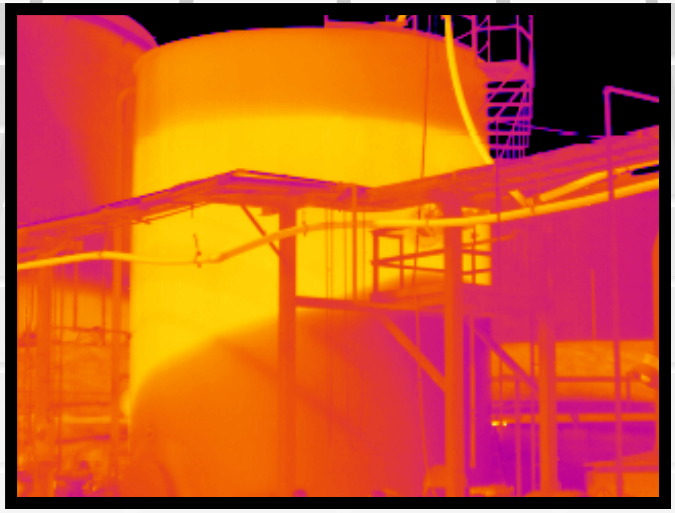
Leak Detection and ROI

Jim Riffle, CIH, CIT
Certified Infrared Thermographer



auburn environmental

LEAK FINDER

Objective

- Discuss two methods for identifying energy leaks and calculating the associated return on investment.
  - Infrared Thermography
  - Ultrasonic

Infrared Thermography

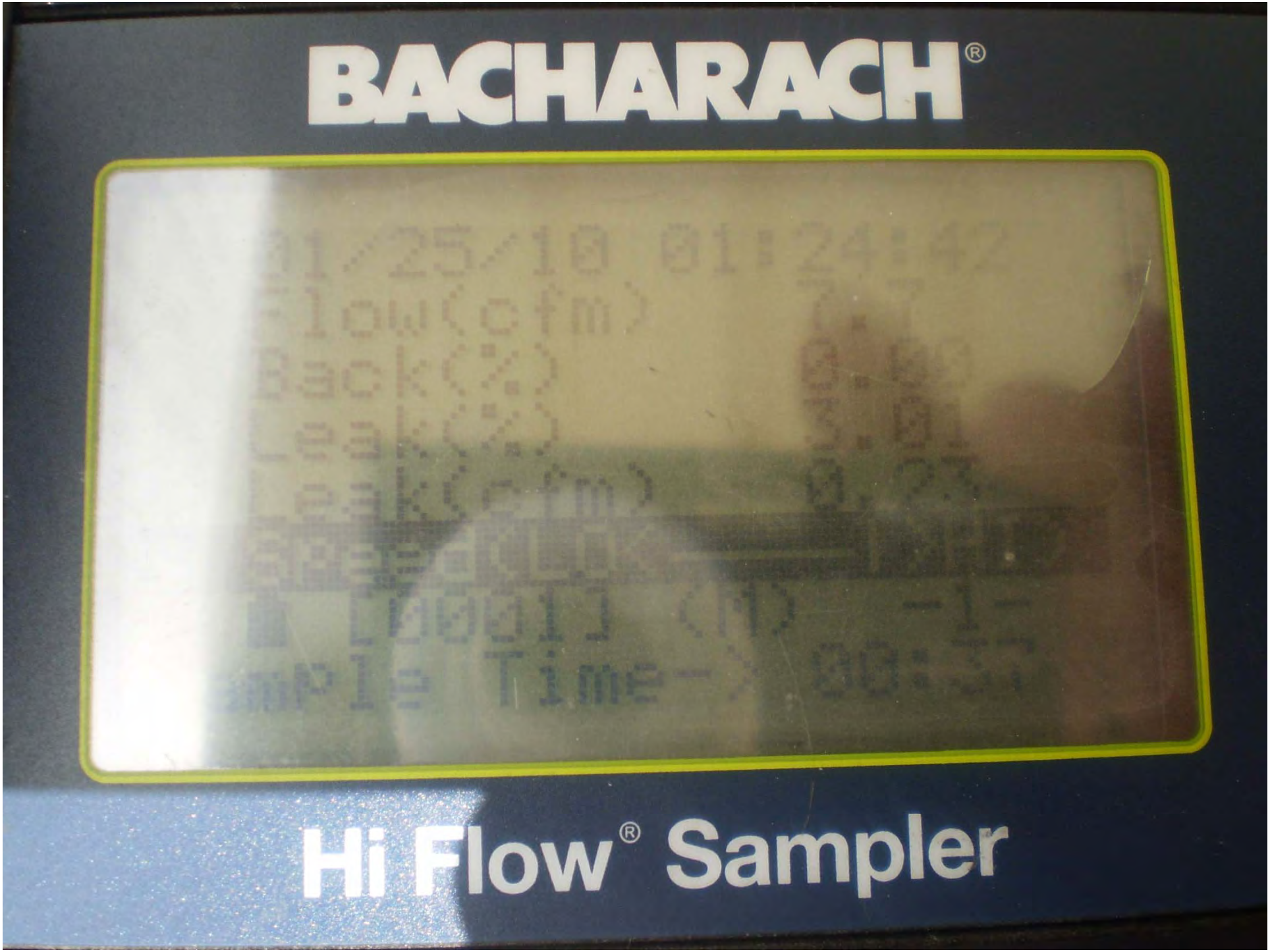
- Gas Surveys - Natural Gas, Carbon Monoxide, SF6, Ammonia, FREON, Ethylene and many others.
- Electrical/Mechanical Surveys - Transformers, breakers, motors, steam traps, etc.
- Refractory Surveys - Wear spots in furnaces, kilns, towers, etc.

