

BWT CS-3015 vs. STA-BR-EX®

August 2012



For You and Planet Blue.



BWT CS-3015 Biocide vs. STA-BR-EX

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Summary

- BWT CS-3015 biocide has **biofilm** claim on the EPA-registered label!
- BWT CS-3015 biocide contains higher level of active halogen; therefore, less product consumption in the field is expected.
 - According to the product label, BWT CS-3015 biocide contains ~ 7% higher active halogen.
 - An average consumption rate ~ 10% lower of BWT CS-3015 Vs STA-BR-EX has been reported by some customers.
- BWT CS-3015 biocide is more stable than STA-BR-EX → Longer shelf life
- Both products are based on stabilized bromine chemistry. Laboratory and field data indicate that when dosed to the same total halogen residual, the biocidal performance of the two products are expected to be similar.
- When dose to the same total halogen residual, the halogen decay profile of the two products are expected to be similar.

BWT CS-3015 Biocide vs. STA-BR-EX

	BWT CS-3015 Biocide	STA-BR-EX
Starting active ingredients	BrCl	NaBr and NaOCl
% Active expressed as Cl₂	~ 7	~ 6.4
% Active expressed as Br₂	~15	~ 14

Based on label information, BWT CS-3015 biocide contains ~ 7% higher active halogen than STA-BR-EX

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Stability Study Protocol

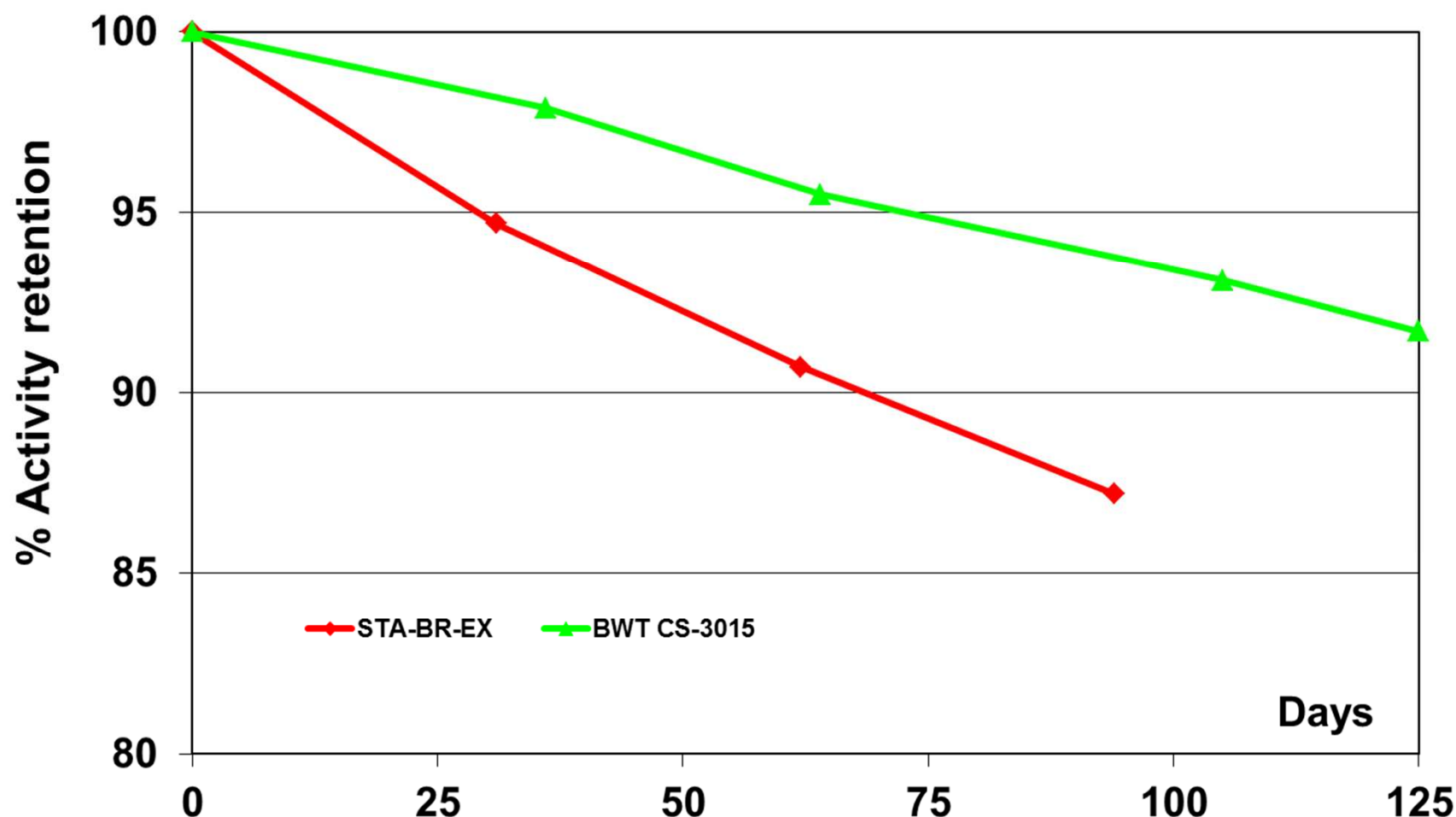
- Analyze sample for halogen activity using KI/thiosulfate method to determine initial activity.
- Transfer a portion of the sample into a 4- or 8-oz high density polyethylene bottle and close the cap.
- Place the bottle in an oven, set for the appropriate test temperature.
- Periodically, remove the bottle from the oven, allow it to cool to room temperature in a dark place. The sample should not be exposed to light during storage.
- Analyze by the KI/thiosulfate method to determine % halogen activity.
- Determine activity retention.

