CESTOIL CHEMICAL INC

Expanding Possibilities

Pipeline & Terminal Solutions > Drag Reducers

Cestoil DRA CDR2081

Lifts Crude Throughput 21.7% on a 64-km Port-to-Refinery Pipeline at 14 ppm — Two Pumps Now Out-Deliver Three

Reading the results: Daily figures are reported capacity estimates, not 24-hour totals.
Hourly-flow and start-to-full pressure comparisons use different baselines.
Power, cost savings and downstream effects were not measured in this trial summary.

Key results

+21.7%
daily throughput at 14 ppm (30,000 → 36,500 t/d), two pumps, same valve

−0.46 MPa
outlet pressure (3.96 → 3.50 MPa) while flow rose 20%

2 > 3
two pumps + CDR2081 beat three pumps without (36.5 vs 33 kt/d)

Benefits

- **Beats the guarantee** — 21.7% at 14 ppm vs. contractual ≥ 15% at ≤ 15 ppm
- **Out-performs the incumbent** — 1.0 points more gain at 1 ppm less
- **Same-day response** — line filled in under 9 h; flow rose from the first hour
- **Metal-free, odourless** — no downstream effect; operators' preferred product

Typical properties

Density (20 °C), kg/L	0.88–0.92
Viscosity (20 °C), cP	> 100
Flash point (closed), °C	> 60
Pour point, °C	< 5

Challenge

A **63.8-km, DN500 crude pipeline** carries imported crude from a coastal terminal to one of China's largest refineries, in South China. Laid in the mid-1970s for 10 Mt/a, it now feeds a site whose primary capacity has grown past 20 Mt/a, and every tonne it cannot move has to come by a longer route. With two of its four mainline pumps running the line delivers about **30,000 t/d at 4.5 MPa**; starting a third pump adds only 3,000 t/d and pushes the outlet to the **5.0 MPa design limit**. The operator wanted more throughput without a new pump, a new line or a higher operating pressure — and it already ran a domestic drag reducer, so the alternative had to prove itself against a known benchmark.

Analysis

In turbulent crude flow most of the pressure drop is spent in near-wall eddies. **CDR2081**, a high-molecular-weight polyolefin drag reducer, damps those eddies at ppm dosage, so the same pumps push more oil at the same or lower pressure. Cestoil and the pipeline operator wrote the test into a technical agreement: two-pump operation, dose ≤ 15 ppm, throughput gain ≥ 15% measured at the pump-outlet flowmeter once the line was full of treated oil, with the product guaranteed metal-free and without effect on downstream units. The trial would run on Oman crude (866 kg/m³, 8.8 mm²/s at 50 °C, 34 °C in the line), with the pump-outlet valve **held at 60%** so that any change in flow could only come from the additive.

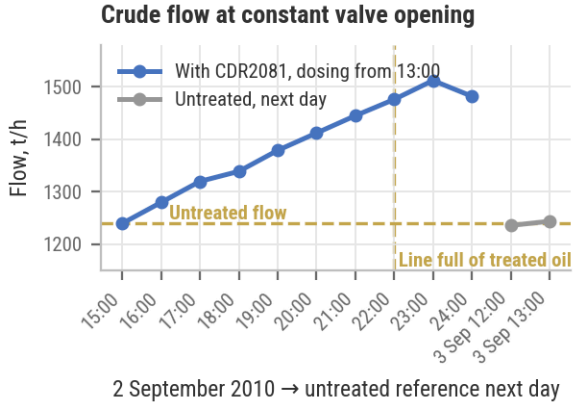

Figure 1: Pump-outlet flow with the outlet valve fixed at 60%. CDR2081 injection began at 13:00; the additive reached the refinery end at about 21:30 and flow settled at 1,476–1,512 t/h. Dosing stopped at 24:00; by the next day, with the line flushed, flow was back to 1,236–1,244 t/h. Operator's log.

