REPORTING AND CLASSIFICATION OF PERSONAL H_2S ALARM INCIDENTS

Prioritizing Personal H_2S Alarm Incidents Using a Standard Risk Assessment Process

Jody Kliebert, MSPH
Industrial Hygienist, MOTIVA Enterprises, L.L.C. – Convent Refinery

AGENDA

Why Report and Risk Rank Personal H_2S Alarms?

Reporting and Risk Ranking Process

Data Analysis

Unexpected Discoveries and Benefits

Recommendations for Implementation

WHY REPORT PERSONAL H_2S ALARMS?

Additional data to identify H_2S Hazards

- Required use of monitors = entire population of all possible exposures is measured – Capture This Data

See a larger percentage of H_2S related incidents

- If no required reporting, do not see near misses – only see incidents with consequences
- 93.5% of H_2S alarms were near misses/potential incidents
- Identifies potentially more high risk incidents

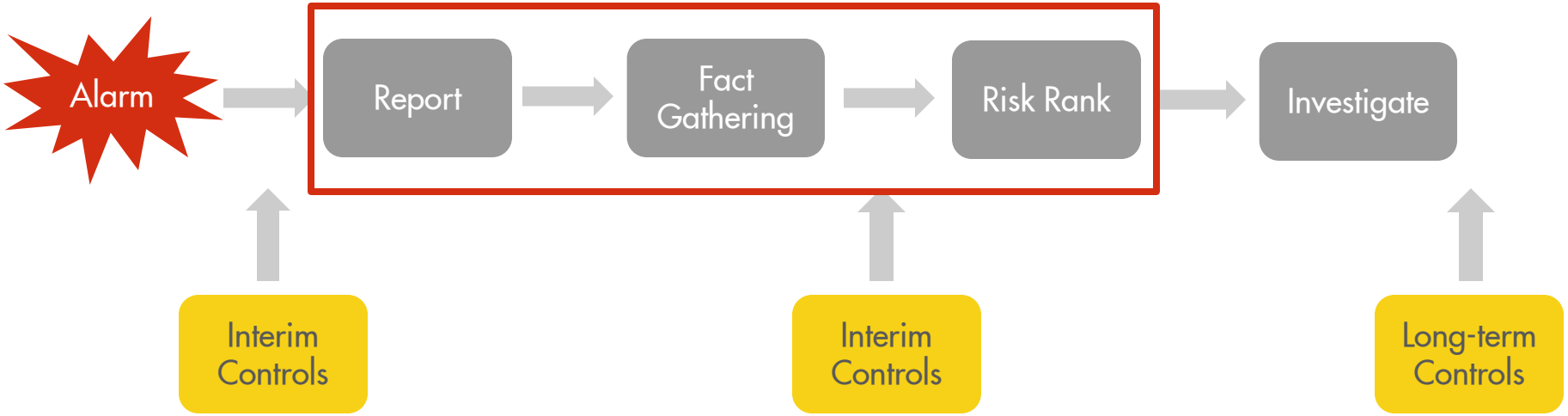
WHY RISK RANK PERSONAL H_2S ALARM INCIDENTS?

Prioritization

- Focus management's attention on hazard sources
- Focus resources based on risk
- Triggers fact gathering
- Determines level of incident investigation

