



Directed Inspection & Maintenance: An Overview of Gas STAR Practices



Technology Transfer Workshop
June 8, 2005
Midland , Texas

Outline

- ★ Background
- ★ Phase I - Study
- ★ Pipeline Leak Study
- ★ Monument Gas Plant
- ★ Phase II - Study



Background



- ★ GRI Study – D I & M
- ★ D I & M - BMP
- ★ Dynegy's experience with D I & M



Phase I Study



- ★ Two DMS facilities in study
- ★ Cost was \$ 30 K
- ★ Amount methane saved = 100 MMSCF/yr
(\$700K @ \$7/MSCF)
- ★ Savings Realized within 18 Months – Largest
Cost-Effective Leaks Repaired



Chico Gas Plant



Chico Gas Plant – Old Flares



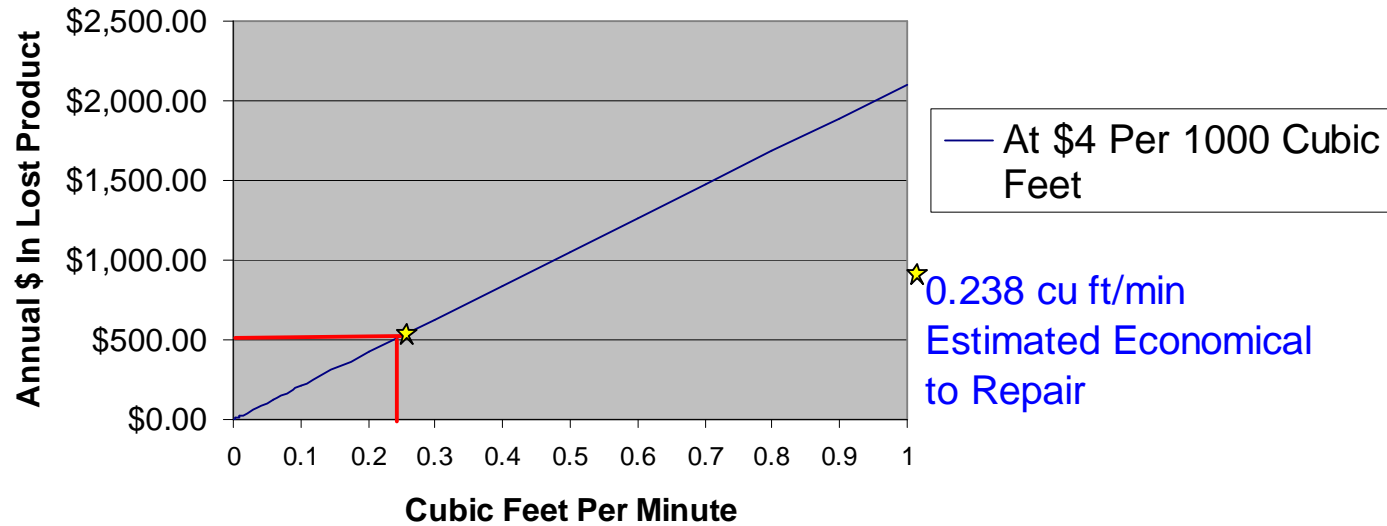
Chico Gas Plant – New Flare



Economics of LAUF



Lost and Unaccounted For Product Potential \$ Savings Equating Pure Methane Leak Rate to Dollars



