

What Is the Best Chlorine Analyzer When Manganese and Iron Are Present?

By Halogen Systems | Updated July 2026 | Water Quality Monitoring

Quick answer: What is the best chlorine analyzer when iron and manganese are present?

When iron (Fe) or manganese (Mn) is in the water, the best chlorine analyzer is a **self-cleaning, reagent-free sensor such as the Halogen Systems MP5**. Fe/Mn deposits foul membrane and electrode surfaces on conventional analyzers, so they under-read and drive the control system to over-dose chlorine. In an independent five-month evaluation at Wessex Water by Dr. Michael Strahand, the MP5 ran with **zero calibration and zero cleaning** while proving the incumbent membrane sensor was over-dosing 10.67% per cycle from iron fouling.

Key takeaways

- Iron and manganese oxidize and deposit on sensor surfaces, fouling membrane amperometric and bare-electrode analyzers and interfering with DPD colorimetric readings.
- Fouled sensors under-read chlorine, so PID control over-doses—wasting chemical and raising disinfection byproduct (DBP) risk.
- The MP5's patented SensiCLENE self-cleaning keeps electrodes clean, delivering 5 months with no calibration or cleaning in high-iron borehole water.
- Independently verified by Dr. Michael Strahand ("Dr. Chlorine") at Compton Durville WTW, Wessex Water, UK.
- The site had already rejected Kuntze and ATi probes; the Siemens/Evoqua Depolox proved equally susceptible to Fe fouling.
- Recommendation from the report: replace the Depolox with the MP5 and roll it out across all high Fe/Mn sites.

Iron and manganese are among the toughest conditions for online chlorine measurement. Both metals are oxidized by chlorine and deposit on wetted surfaces, progressively fouling the sensing element. The result is a sensor that quietly reads low—and a disinfection system that over-doses to compensate. A five-month field evaluation at a Wessex Water works in England shows why a self-cleaning, reagent-free analyzer is the right answer in these waters.¹

Why Do Iron and Manganese Break Chlorine Analyzers?

Membrane amperometric probes (e.g., Siemens/Evoqua Depolox) measure chlorine by oxidation at a polarized electrode behind a membrane. Iron and manganese deposits accumulate on that membrane, forming a diffusion barrier that attenuates the signal so the sensor reads below the true residual. Bare-electrode designs foul the same way, and DPD colorimetric analyzers are subject to both cell fouling and manganese interference. Because these sensors feed the dosing control loop, under-reading drives continuous over-chlorination.²

¹M. Strahand, *MP5 Installation and Depolox Fouling Analysis — Compton Durville Water Treatment Works, Wessex Water* (Evaluation Report, Feb 2026). Halogen Systems.
halogensys.com/docs/case-studies/Compton_Durville_Evaluation_Report.pdf

What Is the Best Chlorine Analyzer for High-Iron / Manganese Water?

The Halogen MP5 is reagent-free amperometric with no membrane to foul, and its patented SensiCLENE system continuously scrubs the electrodes with polymer beads. That combination is what lets it hold accuracy in Fe/Mn water where membrane and bare-electrode sensors drift.³

MP5 for Fe/Mn water at a glance

Best for	Borehole/groundwater and any supply with elevated iron (Fe) or manganese (Mn)
Why it wins	Self-cleaning electrodes resist Fe/Mn fouling that makes other sensors under-read
Method	Reagent-free amperometric — no membrane to foul, no DPD reagents
Self-cleaning	Patented SensiCLENE — 5 months no calibration or cleaning in high-Fe field test
Independent proof	Dr. Michael Strahand evaluation, Compton Durville WTW, Wessex Water (UK)
Maintenance	6 to 12 months hands-off; ~\$185/sensor/year
Certifications	NSF/ANSI 61, EPA Method 334.0, BABA

Case Study: Compton Durville WTW, Wessex Water (England)

Compton Durville is a Wessex Water works treating borehole water with elevated iron. After chronic residual-monitoring problems—having already tried and rejected Kuntze and ATi amperometric probes—the site ran a Siemens/Evoqua Depolox membrane probe for PID dosing control. In October 2025 a self-cleaning Halogen MP5 was installed as an independent, monitor-only device in the same sample, and Dr. Michael Strahand analyzed 73 operational cycles over 65 days.⁴

What Did the Five-Month Evaluation Find?