Gas Survey Cameras

Midwave - Benzene, Natural Gas, others

Long wave – SF6, FREON, others

Natural Gas Surveys


BACHARACH®
01/25/10 01:24:42
Flow(cfm)
Back(%)
Leak(%)
Leak(cfm)
Hi Flow® Sampler

Return on Investment – Recent Inspection

- 61 leaks identified in two days
- Return on Investment – Can be fast!!!
  - Approximately $150,000.00 of leaks identified per year.
  - Parts and labor less than $50,000.00

0.3 CFM Leak Rate Small Leak – On one (1)component!!!!!!!!!!!!!!!	**$1200.00 year – For one (1) component!!!!!!!**

Return on Investment

Location Component	Yearly Leak Rate (Mcf/yr)	Gas Price MCF ($)	Annual Costs
56 inch mill near swing pan blank	52.6	13	$683.80
56 inch mill east side gas line on roof dresser coupling	1577	13	$20,501.00
56 inch mill west side gas line on roof dresser coupling	1577	13	$20,501.00
Burma Road Gas Line Near River – Underground leak, travelling up electric pole 28	5256	13	$68,328.00
		Total	**$110,013.80**

- 56 inch mill east side fitting near pan blank 0.1 cfm, $683.80 per year

Carbon monoxide

Return on Investment

Return on Investment

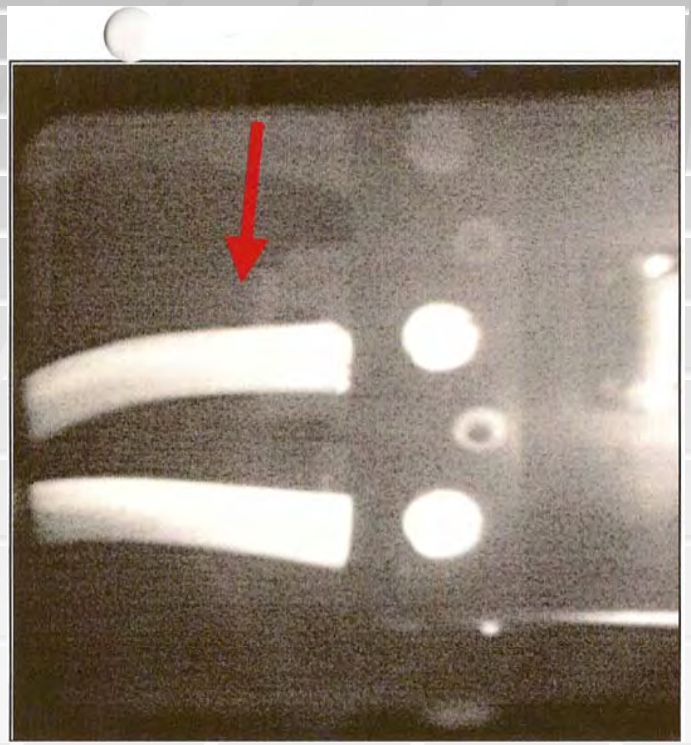
- Crane operator carbon monoxide poisoning
- Assisted with thermal furnace tuning using GASFINDIR

