15th Annual Natural Gas STAR Implementation Workshop

Fugitive Emissions & Detection

By: Larry "Rick" Loveless

Northern Natural Gas
A MIDAMERICAN ENERGY HOLDINGS COMPANY

November 11-13, 2008
The Westin Riverwalk
San Antonio, Texas

Topics

- Northern Natural Gas Company?
- Greenhouse Gas (GHG) Fugitive Emissions
- Methane Detection and Quantification Technology
- Facility Leakage Audits (FLA)
- EPA STAR Program
- RESPECT

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Northern Natural Gas Company?

- ★ 13,000 miles of pipeline
- ★ 60 Compressor Stations
- ★ 1000 employees
- ★ 2000 TBSs

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Greenhouse Gas (GHG) Fugitive Emissions Component Mapping

- Component –size – pressure – activity
- Connections (flange, thread, weld, open end pipe)
- Valves (block, control, relief, etc)
- Valves (three different fugitives/ leaks)
- Scrubbers/ Vessels (0.5 inches)
- Compressor cylinders (HE, CE, suction, discharge, test port)
- Fugitive default value

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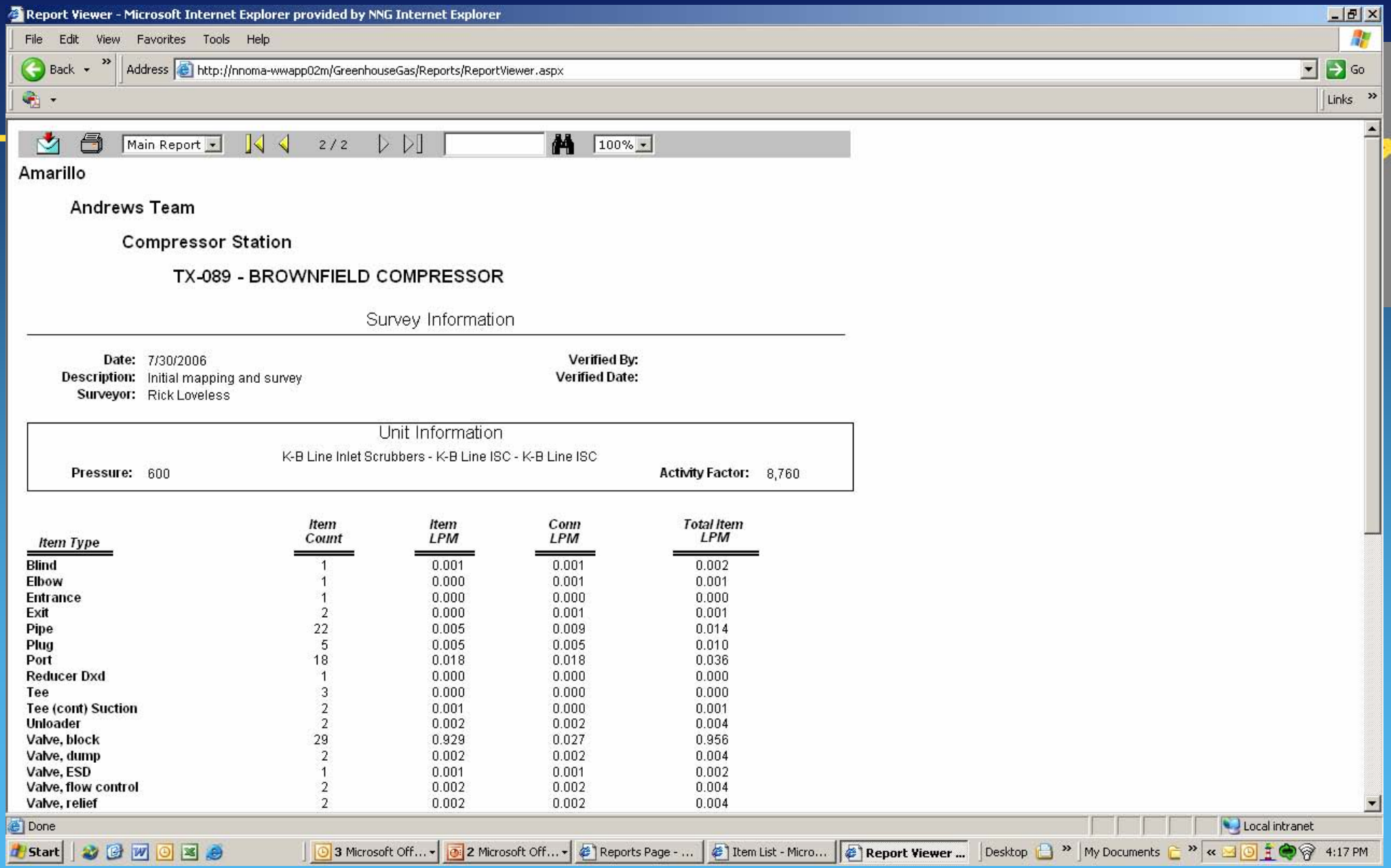
Greenhouse Gas Inventory Management System

