



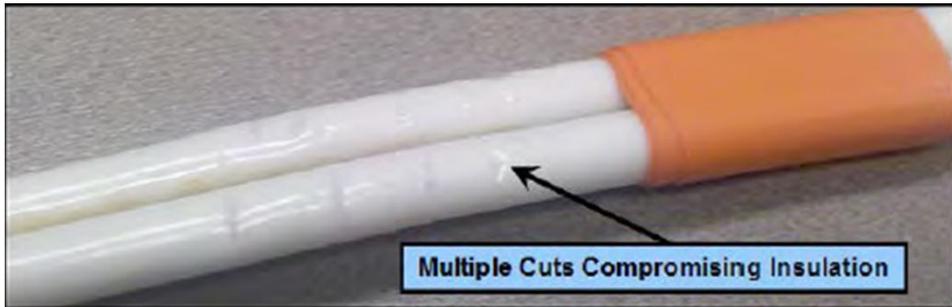
Using PQ Data for Utility Equipment Assessment and Incipient Failure

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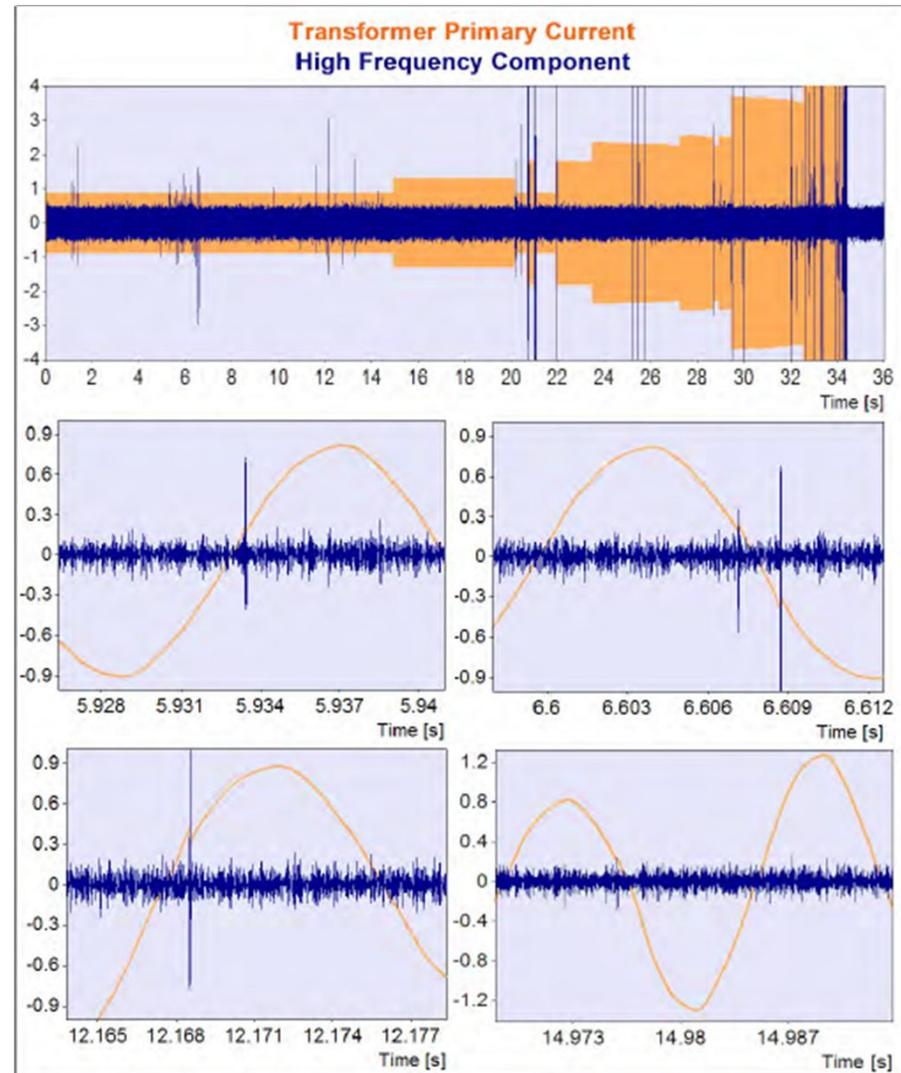
Manager, EPRI Industrial Center of Excellence

