
ConocoPhillips

Optical Fugitive Emission Detection and Measurement Pilot Study

Terence Trefiak P. Eng.

ConocoPhillips Canada

ConocoPhillips

OVERVIEW

- BACKGROUND
- PILOT STUDY SCOPE
- STUDY FINDINGS
  - Source Data
  - Facility Comparison
  - Economics
- PATH FORWARD
- SUMMARY

ConocoPhillips

FUGITIVE EMISSIONS

Losses (leaks) of HC product

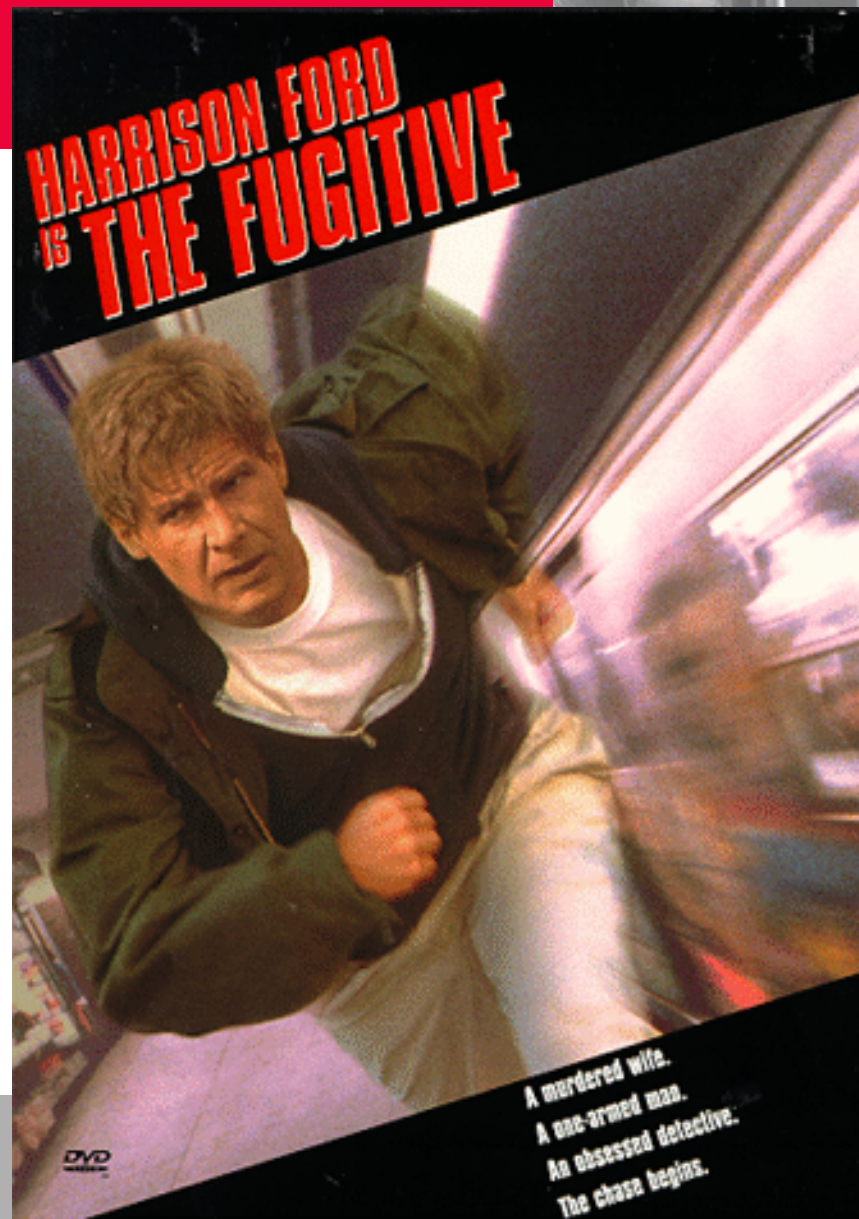
(methane, propane, VOC's)

UNINTENTIONAL FUGITIVES

- normal wear and tear / damage
- improper or incomplete assembly of components
- inadequate material specification
- manufacturing defects

INTENTIONAL FUGITIVES

- venting (tanks, controllers, comp. seals, stacks, etc.)



“Why worry about some little leaks?”

What is the Problem?...