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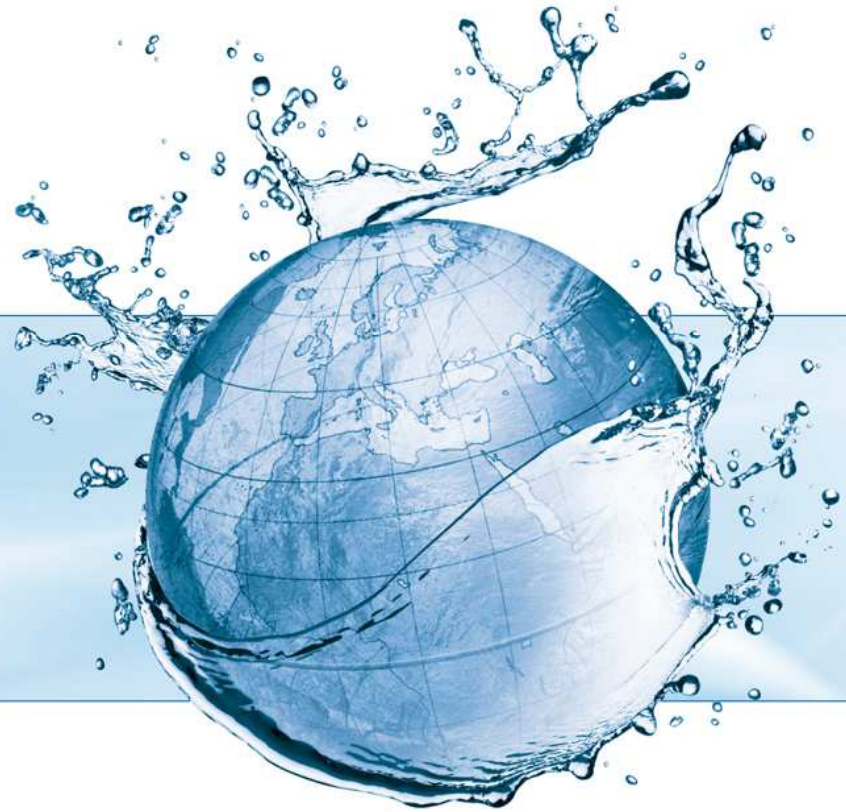


Stability Study at 40 °C



BWT CS-3015 biocide is more stable than STA-BR-EX

Field Study at the Albemarle Technical Center Cooling Tower



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Field Study at the ATC Cooling Tower

Study Protocol

- Dose the biocide three times per week (M, W, F) to achieve the target halogen residual
 - 1 hr pre-bleed
 - 1 hr lock-out (includes the biocide feed time)
- Monitor:
 - Residuals
 - Biocidal efficacy using 3M PetriFilm™ (Incubate at 35 °C for 5 – 7 days)

The average consumption rate of BWT CS-3015 biocide was ~ 10% lower than that of STA-BR-EX

