

Optimizing source selection for
controlling disinfection by-products
for Astoria, Oregon

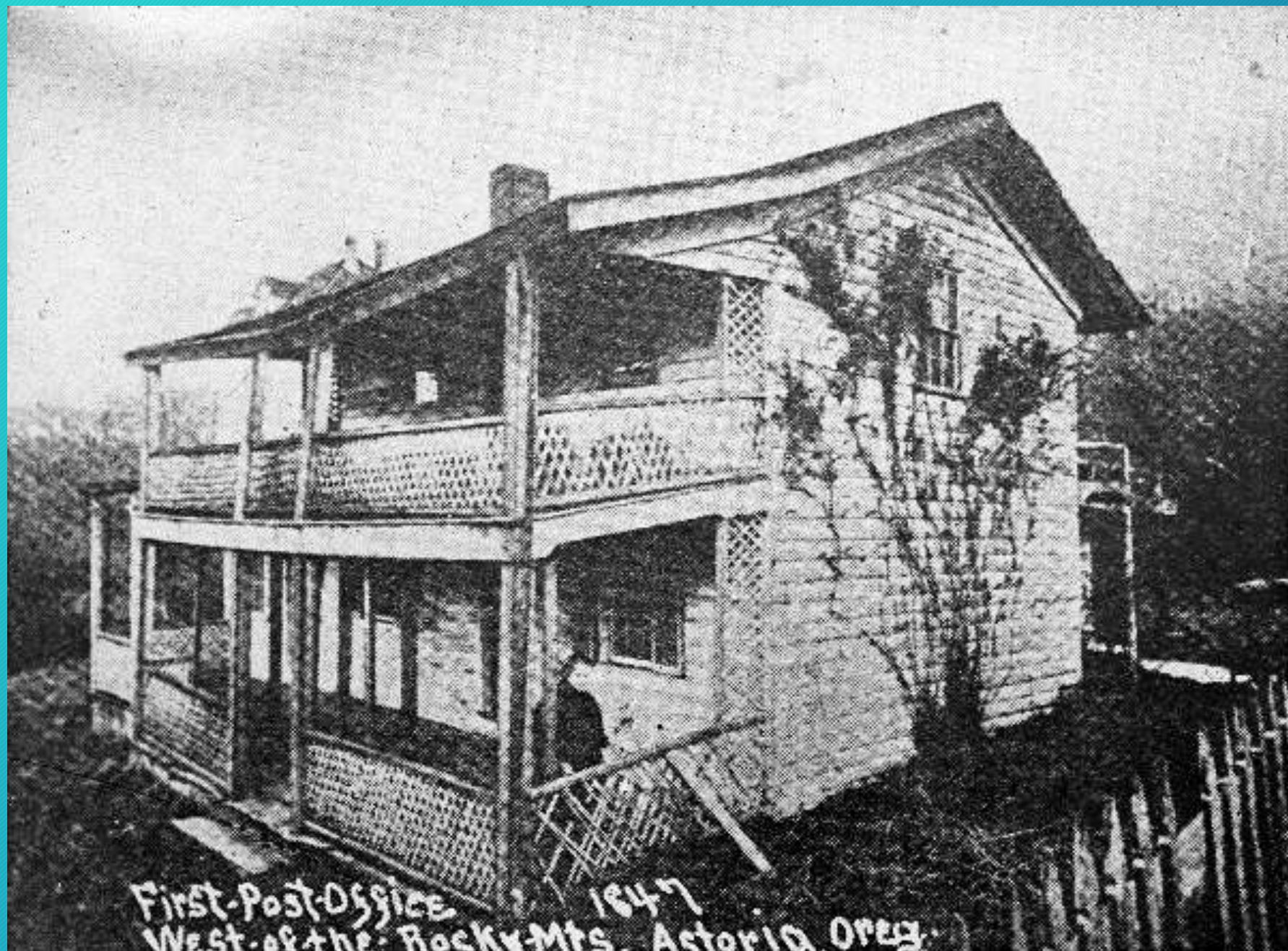
Paul Berg

PNWS AWWA—May 2015

ch2m.SM

Astoria





First Post Office 1847
West of the Rock Mts. Astoria, Oreg.