“Gas leaks are *invisible, unregulated* and *go unnoticed”*

ConocoPhillips

STUDY OBJECTIVE

Evaluate new leak detection and measurement technologies and determine actual facility fugitive emission rates

Drivers

- Increase production & reduce costs by recovering lost gas
- CAPP Fugitive Emission Management BMP
- Increase operations Health & Safety
- Reduce GHG emissions / Carbon Credits
- Part of CPC E/E, Gas Star Program, and BIC Initiative

DETECTION TECHNOLOGY

GasfindIR®

- optical emission technology
- infrared video camera with hydrocarbon/VOC filter
- provides visible images of a HC gas emissions in real-time

Benefits :

- Rapid, accurate and safe detection
- Scan hard-to-reach components from a distance
- Assessments performed without interruption of operations
- Inspection times are minimal, which can keep costs down.
- With exact leak source info, repairs are less time consuming and less expensive.
- Cost-effectively scan hundreds of components simultaneously

Approx. Cost: $75,000.00USD

ConocoPhillips

MEASUREMENT TECHNOLOGY

Hi Flow® Sampler

- volumetric leak measurement
- vacuum flow rate detection uses dual-element hydrocarbon (methane) detector
- measures hydrocarbon concentrations in the captured air stream and determines the leak flow rate (+- 10%)

Benefits :

- offers a much higher accuracy of measurement (compared to conventional methods)
- allows an objective cost-benefit analysis of each repair opportunity

Approx. Cost: $14,000 USD

SCOPE

- Evaluate 22 facilities (9 gas plants and 13 comp. stns.) from various asset areas
- Obtain fugitive emission data
- Complete repair cost/benefit analysis
- Create recommendations for applying a Canada-wide program (CAPP BMP)

ConocoPhillips

RESULTS SUMMARY

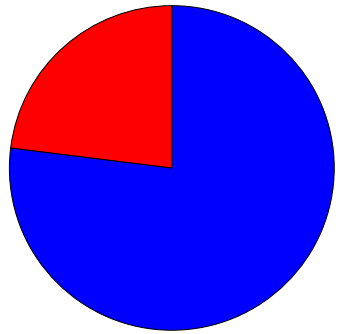
# of Sources	**144**
Total Yearly Rate (mcf/year)	**58,416**
Savings Potential (US$/year)	**$357,718.82**
Average Payback (years)	**0.37**
NPV (US$)	**$2,002,602.72**
CO_2e Emission Rate (tonnes/year)	**21,421**
CO_2e Credit Value (US$)	**$535,525.00**

* Using $5.50 USD/mmbtu and $25.00 USD/tonne CO2e

SOURCE INFO

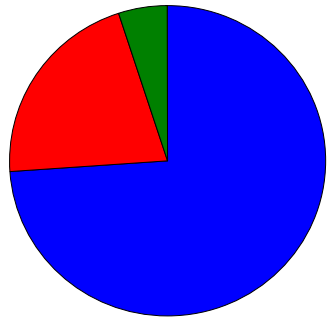
# of Sources

- **77%** leaking components (111)
- **23%** other fugitive emission sources (33)
- **92%** economical to repair (133)



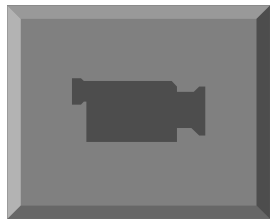
Composition

- **75%** Process gas (108)
- **21%** Fuel gas (30)
- **4%** Propane (6)



