

# Perspectives on LDAR Programs

Carolina Air Pollution Control Association  
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# Challenges to Effective LDAR Compliance

- Rules are Complex
- Magnitude of Source to Manage is Typically Huge

# Complexity

- Federal LDAR Programs are Numerous
  - NSPS VV
  - Part 61 NESHAP Subpart V
  - Part 63 NESHAP
    - HON
    - MON
    - P&R Group IV
    - Etc.
  - RCRA Part 264 & 265 Subpart BB

# Complexity - LDAR Programs Apply to Many Different Types of Potential Leak Sources

Source	NSPS VV	RCRA	HON	Benzene NESHAP
Pumps, LL	Y	Y	Y	Pumps
Compressors	Y	Y	Y	Y
PRD, GV	Y	Y	Y	Y
Sampling Sys.	Y	Y	Y	Y
Open-Ended Lines or Valves	Y	Y	Y	Y
Valves, GV or LL	Y	Y	Y	Valves
Pumps & Valves – HL, PRD – LL/HL, Connectors (all)	Y	Y		PRD, Liq, Connectors
Pumps, Valves, Connectors, & Agitators – HL, Instrumentation Systems, PRD – LS			Y	
Closed Vent Systems	Y	Y	Y	Y
Surge Control Vessels & Bottoms Rec.			Y	Y
Agitators in G/V, LL			Y	
Connectors in GV, LL			Y	

# Complexity

- Varying Monitoring Schedules
  - Different schedules for different types of equipment
    - Pumps, Weekly Visual, Monthly M-21
    - PRD – GV, M21 within 5 days of Activation
    - Connectors, HL, M-21 after leak repairs
  - Different schedules for different regulations
    - Valves, GV, LL
      - Monthly or via Skip Frequency (VV, RCRA, & V)
      - Quarterly or via Skip Frequency (HON)

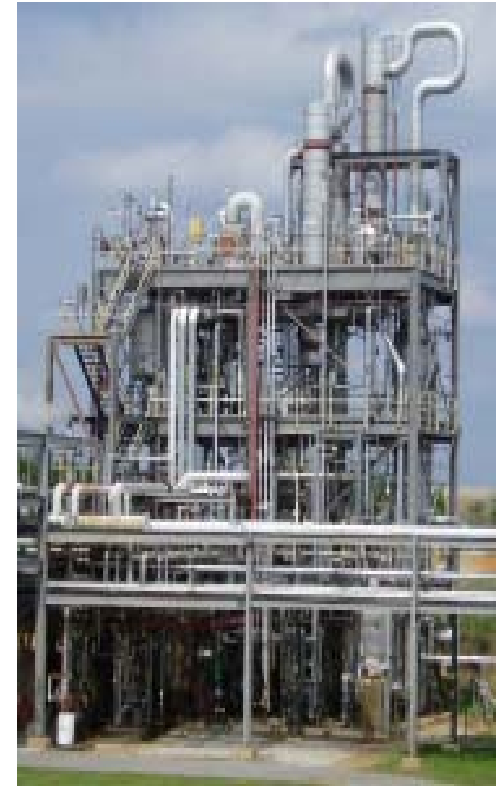
# Complexity

- Varying Leak Requirements

Source	NSPS VV, RCRA, Benzene NESHAP	HON
Pumps, LL	10,000 ppm	1,000 ppm 2,000 ppm (Food Service) 5,000 ppm (polymerizer)
Valves, GV	10,000 ppm	500 ppm (phase III)
PRD, GV	500 ppm	500 ppm

# Complexity

- Determining individual leak points
  - Water Lines Steam Lines
  - Compressed Air Lines
  - Nitrogen / Inert Gas Lines
  - Heat Transfer Fluid Lines
  - Process Lines without Affected Chemicals
  - Process Lines with Affected Chemicals at Less than Threshold Values
  - **Process lines with affected chemicals**
    - Gas / Vapor
    - Light Liquid
    - Heavy Liquid



Only these lines  
are affected.

