



Canadian and U.S. Downstream
Fugitive Emission Programs
November 5, 2014



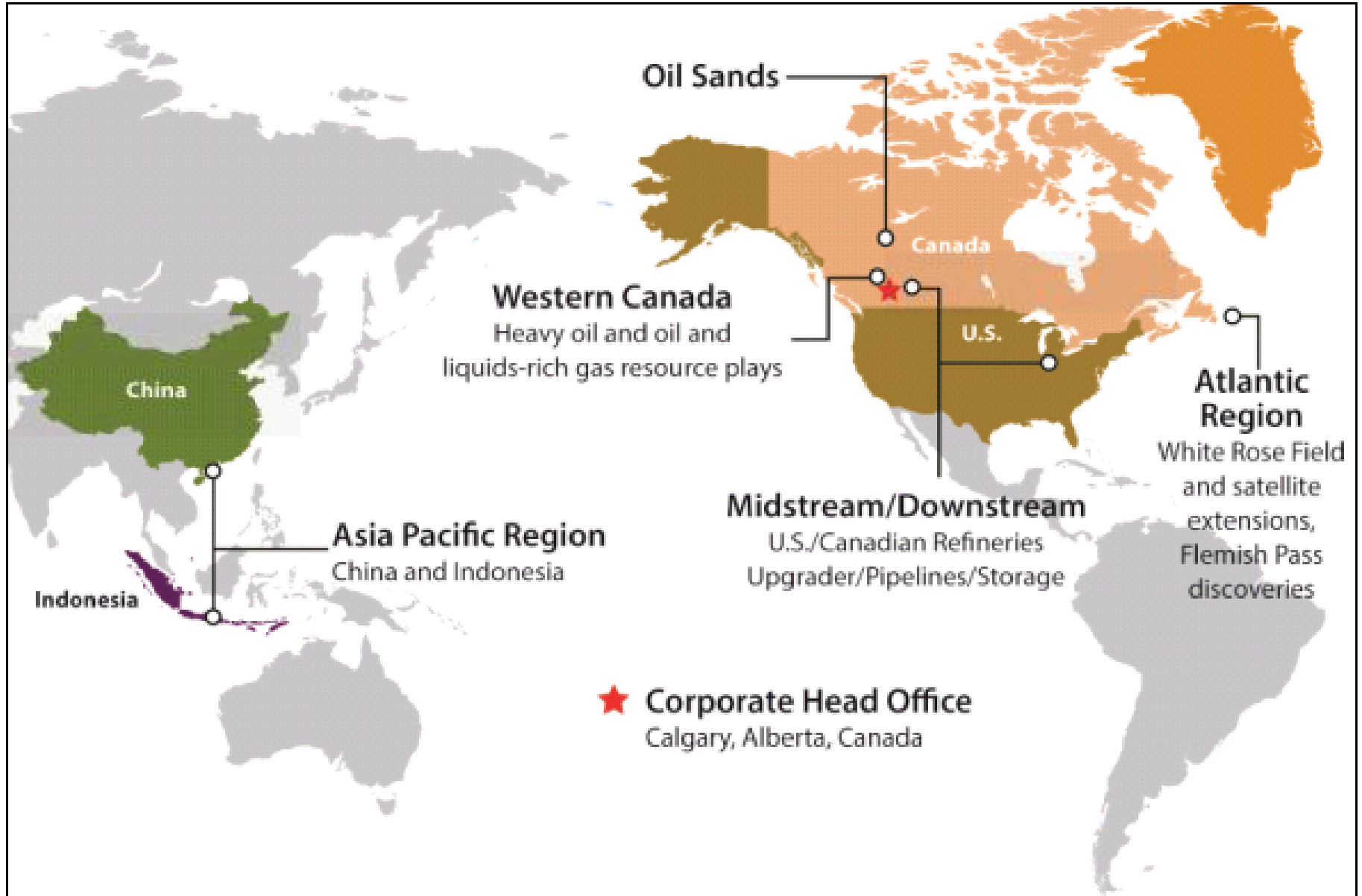


Husky Energy

- Husky Energy Global Operations
- Canadian Downstream Operations Overview
- Canadian Fugitive Emissions Management Program
- U.S. Downstream Refinery Operations – Lima Refinery, Ohio Overview
- Lima Refinery Fugitive Emissions Management Program



