

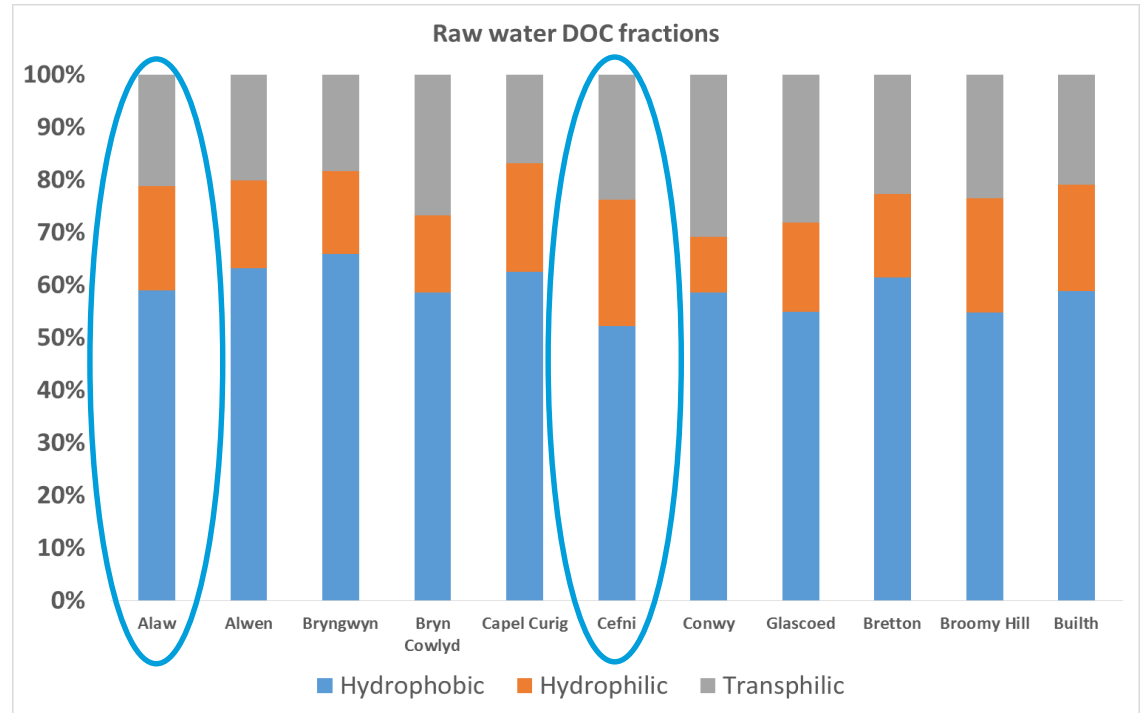
Challenges with DOC in Treatment

Risk of Disinfection By-Products at Alaw & Cefni WTWs



Introduction

- There is a continued problem of increasing dissolved organic carbon (DOC) concentrations in UK surface waters
- High DOC concentrations have increased the risk of disinfection by-product formation (DBPF)



- Transphilic fractions increase in Spring
- Hydrophilic fractions increase in Summer/Autumn
- Hydrophobic fractions generally stable

Alaw & Cefni WTWs

- Located on the isle of Anglesey, North Wales
- Raw Water DOC consistently above 6 mg/l
- DBP formation is an issue prevalent at Alaw and Cefni water treatment works
- Coagulation alone cannot deal with the DOC, especially in the summer months
 - Removal at 60% or less using coagulation