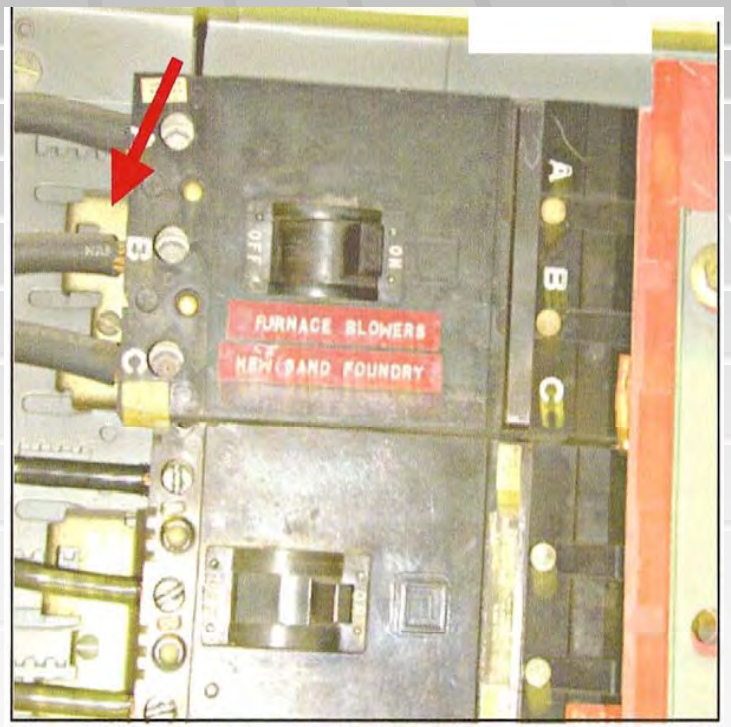
Gas Leak Detection

Electrical Surveys

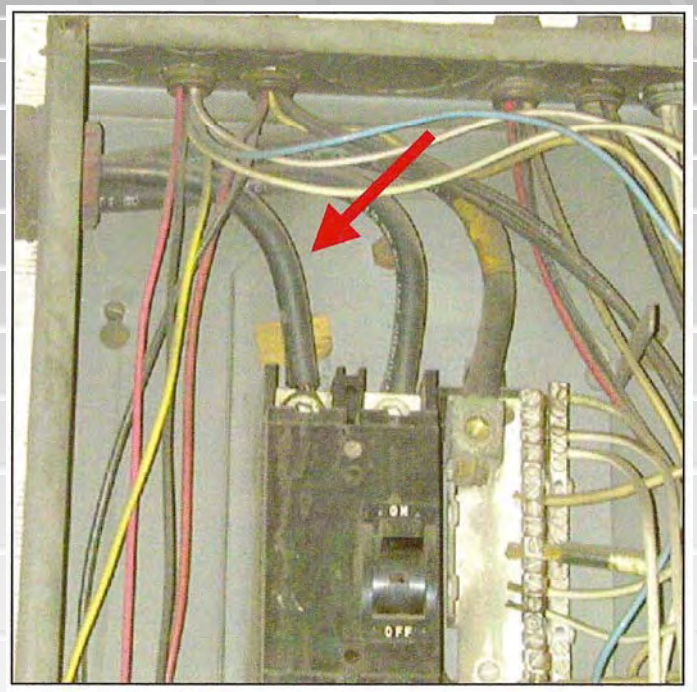
- ✓ **Arcing, over loads, green house gas**