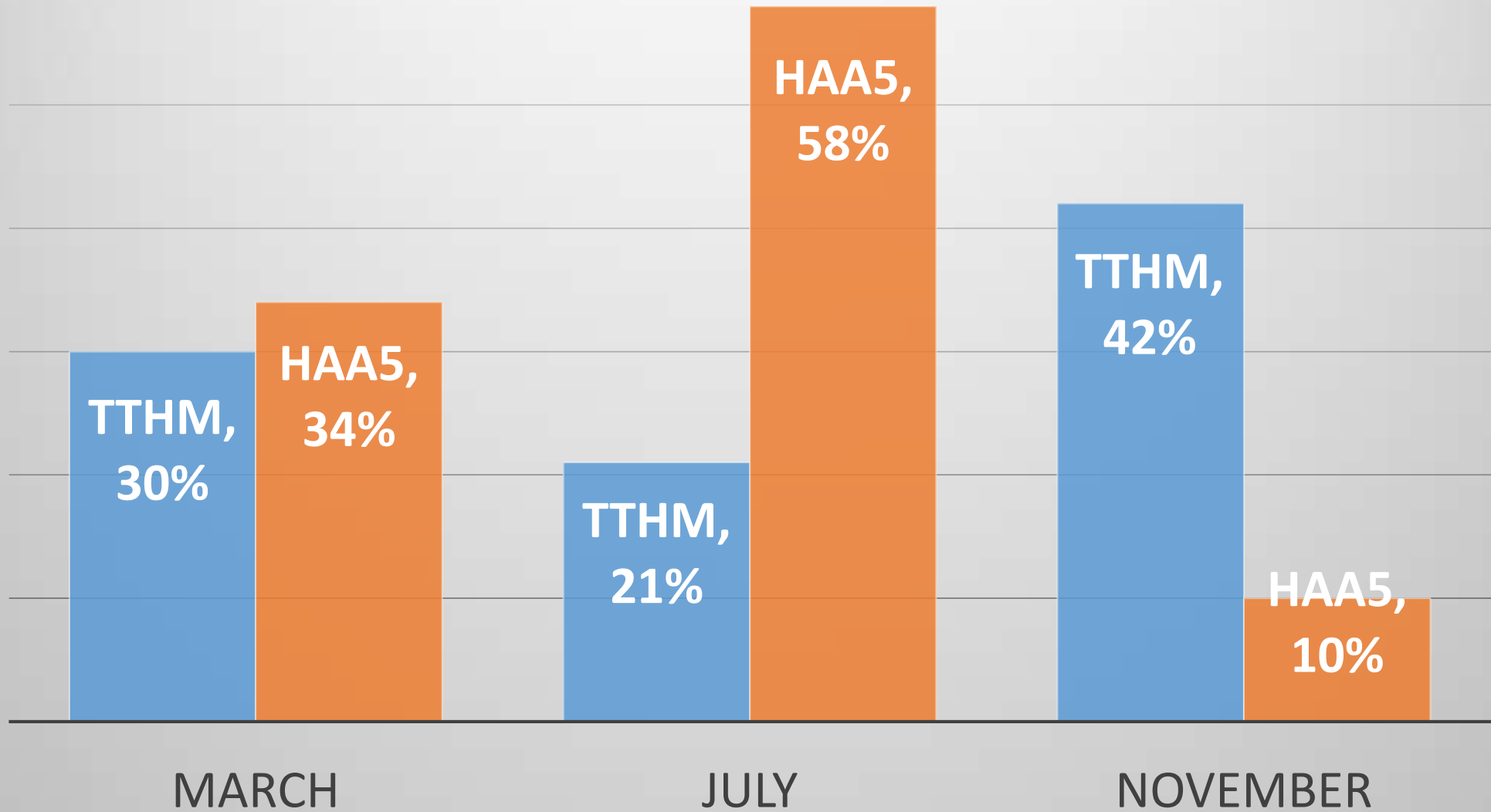
Bear Creek Reservoir

Google earth

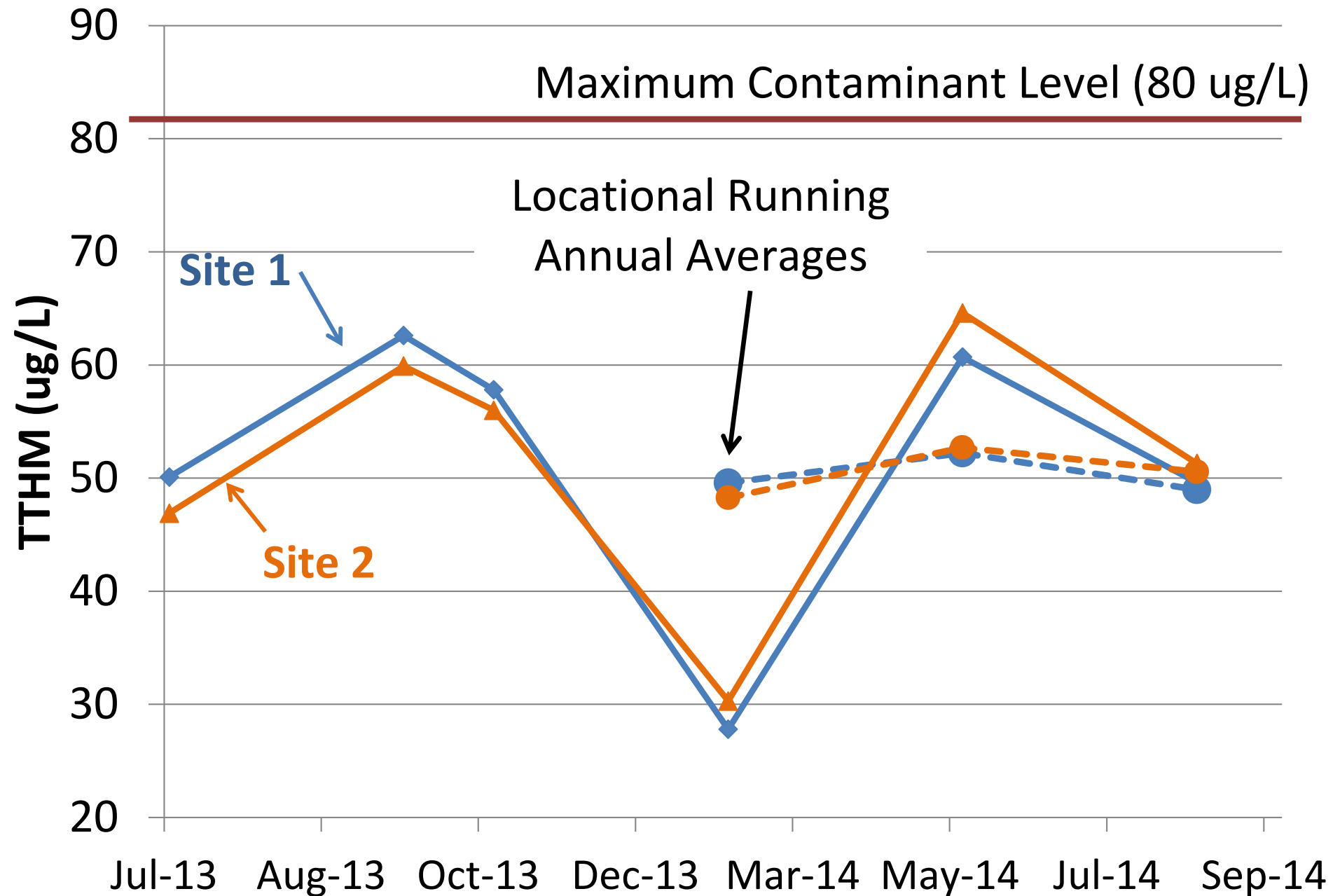
1994

Imagery Date: 7/6/2012 46°06'59.44" N 123°38'12.27" W elev 705 ft eye alt 2966 ft

