



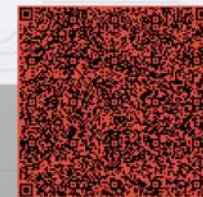
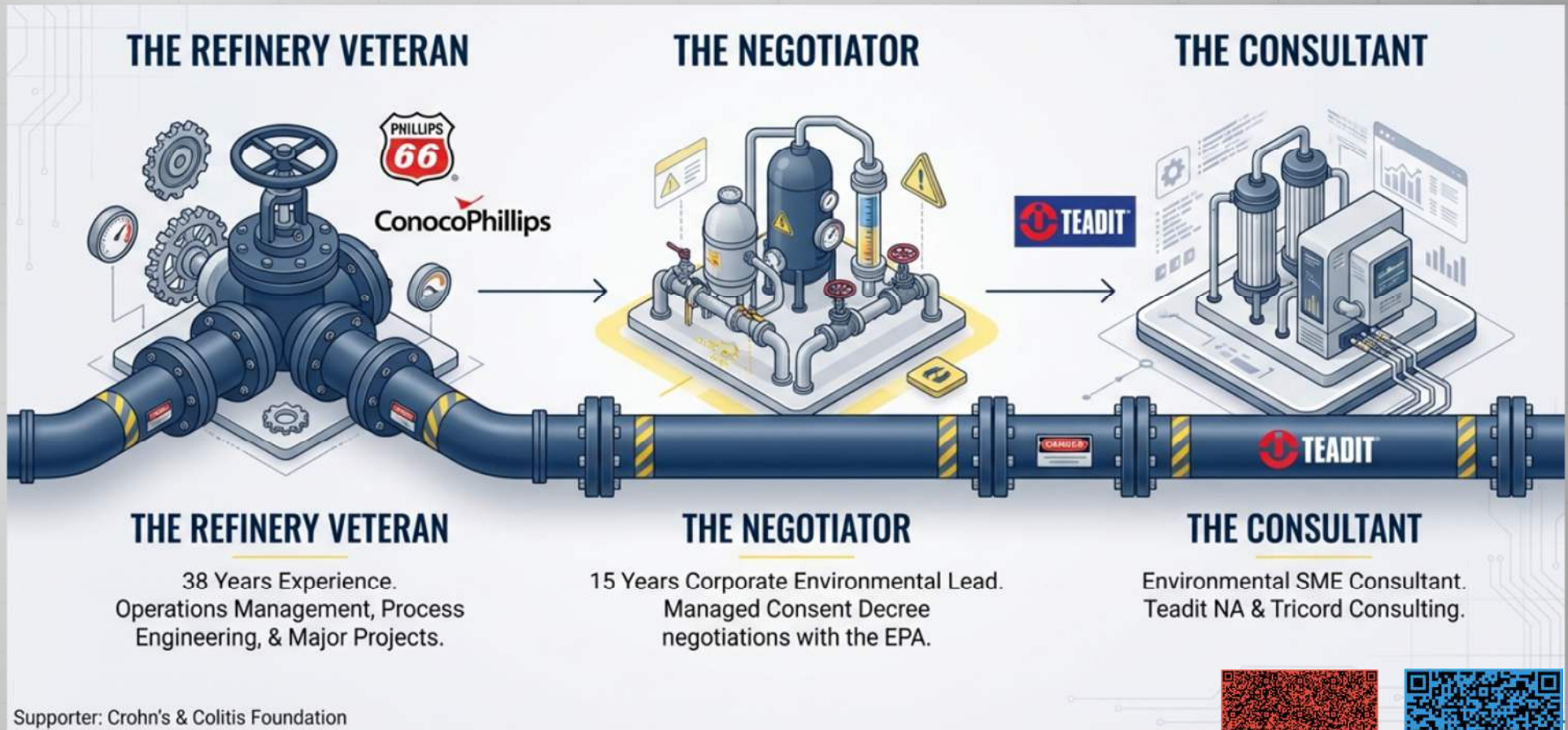
Little Leaks Matter - What Does Compliance Mean to You?