Optical Remote Leak Detection

Infrared Differential Absorption

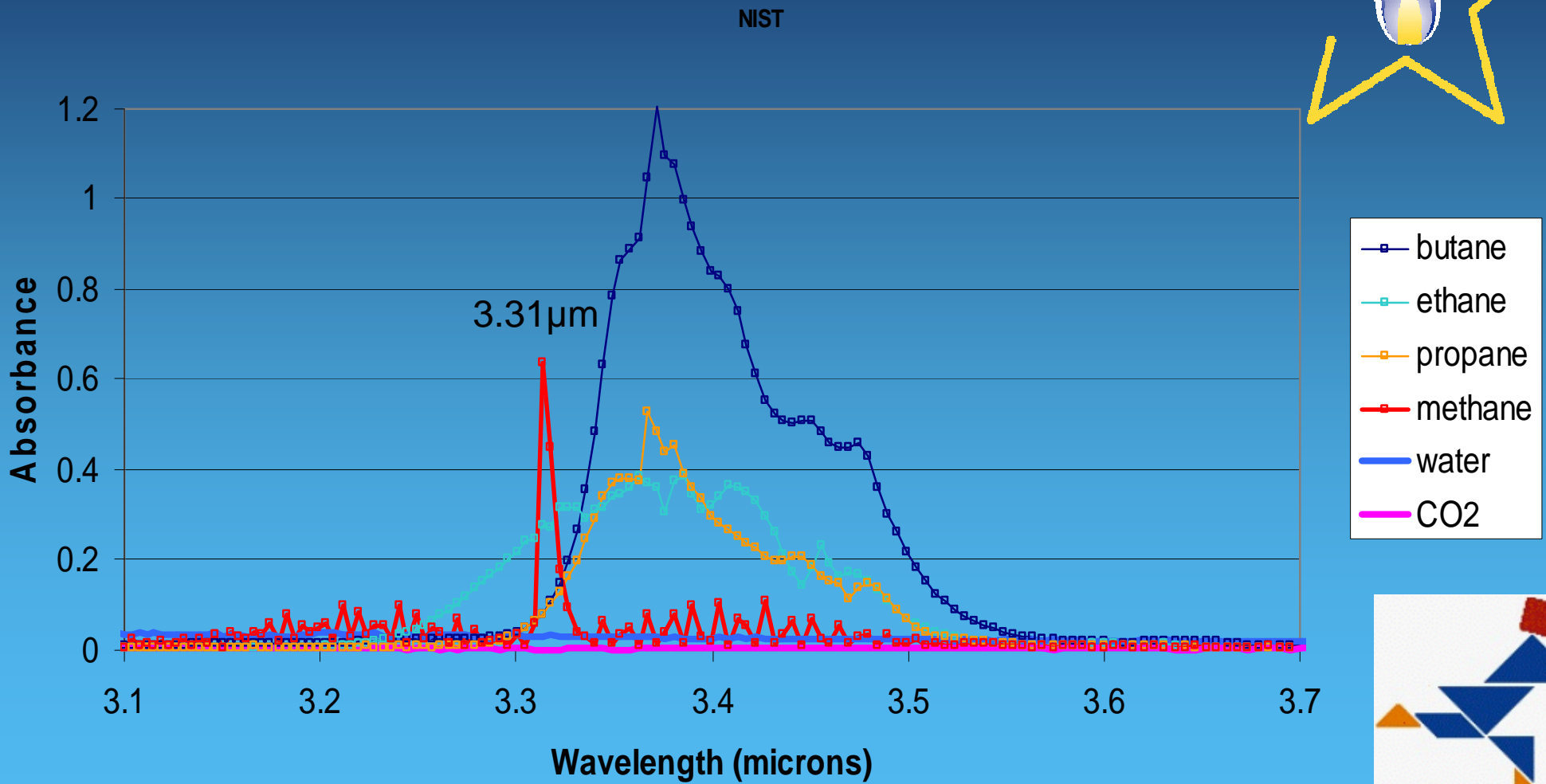
- ★ **Mid wave Infrared - 3 to 5 μm**
- ★ **Long wave Infrared - 8 to 11 μm**
- ★ **Visible - 0.4 to 1.0 Microns**
- ★ **Near IR - 0.9 to 1.6 Microns**

Remote sensing is the science and art of obtaining information about an object, area, or phenomenon through the analysis of data acquired by a device that is not in contact with the object, area, or phenomenon under investigation.

From Remote Sensing and Image Interpretation, Lilles and Kiefer, 1987



Similar to Gas Chromatography



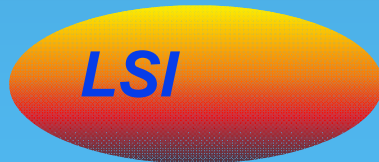
Active vs. Passive Imaging



- ★ Active techniques employ an artificial radiation source (e.g. a microwave transmitter, a laser, a thermal heater, etc.) for illumination of the target area
- ★ Passive techniques utilize the naturally occurring ambient radiation



Passive Remote Optical Infrared Leak Detection, Quantification, and Speciation



PAT



LSI Camera Visualizes Gasoline Vapor



- ★ Field Portable
- ★ Rugged
- ★ Reliable
- ★ Repeatable
- ★ Sensitivity
- ★ Ease of Use - Doesn't Require Frequent Adjustment
- ★ Capable of Identifying "Inaccessible" Leaks



