

PILOT STUDY • SURFACE-WATER TREATMENT

Goleta Water District

Full-scale plant evaluation of Jenfitch JC 9450 as a pre-oxidant alternative to sodium hypochlorite at the Corona Del Mar Water Treatment Plant — targeting reductions in total organic carbon and trihalomethane (THM) formation from the Lake Cachuma surface supply.

95%

TTHM REDUCTION AT 5 MG/L
JC 9450 (JAR TEST)

21%

LOWER 7-DAY TTHM FORMATION
POTENTIAL

5 mg/L

OPTIMAL JC 9450 PRE-OXIDANT
DOSE

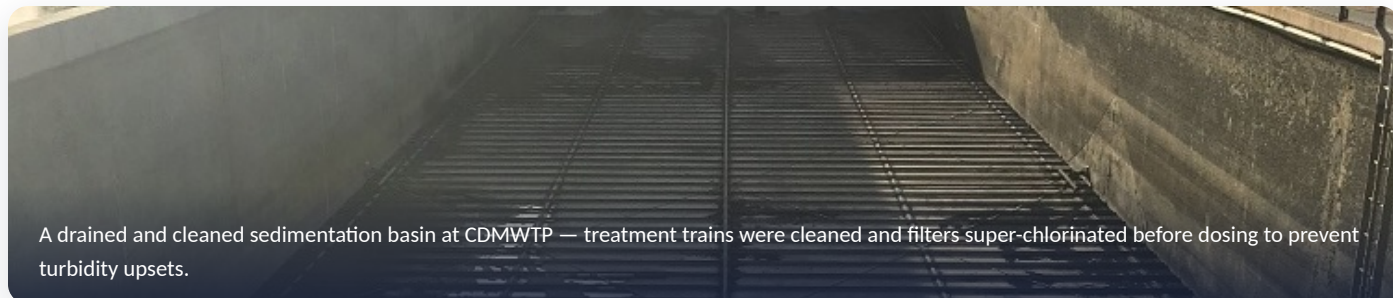
— Objective

Validate, at full plant scale, the substantial THM reductions that Goleta Water District (GWD) measured in October 2017 jar testing — gradually replacing sodium hypochlorite with a low dose of JC 9450 as the pre-oxidant while sodium hypochlorite is retained only as the final disinfectant.

Six years of drought and two major wildfires in the Lake Cachuma watershed have driven total organic carbon (TOC) up roughly 40% to a current level of about 5.4 mg/L, with further increases expected. Because chlorine pre-oxidation reacts with this organic matter to form THMs, GWD sought a treatment that lowers THM formation while the District remains within the 80 µg/L locational running annual average (LRAA) total-trihalomethane (TTHM) standard.

— Pilot Setup

JC 9450 — an NSF/ANSI Standard 61-approved oxidant manufactured by Jenfitch, LLC — was fed in place of sodium hypochlorite at Flash Mix 2 on a single isolated treatment train operating at approximately 3 MGD. The preliminary full-scale test was scheduled to run up to two weeks (January 2018), with an option to extend to a comprehensive three-month evaluation on surface water.



A drained and cleaned sedimentation basin at CDMWTP — treatment trains were cleaned and filters super-chlorinated before dosing to prevent turbidity upsets.

— Key Results — Jar Testing (October 25, 2017)

GWD simulated CDMWTP treatment on Lake Cachuma influent, dosing JC 9450 in place of sodium hypochlorite as the oxidant. Of five doses tested, **5 mg/L** gave the greatest reduction in both clearwell TTHM and the 168-hour (7-day) TTHM formation potential that simulates the oldest water age in the distribution system.

DOSE (MG/L)	TOC (MG C/L)	TOTAL FE (MG/L)	TOTAL MN (MG/L)	TTHM (MG/L)	MAX TTHM FORMATION, 168 HR (MG/L)
Control (0)	4.7	<0.02	0.014	45	140
JC 9450 — 5	4.6	<0.02	0.014	2.2 -95%	110 -21%
JC 9450 — 10	4.5	<0.02	0.013	6.2	130
JC 9450 — 15	4.5	<0.02	0.013	12	140
JC 9450 — 20	4.5	<0.02	0.012	26	140
JC 9450 — 25	4.4	<0.02	0.011	41	150

Table 1 — without powdered activated carbon (PAC). All samples also dosed with 40 mg/L alum, 1 mg/L polymer and 2.8 mg/L sodium hypochlorite. Removal rate declined as dose increased above 5 mg/L.

DOSE (MG/L)	TOC (MG C/L)	TOTAL FE (MG/L)	TOTAL MN (MG/L)	TTHM (MG/L)	MAX TTHM FORMATION, 168 HR (MG/L)
Control (0)	4.8	<0.02	0.006	31	170
JC 9450 — 5	4.7	<0.02	0.014	2.1 -93%	120 -50 µg/L
JC 9450 — 10	4.7	<0.02	0.015	5.3	120
JC 9450 — 15	4.6	0.057	0.016	7.2	120
JC 9450 — 25	4.6	<0.02	0.011	15	130

Table 2 — using 20 mg/L PAC (plus 40 mg/L alum, 1 mg/L polymer, 2.8 mg/L sodium hypochlorite). At 5 mg/L, maximum TTHM formation fell 50 µg/L below the control. Analyses by Eurofins Eaton Analytical (ORELAP 4034).

