

TTHMs

Recent increases in chlorination have raised investigative TTHM levels to 80 Parts Per Billion. TTHMs are affected by chlorine dose, time, temperature, and pH. We expect to exceed the MCL for TTHMs in July. If we exceed MCL we will have to notify members and likely return to quarterly sampling. Gray & Osborne has provided estimates for investigating and piloting treatment changes to reduce TTHM formation (see attached email).

TTHMs	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Notes
TTHM Running Annual Average	57/58	(80)						2 samples due						Trigger: 60 PPB MCL: 80 PPB

		RAW	POST CARBON	pre ATEC	POST ATEC	RESERVOIRS 2 online	Pre DISTRIBUTION	DISTRIBUTION 300 X PI
JANUARY	CHLORINE - avg weekly			2.0/1.4	.73/.53	.28/.16	.83/.69	.04/.01
1/28/20	TTHM				6.1	40.2		80.0
1/28/20	MTTP (max TTHM potential)	323.7	263.1		297.8	301.1		256.1

TOC AND UVA

At DOH’s request, we are sampling Total Organic Carbon (TOC) monthly to determine the correlation between TOC and UVA. The correlation between UVA and TTHMs has been documented and graphed by Gray & Osborne.

		RAW	POST CARBON	POST ATEC	RESERVOIRS	DISTRIBUTION
1/28/20	UV	0.178	0.105	0.076	0.063	
1/28/20	TOC	3.82	2.05	1.96	2.10	1.96
	%	0.05	0.05	0.04	0.03	
2/26/20	UV	0.174	0.073			0.056
2/26/20	TOC	3.62	1.64	1.44	1.75	1.51
	%	0.05	0.04			0.04

RESERVOIRS

As required in our sanitary survey, four new reservoir vents were installed by Baker Silo on March 18th.

From: Russ Porter <rporter@g-o.com>
Sent: Sunday, March 15, 2020 4:06 PM
To: 'Water'
Subject: Work proposals

Follow Up Flag: Follow up
Flag Status: Flagged

April,

I have been thinking about the work you have requested. There are a couple of ways to approach it. One way would be for me to put together a more formal proposal that would include putting together a protocol for doing the pilot study full scale at the plant, we could do both with ambient air and KMnO4 or just KMnO4. We would run it by DOH for their approval since it would be full scale. We did something similar to this for Bill at North Beach at their North Treatment Plant. The cost for that study was \$14k back in 2011 but they have several wells there so there was a couple days of testing. I would suspect that it would be about \$15k to do that now.

Another option would be to have ATEC come with their pilot trailer and do the work with them in the pilot trailer. We could do several runs at different flow rates. We wouldn't need DOH approval to do that work since it wouldn't involve running water through the existing plant. We would determine the level of KMnO4 required to remove the manganese and some of the organics without having any extra KMnO4 come out the filter. We could assess the UV and take some sample to go to the lab for max THM formation potential to assess the effectiveness of the KMnO4. After doing the work with their pilot trailer, we would do a report and then ask DOH if we could do full scale work at the plant. This option would have less paperwork since we wouldn't have to prepare a protocol for DOH. It would require rental of the ATEC unit. I don't know what their current rate is but I will ask them.

Another option would be take things more incrementally. I could come down for a day to do some sampling for DO and various things. We could do some jar testing and such. This would give us some idea of the parameters and then we could assess our next move. At that point, it would likely be one of the first options but we would have a better idea of what we wanted to target.

What I would like to do is talk to Nick at DOH and ATEC this week to get their thoughts before I provide a final proposal. I apologize for the delay in getting something to you but I finally some time to think about this at length.

Those are my thoughts. I will let you know what I find out from DOH and ATEC.

Russ Porter, P.E. | Project Manager | 206.284.0860 p | 206.283.3206 f
Gray & Osborne, Inc. | 1130 Rainier Ave. S., Suite 300, Seattle, WA, 98144



Please consider the environment before printing this email.

INFORMATION FROM DOH ON TTHMs

<https://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/Disinfection/DisinfectionByproducts>

What are disinfection byproducts and how are they formed?

