



Natural Gas STAR Partner Experiences

Northern Natural Gas Company

By: Larry "Rick" Loveless



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Outline



- ★ Who is Northern Natural Gas Company
- ★ Where Northern has been
- ★ Northern's STAR I Program
- ★ Northern's STAR II Program
- ★ Overview of Northern's Future Plan
- ★ MidAmerican's Environmental RESPECT Policy
- ★ Questions



Take Away Items!!!!



- ★ The EPA STAR Program adds value.
- ★ Gives you the opportunity to profitably achieve environmental stewardship.
- ★ Allows the environmental department/program to add to the bottom line
- ★ Take a look at some new technologies

Who is Northern Natural Gas Company?



- ★ Northern believes responsible environmental management is good business; it benefits our customers and improves the quality of the environment in which we live.
- ★ Our policy establishes the environmental RESPECT principles that guide our corporate commitment to the environment.



Northern Natural Gas System Map



- ★ 13,000 miles of pipeline
- ★ 96 Compressor Stations
- ★ 1100 employees
- ★ 2000 TBSs



STAR I & STAR II Programs



- ★ STAR I – The methane leaks from a Facility Leakage Audit (DI&M) that are repaired. Un-repaired leaks go into our “unaccounted for” volumes
- ★ STAR II – The volume of methane that is conserved during normal pipeline venting operations.

Northern's STAR Accomplishments



- ★ 5.6 Bcf in total reductions
- ★ Annual Emissions Reductions:

Previous: 144.2 MMCF

1996: 87.6 MMCF

1997: 884.2 MMCF

1998: 731.9 MMCF

1999: 548.1 MMCF

2000: 331.4 MMCF

2001: 172.8 MMCF

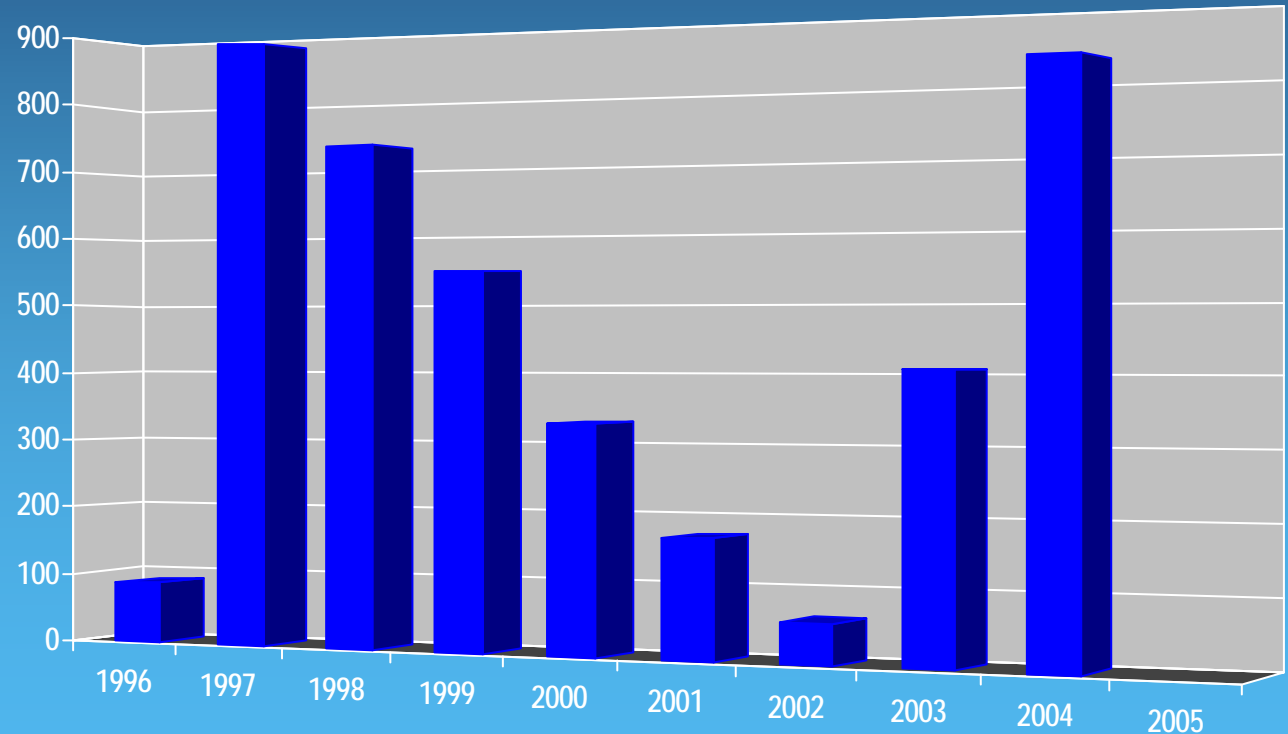
2002: 59.6 MMCF

2003: 408.7 MMCF

2004: 832.8 MMCF

2005: ?

