The Secrets of Leak

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Leak Detection

- For a long time we assumed that a leak was random event
  - In the beginning we had to establish a starting po of detecting leaks with an OVA 108 Analyzer
  - Definition of a "light liquid"
    - 0.3KPA at 20° Celsius
    - Dissipation of 10% or greater at 300 ° Fahrenheit

Leak Detection

- What has 30 years of Leak Detection History taught us?
  - Process, not just vapor pressure
  - The type of process your valves are exposed to directly effects it's performance
    - Snow Tires v. Racing Tires
  - The "light liquid" definition is a gauge/guide, it is n a guarantee in determining what really leaks in a facility

The Scientific Method

Refinery A	UNIT	LEAKS
01	CRUDE**	MEDIUM LEAKS
03	ULTRAFORMER***	HIGH LEAKS
04	UNICRACKER***	HIGH LEAKS
07	HF-ALKY	HIGH LEAKS
08	SAT GAS #1	HIGH LEAKS
16	PLATFORMER	HIGH LEAKS
69	DIESEL HT	LOW LEAKS
74	GDU	LOW LEAKS
76	PFS***	MEDIUM LEAKS
77	PENEX	HIGH LEAKS
82	FCCU/ CO-B***	LOW LEAKS
83	LEP*	LOW LEAKS
88	CNS	MEDIUM LEAKS
90	REG COKER	LOW LEAKS

* This should ordinarily be a hig
leaker, proving the algorithm n
works

** This unit can have the algori
isolate leaking range to less tha
of the unit

*** Unit contains many leaks, b
across many components. Spe
sections in these unit can be is
using an algorithm that reduce
leaking range by 50-60%

Is There a "Smarter" Way?

- **Facility Example 1**
  - 389,871 total components
  - Total Emissions for 2010 - 22,882 kg
  - Top 50 Emitters - 6,069 kg
  - 26 percent of the emissions are from .01 percen the components!

Is There a "Smarter" Way?

- **Facility Example 2**
  - 111,528 total components
  - Total Emissions for 2010 - 160,376 kg
  - Top 50 Emitters - 25,357 kg
  - 15 percent of the emissions are from .04 percent o the components!

Is There a "Smarter" Way?

- **Facility Example 3**
  - 87,798 total components
  - Total Emissions for 2010 - 54,581 kg
  - Top 50 Emitters - 13,696 kg
  - 25 percent of the emissions are from .05 percent the components!

Is There a "Smarter" Way?

- Sensors that detect to the PPB
  - Cost Effective
  - Radio Frequency that sends signal to remote terminal tha can be shared by site and Government
  - True detection at the first sign of concern

Is There a "Smarter" Way?

- IR Camera
  - Second Line of Defense, to be used when elevated readings are measured electronically
  - Quick and Efficient sweeps that have proven to capture process problems quickly

Is There a "Smarter" Way?

- Method 21
  - Smart Method, with algorithm driven monitoring
  - The approach should be from the top down, not from the bottom up

Is There a "Smarter" Way?

- **The Key is Inventory**
  - Inventor a facility without any subdivisions of process units or trains. Why?
  - Capture all components that have the potential to leak during the inventory process
    - If it can leak, it should have some sort of screening for LDAR
    - Rotating equipment with correct criteria should be screened more frequently
  - Pair the inventory with the screening results
  - Proper inventory gives you the ability to group components by the results of screening values coupled with reasons why the results you discovered are present.
    - Strategic engineering analysis of this data allows you to work smarter and reduce the manpower and equipment necessary to maintain the program (You get better results with less physical effort).

Is There a "Smarter" Way?

This program highlights a design control strategy that focus on what really causes leaks

- Strategic engineering analysis of rolling data is necessary
  - Any database will be able to manage the rolling averages for monitoring
  - Adjust your program to control emissions from what the data tells you
- Higher leaking components get more frequent M21
- Consider low leak strategies
- Consider engineering fixes or better designs
- Non Leaking components will receive less and less M21 events each year(s)
- Lower leaking components get less frequent M21

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Is There a "Smarter" Way?

- **Facility A**
  - Refinery producing approximately 225,000bpd
  - Component Count Quarterly: 51,000
  - Tons emitted 2013: 30 tons
  - Tons emitted 1998: 265 tons
  - LDAR Program Cost Annually $726,924
  - LDAR Program savings in emissions: 235 tons
  - Cost Savings from emissions reductions:
    - 235 tons = 1645 barrels (crude) = $164,500
    - US EPA Example: $164,500 - $726,924 = ($562,424)
    - Proposed Example: $164,500 - $145,014 = $19,486

Note: These are rough estimates using market value of crude. For actual cost savings, much more detail would be required. However, the difference between examples would be similar.

We have a responsibility to our Environment

What if we can take ca of the environmental responsibility, while increasing profits?

Working hard AND sma can equate to truly effective programs!

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