Source: Operator's trial summary and technical agreement, 63.8-km crude pipeline, South China, September 2010; pipeline background from public sources. Trial figures as reported by the operator. · CS-PIPE-CDR2081-2026B · v1.1 · 2026-09

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Solution

A first attempt in August was cut short by an injection-pump seal problem; Cestoil returned with the pump repaired and the trial ran on **2 September 2010**. Injection started at 13:00 into a baseline flow of 1,300 t/h; cumulative injection, hourly flow, outlet pressure and valve opening were logged every hour. From the line's 13,600 m³ volume the operator calculated the additive reaching the refinery at about 21:30 and counted treated flow and dose from 22:00 — **21.3 kg/h, 14 ppm**. Tank room at the refinery end limited the run to eleven hours; dosing stopped at 24:00 and the line was read again the next day, untreated, at the same valve opening.

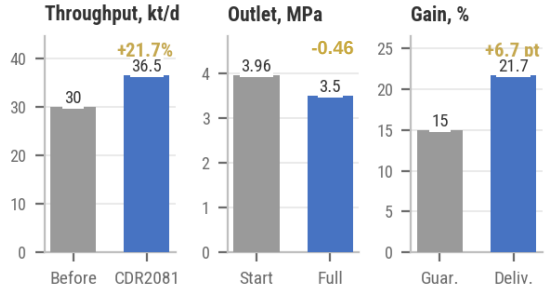

Figure 2: Daily throughput and station outlet pressure before and at full effect, and the throughput gain delivered against the ≥ 15% contractual guarantee. Operator's report and technical agreement.

Result*

- **Flow up 20–22% at the same valve opening.** Once the line was full, treated flow held at 1,476–1,512 t/h against 1,236–1,244 t/h measured the next day with the additive flushed out (Figure 1). On a daily basis the operator puts it at **30,000 → 36,500 t/d, +21.7%** (up to 23.2% at the 14 ppm steady state).
- **Guarantee exceeded.** The agreement required ≥ 15% at ≤ 15 ppm; CDR2081 delivered 21.7% at 14 ppm. The incumbent domestic DRA gives 20.7% at 15 ppm — 1.0 points less at a higher dose.
- **Pressure down while flow went up.** Outlet pressure fell from 3.96 MPa at the start to 3.48–3.52 MPa at full effect with the outlet valve untouched at 60% — friction, not pump work, had changed (Figure 2).
- **Two pumps out-deliver three.** Two pumps with CDR2081 moved 36,500 t/d at ≤ 4.05 MPa; three pumps without it manage 33,000 t/d at the 5.0 MPa limit — the third pump and a megapascal of pressure margin come free.
- **Operators' choice.** The incumbent DRA has an irritating odour; CDR2081 has none, and the operators asked to keep it. The operator's report concludes that CDR2081 "effectively lowers pipeline friction and substantially raises the line's delivery capacity without changing existing pumps or pipeline".

Value delivered

Daily throughput, two pumps	30,000 → 36,500 t/d (+21.7%) at 14 ppm
Contract guarantee vs. delivered	≥ 15% at ≤ 15 ppm required — 21.7% at 14 ppm delivered
Pressure and pump duty	Outlet 3.96 → 3.50 MPa; third pump not needed for > 33,000 t/d
Capacity unlocked (derived, 330 d/yr)	≈ 2.1 Mt/a more deliverable on the existing line

About Cestoil DRA CDR2081

Cestoil CDR2081 is a high-molecular-weight polyolefin drag reducer for crude and refined-product pipelines. Injected at 5–30 ppm, it suppresses the turbulent eddies that consume pumping energy, raising throughput at constant pressure or cutting pressure and power at constant throughput. It is metal-free and odourless, and shears out in downstream processing, leaving crude quality and refinery units untouched.

Proven in crude and product pipelines from 160-km trunk lines to short port-to-refinery links, with phased dosing trials that find the lowest dose for the capacity needed. Cestoil supplies injection skids and site support for every trial.

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Discuss a similar application

Send us your line profile, pump curves and the flow–pressure log of a typical day — we will size the dose, the injection skid and a one-day proof test like this one.

About Cestoil Chemical

Cestoil Chemical is a global provider of specialty chemicals — fuel additives, process additives and advanced materials — headquartered in Ontario, Canada, with operations in North America and Asia. For over 20 years we have combined disruptive technology with hands-on technical service to deliver bottom-line results for refiners, petrochemical producers and pipeline operators.