In-plant Equipment Problems



Detecting problems in Transformers

- Many issues in the electrical environment can lead to transformer failure
 - Overloading
 - Overheating
 - Mechanical stress
 - Electrical stress
 - Contamination
- Higher-frequency voltage components can provide indication of incipient failure



Quick Review – PQ for Equipment Assessment and Incipient Failure

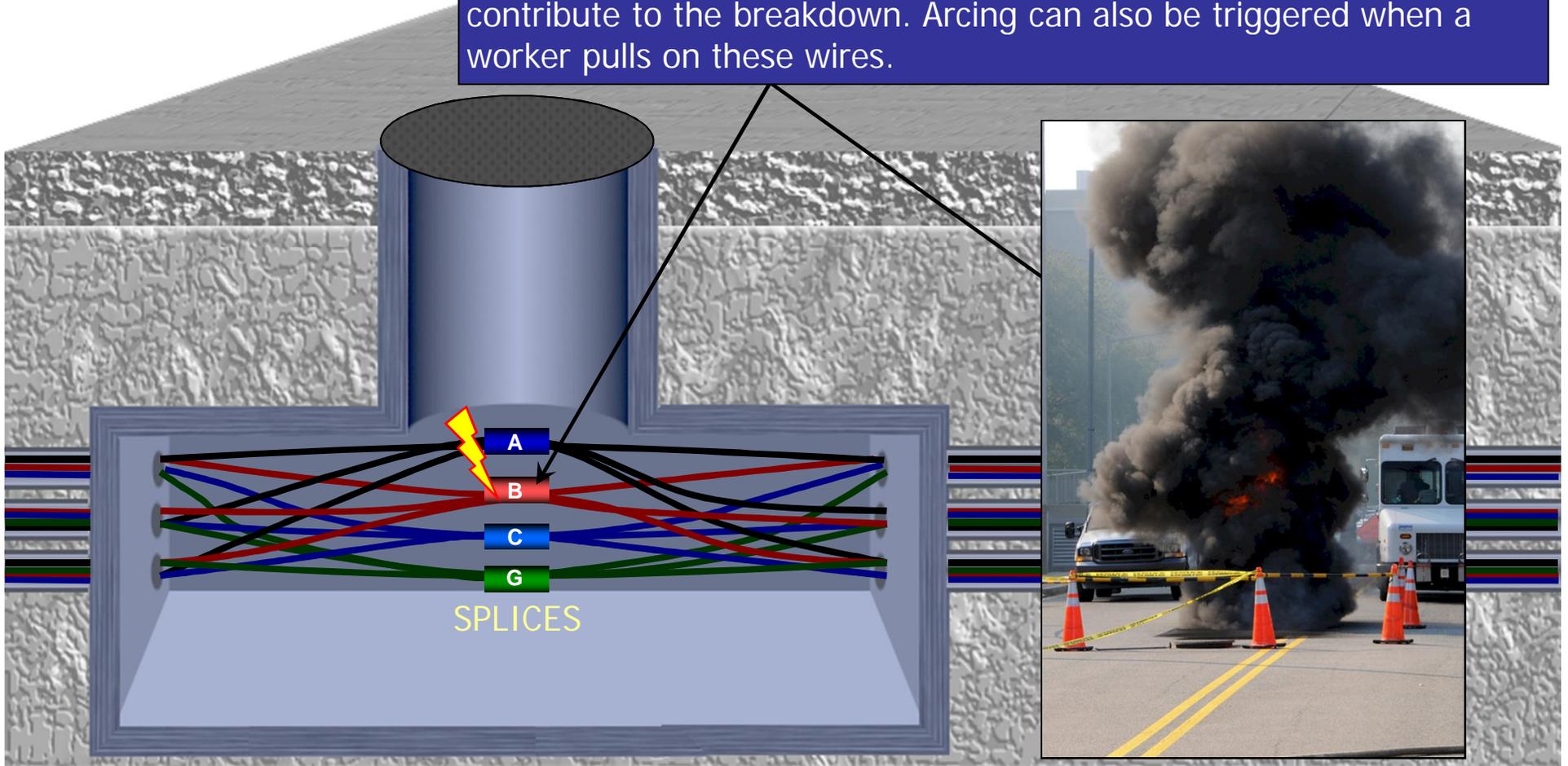
Key Findings

- Arcing/Partial Discharge most common phenomena of impending failure
- Arcing Indicators Established
- Systems need new triggering algorithms and enhanced data acquisition methods



