

Rawls, Bruce

From: Jim.Correll@CH2M.com
Sent: Tuesday, February 15, 2005 2:49 PM
To: mpetersen@landscouncil.org
Cc: Rawls, Bruce; JSelle@chamber.spokane.net; John.Spencer2@CH2M.com
Subject: RE: wastewater treatment

Attachments: Adv WWT Tech Eval Wkshop Memo FNL bk237.pdf



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Mike -

This is in response to your inquiry regarding Mr. Ragsdale's endorsement of dual sand filtration as a cost effective solution to meeting the proposed DO TMDL in Spokane.

The Spokane dischargers sponsored a one day Advanced Wastewater Treatment Technology Evaluation workshop in Spokane last Fall. The workshop was conducted by highly experienced wastewater process engineers from around the US as well as two Dept of Ecology engineers. The meeting was led by Dr. Glen Daigger who is Chief Technology Officer for CH2M HILL. Dr. David Stensel from the University of Washington was also a participant as were Dr. JB Neethling, Director of WW Treatment Technology for HDR Engineers and Dr. Larry Esvelt of Esvelt Environmental Engineering. The goal of the workshop was to evaluate all existing and emerging wastewater treatment technologies in terms of both their "readiness" for full scale municipal application as well as their ability to achieve the extremely low total phosphorous concentrations being proposed by Ecology. The evaluation was modeled on a similar international process conducted by the Rockefeller Foundation in which Dr. Daigger was a participant. A copy of the Spokane workshop summary is attached I urge you to read it.

The dual stage filtration system referred to by Mr. Ragsdale was included in the evaluation. Indeed all of the PhD wastewater process engineers participating in the meeting were familiar with the technology including its applications in upstate New York. Key conclusions were that dual sand filtration has never been successfully applied to municipal wastewater at a flow rate within an order of magnitude of the rates currently being treated in Spokane. Further, the small plants in upstate New York are not required to meet a 10 microgram/liter total phosphorous discharge limit nor are they required to monitor total phosphorous on a daily basis nor are they required to use laboratory testing procedures capable of measuring compliance with such a low limit. Consequently, allegations of applicability to Spokane are spurious at best.

Notwithstanding these limitations, the reviewers concluded that dual stage filtration may be capable of meeting an average TP discharge concentration of 50 micrograms per liter. This means that the technology can reach phosphorous concentrations as low as 10 ug/l but it will also experience concentrations in excess of 100 ug/l. They also noted that other technologies including conventional effluent filtration and lime

stabilization are also capable of meeting a 50 ug/l average and those technologies are currently operating in actual full scale applications at multiple locations throughout the US. Consequently, the reviewers concluded that dual stage filtration has not yet been developed sufficiently to be considered for full-scale application in Spokane and that other technologies are more proven and applicable.

The reviewers also concluded that there is no known proven technology capable of meeting a 10 ug/l total phosphorous effluent concentration limit. They did observe that reverse osmosis might come close to meeting such a limit although it has never been used to treat municipal wastewater. It is a technology that is occasionally used to treat drinking water. This brings us to Mr. Ragsdale's apparent allegation that water treatment is equivalent to wastewater treatment - "these type of filters with over 100 mgd capacity have been employed for drinking water treatment in New Mexico, Utah and elsewhere...". Contrary to municipal raw water supplies, the types and concentrations of contaminants and the rates of flow associated with municipal wastewater typically vary by over 150% throughout a given day as well as seasonally. Wastewater treatment processes, as opposed to drinking water treatment processes, must respond to these huge variations. To claim that a water treatment process will achieve 10 ug/l total phosphorous effluent concentration when applied to municipal sewage demonstrates either a complete lack of understanding of wastewater treatment process or an intentional effort to mislead.

Mr. Ragsdale also stated "CH2MHill and HDR are pushing the MBR technology so hard it makes me wonder if they have some proprietary interest...". This statement is so insulting that I'm tempted not to dignify it with a response. However, if you review the technology evaluation memorandum, you will see that membrane bioreactors also did not score as highly as more conventional technologies, for the simple reason that the reviewers clearly recognized that MBR's have not yet demonstrated successful applications at the rates of flow that are being considered in Spokane.

Finally, there is the issue of cost scalability. Mr. Ragsdale has apparently been given a cost per gallon by a system vendor who, pardon my sarcasm, couldn't possibly have any vested interest in "selling" its technology. Ostensibly this quote is based on a treatment plant in upstate New York that treats only a very small percentage of the rate of flow that Spokane must accommodate. The cost supposedly covers complete implementation of the proposed technology to treat 10 to 40 times the amount of wastewater ever previously treated with the technology to meet a 10 ug/l phosphorous limit that has never been achieved anywhere else in the US. No ethical professional engineer could ever recommend that his/her client make such a high risk commitment without receiving at least a 100% performance and payment bond guaranteeing the capital price, the implementation schedule, the effluent quality, the operations costs as well as a hold harmless clause protecting the owner from the cost impacts of a system failure. Note that failure to meet the NPDES permit discharge limits can cost the municipality \$25,000 per day in fines.

It's interesting that Mr. Ragsdale now suggests that the 10 ug/l limit was actually never intended to be a "not to exceed" limit. It was actually intended to be a daily average. That directly contradicts the Ecology interpretation presented to the Dischargers; however, if it is true, it is

certainly a step in the right direction. The dischargers have proposed an average limit of 50 ug/l of total phosphorous which is the best that any proven technology can achieve.

