



ENERGY INSTITUTE

COLORADO STATE UNIVERSITY

Thoughts on Future of Leak Detection & Repair

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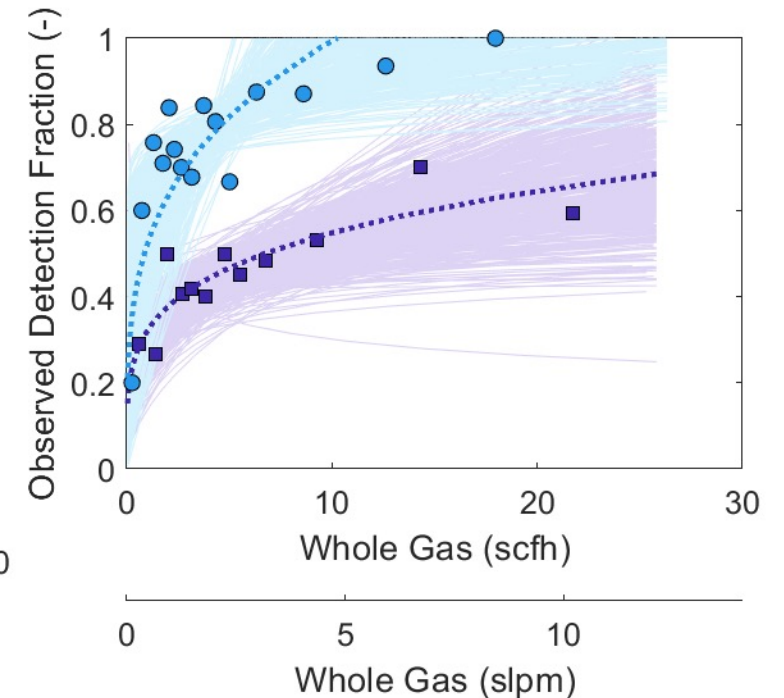
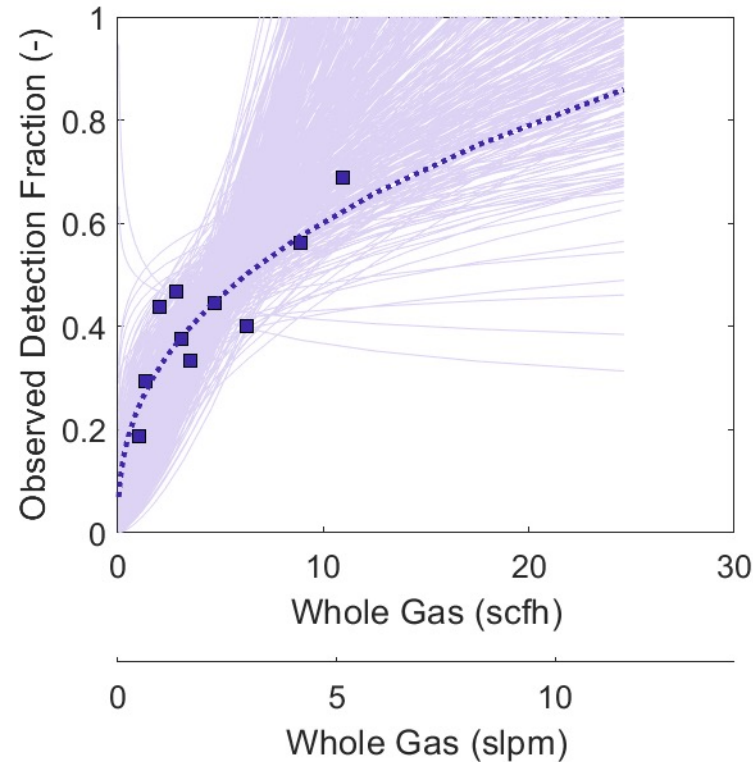
CSU Testing Experience

- ≈40 leak detection solutions have tested at METEC
- Range of testing from “kicking tires” to single-blind protocol tests



What We Have Learned

- *Huge* investment in next-gen solutions
- Next-gen solutions are getting steadily better
- Current regulatory solutions (e.g. OGI) have lower efficacy than expected



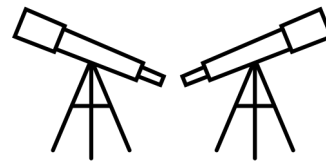
But LDAR has a serious problem...



