

Deming, Amy

From: Grande, Joseph
Sent: Friday, May 18, 2018 10:11 AM
To: 'hannah.l.alvarado.mil@mail.mil'; 'matthew.l.shaw4.mil@mail.mil'; 'jeffrey.s.reese2.mil@mail.mil'
Cc: Heikkinen, Thomas
Subject: PFC Water Testing Questions
Attachments: NotesJDG.20161011.pdf; NotesJDG.20170117.WUB.pdf; NotesJDG.20171019.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

To Captain Matthew Shaw and other 115th Fighter Wing environmental compliance personnel:

Below are responses to questions regarding PFAS testing by Madison Water Utility and the significance of the results. I have also attached meeting notes from previous technical advisory committee meetings in which the subject of PFAS was discussed.

Response to Question 1:

Unregulated Contaminant Monitoring Rule, Cycle 3 (UCMR3) required all large community water systems, including Madison, to monitor six PFAS using EPA Method 537. Madison Water Utility monitored all wells twice in 2015 and had no detections at any well. However, MRLs were ten times higher than health endpoints suggested by human and animal studies and up to two orders of magnitude above currently existing laboratory analytical capabilities (Hu et al., 2016). Our technical advisory board recommended more testing with lower detection limits based on this information.

Response to Questions 2 and 3:

Testing in 2017 and 2018 followed a modified EPA Method 537 procedure; detection limits are <1 ng/L for each PFAS screened. Because PFAS in water are not regulated in Wisconsin, there is no state-recognized method for their analysis. Please note, however, that similar concentrations were reported by two private laboratories - one that has been working with the Department of Defense to assess environmental releases and low-level PFAS occurrence at and around US military installations - using the modified 537 method.

Response to Question 4:

Meeting notes for the 26 April 2018 technical advisory committee meeting are not yet available. I can provide them when they become available.

Response to Question 5:

A mixture of several PFAS, suggestive of a fire-fighting foam origin, at Well 15 is concerning to the water utility. Unfortunately, the treatment system, installed in 2013, to remove other industrial contaminants (VOCs: PCE & TCE) found at Well 15 is not effective at removing PFAS. The combined level of PFAS at Well 15 is not currently above the US EPA Health Advisory Level; however, we are investigating potential sources of PFAS to Well 15. Although there is no current federal drinking water standard, other states (New Jersey & New York, for example) have adopted or are contemplating lower standards for PFAS. Wisconsin DNR recently asked DHS to investigate a potential groundwater standard for these contaminants. We are following the emerging science on toxicology and regulatory activity at the federal and state level regarding these substances to see if additional water treatment may be necessary, in the future, at Well 15.

Response to Question 6:

Yes, we plan to sample Wells 15 and 16 again in September.

Response to Question 7:

Yes, we have been in contact with DNR staff. We were notified in April 2018 of the non-emergency hazardous substance discharge (DNR Form 4400-225, dated 12 April 2018). At the same time, we received an electronic copy of the draft report on the site inspection for perfluorinated compounds at Truax Field that reported the likely off-site migration of PFAS.

Here are some web links to additional information:

- Madison Water Utility, perfluorinated compounds page - <http://www.cityofmadison.com/water/water-quality/water-quality-testing/perfluorinated-compounds>
- Madison Water Utility, Well 15 water quality report - <http://www.cityofmadison.com/water/documents/Well15QualityReport.pdf>
- New Jersey PFOA drinking water standard - <https://patch.com/new-jersey/maplewood/new-jersey-1st-state-set-drinking-water-limit-pfoa>
- Hu et al., 2016 - <https://pubs.acs.org/doi/abs/10.1021/acs.estlett.6b00260>

Please feel free to contact me directly if you have additional questions or need clarification on any of the above responses. Also, I would be happy to meet with you or your staff to discuss this subject in further detail.