Husky Energy Global Operations





Husky Assets in Lloydminster



Ethanol Plant



Asphalt Refinery and Pipeline Terminal



Upgrader



Other Canadian Downstream Assets



Prince George Refinery



Hardisty Pipeline Terminal



Minnedosa Ethanol Plant



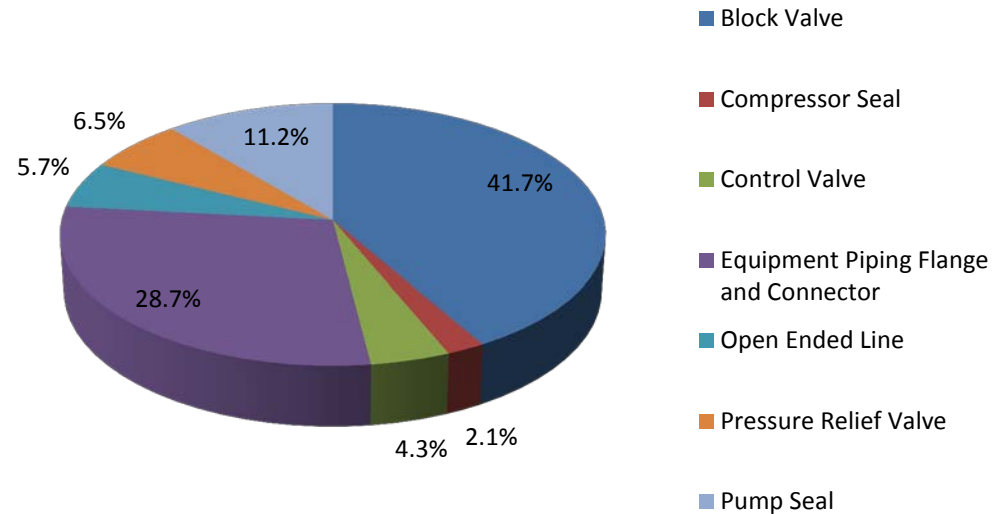
Canadian Downstream

- Fugitive Emission Management
 - Corporate procedure follows CCME Guideline
 - Risk managed as part of the facilities Environmental Management System (EMS)
 - Asset Integrity
 - Risk Based Integrity Management (RBIM)
 - Flange Management Program
 - Inspection rounds
 - Bolting procedure during Turnarounds
 - Monitoring & Measuring (LDAR)
 - Developing a new Leak Detection Management Solution (LDMS), LDAR results and reporting database