Water systems add chlorine to drinking water to kill or inactivate harmful organisms in a process called “disinfection.” During this process, chlorine also reacts with naturally occurring organic matter that may be present in drinking water. Chlorine disinfection byproducts (DBPs) can form during this chemical reaction.

What are the regulations on DBPs?

The Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules require water systems that use a disinfectant to monitor for two groups of DBPs. The U.S. Environmental Protection Agency (EPA) determined that regulating these two groups of DBPs would cause a general overall reduction in all DBPs. Other regulations apply to other less commonly used disinfectants, such as chlorine dioxide and ozone.

Total Trihalomethanes (TTHM): The maximum contaminant level for TTHM is 0.080 mg/L.

Haloacetic acids (HAA5): The maximum contaminant level for HAA5 is 0.060 mg/L.

At present, EPA is reexamining TTHM and HAA5 regulations based on new information regarding these contaminants.

Do DBPs have harmful health effects?

According to EPA, some people who drink water containing TTHM or HAA5 in excess of the established MCLs over many years may experience problems with their liver, kidneys, or central nervous system and may have an increased risk of getting cancer. At present, however, there is no conclusive evidence linking DBPs in water with cancer or other health effects.

Do the benefits of chlorination outweigh the health risks of DBPs?

The simple answer is yes. Adding chlorine to drinking water sources with bacteria and other harmful organisms makes the water safer to drink. When used correctly, chlorine kills or inactivates harmful microorganisms that cause diseases, such as *E.coli* infection, typhoid, cholera and dysentery.



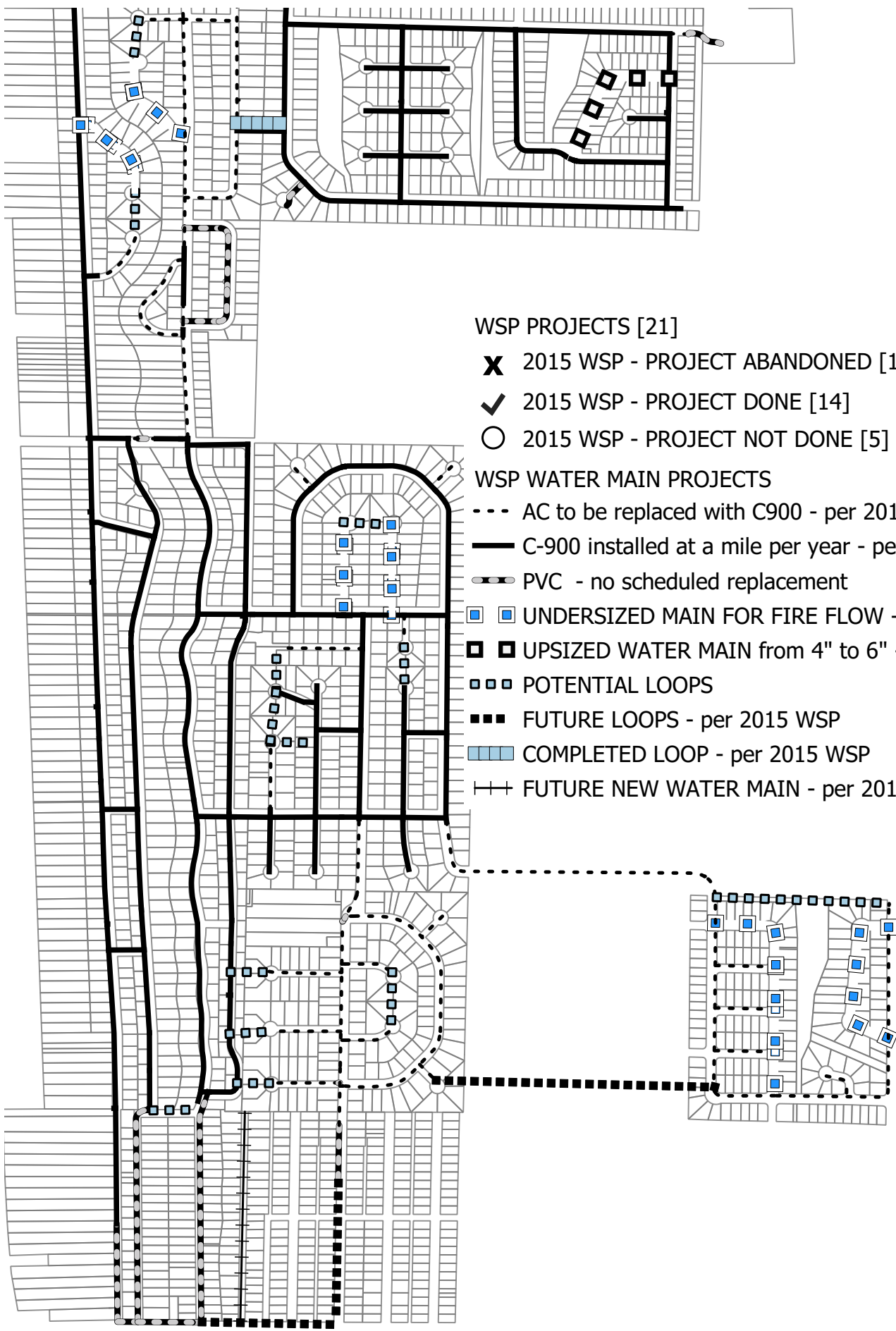
WSP PROJECTS [21]