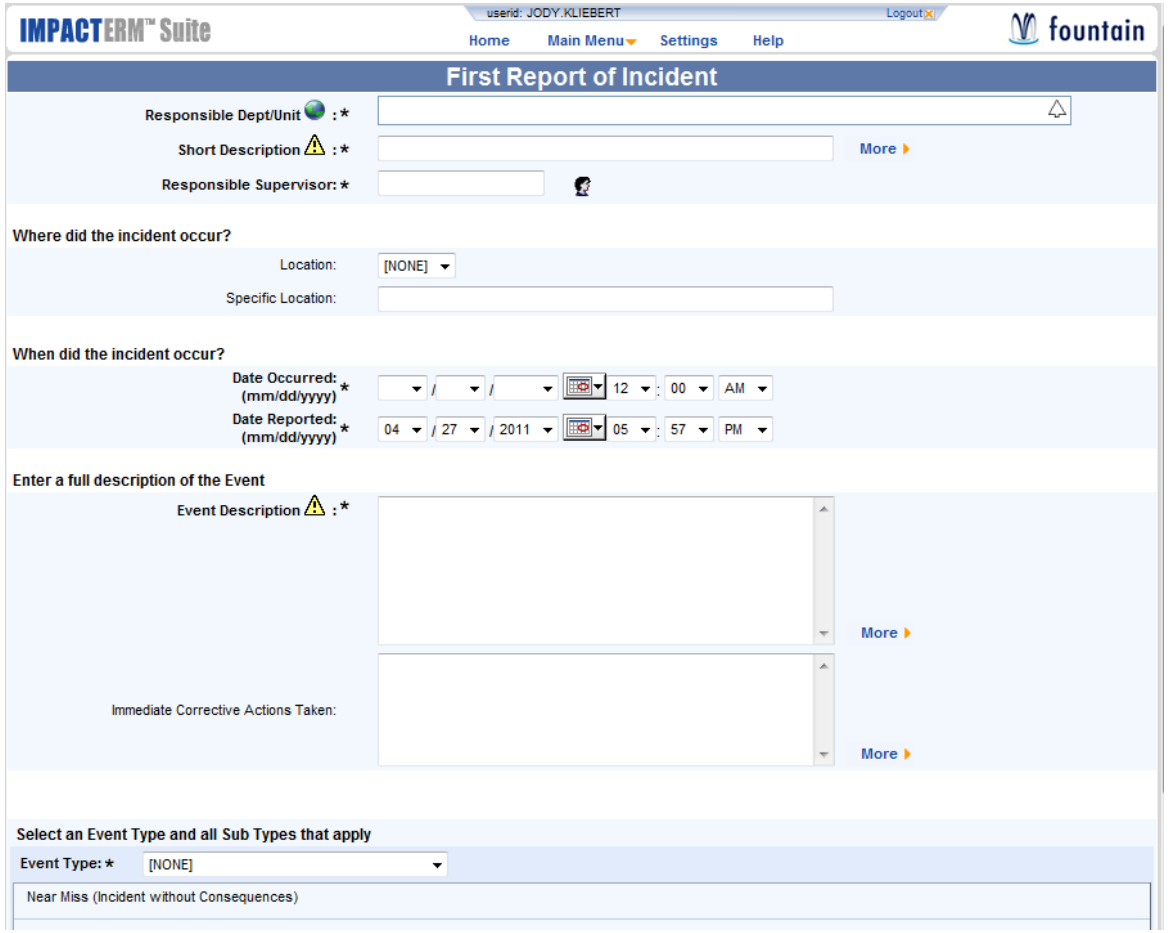
REPORTING AND RISK RANKING PROCESS

- Uses existing incident reporting, risk ranking and investigation processes



REPORT

- Policy requires all personal H_2S and CO alarms be reported
- First Report of Incident entered by a supervisor



