UNITED ELECTRIC CONTROLS

Hybrid Approach to Emissions Monitoring

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Vanguard Methane Gas Detector

- Field – Ready
- 5 Year Battery Life
- Low Maintenance
- WirelessHART Communication
- Heavy Duty Antenna
- One Button Calibration
- IR Sensor

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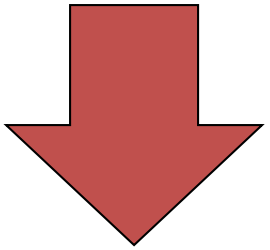
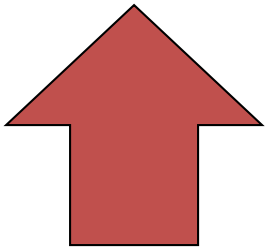
Move towards operator cost-benefit

- Decrease cost of monitoring for emissions
  - Minimize the time spent at each location
  - Minimize the number of locations to be monitored by labor intensive methods



- Increase amount of savings from emission monitoring
  - Shrink leak rate
  - Minimize the amount of time leak exists
  - Have less total leaks



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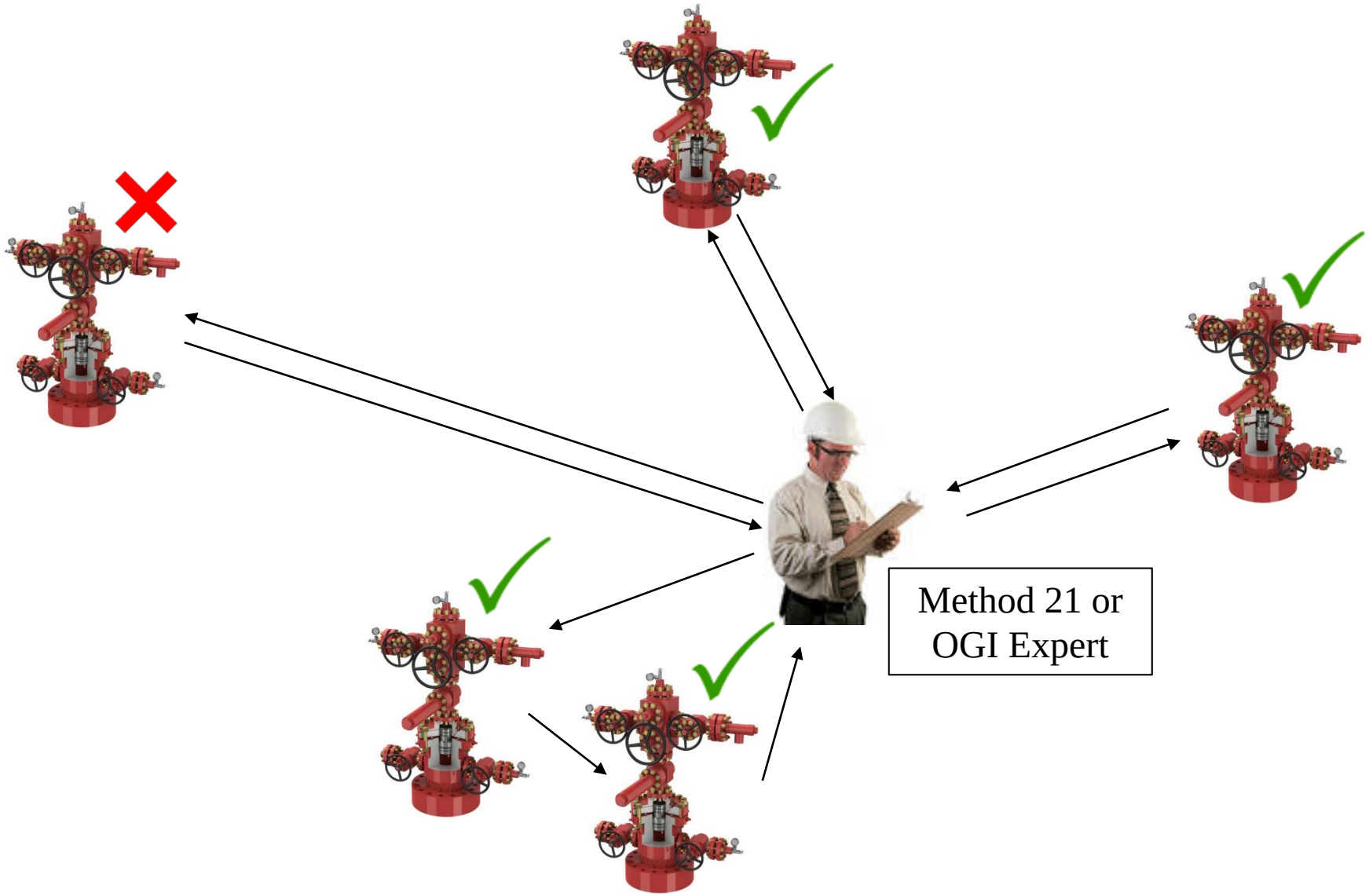
Current Solution



