



## **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**

# Natural Gas STAR Implementation Workshop

## San Antonio, November 11, 12 and 13, 2008

**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)**

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**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.**

**ThermaCAM® GasFindIR**



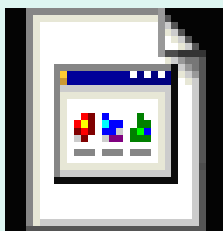
**Make repairs and/or adjustments to any equipment allowing gas to escape to atmosphere**

**Equipment Examples:**

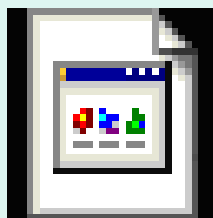
- **hoses on compressors**
- **compressor valve caps**
- **vent/flare valves**
- **blanket gas inlet and outlet regulators**
- **doors on produced water, processing units**

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Wemco door gasket.asf



Compressor valve cover.asf

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## 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**



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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

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## FCI – Thermal Mass Flow Meter



## Ultra Probe Model 2000 ultrasonic leak detector



10/07/2008

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# Questions?



# Evolution of Chevron's DC Air Compressor packages

**Compressed Air vs Natural Gas,  
3<sup>rd</sup> Generation package as supply source  
for 4 single well caissons**

**Presented by Phil Miller**

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- 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





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- **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/N<sub>2</sub> 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)

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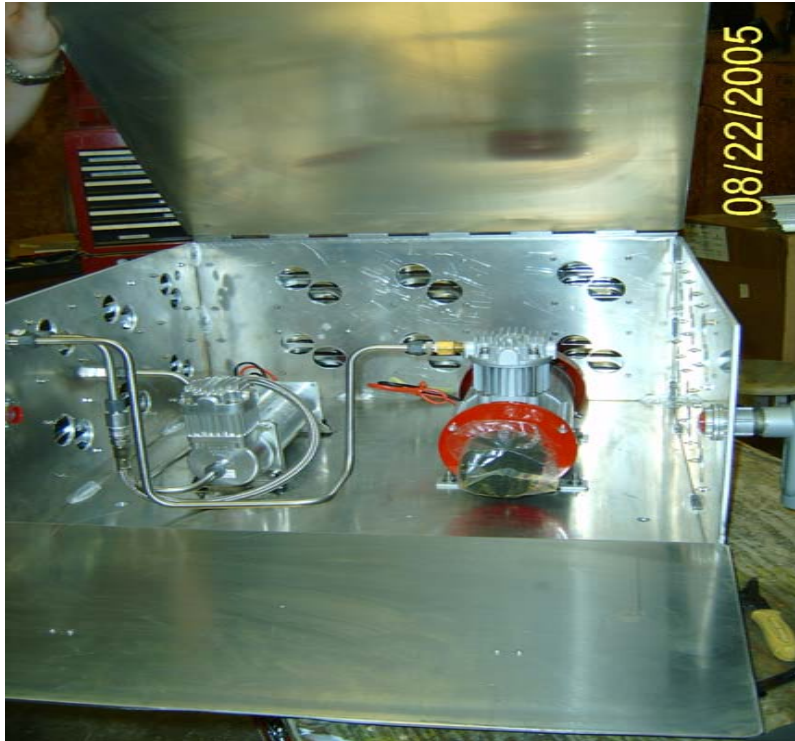
### ■ 24VDC Compressed Air Supply (9 mos. before & after)

- 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 mcf/d (\$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 $\frac{3}{4}$ 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 $\frac{1}{4}$ hp comp**

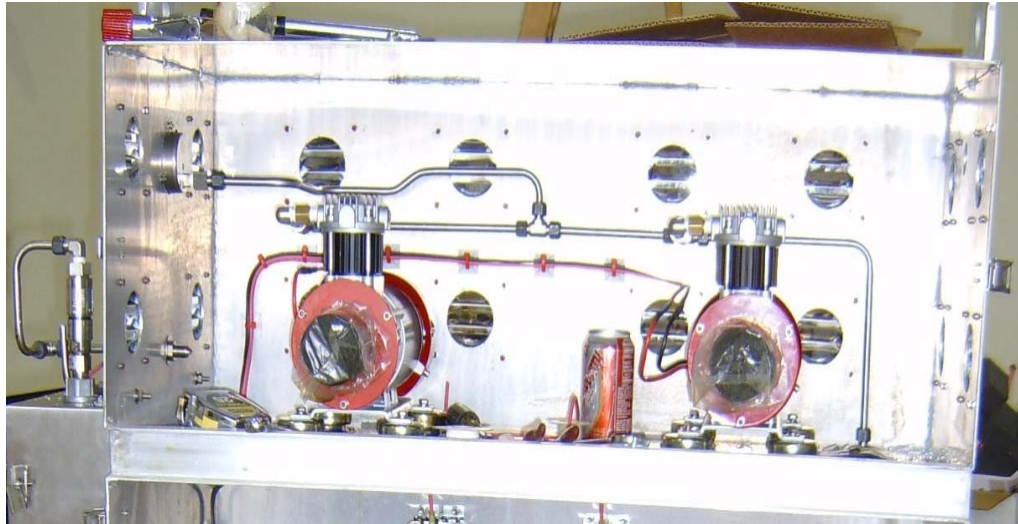
- .97 cfm @ 100psi
- 11 amp draw @ 100psi
- 12 or 24 volt
- 12.75"L x 4" W x 7" H
- Net Weight 9.75 lbs

4 – 80 watt solar panels

1 – Air X Marine wind generator



# 2<sup>nd</sup> DC Air Compressor Package for SM240 #203



**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.**

## 2 - Extremeaire $\frac{3}{4}$ 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

## 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  $\frac{3}{4}$  hp 1750 rpm **Explosion proof** electric motors

✓ Thomas  $\frac{3}{4}$  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**