Tim Goedeker
February 26, 2026

Sealing for a Safer and Greener Tomorrow



40+ Yrs in Industry - Operations to Environmental



Roadmap for Today



Preventing Leaks - What is a Leak? (Define)



THE BIG LEAKS (Process Safety)

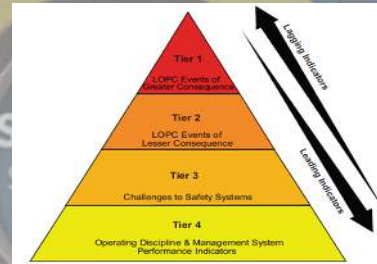


- **Definition:** Uncontrolled release of material from a process.
- **Threshold:** ~10,000 lb of flammable gases/liquids.
- **Focus:** PSM (Process Safety Management) prevents explosions and **catastrophes**.

THE LITTLE LEAKS (Environmental)



- **Definition:** Unintentional air pollutants escaping from pipes, flanges, and valves.
- **Measurement:** Concentration (ppm) via EPA Method 21. Goal is **"No Detectable Emissions"**.
- **Programs:** LDAR (Leak Detection and Repair) and BWON.



LDAR: Sources of Fugitive Emissions – Refinery (EPA data)

Equipment	200,000 B/D refinery, #	Leak Rate, ton / yr
Valves	~50,000	~150 (@ 500 ppm)
Flanges	~150,000	~350 (@ 500 ppm)

Is Achieving Zero Fugitive Leaks Feasible?

Cumulatively Little Leaks are Not Little - ~500 tons/yr for Avg Refinery



Env Compliance - Is A Requirement & Safeguard

Env Compliance protects a plant's "License to Operate"

Who "grants" a facility its "License to Operate"?

- Neighbors/Community, enforced by State, Federal agencies



Poor Env compliance -> adds business risk

- Erodes community trust
- Increases likelihood of regulatory audits

Is Achieving Zero Fugitive Leaks Feasible?

RECENT ENFORCEMENT

Consent Decrees:
BP-Whiting, Cenovus-Lima,
HFS-Artesia

FINANCIAL IMPACT

\$25 MILLION
(Fine per Instance)

\$150 MILLION
(Required Capital Projects)

CURRENT THREAT

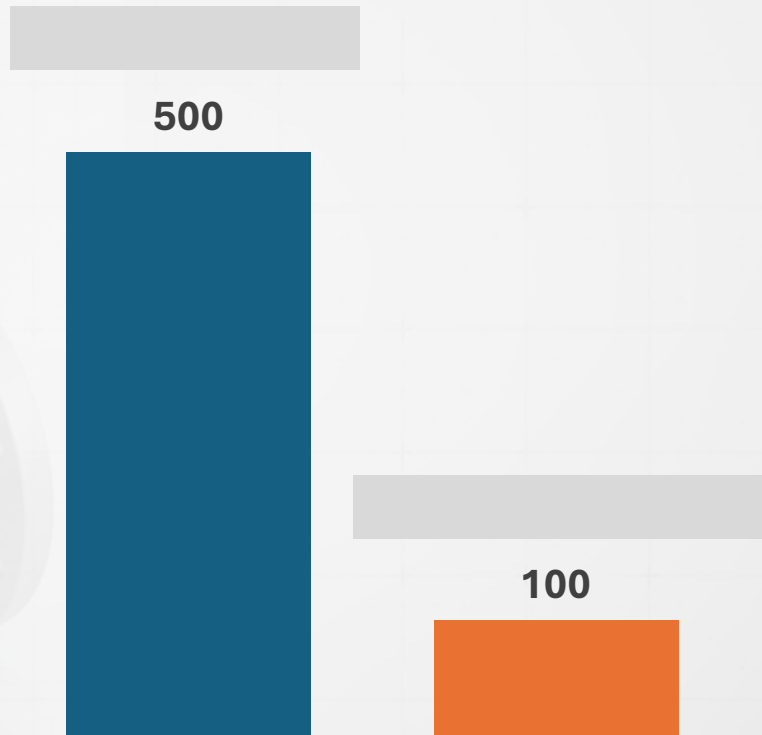
~30 Refineries currently in Consent Decree negotiations.