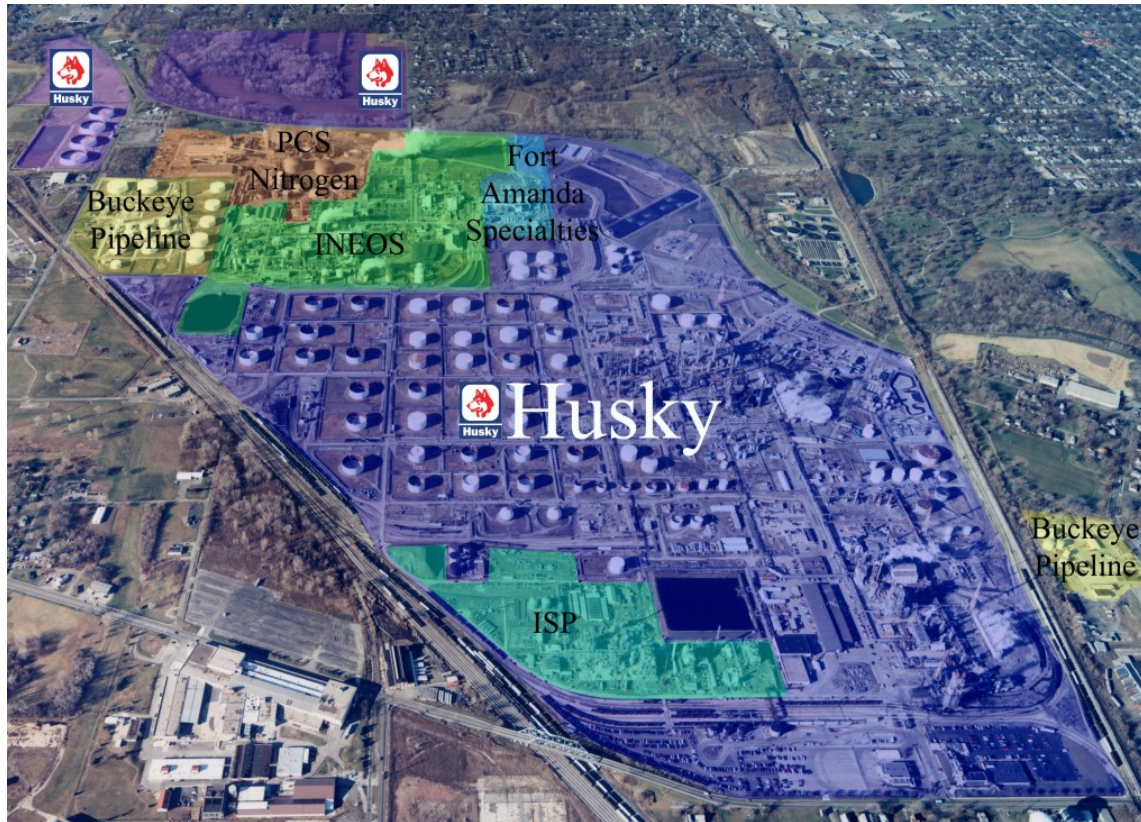
Canadian Downstream



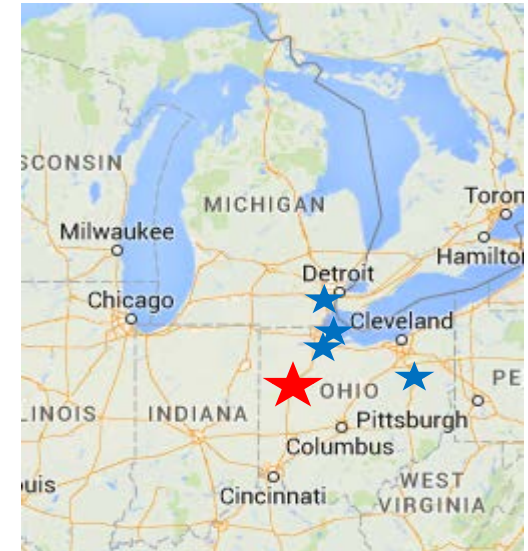
- >95% of Emissions due to leaks are from the following three components categories:
 - i. Pumps
 - ii. Valves
 - iii. Equipment and Piping Flange Connections.
- Pumps have the highest % leak rate (i.e. # of leaking pumps to total # of pumps)
- Block Valves and Equipment Piping Flanges and Connections contribute to majority of the leak count and total mass emission



U.S. Downstream



- 600-acre complex – refinery occupies 480 acres
- Share with five other businesses



- 323 km south of Sarnia
- Pop 40,000 (Lima)
- 105,000 (Allen County)
- Four refineries in OH
- Five within 200 km of each other



Husky Lima Refinery Basics

- Lima Refinery, est. 1886
- The refinery operates 24/7 with scheduled maintenance shutdowns approximately every five years
- Primary products: gasoline, jet fuel and diesel
- Lima Refinery provides 25% of gasoline consumed in Ohio
- Approximately 440 Husky and 200 contract employees
- Title V, Consent Decree, Legal and other regulatory requirements