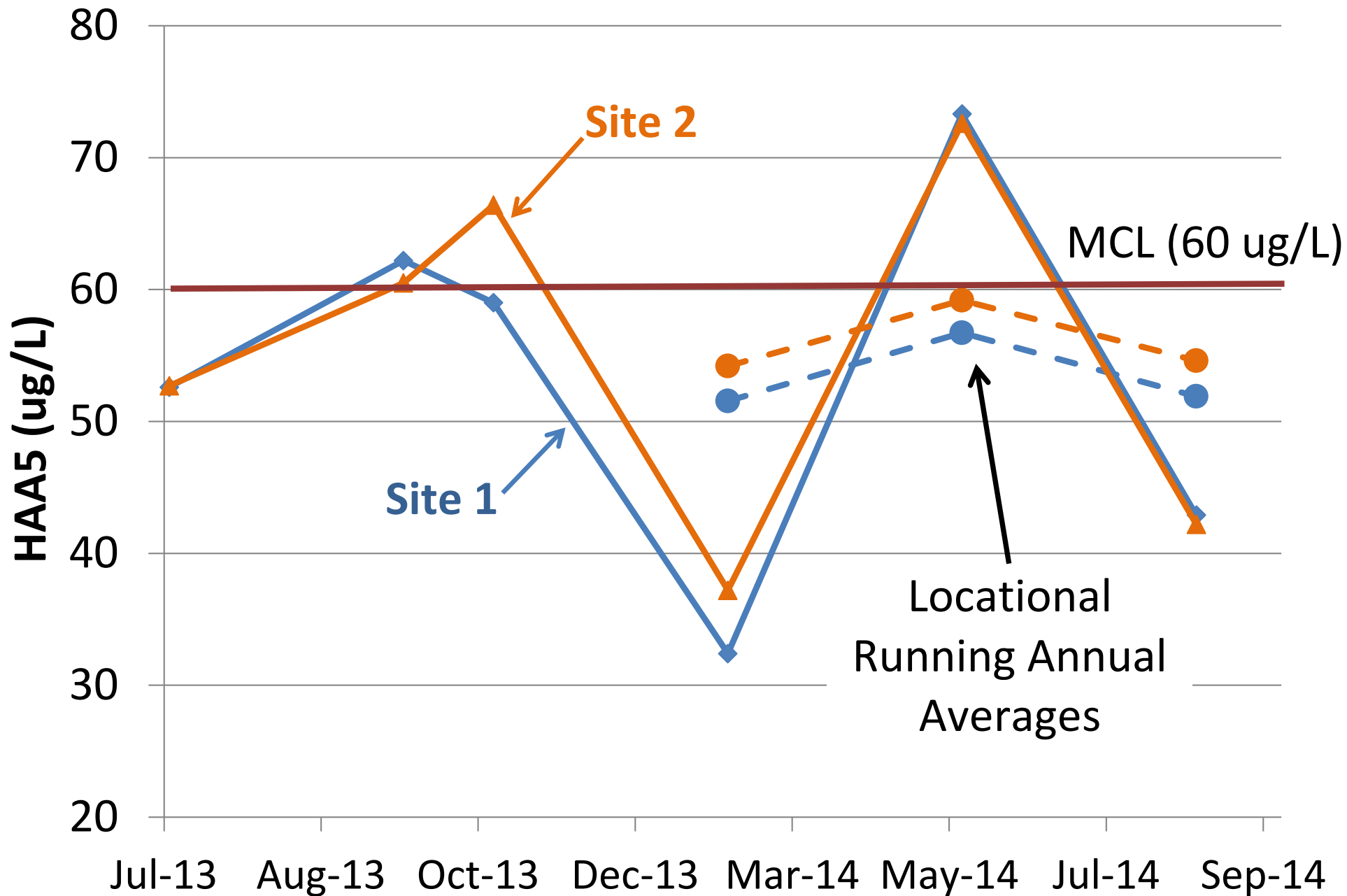
Removal through Slow Sand Filter Plant



Stage 2 Total Trihalomethane Distribution Results



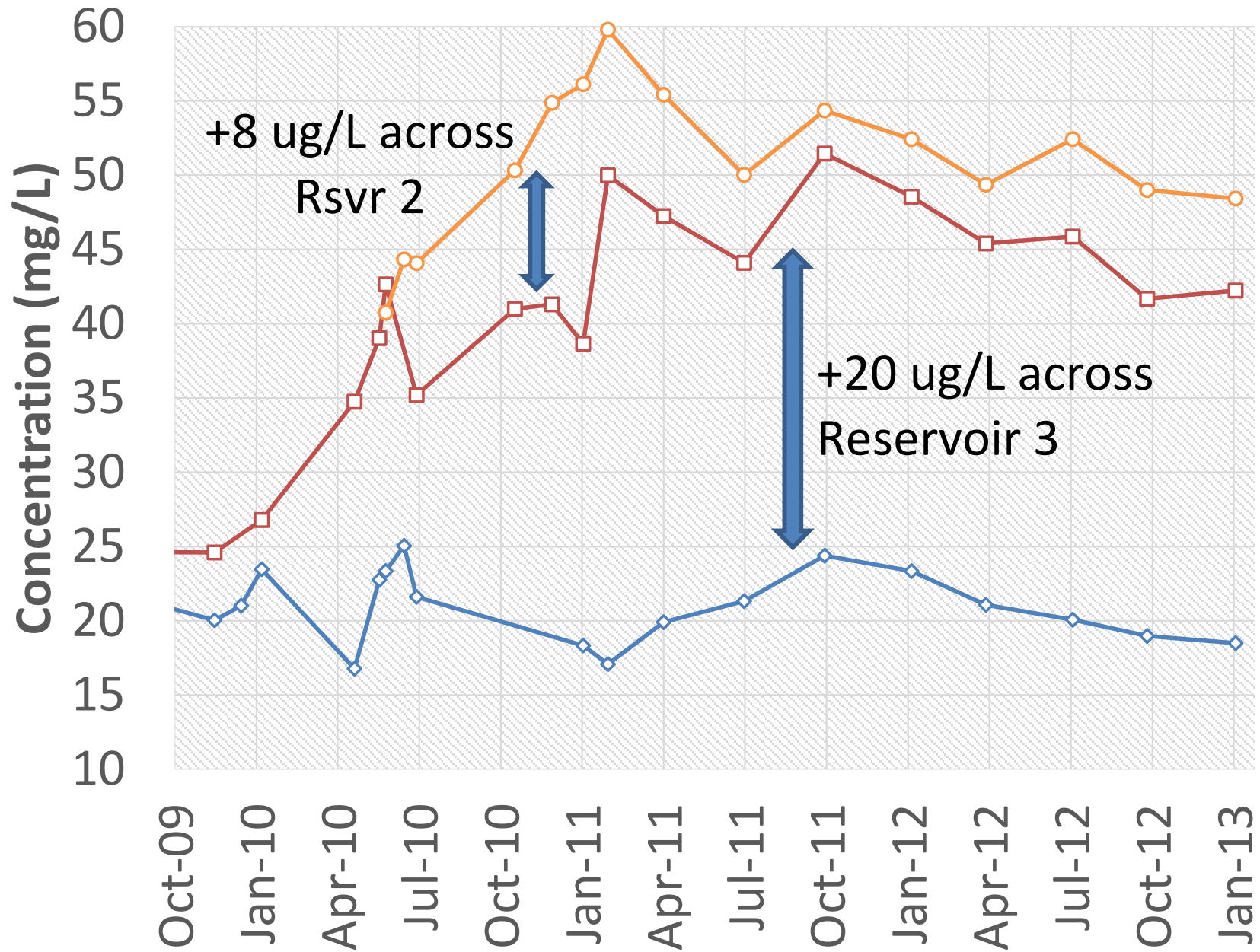
Stage 2 Haloacetic Acid Distribution Results



