From:	Edo McGowan
To:	lyris@swrcb18.waterboards.ca.gov; WB-DDW-RecycledWater; Morris, Melissa@Waterboards; Burres, Erick@Waterboards; Wu, Eric@Waterboards; Edo McGowan; woody.maxwell@venturausd.org; katherine@venturahydraulics.com; Samantha.Omana@asm.ca.gov; akruzel@countyofsb.org
Subject:	Re: Proposed Framework for Regulating Direct Potable Reuse is posted for Public Review
Date:	Wednesday, April 25, 2018 1:38:23 PM

Comments on: **Proposed Framework for Regulating Direct Potable Reuse is posted for Public Review**

The smallest pathogenic particle representative in the extracted text below is the virus, so this is down to around 20 nm. But, again for some reason, we are not considering antibiotic resistance in this discussion, notwithstanding the seriousness of the growing threat from these bugs. Again, the question of "why" the state has difficulty with this topic pops up. We seem to be forgetting the size of a gene, as in "antibiotic resistant genes", as well as virulence factors (VF). In this instance we are talking about something that can pass through the lumen of a pilus---2 nm. Additionally, ARGs and VFs are recalcitrant to treatment by both chlorine-type disinfectants and UV. Thus, in the text material below from your proposal, the treatment train might be sized a magnitude too large----20 nm based on virus vs 2 nm based on gene. These smaller particles will also have an enhanced chance of getting through, but because the system is not designed to spot them. Thus, they will likely be neglected. The genes may thus have an opportunity to reach the human gut where the gut biota can take in that genetic information. This then allows for transfer amongst the gut biota and as shown by Sjolund, they can remain for years as a library offered to visiting pathogens. That will then also comeback and confound your risk assessment, hence affecting (perhaps adversely) your underlying budgetary estimates, as if necessary to get down the these smaller and more recalcitrant sizes, the cost will need readjustment.

Dr Edo McGowan

Below from your proposal

The set of reference pathogens should be comprehensive enough to represent the risk posed by all pathogens. It is not practical, however, to regulate water quality using a large number of reference pathogens. Reference pathogens are selected based on a number of factors including pathogenicity, potential occurrence in the source wastewater, and susceptibility to treatment. Enteric virus, Giardia, and Cryptosporidium were used to regulate IPR. Additional and/or alternative pathogens are likely to be considered for DPR.

From: lyris@swrcb18.waterboards.ca.gov <lyris@swrcb18.waterboards.ca.gov>
Sent: Wednesday, April 25, 2018 9:43:43 AM
To: Dr Edo McGowan
Subject: Proposed Framework for Regulating Direct Potable Reuse is posted for Public Review

This is a message from the State Water Resources Control Board.

To All Interested Parties:

Please see the following Announcement from the Division of Drinking Water Potable Reuse.

ANNOUNCEMENT: Proposed Framework for Regulating Direct Potable Reuse is posted for Public Review

From the State Water Resources Control Board:

The Proposed Framework for Regulating Direct Potable Reuse (Framework) is posted for public review and is available at the following
link: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/direct_potable_reuse/dprframewk.pdf

A PROPOSED FRAMEWORK FOR REGULATING DIRECT POTABLE REUSE ...

www.waterboards.ca.gov

a proposed framework for regulating direct potable reuse in california s tat e wat er r eso ur ce s contr ol b oa r d april 2018

State Water Board is soliciting public comments on the Framework. The initial 30-day public comment period will close on May 20, 2018. The public is also welcome to submit comments on the Framework after the close of public comment period.

Information on how to submit comments and how to attend the scheduled public workshops is available on the Division of Drinking Water Direct Potable Reuse webpage:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/direct_potable_reuse.html

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Rosilela, Sherly@Waterboards

From: Edo McGowan <edo_mcgowan@hotmail.com>
Sent: Sunday, April 29, 2018 11:42 AM
To: WB-DDW-RecycledWater; Edo McGowan; Burres, Erick@Waterboards; Wu, Eric@Waterboards; Samantha.Omana@asm.ca.gov
Subject: Comment

The required LRV for each reference pathogen is calculated using the organism density that can occur in the raw wastewater and the density in finished drinking water that will result in an appropriate level of public health protection.