Great Compliance **reduces Risk** - preserves the License to Operate



Compliance – The Regulatory & CD Squeeze

Fugitives Leak Limits, ppm



Regulations

- SCAQMD – Los Angeles
 - *Incl Gaskets*
- Ethylene Oxide
 - *Incl Gaskets*
- Refineries
- Chemicals – built before 2023
- Oil & Gas – after May, 2024
 - *Incl Gaskets*

Regulations

- Chemicals – built after 2023
- SCAQMD – *Jan, 2026*
 - *Incl Gaskets*
- Ethylene Oxide – *Jul, 2026*
 - *Incl Gaskets*

Leak Repairs

- Oil & Gas – after 2024 *requires < 100 ppm Valves & Gaskets*
- Consent Decrees – *require < 100 ppm Valves & Gaskets*

**Is Achieving
Zero Fugitive
Leaks Feasible?**

Leak Limits transitioning from 500 ppm to 100 ppm

Compliance – Your Perspective Matters (Leaks)

Question: What does “leak” compliance mean in YOUR role?

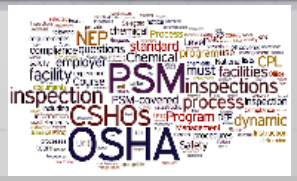


Reliability / Mechanical
 Focus: ASME B16.20 compliance, Mechanical Integrity, MTBF.

Environmental
 Focus: EPA regulations, Emission limits (ppm), Reporting, Fines.



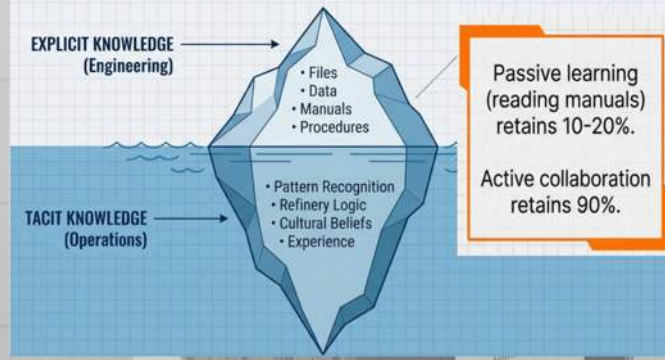
Operations / Maintenance
 Focus: Lock-out/Tag-out, Safe Start-ups, No visible leaks.



Reliability / Mechanical:
 Environmental:
 Ops / Maint.
 independently rather than collaboratively

How Do We Learn?