Sincerely,
Joe Grande

Joseph Grande
Water Quality Manager
Madison Water Utility
608-261-9101

-----Original Message-----

From: Alvarado, Hannah L MSgt USAF 115 FW (US) [mailto:hannah.l.alvarado.mil@mail.mil]
Sent: Thursday, May 17, 2018 2:07 PM
To: Van Aartsen, Marie <MVanaartsen@madisonwater.org>
Cc: Shaw, Matthew L Capt USAF 115 MSG (US) <matthew.l.shaw4.mil@mail.mil>; Reese, Jeffrey S SMSgt USAF 115 MDG (US) <jeffrey.s.reese2.mil@mail.mil>
Subject: PFC Water Testing Questions

Marie,

Hope this email is finding you well and you've had a great start to the summer!

Again here at the base, the water testing for Perfluorinated Compounds has become a hot topic, and I wanted to touch base with you for a few specific questions regarding the most recent 2017 PFC testing. We've consolidated a list of specific questions (below). If you could provide any additional information as soon as you're able that would be great! Also, I've cc'd our base Environmental Manager as well (if you could please "reply all" so he can see the responses that would be fantastic).


1. What testing standard was used to test the wells for PFCs (well 15) (specific standard with number and title)?
2. What "more sensitive" analytical testing standard was used to detect PFOS/PFOA?

3. Just to confirm, is the "more sensitive" analytical testing recognized as a testing standard by the WI DNR and the EPA?
4. Is it possible to get a copy of any meeting minutes from the "Water Quality Technical Advisory Committee Meeting (26 April 2018)" that had PFOS/PFOA as an agenda item?
5. Does your office have any general concerns about PFOS/PFOA since this additional testing was been done?
6. Is it correct that more sampling will be accomplished in September?
7. Has Madison Water Utility been in contact with the DNR regarding this issue?

Thank you for any information or update you can give! As always, your help is greatly appreciated. :)

v/r,

Hannah

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Water Quality Technical Advisory Committee

Meeting Notes

Olin Avenue Conference Room

October 11, 2016 – 1:00 p.m.

Attending: Janet Battista, Greg Harrington, Jocelyn Hemming, Joseph Grande, Joe DeMorett, Al Larson, Amy Barrilleaux

Absent: Sharon Long, Tom Heikkinen

Guests: Eric Oelkers, SCS Engineers; 1 citizen

1. Agenda Repair/Announcements

2. **Review of Meeting Notes** - No changes to the July 12, 2016 notes were proposed.

3. **2017 Meeting Dates** – January 17; April 11; July 11; October 10

All meetings are held in the Olin Avenue Conference Room and start at 1 p.m.

4. Madison Kipp – Well 8 Groundwater Study Update; presentation by Eric Oelkers (handouts)

Eric provided an update on the groundwater study review. Handouts were prepared by TRC and not Arcadis.

General observations include: some PCE degradates are present in MKC plume, small amount of TCE suggests limited degradation; 1,2-DCE shows slight (?) increase at UW 8, however, not necessarily coming from MKC; plume appears to be moving northward, but increased future pumping at UW 8 could change this; elevated PCE level at MW6/MW17 – where highest level currently observed – not being captured by GWE well.

Well Locations Map [Figure 2], modified by EO, shows potential flow paths from MKC to UW 8 generated from the updated Groundwater Flow Model. Output conservatively estimates 50-60 year travel time for horizontal transport to UW 8; significantly longer timeframe for vertical transfer across shale layer. Pathway probably not direct, high concentration, rather would be some outward diffusion; however would require further investigation and potential conversation with Geological Survey staff to confirm. Previous modeling showed particle pathway was more to the west going through Elmside Park. Modeling suggests importance of monitoring well in lower aquifer to determine if PCE or degradates are present.

Extraction Well Influence [Figure 3], shows the capture zone of the extraction well; monitoring indicates the level of contamination in the extracted groundwater is decreasing. From January to June 2016, the concentrations decreased by 40% from 2500 mg/L to 1500 mg/L; overall 220 lbs of cumulative VOC has been removed during this period. The concentration in most wells to the SE of MKC are either decreasing or showing no change.

Upper Wonewoc Formation Tetrachloroethene (PCE) Isoconcentrations [Figure 9] shows the estimated extent of the PCE plume. Under current conditions, it appears to be moving more to the north than the south. This could change if UW 8 is pumped more. The plume is likely not spreading rapidly but may be moving outward as 15% - 25% of the monitoring wells show an increase in concentration. Increasing concentrations are present in some wells to the north and west of MKC where the increases are present at varying depths.

