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 coding 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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