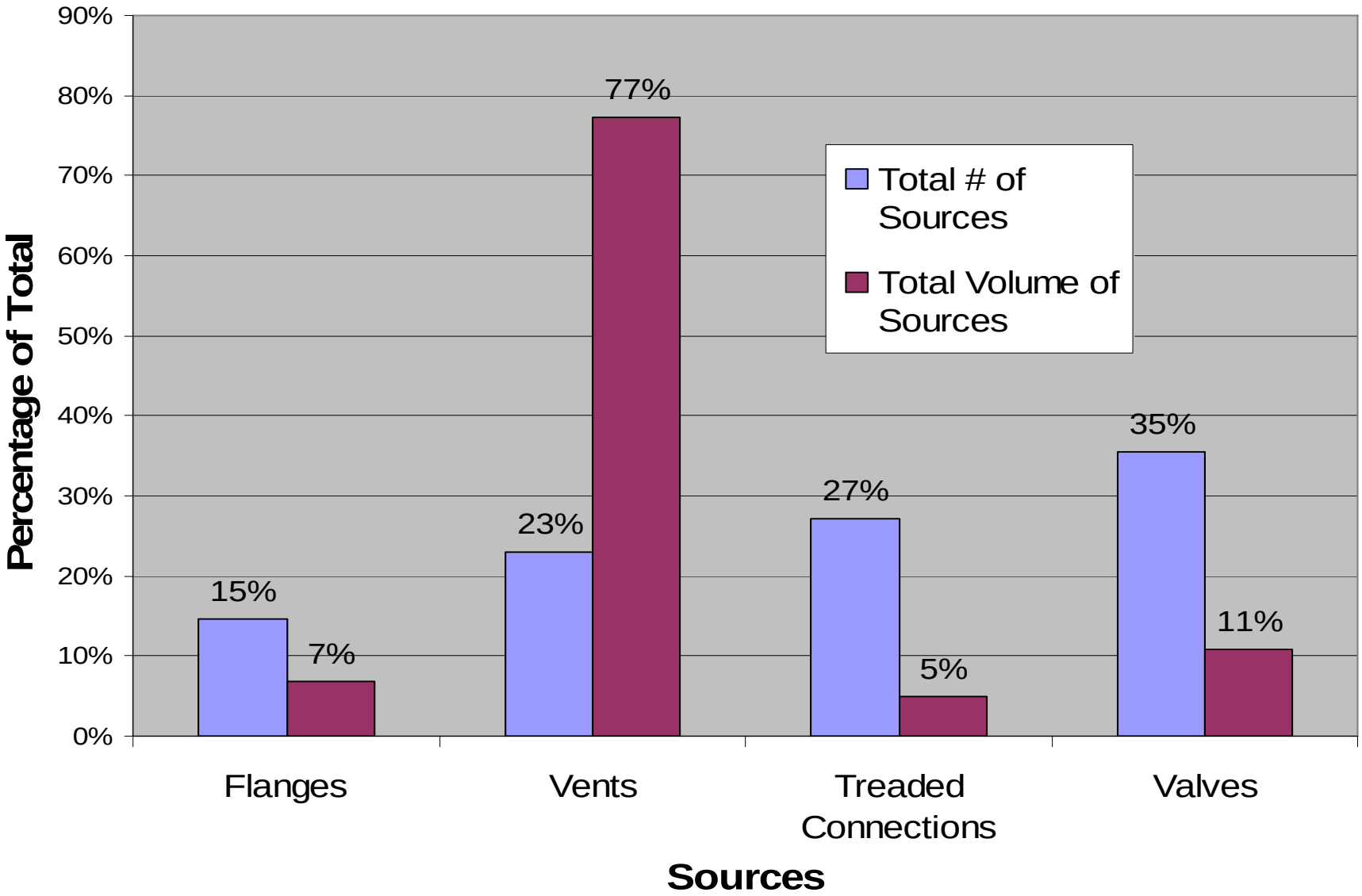
Location

- **72% Compressor Buildings**
- **20% Process Buildings**
- **4% Outside piping**
- **4% Tanks**