Cooling Tower Water Chemistry

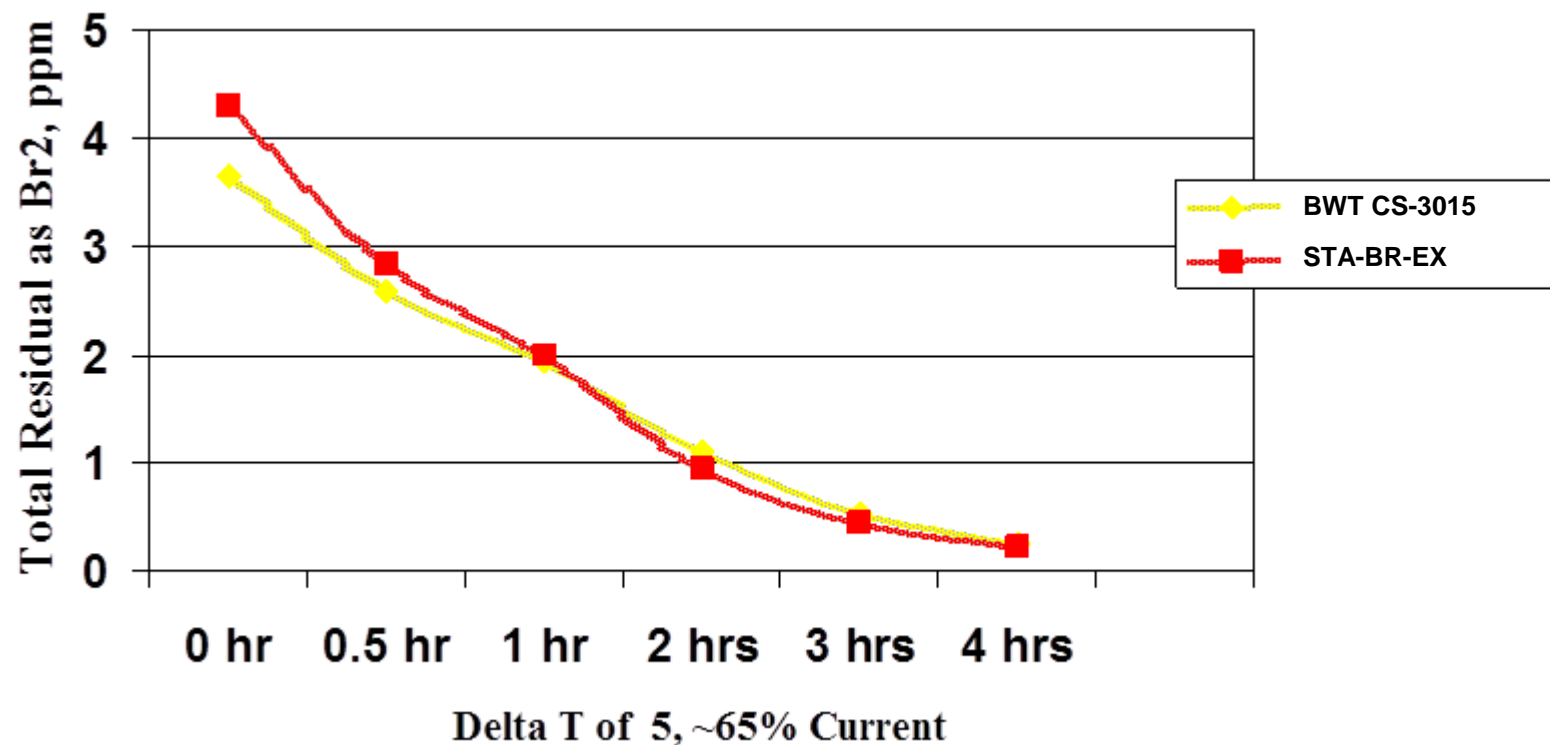
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	Tower Water	Make-up Water
Alkalinity, ppm	450 - 570	130 - 170
Total hardness, ppm	< 20	< 10
Conductivity, μS/cm	1100 - 1400	300 - 350
pH	9.1 – 9.3	8.9 - 9.1
Silica, ppm	75 –110	25 –30
Mo/TT	1.3 – 2.8/ 0.2 – 0.8	