I hope that this over-long memo is of some help. I would be happy to meet with you to discuss it further.

Jim

Jim Correll, PE
CH2M HILL
Vice President and Spokane Area Manager
9 S. Washington Suite 400
Spokane, Washington 99201
509/747-2000
jcorrell@ch2m.com

"Quality, Service, Integrity & Value"

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

From: Mike Petersen [mailto:mpetersen@landscouncil.org]
Sent: Friday, February 11, 2005 1:41 PM
To: Correll, Jim/SPK; Jeff Selle
Cc: Bruce Rawls
Subject: wastewater treatment

Jim and Jeff,

As the possibility of a joint meeting takes shape, I can anticipate some discussion of which technologies are technically and cost effective. I wanted to show you a couple of emails that I received and get your thoughts on this, as I way I can be more prepared for a meeting. Perhaps someone can forward this and any response to Todd and Dale as well?

Thanks,

Mike Petersen
The Lands Council
509-838-4912

From: Ragsdale, Dave

Per your request is some information about costs of treatment that have the potential to meet phosphorus targets of the TMDL. One vendor quoted the capital costs for installing two stage filters as approximately \$0.68/gallon treated. This is the price I applied below in calculating the difference in price for installing these filters in the Chehalis WWTP. So, installing these filters to the 44 mgd City of Spokane WWTP would cost about \$30 million. Amortized over 20 years, as is common, would represent very little change in the monthly sewer rate.

Two-stage filters have been installed at a number of WWTP in the NY City watershed and in several other states and are achieving effluent quality averaging close to 10 ug/l total P. There is some uncertainty about the

average only because the treatment plants do not typically use analytical test methodologies that achieve detection levels much below 10 ug/l. The Spokane dischargers apparently dismissed this technology because none of these wastewater installations are for facilities bigger than 5 mgd. However, these type of filters with over 100 mgd capacity have been employed for drinking water treatment in New Mexico, Utah and elsewhere (Parkson, 2005). I am currently awaiting more information from Parkson, one of the vendors for this filter technology. CH2MHill and HDR are pushing the MBR technology so hard it makes me wonder if they have some proprietary interest...

Note: the TMDL and the technical report did not specify whether the instream target for phosphorus was supposed to be an instantaneous/daily maximum value or a season average value. I believe it should be the seasonal average. I recently spoke with EPA Region 1 staff (about northeast states also struggling with nutrient problems) and learned they are expressing effluent limitations as 60-day rolling averages to achieve the same approximate targets. This might be a good approach for the Spokane dischargers as it gives them some flexibility to deal with day-to-day variation of influent wastewater and operational control but still forces them to meet that seasonal average target. The UAA indicates the dischargers were interpreting the TMDL target as being a very low number that their effluent's could never exceed at any time. In case you are alarmed the above interpretation might erode water quality protection, remember that effluent concentrations that exceed the target during the averaging period must be compensated for by achieving concentrations lower than the target.

Talk with you soon. Dave.

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

From: Ragsdale, Dave

Subject: Cost-effective treatment associated with Spokane

As we have discussed, I have been inquiring about various wastewater treatment and land application options that might be employed by the Spokane dischargers to meet the targets for phosphorus identified in the TMDL. With a little rounding, that seasonal average in-stream target for total phosphorus is 10 ug/l.

The UAA portends the "next level of treatment" that provides the best removal to phosphorus as being membrane bio-reactors (MBRs). The UAA identified the demonstrated performance of MBRs to be about 50 ug/l total p on average. Cost estimates for installing this technology are not easily evaluated as presented in Appendix E3-1. The UAA presents gross cost estimates for treating 100 mgd. The current cumulative wastewater discharged by the Washington facilities during the critical period is significantly less. These costs were also brought back from 2015 to be expressed in 2004 dollars. It was difficult for me to digest this information and determine whether hardship would be imposed on these

communities in an effort to achieve the TMDL targets.

I approached evaluating their presentation by comparing cost of applying MBR technology to the anticipated costs of using two stage filtration of secondary effluent. From Ecology's SRF staff I learned the capital construction costs of the proposed Spokane County MBR WWTP is estimated to be \$73.4 million. I believe the design capacity of this plant would be 8.5 mgd. This equates to a cost of about \$8.6 million per mgd treated wastewater. I compared this cost to the Chehalis WWTP that is currently under construction. Chehalis is installing sequencing batch reactors (SBRs) with filtration and will have a treatment capacity of 12 mgd. The estimated cost of the Chehalis WWTP from the SRF program is \$33 million. I calculate that replacing the filter Chehalis is installing with a two stage filtration process might increase the total WWTP construction cost to about \$37 million. This represents a cost of about \$3.1 million per mgd treated wastewater. The MBR and SBR will both produce class A reclaimed wastewater.

Information available to date (from operating WWTPs in the NYC watershed) indicates that applying two-stage filtration to nitrified secondary effluent can consistently achieve less than 20 ug/l TP and have a long term average concentration about 10 ug/l. This would meet the targets of the TMDL at 36% of the construction cost of installing the MBR technology promoted by the UAA sponsors.
