Chevron’s experience with Directed Inspection & Maintenance (D I & M) to minimize Methane Releases From Offshore Platforms

Phil Miller for Raymond O’Neal
Chevron-GOM
Methods and Tools used to detect and estimate releases of gas volumes from vent/flare and lease use gas (blanket gas) systems

Tools:

• FLIR GasFindIR camera

• VPAC (Physical Acoustics Corporation) volume estimating tool and software

■ This presentation will not discuss the following tools we have recently began using.

• FCI thermal mass portable gas meter

• Ultraprobe Model 2000 ultrasonic leak detector (listening device only)
GasFindIR survey of facility performed to reveal any leaks to atmosphere and/or internal leaks across closed valves. The temperature differences across closed valves can often be detected with use of the camera.
Make repairs and/or adjustments to any equipment allowing gas to escape to atmosphere

Equipment Examples:
- hoses on compressors
- compressor valve caps
- vent/flare valves
- blanket gas inlet and outlet regulators
- doors on produced water, processing units
Wemco door gasket.asf

Compressor valve cover.asf
Natural Gas STAR Implementation Workshop
San Antonio, November 11, 12 and 13, 2008

VPAC – Physical Acoustics
VPAC Analysis Process:

- Use VPAC to estimate through-valve leakage based on measurements made using a Physical Acoustics Model 5131 portable monitor, together with data on valve size, type, and differential pressure.

- Take readings upstream and downstream of valve; and on valve body. If readings on valve are above that of the upstream and the downstream readings, leakage is probable. Enter decibel level in the software.

- The software estimates the leakage rate depending on decibel level, pressure differential across valve, and valve size. Helps prioritize leaks to fix.
Valves Typically Inspected include:

Pressure Safety Valves
Blow Down Valves
Shut Down Valves
Recycle Valves
Surge Valves
Make-up Valves
Well Header Valves
Back-Pressure Valves
1. Using VPAC and/or portable Thermal Mass meter, technician would estimate a base theoretical vent/flare volume from a platform (an “if” you had a meter on all outlets, here is an estimated spot rate volume)

2. Technician would then work with Operators to make adjustments to blanket gas and/or any leaking equipment to decrease vent/flare and fuel/lease gas use volumes

3. Technician would perform a final platform review to establish improvement and to also let Operations know what items still need attention
FCI – Thermal Mass Flow Meter
Ultra Probe Model 2000
ultrasonic leak detector
Questions?
Evolution of Chevron’s DC Air Compressor packages

Compressed Air vs Natural Gas,

3rd Generation package as supply source for 4 single well caissons

Presented by Phil Miller
Mound Point #114 single well Caisson

Natural gas supply skid w/Bazooka pulling supply off of flowline

Increased sand & water production from well, causing many problems

Fluids in supply system problems

81% downtime in 19-day period

26,604 OEG impact
- Replaced natural gas supply skid w/24 VDC solar powered air compressor package
- Overcoming resistance to change; Operations and Engineering.
- Operations installed new skid
- Total installed cost, $25,000
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Natural Gas Supply Skid

24VDC Compressed Air Supply
Before compressed air supply (19-day period)

- Equipment repairs due to fluids
  - 1-Maximator pump, 2-Haskell pumps ($3,800)
  - 4-FieldVue controllers ($10,000)
- L/B Superior Gold standby w/N₂ supply
  - 2-days ($4,050)
- Miscellaneous wet supply gas problems
  - ($3,000)
- Downtime (deferred production)
  - 26,604 boeg ($1,336,585)
- Instrumentation venting, panel, & other supply usage
  - Instrument bleed - 4.5 mcf/d ($30.27/d)
  - Other usages – 1.0 mcf/d ($6.78/d)
24VDC Compressed Air Supply (9 mos. before & after)

- Improve equipment reliability
  - Dry supply source
  - Reduce supply gas related downtime ~90%
  - 37 days/yr. @ 1,070 OEG/d ($2 MM/yr.)

- Eliminate supply gas users (efficiency)
  - Regulators(4), controllers(2) & scrubber pump(1) - fugitive gas emissions
  - 5.5 mcfd ($13,600/yr.)

- Eliminate spill exposure from instrumentation venting & tubing leaks

- Caveat (non-continuous supply)
  - Battery life limited ~3 hrs/day run time
  - Essential to minimize air leaks.
  - Need to rebuild panels prior to conversion.
We have built 3 different designed packages
First DC Air Compressor
Package MP #114

Wonderware (SCADA) is able to monitor pressures, Battery Voltage, records each units daily and accumulated run time.

Extremeaire ¾ hp comp
- 1.3 cfm @ 100psi
- 21 amp draw @ 100psi
- 12 or 24 volt
- 14” L x 6” W x 10” H
- Net Weight 17 lbs.

Viair ¼ hp comp
- .97 cfm @ 100psi
- 11 amp draw @ 100psi
- 12 or 24 volt
- 12.75”L x 4” W x 7” H
- Net Weight 9.75 lbs

4 – 80 watt solar panels
1 – Air X Marine wind generator
2nd DC Air Compressor Package for SM240 #203

2 - Extremeaire ¾ hp compressors
- 1.3 cfm @ 100psi
- 21 amp draw @ 100psi
- 12 or 24 volt
- 14” L x 6” W x 10” H
- Net Weight 17 lbs each

3 – BP 160 watt solar panels

1 – Air X Marine wind generator

- Flex hoses on discharge piping
- Shock absorbers under compressors

Wonderware (SCADA) is able to monitor pressures, Battery Voltage, records each units daily and accumulated run time. Can remotely switch air compressors, start and stop either or both units.
Third - DC Air Compressor Packages, EI24 #10, VR24 #6

* Wonderware (SCADA) is able to monitor pressures, Battery Voltage, solar array output and run time. Also can remotely start, stop or switch air compressors. Low voltage disconnect, saves batteries

✓ Pacific Scientific ¾ hp 1750 rpm Explosion proof electric motors

✓ Thomas 3/4 hp, 1750 rpm, 24vdc Compressors, produces 2.21 cfm @100 psi pulling 31 Amps

✓ 3 – BP Solar Panels, 170 watts, output 5.09 amps

✓ 1 - Air X Marine Wind Generator 400 watts, output 16.69 amps
The four single well platforms
DC Air Compressor Team

Thanks to team members

- Paul Naquin – Operator w/ Idea
- Phillip R. Miller – PI, Designer
- Gary Wilson – EE, Designer