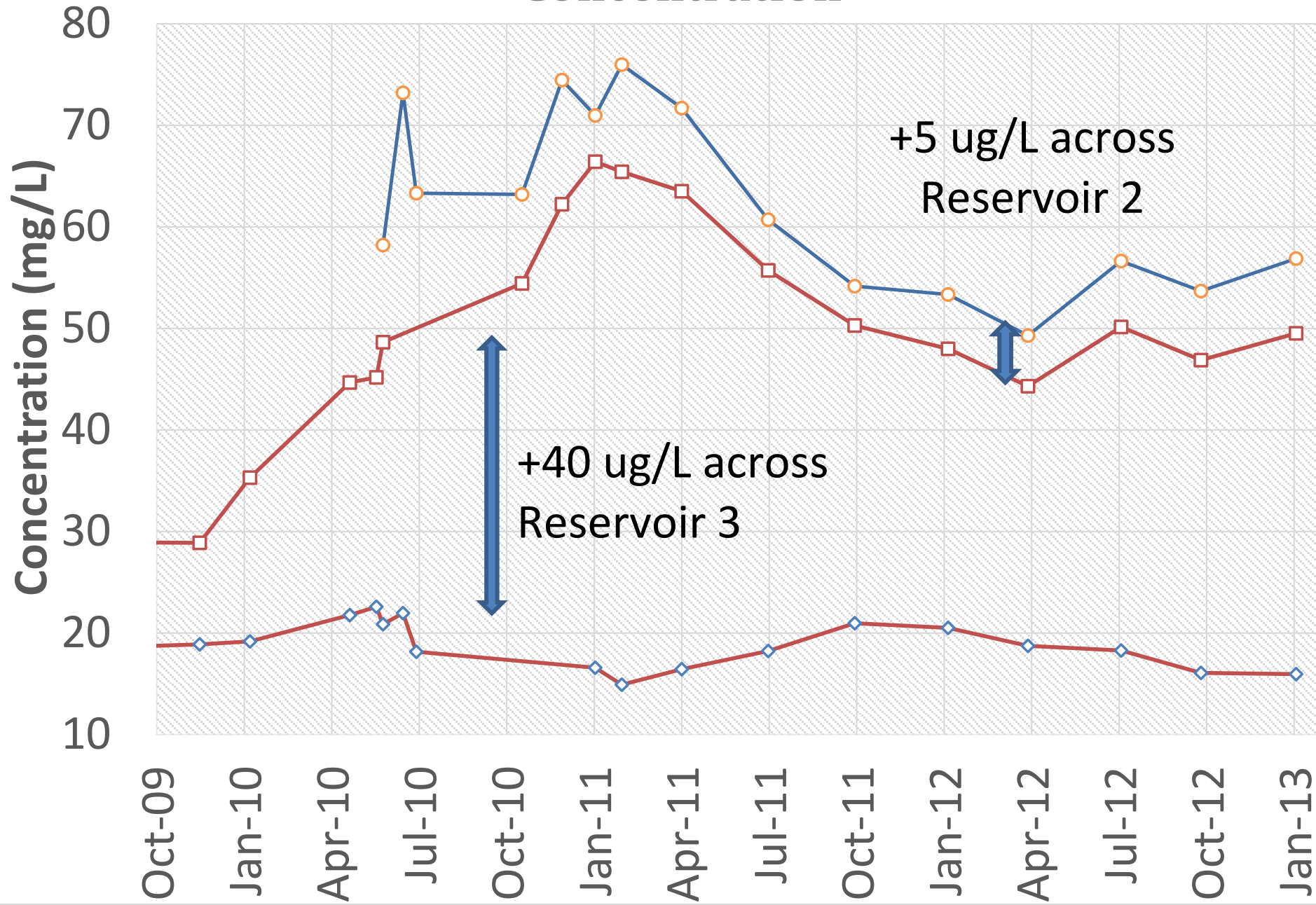




Locational Running Annual Average TTHMs



Locational Running Annual Average HAA5 Concentration



Options

- Source selection
- Treatment optimization
 - Chlorination
 - GAC sandwich in slow sand filters
- Pretreatment prevention
- Post treatment removal

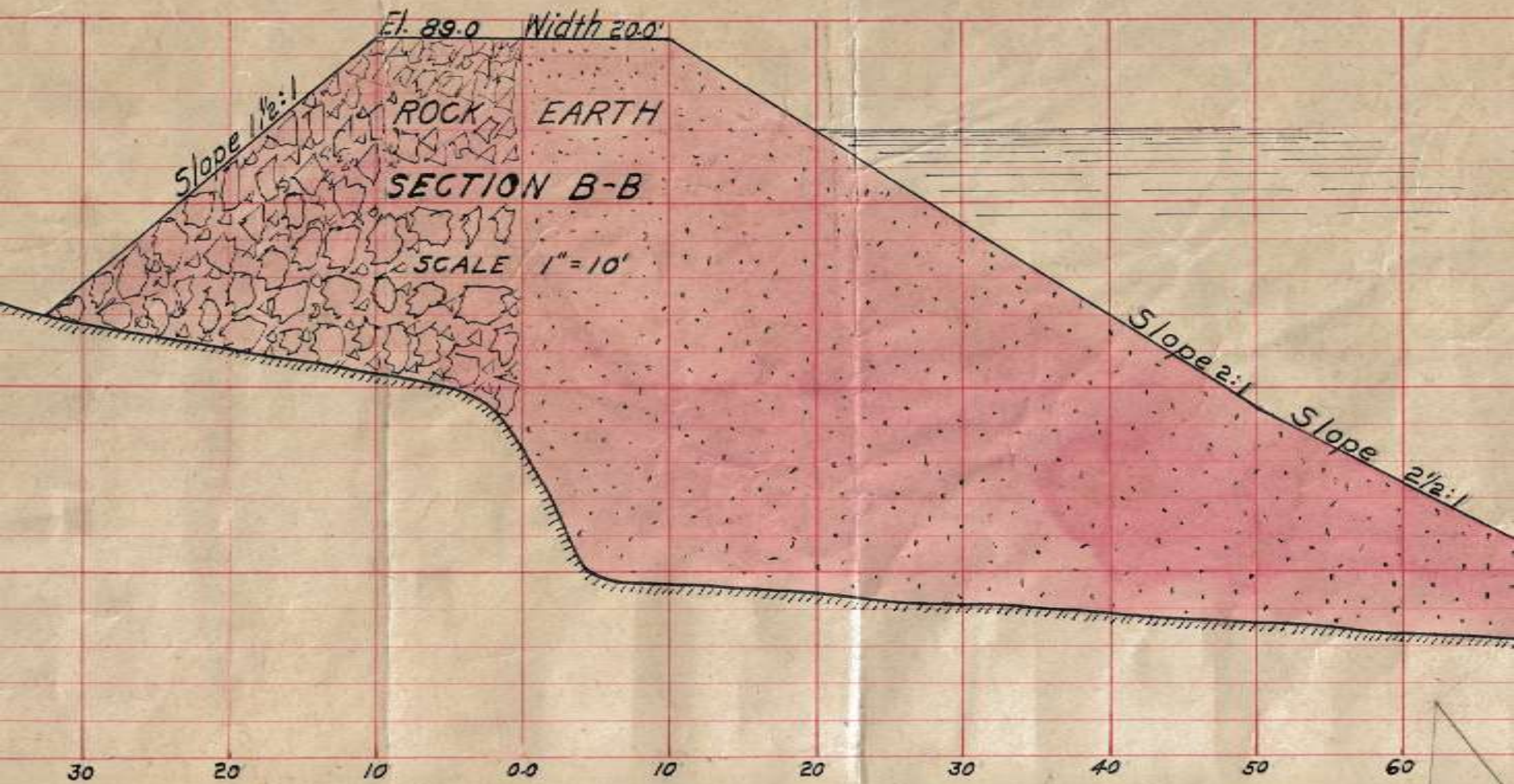


Logging Operations about $\frac{1}{2}$ mile Northeast of Lake Wickiup August 29, 1951





