D"

Hot connection on circuit breaker for Auxiliary Coolant Pump as found at the time of the previous inspection.



Same circuit breaker as above with normal condition after servicing the connection.