Five years of operations of the Columbia WTP

A journey thru operations and maintenance of our 6 MGD microfiltration membrane plant.

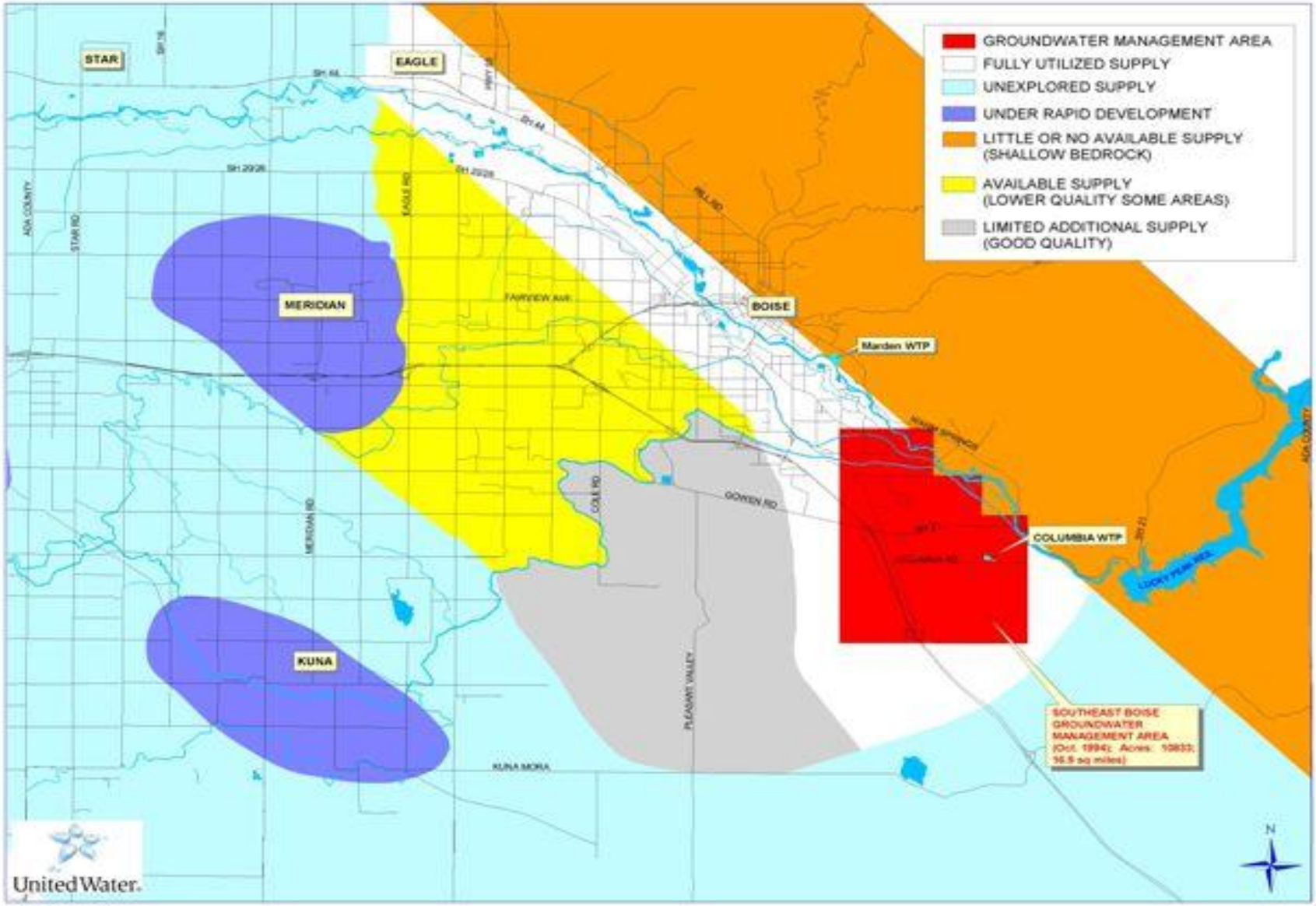
Seth Goertz

- My Background
- United Water ID Control Technician
- Worked at CWTP from startup thru the first 3 years as an operator. Since then as needed as a technician.
- I have been employed with United Water since May 2004.
- I have worked in treatment plants since 1999 and have Treatment IV and Distribution III licenses.