Item List

Region: Amarillo
Team: Andrews Team
Facility: TX-089 - BROWNFIELD COMPRESSOR
Survey: Initial mapping and survey
Unit Description: Suction Piping - K-B Line Suction Piping

Show audit columns

	Seq #	Item Type	Connection Type	ID # 2	Nominal Size	liter/min	Connection liter/min	Notes	
Select	11	Plug	Threaded	SP	2.00000	0.001	0.001		Delete
Select	12	Welded saddle	Welded	SP	8.00000	0.000	0.000		Delete
Select	13	Valve, block	Flange	BF101; ball valve	8.00000	0.001	0.001		Delete
Select	14	Valve, ESD	Flange	SP	8.00000	0.001	0.001	ESD valve, 8 inch Leak = 69.308 lpm	Delete
Select	15	Pipe	Open End Pipe	SP	8.00000	0.001	0.001	Ball valve, open ended pipe, 8 inch 28.510 lpm	Delete
Select	16	Welded saddle	Welded	SP	8.00000	0.000	0.000		Delete
Select	17	Valve, block	Flange	Ball Valve	8.00000	0.001	0.001		Delete
Select	18	Pipe	Open End Pipe	SP	8.00000	69.000	0.001	East station vent	Delete
Select	19	Tee	Welded	T-02	6.00000	0.000	0.000		Delete
Select	20	Welded saddle	Welded	SP	30.00000	0.000	0.000		Delete


Report Viewer - Microsoft Internet Explorer provided by NNG Internet Explorer
File Edit View Favorites Tools Help
Back
Address http://nnoma-wwapp02m/GreenhouseGas/Reports/ReportViewer.aspx
Go
Links
Main Report
2 / 2
100%
Amarillo
Andrews Team
Compressor Station
TX-089 - BROWNFIELD COMPRESSOR
Survey Information
Date: 7/30/2006
Description: Initial mapping and survey
Surveyor: Rick Loveless
Verified By:
Verified Date:
Unit Information
K-B Line Inlet Scrubbers - K-B Line ISC - K-B Line ISC
Pressure: 600
Activity Factor: 8,760
Item Type | Item Count | Item LPM | Conn LPM | Total Item LPM
Blind 1 0.001 0.001 0.002
Elbow 1 0.000 0.001 0.001
Entrance 1 0.000 0.000 0.000
Exit 2 0.000 0.001 0.001
Pipe 22 0.005 0.009 0.014
Plug 5 0.005 0.005 0.010
Port 18 0.018 0.018 0.036
Reducer Dxd 1 0.000 0.000 0.000
Tee 3 0.000 0.000 0.000
Tee (cont) Suction 2 0.001 0.000 0.001
Unloader 2 0.002 0.002 0.004
Valve, block 29 0.929 0.027 0.956
Valve, dump 2 0.002 0.002 0.004
Valve, ESD 1 0.001 0.001 0.002
Valve, flow control 2 0.002 0.002 0.004
Valve, relief 2 0.002 0.002 0.004
Done
Local intranet
Start
3 Microsoft Off...
2 Microsoft Off...
Reports Page - ...
Item List - Micro...
Report Viewer ...
Desktop
My Documents
4:17 PM

Methane Detection and Quantification Technology

- ★GasFindIR – infrared camera
- ★RMLD (remote methane leak detector)
- ★HiFlow Analyzer
- ★Aerial Infrared Methane Leak Detection