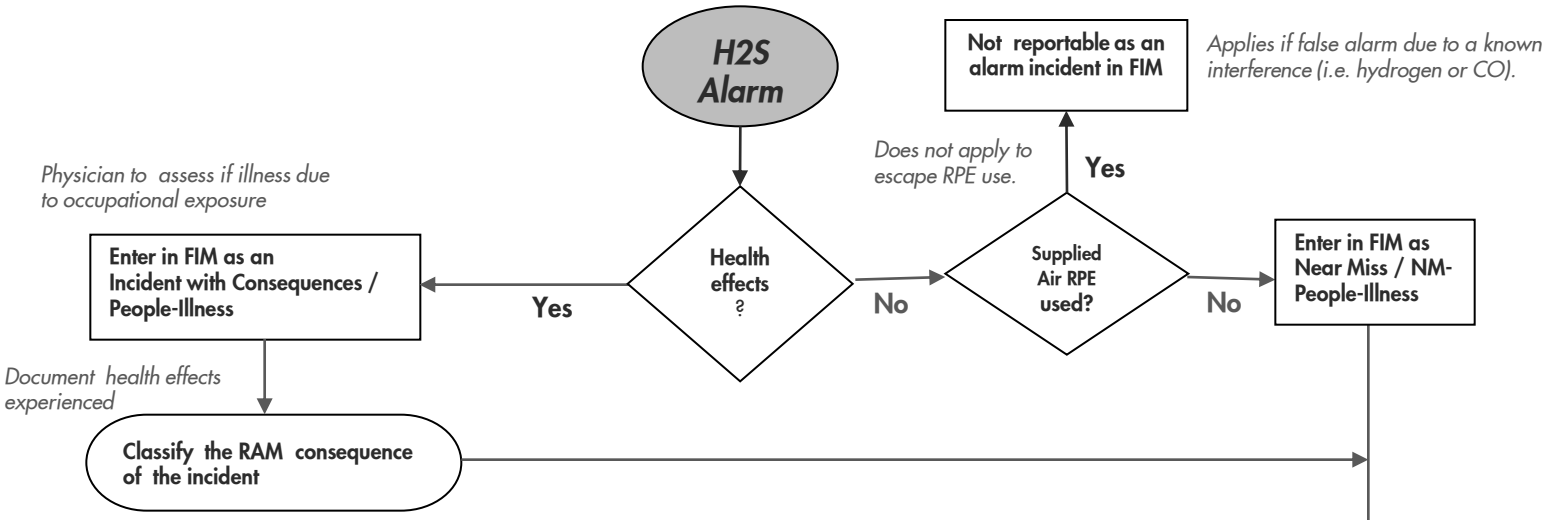
FACT GATHERING

- First Report only includes the basic elements
- Additional information required for risk ranking:
  - Chemical involved
  - Source of chemical involved
  - Volume of chemical involved
  - Concentration of H_2S in the chemical involved
  - Concentration of H_2S measured by personal monitor
  - Full-shift and short term exposures, if available
  - Task performed at time of the alarm
- Conducted by site IH or H&S Professional

RISK RANKING PROCESS

- Focused specifically to Personal H_2S alarms
- Standardized for U.S. Manufacturing Sites
- Step-by step method to classify H_2S alarms: low, medium or high
- Considers:
  - Actual health effects
  - Respiratory protection
  - Volume of chemical involved
  - Concentration of H_2S in chemical
  - Risk ranking using the Shell Risk Assessment Matrix (RAM)
- Conducted by site IH, incident management coordinator or lead investigator

Entering and Classifying H2S Alarm Incidents in FIM



Actual

Potential

Volume of Substance	Classification of Potential Risk (1)	Concentration of H2S (2): < 0.01 %vol *OR* < 100ppm vapor space	Concentration of H2S (2): >0.01 % vol *OR* ≥ 100ppm vapor space	Concentration of H2S (2): >0.01 % vol *OR* ≥ 100ppm vapor space
	(3)	<100 ppm (peak reading) **OR** Health effect ≤ First Aid	<100 ppm (peak reading) **OR** Health effect ≤ First Aid	≥ 100 ppm (peak reading) **OR** Health effect > First Aid
Small	Sample container, fixed volume sample, small analyzer / instrument leak			
Medium	Seal pot, opening isolated process line/equipment, drum/tote, minor process leak			
Large	Storage tank, ship/barge hold, tank truck, rail car, opening equipment or process line not isolated, major process leak			

1. Estimate volume of the substance involved.
2. Identify liquid or vapor space concentration of H2S
3. Identify and use peak reading from the H2S monitor.