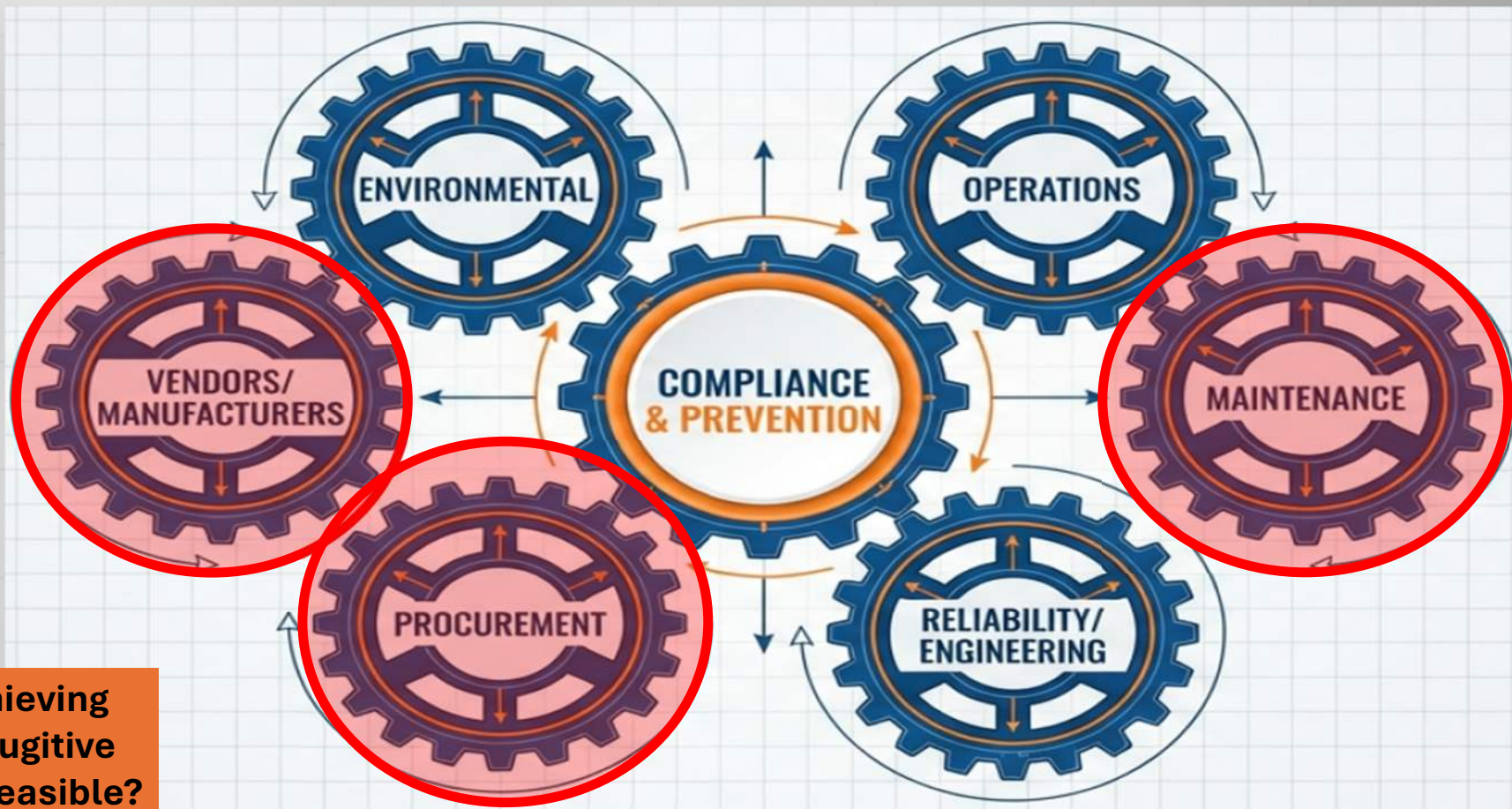
THE ICEBERG OF KNOWLEDGE



Is Achieving Zero Fugitive Leaks Feasible?

Silos Don't Effectively Eliminate Leaks

Now, Imagine These Additional Perspectives



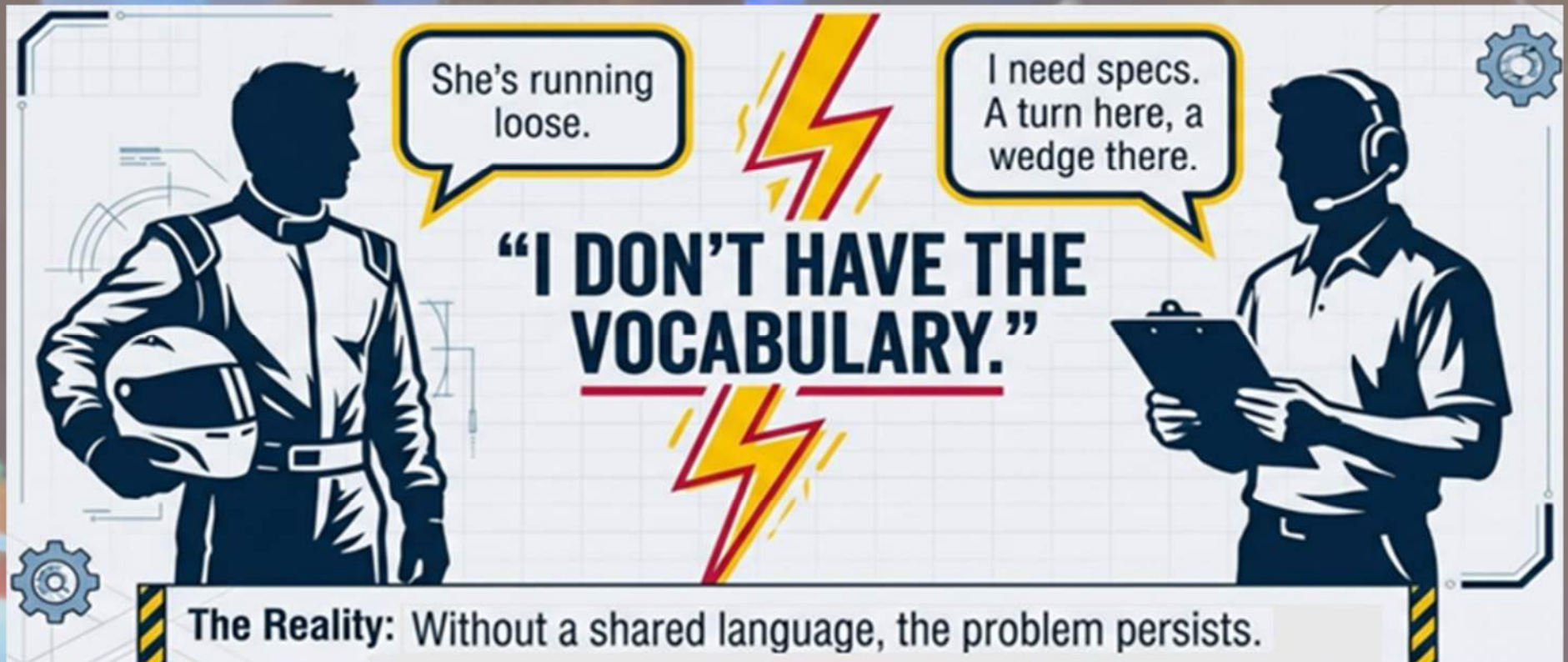
Is Achieving
Zero Fugitive
Leaks Feasible?

