OMB Control No. 2060-0328 Approval Expires 3/31/2008

Natural Gas STAR International

Implementation Plan

Company Information

Company Name: _____

Gas Star Contact: _____

Title: _____

Address: _____

_____

City: _____

Country: _____

Telephone: _____

Fax: _____

E-mail: _____

This implementation plan pertains to the company's operations in *(please specify country)** :

_____

This implementation plan includes planned activities for the following facilities or locations:

_____

_____

_____

The purpose of this Implementation Plan is to guide your company's participation in Natural Gas STAR International. Please evaluate the technologies and practices that your company is currently implementing as well as additional technologies and practices that, if implemented, would be beneficial to your company.

The Implementation Plan is designed to be a dynamic tool for Natural Gas STAR International partners to plan their Program activities. As company priorities and plans shift over time, the Implementation Plan may be revised or updated by submitting a new form to the Program.

Implementation Plan Elements

ELEMENT 1 – Evaluate Past and Current Reductions

Partners are encouraged to review current and past activities that have resulted in methane emission reductions. Reviewing these activities will help guide companies' participation in Natural Gas STAR International by creating a base of understanding of current activities to facilitate planning of future activities.

ELEMENT 2 - Emissions Reduction Technologies & Practices

Natural Gas STAR International partners reduce methane emissions throughout their operations by implementing a wide variety of technologies and practices. New partners are encouraged to evaluate and report current and new technologies or practices that cost effectively reduce methane emissions. A list of technologies and practices that have been implemented by industry partners and reported to Natural Gas STAR is included in the appendix.

* Please submit a separate Implementation Plan for each country in which you plan to implement Natural Gas STAR International.

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ELEMENT 1

Evaluate Past and Current Reductions

A review of past and current methane emission reduction activities will help guide your company's participation in Natural Gas STAR International by creating a base of understanding of current activities to facilitate planning of future activities.

As a first step, many new partners find it useful to review and document past methane emissions reduction efforts. The process helps companies quantify the success of their past activities and target future emission reduction efforts.

Will you include past activities in your annual report? ☐ Yes ☐ No

If yes, please describe your company's plans for reviewing past emission reduction activities.

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ELEMENT 2

Emissions Reduction Technologies & Practices

Your company may implement a variety of technologies and practices to reduce methane emissions. Please complete this form indicating which technologies and practices you are currently implementing and those you plan to implement in the future. For your reference, the appendix includes a list of proposed methane emission reduction technologies and practices and conversion factors.

Please fill out a separate page for each technology or practice your company plans to implement. (Please make additional copies, if necessary)

Technology or practice your company is currently implementing or will be implementing

Name of Technology or Practice (choose from the list in the appendix or describe your own):	Please provide a description of the technology or practice and how you plan to implement it *(including location or facility where you plan to implement it)*:
At what scale will you be implementing this activity? ☐ Company Wide ☐ Pilot Project ☐ Other _____	Level of Implementation *(check one):* ☐ Number of units to be installed: _____units ☐ Frequency of practice: _____times/year

Additional Information on Anticipated Plans and Projects

If additional space is needed, please continue on the back.

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Appendix A-1

Methane Emission Reduction Technologies & Practices- Production Sector

The list below describes a variety of methane emission reduction technologies and practices that Natural Gas STAR partners in the production sector have implemented and reported to Natural Gas STAR. You may use this list as a guide when completing your Implementation Plan. More information on each of these activities can be found at epa.gov/gasstar/techprac.htm.

Dehydrators

- Convert gas-driven chemical pumps to instrument air
- Install condenser on glycol vent
- Install flash tank separators on glycol dehydrators
- Install zero emissions dehydrators
- Link dehydrator unit to incinerator
- Pipe glycol dehydrator to vapor recovery unit
- Replace gas-assisted glycol pumps with electric pumps
- Reduce/optimize glycol circulation rates in dehydrators
- Replace glycol dehydration units with methanol injection
- Replace glycol dehydrators with desiccant dehydrators
- Reroute glycol skimmer gas
- Use portable desiccant dehydrators

Compressors/Engines

- Convert engine starting to nitrogen
- Install automated air/fuel ratio control systems
- Install electric compressors
- Install electric starters
- Install instrument air systems
- Redesign blowdown systems and alter ESD practices
- Reduce emissions when taking compressors off-line
- Reduce emissions from compressor rod packing systems
- Reduce frequency of engine starts with gas
- Replace gas starters with air
- Replace ignition/reduce false starts
- Replace wet compressor seals with dry seals

