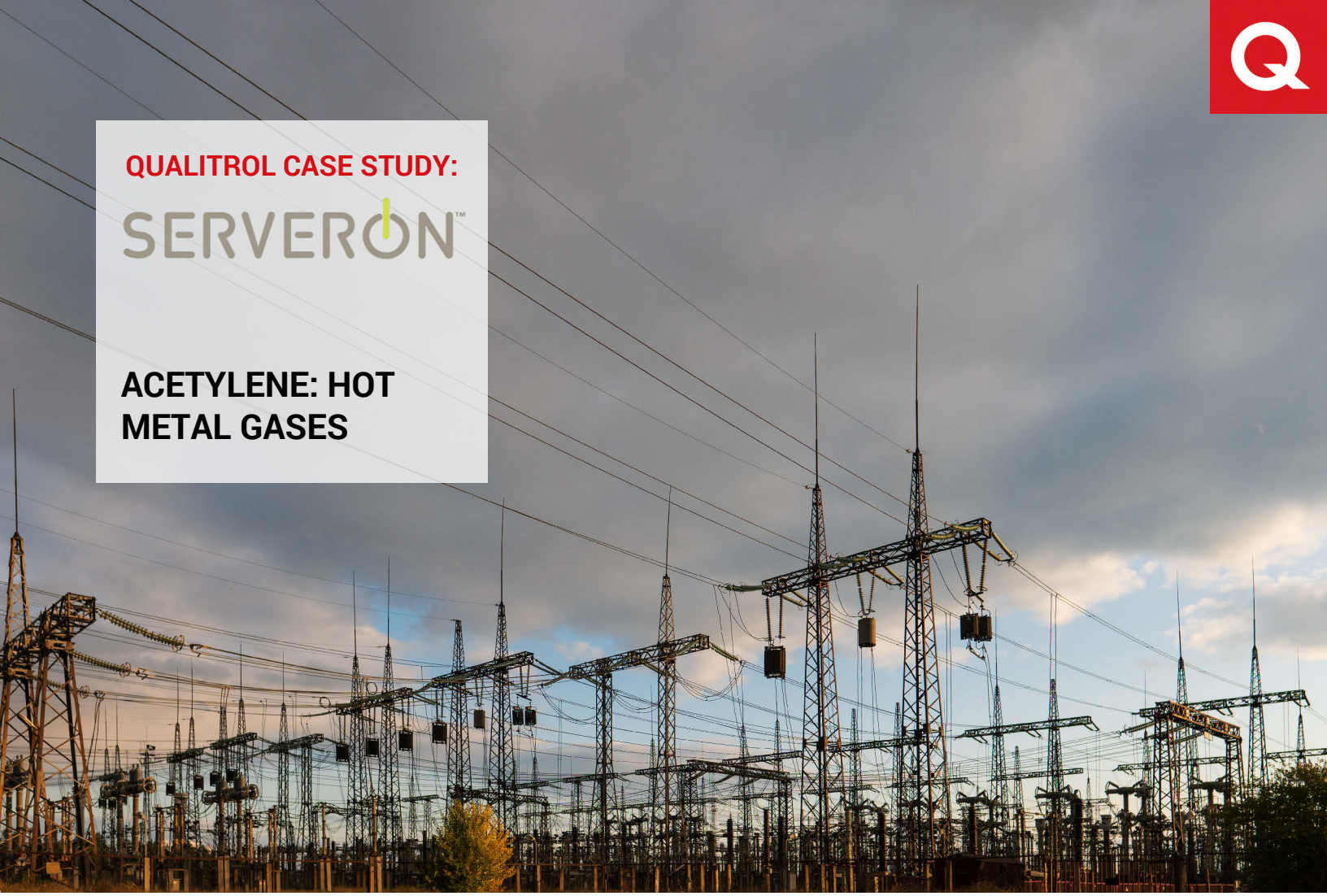


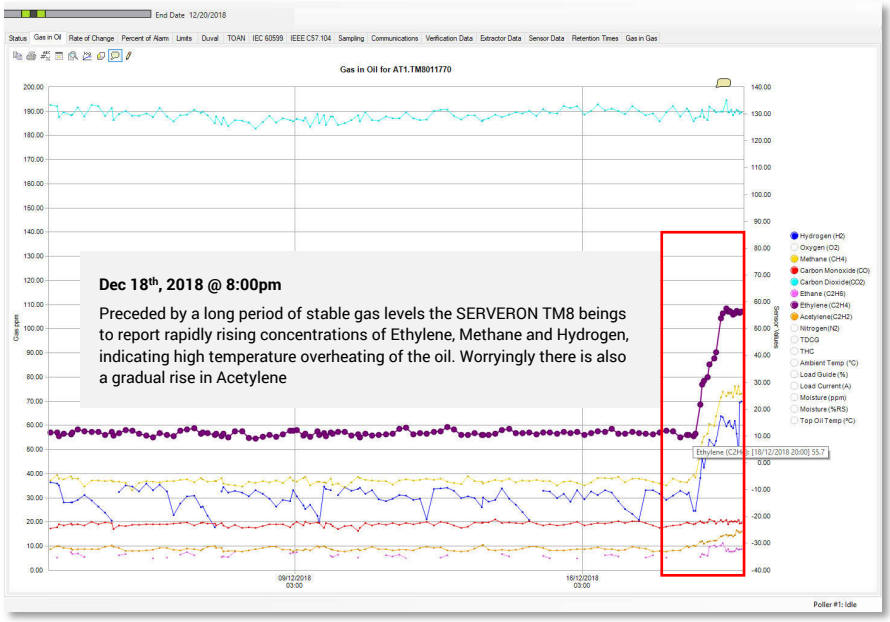
QUALITROL CASE STUDY:

SERVERON™

ACETYLENE: HOT METAL GASES

BACKGROUND

A Qualitrol Serveron TM8 monitor was installed on a transmission transformer at a US utility in 2016. Transformer operation was typical and stable for several years. At 9pm on December 19, 2018 the TM8 alarmed for increasing concentration of Acetylene. Upon reviewing the full DGA data it was observed that Acetylene and other hot metal gases were being generated at a significant rate. The online DGA data revealed gases had started rising just 24 hours earlier. Immediately upon alarm levels of gas being detected the monitor automatically switched into an accelerated sampling rate (from 6 times per day to 24 times per day), generating very detailed resolution on gas generation.



QUALITROL COMPANY LLC, 1385 Fairport Road, Fairport, New York 14450
(585) 643-3717 www.qualitrolcorp.com **Email:** info@qualitrolcorp.com

QUALITROL®
Defining Reliability

By reviewing the data around the time of the sudden increase in gas concentrations using SERVERON TM View one can observe that this combination of gases are typical of a high temperature fault:

Diagnostics Method	Indicated Condition
Duval Pentagon 1	T3 Thermal Fault >700ºC
Duval Pentagon 2	T3 Thermal Fault in Oil >700ºC
Duval Triangle 1	T3 Thermal Fault >700ºC