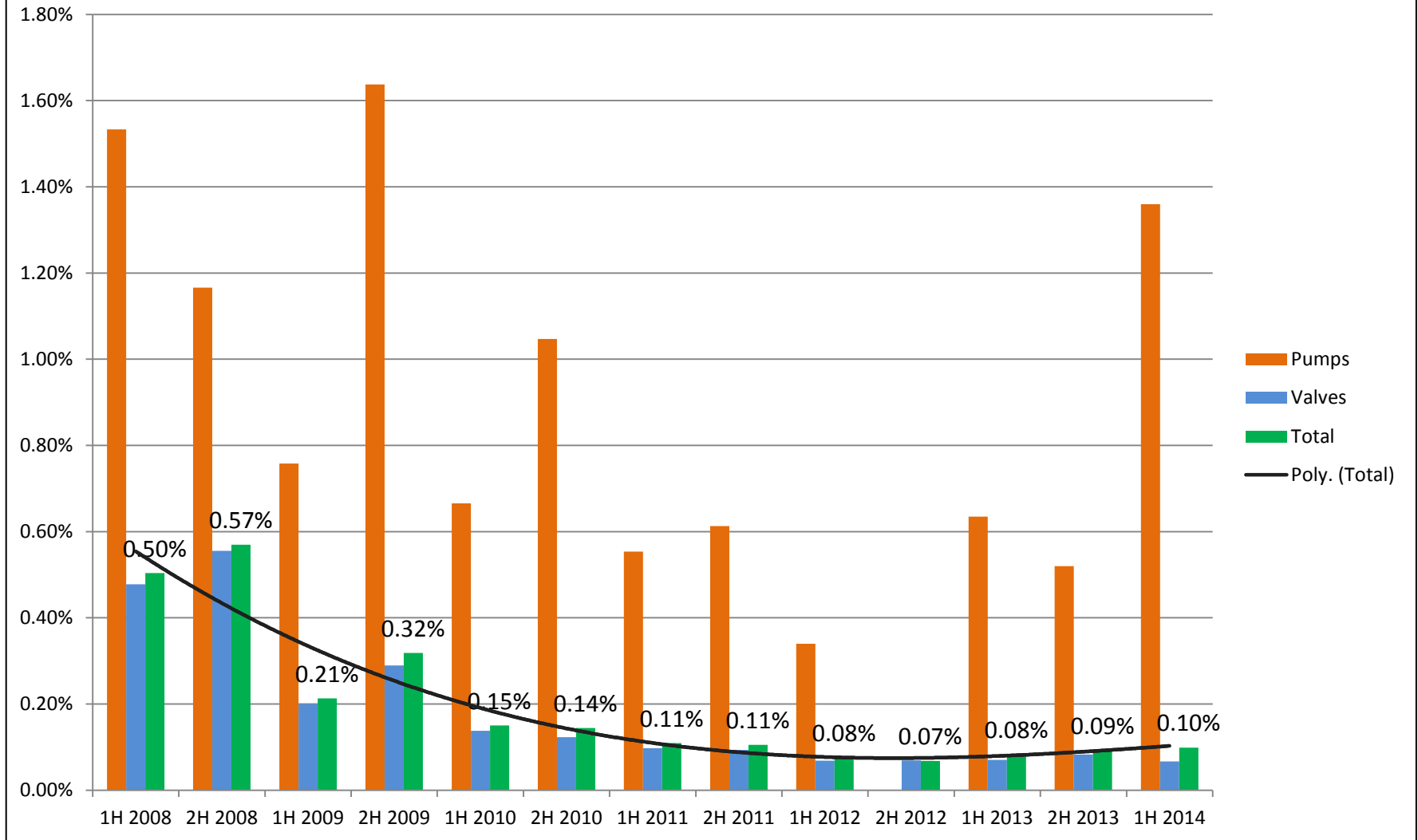
U.S. Downstream

- Enhanced LDAR program since 2008 (consent decree)
- Alternative monitoring program (quarterly vs. monthly)
- For pumps and valves:
 - In 2001 → 18,327 quarterly monitoring events*
 - In 2014 → 26,036 quarterly monitoring events*