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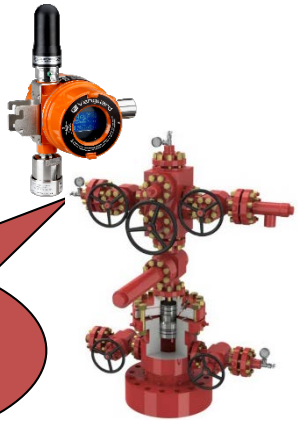
Proposed (Hybrid) Solution

I'm Leaking

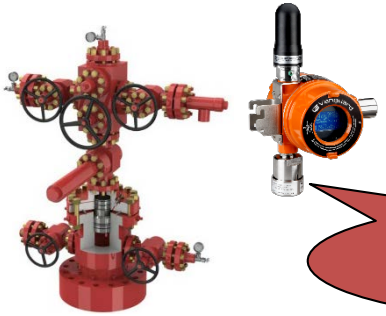
I'm Not Leaking

I'm Not Leaking

Method 21 or OGI Expert



I'm Not Leaking



I'm Not Leaking

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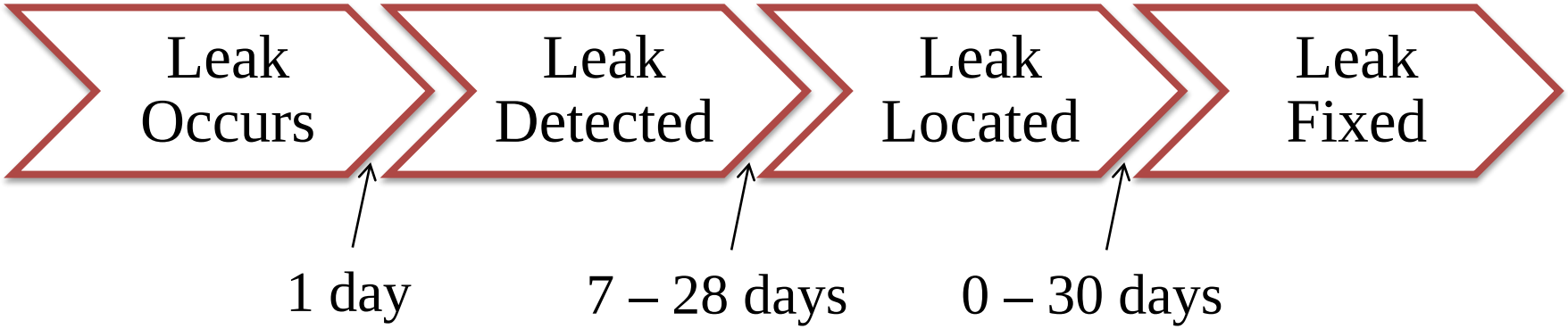
Leak Timeline

Current Solution

Leak Fixed in 1 – 212 days.

Proposed (Hybrid) Solution

Leak Fixed in 8-65 days.



