OUR PERSPECTIVE

ABOUT GLYCOL DEHYDRATORS

- Glycol is used a drying agent to remove water from natural gas liquids.
- If water is not removed, hydrates or blocks of ice can form in the gas lines creating slugs that block the gathering pipelines.
- By calculating the flow rates of the glycol and matching it with the gas flow rate, an engineer can estimate of the amount of water left in the gas stream.
- Larger centrally located units are gaining favour over smaller, wellsite-based dehydrators.

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GLYCOL – REMOVES PRODUCED WATER FROM NATURAL GAS

Canada is the fifth largest producer of natural gas in the world. With advancements in technology, accessing Canada's vast natural gas reserves is easier using a combination of horizontal drilling and hydraulic fracturing. But there's still a challenge removing produced water from the gas. Glycol dehydration is used as a drying agent to remove water from natural gas and natural gas liquids (NGL). It is the most common and economical way to remove water from these streams and is similar to the glycol variants of the same green liquid used in your car radiator.

Dehydration is necessary to ensure efficient operation of gas transmission lines. Without dehydration or water removal, hydrates or solid blocks of ice can form in the gas lines. Even if hydrates don't form in the pipeline, liquids might accumulate in low spots on the pipeline. These liquids can form slugs. Slugs can sit in a low spot until enough liquid collects to block the full diameter of the pipe. If enough pressure builds up the slug of liquid gets pushed down the pipe and causes damage as it hammers its way through valves, meters and other equipment.

Obviously, it's important to remove water from the gas stream prior to delivering it to a pipeline. One of the more common ways to do this is using a glycol dehydrator. Glycol is a favorite because it really likes water, and it is easy to recover water back out of it.

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Glycol dehydrators are steel towers, 12" to as big as 48" in diameter, and range in height anywhere from 12' to roughly 32' seam to seam. For the purpose of article an over-simplified version of a glycol dehydrator will be used as an example. A typical dehydrator used in Canada is packaged on a single skid with a house, a boiler, a dehydrator tower, and one or two pumps.

At first glance, a dehydration skid can be quite. But imagine a 30 foot tall tower about 24" diameter standing in the corner of the building. Near the bottom of the tower, wet gas enters. Free liquids are collected below this inlet, and the gas is allowed move further up the tower. As gas travels up, it is forced through a number of trays fixed with special bubble caps. At the top of the tower, dry glycol enters. The glycol and the gas run counter-current, with the driest glycol seeking the driest gas at the top, and the wettest glycol and wettest gas found at the bottom. By calculating the flow rates of the glycol and matching it with the gas flow rate, an engineer can provide a reasonable estimate of the amount of water left in the gas stream exiting the tower. An acceptable amount is no more than four lbs. of water per one mcf.

Wet glycol collected at the bottom of the tower is directed through a pump to a reboiler. The reboiler boils the "wet" glycol to the point that the water is evaporated. This water is released from the reboiler through the stripping still column. The stripping still column uses fins to try to condense the glycol that is trying to escape out the vapor vent, but still allows water vapor to escape to atmosphere. The process also uses glycol filters, accumulator drums, and gas/glycol and glycol/glycol heat exchangers, but the simplified process is as described. Some producers use different varieties of glycol to suit their type of reboiler. (Di-Ethylene and Tri-Ethylene Glycol). Reboilers are often heated with a firetube, but sometimes indirect heat, from hot oil heaters are used also.

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There are two variations to the above process worth noting. One older process uses a packed column, sometimes used for very small volumes, where instead of trays, a packing medium of some sort is used. The flow is the same, but is less expensive, but more prone to getting plugged and not as efficient as bubble caps. The second process used by manufacturers such as Westerman and Natco are re-pioneering this process called desiccant dehydration. This uses a tablet made up of a special type of salt (Calcium Chloride) that attracts water. The tablets need to be replaced as they turn into briny water.   This process releases no emissions.

A glycol dehydrator not only likes water, but also Benzene, Toluene, Ethyl Benzene, and Xylene. These chemicals, often k known as "BTEX" emissions, are a byproduct of glycol dehydrators. The desiccant dehydrator has made a comeback in areas where emissions are a concern, and where they show promising alternatives to incineration. The desiccant dehydrator used for small volume applications such as the drying of casing gas and tank vapors that are used as fuel gas for motors and burners.

Currently, larger centrally located units are gaining favour over smaller wellsite-based dehydrators. Using larger centrally located units avoids having to run a complicated, and high-maintenance dehydrator, by injecting glycol or methanol in the smaller flow lines. These products are later recovered in the bottom of the larger dehydrator tower, or in a separator located upstream.