Disconnect
Loose/poor Connector
"A" Phase





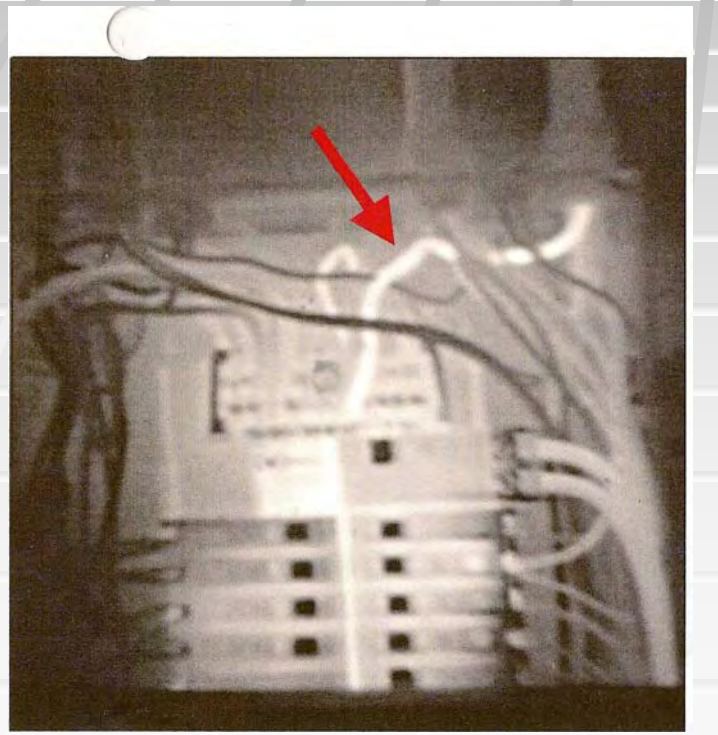
Disconnect
Loose Connector



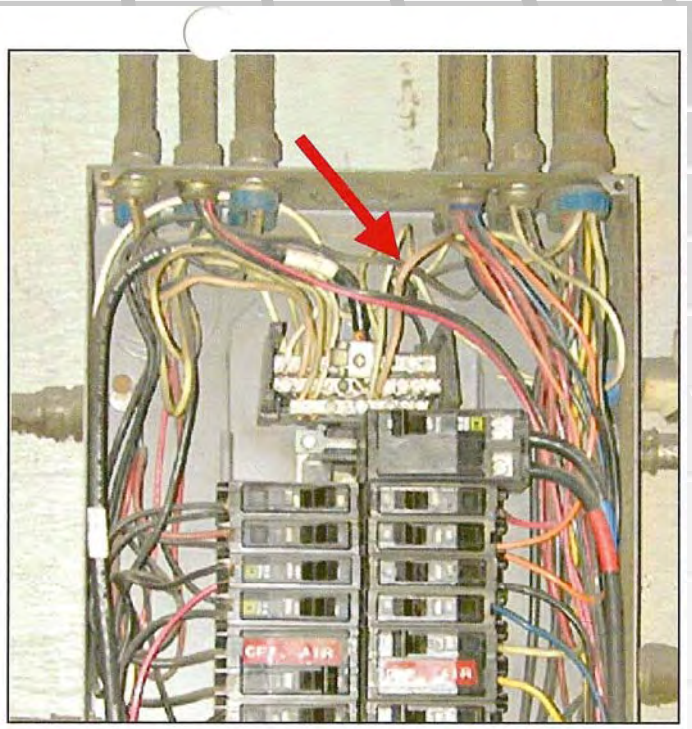
Slight Overload

Location: Lighting Panel

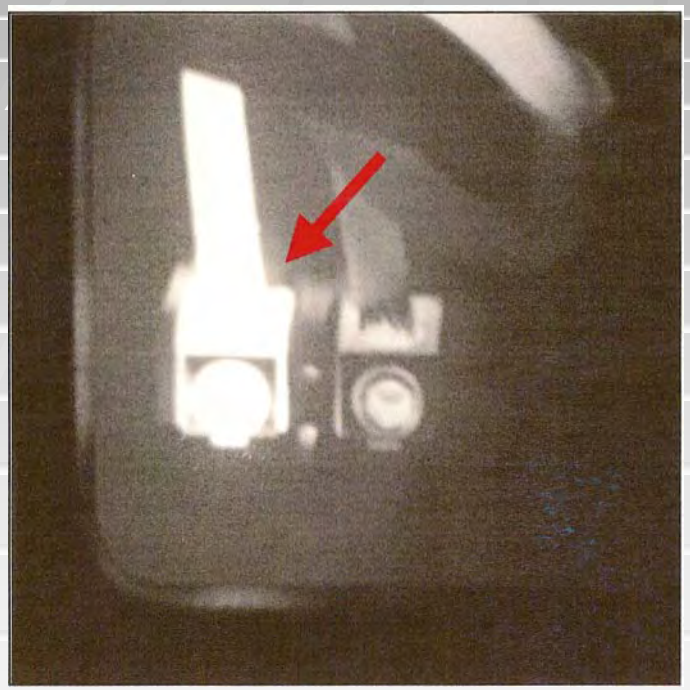
A phase 12

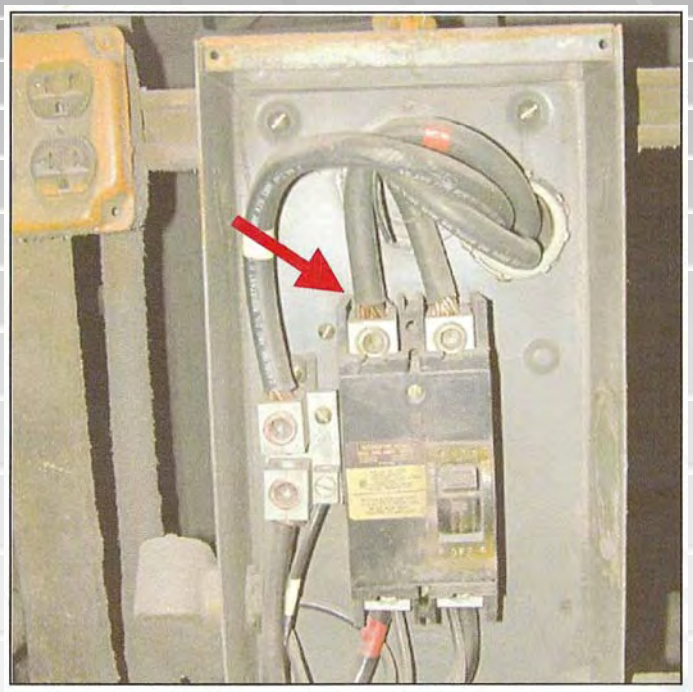


B phase 8

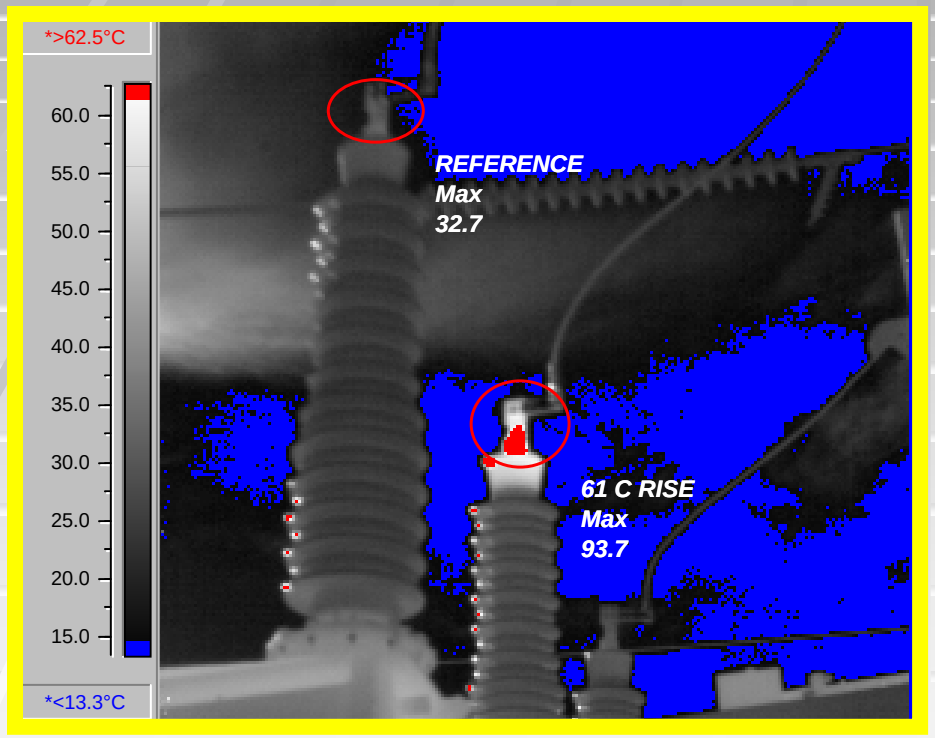


Power Breaker
Loose Connection Line Side





Electrical Distribution Systems



ROI CASE STUDY…

Large US Utility

#3A Bank 220/66 KV

Hot Bushing Rod

Potential loss –

$2,000,000 (based on previous failure and repair).