An O&G Facility

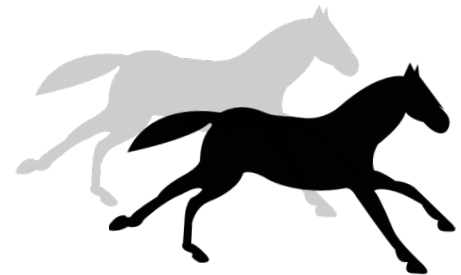


Repair

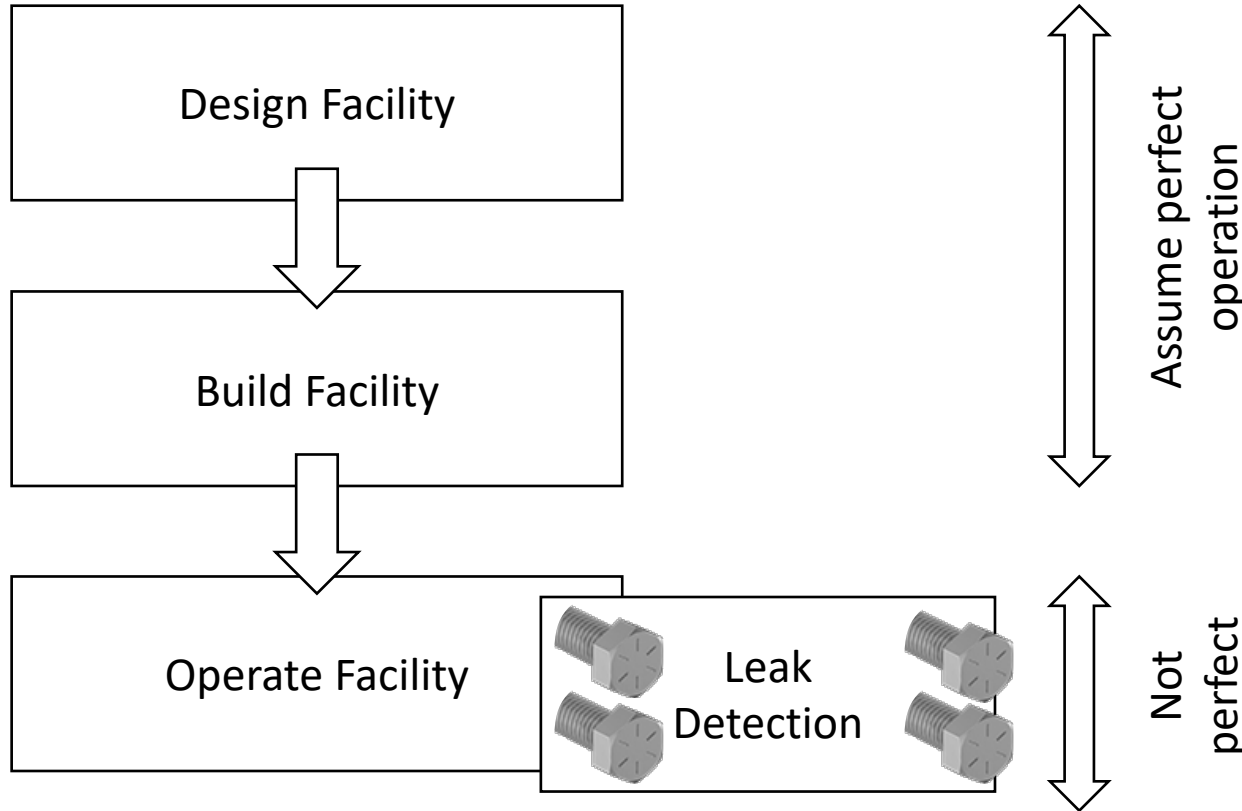


Leak Detection

Emissions



Why? ... Typical Site Design Process



What

- Lowest cost
- Simple operation
- Often no electrical power
- Extensive vented emissions
- Minimal process sensing

→ Difficult for *any* automated *monitoring* ... of which *leak detection* is only one example



LDAR is not the only way ... and not even the best way ... to mitigate emissions



Ways to Mitigate Emissions

How

- Eliminate *planned emissions*
 - Reduce *opportunities to emit*
 - Reduce the *probability of failure*
-
- Detect *deviations in process*
 - Detect emissions & repair

↑ Horse In
↓
↑ Horse Out
↓

Examples

- Draw down before blow down
 - Instrument air vs gas pneumatics
 - Eliminate atmospheric tanks
-
- Analyze/replace poor performing components
 - Integrated process sensors (e.g. tank pressure) and monitoring
 - LDAR programs *of any type*



What's Happening: Bring on the Anecdota...

