



# *Whitmire Filtration Plant*

Commission of Public Works

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May 15, 2007

SCDHEC

Drinking Water Compliance Section

Attention: Tricia H. Kilgore, P.E.

2600 Bull Street

Columbia, S.C. 29201

Mrs. Kilgore:

In July of 2006, we were granted permission from the department to launch a six (6) month pilot study to add the blended polyorthophosphate Seaquest into our distribution system. This study was extended, however, to a nine (9) month study in order for us to gather more data for analysis.

On July 21, 2006, we began adding the blended polyorthophosphate Seaquest into our distribution system. We were informed by the vendor that, if used at a constant feed rate, we could significantly reduce our post caustic feed, reduce chlorine usage, and observe improvements in our distribution piping. This ultimately would result in an overall reduction in chemical and maintenance costs for The Town of Whitmire.

It is our conclusion that during the 9+ months of adding Seaquest into our distribution system, we have noticed many positive effects and **NO** negative effects. More specifically, water quality has not been compromised, but greatly improved. Upon review of the following data analysis report, we feel that you will reach the same conclusion that adding Seaquest has been beneficial to our distribution system. It is our request that you grant us approval for making Seaquest permanent and proceed with issuing us written authorization to obtain a construction permit.

For questions concerning this matter, please feel free to contact me.

Sincerely,

Synthia L. Sinclair

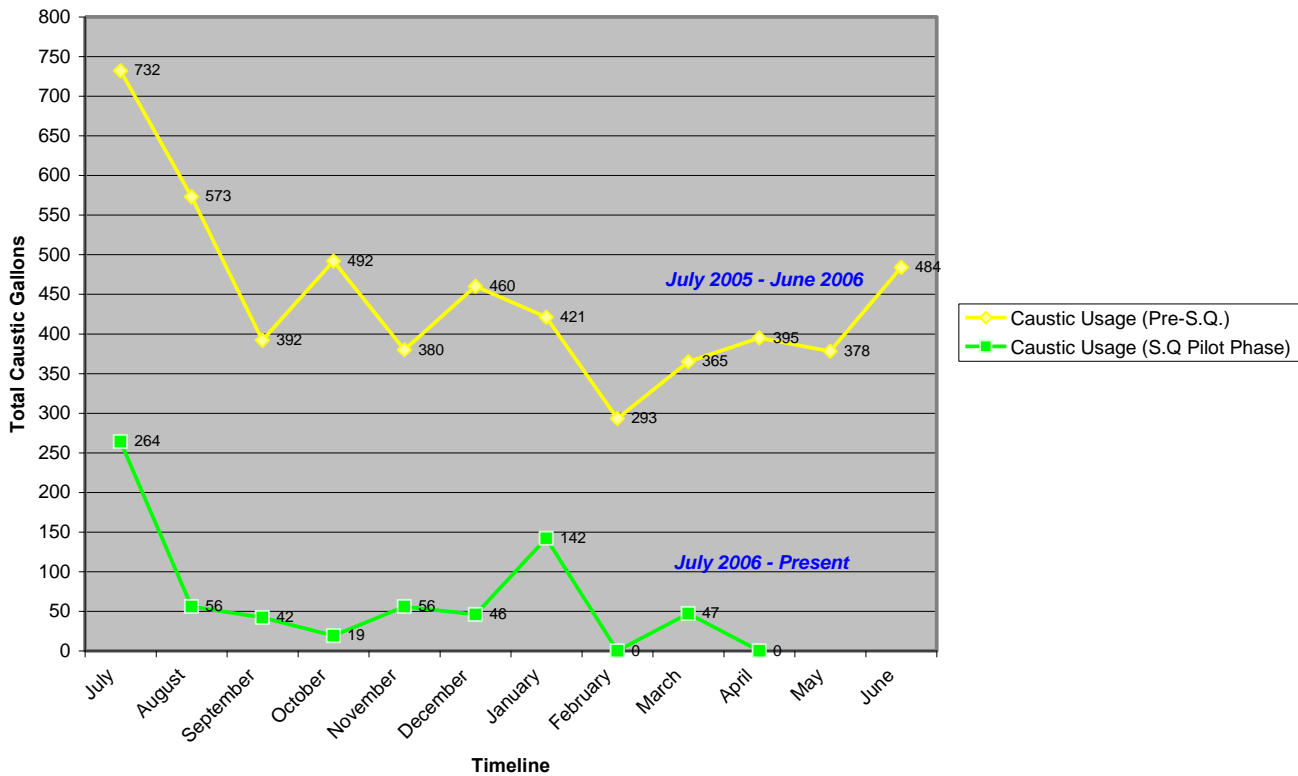
*Chief Operator, Whitmire Filtration Plant*

