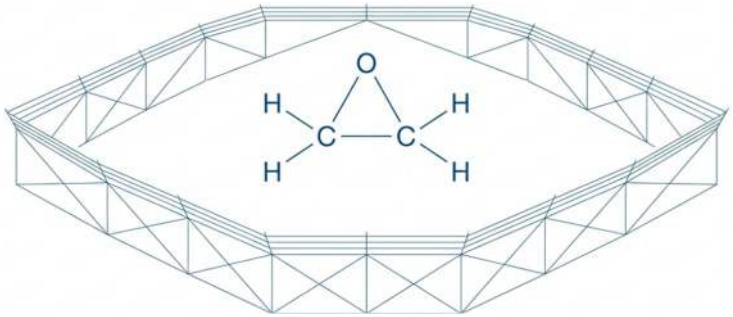


HON EtO Compliance

New EtO HON LDAR Impacts, Fenceline Monitoring Integration, and Regulatory Readiness

TRICORD CONSULTING

The Exemption Paradox

- The Environmental Protection Agency is moving to require enhanced monitoring of ethylene oxide (EtO) at process units and fencelines, including more frequent surveillance and lower threshold detection of leaks, as part of its broader chemical risk reduction strategy.
- The effective date of the rule [July 15, 2026] has not changed.
- Facilities should anticipate integrating continuous or near-real-time leak detection technologies, stricter repair timelines, and rigorous documentation of monitoring results into their LDAR and FLM programs.

Regulatory Uncertainty ≠ Non-Applicability

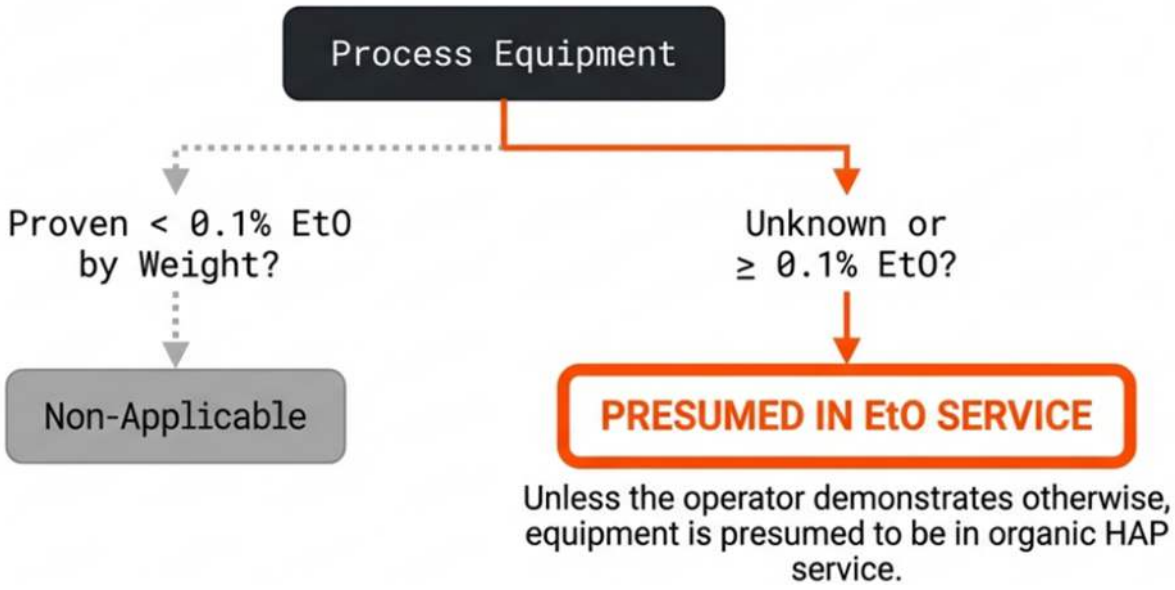
The Urgency of Now!
Why "wait and see" is a risky strategy

- **Current State (The Illusion)**
  - Exemptions created a temporary delay
  - Routine compliance mentality
  - Higher leak definitions
  - Skip period incentives
- **Future State (The Risk)**
  - High priority on hazardous compounds
  - Zero-tolerance leak definitions
  - Monthly monitoring intensity
  - Fenceline accountability

Strategic Takeaway:
Early preparedness is the only effective hedge against non-compliance.
Transition from rule-following to operational risk management.