The above, when using the suggested reference pathogens is likely to fail as a protection for public health. The following is presented to expand on that statement:

When we consider treatment trains and RO, biofouling problems as a subject have been demonstrated to play a main role in reducing the actual performance of the membrane process. That, coupled with other failures in treatment processes merely enhances the level of risk warranting considerably more thought than thus far received by the analysis of the SWRCB on the reuse of wastewater for indirect potable reuse.
Based on the pathogen reduction language and directions found at p. 62 of 81 in the following, (https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20150716.pdf) there is an enhanced opportunity for failure. In a GRRP under the discussed language, there is the enhanced chance for long-term development of contamination via development of biofilms that will continue to seed the system. In all probability, a biofilm will already have been formed in the in-put area leading to the aquifer. Such biofilms thus have the capacity to take in new additions as well as allow for interspecies gene transfer potentially leading to new and higher grade pathogens.
Thus, with the limited capacity, as represented by the proposed selected marker microbes where the size of the screens of the treatment train is insufficient (see previous submissions by McGowan) there is likely an insufficiency to allow or cause actual cessation of through put of materials smaller than 20 nm. Consequently, there will likely be a seeding of an established biofilm. Additionally, and as shown by Kinney, et al, (https://toxics.usgs.gov/highlights/pharm_soils/) and (https://setac.onlinelibrary.wiley.com/doi/abs/10.1897/05-187R.1) there can be a buildup of various xenobiotics, including pharmaceuticals which exert an effect on the development of resistance and its maintenance in the system thus acting as a nidus for transmission into the whole of the system. That pathogens can and do spread deeply into and across aquifers is not

a debatable issue-----they can be found deep into the systems. Thus, the extraction of the aquifer's waters must also consider that extraction wells are thus susceptible to similar processes of contamination via developing of biofilms, hence that water can carry these pathogens and their genes into raw water stock destined for drinking water. To the extent that domestic wells may also be placed in these aquifers, then one must consider the level of treatment applied which may be insufficient to abate human health risks. Once contaminated, these systems will need to see installation of enhanced treatment systems prior to that water's usage in domestic systems to protect users. This may not be cheap. As an aside in this discussion would be the argument for a "inverse taking" as the water may be of little use absent the installation of fairly sophisticated control systems.

Pharmaceuticals Found in Soil Irrigated with Reclaimed Water

toxics.usgs.gov

USGS scientists report that pharmaceuticals in wastewater used for irrigation persist in soil for several months, Toxic Substances Hydrology Program

The following text is extracted from:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20150716.pdf

(h) If a pathogen reduction in subsection (a) is not met based on the on-going monitoring required pursuant to subsection (c), within 24 hours of being aware a project sponsor shall immediately investigate the cause and initiate corrective actions. The project sponsor shall immediately notify the Department and Regional Board if the GRRP fails to meet the pathogen reduction criteria longer than 4 consecutive hours, or more than a total of 8 hours during any 7-day period. Failures of shorter duration shall be reported to the Regional Board by a project sponsor no later than 10 days after the month in which the failure occurred.
(i) If the effectiveness of a treatment train's ability to reduce enteric virus is less than 10-logs, or Giardia cyst or Cryptosporidium oocyst reduction is less than 8-logs, a project sponsor shall immediately notify the Department and Regional Board, and discontinue application of recycled municipal wastewater at the GRRP, unless directed otherwise by the Department or Regional Board.

As seen from the above text, the times specified and protocols do very little to prevent the addition or seeding of pathogens that would fall below the relative size of these markers. Again, this says nothing about genes which can be transmitted to biofilms as discussed above. Thus, the above detail as noted in the extracted text, as a process for assuring protection of public health warrants considerably more thought as it is questionable as an actual secure system for protecting public health.

The idea of established biofilms allows for an almost instantaneous chance for contamination, followed by in-biofilm incorporation, thence gene transfer and biofilm protection. The above times as specified, unfortunately, completely ignore this event and thus are questionable as safeguards for protecting public health.

Dr Edo McGowan
4/29/18
Carpinteria, CA
Sent from Mail for Windows 10