Total: 5637.4 MMCF



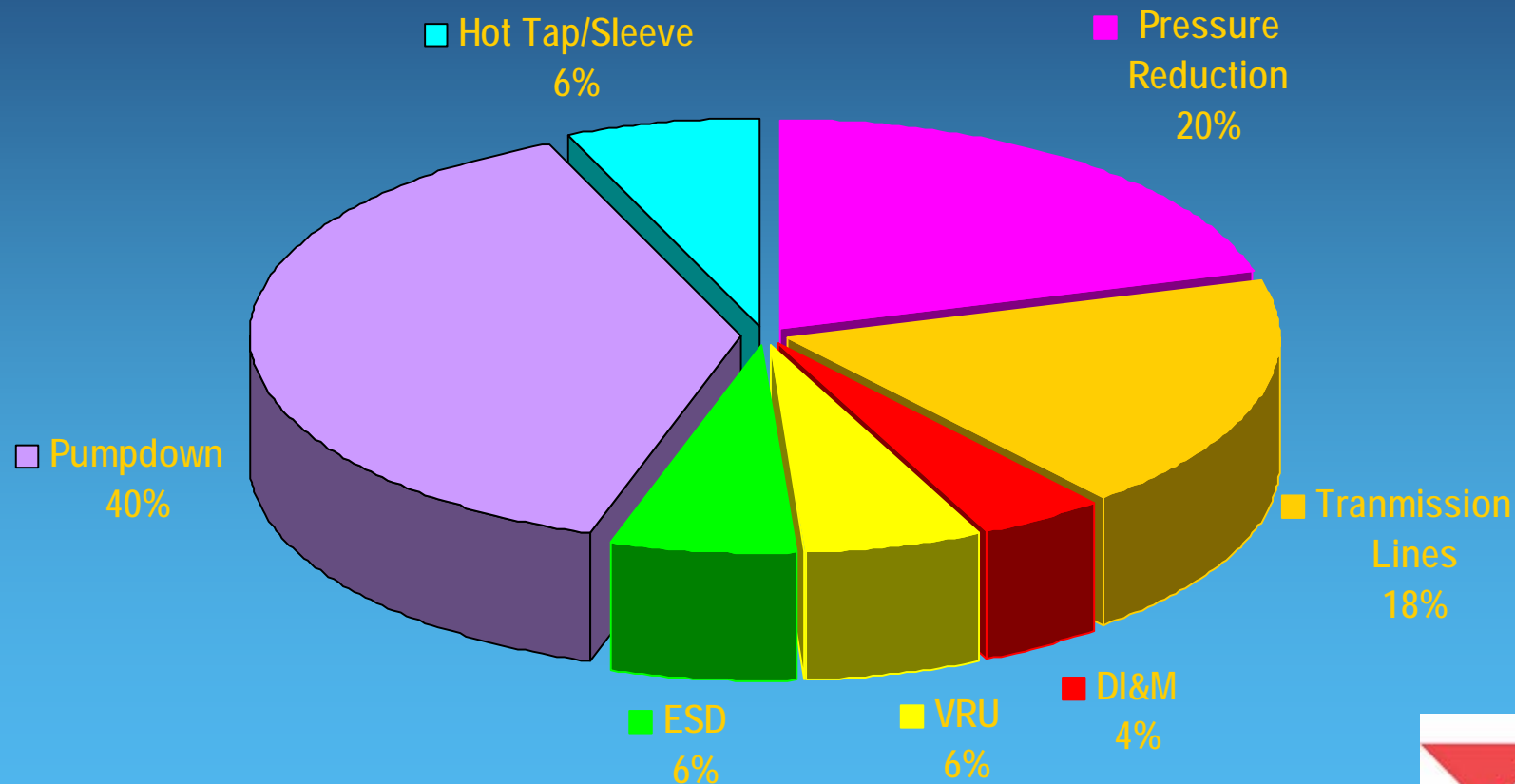
■ Methane Saved in MMCF/Year

Regional Goals and Objectives

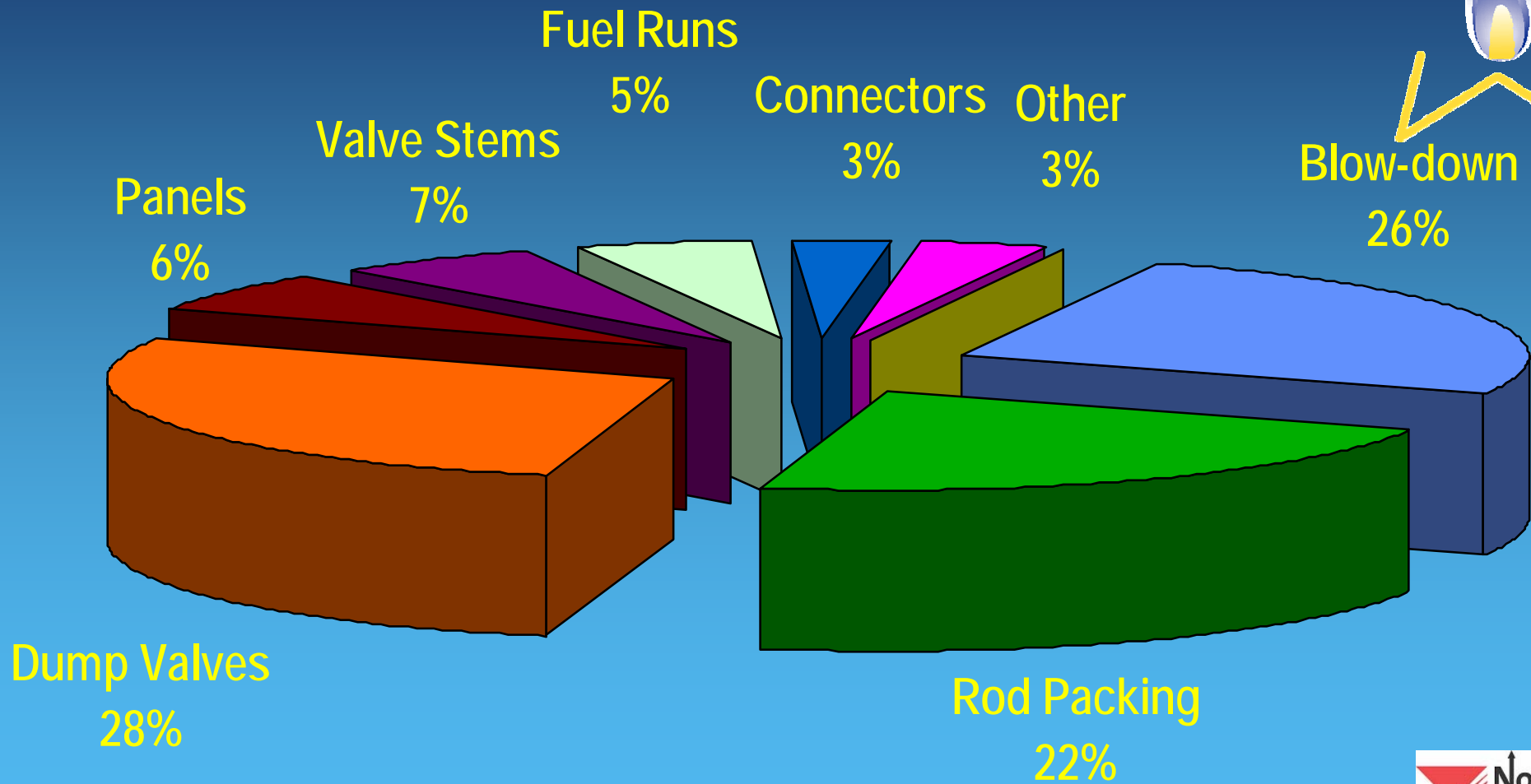


- ★ Conduct FLA at 25% of compressor stations
- ★ Conduct FLA at 25% of TBS/Gate stations
- ★ Create a STAR implementation team (SPIT)

