

## Drag Reduction Agent (DRA) in the Main Oil Line

*By Ian Greasby, Petroleum Development Oman (PDO)*

### Why Use DRA?

DRA has typically been used to cater for those occasional instances when more oil is produced than can be physically pumped down the line, given the pipeline dimensions and pressure constraints available.

However, Drag Reduction is rapidly becoming an essential aspect of cost savings for PDO.

When PDO first built its pipelines, it built them with a life expectancy of about 20 years (wall thickness, materials and corrosion rate calculations all taken into account). But replacing pipelines is a very expensive pastime (up to \$50 million for 100 km). Clearly, if replacing pipelines can be postponed for as long as possible, there are enormous savings in store for PDO.

Over time pipelines corrode, no matter how well you look after them (regular pigging, cathodic protection, injecting corrosion inhibitors, etc.). As the wall thickness reduces, so does the Maximum Allowable Operating Pressure (MAOP). If you continue to operate a line at high pressures but the wall thickness has reduced, you risk a pipeline rupture. Hence, you have 3 choices:

- Renew the line (CAPEX = very costly)
- Reduce your pressure and hence flow (deferment = very costly)
- Inject Drag Reducer (enables equal flows at lower pressures = low cost)

If the MAOP has been reduced to maintain integrity of the system, the amount of oil you can pump through that line must reduce. This can cause deferment in the worst case. However, by injecting Drag Reducer, the same quantity of oil can be pumped, but at a lower pressure. The drag of the oil on the pipeline is reduced, and thus the pressure drop between the two ends of the node is reduced.

Thus, for a small amount of OPEX each year and careful monitoring of the line, the complete line renewal can be postponed, and the massive CAPEX investment can be postponed by perhaps several years.



### What is DRA and who Manages it?

Drag Reducing Agent (DRA) comes in both liquid and gel form. Since 2001, liquid DRA has been supplied by Riyam Engineering (local agent for ConocoPhillips Specialty Products Inc.). They supply 2 skids, presently located at Hubara and Sahma Booster Stations. These skids contain a system of liquid storage, pumps and meters. They inject DRA directly into the Main Oil Line (MOL), downstream of the oil export pumps.

The contract was initially set for 3 years, with the clause to potentially increase by 2 years. This extension has just been agreed and signed. The contract will now continue until June 2006. The contract was extended for two main reasons:

- Operational requirements (as described above)
- PDO is extremely happy with the present contractor. Two years without LTI has been achieved, and the skids have achieved 100% availability with no deferment incurred due to the failure of the DRA skid

The contract is managed by the TTP department. The Contact Owner is Maqbool Zadjali TTP, and the Contract Holder is Ian Greasby TTP/31.

### In which instances is DRA used ?

DRA was initially used only for "peak shaving." This means that during normal operations, no DRA is injected. However, under pump-down conditions DRA would be injected to enable extra flow of oil through a given pipeline with a limited MAOP. This typically occurs following a MOL shut down. A MOL shut down does not necessarily imply deferment. The stations along the MOL mostly have some form of storage tanks and as such can continue producing without pumping into the MOL. They produce to their tanks. Following the shut down, the MOL coordinator then agrees with the Areas who will empty their tanks first and temporarily increase their section of MOL flow. This may only be possible with the use of DRA.

DRA can however be used as described above, to postpone the replacement of an existing pipeline whose MAOP is decreasing (due to corrosion).

Thus it can be seen that DRA has 2 uses:

- To increase the flow of oil through an unchanged MAOP
- To maintain a flow rate through a line where MAOP has been reduced due to corrosion

## The Future of DRA

Recent developments have proven that it is beneficial to postpone pipeline replacements for as long as possible. This enables us to take new developments into account.

For instance, the renewal of the 84 km of 18" line from Marmul to Nimr. The decision whether to replace like for like, or to install a 24" line (knowing that Harweel is coming on line) can be made more easily by utilizing DRA.

It has been agreed to hire a new skid via the contractor Riyam Engineering (for ConocoPhillips Specialty Products Inc.). This extends the life of the existing line and allows for a more calculated decision to be made once more information on Harweel is gained. For a few dollars of OPEX, an enormous off-set against CAPEX can also be made.

Given Riyam Engineering's (ConocoPhillips') reliability and proven HSE record we are confident that no oil will be deferred in the period until the new line is in place.

In all cases, the DRA skids are completely mobile. All that is required to move the skid is concrete foundation to be built at the new location with electrical power supply and a tapping made into the MOL.

The use of DRA is looking to become increasingly important as an aid to making key pipeline investment decisions. Following on from Marmul there is scope to try this strategy in other areas.

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