5. Unregulated Contaminants Monitoring – PFOA/PFOS

Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) were previously monitored as part of the Unregulated Contaminant Monitoring Rule Cycle 3 (UCMR3). Neither was found at any Madison. However, a study suggests that the reporting limits were ten times higher than the safe drinking water limit suggested by some human and animal studies.

Both substances which are used to create non-stick coatings, fabric protectors and in the lining of microwave popcorn bags are detected in 98% of human blood samples. Potential exposure routes other than drinking water also exist.

Fire-fighting foam has been used at Truax field and these substances could be in landfill leachate (i.e. Demetral, Sycamore), wastewater, or old septic fields. Committee recommended additional testing at a few select wells that are likely most susceptible – near the airport or former landfill sites – using the lower detection limits.

6. Water Quality Standard: Temperature

Most distribution temperature monitoring occurs during the winter months, primarily to prevent frozen services. This summer a few customers reported tepid cold water which was confirmed at some locations at the extremes of our distribution system. Phenomenon is likely due to temperature-stratified tanks and reservoirs. Recommend using HOBO style temperature loggers next summer to investigation temperature profile of water in tanks, testing various times of day – filling, emptying – with real time temperature monitoring at hydrants. Studies have shown chlorine variability in excess of 1 mg/L. Mixers are in use at Reservoir 106; to be investigated at 229.

7. Well 27 Radium Study Update

Solids analysis is being conducted on rock cuttings from UW 4 & its replacement UW 27 examining radium pre-cursors (thorium and uranium). In November, MWU to seek Parks Commission permission to install a monitoring well at Klief Park. Cuttings from this hole will also be evaluated for radium pre-cursors. Geophysical tools will be used to characterize the borehole, compare to UW 27, and identify potential radium contributing intervals. Packer testing will be performed to collect water quality samples from identified intervals.

8. Future Agenda Items

- Review – Unit Well 31 Wellhead Protection Plan (January 2017)
- Program Update – Private Well Surveys in Wellhead Protection Areas (January 2017)
- Annexations – Town of Madison (2017); Waunona Sanitary District
- MWU Master Plan & Capital Improvement Plan (April 2017, Al Larson)

9. Adjournment

Next meeting: Tuesday, January 17, 2017 at 1 p.m. in the Olin Avenue Conference Room.

Water Quality Technical Advisory Committee

Meeting Notes

Olin Avenue Conference Room

January 17, 2017 – 1:00 p.m.

Attending: Henry Anderson, Amy Barrilleaux, Janet Battista, Joseph Grande Greg Harrington, Jocelyn Hemming, Gary Krinke, Al Larson, Sharon Long

Absent: Tom Heikkinen, Joe DeMorett

Guests: 1 member of the general public

1. Agenda Repair/Announcements

The committee welcomed Dr. Henry Anderson as the newest member of the committee. Dr. Anderson recently retired from the Wisconsin Department of Public Health where he served as Chief Medical Officer.

Updated contact information was gathered to provide access to a Sharepoint site that will be used for sharing and storing documents that support committee activities.

2. Review of Meeting Notes - No changes to the October 11, 2016 notes were proposed.

3. Wellhead Protection Plan Review – Well 31

Construction of Unit Well 31 will begin in 2017 and the unit should be operational by summer 2018. Prior to the well going on-line, a Wellhead Protection Plan (WHPP) must be reviewed and approved by the Wisconsin DNR. A Wellhead Protection Plan Supplement will be submitted with the current plan. The WHPP Supplement includes documents common to all wellhead protection plans including information on local hydrogeology, regulations, and other wellhead protection resources including a variety of management strategies.

After reviewing the plan, the committee offered the following suggestions:

- Add the underground oil/gas pipelines to Figure 4-1
- Consider the installation of a sentinel well between the well and high-risk potential contamination sites. The committee specifically identified the petroleum terminals and bulk fuel storage facilities (S/SW) and the Dane County landfill.
- Continue communication/relationship building with neighboring municipalities (Village of McFarland, City of Monona, and Town of Blooming Grove), Dane County, and the DNR.
- Include relevant DATCP information related to herbicide and pesticide spills
- Determine petroleum fuel transport requirements for the petroleum terminals
- Inquire about how the Dane County Humane Society disposes of its animal waste.