Site Specific Issues

Alaw WTW

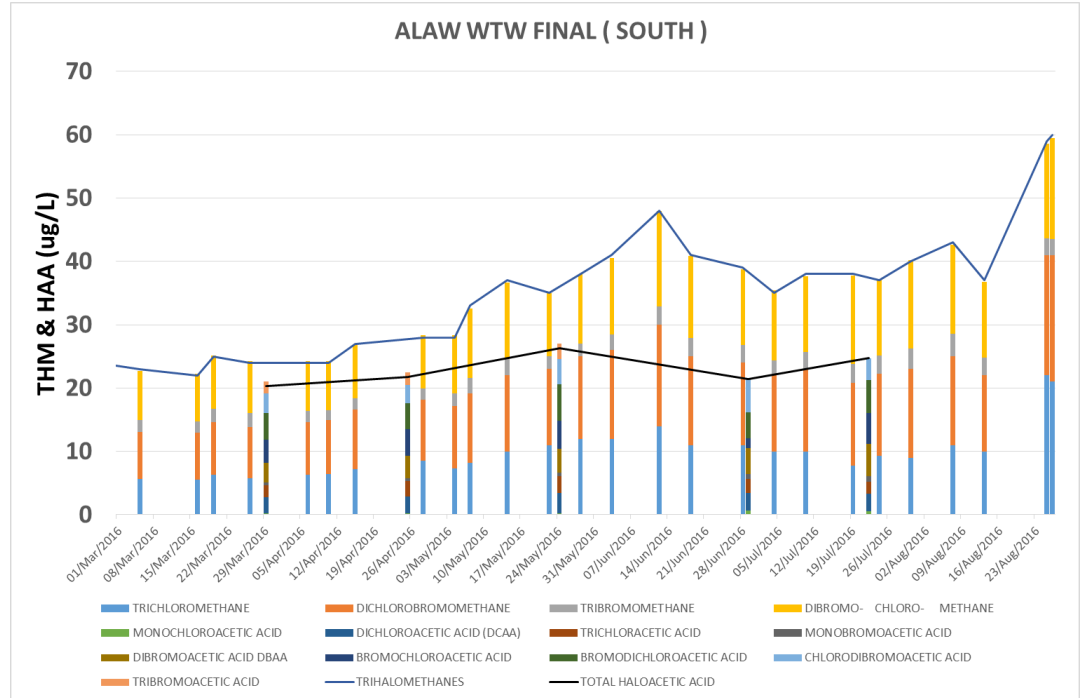
- High variation in Raw Water colour entering the treatment stage
- Coagulant selection limited due to water pH issues
- Coagulation not effective in removing DOC fractions and reducing THMs

Cefni WTW

- High levels of organic taste/odour compounds
- PAC dosing and coagulation stage reduce T&O compounds but DOC fractions remain

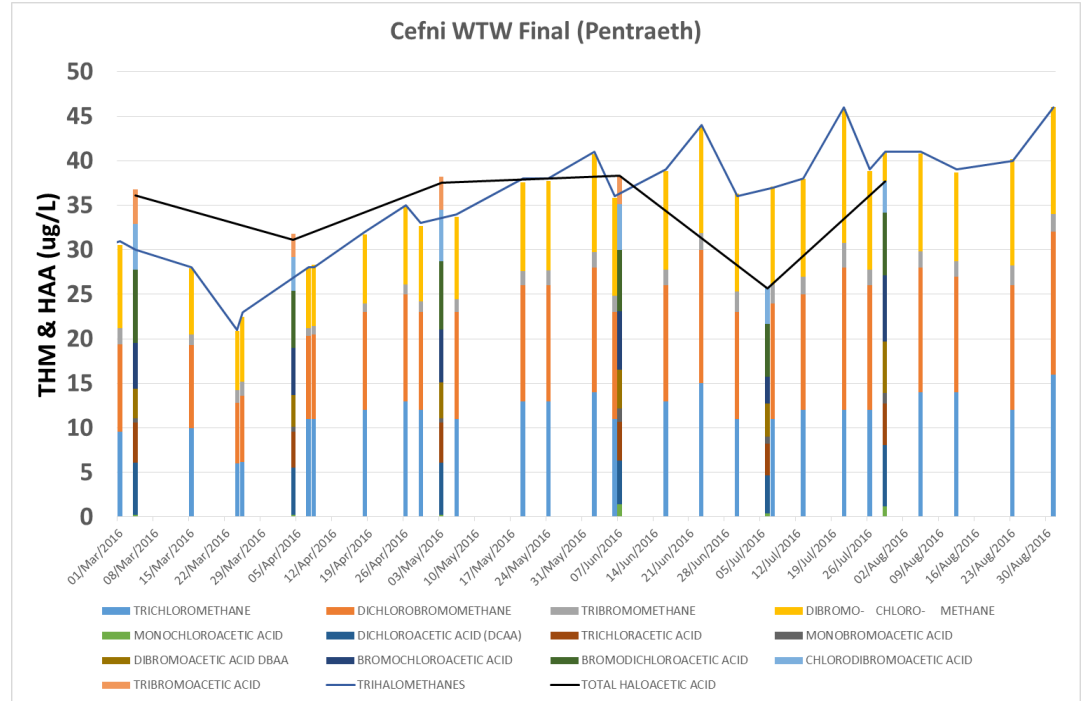
THM & HAA Results (Alaw)