Pipelines

- Inspect flowlines annually
- Install ejector
- Use composite wrap repair
- Use improved protective coating at pipeline canal crossings
- Use portable compressors

Valves

- Inspect and repair compressor station blowdown valves
- Install BASO® valves
- Replace burst plates with secondary relief valves
- Test and repair pressure safety valves
- Test gate station pressure relief valves with nitrogen
- Use ultrasound to identify leaks

Tanks

- Consolidate crude oil production and water storage tanks
- Convert water tank blanket from natural gas to produced CO_2 gas
- Install pressurized storage of condensate
- Install vapor recovery units on crude oil storage tanks
- Recover gas from pipeline pigging operations
- Recycle line recovers gas during condensate loading

Wells

- Connect casing to vapor recovery unit
- Install capillary strings
- Install compressors to capture casinghead gas
- Install downhole separator pumps
- Install plunger lift system in gas wells
- Install pumpjacks on low water production gas wells
- Install gas well “smart” automation system
- Install velocity tubing strings
- Optimize gas well unloading times
- Perform green completions
- Use foaming agents

Pneumatics/Controls

- Convert gas pneumatic controls to instrument air
- Convert pneumatics to mechanical controls
- Install electronic flare ignition devices
- Install flash tank separators on glycol dehydrators

Other

- Conduct facility/process optimization audit
- Conduct directed inspection and maintenance at remote sites
- Eliminate unnecessary equipment and/or systems
- Install electronic safety devices
- Install flares
- Lower heater-treater temperature
- Recover field gas

Appendix A-2

Methane Emission Reduction Technologies & Practices- Processing Sector

The list below describes a variety of methane emission reduction technologies and practices that Natural Gas STAR partners in the processing sector have implemented and reported to Natural Gas STAR. You may use this list as a guide when completing your Implementation Plan. More information on each of these activities can be found at epa.gov/gasstar/techprac.htm.

Dehydrators

- Convert gas-driven chemical pumps to instrument air
- Install condenser on glycol vent
- Install flash tank separators on glycol dehydrators
- Install zero emissions dehydrators
- Pipe glycol dehydrator to vapor recovery unit
- Reduce/optimize glycol circulation rates in dehydrators
- Replace gas-assisted glycol pumps with electric pumps
- Replace glycol dehydration units with methanol injection
- Replace glycol dehydrators with desiccant dehydrators
- Reroute glycol skimmer gas

Compressors/Engines

- Convert engine starting to nitrogen
- Install automated air/fuel ratio control systems
- Install electric compressors
- Install electric starters
- Lower purge pressure for shutdown
- Modify compressor shutdown logic
- Redesign blowdown systems and alter ESD practices
- Reduce emissions when taking compressors off-line
- Reduce frequency of engine starts with gas
- Replace gas starters with air
- Replace ignition/reduce false starts
- Replace compressor rod packing systems
- Replace wet compressor seals with dry seals

Pneumatics/Controls

- Convert gas pneumatics to instrument air systems
- Convert pneumatics to mechanical controls
- Install electronic flare ignition devices
- Replace high-bleed pneumatic devices

Tanks

- Install pressurized storage of condensate
- Install truck-loading VRUs on liquid storage and transfer
- Recover gas from pipeline pigging operations
- Recycle line recovers gas during condensate loading

Valves

- Inspect and repair compressor station blowdown valves
- Replace burst plates with secondary relief valves
- Test and repair pressure safety valves
- Test gate station pressure relief valves with nitrogen
- Use of YALE® closures for ESD testing
- Use ultrasound to identify leaks

Pipelines

- Use composite wrap repair
- Use hot taps for in service pipeline connections
- Use improved protective coating at pipeline canal crossings
- Use fixed/portable compressors for pipeline pumpdown
- Use inert gases and pigs to perform pipeline purges

Other

- Conduct facility/process optimization audit
- Conduct helicopter leak surveys
- Conduct nitrogen rejection unit optimization
- Conduct directed inspection and maintenance at gas plants and booster stations
- Conduct directed inspection and maintenance at remote sites
- Eliminate unnecessary equipment or systems
- Install flares
- Use IR camera/optical imaging for leak detection

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Methane Emission Reduction Technologies & Practices- Transmission and Distribution Sectors

The list below describes a variety of methane emission reduction technologies and practices that Natural Gas STAR partners in the transmission and distribution sectors have implemented and reported to Natural Gas STAR. You may use this list as a guide when completing your Implementation Plan. More information on each of these activities can be found at epa.gov/gasstar/techprac.htm.