FILTER TO WASTE
MEMCOR
MEMBRANE PERMEATE

CWTP Background

- Plant design for 6 mgd with future expansion to 20 mgd.
- Filters chosen were USFilter (Memcor, Siemens) Continuous MicroFiltration with PVDF modules.
- Plant was put high in the distribution system to assist with groundwater recharge due to receding water table in South East Boise.
- Water is pumped from the Boise River (Three miles of 30” pipline and 350’ of elevation difference).


GROUNDWATER MANAGEMENT AREA
FULLY UTILIZED SUPPLY
UNEXPLORED SUPPLY
UNDER RAPID DEVELOPMENT
LITTLE OR NO AVAILABLE SUPPLY (SHALLOW BEDROCK)
AVAILABLE SUPPLY (LOWER QUALITY SOME AREAS)
LIMITED ADDITIONAL SUPPLY (GOOD QUALITY)
STAR
EAGLE
MERIDIAN
KUNA
BOISE
Marden WTP
COLUMBIA WTP
GOWEN RD
COLE RD
MERIDIAN RD
EAGLE RD
STAR RD
ADA COUNTY
PLEASANT VALLEY
KUNA MORA
SOUTHEAST BOISE GROUNDWATER MANAGEMENT AREA (Oct. 1994; Acres: 10833; 16.9 sq miles)
United Water.
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Background Continued

- High elevation in the distribution system allows us to transmit water from the clearwell via gravity and thru our high service pumps.
- All backwash and CIP (Clean in Place) water is kept on site and reclaimed or evaporated.
- We have a 1.2 MG Clearwell that utilizes the “Ribbon Flow” technique. Designed to give a minimum T10/T of .5 at 10 mgd.

More Background

- On site Hypochlorite generation was chosen for disinfection.
- Ferric Chloride for the backwash coagulant.
- Caustic Soda for pH control.
- Citric Acid for the CIP process.
- Peristaltic pumps were selected for the chemical feed systems except for chlorine.

Parameter	**Design Operating Conditions (monthly average)**	**Reduced Effiecency Operating Contions (monthly average)***	**Winter Operating Conditions (monthly average)**
Flux	41 gfd	33 gfd	28 gfd
Backwash Interval	25 min	20 min	25 min
CIP Interval	30 days avg.	21 days avg.	30 days avg.
Recovery	91 percent	88 percent	86 percent
Temperature	10 deg. C	10 deg. C	0.5 deg. C
Iron	<3 mg/L	>3; <5 mg/L	<3 mg/L
Turbidity	<15 NTU	<60 NTU	<15 NTU
Algae	<2,000 cnts/ml	<14,000 cnts/ml	<2,000 cnts/ml
Production	6 MGD	5 MGD	4 MGD
TOC	<4 mg/L	<8 mg/L	<4 mg/L