Ethylene Oxide Service

- *In ethylene oxide service* means the following: (i) For equipment leaks, any equipment that contains or contacts a fluid (liquid or gas) that is **at least 0.1 percent by weight of ethylene oxide**. If information exists that suggests ethylene oxide could be present in equipment, the equipment is considered to be "in ethylene oxide service" unless the procedures specified in § 63.109 are performed to demonstrate that the equipment does not meet the definition of being "in ethylene oxide service".
- 40 CFR 63.181(b)(12) For equipment in ethylene oxide service, as defined in § 63.101, records of the percent ethylene oxide content of the process fluid and the method used to determine it.



New Standards for EtO

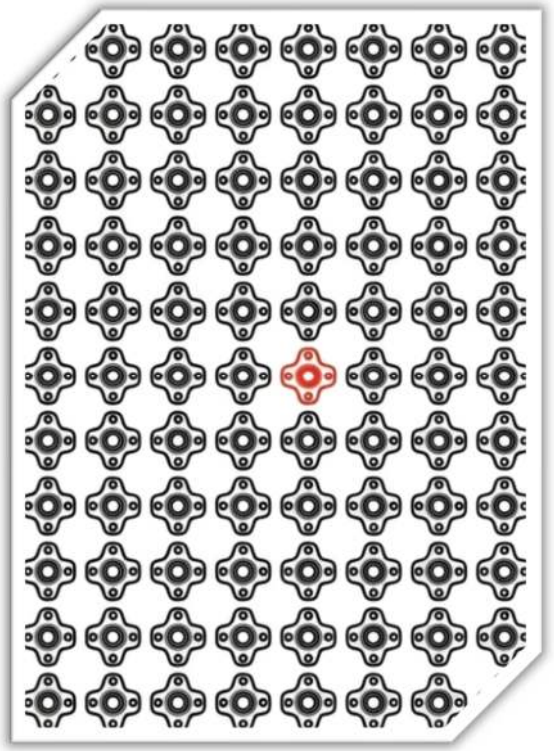
Component	Old Standard	New Standard
Valves	500 ppm / Quarterly	100 ppm / Monthly
Pumps	1,000+ ppm	500 ppm
Connectors	10,000 ppm / Annual	100 ppm / monthly
Fenceline Action Level	N/A	0.2 $\mu g/m^3$

HON EtO LDAR Requirements

- Monitor new pumps and connectors in EtO service within 5 days of initial startup of equipment.
- Pumps in EtO service cannot use the higher 2,000 ppm repair trigger
- No Dual Mechanical Seal (DMS) pump monitoring exemption.
- No Unsafe To Monitor (UTM) connectors
- Skip-period provisions revoked for EtO service.
  - No percent-leaking based reductions
  - **Includes annual DTM monitoring**
- No Delay Of Repair (DOR) allowed. [CRITICAL]
- Atmospheric PRD releases:
  - 40 CFR 63.165(e)(3)(v)(D) […] any release event from an affected pressure relief device in ethylene oxide service is a violation of the pressure release management work practice standards.
- Heat exchange systems in EtO service: weekly monitoring instead of quarterly; repair within 15 days.