- X** 2015 WSP - PROJECT ABANDONED [1]
- ✓** 2015 WSP - PROJECT DONE [14]
- 2015 WSP - PROJECT NOT DONE [5]

WSP WATER MAIN PROJECTS

- - - AC to be replaced with C900 - per 2015 WSP
- C-900 installed at a mile per year - per 2015 WSP
- |—** PVC - no scheduled replacement
- **■** UNDERSIZED MAIN FOR FIRE FLOW - upgrade 4" to 6" - per 2015 WSP
- **■** UPSIZED WATER MAIN from 4" to 6" - per 2015 WSP
- **■** POTENTIAL LOOPS
- **■** FUTURE LOOPS - per 2015 WSP
- **■** COMPLETED LOOP - per 2015 WSP
- ++** FUTURE NEW WATER MAIN - per 2015 WSP

- X** INTERTIE W/ NORTH BEACH, PG 1-26
- System Looping Ocean Woods to Div 16, PG 3-34
- WELL SITE ACCESS, PG 8-2
- RESERVOIR NO. 1 ACCESS, PG 8-2
- FIND AND REPAIR LEAKS, PG 4-5
- RESERVOIR STRATIFICATION STUDY, PG 6-9
- ✓** RESERVOIR CLEAN AND REPAIR, PG 8-2, DONE 2015
- ✓** DBP REDUCTION, PG 3-48, DONE 2018
- ✓** COLOR REMOVAL, PG 3-48, DONE 2018
- ✓** WATER MAIN REPLACEMENT (1 mile per year), PG 8-7, DONE 2009-2020
- ✓** 5 YEAR METER INSTALLATION, PG 3-49 & 4-5, DONE 2012-2017
- ✓** INSTALL PRODUCTION SOURCE METERS, PG 4-5, DONE 2017
- ✓** REDUCE WATER MAIN FLUSHING, PG 4-5, DONE
- ✓** EDUCATE MEMBERS ON WATER USE EFFICIENCY, PG 4-5, DONE 2012
- ✓** ESTABLISH CONSERVATION CHARGE, PG 4-5, DONE 2018 & 2019
- ✓** ANNUAL WATER USE STATEMENTS, PG 4-5, DONE 2012
- ✓** OPERATE WELLS AT 1/3 DRAWDOWN - SALTWATER INTRUSION, PG 5-8, DONE 2015
- ✓** MONTHLY CHLORIDE RESIDUALS - SALTWATER INTRUSION, PG 5-8, DONE
- ✓** WELL TRANSDUCERS - SALT WATER INTRUSION, PG 5-8, DONE 2015
- ✓** NOTIFICATION TO MEMBERS - WELL HEAD PROTECTION AREA, PG- 5-13, DONE 2016



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