- Increasing amount in the summer months
- Breach of internal standard for THMs
- THM levels consistently higher than HAAs



THM & HAA Results (Cefni)

- HAA levels higher in the spring
- THM levels higher in late summer
- Consistently above internal THM standards



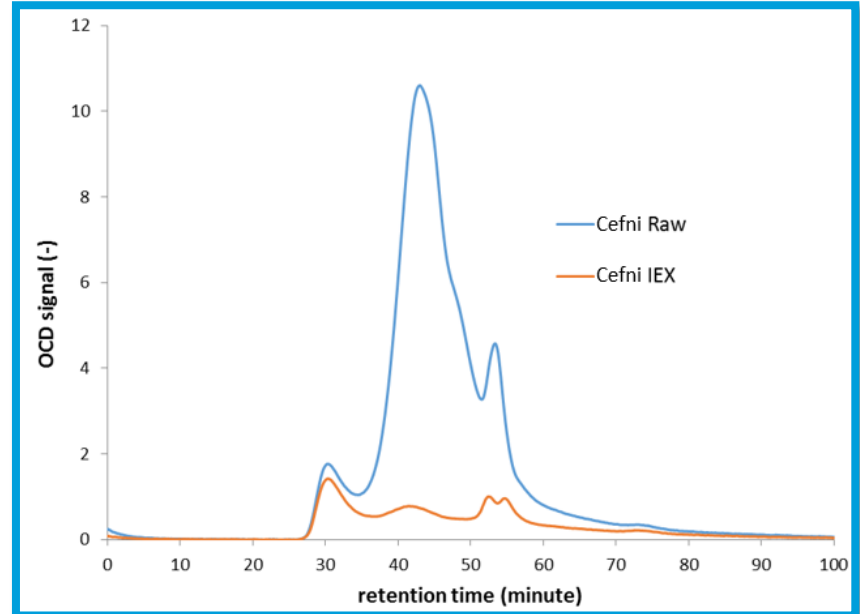
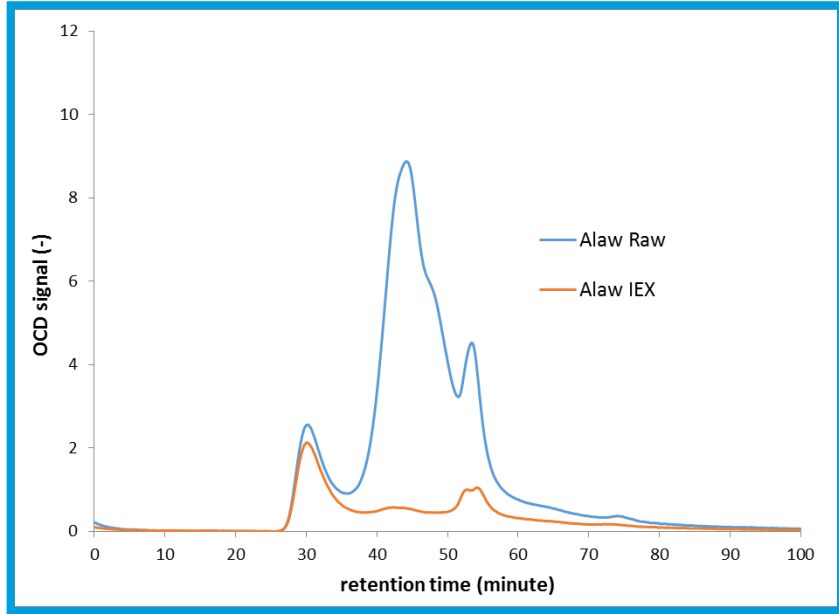
Options Already Explored

- A number of options have been explored to reduce DBP formation
 - Optimisation of coagulation
 - Use of alternative coagulant
 - Improvement of clarification stage (Alaw WTW)
 - Management of water source(s)
 - Use of Activated Carbon

The above have not shown a major improvement in DOC removal so alternatives must be considered

Ion Exchange

Initial results look promising



Further Work

- Jar tests completed by PWNT – Results are promising
 - Show reduction in fractions of DOC with/without Coagulant
- Pilot Plant tested on site at Alaw/Cefni
- Potential expansion of pilot testing to other sites
- Monitoring of THM/HAA performance in the spring, summer and autumn periods