Reduction of Free Chlorine in Bath Water using The Crystal Ball™ Filtration Device

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Submitted By:

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Introduction

The results within this report represent the data gathered by KDFFT in a preliminary investigation of the ability of a Rainshow r® The Crystal Ball™ to reduce influent free chlorine concentrations from bath water.

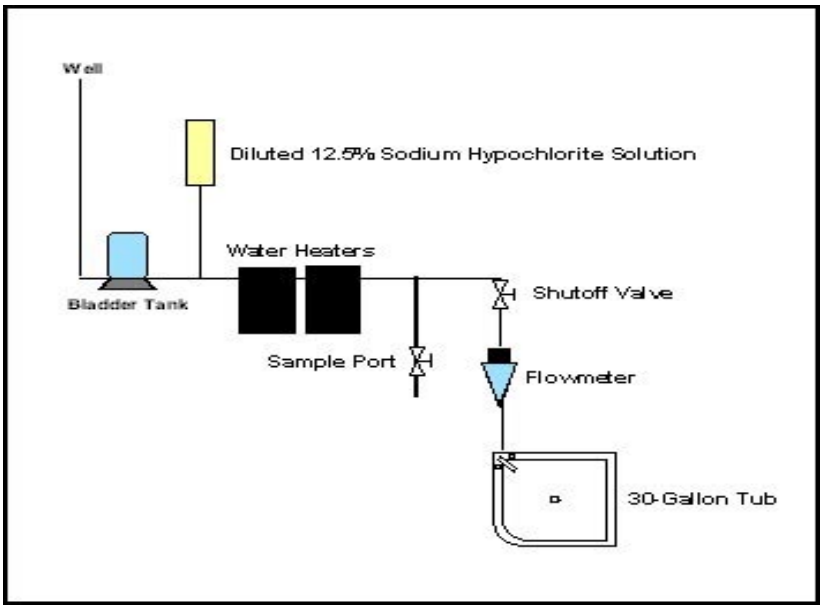
Methodology

Testing Protocol

The challenge water delivery system used by KDFFT complies with ANSI/NSF 42-2000 standards. This consists of a well water supply injected with dilute 12.5% sodium hypochlorite solution. This chlorinated challenge water is then fed directly into electric water heaters and heated to 104°F. These in turn are plumbed directly into a 30-gallon tub. The tub was filled with approximately 15-gallons of the challenge water for this test.

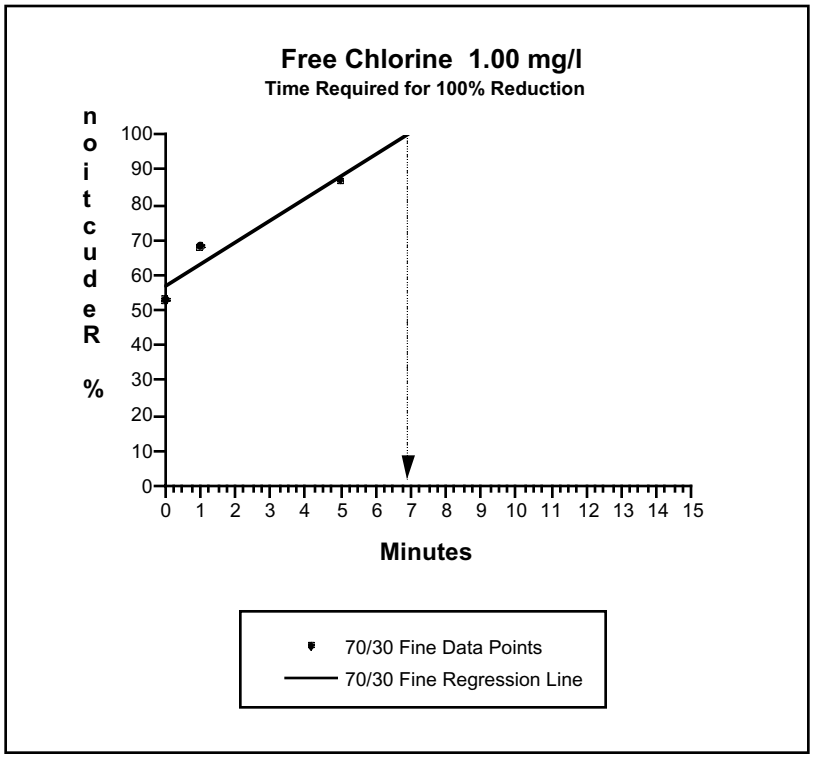
The Crystal Ball™ was assembled by placing 50-grams of fine 70/30 (Cu/Zn) wool into the nylon bag which was then placed into the plastic housing. To test the effectiveness of The Crystal Ball™ it was placed directly in the flow of water from the inlet feed line to the tub and the tub was allowed to fill at 2.00-gpm. An influent reading from the fill line was taken when the 15-gallon mark was reached and an initial, time=0, effluent sample was taken from the tub. After the initial effluent sample was taken the Crystal Ball™ was vigorously swirled in the tub to contact the water for a series of time intervals. These intervals were 1 and 5 minutes. At the end of each time interval a sample was grabbed from the tub for analysis.

Test Apparatus



Data/Results

Free Chlorine 50-Grams Fine Wool			
Influent — 15 Gallons		**Effluent**	
Minutes (t)	Free Chlorine (mg/l)	Free Chlorine (mg/l)	% Reduction From
0	0.95	0.45	53
1		0.30	68
5		0.12	87



Conclusions

1. The Crystal Ball™ with 50-grams of 70/30 fine wool was able to reduce 87% of the free chlorine in the challenge water with in 5-minutes.
2. Linear regression analysis of the data shows that a total of 7-minutes would be required to reduce 100% of the free chlorine.

Client	KDFFT Well Water (Challenge)
Date Received	06/01/00
Technician	HM
Date Analyzed	09/11/00

Test	Method	EDL (mg/l)	Results	Units
pH	SM 18th 4500 B	NA	7.14	PH units
Conductivity	SM 18th 2510 B	NA	656	µS/cm
TDS	SM 18th 2510 B	NA	316	mg/l Total Ionic
Total Alkalinity	SM 18th 2320 B	10.00	266	mg/l as $CaCO_3$
Bicarbonate Alkalinity	SM 18th 2320 B	10.00	266	mg/l as $CaCO_3$
Carbonate Alkalinity	SM 18th 2320 B	10.00	0	mg/l as $CaCO_3$
Total Hardness	Calculated from Ca and Mg	NA	321	mg/l as $CaCO_3$
Calcium	SM 18th 3500 Ca B	13.00	92	mg/l Ionic
Magnesium	SM 18th 3500 Mg B	0.190	22	mg/l Ionic
Sodium	SM 18th 3500 Na B	1.700	13	mg/l Ionic
Potassium	HACH Method 8049	NA	0.87	mg/l ionic
Iron, Total	SM 18th 3500 Fe B	0.020	0.13	mg/l Ionic
Copper	SM 18th 3500 Cu B	0.077	0.013	mg/l Ionic
Zinc, Dissolved	SM 18th 3500 Zn B	0.018	0.005	mg/l Ionic
Sulfate	HACH Method 8051	7.000	47	mg/l Ionic
Nitrate	HACH Method 8171	NA	ND	mg/l Ionic
Phosphate as Orthophosphate	SM 18th 4500 P E	0.010	0.11	mg/l Ionic
Chloride	SM 18th 4500 Cl^- B	10.00	45	mg/l Ionic
Silica	HACH Method 8185	NA	13	mg/l Ionic