From: Busch, Stephen (DEQ)
Sent: Tuesday, June 24, 2014 9:02 AM
To: Johnson, Mark;Crooks, Jennifer
Cc: Poy, Thomas;Prysby, Mike (DEQ);Shoven, Heather;Murphy, Thomas
Subject: RE: Briefing -- Flint River for drinking water, Michigan

Finished water (plant tap) pH levels ranged from 7.1-7.7 for the entire month of May.

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MDEQ
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From: Johnson, Mark [mailto:johnson.mark@epa.gov]
Sent: Monday, June 23, 2014 6:24 PM
To: Crooks, Jennifer
Cc: Poy, Thomas; Prysby, Mike (DEQ); Busch, Stephen (DEQ); Shoven, Heather; Murphy, Thomas
Subject: FW: Briefing -- Flint River for drinking water, Michigan

Jennifer

Here is an initial response from Joe Carpenter, a water quality engineer at the CDC Waterborne Disease Prevention Program in Atlanta. His comments focus on the pH of the finished water as a possible contributor to the reports of skin rashes. In this files that were provided, there were pH measurements for the last week of April. Are there additional data available to determination if pH fluctuations in the distribution system may correspond to the complaints?

Just looking at it from a chemical perspective, I don't see anything in the analysis that would be of a health concern. We can have a follow-up discussion with CDC staff about other constituents if that would be helpful.

Mark

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From: Carpenter, Joe (CDC/OID/NCEZID) [mailto:jcc0@cdc.gov]
Sent: Saturday, June 21, 2014 4:46 PM
To: Beach, Michael J. (CDC/OID/NCEZID); Johnson, Mark
Cc: Yoder, Jonathan S. (CDC/OID/NCEZID); Robinson, Felecia (CDC/OID/NCEZID) (CTR); Gargano, Julia Marie W. (CDC/OID/NCEZID); Sarisky, John (CDC/ONDIEH/NCEH); Blake, Robert G. (CDC/ONDIEH/NCEH)
Subject: RE: Briefing -- Flint River for drinking water, Michigan

Here is a recent article (06/12/2014) about the changes in lime addition at the Flint water plant. It might be a bit challenging to make pH adjustments quickly in the finished water if they had to make this significant lime addition adjustment. High pH from lime softening plants has been associated with consumer issues in the past. See below for a background document about lime softening and a WHO document about the health effects of both high and low pH values. Skin rashes are known to be caused by extreme pH variations in drinking water.

Hope some of this info is helpful.

Joe Carpenter

http://www.mlive.com/news/flint/index.ssf/2014/06/treated_flint_river_water_meet.html

FLINT, MI -- Workers at the city's water treatment plant have bumped up their use of lime in an effort to cut down on both water hardness and rising customer complaints.

Daugherty Johnson, utilities administrator at Flint's water treatment plant, said today, June 12, that 75 percent of raw water is now being treated with lime compared to 25 percent treatment when the city made the initial switch from using Lake Huron to using the Flint River as a drinking water source on April 25.

Background info about lime softening:

http://www.nesc.wvu.edu/pdf/dw/publications/ontap/2009_tb/lime_softening_DWFSOM41.pdf

Health Effects of pH -- WHO

http://www.who.int/water_sanitation_health/dwq/chemicals/en/ph.pdf

EFFECTS ON HUMANS

Exposure to extreme pH values results in irritation to the eyes, **skin,** and mucous membranes. Eye irritation and exacerbation of skin disorders have been associated with pH values greater than 11. In addition, solutions of pH 10–12.5 have been reported to cause hair fibres to swell (*10*). In sensitive individuals, gastrointestinal irritation may also occur. Exposure to low pH values can also result in similar effects. Below pH 4, redness and irritation of the eyes have been reported, the severity of which increases with decreasing pH. Below pH 2.5, damage to the epithelium is irreversible and extensive (*10*). In addition, because pH can affect the degree of corrosion of metals as well as disinfection efficiency, it may have an indirect effect on health.