With Many Perspectives - How Do We Gain Alignment?

Awareness Silo - "Days of Thunder" Example

The Scene: Robert Duval (Crew Chief) - If you think she's running loose, or tight, tell us. We give a turn here, take some wedge out there. That's all there is to it.

The Scene: Tom Cruise (Driver) - "I don't understand what you just said..."



Reduce Silo Effect – "3 Circles" Meeting

Concept: Regular alignment meetings w/ 3 (or more) critical groups (dismantle the "Silos")

Goal: Share data, align priorities, create plan - **eliminate little leaks**

Who Attends:

- **Environmental/Techs:** Env limits, benefits of lower limits
- **Reliability / Engineering:** Design the Fix
- **Planner, Procurement:** Plan the work, purchase the proper components
- **Operations / Maintenance:** Run the Plant, Repair the Equipment
- **Technology Vendor:** Design/Benefits of Low-E vs Std Components

Agenda Example:

General Interest Opportunities: "Eliminating" leaks vs "Repairing" leaks

Leak Trends: What opportunities do techs see in LDAR, BWON service?

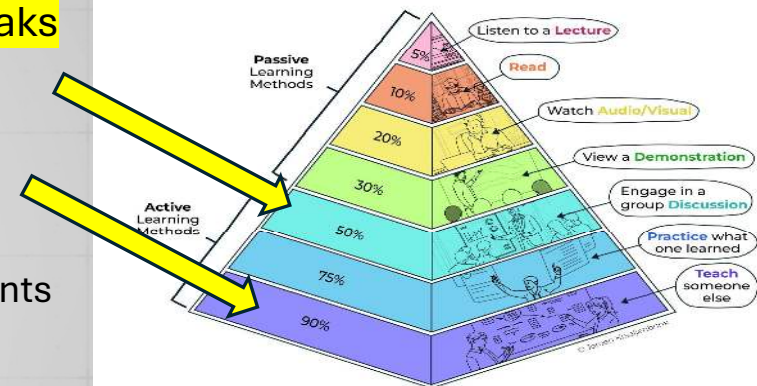
Procurement: "Lowest price" or "Lowest total cost"; ie. fewest leaks?

Is Achieving
Zero Fugitive
Leaks Feasible?

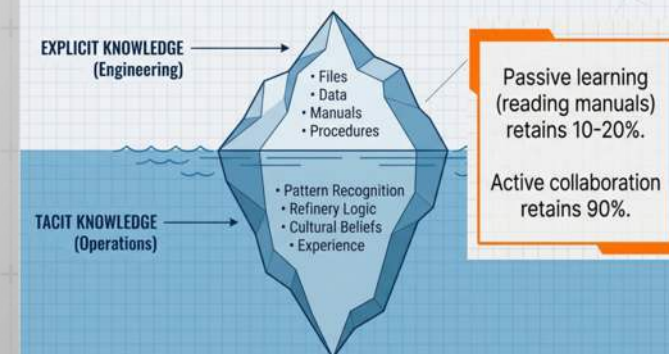
Improved Awareness & Communication Disable Silos

How You Really Learn

You retain ...% of knowledge if you ...