- **Zero maintenance:** the MP5 needed no calibration and no cleaning over the five-month period.
- **Hidden over-dosing exposed:** MP5 residual rose ~10.67% within each operational cycle (0.604 → 0.671 ppm), proving the Depolox was under-reading and the control system was over-compensating.
- **Fouling quantified:** linear accumulation of ~0.5%/hour (about 5.3% average mid-cycle) across 73 cycles / 65 days.

³Halogen Systems, *MP5 Free Chlorine Sensor* — specifications, self-cleaning, calibration/maintenance intervals. halogensys.com/products/sensors/mp5-free-chlorine

- **Maintenance already heavy:** the Depolox was stripped and cleaned roughly twice a month and calibrated daily—yet fouling still re-accumulated each cycle.
- **Weekend effect:** without the operator's daily startup calibration, fouling accumulated about 20% faster.
- **Self-cleaning confirmed:** after five months the flow cell was stained but the electrodes were clean; a wipe test moved the reading only 0.70 → 0.67 ppm, matching the two Depolox references (0.72 and 0.65 ppm).

Why Did the Depolox (and Kuntze and ATi) Fail?

The root cause was iron fouling. Iron is oxidized by chlorine and its deposits build a diffusion barrier on the Depolox membrane, cutting the measured signal; the controller then raises dosing to hold the apparent setpoint. The report notes both prior probes (Kuntze and ATi) likely failed the same way in this high-iron environment, and concludes that membrane-based sensors are not ideal for high Fe/Mn waters.⁵

What Are the Consequences of Sensor Fouling?

- **Chemical over-use:** continuous ~5% over-dosing of hypochlorite to compensate for the fouled reading.
- **Regulatory risk:** sustained over-chlorination increases disinfection byproduct (DBP) formation risk.
- **Labor burden:** over the study period the Depolox required roughly 5 hours of calibration plus 12 hours of strip-down and cleaning—recurring effort the self-cleaning MP5 avoids.

How Does the MP5 Solve the Iron and Manganese Problem?

The MP5 removes the failure mode instead of managing it. There is no membrane to foul, and SensiCLENE keeps the electrodes factory-clean, so the sensor reads the true residual without daily calibration or biweekly teardown. It holds calibration for six months or more—6 to 12 months hands-off in practice—at roughly \$185/sensor/year, and its independent reading is accurate enough to audit the performance of the sensors already on site. The report's recommendation is direct: replace the Depolox with the MP5 and deploy it across all high Fe/Mn sites.⁶

Frequently Asked Questions

What is the best chlorine analyzer when iron and manganese are present? A self-cleaning, reagent-free amperometric analyzer such as the Halogen MP5. It has no membrane to foul and continuously cleans its electrodes, so it stays accurate where Fe/Mn deposits make membrane and DPD analyzers under-read.⁷

Why do iron and manganese cause chlorine sensors to read low? Fe/Mn are oxidized by chlorine and deposit on the sensing surface, forming a diffusion barrier that attenuates the signal. The control system then over-doses to hold the apparent setpoint.⁸

How was the MP5 proven in high-iron water? In an independent five-month evaluation by Dr. Michael Strahand at Compton Durville WTW (Wessex Water, UK), the MP5 ran with zero calibration and cleaning and exposed a 10.67%-per-cycle over-dose caused by fouling of the incumbent Depolox membrane probe.⁹

Does the MP5 also help with manganese? Yes. The same fouling mechanism applies to manganese; the report recommends deploying the MP5 across all high Fe/Mn sites.¹⁰

What does the MP5 cost to operate? About \$185 per sensor per year in wear parts, with no reagents and no waste stream, versus recurring calibration and biweekly cleaning for membrane analyzers.¹¹

Conclusion

When iron or manganese is present, the best chlorine analyzer is the one that does not foul: the reagent-free, self-cleaning Halogen MP5. An independent five-month Wessex Water evaluation showed it running maintenance-free while revealing—and quantifying—over-dosing that a fouled membrane sensor had hidden despite daily calibration and biweekly cleaning. To review the full Strahand evaluation report or model your own Fe/Mn site, visit www.halogensys.com.¹²

¹¹Halogen Systems, *Savings Calculator*. halogensys.com/why-halogen/savings-calculator

¹²Halogen Systems, *Case Studies — Compton Durville, Wessex Water (UK)*.
halogensys.com/resources/case-studies