4. Project Updates

a. Well 14 – Chloride Study

The level of sodium and chloride continues to increase at Well 14. The well pump is scheduled to be removed in a few weeks for maintenance. It will allow for the completion of geophysical and stressed flow logging of the well. The objective of the study is to identify contributing interval(s) and associate sodium and chloride levels with those intervals. If the level of sodium and chloride continues to increase at the current rate (1 mg/L of sodium and 5 – 6 mg/L of chloride), wellhead treatment or some other alternative will be required within the next 15 to 20 years.

b. Well 27 – Radium Study

The Parks Department granted permission for the water utility to install a monitoring well in Klief Park. Cuttings from this well, in addition to the rock cuttings from UW4 and UW27 (UW4's replacement), will be evaluated for radium pre-cursors (thorium and uranium). Geophysical tools will be used to characterize the borehole, compare to UW 27, and identify potential radium contributing intervals. Packer testing will be performed to collect water quality samples from identified intervals.

A laboratory comparison study was conducted in December and involved collecting duplicate split samples that were sent to three different laboratories. Results from two of the labs were recently received; results from the third lab should be received shortly. In general, the initial review of the results shows relatively large variability between duplicate samples analyzed by the same lab.

c. Other Projects of Note

Five wells will be sampled twice in 2017 for Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). The detection limits for these samples will be an order of magnitude lower than the detection limits of UCMR3 samples collected in 2015. The wells that will be sampled are located near the Dane County Airport or near a former or current landfill giving them the highest potential for detections of PFOA and/or PFOS. The wells that will be sampled include wells 7, 15, 16, 18 and 29. All COM municipal wells were sampled in 2015 as part of UCMR3 and there were no detections of either PFOS or PFOA. It was recommended that the laboratory scan for all PFCs covered by the method.

5. Water Quality Monitoring Update – 2016 through 2019

All monitoring requirements for 2016 were fulfilled with no violations. A brief summary of the 2016 monitoring was presented covering routine coliform testing, iron and manganese removal results, VOC testing, and investigative sampling for sodium, chloride, and radium.

Required sampling in 2017 will include inorganic compounds, volatile organic compounds, synthetic organic compounds (including pesticides), radium, lead & copper, and Disinfection-by-Products. UCMR4 testing is scheduled for 2018 – 2019.

The group discussed the recent changes to the Total Coliform Rule. One of the more significant changes is the adoption of a "Find and Fix" approach to determine the cause/source of contamination when present. Most of the changes had a greater impact on the transient non-community (TNC) water systems.

6. Private Well Surveys – Wellhead Protection Areas

A brief summary was shared regarding the wellhead protection efforts undertaken in the Well 31 WHP area. Summary results are included in the Well 31 WHPP.

7. Future Agenda Items

- MWU Master Plan & Capital Improvement Plan (April 2017, Al Larson)
- Annexations – Town of Madison; Town of Blooming Grove

8. Adjournment

Next meeting: Tuesday, April 11, 2017 at 1 p.m. in the Olin Avenue Conference Room.

Water Quality Technical Advisory Committee

Meeting Notes

Paterson Street Conference Room

October 19, 2017 – 10:00 a.m.

Attending: Janet Battista, Jocelyn Hemming, Gary Krinke, Henry Anderson, Sharon Long, Joseph Grande, Al Larson

Absent: Greg Harrington, Tom Heikkinen, Joe Demorett, Amy Barrilleaux

1. Agenda Repair/Announcements

2. **Review of Meeting Notes** - No changes to the July 11, 2017 meeting notes were proposed.

3. Meeting Schedule & Administration

Announced proposed 2018 meeting dates: 1/9, 4/10, 7/10, and 10/9. Committee affirmed quarterly meeting frequency while some committee members expressed concern about afternoon meetings – particularly those involved with laboratory research. For now, meetings will continue to occur on Tuesdays at 1 p.m.