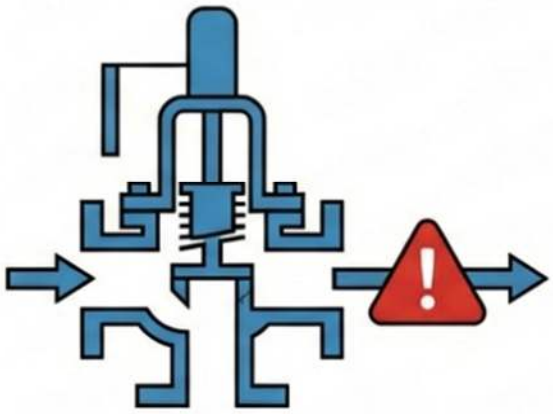
Compliance vs. Capability Gap

- Rules changed faster than programs
- Staffing and procedures under strain
- Repair expectations intensified
- Impact → Exponential increase in monitoring load.
  - Massive increase in labor hours
- Connectors and Flanges: The Sleeper Issue (§63.174)
  - Leak Definition = 100 ppm
  - Frequency = Monthly for all EtO connectors



Release Management

- PRDs and Closed Vent Systems:



3
Redundant Prevention Measures.

Zero Tolerance: Any release to atmosphere is a violation.

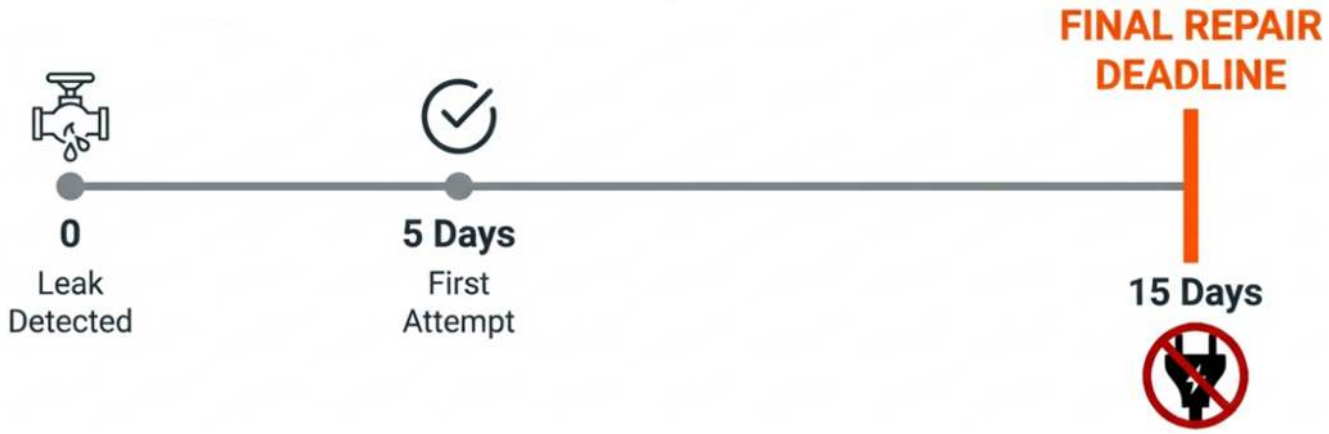
Closed Vent Systems (§ 63.172).

Bypass lines must be car-sealed or lock-and-keyed.

Delay of Repair (DOR)

40 CFR §63.171(f)

(f) For each source as defined in § 63.101, and for each source as defined in § 63.191, beginning no later than the compliance dates specified in § 63.100(k)(11), delay of repair is not allowed for light liquid pumps in ethylene oxide service, gas/vapor and light liquid valves in ethylene oxide service, and connectors in ethylene oxide service.