Because fault was found, they were able to Schedule repair @ $15,000 (includes parts and labor)

Electrical Surveys

Return on Investment – Catastrophic Incidents

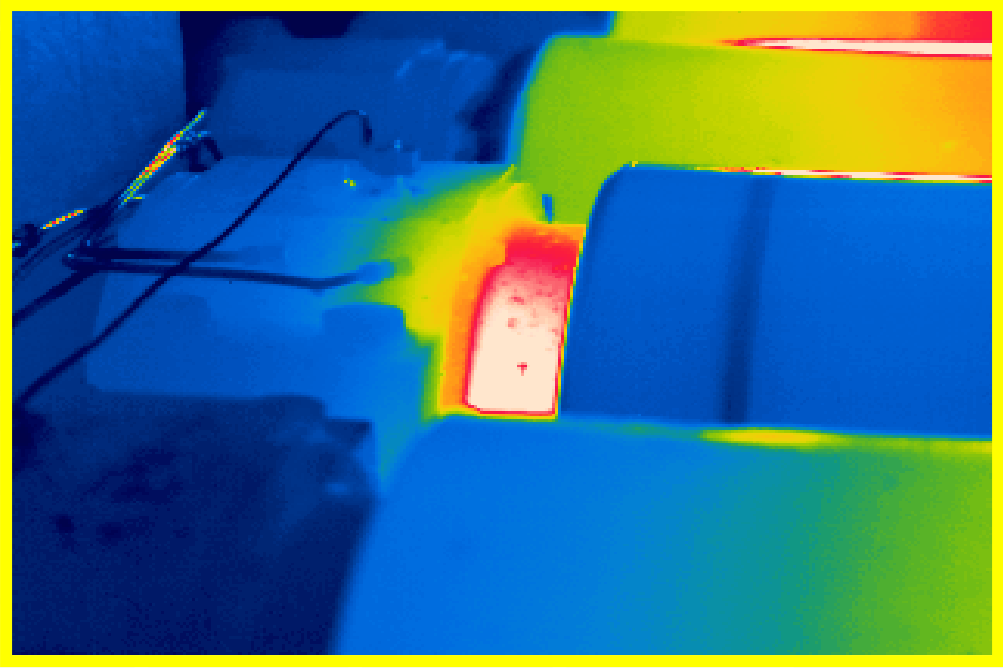
- Combustible dust and fire safety
- Loss in excess of $1,000,000.00


GAS


CLINTON TWP, MI 1-800-968-9070
HOLLY SPRINGS, MS 1-800-654-9147

Mechanical Systems

- US Steel Mill
- Annual shut down prep. *Cost $30,000* to shut down mill for 30 minutes to test roller bearings prior to annual plant turnaround (using vibration analysis).
- Using IR reduced the plant shut down time from 30 to 5 minutes. *Saved the plant $25,000!!!*