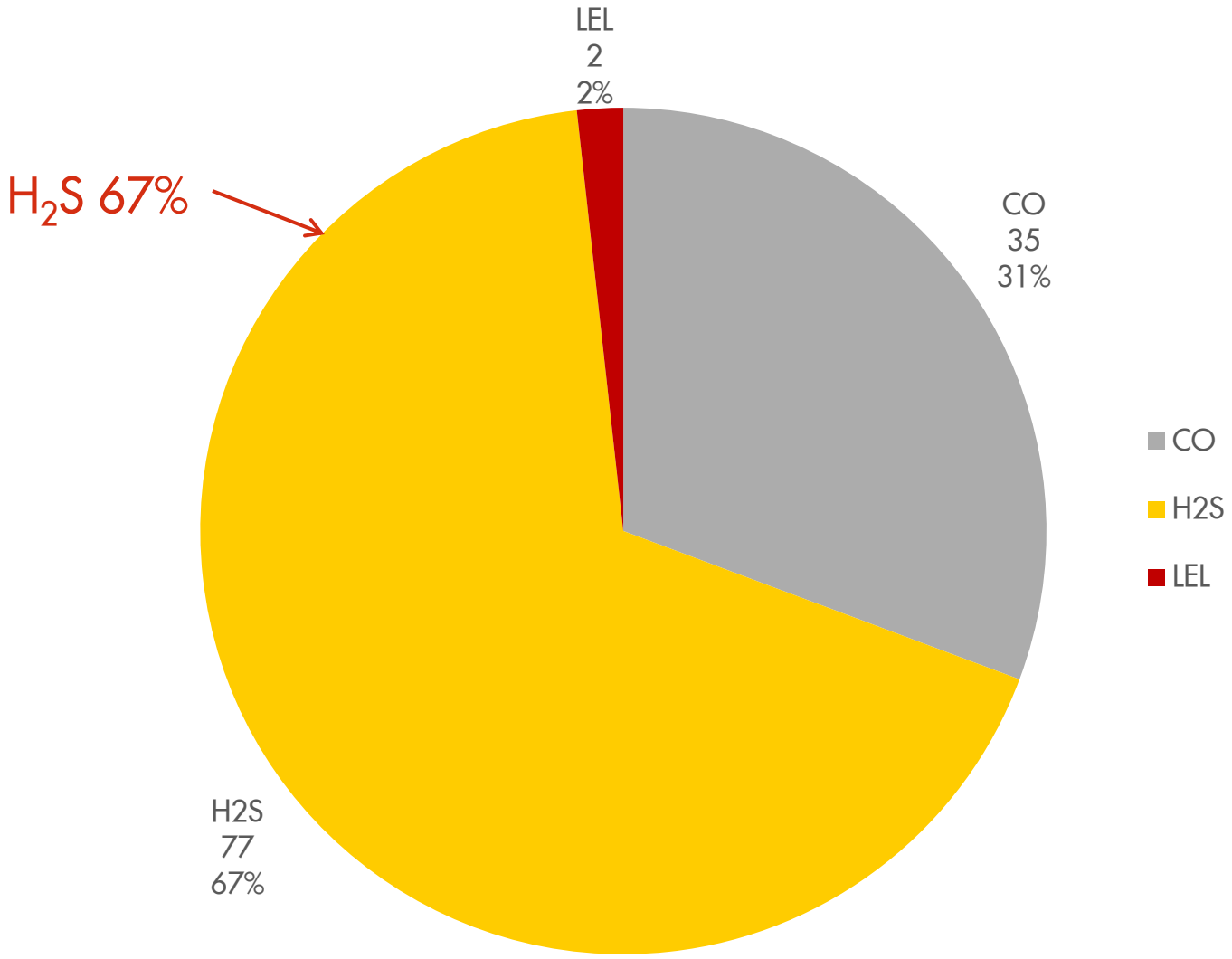
   If a peak reading is not available, then use severity of health effect from the incident.

Apply reference table to classify potential risk.