How to Comply with No DOR?
First Line of Defense: Effective Repair

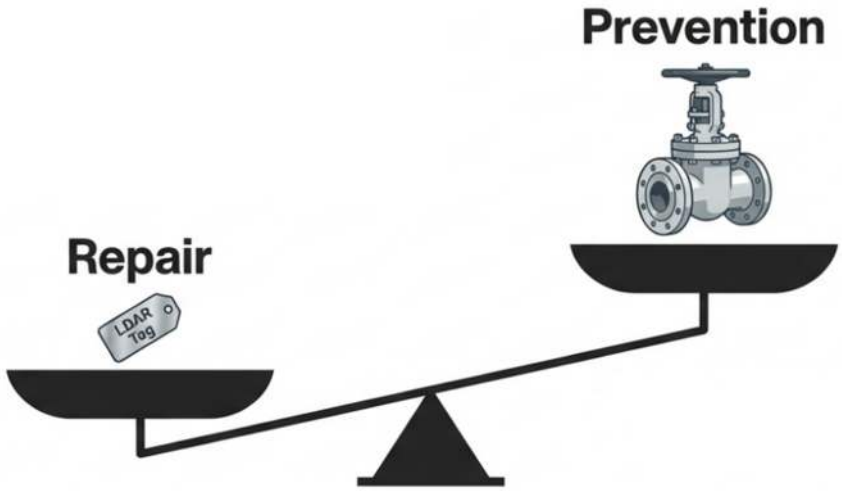
- Dedicated LDAR repair personnel (facility personnel or contractor)
  - Faster attempts means you know when extraordinary attempts will be needed, sooner
  - Dedicated LDAR repair personnel are trained and experienced in extraordinary attempts
  - Emphasis on proactive leak prevention
    - Translation: Durable and sustainable repairs

How to Comply with No DOR?
Second Line of Defense: Extraordinary Repairs

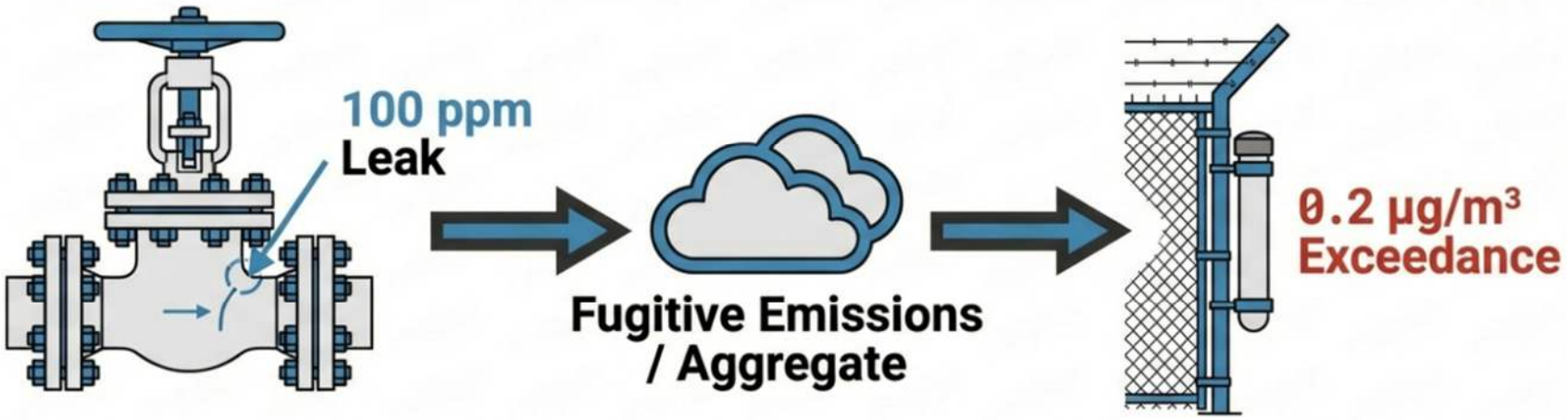
- Extraordinary attempts at repair
  - Drill and tap, multiple injections
    - Don't forget to plug the quill for OEL concerns
    - Once drill and tapped, valve is compromised
  - Clamps
  - Wraps
  - Boxes
  - Hot-tap

Prevention > Repair

- Voluntary lower internal leak thresholds
- Certified Low Leak Technology (CLLT) Options
  - CLLT valves
    - Sufficient stock on hand in warehouse
  - CLLT packing
    - Variety of spools on hand in warehouse
  - Proactive replacement of standard valves with CLLT valves, or repacking with CLLT packing, reduces potential to leak.
- Other emerging technologies