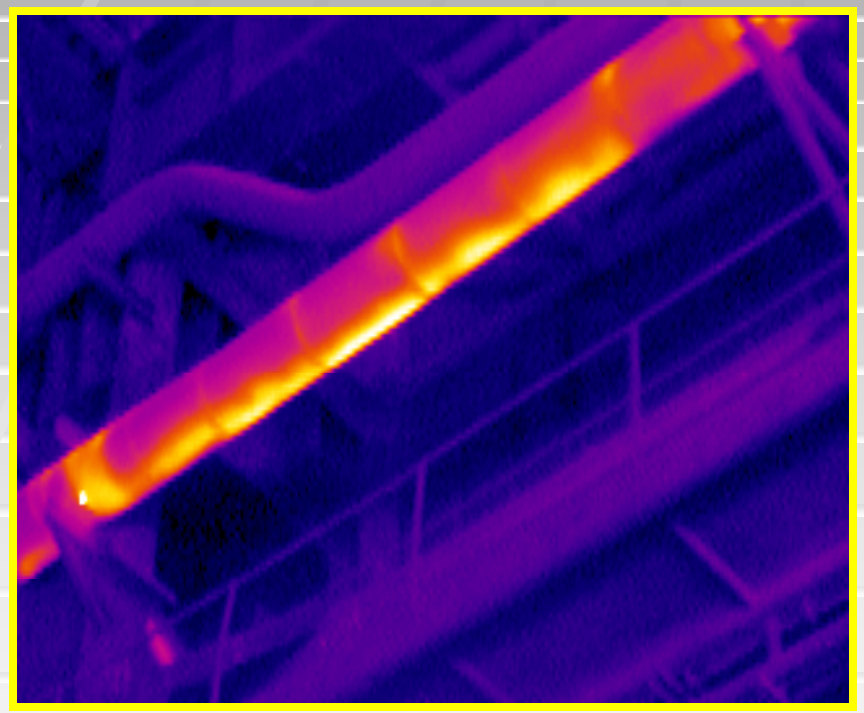


Steam Systems

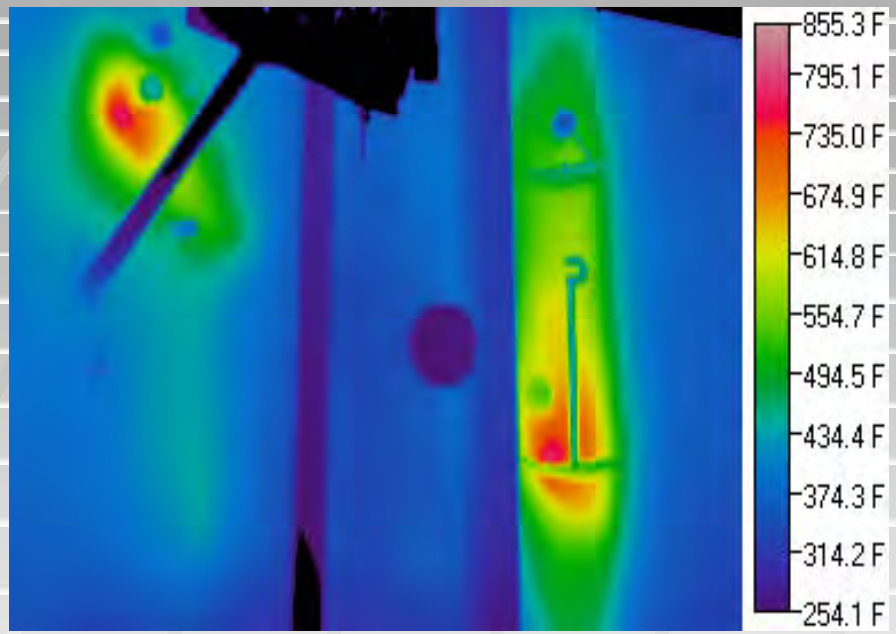
- US HOSPITAL
- Boiler system steam trap study (currently in process).
- Hospital has 800 steam traps. If 15% of these fail per year and go undetected, it can cost them from $100,000 to $300,000 annually.

Steam Systems

- Hot spots are water



Refractory Survey



LOCATION	FR4-HV3 cross-over; North wall
PROBLEM	Severe refractory loss in areas
RECOMMENDATION	Put air on/inject area with refractory/monitor status

Emissivity	Max Temp F	MinTemp F	Average Temperature	Temperature Units
0.90	**855.4**	**176.2**	**374.4**	**F**

Ultrasonic Surveys

- Gas Surveys - Hydrogen, Nitrogen, Oxygen, compressed air systems, etc.
- Electrical Surveys - Panels, breakers, etc.
- Mechanical Surveys - Motors, steam, etc.

Nitrogen, Oxygen & Compressed Air Survey

- US Manufacturing Client
- Two day survey identified over one hundred leaks totaling over $100,000.00

Leak Rates

- Loss was estimated utilizing the following:
- $$$ Loss Per Year = {(20.57 * A * P) / {Dg * (T + 460) ^ 0.5} / 1000} * 60 * 8760 * Cost / 1000 cu ft
- Dollars $$$ lost per year based on effective leak size and pressure.
- ROI calculated subsequent to repairs.

Repairs

- Continuous blow downs of the facility compressed air was a common practice that involved operating traps in the wide open position on a continuous basis.
- Traps were replaced with automatic ones.
- High flow air nozzles were replaced with low flow on cameras in operating mills
- Process leaks repaired.