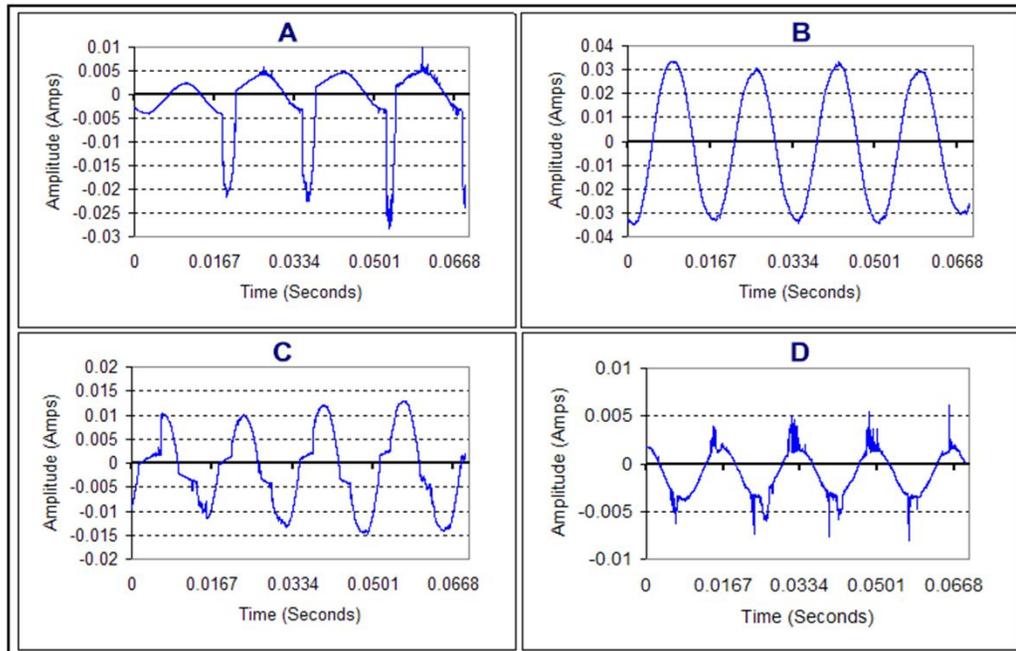
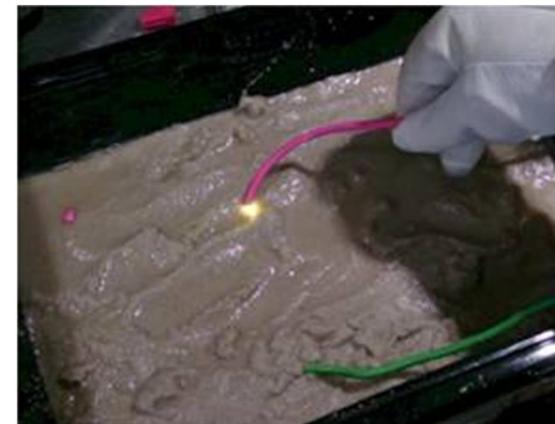
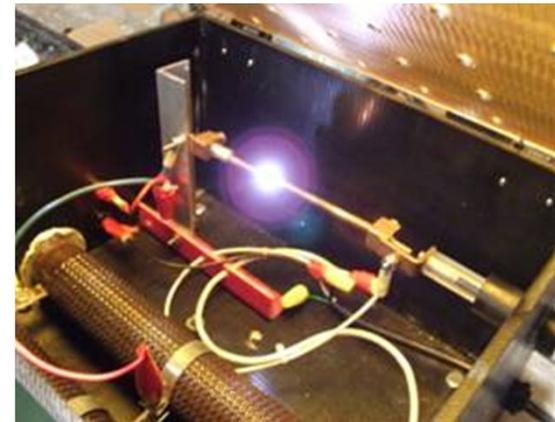
Sample Issue

Common causes stem from poor splice connections, insulation breakdown, or damaged conduit. Rain and ground contaminants can contribute to the breakdown. Arcing can also be triggered when a worker pulls on these wires.