Year One

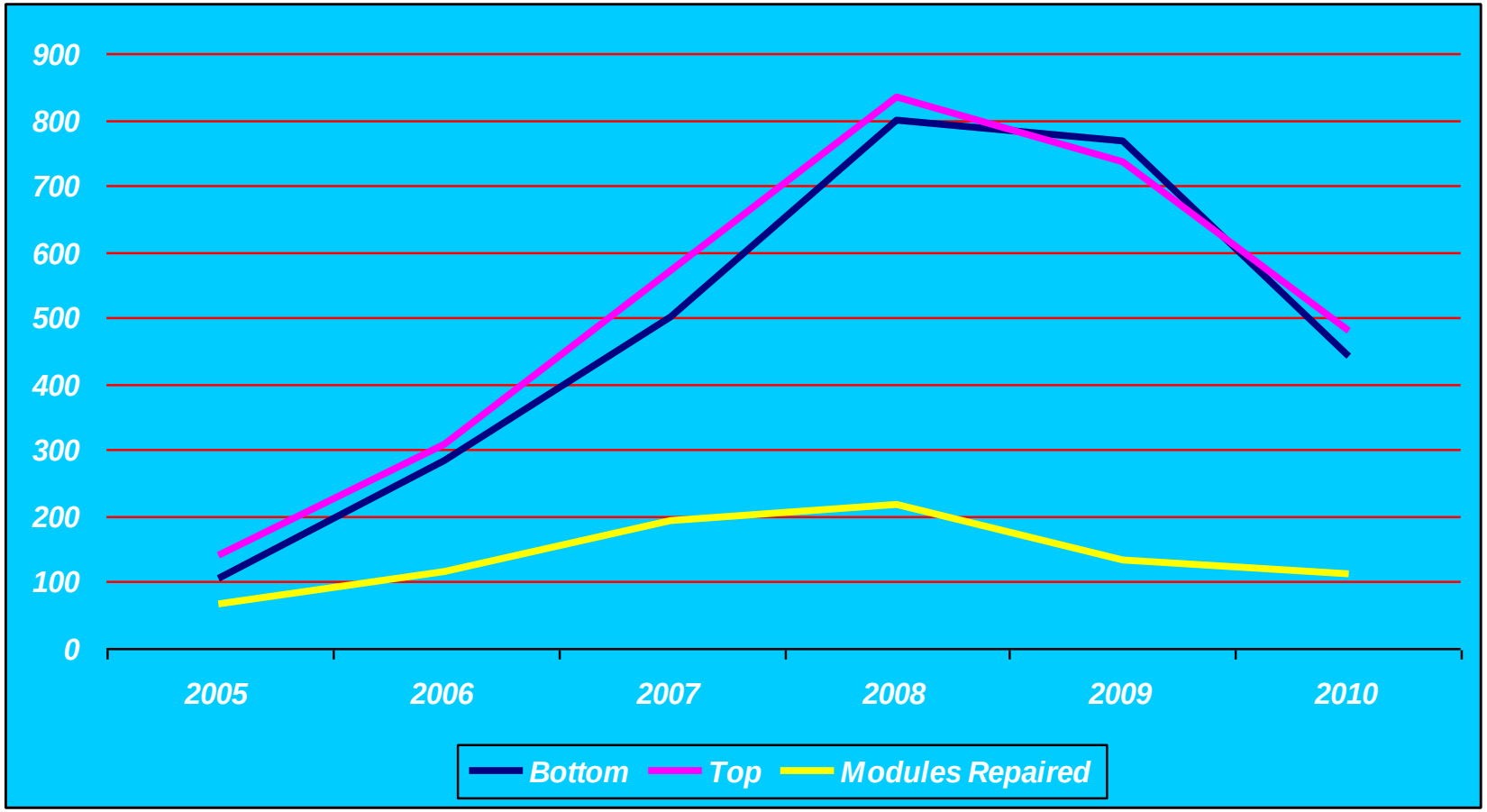
- We changed from Ferric Chloride to a polyaluminum chloride (PAX XL-19).
- Not only were we not settling backwash water well and we were seeing Iron Bacteria growth.
- The change worked. We started settling well, reduced the reclaimed water NTU, and saw a dramatic reduction in iron bacteria.
- US Filter gave us some parameters not to exceed and we were able to run consistently at greater than 95% efficiency.
- We run the plant like a VFD based on the system demand. We have the ability to run on time and volume for Backwashes. This setup let the plant run on system demand and keeps us running efficiently.

Year Two

- Started seeing an increase in fiber breakage. We were getting enough breakage to setup maintenance on the filters into quarterly repairs.
- The CIP process modified due to results of the cleans. We were recommended to CIP with Acid (ph 2.3 and cl2 at 500 PPM) monthly. With short cl2 CIPs (depending on organics in the water) to be done as needed.
- Fluting of RWPS bearings caused all 3 motors to need work. Additional grounding was added from the drives to the motor plus a grounding ring was added to the upper bearing.

CIP
CIP
CIP

Fiber Breakage



Year 3

- Water quality was seeing higher THM's and HAA5's than we liked in two reservoirs highly influenced by the CWTP.
- Started looking at the possibility of some kind of pre treatment.
- Fluting of the new bearings at the RWPS caused more problems. Added ceramic lower bearings.

Things considered

- Potassium Permanganate to be injected at the raw water pump station.
- Pro's: Proven disinfectant that works well in destroying organics without disinfection byproducts. Overdosing make the water a nice pink color.
- Con's: 1.5 mile drive along a gravel canal road to get chemical delivered. The possibility of overdosing and turning the water pink.

Things considered

- Pretreatment through coagulation.
- Pro’s: We had a proven chemical on site that we knew worked with our source water for coagulation.
- Con’s: No point for injection into our raw water line far enough away for adequate coagulation.

Year 4 Coagulant WINS!