OXIDANT PERFORMANCE

JC 9450 also held total iron below 0.02 mg/L and manganese at trace levels — direct evidence of effective oxidation of the reduced metals that drive taste, odor and color.

— How the Pilot Was Run

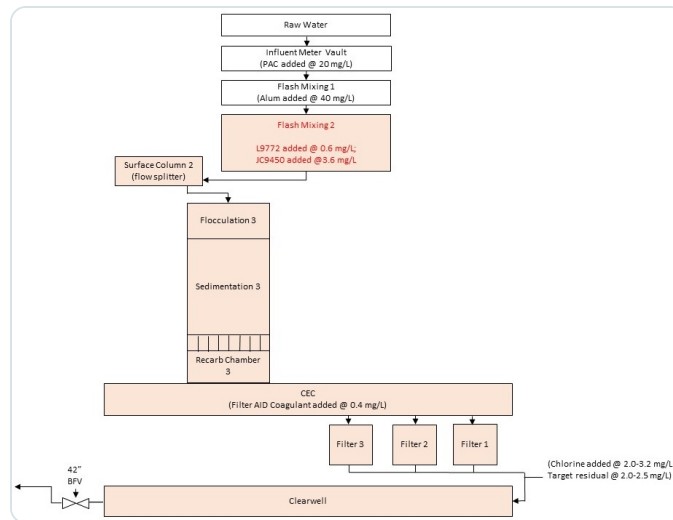
JC 9450 substitutes for sodium hypochlorite at **Flash Mix 2** on one isolated treatment train (one flocculation basin, one sedimentation basin, three conditioned filters). The other three trains stayed on chlorine and in standby, and groundwater wells remained online — so operators could revert to chlorine within minutes if needed.

Gradual changeover. Over two days the chlorine dose was cut in 50% steps while JC 9450 was raised to the full 5 mg/L target; at test end the sequence was reversed hour-by-hour back to 100% chlorine.

ORP-based control. Because JC 9450 leaves no measurable residual, oxidation-reduction potential (ORP) is the primary control signal. A mobile ORP monitor tied to plant SCADA trended ORP in real time against historical baselines, alongside pH, dissolved oxygen and UVA.

Filter protection. Learning from the Stenner (San Luis Obispo) plant — where the only reported adverse effect was a filter-turbidity rise — GWD cleaned the basins and super-chlorinated the filters in advance to renew adsorption capacity.

PILOT PARAMETERS	
Plant	Corona Del Mar WTP
Source	Lake Cachuma (surface)
Dose point	Flash Mix 2
JC 9450 dose	5 mg/L
Flow rate	~3 MGD (up to 6)
Duration	Up to 2 weeks
Control signal	ORP (no residual)
Baseline TOC	~5.4 mg/L
THM standard	80 µg/L LRAA



Proposed single-train configuration: JC 9450 fed at Flash Mixing 2 in place of chlorine, with chlorine retained only as the final disinfectant to the clearwell.

— Conclusions & Recommendations

Jar testing established that a low 5 mg/L dose of JC 9450, used as the pre-oxidant in place of sodium hypochlorite, cuts clearwell TTHM by 95% and lowers seven-day TTHM formation potential by 21% — while simultaneously oxidizing iron and manganese to trace levels.

On the strength of these results, GWD recommended a limited-duration, low-throughput full-scale plant test to validate the jar-test findings and to characterize impacts on filter turbidity, algae and pathogen removal, corrosivity and other disinfection by-products. If the two-week test shows promising results with no adverse impacts, the District plans a longer full-scale evaluation of up to three months, primarily on surface water, to confirm JC 9450 as a long-term THM-control solution.

BOTTOM LINE

A low-dose pre-oxidant swap — no new capital process — delivered up to a 95% TTHM reduction in jar testing, giving Goleta a promising, reversible path to protect water quality as watershed organic loading rises.

— Monitoring & Safety Controls

A ten-point sampling plan covered plant influent through clearwell effluent, with daily field and Eurofins laboratory analysis of TTHM, TOC/DOC, UVA, turbidity, ORP, iron, manganese and disinfection by-products. Continuous SCADA monitoring tracked filter effluent turbidity, head loss and run time throughout the test.

Customer safety governed the design: certified lab confirmation of compliance, instant reversion to chlorine, isolated standby trains, and groundwater backup ensured supply and quality were never at risk.

APPROVALS & BASIS

Certification	NSF/ANSI Std 61
Lab	Eurofins Eaton (ORELAP 4034)
Prior use	Stenner & Martinez WTPs
Regulator	CA SWRCB DDW notified

NSF/ANSI Standard 61 Approved

Drinking-Water Pre-Oxidant

No Measurable Residual

Reversible to Chlorine

DISCUSS A PILOT FOR YOUR PLANT

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This is an executive summary of a full 115-page pilot-study report (with complete laboratory data, SDS, NSF listing and monitoring plan) available on request.