The Nexus: How Fugitive Emissions Become FLM Violations

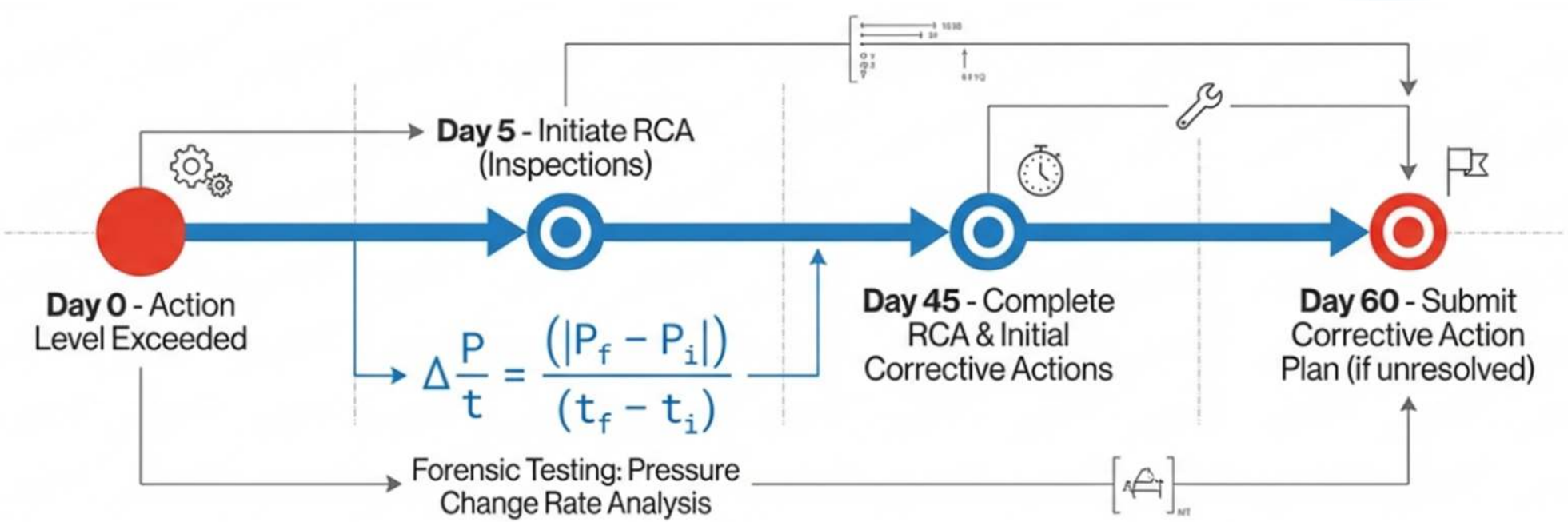


- At this low action level, LDAR data becomes a primary input for FLM Root Cause Analysis (RCA). Fugitive emissions drive concentration trends at the fence!