FIM – Fountain Incident Manager
H2S – Hydrogen Sulfide
NM – Near Miss
PPM – Parts Per Million
RAM – Risk Assessment Matrix
RPE – Respiratory Protective Equipment

DATA ANALYSIS – ALL PERSONAL ALARM INCIDENTS

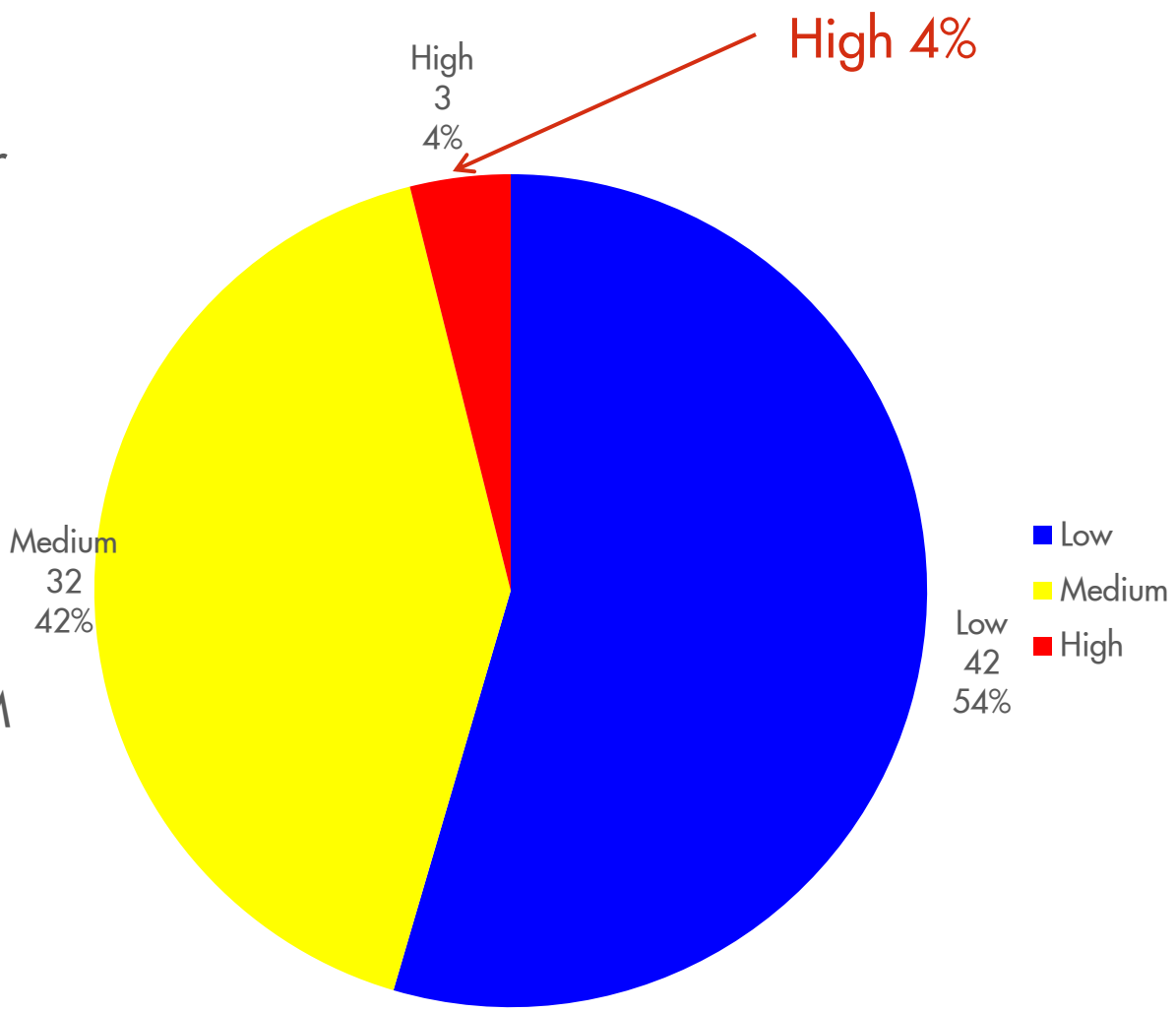
114 personal alarm incidents 12/27/2009 – 04/25/2011