JULY 1958

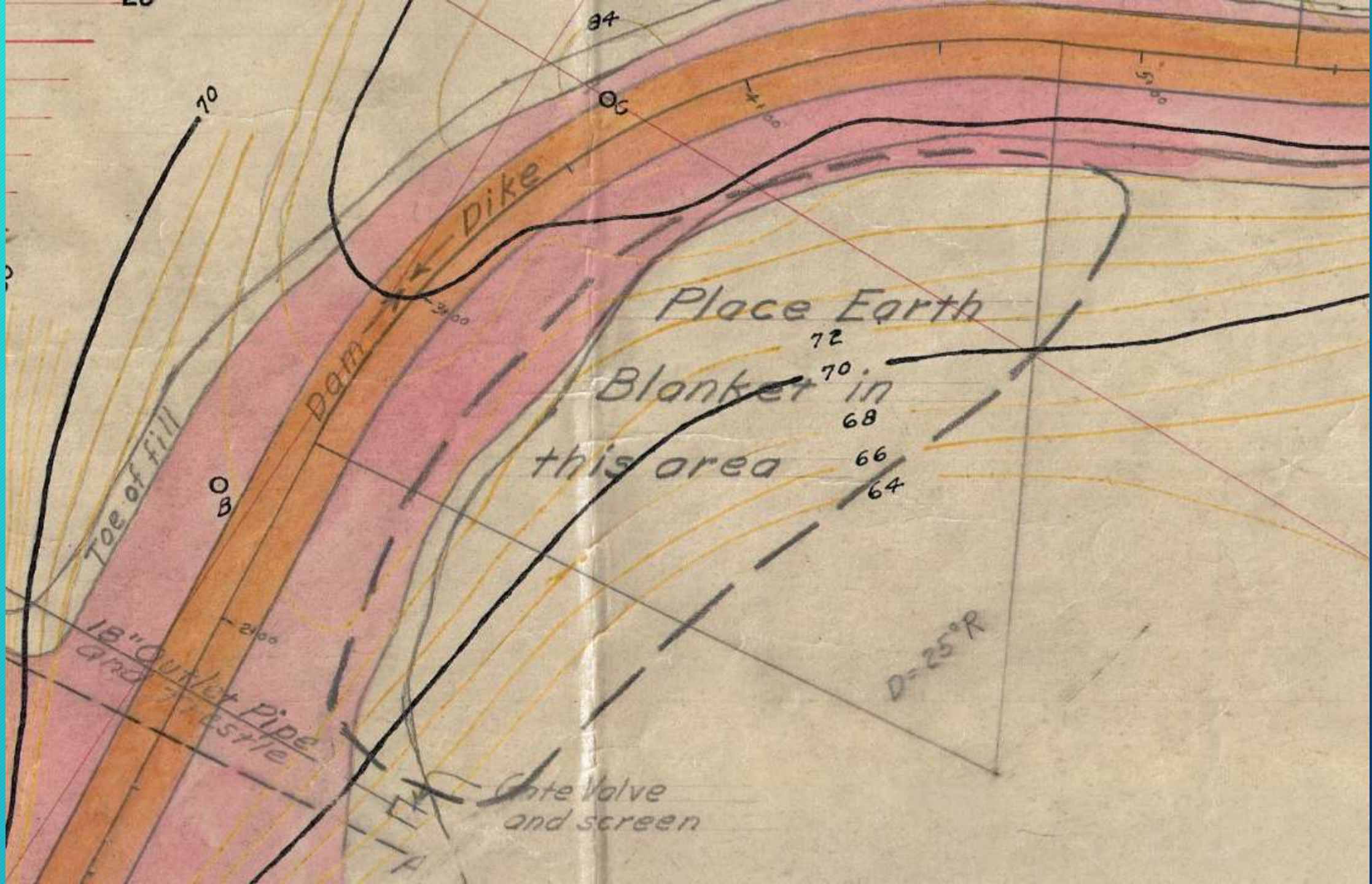


MAY 1958





SEPT 1958



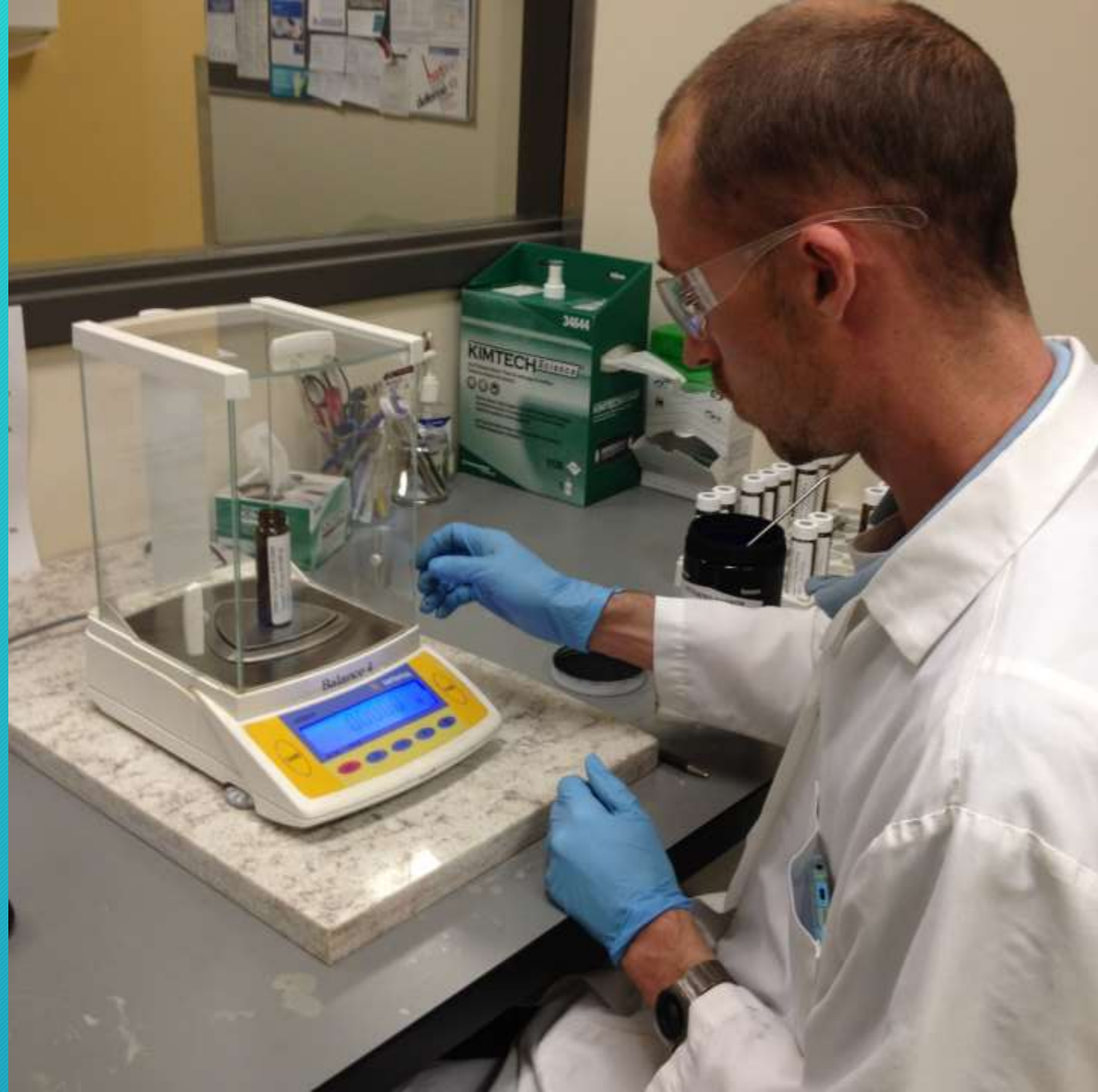




Middle Lake

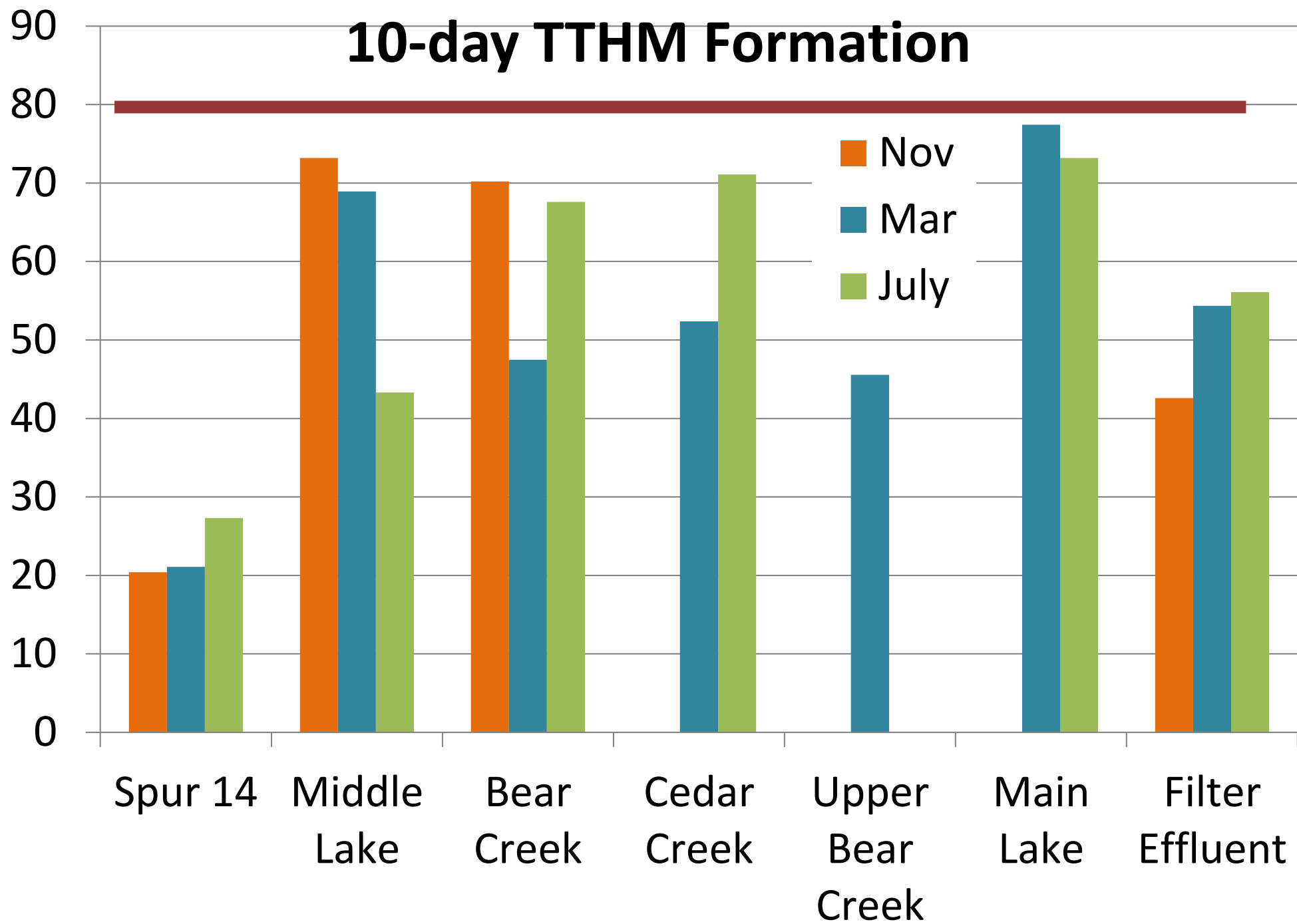
Wickiup Lake



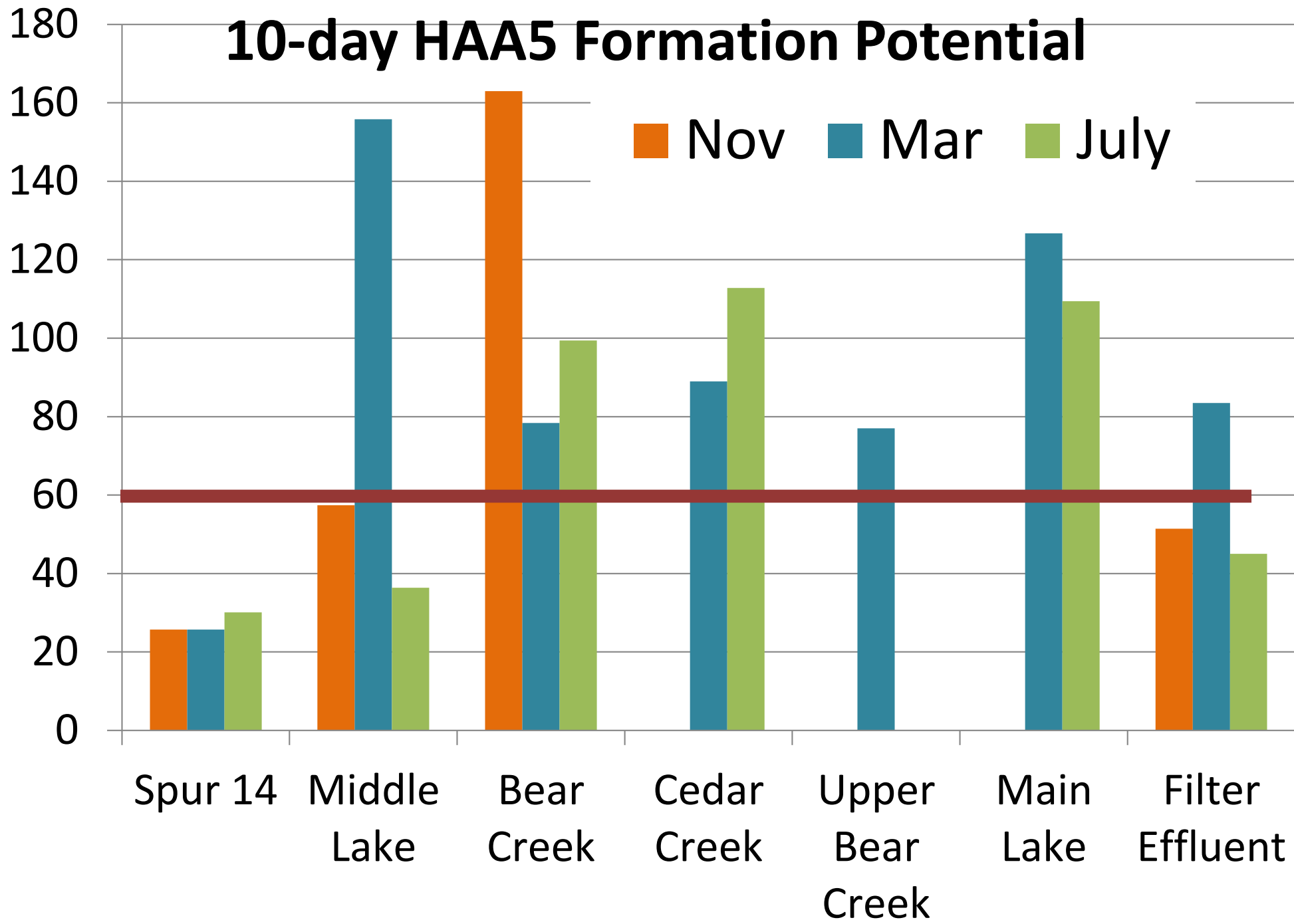


Source	Turbidity (ntu)	TOC (mg/L)	DOC (mg/L)	UV 254 Absorption (1/cm)
Spur 14	0.56	0.42	0.31	0.01
Lakes (avg of 2)	1.29	1.42	1.31	0.06
Creeks (avg of 3)	1.79	0.95	0.83	0.04
Filtered water	0.12	0.85	0.90	0.04

