Producer Technology Transfer Workshop

OCCIDENTAL OIL AND GAS EXPERIENCE IN METHANE EMISSIONS MITIGATION

Nicky Langley
June, 2006
Occidental of Elk Hills Inc.
Natural Gas Star Program

- What is it?
  A voluntary partnership intended to reduce *methane* emissions
- Partners eliminated more than 338 Bcf methane emissions
OOGC Initiation

- OOGC signed Memorandum of Understanding with EPA
- OOGC was keynote speaker at Natural Gas Star Annual Workshop in 2005
- Received award for: International Partner of the Year
OOGC Participation

Two-phased project;

- Phase 1:
  - Documented methane reductions from 1988
  - **7.48 Bcf methane reductions**
  - Report to EPA on previous projects

- Phase 2:
  - Select suitable reporting protocols
  - Select baseline
  - Develop projects for further reductions
OEHI Participation

Annual Aggregated Methane Reductions

Mcf


- 1990: 1,100,000 Mcf
- 2005: 997,826 Mcf
- 1991: 274,000 Mcf
Non-Selective Catalytic Reduction Rich Burn Engines

- Internal combustion engines used throughout oilfield
- 18 engines retrofitted with NSCR
- Residual methane also captured
- 9 MMcf/yr
- Payback 8 days
Tank Removal and Consolidation

- Tank settings used to gather crude
- 338 crude oil tanks removed
- Standing and working losses eliminated
- 0.4 to 4 MMcf per tank, per year
  - 19 MMcf/yr
- Payback <4 years
Convert Pipeline Condensate Traps to Instrument Air

- Condensate traps remove condensables
- Need suitable source of instrument air
- Increase in operational efficiency and decrease in maintenance cost
- Emissions reduction - 715 Mcf per trap
  90 MMcf/yr
- Payback <3 years
#3 Upgrade of Compressor Packing

- Compressors lose emissions from rods & housing
- Applicable where there is an available gas gathering system
- Reduction 400 Mcf per day, per compressor
  - 145 MMcf/yr
- Payback <3 years
Beam pumps used throughout oilfield
Additional benefit of centralized well control
Reduced fuel use $22,400/year
Reduced maintenance cost $3,700/year
Methane reductions: 282 MMcf/yr
Payback 6 years
#1 Fugitive Emissions I&M Program

- Inspection & Maintenance Program
- More frequent inspections at lower leak threshold
- 3,600,000 inspections per year
  - 452 MMcf/yr
- Extended this to wellheads using a Remote Methane Leak Detector

www.heathus.com
Ken Dillon, Production Operations Manager  
Occidental at Elk Hills, Inc.  
Occidental Oil & Gas Corporation  
P.O. Box 1001  
Tuscar, CA 93278-1001

Dear Mr. Dillon:

I wanted to thank you for the recent submission of Occidental Oil & Gas’ Natural Gas STAR Program annual report, which documents Oxy’s achieved historical and 2004 methane emission reductions. While the total Oxy reductions reported were 7.48 billion cubic feet (BCF), 7.1 BCF of those reductions were reported by Occidental of Elk Hills, which is why I am addressing this letter directly to you.

Ever since the wonderful signing ceremony here at Elk Hills in September 2004, I have been continually impressed by your commitment to reducing methane emissions. Seven point one BCF in methane emissions reductions is truly a remarkable achievement. For example, the greenhouse gas emissions reduction impact is preventing 7.1 BCF of methane emissions from escaping to the atmosphere is equivalent to taking approximately 655,000 average U.S. cars off the road for one year. If you consider your achievement in forestry terms, 7.1 BCF in methane reductions is the average yearly carbon sequestration capacity of 862,000 acres of trees, an area larger than Rhode Island.

Elk Hills can confidently claim a place among the U.S. oil and gas industry as a true leader in the application of cost-effective technologies and techniques to reduce methane emissions. Additionally, we thank you for your engagement in Program-sponsored events such as sending your staff to Gas STAR workshops. Attendance serves Oxy through continued education and growth of your staff and enables other Natural Gas STAR partners to learn from your expertise through technology exchange.

It is my personal goal is to make the Natural Gas STAR Program a valuable asset to you, your staff at Elk Hills, Oxy and all of our partners by seeking opportunities to exchange information and ideas. I look forward to Elk Hills’s staff and all of Oxy’s continued participation in Gas STAR through such events as our workshops and as well as possible on-site staff training and new project evaluation. I welcome your input on these and other ways in which Gas STAR can assist you in continuing to reduce methane emissions from your operations while simultaneously generating additional revenue.

With your ongoing success at Elk Hills, we can continue to demonstrate that voluntary programs can do much to improve the environment and enhance corporate profitability for those who look beyond regulatory mandates.

Sincerely,

[Signature]

Roger Fernandez, Team Leader  
Natural Gas STAR Program

CC:  
Mr. John Morgan, President  
Mr. Wesley Good, Vice President  
Mr. Krish Ravishankar, Worldwide Environmental Manager
Challenges

- Look more closely at your own operations
  - Increased efficiency
  - Short payback
- You can’t manage what you don’t measure
- Get ready for the future
Any Questions?