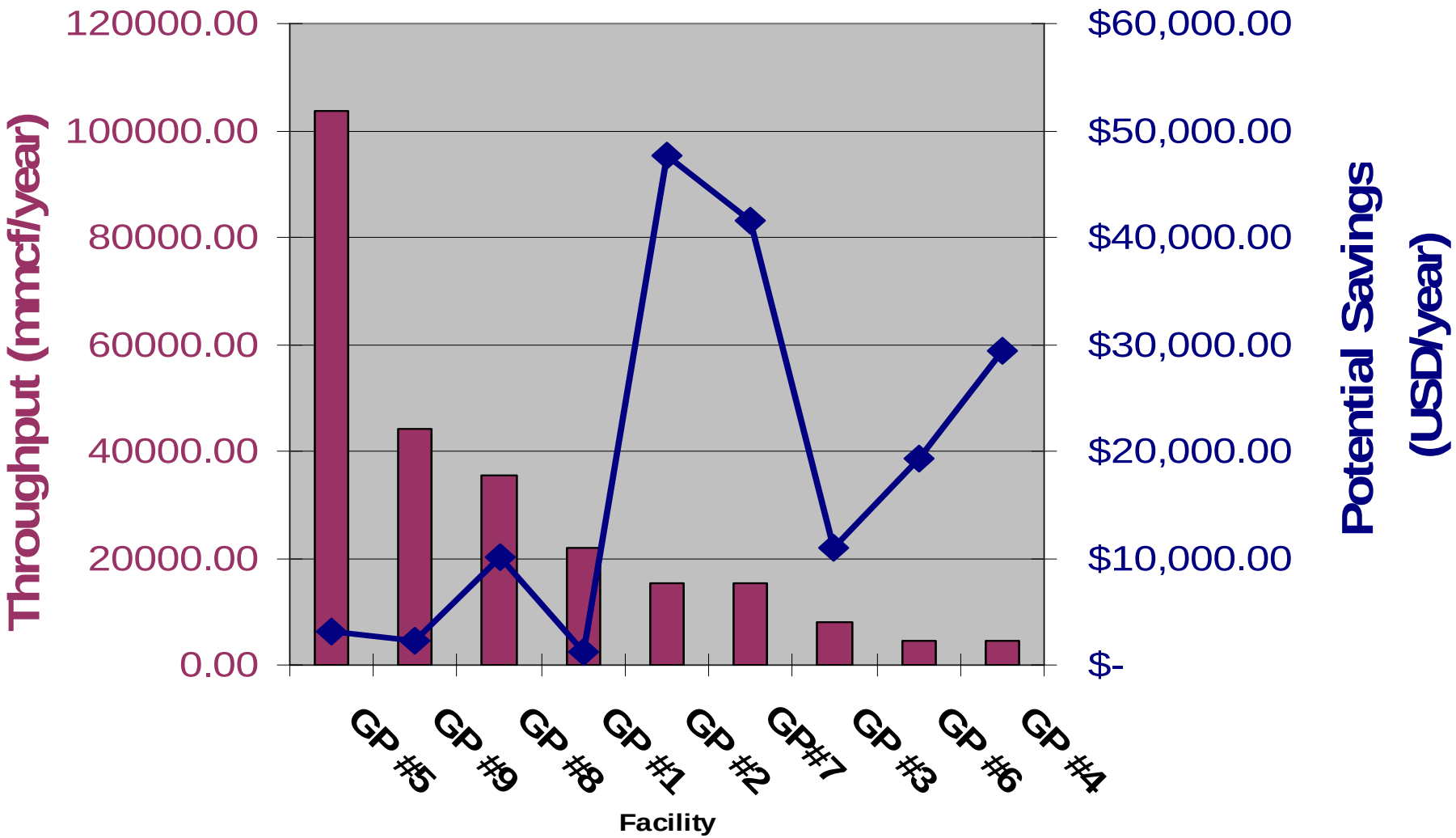


ConocoPhillips

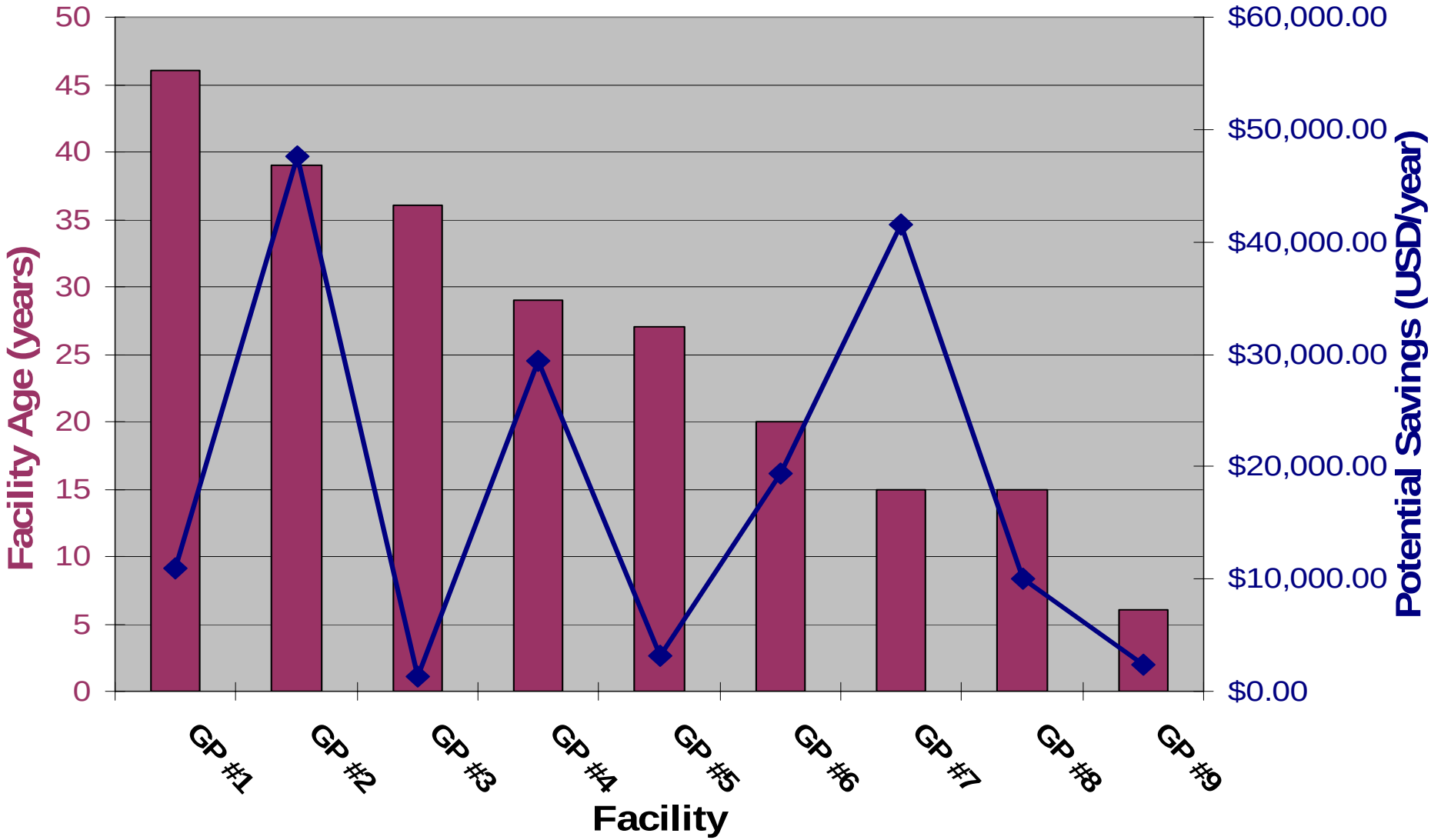
SOURCE TYPES



GAS PLANT THROUGHPUT COMPARISON



GAS PLANT AGE COMPARISON



ECONOMIC PROJECTION

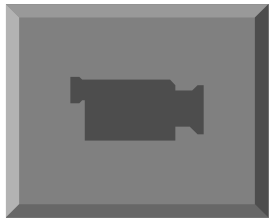
Average Yearly Savings/Facility (US$/year)	**$16,300.00**
Average Total Cost/Facility (US$/year) **(assessment and repairs)**	**$8,000.00**
Average Est. Payout Period (years)	**0.50**
Total Gross Est. Annual Savings (US$/year)	**$10,400,000.00**
Total Est. NPV (US$/year)	**$35,000,000.00**
CO2e/year Reduction (tonnes)	**630,000**
CO_2e Credit Value (US$)	**$15,750,000.00**

* Using $5.50 USD/mmbtu and $25.00 USD/tonne CO2e

GHG REDUCTION POTENTIAL

630,000 tonnes CO2e reduction represents:

- **67%** reduction in CPC Fugitive Emissions
- **18%** reduction in CPC total direct GHG emissions



ConocoPhillips

PATH FORWARD

- **Develop Fugitive Emission Management Program**
  - Set assessment schedule
  - Imbed into Operations and Facility Design
  - Develop repair tracking system and refine data management system
- **Evaluate pipeline & wellsite opportunities**
- **Education / Knowledge Sharing**

ConocoPhillips

SUMMARY

Facility Emissions

- **Emission rates vary significantly with no evidence of a correlation with facility throughput and slight correlation with facility age**
- **Common ("targeted") sources were identified, however, it was determined that sources can vary significantly**
- **High majority of sources were economical to repair**
- **Company-wide fugitive emission assessments would significantly help to reduce health and safety hazards, GHG emissions, costs (fuel gas and propane usage) and increase production**

Technology

- **GasfindIR® and Hi Flow® Sampler pose numerous advantages over conventional detection and measurement methods**
- **Training and experience of equipment technicians is fundamental to performing effective fugitive emission assessments.**
- **ConocoPhillips Canada will be using these technologies as fundamental tools for its Fugitive Emission Management Program**

ConocoPhillips

QUESTIONS?

CONTACT INFO:

Terence Trefiak P.Eng.
Environmental Engineer
ConocoPhillips Canada

Office (403) 233-3371
Cell (403) 613-4153

Terence.W.Trefiak@conocophillips.com