LSI Leak Surveys Video Imagery



Flange Leak

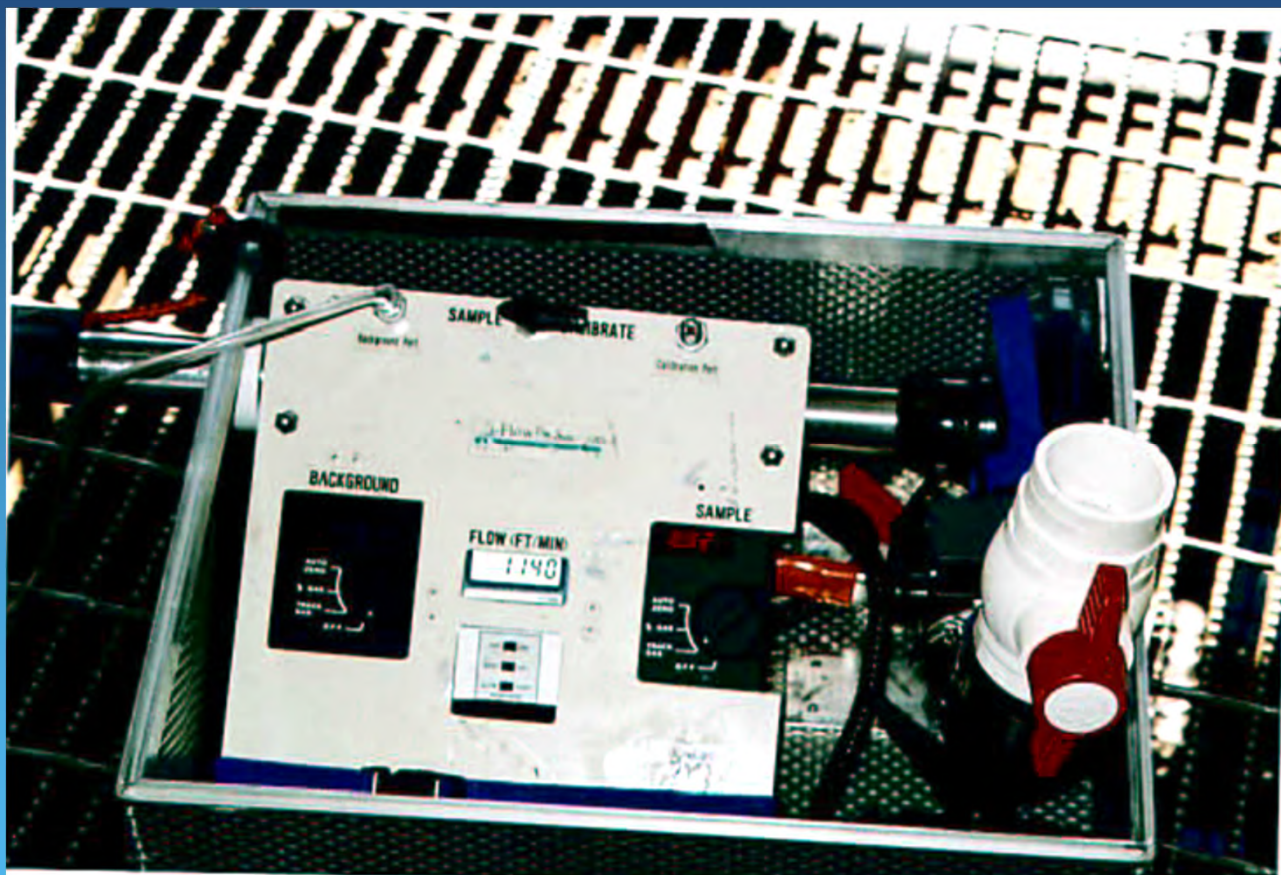


Buried Pipeline Leak

Infrared LSI Camera



High Volume Sampler



Pipeline Leak Study



- ★ Driving – visible signs (e.g. vegetation stress)
- ★ Driving with sniffer trucks twice a year
- ★ 25 – 40 miles per day



Pipeline Leak Study



- ★ Mass Balance Discrepancy Identified Need for Survey
- ★ Infrared Remote Sensing from helicopter
- ★ 200-400 miles per day
- ★ Amount of methane estimated at ~146 MM SCF /yr
or (0.5 MMSCFD)



Monument Gas Plant



Monument Gas Processing Facility, Monument, NM



Monument Gas Plant



- ★ Infrared survey conducted to identify sources of leakage
- ★ ~200 leaking sources identified
- ★ Largest opportunities - blow down vents and valve packing
- ★ Amount of methane saved is ~146 MMSCF/yr \$1022K
@ \$7/MSCF



Monument Gas Plant



- ★ 26 engines to be replaced with integral electric compression
- ★ 18, 500 HP Replaced
- ★ Amount of fuel saved is 1.5 BCF/yr and Corresponding CO2 Reductions



Monument Gas Plant



Monument Gas Plant



Monument Gas Plant



- ★ Cost of this project \$ 8.3 MM
- ★ Amount of fugitive methane losses saved is
~41 MMSCF/yr
- ★ Ancillary Benefit - Criteria (e.g. NO_x) and
HAPs pollutant reduction



Phase II Study

- ★ Eunice Gas Plant and upstream compressors
- ★ Chico Gas Plant Retest and upstream compressors
- ★ Included the LSI Infra red camera (tool kit)



Eunice Plant – Engine Room



Eunice Plant



Eunice Plant



Eunice Plant



Eunice Plant



Chico Plant



Future Plans

- ★ Coordinated Efforts for Sharing BMPs with Field Operations and Maintenance Personnel in 2005.
- ★ Increase management commitment through awareness of cost effective opportunities
- ★ Dynegy is evaluating implementing D, I & M system wide



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