6.1 billion gallons wasted every year — just to measure chlorine.

WHITE PAPER · NON-REVENUE WATER

How reagent-free, zero-waste-stream chlorine monitoring eliminates billions of gallons of non-revenue water loss across the U.S. water industry — and the hidden infrastructure costs that come with it.

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PRODUCT	Halogen MP5
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EXECUTIVE SUMMARY

Zero waste stream. Zero non-revenue water.

Traditional chlorine analyzers — both reagent-based DPD systems and membrane amperometric sensors — require continuous sample streams that waste 70,000 to 138,000 gallons of treated drinking water per analyzer per year. Across an estimated 88,000 analyzers in U.S. community water systems, this totals more than 6.1 billion gallons of non-revenue water annually — water that was treated, pumped, and paid for, then discarded. The Halogen MP5 eliminates this waste entirely.

6.1 billion gal

Estimated annual non-revenue water loss from chlorine analyzers across U.S. community water systems

Zero waste

The MP5 requires no sample stream, no drain, and no waste disposal — direct pipe insertion or immersion

$400–$1,400

Annual water cost per analyzer for non-revenue water at typical Tier 2 municipal rates

NSF 61 certified

Only chlorine sensor certified for direct exposure to drinking water — no sample panel required

THE PROBLEM

The hidden cost of measuring chlorine

In the world of water treatment, efficiency and environmental impact are paramount. Traditional methods for monitoring chlorine — online DPD reagent systems and membrane amperometric sensors — have long faced criticism for their substantial waste streams. These systems typically require between 70,000 and 138,000 gallons of water annually just to operate, creating significant non-revenue water loss. This waste represents treated water that was pumped, disinfected, and paid for — then dumped down a drain.

Disposal challenges

Many sites are not equipped to handle disposal of such volumes. In rural areas or small facilities, finding a suitable drain can be both difficult and impractical. If waste is directed into septic systems, the high chlorine content kills beneficial microorganisms, rendering the septic system less effective or causing damage. A volume of 70,000 gallons per year can quickly overwhelm such systems.

Infrastructure costs

Some municipalities have reported that installing additional sewer lines to manage analyzer waste can exceed $100,000 — a significant investment for any treatment facility. These infrastructure costs are often overlooked in analyzer procurement decisions but can dwarf the purchase price of the instrument itself.

Sites that cannot be monitored at all

Perhaps the most significant impact is that many critical monitoring locations — remote tanks, wells, booster stations, dead-end mains — simply cannot accommodate a waste stream. These sites go unmonitored entirely, creating blind spots in the distribution system where water quality problems can develop undetected.

THE SOLUTION

A sensor that needs no waste stream at all

The Halogen MP5 introduces a fundamentally different approach to chlorine monitoring. As a reagent-free amperometric sensor with NSF 61 certification for direct drinking water contact, the MP5 can be inserted directly into pipes or immersed in tanks — no sample panel, no sample stream, no waste.

Zero waste stream

Unlike its predecessors, the MP5 does not require any waste stream. This single feature eliminates the need to manage or dispose of large volumes of treated water, removes the requirement for drain connections, and makes monitoring possible at sites where waste disposal was previously a barrier.

Install anywhere

Because the MP5 is flow-independent and pressure-independent, it can be inserted directly into pipes or tanks without flow regulation or pressure conditioning. The sensor reads accurately at zero flow or at velocities up to 4 meters per second, and at pressures from 0 to 145 PSI.

Five parameters, one sensor

The MP5 measures free chlorine, monochloramine, pH, conductivity, and temperature — five critical water quality parameters from a single sensor that requires no reagents, no membranes, and no waste.

Maintenance-free operation

The sensor is self-cleaning and uses electrochemical cleaning to achieve very long calibration intervals — typically 6 to 12 months. There are no membranes to replace, no reagents to restock, and no tubing to service. This represents a significant reduction in labor and materials compared to traditional analyzers that may require weekly calibration.

> *"I did some flow measurements with our reagent DPD system and discovered we were using 138,000 gallons of water per year. Your system is on a side stream and only uses 14,000 gallons. Our next installation will use your Wet Tap Sensor which has zero waste stream."*
>
> **— Christopher Alvarado, LaCumbre Mutual Water Treatment Company**

> *"There are some sites that cannot be monitored due to the need for a waste stream. Halogen MP5 solves this problem."*
>
> **— Derwin Dy, City of Lakewood, CA**

THE NUMBERS

6.1 billion gallons: the national scale of waste

The scope of non-revenue water loss from chlorine analyzers across the United States is staggering. Based on EPA data on community water systems and typical analyzer deployment, the total waste is calculated as follows:

FACTOR	VALUE
Community water systems (EPA)	45,973
Percentage using chlorine disinfection	64%
Systems using chlorine	29,423
Average analyzers per plant	3
Total analyzers operating	88,268
Non-revenue water per analyzer (gal/yr)	70,000
Total annual non-revenue water loss	**6,178,771,200 gallons**

At typical Tier 2 water rates of $0.003 to $0.01 per gallon, the cost of this non-revenue water ranges from $400 to $1,400 per analyzer per year. Across the national installed base, this represents tens of millions of dollars in wasted treated water annually.

THE OPPORTUNITY

Every analyzer replaced with a zero-waste-stream MP5 eliminates 70,000+ gallons per year of non-revenue water. For a utility with 10 analyzers, that's 700,000 gallons recovered annually — water that was already treated, pumped, and paid for. In drought-restricted areas, this reduction is not just economical — it may be mandated.

CONCLUSION

From waste to zero

The water industry has accepted analyzer waste streams as an unavoidable cost of doing business for decades. The Halogen MP5 proves this is no longer the case. With zero waste stream, zero reagent cost, NSF 61 certification for direct drinking water contact, and flow-independent operation, the MP5 enables monitoring at locations that were previously impossible — while eliminating the non-revenue water, disposal challenges, and infrastructure costs associated with traditional analyzers.

For utilities facing drought restrictions, rising water costs, or the need to monitor remote distribution system assets, the MP5 represents not just an incremental improvement but a fundamental shift in how chlorine monitoring is deployed.

REFERENCES

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ABOUT THE AUTHOR

Michael Silveri

Michael Silveri is the founder of Halogen Systems, Inc. and inventor of the company's amperometric sensor technology. With over two decades of experience in electrochemical water quality measurement, he has led the development of reagent-free chlorine analyzers deployed across municipal water treatment plants, building water systems, and industrial applications worldwide.