

Sterrex Industries

PLO-59 DRA

Product Presentation



AGENDA

- Introduction to Drag Reducer Technology
- PLO-59 DRA Overview & Advantages
- Target Applications
- Demonstrated results
- Optional Chemistries
- Summary

DRAG REDUCER TECHNOLOGY

- Typical Reasons to use Drag Reducers
- Traditional Drag Reducer Chemistry
- PLO-59 DRA
- Advantages

REASONS TO USE DRAG REDUCERS

Flow limitations in crude oil pipelines

- Limited or reduced Production Capacity
- System back-pressure issues cause stress on pumps, trips, etc.
- Turbulent flow conditions cause vibration, pump stress, etc.
- Various deposits in pipelines (paraffin, asphaltenes, etc.) cause flow restrictions and effect downstream equipment.
- Increased pipeline pump maintenance costs or downtime
- Increased pipeline cleaning (pigging) from deposits
- Looking to improve flow and maximize product transfer

TRADITIONAL CHEMISTRY

Long Chain Polymer Chemistry used to reduce turbulent flow

- Reduce Energy loss from turbulent eddies that form
- Micelles form to break up turbulence and decrease pressure drop
- Allows for laminar flow conditions, but with higher than expected flow rates
- Products are very thick and viscous, with appearance like honey
- Molecules shear easily and need long pipe runs with little to no restrictions
- Special injection equipment needed to prevent shear
- Low temperature concerns since product is so viscous
- Typically multiple injection points required due to shear and loss of benefits
- Do nothing to help with paraffin/asphaltenes in systems

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Multi-Component Formulation

- Proprietary blend offers significant advantages and performance benefits
- Stable molecules that are very shear stable retain structure for longer lasting benefits in long pipeline systems.
- Ability to dissolve most deposits typically found in crude oil systems
- Polar friction modifiers adhere to pipe surfaces and help form micelles
- Easily injected with typical O&G chemical injection pumps
- No low temperature concerns, easy to inject even in very cold conditions
- Lower backpressure and less turbulence result in improved pipeline pump efficiency and less overall maintenance costs
- Formulation breaks up turbulent flow, removes deposits, modifies wall layers, and provides laminar flow with extended Reynolds numbers

PLO-59 DRA ADVANTAGES

Typical Drag Reducer

- Shears easily, loses effectiveness, frequent injection points
- Viscous, difficult to inject, special equipment required, low temp concerns, hard to transfer
- Does nothing to remove paraffin's or heavy deposits in system
- Minimal improvement to pump efficiency and pipeline cleaning costs

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- Shear Stable, long lasting effect even after pumps, less injection points
- Easy to inject, no special equipment needed, no low temp concerns, easily transferred
- Dissolves paraffin's and heavy hydrocarbon deposits to help reduce back-pressure
- Lower pump maintenance and pipeline cleaning costs (pigging reduced or eliminated with continued use)

RECOMMENDED TREATMENT RATES

Injection rates of PLO-59 DRA vary from 50 ppm to 1500 ppm

- Results show continuous flow improvement with increased injection
- Dependent on the system, deposits, pressures, pipe size, etc.

Typical Long Chain Polymer based Drag Reducers are injected at lower dosage rates (typically 10 ppm to 150 ppm), but they shear easily, lose effectiveness, and require additional injection points downstream of pumps or even elbows. Also, diminishing gains in flow improvement over certain treatment rate. They are often priced higher as well.

PLO-59 DRA TARGET APPLICATIONS

All Crude Oil Pipeline systems (large & small), both land based and offshore.

- Flow restrictions or production limitations
- High Paraffin content or heavy hydrocarbon deposits
- Looking to increase production or reduce maintenance costs
- Currently using a traditional drag reducer currently, lots of advantages
- Pipelines in cold environments, product transfer problems
- Large vessel off-loading terminals and associated pipelines
- Systems with high asphaltene content causing operational issues

DEMONSTRATED RESULTS

Crude Oil Production pipeline from Shale play restricted to 8,000 BOPD and decreasing steadily. Monthly shutdown to pig pipeline.