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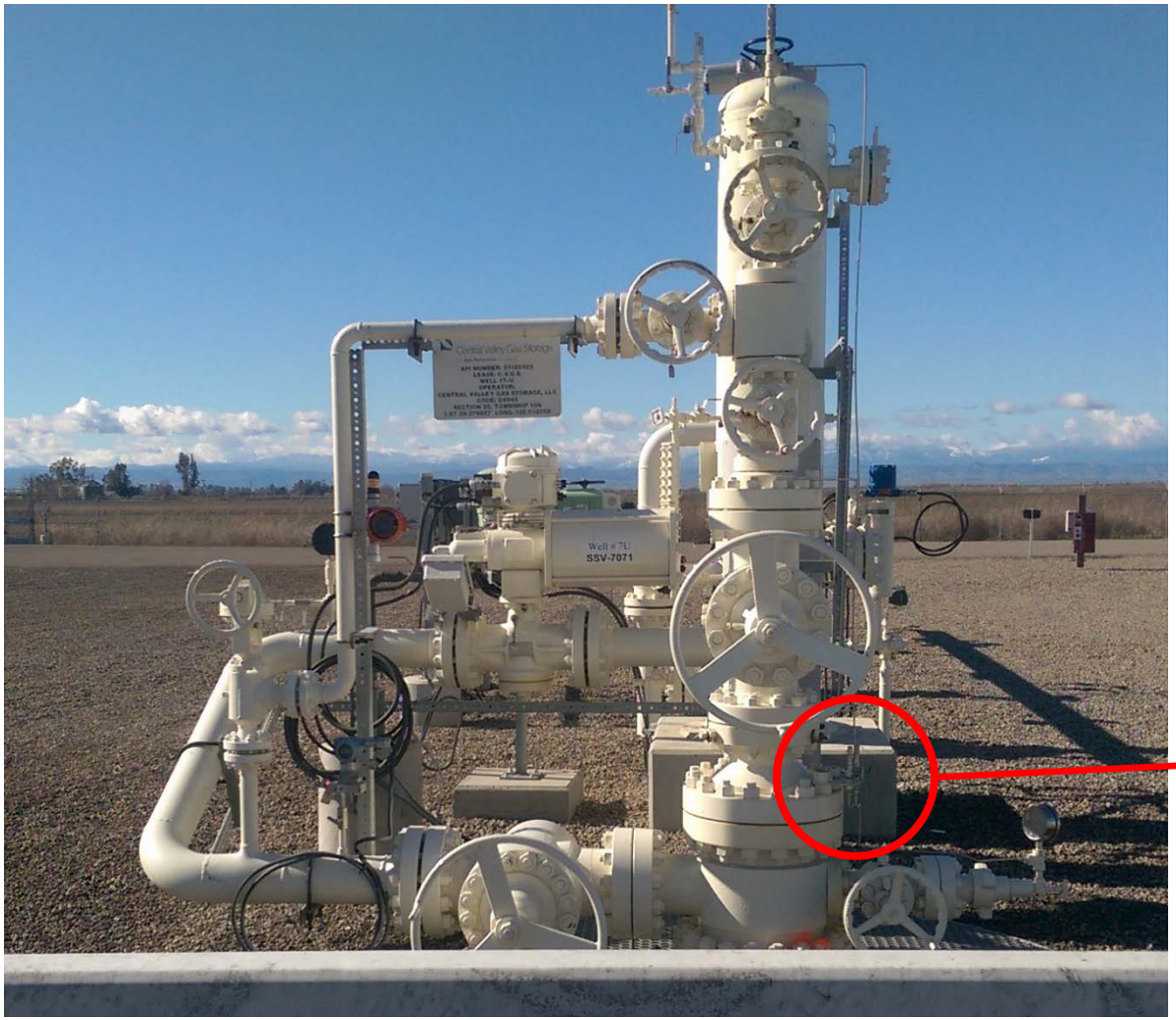
Case Study – Underground Gas Storage



Central Valley in California wanted to augment their daily rounds with gas detection instrument.