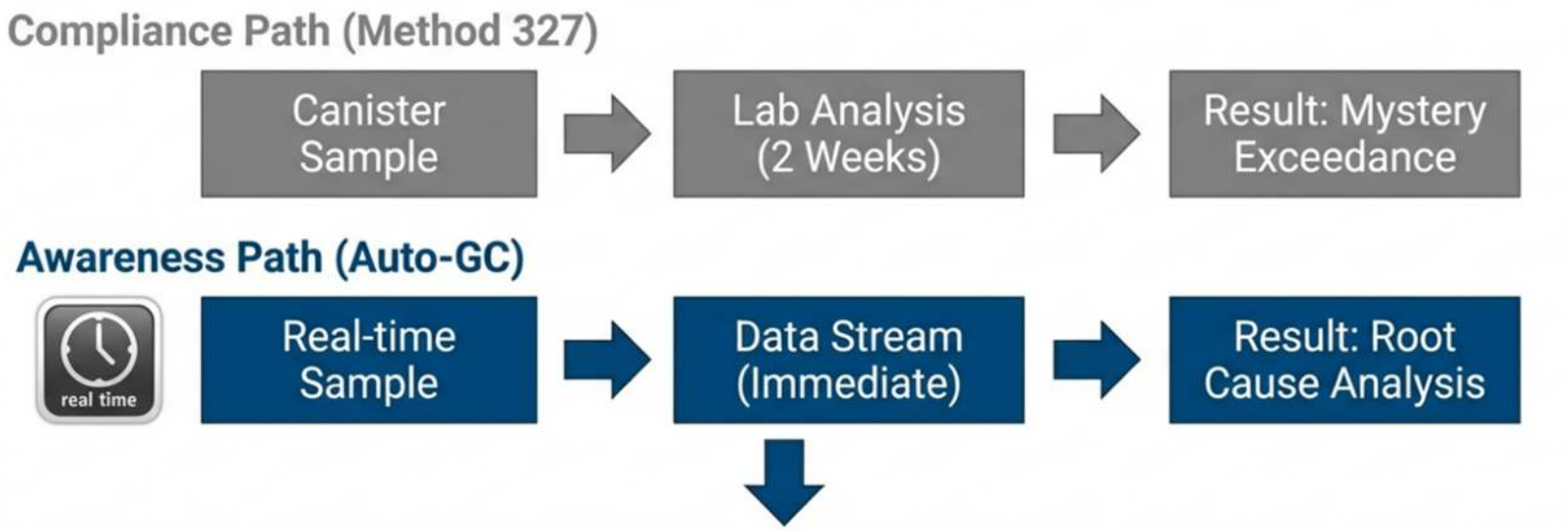
Think Outside the Box!

- Leaks inside the fenceline don't stay inside the fenceline, and come from many sources. Fenceline monitoring is considered "Enhanced LDAR".
- No DOR makes prevention mandatory!
- New Technologies and Proactive Measures
  - Real-time monitoring (ex., eGC, FTIR, micro-GC)
  - Geospatial Monitoring of Air Pollution (GMAP)
  - Optical Gas Imaging (OGI)
  - Set internal action limits at 50% of regulatory limits
  - Extra routine monitoring – Go beyond baseline compliance!

The Ticking Clock: Root Cause Analysis (RCA)



Awareness ≠ Substitution



Real-time tools are not for substituting compliance methods; they are for surviving them. They provide the "Pre-Compliance" intelligence needed for Root Cause Analysis (RCA).

Escalation: Corrective Action Plan (CAP)

- When RCA Fails (§63.184(f))
  - If ΔC remains above action level after repairs, a formal CAP is mandatory.
  - Submission to Administrator within 60 days.
- Mandatory Technology Upgrade
  - The rule explicitly requires "real-time sampling techniques" (*e.g.*, mobile gas chromatographs, optical spectroscopy instruments, sensors) to locate elusive sources.