4. Radium Monitoring Discussion

Concluded on-going discussion on radium analytical methods. Committee received radium results with detection limits and uncertainties for the 2016 Laboratory Comparison Study. Technique (including sample prep, volume used, and count time) is very important especially for dependable radium-228 results. Lower MDL/uncertainty values imply longer counts and larger volumes. Good correspondence between results from Lab A and WSLH in which two completely different methods (7500 – Georgia Tech, EPA 903.1) were used. Lab A provided good consistent results with few outliers. The committee recommended the continued use of Lab A for radium analysis.

Water Utility Board policies mandate quarterly sampling for wells in which combined radium (226+228) exceeds one-half the MCL. The committee received results from three years of monitoring under this policy for Wells 07, 24, 28, and 30. Due to results consistently falling below the MCL, the committee recommended annual sampling at three wells (07, 24, & 28) with samples collected when radium is historically the highest at these sites – which appears to be during the third quarter (July to September) when water demands are likewise higher. Quarterly sampling would continue at Well 30 with sampling frequency reassessed in one year.

5. Water Quality Monitoring Results – PFC, VOC, SOC

Results of perfluoroalkyl substances (PFAS – including PFOA & PFOS) testing were presented and discussed. Previously, the committee recommended testing a suite of six PFASs using lower detection limits (<1 ng/L or parts per trillion, ppt) than those in UCMR3 (range: 10-90 ppt) when none were detected at any well. Five wells were identified based on their presumed vulnerability and likelihood of detections – proximity to landfills, military installations, and airports. Wells 07, 18, and 29 were free of all six PFASs, even at these lower limits, while one (PFHxS – an ingredient common in fire-fighting foams) was detected at Well 16 at the 2.4-2.7 ppt level. Well 15 also showed the presence of PFHxS and four other PFASs including PFOA and PFOS. The combined level of PFASs at Well 15 was 31-35 ng/L. Most research on health effects has focused on PFOA and PFOS. In 2016, the US EPA established a combined health advisory level of 70 ng/L for PFOA and PFOS.

The proximity of Well 15 to the Truax landfill and other unlined (military) waste disposal areas around the former Oscar Mayer facility make it a vulnerable well. The committee questioned whether there is an on-going source from the spray jets inside fighter jets at Truax field. Recommended communication with military about tightening operations to reduce potential pollution. Also wondered where else fire-fighting foams may be deployed.

The committee was also presented with data from Well 18 at the deep well start-up showing elevated levels of PCE, TCE, and TCA initially then stabilizing over a period of 1-2 hours. Presence of the three co-contaminants suggests that it is not a new source. Committee members speculated that past spill (PCE) led to product being sorbed in micropores and diffusion triggered kinetics following periodic disturbances (deep well cycling) leads to temporary contaminant peaks. The level of PCE observed at the entry point has generally ranged from 1-2 µg/L for several years. The MCL is 5 µg/L.

Synthetic organic compound (SOC) results were briefly discussed. Atrazine was detected at Well 29 (27 ng/L) and metolachlor at Well 14 (12 ng/L). Both pesticides were detected just above the detection limits, which were lower than previous monitoring periods in which neither was found at any well. Both wells will be re-tested in 2018 for SOC's including the two detected pesticides.

6. Lead Monitoring & Mitigation

The 2017 lead results for Lead and Copper Rule monitoring were discussed. Results demonstrate compliance with the rule and the contributions of premise plumbing (copper piping with lead solder) to low lead levels that consumers experience at the tap. Much of the reduction in lead exposure from drinking water since the early 1990's is attributed to the replacement of lead service lines, which were the greatest source of lead.

7. Chlorine Residuals Management

The 2017 Sanitary Survey Report completed by the DNR recommended that MWU increase the free chlorine residual to 0.5 mg/L based on AWWA guidelines for disinfection. Discussion ensued about the rationale for higher residuals in our distribution system following virus detections in raw water samples from some deeply cased wells – those cased below the shale. Cell cultures were negative for viruses and research showed the potential for viruses but not viability following chlorination. Whether viruses were infectious was not confirmed. Maintaining higher chlorine residuals is a preventive action to protect public health and avoid potential water-borne illness.

8. Future Agenda Items

- MWU Master Plan & Capital Improvement Plan
- Annexations – Town of Madison; Town of Blooming Grove
- Private Well Program Policies

9. Adjournment