Pipe Glycol Dehydrator to Vapor Recovery Unit

Technology / Practice Overview

Description

Glycol dehydration units use electric or gas assist pumps to re-circulate the lean (dry) glycol back to the gas contactor. Gas assist pumps are driven by expansion of the high-pressure gas entrained in the rich (wet) glycol. This methane gas is either vented to the atmosphere with water vapor that is boiled off in the glycol regenerator, or recovered for beneficial use with a flash tank separator.

When flash tank separators and other vents are piped to a vapor recovery unit (VRU), more gas can be recovered and less methane, volatile organic compounds (VOC), and hazardous air pollutants (HAP) vented from the reboiler. The VRU boosts the recovered gas pressure enough to inject it into a fuel gas system, compressor suction, or gathering/sales line.

Operating Requirements

For full benefit from this practice, the existing VRU should have sufficient capacity to capture the maximum production tank vapor load simultaneously with the glycol dehydrator vent load.

Applicability

There are no limitations when the VRU discharges to a sales line or compressor suction. However, where the beneficial outlet is a fuel gas system, fuel usage may limit the amount of methane recovery.

Methane Emissions

With sufficient spare capacity in an existing production tank VRU, all of the gas collected by a glycol dehydrator flash

- [ ] Compressors/Engines
- [x] Dehydrators
- [ ] Directed Inspection & Maintenance
- [ ] Pipelines
- [ ] Pneumatics/Controls
- [ ] Tanks
- [ ] Valves
- [ ] Wells
- [ ] Other

Applicable Sector(s)

- [x] Production
- [x] Processing
- [x] Transmission
- [ ] Distribution

Other Related Documents:

Reroute Glycol Skimmer Gas, PRO No. 201

Convert Gas-Driven Chemical Pumps, PRO No. 202

Optimize Glycol Circulation and Install Flash Tank Separators in Dehydrators, Lessons Learned

Replacing Gas-Assisted Glycol Pumps with Electric Pumps, Lessons Learned

Economic and Environmental Benefits

Methane Savings

Estimated annual methane emission reductions	*790 Mcf per dehydrator unit*

Economic Evaluation

Estimated Gas Price	Annual Methane Savings	Value of Annual Gas Savings*	Estimated Implementation Cost	Incremental Operating Cost	Payback (months)
$7.00 / Mcf	790 Mcf	$5,900	$2,000	$100—$1,000	4 - 7
$5.00 / Mcf	790 Mcf	$4,200	$2,000	$100—$1,000	6 - 9
$3.00 / Mcf	790 Mcf	$2,500	$2,000	$100—$1,000	10 - 15

* *Whole gas savings are calculated using a conversion factor of 94% methane in pipeline quality natural gas.*

Additional Benefits

- Depending on existing dehydrator system setup, could avoid emissions of HAPs and VOCs
- Could reduce fuel costs for the dehydrator system or the site by recovering gas that can be used as fuel

Pipe Glycol Dehydrator to Vapor Recovery Unit (Cont'd)

tank separator can be recovered. A dehydrator with either an electric or energy exchange circulation pump can recover 300 scf or 900 scf of methane per MMcf of gas processed, respectively when there is no flash tank separator. This is because, when using either a piston or gear type "energy-exchange" pump, for every unit-volume of gas absorbed in the rich TEG leaving the contactor, two more unit-volumes of gas must be added from wet feed gas to supply enough power in the driver for the lean TEG pump.

Methane emissions reductions of 7,600 Mcf per year can be achieved for a 20 MMcf per day dehydrator having a vent condenser, without a flash tank separator, circulating 300 gallons of glycol per hour with an energy exchange pump. The absence of a flash tank separator (as is common with some International Natural Gas STAR Partners) would result in greater emissions and, by extension, a greater amount of gas possibly being recovered through this practice.

Economic Analysis

Basis for Costs and Savings

Typical methane emissions reductions of 790 Mcf per year apply to a 20 MMcf per day glycol dehydration unit, with an energy exchange pump and flash tank separator connected to an existing production tank VRU.

The cost of this project would include planning, design, and implementation by an engineer and installation of additional piping. Using expert judgment and rudimentary estimates of equipment capital and installation costs, the implementation costs are estimated to be approximately $2,000. Additional operating costs are estimated using a cost of 7.5¢ per kWh, electrical power cost would be about $340 per MMcf per year of gas recovered.

Discussion

This technology has a quick payback. The low cost of installing the piping connection between the VRU and flash tank separator vent and the incremental electrical power cost of the vapor recovery compressor partially offset the value of gas savings.

EPA provides the suggested methane emissions estimating methods contained in this document as a tool to develop basic methane emissions estimates only. As regulatory reporting demands a higher-level of accuracy, the methane emission estimating methods and terminology contained in this document may not conform to the Greenhouse Gas Reporting Rule, 40 CFR Part 98, Subpart W methods or those in other EPA regulations.

Methane Content of Natural Gas

The average methane content of natural gas varies by natural gas industry sector. The Natural Gas STAR Program assumes the following methane content of natural gas when estimating methane savings for Partner Reported Opportunities.

Production	79 %
Processing	87 %
Transmission and Distribution	94 %