RISK RANKING RESULTS

- Automated email to upper management for High incidents

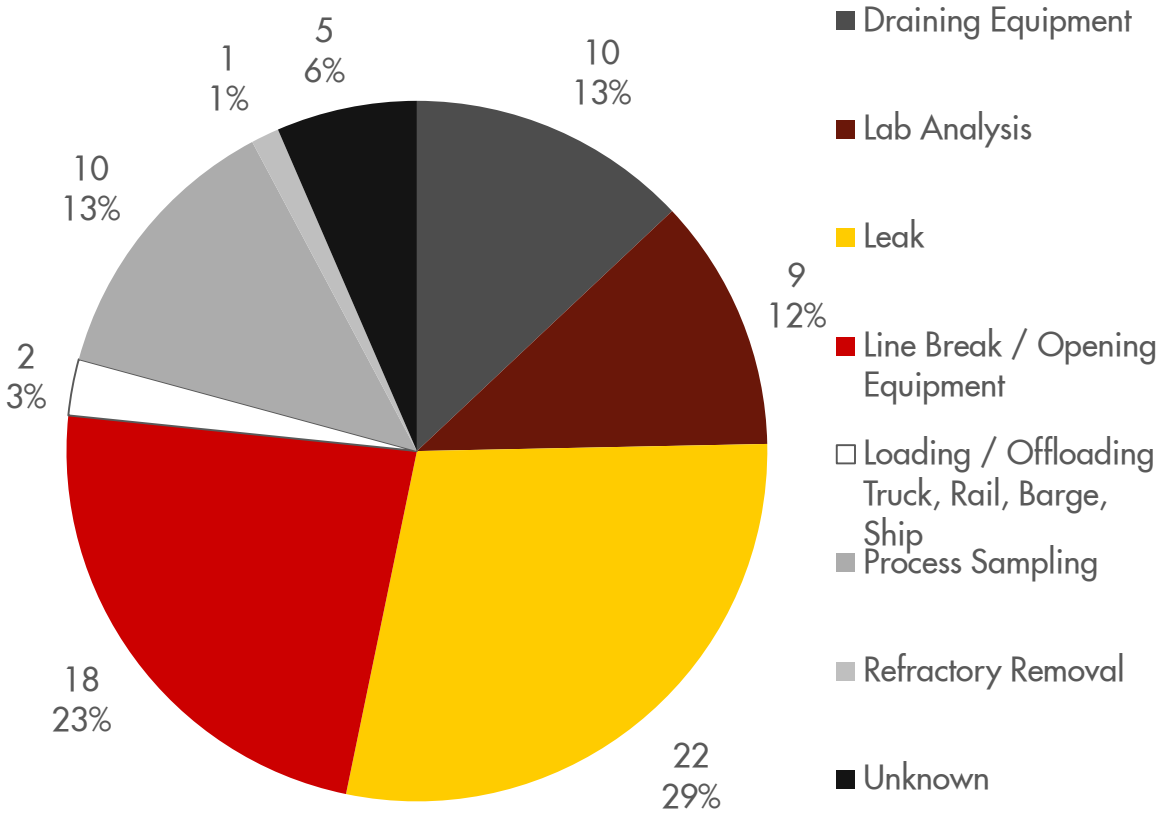
- First 43 incidents:
  - Using general RAM
    6 of 43 incidents High
  - Using H_2S specific RAM
    1 of 43 incidents High



