



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

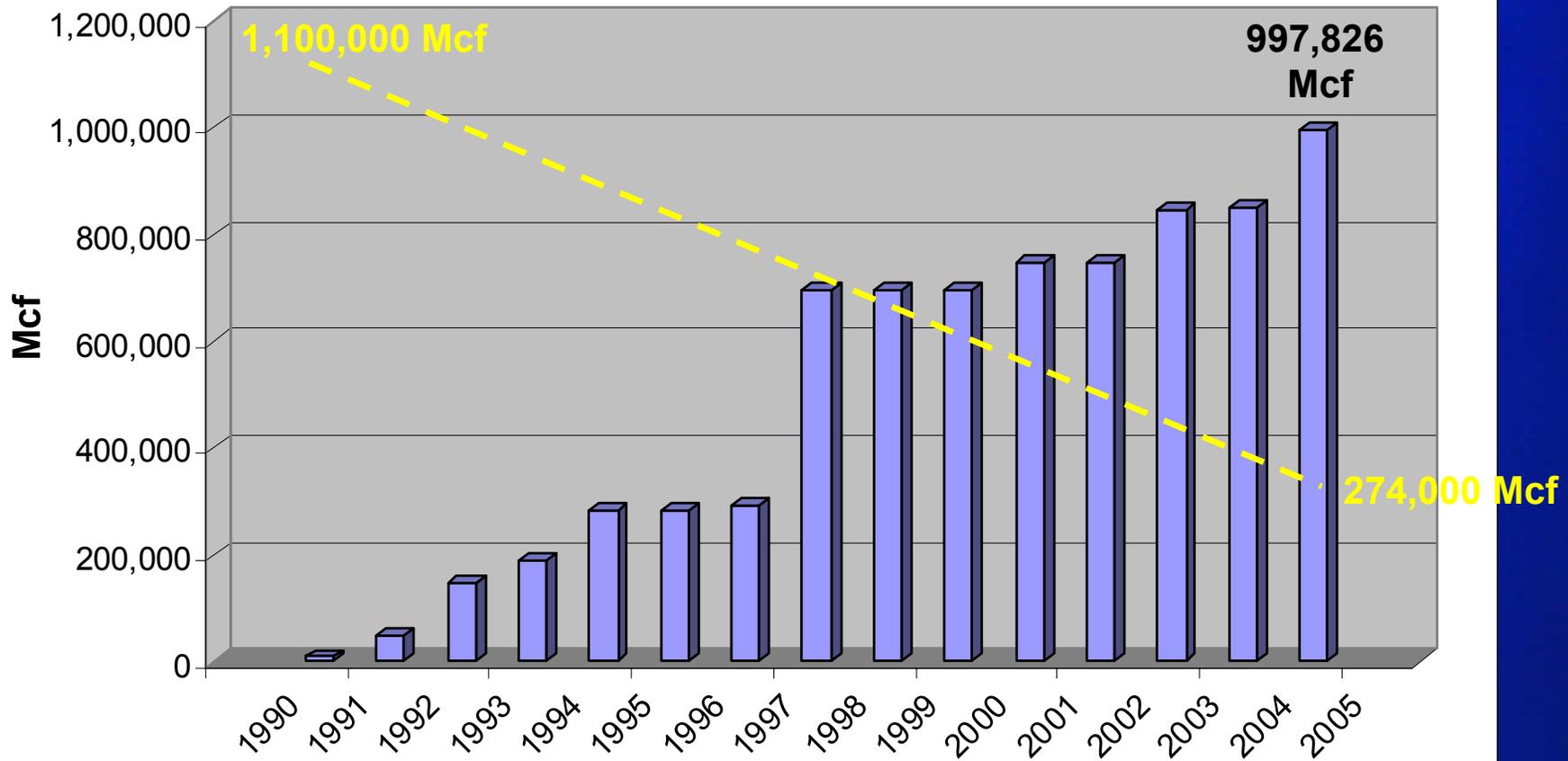
- Two-phased project;
 - Phase 1:
 - Documented methane reductions from 1988
7.48 Bcf methane reductions
 - Report to EPA on previous projects
 - Phase 2:
 - Select suitable reporting protocols
 - Select baseline
 - Develop projects for further reductions





OEHI Participation

Annual Aggregated Methane Reductions





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

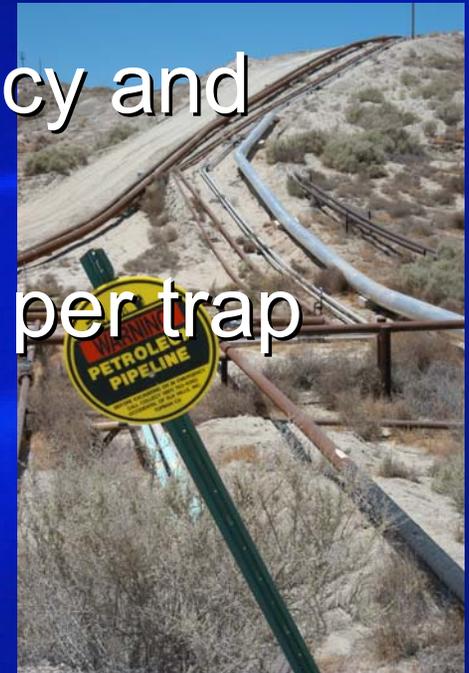
- Tank settings used to gather crude
- 338 crude oil tanks removed
- Standing and working losses eliminated
- 0.4 to 4 MMcf per tank, per year
- **19 MMcf/yr**
- Payback <4 years





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 MMcft/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 MMcft/yr
- Payback <3 years





#2 Engine Electrification

- 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



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF
AIR AND RADIATION

October 13, 2005

Ken Dillon, Production Operations Manager
Occidental of Elk Hills, Inc.
Occidental Oil & Gas Corporation
P.O. Box 1001
Tupman, CA 93276-1001

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 these 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 held 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 of preventing 7.1 BCF of methane emissions from escaping to the atmosphere is equivalent to taking approximately 635,000 average U.S. cars off of 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 on-going 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,

A handwritten signature in black ink, appearing to read "Roger Fernandez".

Roger Fernandez, Team Leader
Natural Gas STAR Program

CC: Mr. John Morgan, President
Mr. Wesley Scott, 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?