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Total Halogen Decay Profile



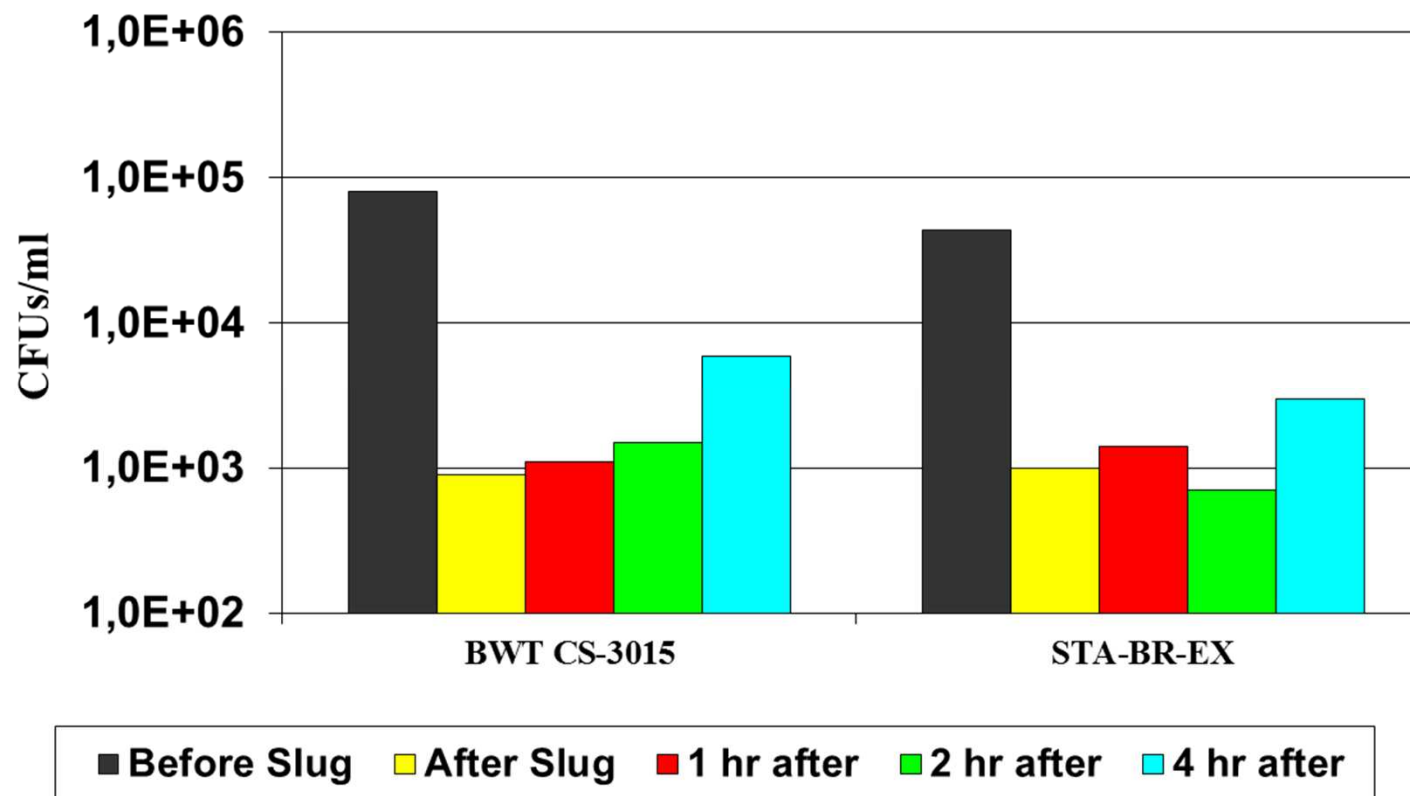
Similar Halogen Residual Decay Profile

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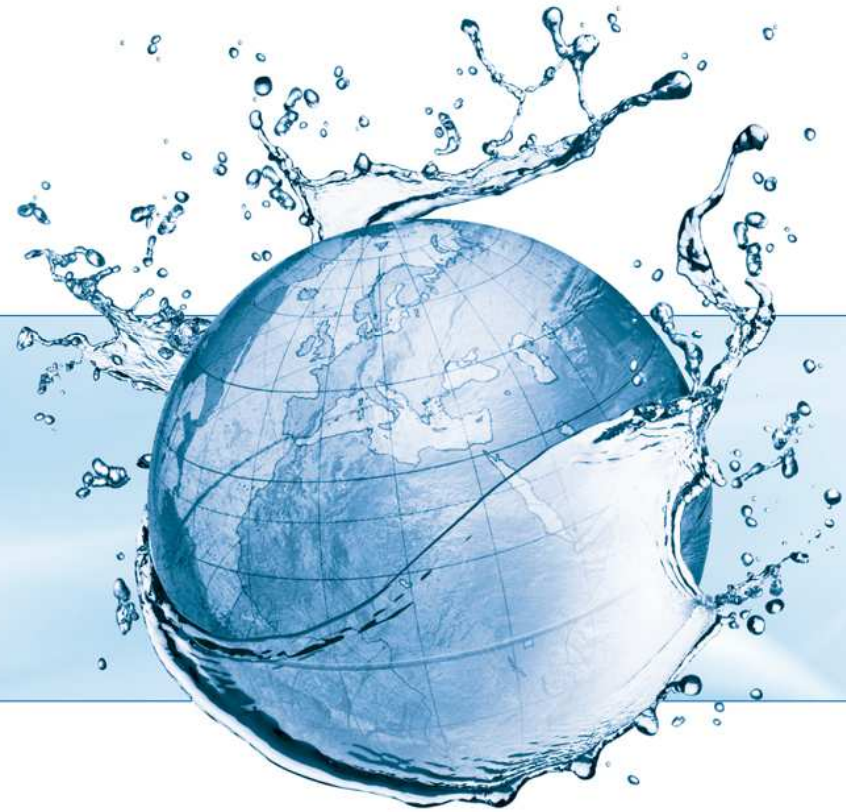