# DATA ANALYSIS REPORT

## CAUSTIC REDUCTION

At the start of the pilot study, we set the chemical feed rate of Seaquest to deliver approximately 1.00 ppm per day into the finished water line. Prior to addition of Seaquest, The Whitmire Filtration Plant had maintained a distribution system pH range of 7.4 – 7.8 to prevent corrosion and scale. It was brought to our attention that Seaquest itself is a corrosion inhibitor, meaning that we could produce water for the distribution system at a lower pH and not have to worry about corrosion in the pipes. We reduced our post caustic feed rate to deliver enough to maintain a pH range of 6.6 – 6.8. Obviously by doing so, we reduced the caustic demand. Below is a graph plotting the total caustic gallons used per month for months prior to Seaquest addition and months during the pilot phase. This pH reduction has not caused any negative effects in the distribution system.

Caustic Usage Comparison

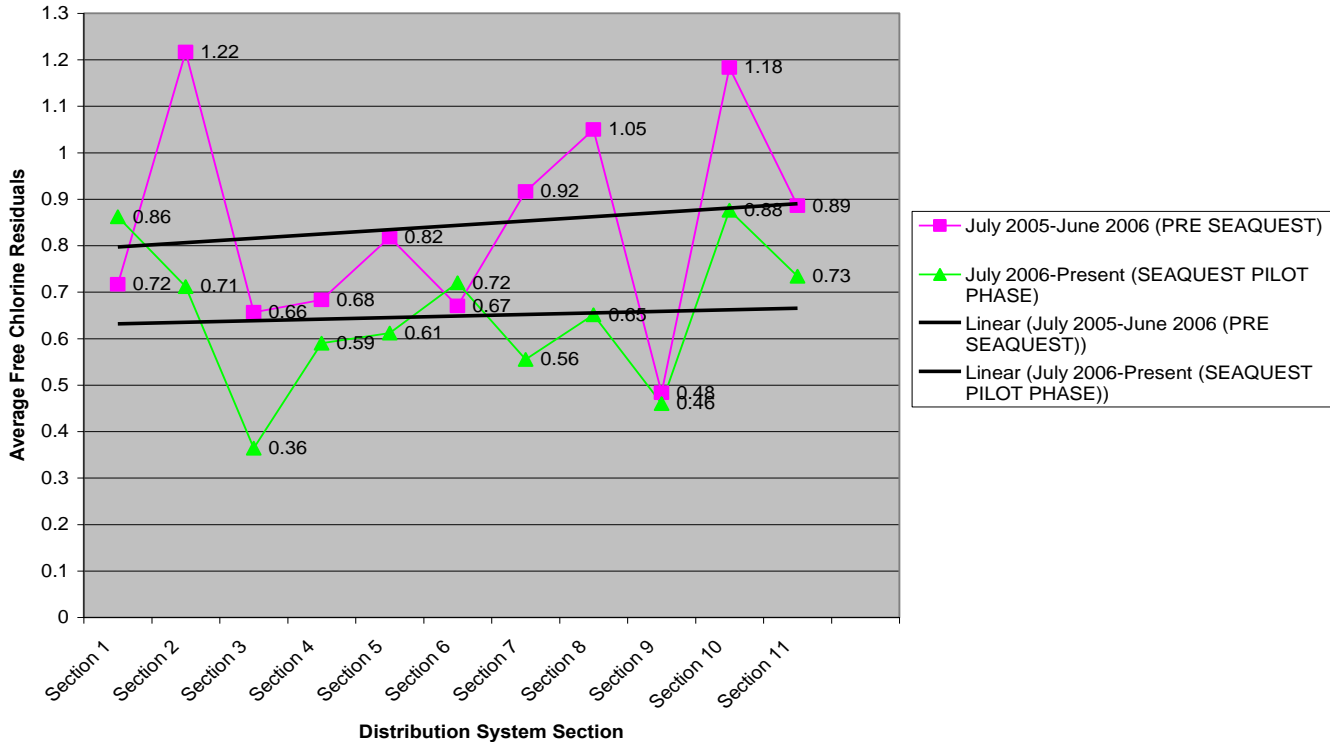