- Injected PLO-59 DRA at a low concentration, increased treatment rate over a 3 day period and maintained injection.
- Production company saw record production of 9,700 bbls/day and were able to maintain this rate with no significant decreases for 30 days.
- Elected to stop injecting PLO-59 DRA and saw decreased production back to 8,000 bbls/day. Production continued to decline to 6,600 bbls/day over a one month period.
- Began injecting the PLO-59 DRA again and rates climbed back to approximately 9,600 bbls/day. Continued this for 4 months with steady production.
- Did not have to shutdown to pig out the line at all during this 6 month period.

Net gain of ~1,600 bbl/day, ~48,000 bbl/mo(at \$50/bbl) = \$2.4 million/month
Additional cost savings from cessation of pigging operations.

DEMONSTRATED RESULTS

Offshore platform experiencing reduced throughput and increasing pressure in Departing Sales Pipeline by approximately 5,000 BOPD and 400psi over one year period causing constant downtime due to Pressure Safety High trips.

- Injected PLO-59 DRA at low concentration and increased treatment rate over a two week period.
- Platform saw immediate benefits and production steadily increased with lower pipeline pressures - Net result of over ~1000 bbls/day of production and significant reduction in operation issues/downtime. Pumps running less and more efficiently with significantly increased flowrates.

Net gain over 30,000 bbls/month at ~ \$50/bbl (not counting significant Natural Gas increases)

Now looking to open well heads that have been blocked to further increase production

Real, very easy to determine results that more than justify using the product

DEMONSTRATED RESULTS

Offshore platform experiencing reduced throughput and increasing pressure in inner field pipeline. Pipeline pumps were not able to overcome the high pressure at peak production. Producer suspected paraffin deposition along with the pumps being underrated. Producer had 500 BOPD shut in.

- Injected PLO-59 DRA at low concentration (150ppm) and increased treatment rate over a two week period. Optimal rate established at 250ppm.
- Platform saw immediate benefits and production steadily increased with lower pipeline pressures – Net result of over ~500 bbls/day of production and significant reduction in operation issues/downtime. Pumps running less and more efficiently with significantly increased flowrates.

Net gain over 15000 bbls/month at ~ \$50/bbl (not counting significant Natural Gas increases) Production is now maximized using PLO-59 DRA.

Pipeline pressure is maintained well below pump specs.

Real, very easy to determine results that more than justify using the product

DISCHARGE FACTOR (DF) w/ TEMP (DFT)

DF = BOPD/PL Pressure

- DF Increases with:
 - BOPD gains
 - PL Pressure Decreases

DFT = BOPD/(PL Pressure x Motor Temp)

- DFT Increases with:
 - BOPD gains
 - PL Pressure Decreases
 - PL Motor Temperature Reduction

