Optum's DRA and simulation technologies solve takeaway capacity limitation

Optum provides hydraulic "what if" analysis and DRA technology to manage expansion project in the Delaware Basin of West Texas.

DELAWARE BASIN, WEST TEXAS

Challenge

Rapidly changing takeaway requirements in the Delaware Basin

A midstream company transporting light crude (API>35) from the Delaware Basin had upgraded their takeaway capacity over a 12-mile, 10" interconnection of two trunk systems. A short time after the completion of the upgrade, producers in the Basin announced increases calling for higher takeaway commitments through the 12-mile tie in. These types of changes are common in the region and present opportunities for an agile operator. In this case, any investment in pumping capacity and storage was easily justified, but an interim solution was needed to maximize capacity while installing the upgrades. The capacity was restricted by line operating pressure and insufficient horsepower. Additionally, the operator wanted to evaluate various "what if" scenarios in anticipation of a ramp up in production to 100,000 BPD over the coming months.

BASELINE CONDITIONS

Number of pumps	Flow rate BPD	MAOP [PSI]	Pump variable frequency drive [Hz]	Length of line [miles]
2	44,640	144	54	12

Solution

DRA provides solution

DRA technology was selected because of its quick deployment advantage. Optum was given the opportunity because of its proven technology for light crude oil and its in-house hydraulics modeling expertise. Transient pressure surges at the higher flow rates expected were an important safety concern. Working with the consulting company hired to manage the project, Optum proposed a field trial to establish the behavior of the system while using DRA. An additional challenge was the short line length of only 12 miles. Fast dissolution of the DRA was essential.

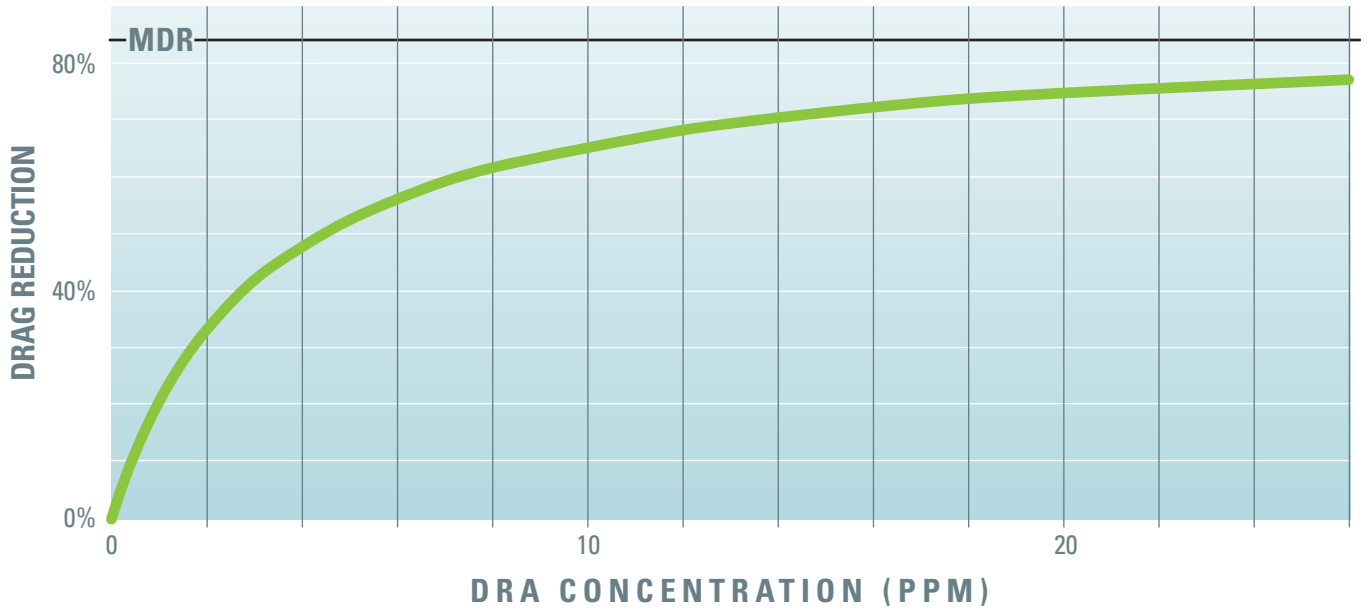
The trial protocol called for three dosages at constant flow rate. Then, depending on the results of the first three dosages, a fourth dosage would be selected to pinpoint the current system's maximum sustainable flow rate. The results would also serve to model the operator's "what if" analysis and to support decisions regarding the capital investment plan using DRA.

The injection module had a DRA precision metering pump injection capable of up to 9 gal/hour and was fully instrumented for remote monitoring and control.

Results

Flow Optimizer™'s rapid dissolution provides immediate advantage

Flow Optimizer's rapid dissolution easily met the challenge posed by the short line length. The maximum drag reduction (MDR), an indicator of the DRA's polymer quality, was calculated to be 84%. The first dosage of 15 ppm produced such high drag reduction that lower dosages were required to develop the shape of the performance curve.



The installed horsepower limitation permitted a maximum flow rate of 60,170 BPD using 8 ppm of Flow Optimizer. Higher DRA dosages would lower pressure but no additional flow increase could be achieved due to the horsepower limitation. A dosage of 4.5 ppm of Flow Optimizer was selected for operating while the station upgrade capital project was completed. This dosage would handle the fluctuating capacity needs of the operator, while still maintaining the pressure below the prescribed safe operating pressure.

Dosage	% Drag reduction	Flow rate BPD	Discharge Pressure [psi]
15	**66**	**44,640**	**34**
10	**62**	**44,640**	**42**
8	**58**	**60,170**	**91**
4	**47**	**44,640**	**121**

The low dosages possible with Flow Optimizer led to reducing the size of the skid's metering pump.

Optum's hydraulics team reported the needed safety precautions related to the transients. The trial results and the model generated can now be used to size pump drives for the flow rate desired and valves needed to safely manage the transient pressure surges at the higher flow rates resulting from DRA use.