10-day TTHM Formation

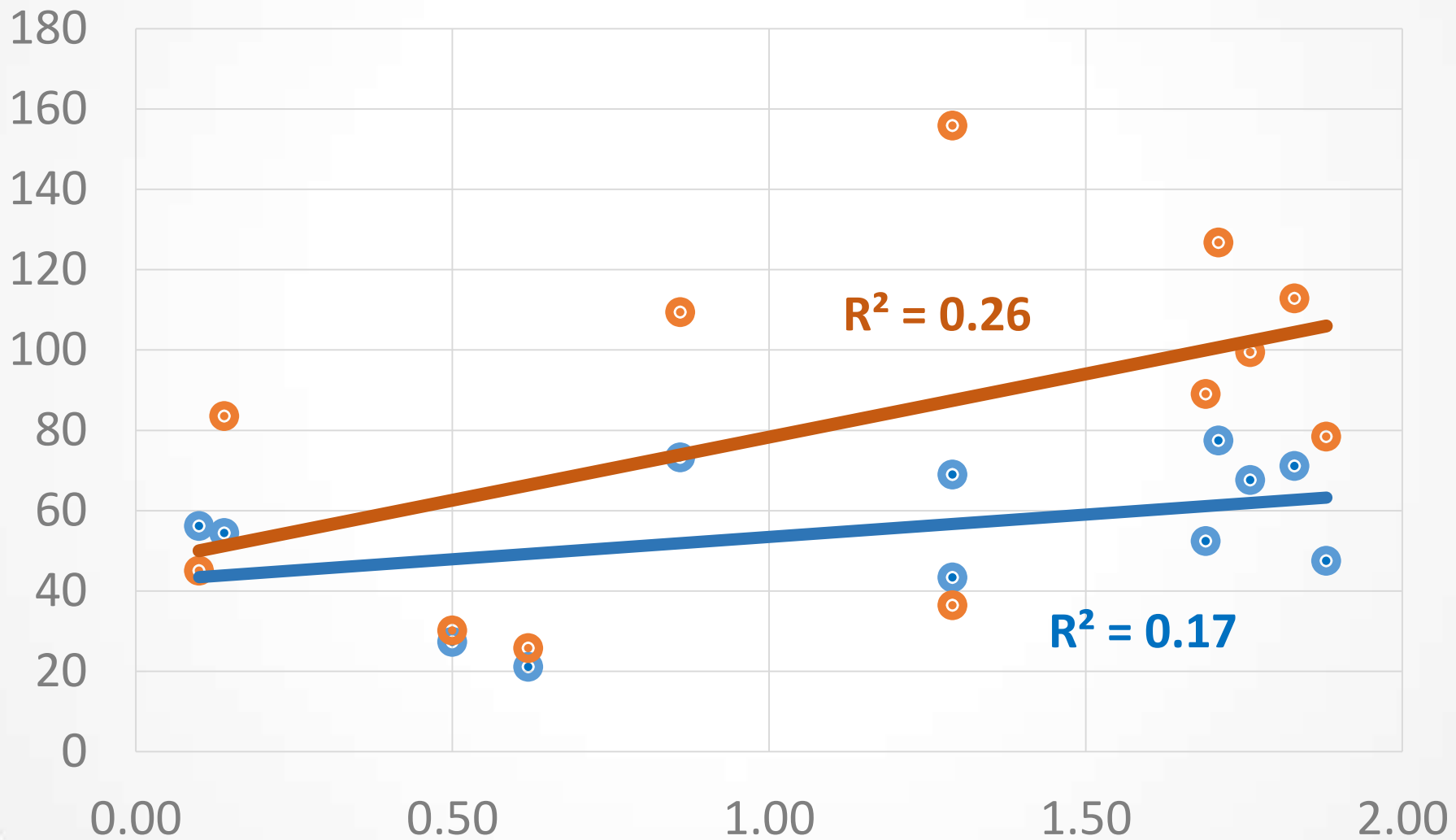


10-day HAA5 Formation Potential



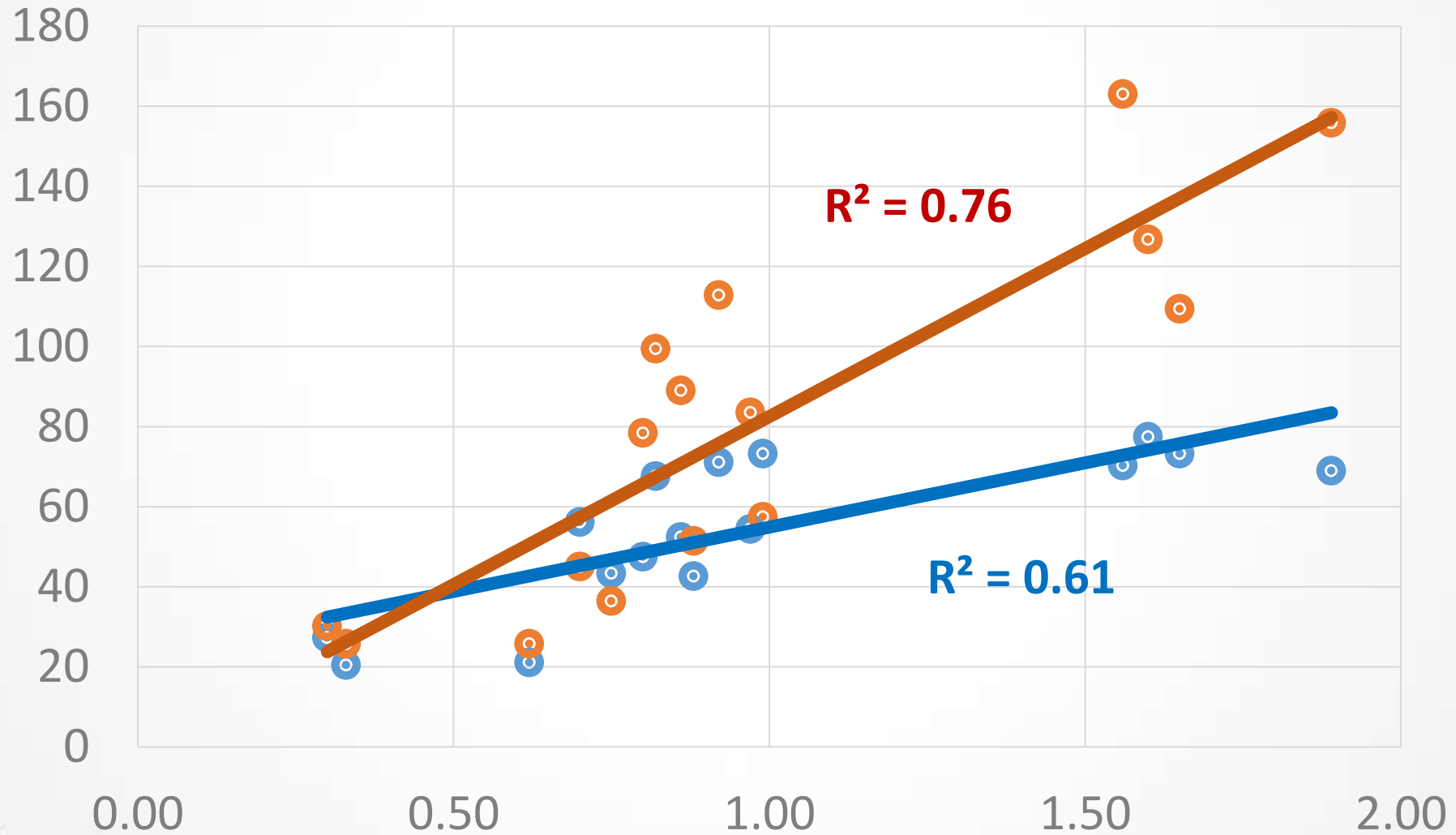
Turbidity compared to TTHM and HAA5

● TTHM ● HAA5 — Linear (TTHM) — Linear (HAA5)