## CHLORINE USAGE

Historically, The Town of Whitmire has struggled to maintain consistent chlorine residuals in some of the sections in the distribution system. It can be reasoned that free chlorine residuals will naturally diminish in the pipes the further out in the distribution system you monitor. In order to maintain a trace residual in the past in some sections of the system, we would have to produce water here at the plant with higher residuals just to ensure that this trace is present at the peripherals of the system. The vendor had told us we could expect to see a gradual boost in our chlorine residuals all throughout the distribution system in as little as 6 months. We extended the study to 9 months and plotted our findings in the graphs below.

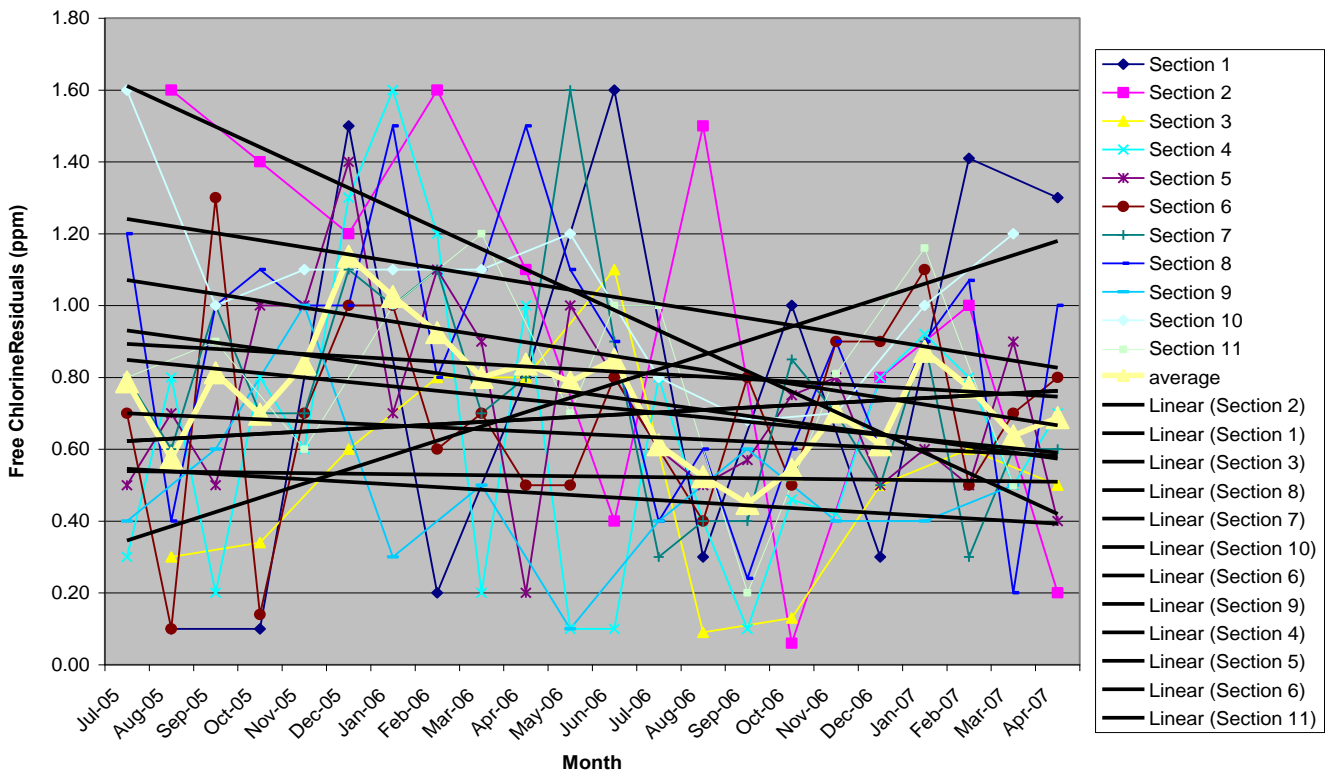
# GRAPH 1

YEARLY AVERAGES OF FREE CHLORINE RESIDUALS VS. DISTRIBUTION SYSTEM SECTION



# GRAPH 2

Average Monthly Free Chlorine Residuals (July 2005 - April 2007)