PLO-59 DRA

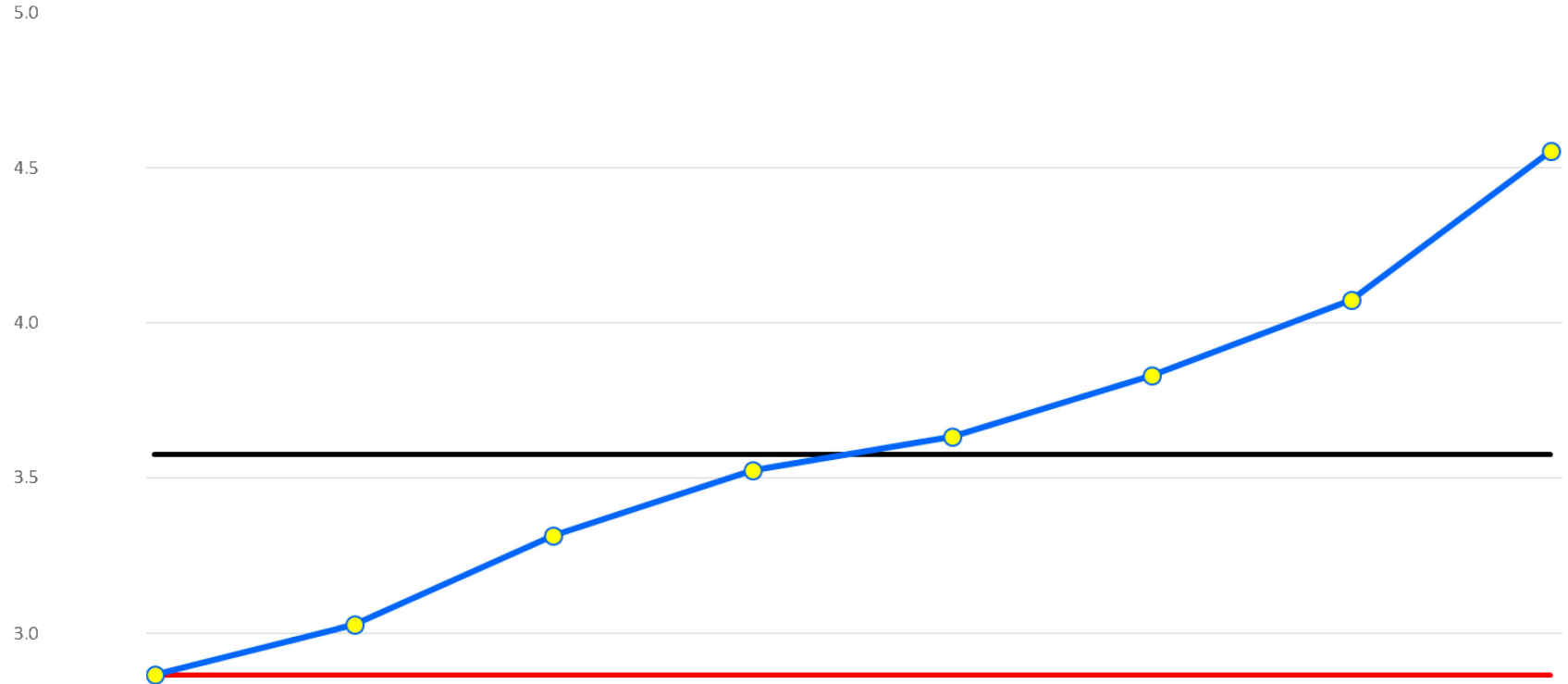
Discharge Factor (DF = BOPD / PL PSI)



	Day 1	Day 5	Day 10	Day 15	Day 20	Day 25	Day 30	Day 35
DF (Beginning)	2.73504	2.73504	2.73504	2.73504	2.73504	2.73504	2.73504	2.73504
DF (Average)	3.24205	3.24205	3.24205	3.24205	3.24205	3.24205	3.24205	3.24205
DF	2.73504	2.87166	3.05286	3.22668	3.30602	3.44376	3.56155	3.78928

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Discharge Factor with Motor Temp (DFT = BOPD / (PL PSI x Motor Temp))



	Day 1	Day 5	Day 10	Day 15	Day 20	Day 25	Day 30	Day 35
DFT (Beginning)	2.86692	2.86692	2.86692	2.86692	2.86692	2.86692	2.86692	2.86692
DFT (Average)	3.57596	3.57596	3.57596	3.57596	3.57596	3.57596	3.57596	3.57596
DFT	2.86692	3.02918	3.31472	3.52642	3.63298	3.83065	4.07499	4.55443

OPTIONAL CHEMISTRIES

- Balanced Drag Reducer and Paraffin/ Asphaltene Chemistry.
- Increased Drag Reducer component and Reduced Paraffin/ Asphaltene component.
- Umbilical Approved Paraffin/Asphaltene remediation Chemistry (20,000psi at 300 deg F)
- Premier Paraffin Solvent available for line soaks, vessel/ equipment paraffin removal.

SUMMARY

- Easily definable and measurable KPIs: reduced pressure, increased throughput.
- Economical solutions: Gains far greater than costs.
- Unlimited potential with a product that differentiates from the conventional products.
- All systems are different, but due to multi-tiered approach, improvements expected in almost all systems.
- Continuous injection results in consistent improvement.
- Technical support available to custom tailor solutions to meet customer goals.
- Contact us with any questions.



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