THE ICEBERG OF KNOWLEDGE



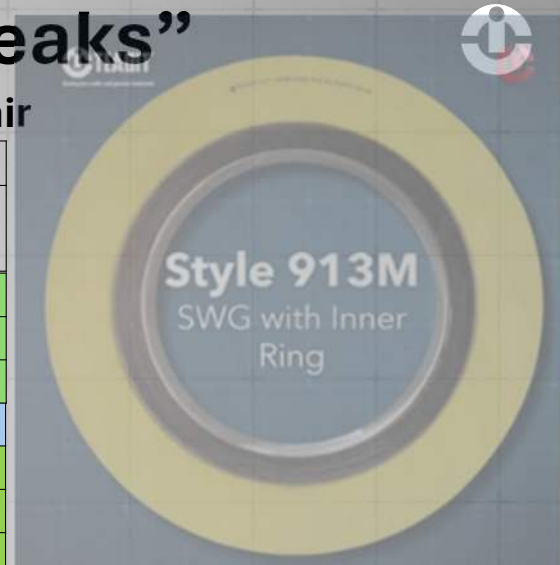
Opportunity – Eliminate LDAR “Leaks”

Example - 200,00 bpd / 50K Valves / 150K Flange Pair

Valves “Leaking”
Flange Pair “Leaking”
Fugitive Emissions, ton/yr
Annual Costs/Fees
Lost Product Value
Emissions Fees
Valve Repair Cost
Gasket Repair Cost
Re-Monitoring Cost
Total, \$/yr

"Compliance"
Standard Valves & Gaskets (500 ppm)
~700
~70
~500
~\$150K
~\$125K
~\$625K
~\$75K
~\$75K
~\$1,050K

Beyond "Compliance"
Low-E Valves & Gaskets (< 100 ppm)
Zero
Zero
~35
Near zero (<\$15K)
Near zero (<\$10K)
Zero
Zero
Zero
~\$25K



Other Opportunities (Low-E):

Skip Monitoring (Monitoring savings) - LDAR valve inventory - Low/No Leaks - \$\$\$

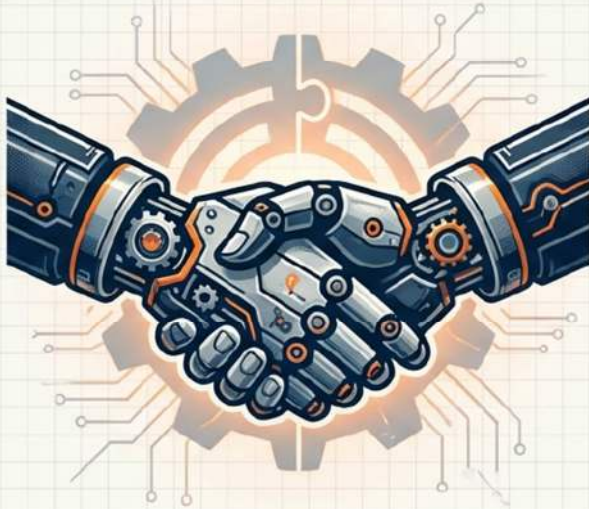
New Projects – Low-E vs. Std -> Reduced VOC/Ozone emissions – Permit flexibility - \$\$\$

What’s the 1st step to vet this idea? **Set up some “3 Circles” meetings?**

Yes - Achieving Zero Fugitive Leaks Is Feasible

LDAR - Going “Beyond Compliance” Can Generate Positive ROI

Collaboration is Your Competitive Advantage



Call to Action

1. Schedule your first '3 Circles' meeting this week. →
2. Ask: Are we buying based on price or total cost? →
3. Bridge the vocabulary gap between Operations and Environmental. →

"Little leaks matter too. Don't wait for a Consent Decree to force your hand."



TEADIT®

Tim Goedeker - ting@teadit.com - 281-739-9031
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