From: Edo McGowan <edo_mcgowan@hotmail.com>
To: commentletters <commentletters@waterboards.ca.gov>, "BynJam@aol.com" <bynjam@aol.com>, <edo_mcgowan@hotmail.com>, Elizabeth Erickson <eerickson@waterboards.ca.gov>, "Jeffrey.Stone@cdph.ca.gov" <jeffrey.stone@cdph.ca.gov>, <josh@elementshomecenter.com>, <jstone1@dhs.ca.gov>, "Katherine@venturahydraulics.com" <katherine@venturahydraulics.com>, <kmn-law@sbcglobal.net>, <laura@forester.net>, <layne@lawyersforcleanwater.com>, <maureen.reilly@sympatico.ca>, <owl@owlfoundation.net>, <peter.collignon@act.gov.au>, <woody.maxwell@venturausd.org>, <toxlaw@cox.net>, <thaslebacher@kcwa.com>, <mkeeling@waterboard.ca.go>, <mkeeling@waterboards.ca.gov>
Date: Thu, Sep 20, 2007 8:45 AM
Subject: RE: Water Recycling Policy

To: Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
Executive Office
1001 I Street
Sacramento, CA 95823

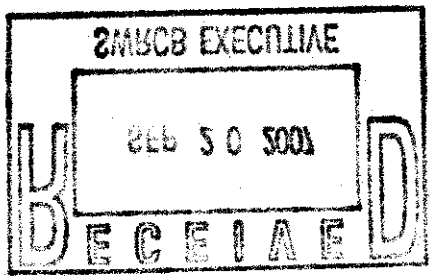
Re: Draft Board Policy on Recycled Water---continuing McGowan's comments

Ms. Townsend, thank you for the feedback. In an email on Mon, 17 Sep 2007, you note the following: I AM SENDING YOU THIS E-MAIL TO CONFIRM THAT THE DOCUMENT(S) YOU SENT FOR "COMMENTLETTERS" FOR WATER RECYCLING POLICY IS IN FACT FOR THIS ISSUE. THE ATTACHMENTS THAT YOU SEND SEEM TO BE WITH ANOTHER ISSUE AND NOT WATER RECYCLING. PLEASE CLARIFY.

I will consider this comment as an addendum to my previous submittals. I appreciate that you get numerous comments on myriad items. I will attempt to clarify but it would be more helpful if you could be more specific. I was responding to a call for comments pursuant to a State Water Resources Board request for comments on its draft of a newly proposed policy on recycled water.

Recycled water is part of an overall train of processes coming from the treatment of sewage. To fully appreciate this, your Board needs to look at the broader impacts, especially those that impact upon on public health. Your Board has, within its capacity, the where-with-all to address some of this and certainly is charged with protecting the public health. Thus to attain that goal it needs to appreciate the following. It can not merely defer to the state's DHS, Title 22, and thus blindly forge ahead absent some understanding of its impact on public health. This is especially true if the standards and criteria that dictate the operation of Title 22 are found to be deficient. I believe them to be badly deficient, failing to protect public health to the extent that this deficiency is almost criminally negligent.

There are several issues that are not covered within the currently proposed policy statements. The policy is very weak on public health impacts stemming from recycled water as currently produced. These impacts include disease transmission and this stems from the pass-through and synergistic effects of what enters the treatment works. That is further dependent on how that input is processed. This will affect the exchange of genetic information that enhances antimicrobial (antibiotic) resistance as well as virulence, and thus what is left over to become part of the recycled/reclaimed water. This water is then spread into the environment in various ways. As I have indicated, we ran Title 22 water in the lab and it contained multi-drug resistant bacteria. Pruden, et al have demonstrated the pass-through of genetic material and Rose, et al confirmed the carriage of numerous pathogens within reclaimed water. Thus, in spite of what one may wish to believe, Title 22 is, as currently operated, not protective of public health---in fact it is a major transmission vehicle for multi-drug resistant pathogens. Since these are placed into large areas where the public has considerable contact, this allows transmission to the public, hence enhancing


SWRCB EXECUTIVE
RECEIVED

the risk of disease and the advancement of drug-resistance. Thus we have what, at least I would consider, contamination, pollution and nuisance, all clearly defined within statute. To the extent that there is incidental movement off-site, this impacts other water bodies via transport routes and thus the capacity to establish terrestrial and aquatic niches that then act as lending libraries. This incidental movement or runoff is contrary to PL 92-500 and state law.

When we consider disease transmission, we need to look at epidemiology possibilities and thus human health risks. There are no such human health risk assessment studies on reclaimed water of which I am aware. Thus, as far as I am concerned, the Board is punting down the field, but the stadium lights are out and no one knows where the ball will go. It will be reckless to progress unless the entirety of the interconnecting parts are well understood, and your Board seems not to appreciate that aspect.

There is no valid scientific evidence that turbidity and viral numbers actually correlate. Yet it is assumed that a surrogate measure operating on assumptions of a technology based train that looks at indicator bacteria will demonstrate adequate viral reductions. This lack of scientific evidence has been confirmed by the state DHS. Further, the 2.2 MPN/100ml fails to appreciate several important aspects that do impact disease transmission. One of these is viable but non-culturable (VBNC) which is not considered by current lab tests. Neither are similar states such as persisters. Additionally, since the current indicators are vegetative bacteria that only require low-level disinfection, this protocol completely ignores the pathogens that would require high-level disinfection. Additionally since antibiotic resistant genes and virulence islands are not "alive", current levels of chlorine have no impact on them, yet these bits of genetic information are clearly capable of moving into other organisms and thus rendering them resistant or more virulent. None of this is considered within the standards or for that matter within the instruction and licensing of sewer plant operators who will be producing reclaimed/recycled water.