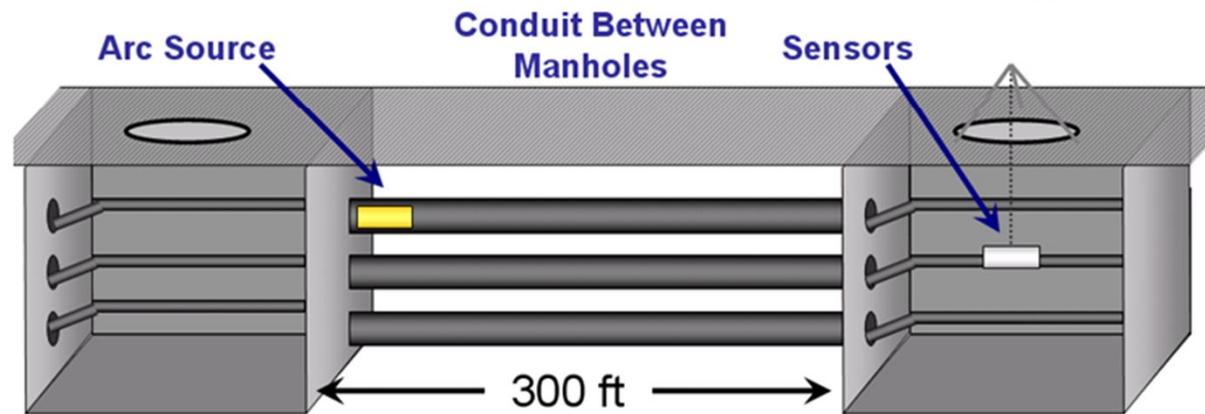


Laboratory Demonstration

- Assess types of Arcing and Signatures
- Controlled and Field Simulations

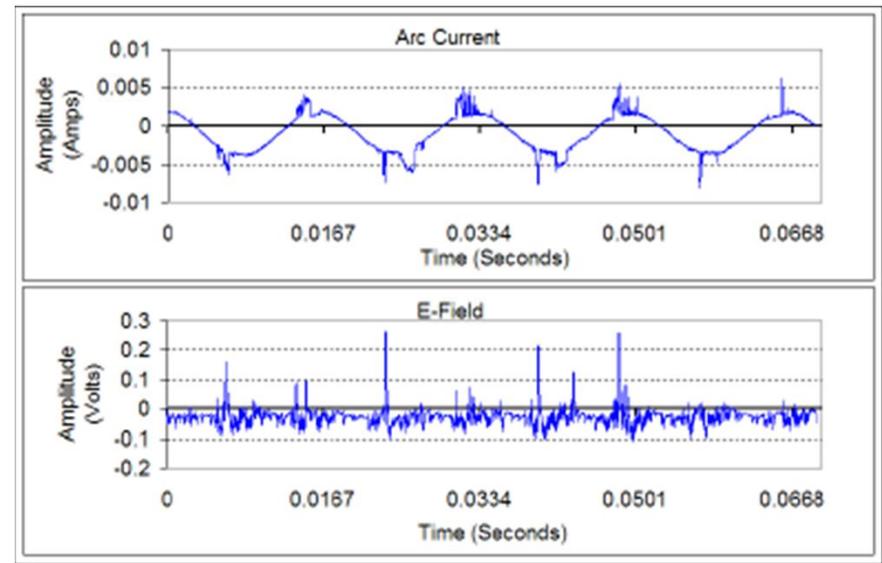


Field Demonstration



Challenge: Eliminating “False Positives”

- Some end-use devices produce high crest-factor waveforms as a part of normal operation
- Identifying and eliminating these will be crucial for the continued success of incipient failure detection