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GasFindIR Infrared Camera

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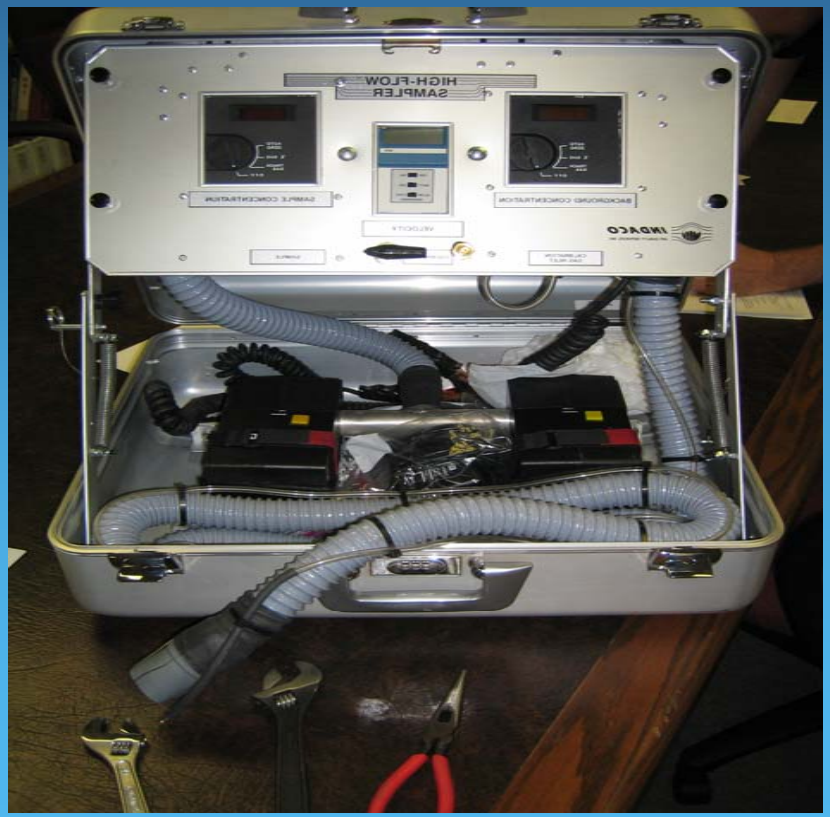
Scrubber Dump Valve Leak

Repaired Scrubber Dump Valve

RMLD (remote methane leak detector)