STAR II Emission Categories (2004)



STAR I Emission Categories



Leak Breakdown



★ 5% of leaks equal 67% of volume

★ 10 % of leaks equal 79% of volume

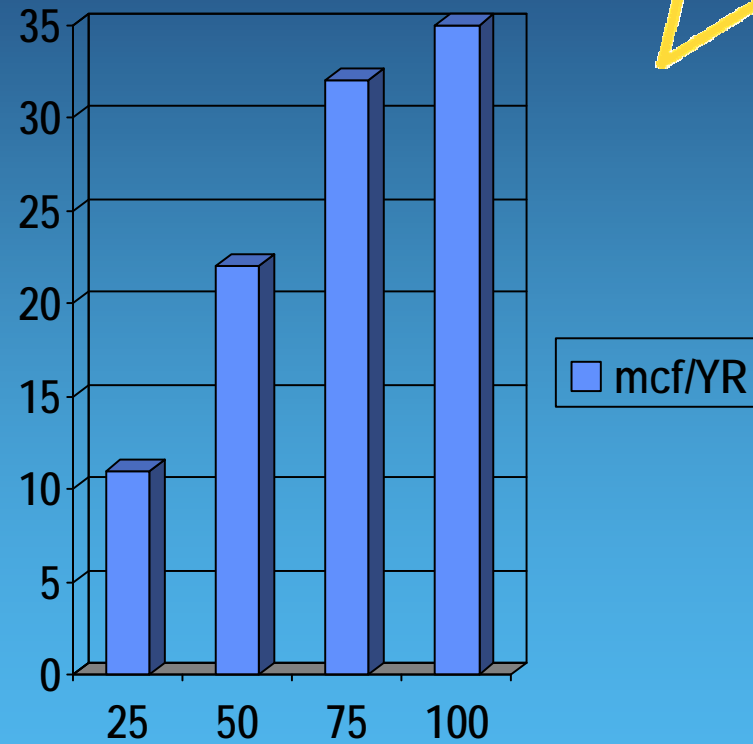
Leak Breakdown

★ >25 MCF/yr 11%

★ >50 MCF/yr 22%

★ >75 MCF/yr 32%

★ >100 MCF/yr 35%



Plan



- ★ Find leaks in that 5% or 10% region that are above 75 MCF
- ★ Find a way to conduct rapid effective audits on TBSs
- ★ Find a way to conduct rapid effective audits on underground storage well; and other above ground facilities.