Planktonic Plate Counts



Similar Biocidal Performance

Laboratory Study



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BEST WATER TECHNOLOGY

Laboratory Efficacy Study Protocol

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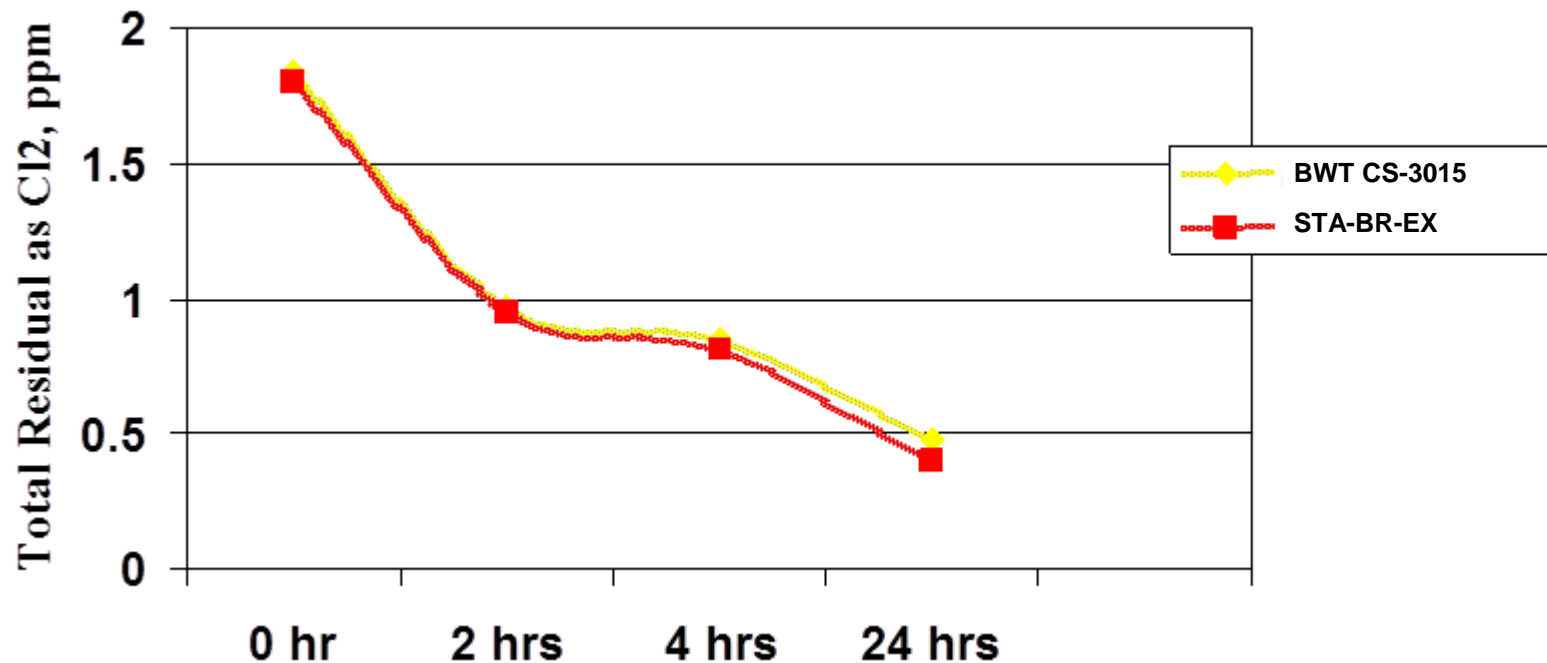


- Prepare biocide stock solutions at ~ 1000 ppm as Br₂
- Dose into cooling tower water sample to achieve the target total halogen residual
- Monitor the residuals and efficacy over time
 - Determine efficacy using PetriFilm™ aerobic count plates
 - Incubate at 35 - 36 °C for 3 - 5 days

* Water samples were hazy and were filtered for halogen residual determinations only.