Pipelines

- Identify and rehabilitate leaky distribution pipe
- Inject blowdown gas into low pressure mains
- Insert gas main flexible liners
- Install ejector
- Reduce distribution system pressure (manual)
- Reinject blowdown gas
- Use composite wrap repair
- Use hot taps for in service pipeline connections
- Use inert gases and pigs to perform pipeline purges
- Use fixed/portable compressors for pipeline pumpdown
- Use improved protective coating at pipeline canal crossings
- Use automated systems to reduce pressure (e.g., smart regulators/clocking solenoids)
- Use flares for pipeline pumpdown/maintenance

Compressors/Engines

- Automate systems operations to reduce venting
- Convert engine starting to nitrogen
- Install automated air/fuel ratio control systems
- Install electric compressors
- Install electric starters
- Install static pacs at compressor stations
- Lower purge pressure for shutdown
- Redesign blowdown systems and alter ESD practices
- Reduce emissions when taking compressors off-line
- Reduce frequency of engine starts with gas
- Replace compressor cylinder unloaders
- Replace compressor rod packing systems
- Replace gas starters with air
- Replace ignition/reduce false starts
- Replace wet compressor seals with dry seals
- Use turbines at compressor stations

Valves

- Close main and unit valves prior to blowdown
- Design isolation valves to minimize gas blowdown volumes
- Inspect and repair compressor station blowdown valves
- Install excess flow valves
- Move fire gates in to reduce venting at compressor stations
- Perform leak repair during pipeline replacement
- Replace burst plates with secondary relief valves
- Test and repair pressure safety valves
- Test gate station pressure relief valves with nitrogen
- Use YALE® closures for ESD testing
- Use ultrasound to identify leaks

Pneumatics/Controls

- Convert gas pneumatic controls to instrument air
- Convert pneumatics to mechanical controls
- Identify and replace high-bleed pneumatic devices
- Install electric flare ignition devices
- Reduce frequency of replacing modules in turbine meters
- Replace bi-directional orifice metering with ultrasonic meters

Dehydrators

- Convert gas-driven chemical pumps to instrument air
- Install condenser on glycol vent
- Install zero emissions dehydrators
- Pipe glycol dehydrator to vapor recovery unit
- Replace gas-assisted glycol pumps with electric pumps
- Replace glycol dehydrators with separators and in-line heaters
- Reroute glycol skimmer gas

Tanks

- Capture methane released from pipeline liquid tanks
- Install pressurized storage of condensate
- Install vapor recovery units on storage tanks
- Purge and retire low pressure gas holders
- Recover gas from pipeline pigging operations
- Recycle line recovers gas during condensate loading

Appendix A-3 (continued)

Methane Emission Reduction Technologies & Practices- Transmission and Distribution Sectors

Other

- Conduct helicopter leak surveys
- Conduct directed inspection and maintenance at compressor stations
- Conduct directed inspection and maintenance at gate stations and surface facilities
- Conduct directed inspection and maintenance at remote sites
- Eliminate unnecessary equipment and/or systems
- Increase walking survey from 5 to 3 year basis
- Install flares
- Require improvements in the quality of gas received from producers
- Use IR camera/optical imaging for leak detection

Appendix B

Conversion Factors

Please see below for a variety of conversion factors that might be useful when completing your Implementation Plan. Please contact Natural Gas STAR if you have questions about this information.

Gas Conversions

Please report emissions reductions to Natural Gas STAR International in thousand cubic feet (Mcf).

1 Cubic foot of methane	= 1,014.6 Btu
1 Btu	= 0.000986 Cubic feet of methane
1 Cubic foot	= 0.02832 Cubic meter
1 Cubic meter	= 35.312 Cubic feet
1 Mile	= 1.609 Kilometer
1 Kilometer	= 0.6214 Mile
1 Btu	= 251.996 Calories
1 Calorie	= 0.00397 Btu
1 Btu	= 1055.056 Joules
1 Joule	= 0.00095 Btu

Please send completed forms to:

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