- We were upgrading our raw flow meter and we were able to common trench new conduit and a chemical feed line. The injector was installed in the raw water meter vault and a spare backwash dosing pump was dedicated to the endeavor. With some minor PLC changes the pump would pace off the raw water meter and our current dosing program would make it as easy to operate as our other feed systems.

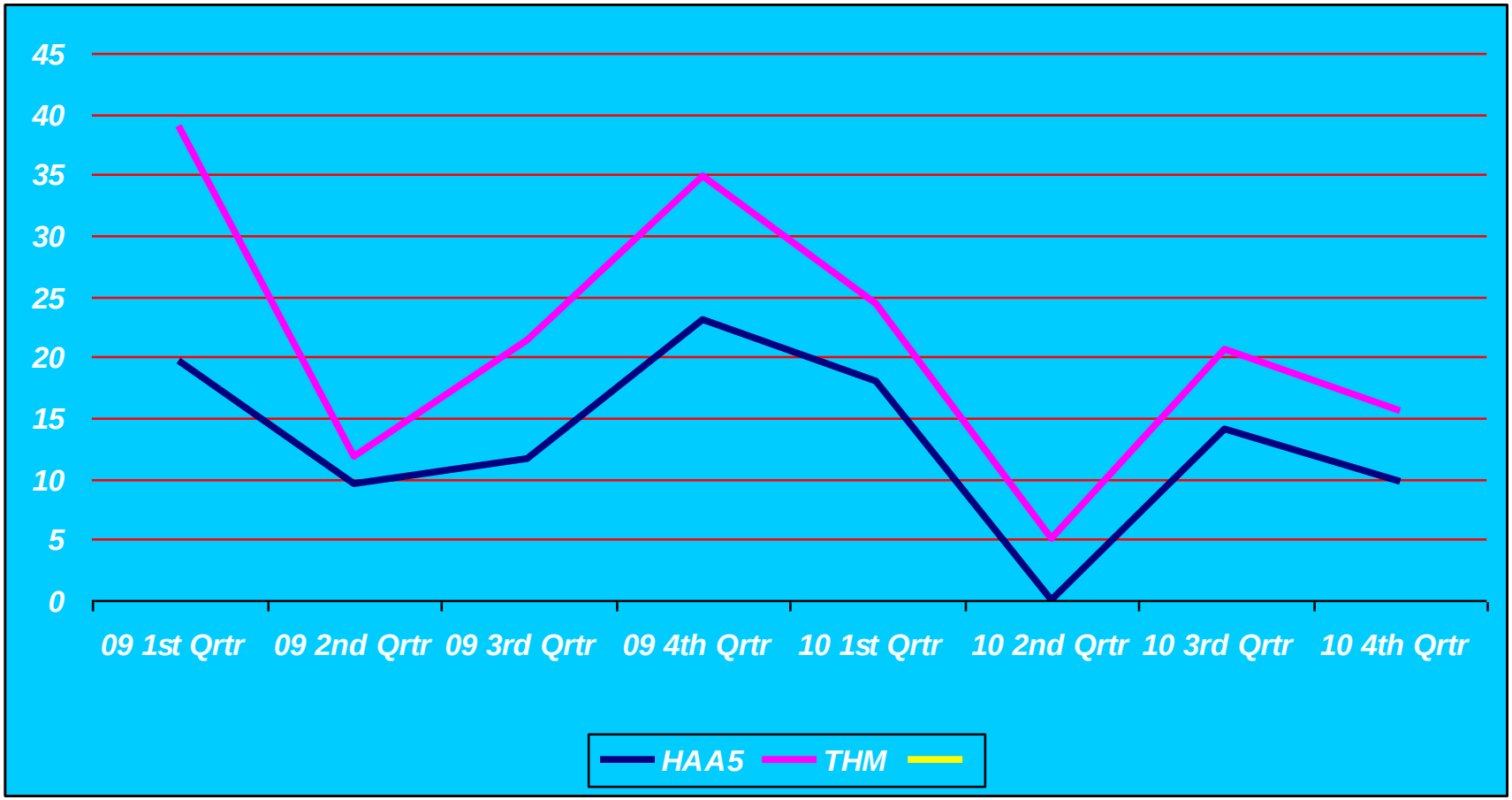
Year 4

- In an attempt to reduce power we changed our feed pressure from 32 to 24 psi at the filters.
- We started to pilot the coagulant pretreatment.
- Pilot was successful.