Duval Triangle 4	N/A as only applies to low temp faults
Duval Triangle 5	T3 Hot Spot in oil
IEC 60599 Rodgers Ratios	T3 Fault
IEEE 57 104 2008	Condition 3 for Acetylene and Ethylene Condition 4 for total combustible gas

ON DECEMBER 20, 2018 AT MIDNIGHT THE TRANSFORMER WAS TAKEN OFF LOAD, JUST 28 HOURS AFTER THE FIRST EVIDENCE OF AN ISSUE EMERGED.

OUTCOME

The transformer was inspected on site by the manufacturer and it was identified that a loose nut on the PA Core Leg Phase 1 resulted in an area of overheating (Figure 1).

Upon returning the transformer to the factory for repair (Figure 2) it was further discovered that the nut had screw thread damage which resulted in the correct torque being applied during manufacture not actually tightening the nut sufficiently (Figure 3).

Vibration in operation had caused the nut to loosen and disassemble.

Repair was affected by replacement of the PA unit following careful inspection of threads for damage and the application of the correct torque to the nut.

Figure 1: *Loose nut on PA core leg phase 1*

Figure 2. *PA after being removed from tank*

Figure 3: *Image of offending bolt/nut assembly showing thread damage*

QUALITROL COMPANY LLC, 1385 Fairport Road, Fairport, New York 14450
(585) 643-3717 www.qualitrolcorp.com **Email:** info@qualitrolcorp.com

QUALITROL® Defining Reliability