

## PRIMARY INFLUENT PUMPS INCREASE CAPACITY

December, 2007

Flows to Moccasin Bend Regional Wastewater Authority (City of Chattanooga, Tn.) are increasing rapidly due to development in surrounding districts such as North Georgia, Hamilton County and other smaller municipalities. Flow projections indicate that the influent primary pumps would be unable to meet peak capacity requirements within a few years.

Without improvements, additional primary pumps would be required; however no current space or room is available in the primary pump building thus requiring a new, separate primary pump building be constructed in an already crowded area.

If capacity could be increased to meet peak demand, Moccasin Bend could delay major capital investments for years until further engineering design and study could be completed.

Anionic polymers (negative charged) are designed, formulated and used extensively in the municipal wastewater industry to change the rheology, flow characteristics, of influent wastewater. As we all know polymers when mixed with water become very slippery. This is the principle used to increase primary pump capacity by making the wastewater flow faster, reducing the coefficient of gravity, thus pumping more. Many fire departments use anionic polymers added to their fire truck tankers to speed the water exiting the tanker.

Preliminary lab testing of several anionic polymers was conducted. These anionic polymer solutions (0.1%) were then added to the primary influent as compared to untreated primary influent. A pump was used to pump 5 gallon aliquots with and without polymer to compare speed of discharge. The results are:

Quantity	Speed to empty	PPM polymer
5 gallons	41 seconds	blank, none
5 gallons	40 seconds	blank, none
5 gallons	40 seconds	blank, none
5 gallons	32 seconds	5*
5 gallons	31 seconds	5*
5 gallons	38 seconds	20*
5 gallons	39 seconds	20*
5 gallons	34 seconds	10*
5 gallons	35 seconds	10*

\* Nalco 8184 anionic polymer.\*\* These results require 30-45 seconds of pre-mix time before pumping, not an instantaneous addition.

Nalco 8184 is an emulsion type anionic polymer with a density of 1.055 which is 8.8 pounds/gallon.

Other polymers tested: Nalco 8736,7768,7766+, Ciba Specialty Chemicals Alcomer 74-L, 175L and Antiprex 2695. These did not warrant further study due to poor lab results prior to 5 gallon evaluations.

Through this test primary pump capacity increased by more than 20%. With this as a target a full-scale test is recommended. A full-scale test could be conducted at the Influent Relief Pump Station in front of Moccasin Bend main plant using a Nalco MDS-4 polymer dilution system with one (1) 250 gallon tote of Nalco 8184. Only water and 110 V electrical outlet is required for this evaluation. The Nalco MDS would be on a no-charge trial basis and could be used for at least 90 days. With a flow of 100 mgd the pure polymer use is targeted to be 5-10 gpd (44-88#s). Cost of the pure polymer in tote-bins is approximately \$1.00-\$1.25 per pound. Bulk quantities projected to be in the low \$0.90 per pound range.

The diluted anionic polymer (Nalco 8184) would be diluted to 0.1% ; added to the suction line within influent relief pump station pumps. The feed pump will be calibrated at various speeds using the calibration cylinder to establish a feed pump curve.

Page 5

The primary influent pumps would be operated until a steady baseline flow rate was achieved, then polymer added at a selected dosage rate. Flow rates, pressure and wet well levels will be recorded every 60 minutes during testing. The polymer feed rate will be adjusted with changes in flow rate to maintain a constant dosage rate throughout each test.

The frequency and duration of full-scale operations will depend on the frequency and magnitude of peak events. When higher pump capacities corresponds from the use of anionic polymer Moccasin Bend could meet or exceed peak primary pumping demands for years.

All that will be necessary to start this study is the purchase of one(1) tote-bin of Nalco 8184 from the current order point (Rick St. Jules). One tote-bin should weigh 2325 pounds in non-returnable bins. Willing to discuss details of this testing at your convenience.

Donald L. Seagle

**WATER ENVIRONMENTAL CONSULTANTS**