# Magnitude

- Large numbers of potential leak sources make the program difficult and costly to set up and maintain
  - Typical production units include hundreds to thousands of potential leak points

# Typical Programs

- | 17 Refineries | Valves |
|---------------|--------|
| • Minimum #   | 2,229  |
| • Maximum #   | 42,505 |
| • Average     | 10,042 |
- *Source: US EPA Enforcement Alert, October 1999*

# Magnitude

- "[Fugitive emission monitoring] is like trying to find a burned out Christmas tree bulb." — Brett Sago, Eastman Chemical
- The numbers involved make it difficult to be perfect always, everytime.



# Magnitude

- Cost Elements
  - Set-Up
    - Tagging Each Component
    - Data Entry into Computer-Based Management System
      - ID, Source Type, Rule Applicability
    - Monitoring Equipment
  - Operation & Maintenance
    - Daily Calibration
    - Monitoring Cost (Including Disruption to Operations)
    - Repair Costs
    - Data Management
    - Management of Change
    - Report Generation, Data Review, Verification & Certification

# Administrative Burden

- Compliance Must be Proven
  - Current LDAR requires Detailed Documentation.
  - Records are Required for Each Point
  - Tags for Each Point
  - Tags for Leakers
  - Maintenance Records for Each Repair & Repair Attempt
  - Records for Delays

# Magnitude

- Challenges

- Easy to miss one or two out of hundreds during set-up or during monitoring
- Many tags to maintain
- Many records to maintain
- Potential for confusion
- With hundreds of non-leaking sources, easy for technicians to become complacent
- Costly

# Requirements for a Good Program

- **Set-Up**
  - Accurate Drawings
  - Detailed Knowledge of Process Conditions
    - Composition, Vapor Pressure, Pressure or Vacuum Service?
  - Assignment of Organized, Detailed Oriented Personnel

# Requirements for a Good Program

- **Set-Up**
  - **Commitment of Resources**
    - May all be Internally Supplied
    - May be Lead and Implemented by Contractor
    - **HOWEVER, Must Include Process Knowledge which is Available for Effective Use During Development & Implementation**

# Requirements for a Good Program

- Good Software Aids in Unraveling Complexity Issues
  - Can Address Leak Rate Definitions
  - Can Document Which Programs Apply
  - Can Aid in Scheduling and Ensuring Monitoring is Done on Schedule
  - Can Aid in Ensuring Repairs Made Within Deadlines

***But Software is a Tool and Cannot Eliminate the Basic Challenge that the Rules are Complex.***

# Requirements for a Good Program

- **Running the Program**
  - Management Commitment to Compliance with Monitoring & Repair Deadlines is Vital
  - Communication between Monitoring Team, Operations Team and Maintenance

# Completeness

- Detailed oriented personnel and systems are keys to successful LDAR program
- Management understanding and buy-in form the foundation of success.
- Recognition and reward system must support attention to detail.

# Alternatives

- "Smart" LDAR
- Audible – Visual - Olfactory
  - Mandated
  - As an Alternative

# Audible – Visual - Olfactory

- An AVO System Can be Exceedingly Effective for Finding Leaks when
  - The chemical exhibits a strong odor
  - The chemical exhibits a visual sign when leaking (flag, plume, drips or wet spots)

# Audible – Visual - Olfactory

- Examples

- Good:

- Acetic Acid – Low Odor Threshold
- Ethylene Glycol – Low Vapor Pressure
- Low Operating Temperatures which Allow Visual Signs of Leaks

- Poor

- Ethane – No Odor, Very High Vapor Pressure
- Methane – No Odor (without mercaptan additives), Very High Vapor Pressure

# Summary

- LDAR programs are difficult to fully implement because...
  - The rules are complex, and
  - The piping systems they are intended to regulated consist of literally thousands of components.