“Leak” Location

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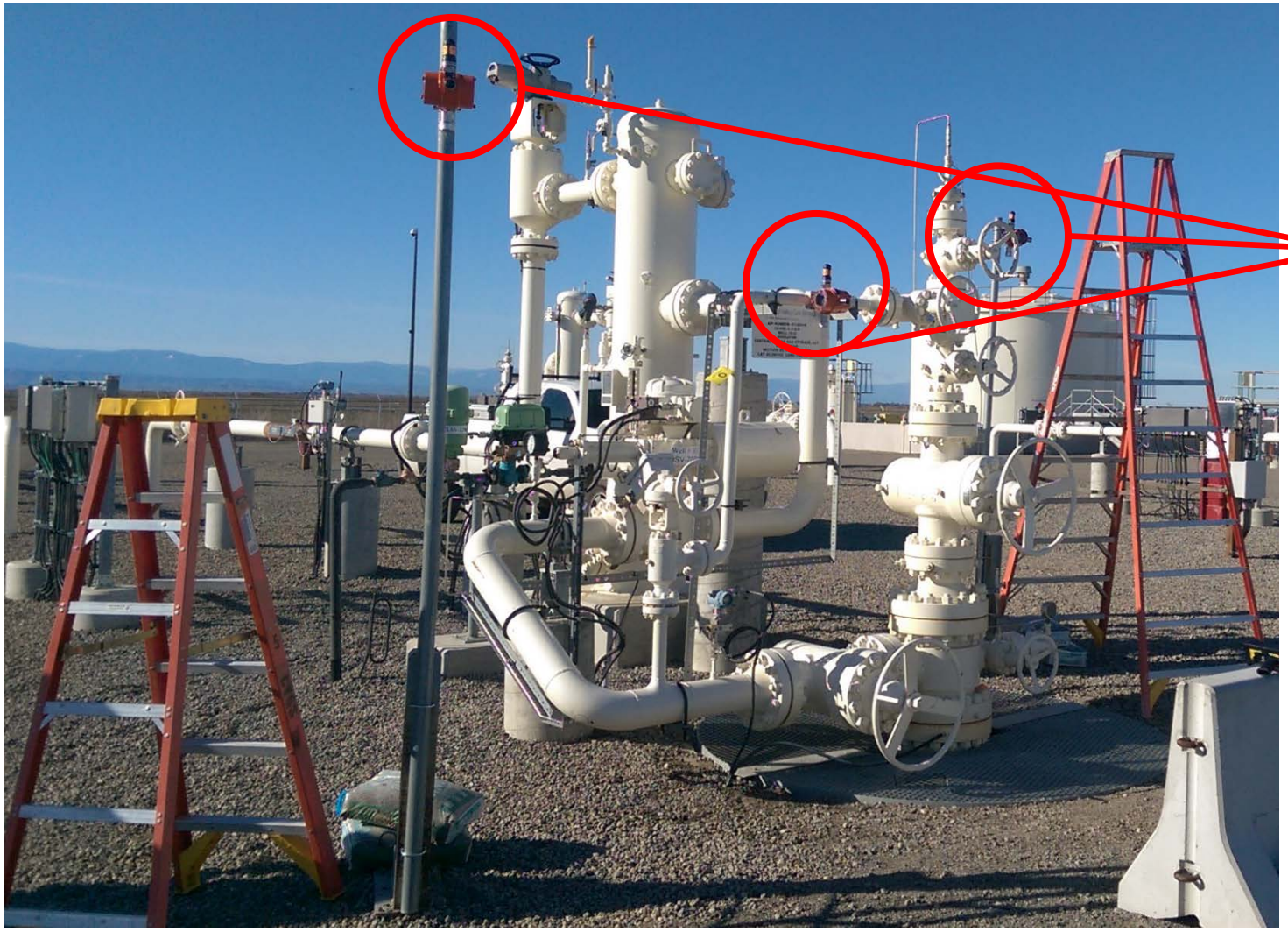
Case Study – Test Setup