As you can see, both graphs reveal an overall downward trend of free chlorine residuals. After analyzing this data, we expected the trend lines to have a positive slope. That is not the case here. There seems to be no consistent pattern with the chlorine residuals in these 2 graphs. At this point, the data is inconclusive.

*(Note: We had originally stated that we expected to see a reduction in TTHM and HAA formation as a result of using Seaquest as well as seeing an overall reduction in chlorine usage. Because we had changed our disinfection strategy of the plant **DURING** this pilot phase, we cannot make a true correlation of this data with use of Seaquest. However, our TTHMs and HAAs have significantly been reduced, as has overall chlorine usage, but we feel it is mostly in part to a change in our disinfection strategy.)*

## COST ANALYSIS

A cost analysis was conducted to see if there had actually been a reduction in chemical costs as a result of reducing the amount of caustic for post pH adjustment. We compared the combined total monthly costs of Seaquest and caustic from July 2005 to April 2007. The following table and graph show the analysis of total monthly cost of caustic from July 2005 to June 2006 (pre-Seaquest). Also, a total combined monthly cost of caustic and Seaquest from July 2006 to April 2007 (Seaquest pilot phase) was analyzed.

### CHEMICAL USAGE AND COST DATA

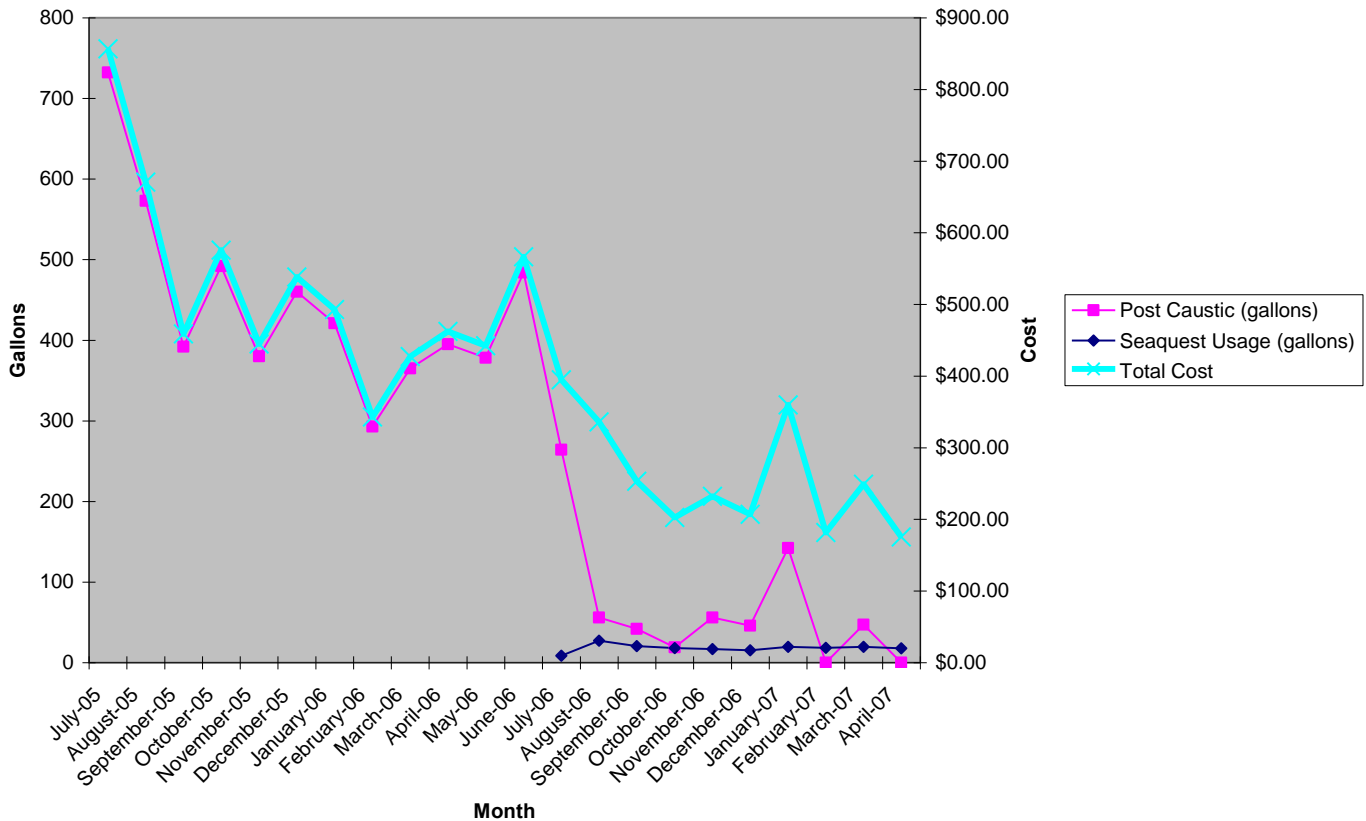
		cost per gallon:    \$1.17    \$9.96				
		Post Caustic (gallons)	Seaquest Usage (gallons)	↑ Monthly Cost of Caustic	↑ Monthly Cost of Seaquest	Total Cost
<b>Prior To Seaquest (July 2005 - June 2006)</b>	July-05	732		\$856.68		\$856.68
	August-05	573		\$670.59		\$670.59
	September-05	392		\$458.77		\$458.77
	October-05	492		\$575.80		\$575.80
	November-05	380		\$444.72		\$444.72
	December-05	460		\$538.35		\$538.35
	January-06	421		\$492.71		\$492.71
	February-06	293		\$342.90		\$342.90
	March-06	365		\$427.17		\$427.17
	April-06	395		\$462.28		\$462.28
	May-06	378		\$442.38		\$442.38
	June-06	484		\$566.44		\$566.44
<b>Seaquest Pilot Phase (July 2006-Present)</b>	July-06	264	8.6	\$308.97	\$85.67	\$394.64