Readiness: Phase 1
Assessment & Inventory

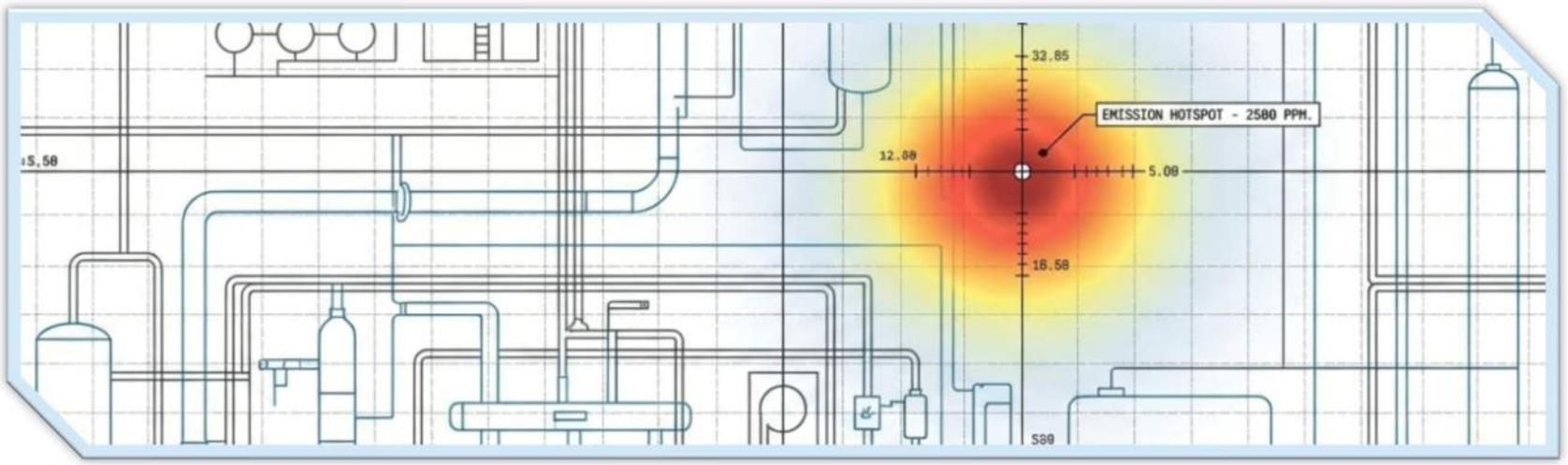
- Applicability determination
  - Define EtO service process streams per §63.101(b)
  - No de minimis value → Do not assume zero EtO without verification!
    - 40 CFR 63.109(c)
- Inventory scrub
  - Identify all valves, pumps, connectors, etc… in EtO service
  - Update monitoring frequency and leak definition in database rule engine
- Gap assessment + Pilot Study
  - Third party review for program health in advance of regulatory deadline
  - Mobile ambient air monitoring (GMAP)
- **Strategy**
  - Implement "**Compliance Margin**" protocols
    - Monitor internally at HON levels before effective dates
    - Proactively replace suspect or chronic leaking components (Low-E if possible)

Readiness: Phase 2
Operational & Workforce Planning

- Staffing models:
  - Calculate man-hours for monthly valve/connector monitoring
  - Method 327 – in house resources or contract?
  - Plan for staff augmentation
- Equipment:
  - Procure Method 21 calibration gases suitable for 100 ppm leak definitions
  - Invest in Certified Low-Leak Technology (CLLT)
  - Secure Method 327 lab contracts immediately
  - Provisions for DTM and UTM component monitoring
- Data systems:
  - Update LDAR software to flag EtO components for no exemptions (i.e., DOR, UTM, DTM, skip period monitoring, PRD releases, etc…)

Readiness: Phase 3
The Technology Shield + Proactive Surveillance

- Strategic Value: Compliance tools for internal risk screening
  - Identify issues early, before they trigger a 5-day sample exceedance
  - Build defensible data trails for RCA



The Manager's Checklist: Path to HON Readiness

- ❑ Complete applicability determination for EtO service
- ❑ Update component inventory and database triggers
- ❑ Model workforce costs for monthly LDAR monitoring and resources
- ❑ Forecast operational burden of Method 327 sampling
- ❑ Establish baseline fenceline data (Pilot Program)
- ❑ Review PRD redundancy measures
- ❑ Engage Stakeholders and document actions for defensibility
- ❑ Draft RCA Standard Operating Procedure (SOP)
- ❑ Consider developing a Site-Specific Monitoring Plan (SSMP)
- ❑ Explore real-time monitoring technology as compliance shield

Key Takeaways and Call to Action

- Stringency historically increases over time
- Contact colleagues or peers that are already complying
- New and emerging technologies
  - Enhanced monitoring
    - Real-time ambient air monitoring
    - GMAP
  - Low-E or Certified Low Leak Technology (CLLT)
  - Training
  - Rapid Response Team (RRT)
- Fenceline compliance overlap

Thank You!

Questions?