Wireless Gas Detectors

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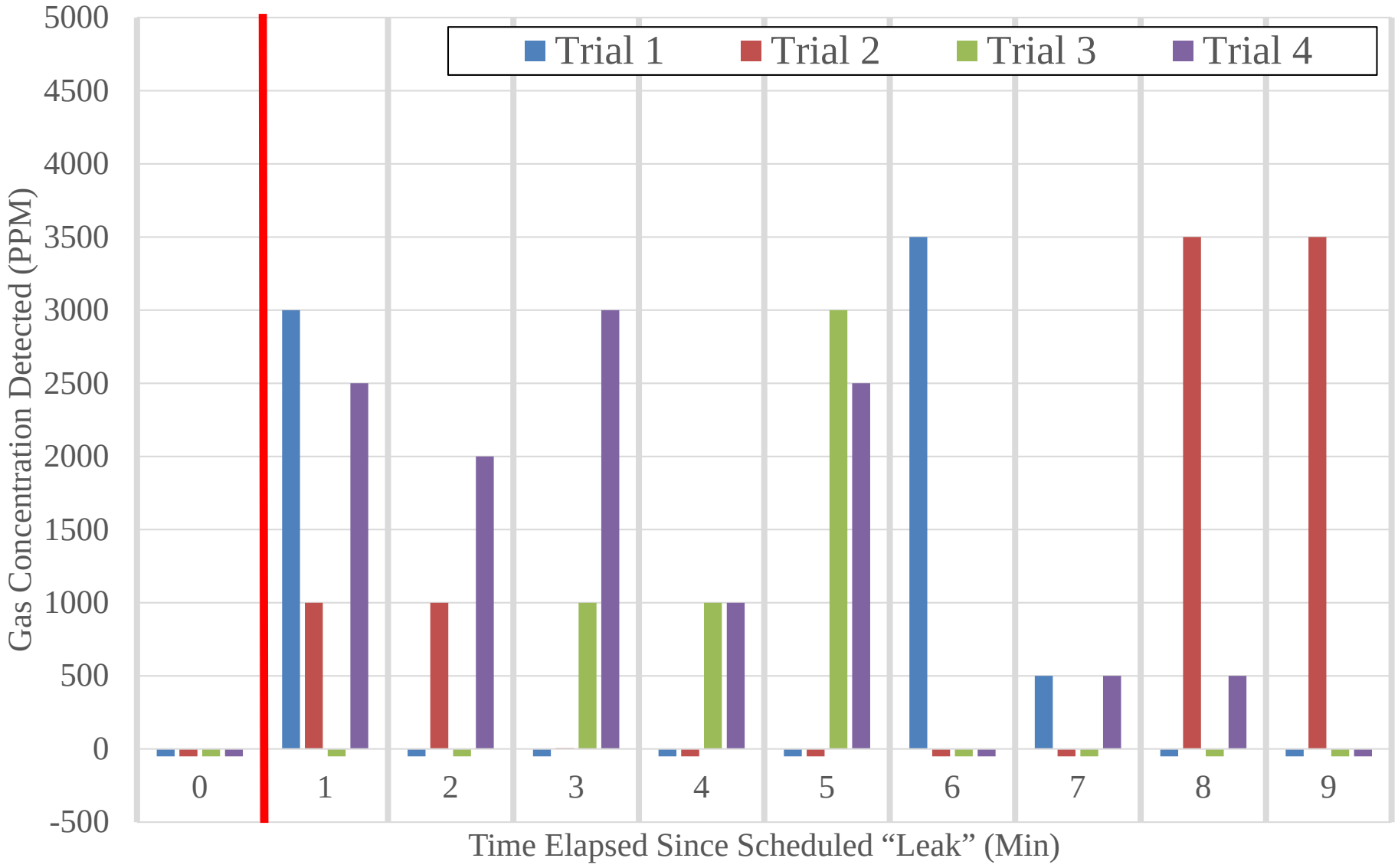
Results



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Next Steps

- Quantitative CFD analysis for detector coverage
- Supplemental quantitative low range testing
- What is beyond minimum viable product?

Andrew Liptak
aliptak@ueonline.com
C: 617-999-9030
O: 617-321-1174
180 Dexter Ave
Watertown, MA
02472

John Sestito
jsestito@ueonline.com
C: 508-965-5960
O: 617-321-1293
180 Dexter Ave
Watertown, MA
02472

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