	August-06	56	27.14	\$65.54	\$270.36	\$335.90
	September-06	42	20.46	\$49.15	\$203.82	\$252.97
	October-06	19	18.09	\$22.24	\$180.21	\$202.45
	November-06	56	16.74	\$65.54	\$166.76	\$232.30
	December-06	46	15.38	\$53.83	\$153.21	\$207.05
	January-07	142	19.42	\$166.19	\$193.46	\$359.64
	February-07	0	18.23	\$0.00	\$181.60	\$181.60
	March-07	47	19.47	\$55.01	\$193.96	\$248.96
	April-07	0	17.62	\$0.00	\$175.53	\$175.53

**cost per gallon calculations based on:**

**caustic:** \$5266.45 for 4500 gallon bulk delivery, priced on 5/11/07.

**Seaquest:** \$1931.60 + \$260 shipping for four 55-gallon drums.

## Chemical Costs



The table and the graph above both conclude that there is a definite reduction in chemical costs since the Seaquest pilot phase began. The total cost for chemicals has decreased because we are using less caustic, even with the more expensive Seaquest. However, the cost of Seaquest quoted in the table was based on the price of receiving it in a 55-gallon drum stock. When the construction of the new storage tank is complete, we will be able to purchase Seaquest in bigger batches, thereby resulting in cheaper freight, which, in turn, will further reduce the overall chemical cost.

## DISTRIBUTION SYSTEM PIPING

The age of our distribution system was one of the main reasons we were interested in trying Seaquest. Due to the Town of Whitmire’s limited operating budget, replacing all of the old piping in the system would be nearly impossible for obvious reasons. The product over time is designed to sequester any scale and biofilms present in various piping. Although there has been no pattern in the data analysis that suggests a boost in chlorine residuals in the distribution system, we are convinced that the polyorthophosphate blend has been beneficial to our distribution system. According to the distribution system supervisor, Jimmy Dunaway, there have been **NO** red water complaints since the pilot phase of Seaquest addition began. Previously, Mr. Dunaway would receive occasional complaints about red water from houses throughout the distribution system. We feel, in time, that these other effects will become more evident.