From: Beach, Michael J. (CDC/OID/NCEZID)
Sent: Saturday, June 21, 2014 12:53 PM
To: Johnson, Mark (EPA) (CDC epa.gov)

Cc: Carpenter, Joe (CDC/OID/NCEZID); Yoder, Jonathan S. (CDC/OID/NCEZID); Robinson, Felecia (CDC/OID/NCEZID) (CTR); Beach, Michael J. (CDC/OID/NCEZID); Gargano, Julia Marie W. (CDC/OID/NCEZID); Sarisky, John (CDC/ONDIEH/NCEH); Blake, Robert G. (CDC/ONDIEH/NCEH)
Subject: FW: Briefing -- Flint River for drinking water, Michigan

Mark,
Am cc:ing our water engineer, Joe Carpenter, for his take on this. We have heard of the rashes related to switch to chloramine (not happening here) w, which has become very activist oriented but not sure from the data here what this might be. Also including the EH services Branch for input
Michael

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Visit CDC's Healthy Water website at www.cdc.gov/healthywater


Please only print this e-mail if necessary.

From: Johnson, Mark (EPA) (CDC epa.gov)
Sent: Friday, June 20, 2014 5:57 PM
To: Beach, Michael J. (CDC/OID/NCEZID); Roberts, Virginia (CDC/OID/NCEZID)
Subject: FW: Briefing -- Flint River for drinking water, Michigan

Michael and Virginia

We were contacted by USEPA this week regarding complaints from residents of Flint, Michigan associated with the quality of their drinking water. There have been recent taste and odor complaints, but also claims of people developing rashes. The complaints seem to correspond to the timeframe the City of Flint switching from purchasing water from the City of Detroit to utilizing their own treatment system that takes water from the Flint River, which began in late April, 2014.

Although this is a regulatory compliance issue, ATSDR was contacted to assist in addressing health concerns in the community. Although the analytical testing does not indicate the presence of chemicals that appear to be a health concern, the fact that their raw water is coming from a new source raises questions about other constituents that have not been evaluated. We will be contacting the Michigan Dept. of Community Health, but we also wanted to contact your program to see if you get involved with these situations and can offer some advice.

Let me know what you think.

Mark

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From: Crooks, Jennifer
Sent: Friday, June 20, 2014 3:07 PM
To: Johnson, Mark
Cc: Poy, Thomas; Prysby, Mike (DEQ); Busch, Stephen (DEQ); Shoven, Heather; Murphy, Thomas
Subject: Briefing -- Flint River for drinking water, Michigan

Mark---as we discussed earlier this week, below is a briefing containing the information we discussed regarding the Flint, Michigan water supply. I am out of the office this coming week; if you have questions, please contact Tom Poy, Ground Water and Drinking Water Branch Chief.

Thank you for your time!

Jennifer

Drinking Water in Flint, Michigan

ISSUE: Flint began pumping/treating/distributing Flint River water as their drinking water source on April 25, 2014, and beginning in mid-May, there have been numerous complaints to the Region 5 Ground Water and Drinking Water Branch regarding the drinking water, including rotten egg smell, swamp water smell, people developing rashes. The Region immediately contacted and involved the Drinking Water program at the Michigan Dept of Environmental Quality (MDEQ).

BACKGROUND: Flint has been purchasing finished drinking water from Detroit for decades (source water is Lake Huron). It has been delivered by a large single pipeline from Detroit. In the late 1980's, the State drinking water staff requested that Flint renovate their old surface water treatment plant to meet the State's redundancy requirements, in case the single pipeline from Detroit was unable to transmit finished drinking water. Flint would treat Flint River water periodically throughout the year, to verify that the water treatment plant (WTP) was able to treat Flint River water that met Safe Drinking Water Act (SDWA) standards.

Over the past 15 years or so, Detroit has seen a decrease in its City population, and an increase in poverty/low income residents. Detroit currently has an Emergency Manager due to poor financial situation. (As an aside, last year the City of Highland Park told Detroit it was unable to pay its water/sewer bills, and currently has an Emergency Manager. Highland Park was unable to obtain funding to retrofit its surface water treatment plant, so Detroit is providing water/sewer currently to Highland Park for free.) In order to continue to provide adequately treated water that meets SDWA Health standards, the suburbs have been subsidizing the lower income residents for years. Consequently, communities like Flint have decided to find an alternate source of drinking water.

A regional water authority was formed in 2010, the Karegnondi Water Authority (KWA), which will serve water in mid-Michigan and the Thumb areas. Members of the KWA include Flint, Lapeer; and Genesee, Lapeer and Sanilac Counties. The KWA is currently constructing the Karegnondi pipeline to bring raw water from Lake Huron. It will be completed in about 2 years. Flint has an Emergency Manager now, and I think on paper, it looked like a savings to pump and treat Flint River water for the 2-year interim period prior to connecting to the Karegnondi pipeline, than to continue to pay Detroit prices for finished drinking water. MDEQ has worked long and hard with the City of Flint and water operators to get the WTP ready to treat Flint River water for the next few years. Complete operation/treatment began April 25, 2014.