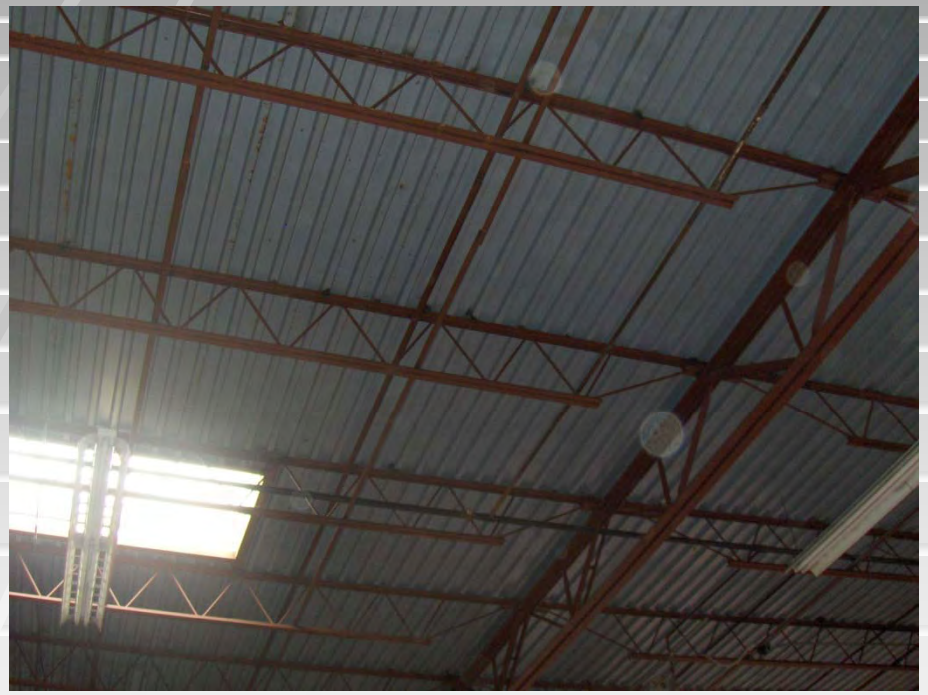
Ultrasonic Detected

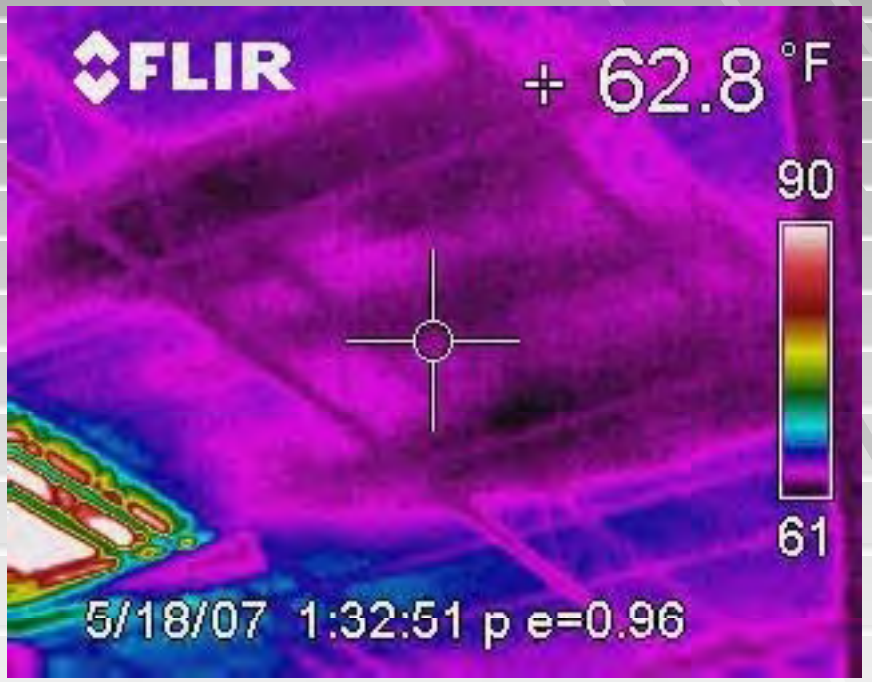
- Gas line near river – underground leak travelling up
- Electric pole #28 - 10 cfm, $68,328.00 per year.