CAUSES OF H_2S ALARM INCIDENTS

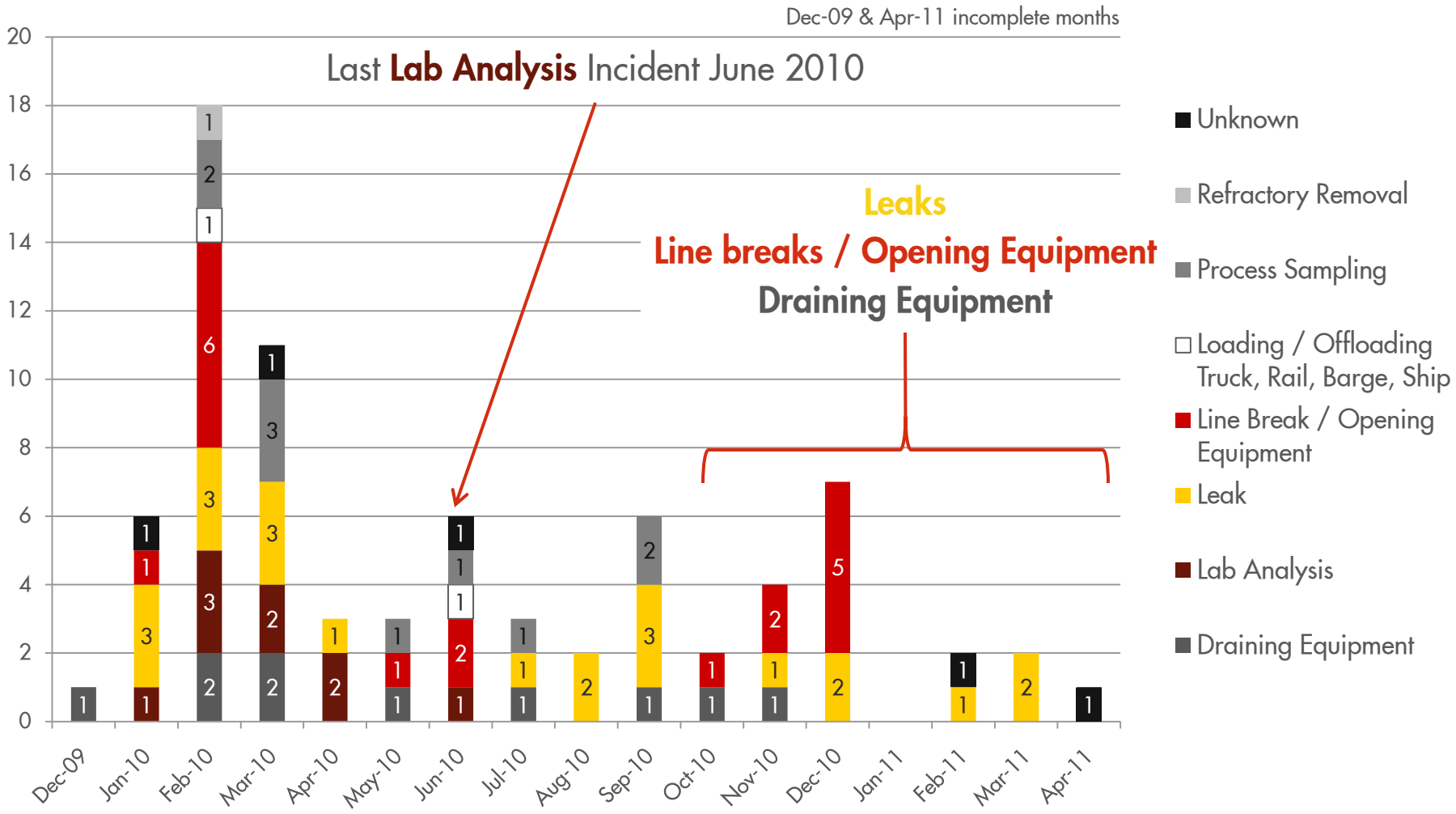
77 personal H_2S alarm incidents 12/27/2009 – 04/25/2011

- Leading causes:
  - Leaks – 29%
  - Line breaks / Opening equipment – 23%
  - Lab analysis – 12%
  - Draining equipment – 13%
  - Process sampling – 13%