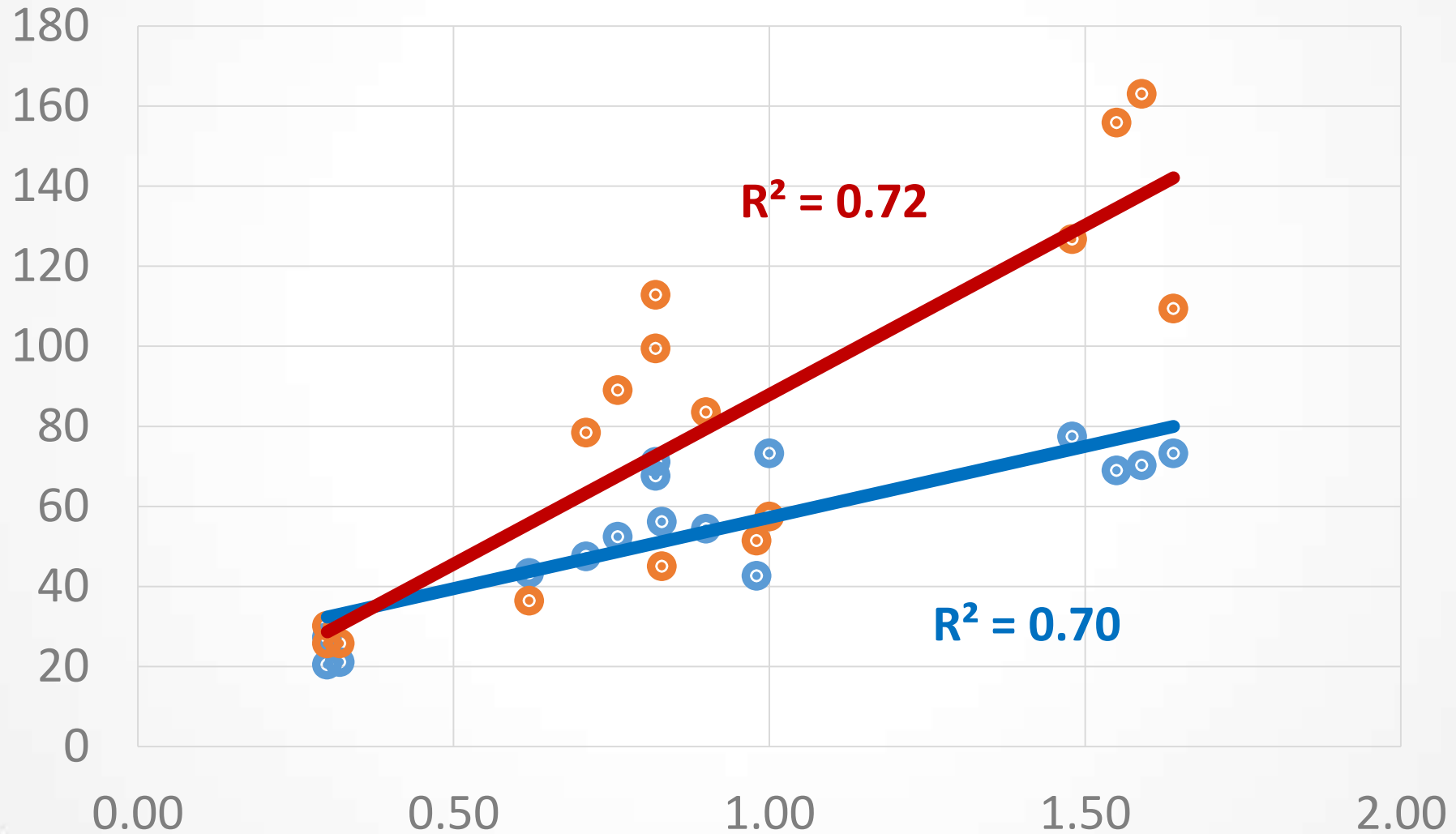
TOC compared to TTHM and HAA5

○ TTHM ○ HAA5 — Linear (TTHM) — Linear (HAA5)



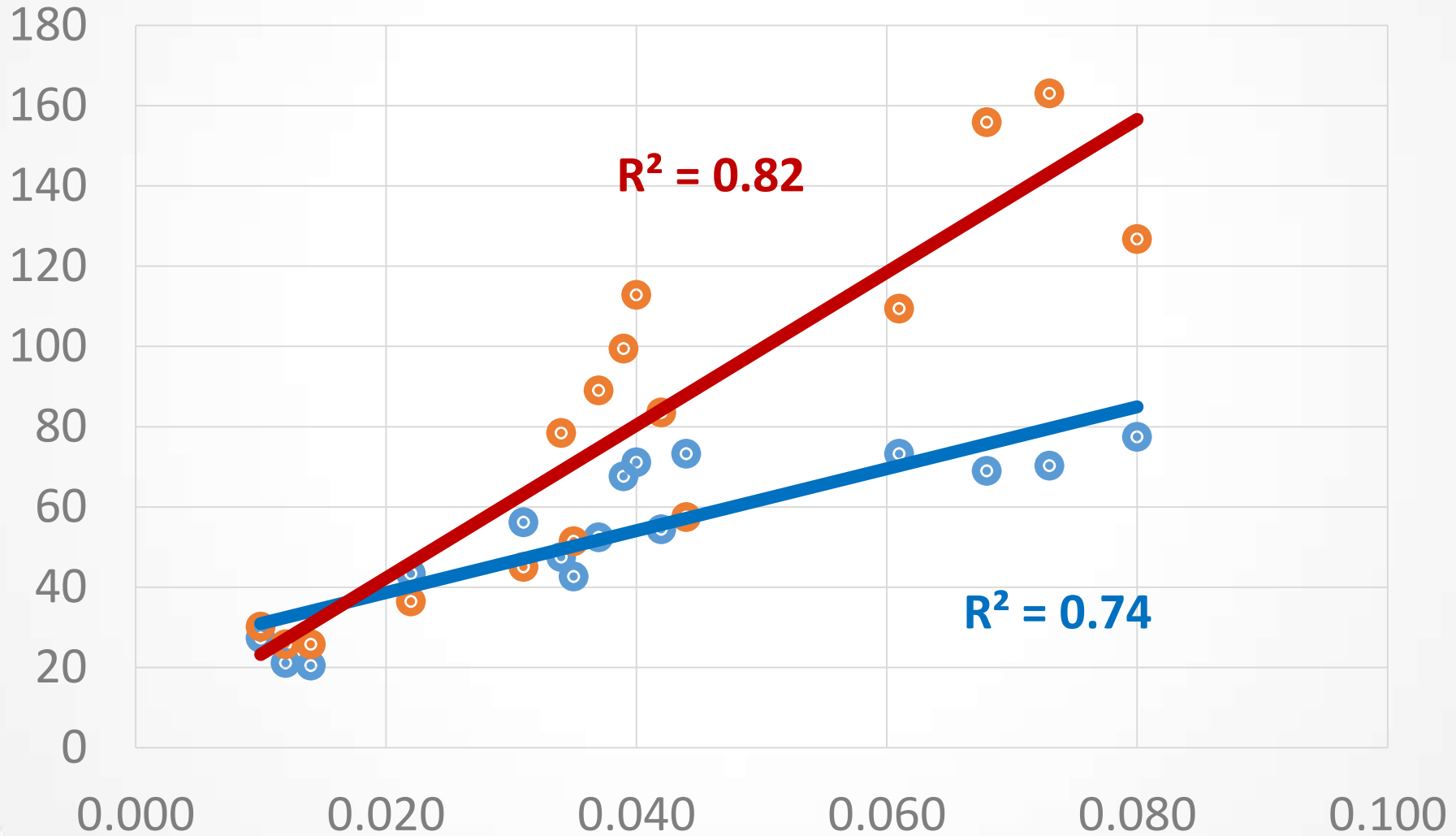
DOC compared to TTHM and HAA5

○ TTHM ○ HAA5 — Linear (TTHM) — Linear (HAA5)



UV254 compared to TTHM and HAA5

○ TTHM ○ HAA5 — Linear (TTHM) — Linear (HAA5)





Thank you.

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