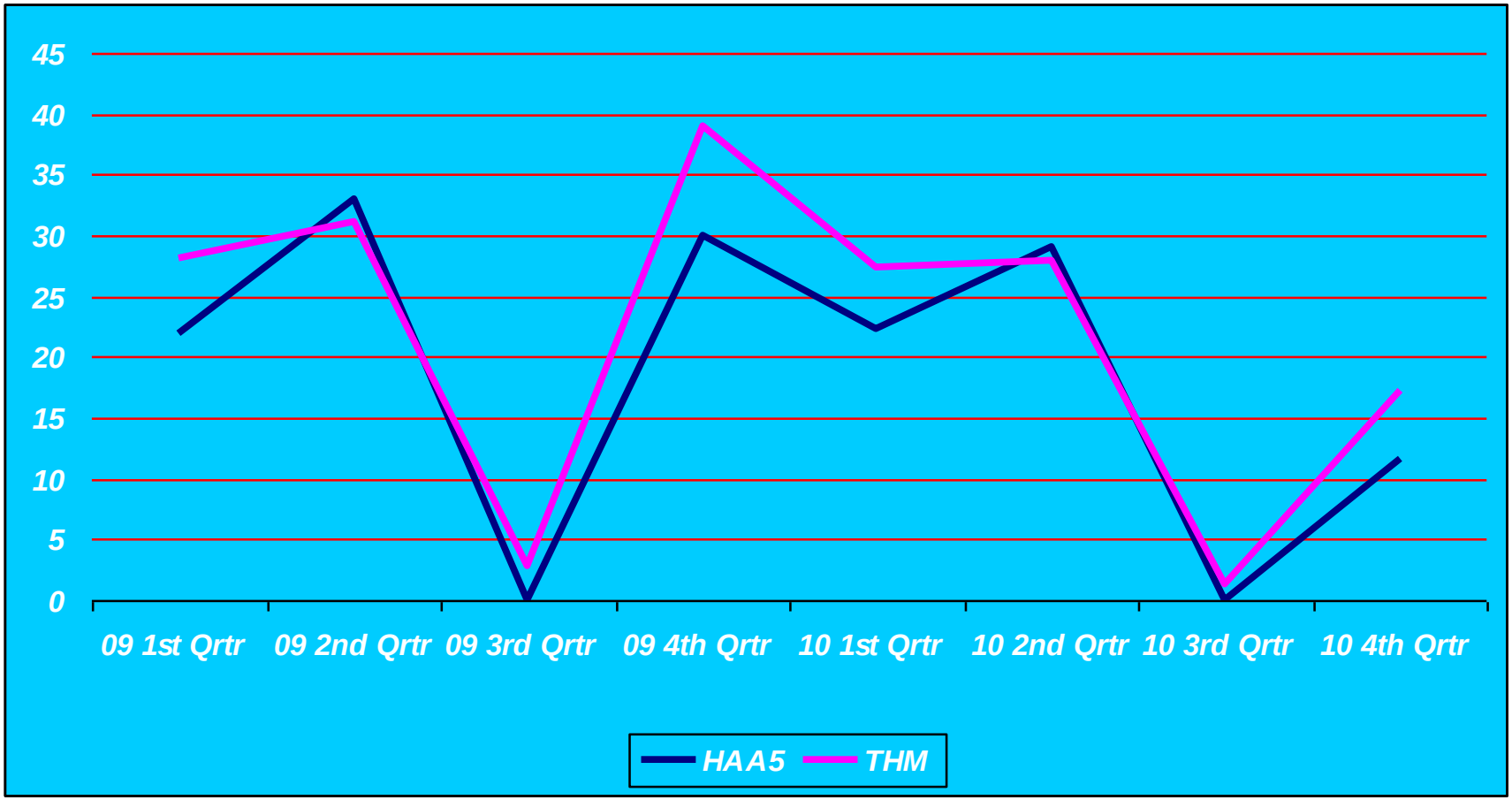
Pilot Results

- No noticeable change in TMP. Dosages of 1 to 4 mg/L were used. Not expected.
- No significant change of TOC removal.
- Huge change in system THM/HAA5's in 2 influenced reservoirs.

Federal RSVR



Harris Ranch Bstr



Questions?