In mid-May, Region 5 Ground Water and Drinking Water Branch began receiving calls from Flint citizens regarding the quality of the Flint drinking water. Complaints include rotten egg smell, swamp water smell, people developing rashes. I talked with Richard Benzie, the Community Drinking Water Unit Chief, at MDEQ about any possible chemical releases into the Flint River, and neither he nor Mike Prysby, the Lansing District engineer for Flint, have heard of anything such as this. The normal procedure of chemical releases is that Mike Prysby and Richard would be alerted/notified through the Pollution Emergency Alert System (PEAS), and that hasn't happened.

Mike Prysby has been working quite closely with the Operator-in-Charge at the Flint Water Treatment plant to prepare the WTP and operators to treat the Flint River water. Attached are several analytical results: July 2013 Test Run of Phase 2/5 contaminants conducted on the Flint River, sampled in July 2013; no exceedances are noted; detects of barium and selenium. The April 2014 Monthly Operation Report (MOR) which includes bacteriological analyses, was finalized in mid-May (includes only April 25-30 operation activity) with the following test results (sampled in May 2014), that were provided last week by Steve Busch, the MDEQ Supervising District Engineer: Total Organic Carbon (TOC), Metals, Volatile Organic Carbon (VOC), Synthetic Organic Contaminants (SOC) (all 3 categories), and partial chemistry (which includes nitrates). As the WTP only operated for the last 6 days in April, the MOR results provide limited information. The Bacteriological Portion of the May Operating Period were due 6/10, but the operational monitoring won't be reported until 6/30.

FINDINGS: So, bottom line—yes, the raw water is a different quality and more variable than Lake Huron raw water that Detroit is using. The Flint River is not as high a quality water as Lake Huron, but they are pretreating with ozone, conducting softening to reduce hardness and organic precursors, and are working with chlorine application. And, the Flint River is an interim source of raw water until the Karognondi pipeline is constructed to bring raw Lake Huron water to Flint for treatment.

When you look at the July 2013 Test Run analyses attached, note:
The sample was taken at the Filter Effluent—normally it would be taken at the plant tap, but they were running Flint River water through most of the plant last summer to test treatment, and the filters were the last stop before the clear well/plant tap which were filled with Detroit water they were serving last year. Note: Trihalomethanes (TTHM) are detected, but no exceedances. Detects could be due to: Softening had not been introduced to the treatment process last summer which would reduce the hardness and also remove some of the organic precursor that would add to TTHM levels. Softening is being conducted now in the treatment process. Last summer, chlorine was added in mid-treatment which also could have added to the TTHM level. Now, chlorine is added just before the filters. Also, since it's summer surface water, there will be more run-off, thus more precursor in the raw water. Mike Prysby, the MDEQ District Engineer, believes that today's operation of the plant and quality of drinking water produced is much better than the test runs done over the past year, due to the adjusting of the treatment, such as the softening process and the chlorine application.

Mike received Flint's first Monthly Operation Report (MOR) for the timeframe of April 25-30. Ozone pretreatment is provided to the raw water, and there is ozone destruction at the end of the pretreatment. The Filter Effluent has never been over 0.3 NTU, the ave range is 0.12-0.21 NTU. The chlorine residual at the plant tap is 0.9-1.0 free chlorine. The distribution chlorine residual ranged from 0.7-1.0 of free chlorine, which is acceptable. Bacti samples are pulled every 3-4 hours starting on April 25-30, and all were clear.

CONCLUSION: The analyses show some detects of regulated contaminants, but no exceedances. Thus, we have no report on any regulated contaminant that might be causing rashes, and the complaints we're hearing. I did ask Steve Busch at MDEQ, if there was a possibility of the existence of cyanotoxins from algae on the Flint River. Steve has worked with systems in Southeast Michigan and with Ohio EPA on algae issues, and he didn't think the conditions of the Flint River would support an algae bloom that would cause cyanotoxins to be present.

We would like to know if ATSDR would be interested in looking into this situation, to determine if there are other unregulated contaminants causing complaints of poor water quality.

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Jennifer

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