CONVERSION FROM ALUMINUM SULFATE TO POLY ALUMINUM CHLORIDE

A BRIEF SYNOPSIS

ALUMINUM SULFATE (ALUM)

- ALUM HAS BEEN USED SINCE THE PLANT WAS FIRST PUT IN SERVICE IN 1928
- IT HAS BEEN USED FOR DIFFERENT PURPOSES FOR HUNDREDS IF NOT THOUSANDS OF YEARS
- VERY COMMON IN WATER AND WASTEWATER TREATMENT PLANTS AS A COAGULANT
- IT BRINGS CHARGED PARTICLES IN THE WATER TOGETHER TO MORE EASILY SETTLE OUT OF SOLUTION

ALUMINUM SULFATE (ALUM)

ADVANTAGES

- RELATIVELY CHEAP AND BIDDING IS COMPETITIVE
- OPERATORS ARE FAMILIAR WITH IT

DISADVANTAGES

- INEFFICIENT IN COLDER WATER
- REQUIRES NARROW PH RANGE TO WORK EFFECTIVELY

POLYALUMINUM CHLORIDE (PACL)

- RELATIVELY NEW, HAVING BEEN USED SINCE THE 1970'S
- HAS BECOME MORE COMMON FOR USE IN WATER AND WASTEWATER TREATMENT PLANTS
- USED AS A COAGULANT/FLOCCULANT THE SAME WAY ALUM IS USED
- THERE ARE MANY DIFFERENT TYPES OF PACL DEPENDING ON WATER CHARACTERISTICS

POLYALUMINUM CHLORIDE (PACL)

ADVANTAGES

- USE LESS VOLUME OF CHEMICAL
- LESS DEPENDENT ON SOURCE WATER PH
- WORKS EFFICIENTLY IN COLDER WATER
- REACTS WITH WATER QUICKLY
- MARKET IS BECOMING MUCH MORE COMPETITIVE

DISADVANTAGES

- USUALLY MORE EXPENSIVE PER VOLUME
- REQUIRES LOWER PH THAN OUR SOURCE WATER

OUR COAGULANT STUDY

OVER A YEAR OF JAR TESTING (MAY 2015-MAY 2016

- TRIED MULTIPLE TYPES OF POLYALUMINUM CHLORIDES, SOME WITH POLYMER ADDED
- VARIOUS RAW WATER CONDITIONS AND SOURCE WATER BLENDS
- DETERMINE WHICH PACL SETTLES OUT THE BEST/FASTEST
- FOUND TWO PACL TYPES THAT HAD THE BEST SETTLING/ORGANIC REMOVAL

TRIAL RUN WITH DF-801

- MANUFACTURED BY USALCO WHICH IS OUR CURRENT SUPPLIER OF ALUM
- BEGAN IN DECEMBER 2016 AND JUST CONCLUDED
- EXTREMELY GOOD SETTLEABILITY UNDER VARIOUS RAW WATER CONDITIONS
- GOOD FILTER EFFLUENT TURBIDITY (BETTER THAN ALUM)
- OVERALL EXCELLENT TREATMENT (BETTER THAN ALUM)
- ONLY CONCERN WAS WITH FILTER CLOGGING (INCREASED LOSS OF HEAD)

WHERE DO WE GO FROM HERE?

- WITH VARIOUS TYPES OF PACL OUT THERE, ANOTHER MIGHT BE BETTER SUITED FOR THIS SOURCE WATER
  - ONE THAT DOESN'T AFFECT THE FILTERS AS MUCH
  - DELPAC 2020 IS A POPULAR PRODUCT THAT MIGHT WORK BETTER OVERALL
    - NO POLYMER IN DELPAC 2020
    - MANY PLANTS USE THE PRODUCT WITH GREAT SUCCESS
    - IT PERFORMED BETTER THAN ALUM IN JAR TESTING
- <u>NEED ACID ADDITION TO LOWER RAW PH ESPECIALLY DURING THE SUMMER MONTHS</u>

CONCLUSION

- PACL SEEMS LIKE THE BEST OPTION FOR TREATMENT
- WITH INCREASED WATER DEMAND, CONSISTENT WATER PRODUCTION IS CRITICAL
- WILL REQUIRE A CAPITAL IMPROVEMENT FOR ACID ADDITION
- WE HAVE BEEN AND WILL CONTINUE TO CLOSELY MONITOR CORROSION POTENTIAL
- THERE IS POTENTIAL FOR COST SAVINGS, ESPECIALLY DURING WINTER MONTHS

	Alum	DF-801
Coagulant		
Average dose	48	22.9
Unit cost	$0.076	$0.150
Average cost, $/million gallons	$30.59	$28.59
Sodium Hydroxide		
Average dose	6	0
Unit cost	$0.24	$0.24
Average cost, $/million gallons	$11.87	$0.00
Sulfuric Acid		
Average dose	0	8
Unit cost	$0.125	$0.125
Average cost, $/million gallons	$0.00	$2.24
Total Cost, $/million gallons	**$42.46**	**$30.84**
Yearly Cost, based on 2016 Production of 3896 MG	**$165,424.16**	**$120,152.64**