*initial monitors – does not include remonitors on leakers

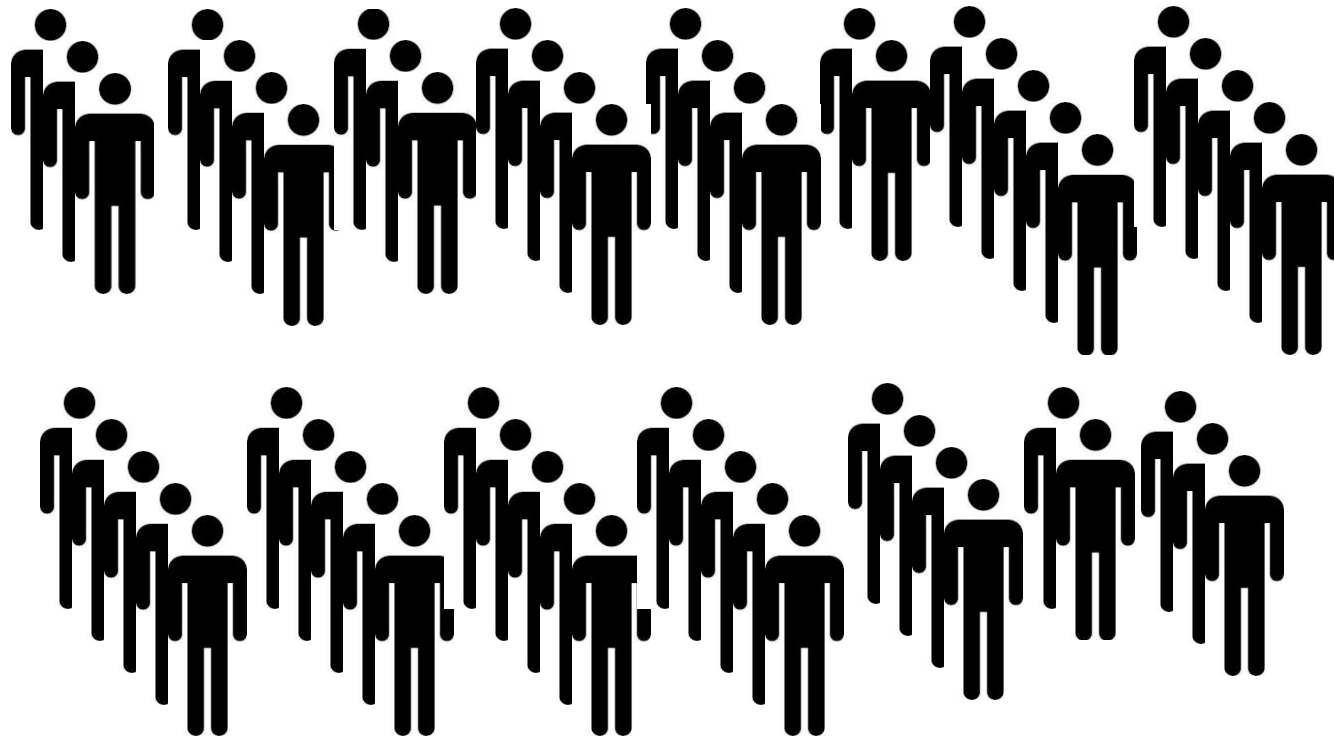


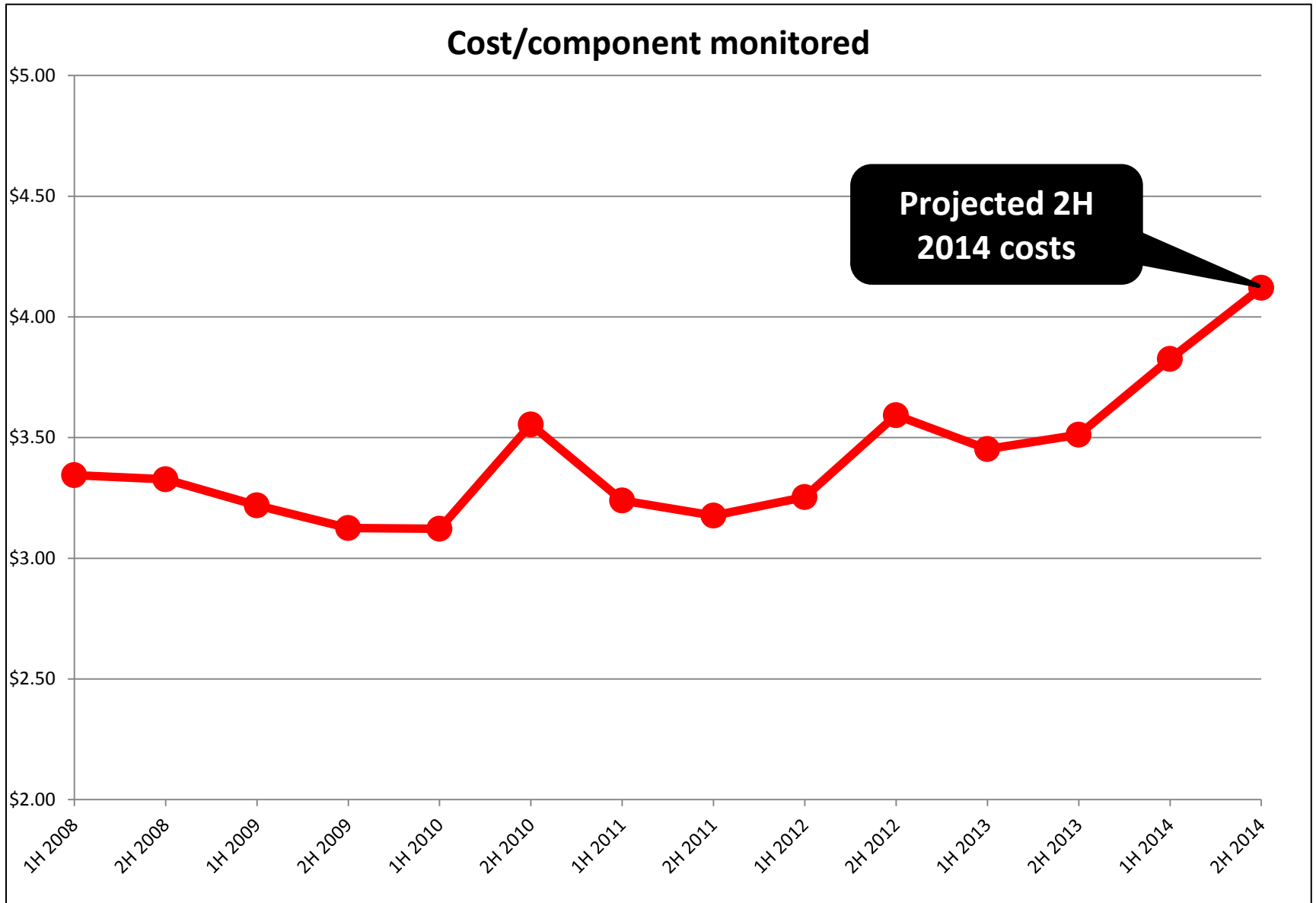
Refinery Wide Leak Rates (Pumps, Valves, Total)





Consultants, IT Department, Senior Leadership,
Procurement







U.S. Downstream

1,3-Butadiene

- Initially sampled in 1992 as part of Hazardous Air Pollutants (HAPs) program
 - **MDL = 500 ug/L**
 - Results below MDL = no more sampling
- 2007 – Refinery Information Collection Request (ICR)
 - submitted calculations using 1992 MDL
- 2013 – US EPA calls – ICR data shows very high 1,3-butadiene
 - Resampled, analyzed using current methods
 - **NEW MDL = 5 ug/L**
 - Results were below new MDL
 - Sampled two more times, both sets of results were below the new MDL

Conclusion

- 1,3-butadiene not present in Husky's U.S. Lima Refinery emissions
- No further sampling is planned at this time



Lessons Learned

- Minimizing fugitive emissions starts with a solid asset integrity program
- LDAR is only one piece of the fugitive emission reduction strategies at facilities
- Increased carrying costs by maintaining an inventory of replacement maintenance equipment
- Identifying top emitting components which don't meet the leak definition and prioritizing their repair based on actual leak rate (tonnes/yr) not TVA reading (ppm)
- Ohio EPA regulatory air monitoring of benzene and 1,3-butadiene below threshold values
- Repeated analytical testing shows 1,3-butadiene not to be a contaminant of concern at our U.S. refinery
- Opportunity to optimize the LDAR frequency based on achieving ALARP emissions



Questions?

Thank-you