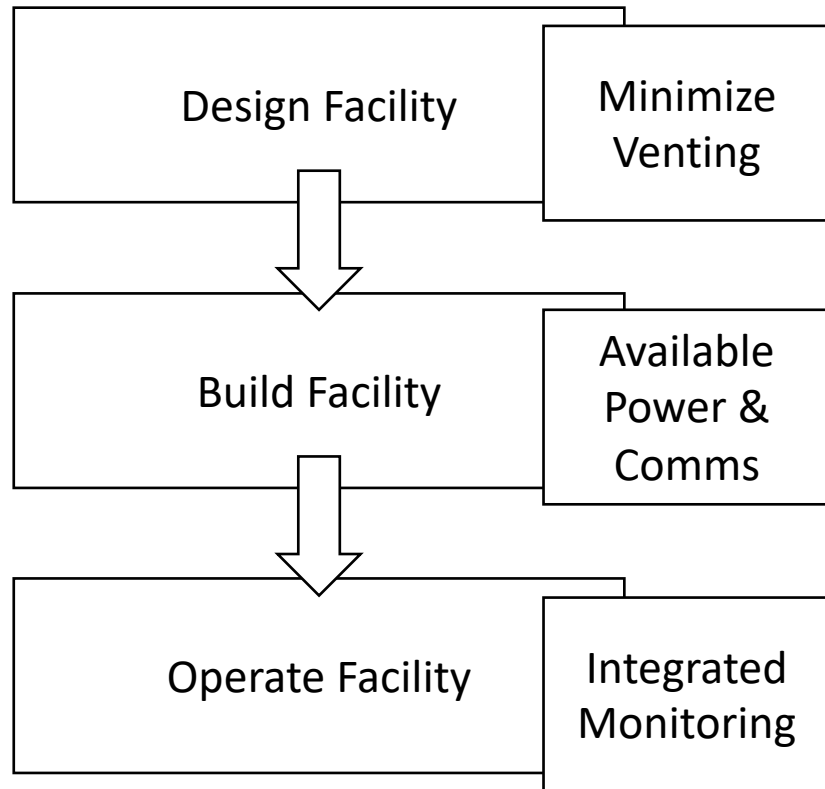
- “Our flares were going out way more than we thought, so we installed temperature sensors on all our (well pad) flares ...”
- “We’re swapping out all of our <redacted> controllers ... they stick open too often”
- “Our sensors ... [detected] ... that our tank load out contractor was not connecting gas recovery lines correctly, so we <training & process change>”
- “We had to get our guys off these tanks, they were leaving the thief hatches open ... so we installed automatic gauging on all the tanks. Safer too.”
- “We’re moving all our compressor stations to instrument air. More reliable, less of a hassle ... even with the extra equipment requirements.”

Etc..

Point: progressive companies are focused on barn doors, not telescopes.



~~Leak Detection~~ Emissions Prevention by Design



- Design bottom-up to be low-emitting
 - Drive 'expected' (vented) emissions down
 - Provide power and networking
 - Instrument key processes for autonomous monitoring
 - Retrofit existing facilities over time

Result: ***Almost any detected emissions are fugitive (i.e. unplanned) and process monitoring provides causal notification of process problems***

Future: ALD (automated leak detection) is a *fail-safe process monitor integrated into other process monitoring*, running continuously (or frequently) with minimal human management



Take Away Points

- Leak detection solutions improving rapidly but ...
 - Size / type / nature of leaks today will not be true 5 years from now
- Leak detection is *one type of process monitoring* → and one of the hardest to implement
 - Think 'smoke alarm' not separate system
- Ideally leak detection is designed into the site → design sites for *leaks to be detected*.



Thank You

Contact



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