INDECO HiFlow



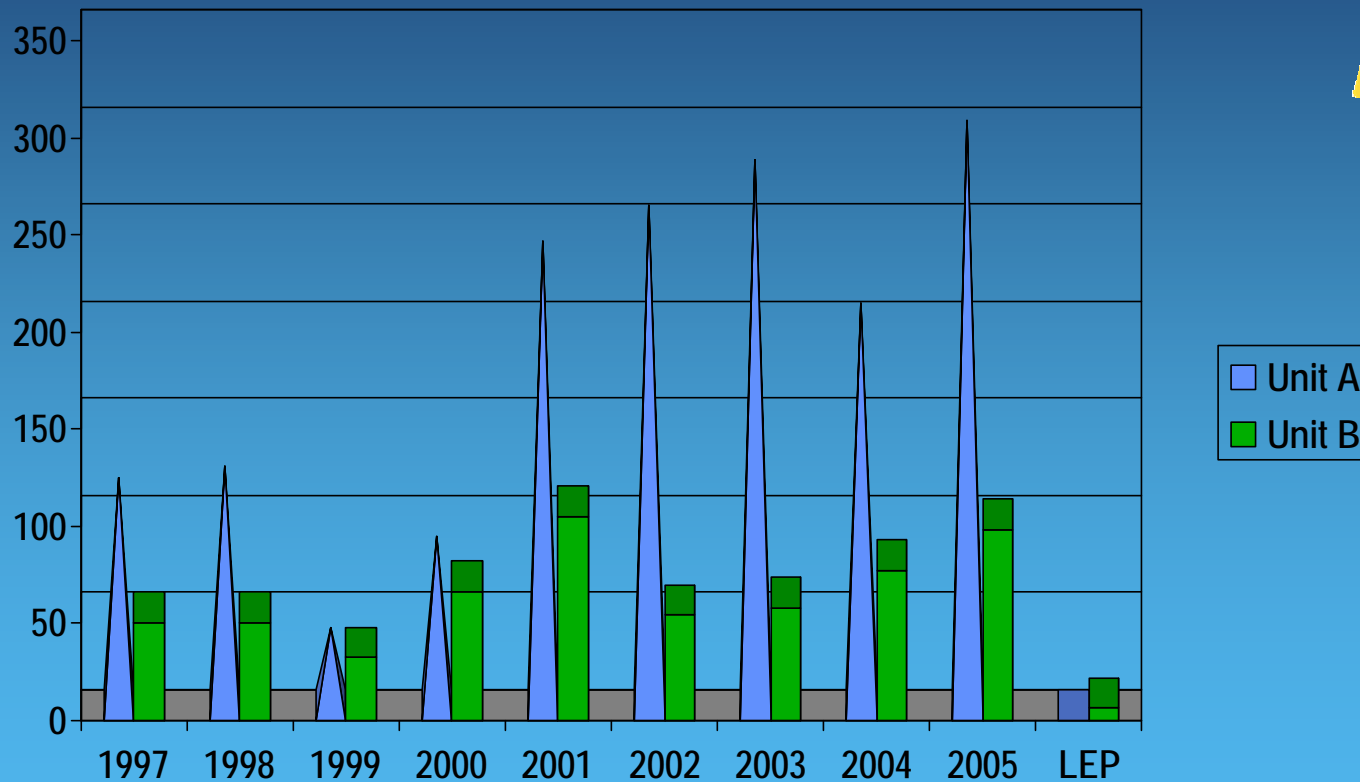




Hotwire Anemometer



NNG Unit A/B Leakage Rates



NNG Packing Leakage

Economic Replacement Point



- ★ Approximate packing replacement cost is \$3000 per compressor rod (parts/labor)
- ★ Assuming gas at \$5/MCF: $1\text{CFM}=28.316\text{L}$
 - $50\text{ liters per min}/28.316=1.766\text{ scfm}$
 - $1.766 \times 1440\text{min/day}=2543\text{ scf per day}$
 - $2543/1000=2.543\text{ MCF}$
 - $2.543 \times 365\text{ days}=928\text{MCF per year}$
 - $928 \times \$5\text{MCF}=\$4640\text{ per year leakage}$