If you are having problems appreciating this, I can imagine that you will find my submission troubling. Can you be more specific in determining what in particular you find difficult to understand. I will attempt to correct the lack of clarity. The stakes are too high to let this go.

One of the issues that warrants clarity is how the Board interprets its own legislative directives. For example, one of the operative Water Code sections is 13550 (a)(3), which makes a pronouncement that the use of recycled water will not be detrimental to public health. How is that interpreted by your Board will have ripple effects on public health. If the Board does not appreciate the interconnections between the pass through of pathogens and genetic material as found within reclaimed/recycled water (see for example: Pruden, et al; Rose, et al; Kinney, et al; Kummerer, et al; Firl, et al; McGowan; Higgins & Murthy) and the impacts on public health, it will be unable to connect the dots. In short Title 22 needs a thorough review as the standards as presently written and applied, fail to protect public health.

WC 13521 requires protection of public health, it is the moving section relating to reclaimed water. That is followed by 13522 and requires abatement of contamination.

Then we have health and Safety Code provisions. 5410---contamination means impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. Waters of the state is defined via 5410 (c) to mean any water, surface or underground including saline waters within the boundaries of the state.

5410(d) further defines contamination.

5411—no person shall discharge sewage or other waste, or the effluent of treated sewage or other waste, in any manner which will result in contamination, pollution, or nuisance. Nuisance is defined via 5410(f) as anything which: 1, is injurious to health...and occurs during or as a result of the treatment or disposal of wastes.

Taking the above together, it would seem that the state is violating its own laws. Certainly, as currently produced and scientifically verified, Title 22 water does contain numerous pathogens and multi-drug resistant pathogens. This is a direct risk to public health. These pathogens are by definition contaminates

and thus fall under several of the code sections that direct the Board. The DHS, via H&SC 100125, is to examine and prevent water pollution, but where and how does that tie back to Title 22 and thus what the Board does? Further, H&SC 120125 would require an examination into the causes of communicable disease. Again where is this with respect to genetic material conferring both resistance and virulence?

If an activity that meets all applicable standards is still a threat to the public health, then that activity by definition is an ultrahazardous activity.

Thus, if you would be kind enough to be more specific, I will be most pleased to answer what ever questions you feel necessary.

Again, thank you for your questions and interest in this subject.

With all due respect to your Board,

Dr. Edo McGowan, Medical Geo-hydrology

> Date: Mon, 17 Sep 2007 15:16:53 -0700> From: commentletters@waterboards.ca.gov> To: edo_mcgowan@hotmail.com> Subject: Re: Water Recycling Policy>> Dear Dr. McGowan: I am sending you this e-mail to confirm that the document(s) you sent for "CommentLetters" for Water Recycling Policy is in fact for this issue. The attachments that you send seem to be with another issue and not water recycling. Please clarify.> Clerk to the Board> State Water Resources Control Board> Executive Office> 1001 I Street> Sacramento, CA 95823> (916) 341-5600> (916) 341-5620 Fax> commentletters@waterboards.ca.gov> www.waterboards.ca.gov>>>> Edo McGowan Sunday, September 16, 2007 2:34:18 PM>>>> To: State Water Resources Control Board> Fm: Dr Edo McGowan> Re: Comments related to---http://www.swrcb.ca.gov/comments/docs/water_recycling_policy_notice.pdf> http://www.waterboards.ca.gov/comments/docs/water_recycling_policy.pdf> The document and its underpinnings are so weak on pathogens, transfer of antimicrobial resistance, lateral transfer of genetic information to soil and aquatic microbes and environmental niches, all potentially impacting public health as to be blatantly dangerous. Because of the potential impact on public health, an EIR warrants preparation under CEQA to fully discuss the human and environmental health implications and alternatives. The reference resolutions noted within the document are so old with respect to issues and impacts on public health, that they are useless. There are provisions within the resolution (resolved 7 (b) relating to Title 22, Resolve 10 requiring CDPH to have developed MCL, but nothing on pathogens, antibiotic resistant genetic material, antibiotic resistance and the build up of antibiotics such as macrolides that can maintain vancomycin resistance. Thus for constituents that CDPH has not established MCLs, the regional boards may establish such---but where is the expertise to do so?> Therefore let us take some examples for illustrative purposes---------> Let us first discuss Erythromycin, which is a bioaccumulating macrolide that has been shown to maintain or cause cross resistance with vancomycin. Hence, since this can bioaccumulate in soils, and where there are soil microbes, these can develop resistance to both of these antibiotics. There are soil microbes everywhere in soils. Thus one may well see the build up of resistance or similar cellular and molecular machinery established that can supply cross resistance. Additionally, the entrained antibiotic resistant genetic material as discussed by Pruden et al is found in Title 22 water and the pathogens entrained in this water, as discussed by Rose et al, (WERF #00-PUM-2T)will be delivered with the Title 22 water. Thus, we have, under each micro-emitter of a drip system a small biological factory for producing antibiotic resistant pathogens. I have had this Title 22 water run in the lab and it contained multi-drug resistant bacteria. In viewing the Mueller-Hinton plates two days later, we noticed secondary growth within formerly clear areas. This may have represented bacteria in the viable but non-culturable (VBNC) state that resuscitated. These also were resistant. Title 22 does not, as far as I can ascertain, look for either resistance or VBNC. Rose in her paper as published by WERF comments on