Ultrasonic Non- Detected

- 56 inch mill west side gas line on roof - 3.0 cfm,$20,501.00 per year

Roof Holding Water
Ohio - Day

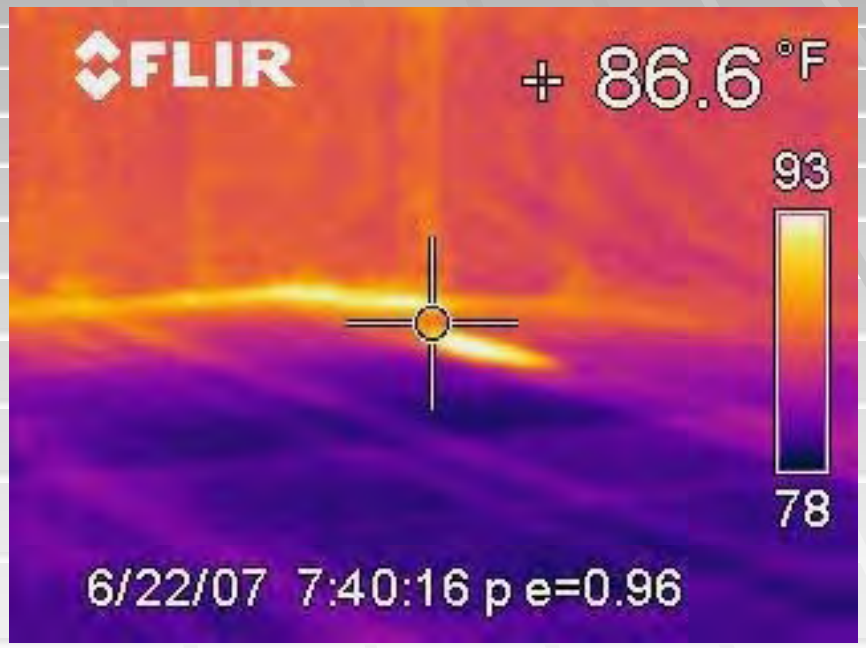




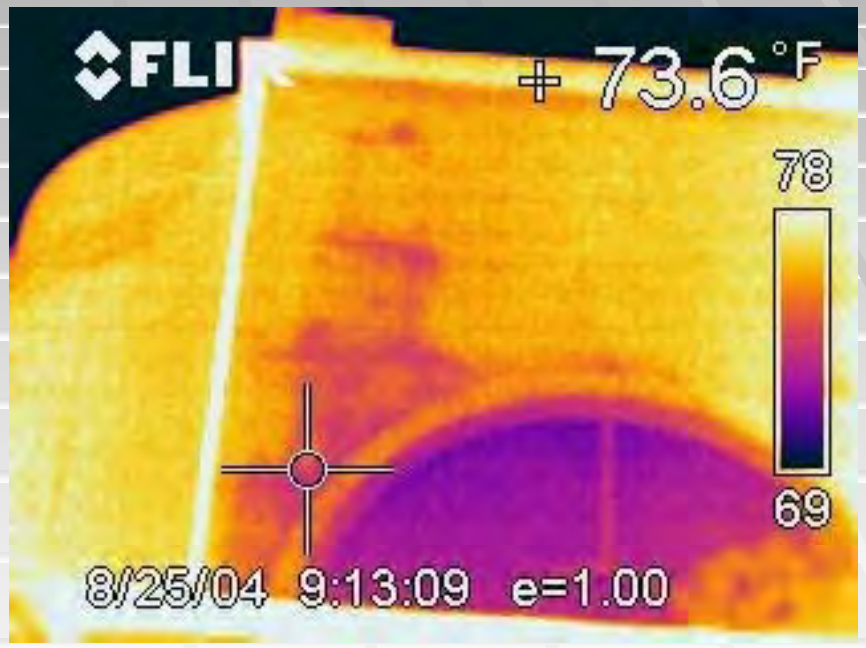
Thermal Capacitance

- Water has a high thermal capacitance or ability to store heat.
- Wet areas of building material that are evaluated at sunset will maintain the heat absorbed from the daytime sunlight better than the surrounding dry building materials.

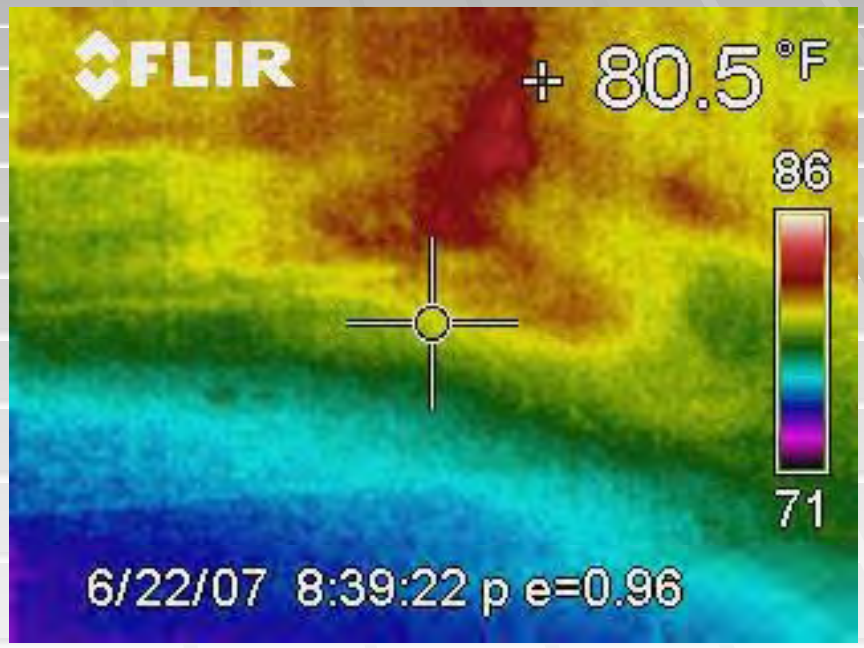
Thermal Capacitance
Florida Condo - Night



Hidden Water Problems



Florida Condo - Night



Contact Information

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