Natural Gas Dehydration Units

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Need for Dehydration in Gathering System

- Remove water vapor found in raw natural gas
- Prevent hydrates (solid, ice-like crystallization formed from hydrocarbons and water) that can block pipelines, jam valves, and be destructive to pipeline equipment and instrumentation
- Prevent corrosion of pipelines that can cause leaks

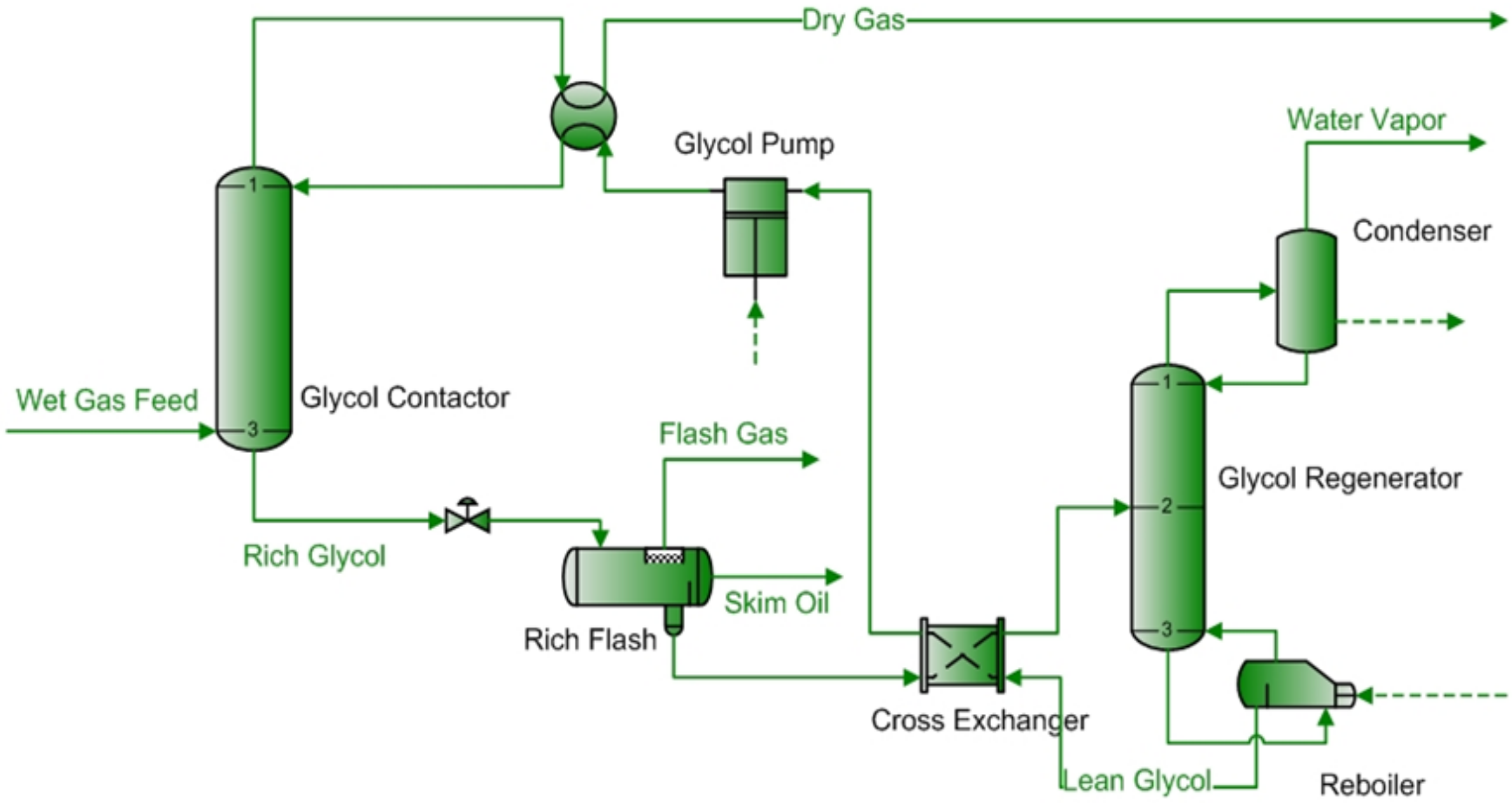
Types of Dehydration Found in Natural Gas Gathering System

- Solid Desiccant, Molecular Sieve, Dehydration Beds
  - Typically only found at cryogenic gas plants due to lower water content specifications due to extremely cold operating temperatures
- Liquid Desiccant Dehydration Systems
  - Ethylene Glycol System – used for dew point suppression
  - Triethylene Glycol (TEG) System – majority of dehydration systems use this technology

Tri-ethylene Glycol (TEG) Dehydration Units

- Uses absorption process to transfer water into the glycol
- Typically found at midstream compressor stations
- Can be found at existing and new natural gas well sites
- Emission sources:
  - Still Vent Vapors – top of regeneration unit
  - Flash Tank Vapor – if flash tank installed

Glycol Dehydration Unit



Triethylene Glycol Dehydration Unit

Regulated Under Federal Air Rules: 40 CFR 63, Subpart HH

- 40 CFR Part 63, Subpart HH (MACT HH) - National Emission Standards for Hazardous Air Pollutants (HAPs) From Oil and Natural Gas Production Facilities
- TEG Units at Major Sources (> 10 TPY single HAP or > 25 TPY combined HAPs)
  - Large Dehys (> 3 MMSCFD and > 1 TPY benzene) must reduce total air toxics emissions by 95 percent or reduce benzene emissions to less than 1 ton per year
  - Small Dehys must meet unit-specific BTEX limit for emissions based on natural gas throughput and gas composition

TEG Units Regulated Under 40 CFR 63, Subpart HH

- Area Source TEG Units over 1 TPY Benzene and over 3 MMSCFD gas throughput
  - Send emissions to a control device for sources in densely populated areas
  - Limit maximum glycol circulation rate for sources in certain rural locations
- Area Sources TEG Units less than 1 TPY Benzene or under 3 MMSCFD gas throughput
  - Exempt from controls due to small emission rates
- Rule last updated in 2012 and found current control requirements were adequate

Air Permitting Regulations

- NMED Air Permitting (New Source Review)
  - Monitoring required of glycol circulation rate
  - Control device monitoring required, if emissions are controlled
- Typical Controls Installed with NSR Synthetic Minor Emission Limits
  - Flash tank
  - Flash tank routed to control or recycled to process
  - BTEX condenser on still vent
  - BTEX condenser with combustor on still vent
  - BTEX condenser with Vapor Recovery Unit (VRU) back to process

Emission Reduction Strategies

- Operators typically control glycol dehydration unit emissions to reduce VOC and HAP emissions with Federally Enforceable NSR permit limits to remain below thresholds:
  - General Construction Permit (GCP)
  - Title V Permitting
  - MACT HH control exemption for area sources (less than 1 tpy benzene)
- These reductions have the co-benefit of also reducing methane emissions in these process vents

Emission Reduction Strategies

- Limit glycol circulation rate to amount needed to meet pipeline spec
- Flash Tank installed before glycol regeneration
  - Flash gas typically routed back to the process, used as fuel, or routed to combustion device
  - Most absorbed methane flashes off in Flash Tank (90% recovery)
- BTEX Condenser installed after Still Vent to condense water and heavier hydrocarbons (VOC/HAPs)
  - Combustion Device installed after BTEX condenser to further reduce VOC/HAP emissions, equally reduces methane
- Vapor Recovery Unit (VRU) after BTEX condenser to route gas back to process