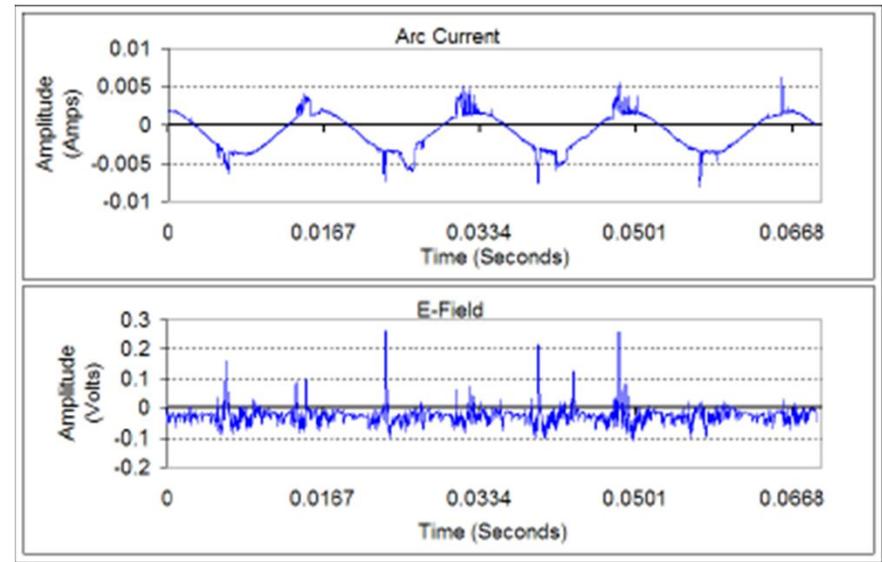


Current profile for a Neon Sign can include transients

Non-contact Methodologies

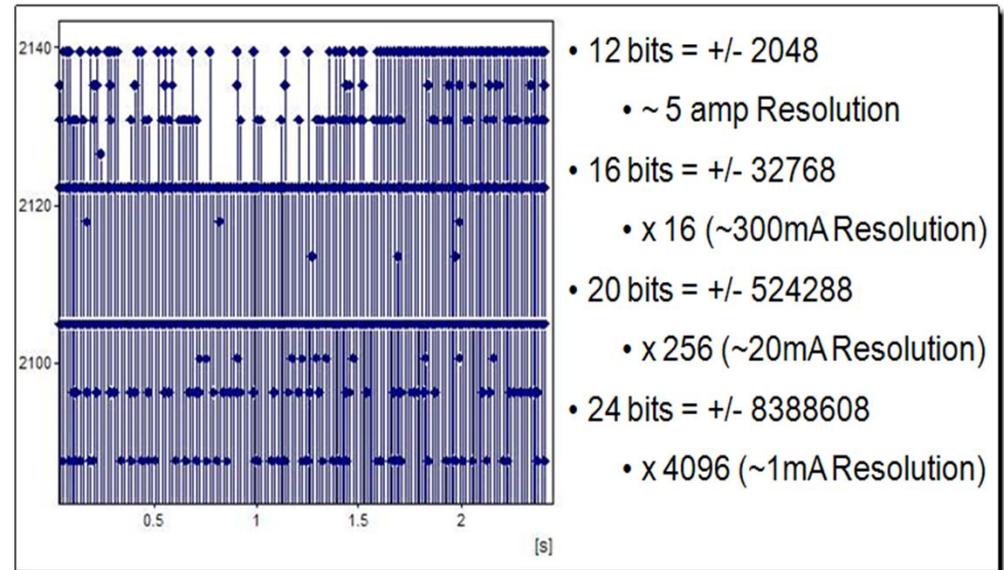
E-Field Measurements

- Direct measurement of voltages and currents is useful, but requires contact with conductors and or insertion of sensors
- E-field measures use electromagnetic fields to access equipment health



Development Plans

- Incorporate enhanced arc-detection algorithms into an existing commercial PQ monitor.
 - Improve Measurement Depth/Resolution
- External Sensors
- Field trials to determine capability as well as establish sources of false positives for arcing
- Establish the Pathway for Incorporating Arcing Indicators into Measurement Standards



Development Plans (cont.)

Today: Laboratory instruments and separate analysis



Tomorrow: Integration into portable instruments with automatic analysis





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