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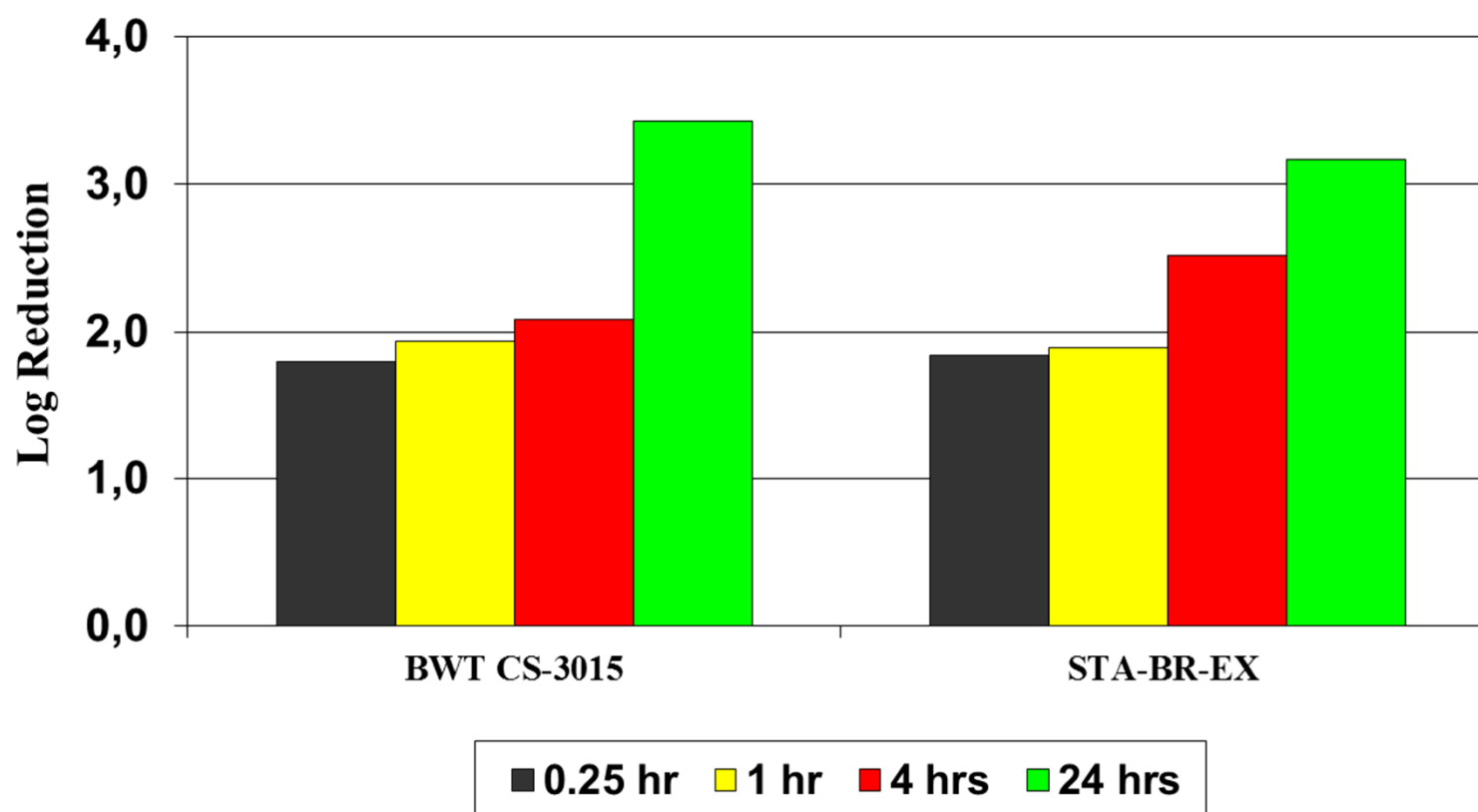
Halogen Decay Profile (Lab Study)



Similar Halogen Residual Decay Profile

BWT CS-3015 biocide vs. STA-BR-EX

Planktonic Plate Counts (Lab Study)



Similar Biocidal Performance