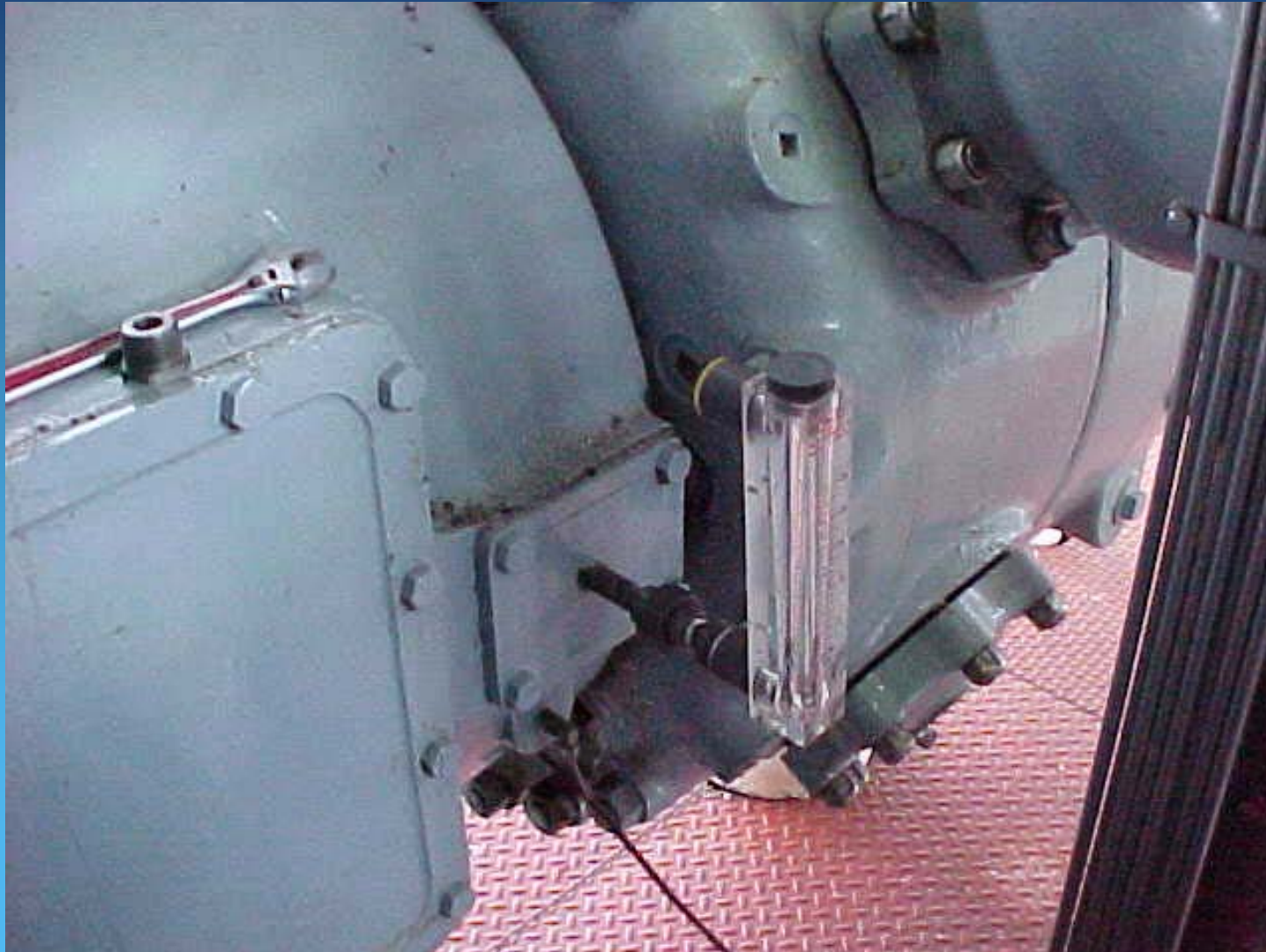








Rod Packing Direct Measurement











Facility Leakage Audits (DI&M)



★ 2004 DI&M 4% of 800 MMSCF = 32 MMSCF

★ 2005 DI&M = 670 MMSCF

Northern's STAR Accomplishments



- ★ 6.5 Bcf in total reductions
- ★ Annual Emissions Reductions:

Previous: 144.2 MMCF

1996: 87.6 MMCF

1997: 884.2 MMCF

1998: 731.9 MMCF

1999: 548.1 MMCF

2000: 331.4 MMCF

2001: 172.8 MMCF

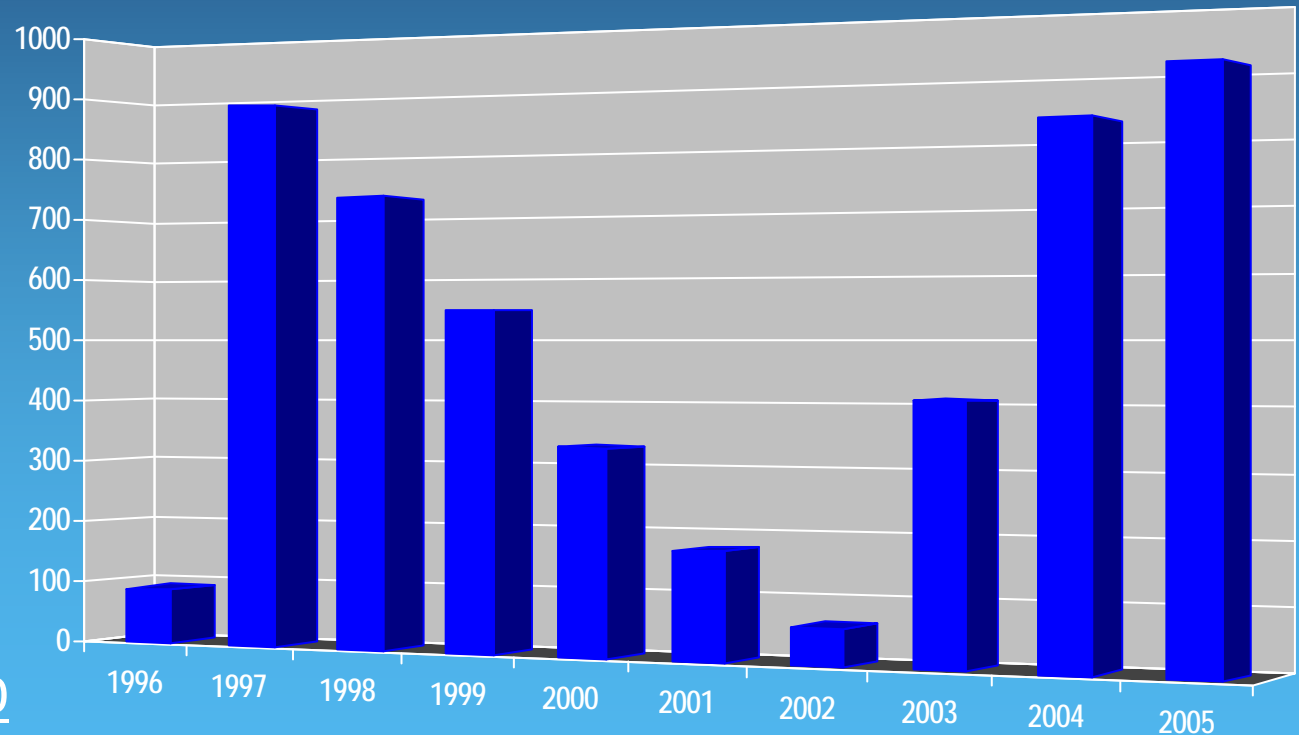
2002: 59.6 MMCF

2003: 408.7 MMCF

2004: 832.8 MMCF

2005: 910.4 MMCF YTD

Total: 6547.8 MMCF

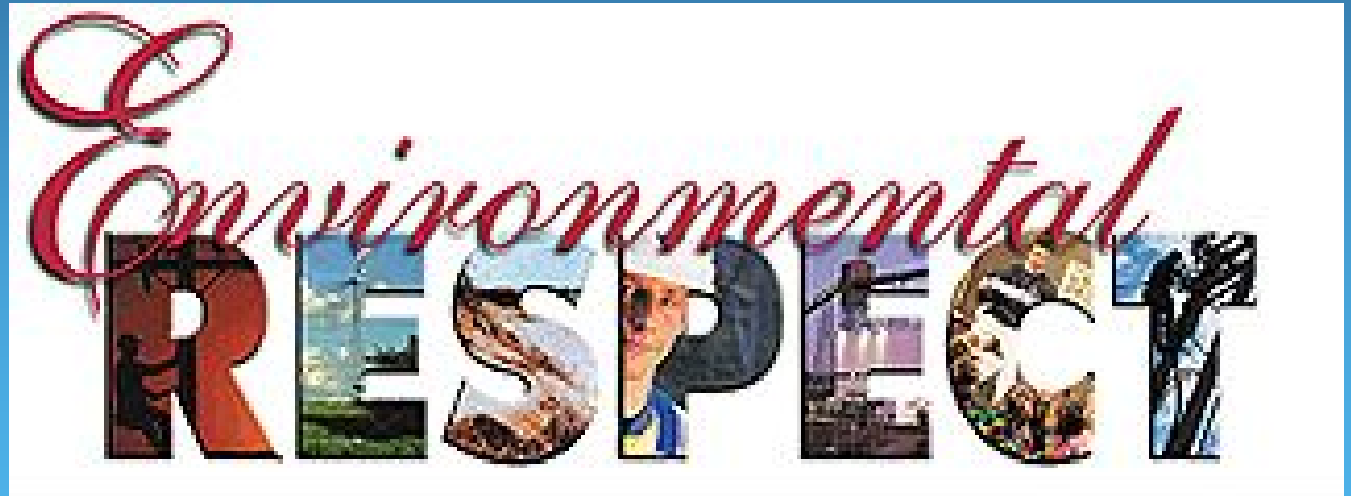


■ Methane Saved in MMCF/Year

MidAmerican Energy RESPECT Policy



- ★ Respect
- ★ Efficiency
- ★ Stewardship
- ★ Performance
- ★ Evaluation
- ★ Communication
- ★ Training



Question?



Contact Information



★ Larry "Rick" Loveless

(806) 345-3502 office

(806) 282-8344 cellular

rick.loveless@nngco.com

★ Please visit www.epa.gov/gasstar

