Dehydration of Natural gas
Economising energy when regenerating Triethylene glycol (TeG)

By C. Montagnier, Projects Engineer, PILLARD (EGCI), Marseille (F)

1 - CLASSIC UNITS FOR Triethylene glycol (TeG) REGENERATION

Since extracted natural gas is wet, it must be dehydrated.
TeG absorbs the water in natural gas and has a boiling point of approx.200°C. It can be regenerated after water absorption in a distillation system.

The classic systems (see Fig.1) are comprised of
- A "reboiler" fitted with a distillation column
- A Natural gas burner with pre-chamber giving flue gas at around 900°C which heats the reboiler
- An aero-refrigeration cooler.
- A "Still" separator with recuperation of condensed water polluted by hydrocarbons & a flare with pilot.

The wet TeG loses its water in the distillation column above the TeG reboiler tank. Dry TeG is evacuated for reuse.

The mixture of water vapour & effluent (residuals of Natural gas, Mercaptans, methanol) from the column are sent to the 'Still' where the condensates are separated.

The gaseous effluents are fired in the flare comprising a natural gas pilot flame. Combustion energy from the effluents is therefore lost.

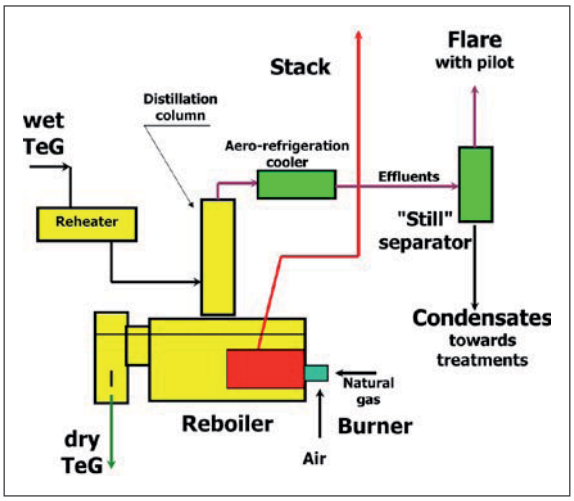

Fig.1 - Classic Regeneration unit

2 - NEW UNITS FOR TeG REGENERATION WITH ENERGY RECOVERY

The specified realisation (for which the principle is given in Fig.2) is at the natural gas storage centre of GAZ DE FRANCE at Gournay sur Aronde (France), a general view is given in Fig.3

The flare is replaced by a combustion chamber (called an 'economiser') supplied with water vapour & effluents from the column (with Natural gas support) making flue gas at 900°C which heats the reboiler.

The natural gas support is managed by a control system measuring the effluent flow rate. The safety chains check the minimum/maximum temperatures and for any possible anomalies.

The flexibility and rapid response time of the "economiser" results in particular from the low refractory inertia and the burner standby operation.

In the case of regeneration shut-down and during cold start-up, the "economiser" load must be determined for a sufficiently high level to enable it to be operational within an hour.

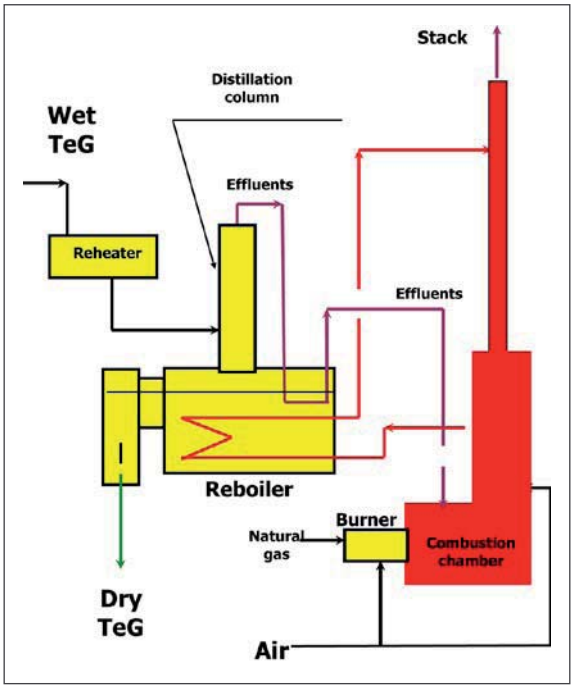

Fig.2 - Regeneration unit with energy recovery

The “economiser” fulfils two roles :
- Generating energy
- Incineration of gaseous effluents.

Advantages
- Thermal destruction of gaseous effluents (2 seconds residence time at 850°C)
- Economical consumption of natural gas
- Economical running costs by removing the cost of treating the condensates polluted with hydrocarbons.

Characteristics and results obtained

- TeG flow rate to be treated	:	0 à 4,7m^3/h	(liquid)
- Reboiler load	:	350	kW
- Economiser peak load	:	1 200	kW (stable operation 400)
- Natural gas flow rate maximum			
* Peak (start-up)	:	120	Nm^3/h
* Stable operation (approx.)	:	10	Nm^3/h
- Effluent flow rate	:	0 à 300	Nm^3/h
- Effluent LHV	:	7 200 à 28 800	kJ Nm^3/h
- Natural gas saving (approx.)	:	28	Nm^3/h
- Natural gas savings per m^3 of liquid TeG	:	6	Nm^3/h
- Cost savings for removing the condensate treatment unit, per m^3 of liquid TeG	:	12	€

Fig.3 - Overall view of the regeneration unit at Gournay sur Aronde (France)

Conclusions
- The “economiser” operates reliably and gives costs savings as forecast
- The unit gives out no pollutants, which is the contrary of previous solutions
- It enables savings to be evaluated at (6(n)m^3 of natural gas + 12 euros) per m^3 of liquid TeG