CAUSES OF H_2S ALARM INCIDENTS OVER TIME

77 personal H_2S alarm incidents 12/27/2009 – 04/25/2011



UNEXPECTED DISCOVERIES AND BENEFITS

- Reporting all types of personal alarms – H_2S, CO, LEL
- Alarms triggered by chemicals other than that intended
  - H_2S alarms: 7% H_2
  - CO alarms: 65% H_2, 3% hydrocarbon
- Improved environmental responsibility
  - Incidents are reviewed and risk ranked by environmental engineers
  - Detect and repair leaks not found by LDAR program
- Improved safety and reliability
  - Incidents are reviewed and risk ranked by reliability engineers
  - Detect and repair H_2 and hydrocarbon leaks

RECOMMENDATIONS FOR IMPLEMENTATION

- Require reporting of personal alarms – don't just recommend
- Provide written guidance and training on:
  - Information required for initial report
  - Entry of initial report
  - Documenting closing the incident loop: alarm, report, control, verify
- Minimize number of individuals conducting risk ranking
- Configure incident database for accurate data retrieval
  - Add incident flag for "Personal gas monitor alarm"
- Communicate benefits of reporting to site personnel repeatedly
- Use interim controls other than SARs where possible
- Standardize personal gas monitors

Q & A

BACKGROUND

MOTIVA Enterprises, L.L.C. – Convent Refinery:

- SE Louisiana
- 50/50 JV - Shell Group and Saudi Refining Inc.
- Constructed: 1964
- Throughput: 245,000 bpd
- Crude slate: predominately sour crude
- Products: Fuel oil and lighter

HISTORY OF PROCESS

Path to standardized reporting and risk ranking:

- 1998, Feb. – H_2S related fatality
- 1998 – Required personal H_2S monitors for company personnel
- 2007, Aug. – Required personal H_2S monitors for anyone entering the refinery
- 2009, Dec. – Required personal CO monitors in some areas
- 2009, Dec. – Required reporting of personal H_2S and CO alarms
- 2010, Mar. – H_2S Team, Goal: Zero personal H_2S Alarm Incidents
- 2010, Apr. – H_2S Alarm Incident Risk Ranking Pilot

CONTROLS - LEAKS

- Most leaks were unknown prior to personal alarm incident
- LDAR program, PEI program and operator rounds play a large role in control
- Added:
  - Personal alarm reporting process itself – repair identified leaks

CONTROLS – LINE BREAKS / OPENING EQUIPMENT

- Equipment draining and decontamination procedures, permit to work process and energy isolation play a large role in control
- Zero Energy Isolation reduced splash/spray incidents
- Added:
  - Decontamination of Process Equipment Chemical Exposure Control Policy
  - Line Break Policy
  - Full-time respirator technician

CONTROLS – LAB ANALYSIS

- Lab ventilation systems, analytical procedures, lab design, sample cooling and limiting chemical volume play a large role in control
- Added:
  - Move problem analysis into lab hoods
  - Vent instruments to ventilation systems
  - High flowrate fans for outside operations
  - Increase emphasis on process sample labeling

CONTROLS – DRAINING EQUIPMENT

- Equipment draining and decontamination procedures, closed drain lines and hoses, closed decontamination headers (T/A) and decontamination stream analysis (T/A) play a large role in control
- Added:
  - Additional closed drain lines
  - Improve drain/vent to flare

CONTROLS – PROCESS SAMPLING

- Closed-loop sample stations, eductor box sample stations and process sampling procedures play a large role in control
- Added:
  - Hierarchy of controls specific to process sampling
  - Discontinue/minimize sampling
  - Additional closed-loop sample stations
  - Microwave gauges on tanks
  - Mini SAR carts

NEXT STEPS

- Automatic download of personal monitor data – see all alarms
- Increase emphasis on reporting requirements
  - Communicate data analysis and benefits to site personnel
  - Communicate unreported alarms to management
- Configure hand-held instruments with H_2 null CO sensors and H_2 sensors to investigate H_2 and CO sources
- Adjust H_2S alarm set points: 5 ppm low, 10 ppm high
- Required reporting and classification of personal H_2S alarms at Shell Group U.S. Manufacturing sites