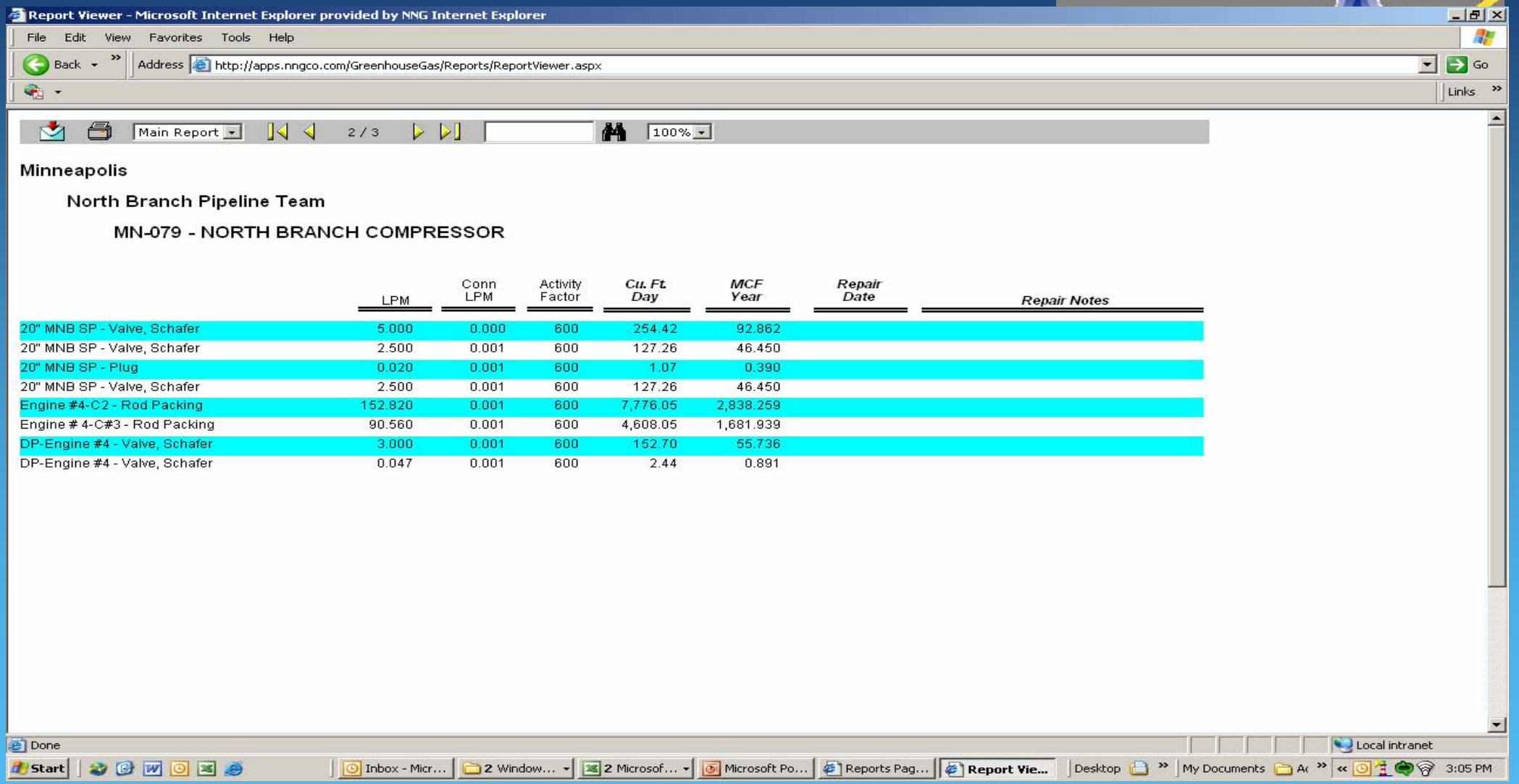
HiFlow Analyzer



Aerial Leak Detection
Airborne Natural Gas Emission LIDAR (*ANGEL*)

Underground Pipeline Leak - July 2007

Facility Leakage Audits



	LPM	Conn LPM	Activity Factor	Cu. Ft. Day	MCF Year	Repair Date	Repair Notes
20" MNB SP - Valve, Schafer	5.000	0.000	600	254.42	92.862		
20" MNB SP - Valve, Schafer	2.500	0.001	600	127.26	46.450		
20" MNB SP - Plug	0.020	0.001	600	1.07	0.390		
20" MNB SP - Valve, Schafer	2.500	0.001	600	127.26	46.450		
Engine #4-C2 - Rod Packing	152.820	0.001	600	7,776.05	2,838.259		
Engine # 4-C#3 - Rod Packing	90.560	0.001	600	4,608.05	1,681.939		
DP-Engine #4 - Valve, Schafer	3.000	0.001	600	152.70	55.736		
DP-Engine #4 - Valve, Schafer	0.047	0.001	600	2.44	0.891		

EPA STAR Program

- STAR I – The volume of methane from a Facility Leakage Audit (FLA) that was repaired. Un-repaired leaks go into our “unaccounted for” volumes
- STAR II – The volume of methane that was conserved during normal pipeline operations.
- STAR III – Other methane conservation calculations.

STAR I

- ★DI&M
  - Dump valves
  - Rodpacking
  - Valves
- ★Pipeline
  - Pumpkins
  - Patches
  - Sleeves

STAR II

- ★ Pressure reductions
- ★ Blocked ESD
- ★ Low bleed
- ★ VRU
- ★ Reroutes
- ★ Electronic ignitions
- ★ Temporary compression
- ★ Dehy mods

STAR III

- ★Hot taps
- ★Clock springs/ composite wrap
- ★Stopples
- ★Pumpkins
- ★Patches
- ★Sleeves

MidAmerican Energy RESPECT Policy

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

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Today's Agenda

- ★ Northern Natural Gas Company?
- ★ Greenhouse Gas (GHG) Fugitive Emissions
- ★ Methane Detection and Quantification Technology
- ★ Facility Leakage Audits
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Question?

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