Technical Advisory Panel Meeting
July 24, 2008
9:00 am – 3:30 pm

Welcome and Introductions

Angie Thomson welcomed everyone and introductions were made. Kathy Cupps, Washington State Department of Ecology (Ecology), was concerned about the number of panel members present to accomplish the meeting objectives. Angie suggested finding out why there is low attendance and if it is just a conflict of schedules, Ecology should figure out how to work around that.

Angie reviewed the agenda. Tim Gaffney introduced himself as the new rule writer for Ecology. Jim McCauley, Ecology, distributed the TAP workplan and progress report and reviewed the items. Jim reminded panel members that the group is making progress but said there is still a lot to do. Jim said he would like to finalize the pathogen issues and groundwater recharge today and get started on aquifer storage and recovery (ASR) and direct injection.

Task #1 Pathogen sub-group presentations

Jim distributed handouts and reviewed the remaining pathogens issues the group needs to address. Jim asked if there was any new information to support the first recommendation for log removal.

Craig Riley said eleven log removal of viruses from raw to potable water is achievable, but eleven log removal of protozoa and pathogens would be difficult to accomplish. Jim asked if there was any research to support that. Craig thought the recommendation should be included in guidance because there is no solid evidence from research to support the log removal numbers proposed by panel members. Craig said reduction of any indicator should be considered evidence of treatment efficacy and efficiency, not a public health level. Kathy asked Craig what he would recommend for the rule to address pathogens. Craig said he would keep the current approach. Kathy clarified that Craig would prefer to use the current total coliform criteria. Craig confirmed this and said to date he has not seen anything research that indicates this is not a good approach; the current approach is a public health approach and has worked for a long time.

Angie asked if the people who were a part of the previous small group discussions on pathogen standards thought the rest of the group would support this recommendation. Kathy said Frank Loge argued that the literature has shown the current requirement does not show how the viruses and other pathogens are being dealt with; the treatment technologies get rid of the bacteria but not the viruses. Craig agreed with Frank's point, but said currently there are no good methods to monitor other indicators.

Kathy said California is requiring a facility to demonstrate a five log removal across the treatment train during design. Jim reviewed the California rule language. He said the rule provides an either/or option for log removal or disinfection. Kathy suggested that another option could be to adopt the California standards. Jim asked Craig if he would support an either/or approach for the recommendation including demonstrated log removal or monitoring. Craig said he would support this approach.

Ken Butti asked if the California standard uses total chlorine residual. Jim said it does; the California standard requires total chlorine disinfection or proving five log removal of viruses through a challenge study. Bill Persich thought that disinfection methods other than chlorine should be allowed. Ken agreed and felt that Washington should use free chlorine instead of total chlorine. Bill asked if it would be worthwhile to specify a portion of the log removal for disinfection. Bill also asked if the panel should consider the other drinking water standards for disinfection to broaden the requirement. Kathy thought this was a valid point and suggested including standards for ozone and ultra-violet (UV) as well. Craig agreed, but said any methods beyond those three are not reliable yet. Craig suggested including something in guidance to say if better methods are identified, they may be used in the future.

Ken thought that specifying a log removal would create problems where people have a high quality effluent and they will not be able to achieve the log removal level. Jim argued that this is why we are including another option for meeting the standards; you could prove the removal through treatment technology or select a treatment and disinfection method to meet a specified log removal. Bill clarified that the log removal is after secondary and the disinfection is after filtration. Jim added that the disinfection standards will be for Class A/Human Contact water.

Jay Swift thought that having bacteria, virus and protozoa covered through monitoring or a design requirement is useful because some pathogens are removed through some processes more than others. Jay felt strongly that the log reduction should be included in the rule, but said the panel needs to agree on log reduction levels. Bill suggested that the rule require a five log removal of viruses after secondary and the guidance could provide some examples of ways to accomplish that. Jay said this requirement would leave out membrane bioreactors (MBR). Jay said this is why the small group came up with an overall treatment train requirement of eleven log removal. Jay said the group needs a more documented basis for the eleven log requirement before it could be put into a document that everyone would support.

Jim thought the panel needs to move forward and stop debating the log removal issue. He said if the group cannot currently validate a requirement, then it should be included as a future possibility. Angie asked if there is something available now to support putting the log removal requirement in the rule. Bill said the drinking water standard requires four log removal for viruses, with at least one log of that total coming from disinfection. He said the challenge study should include a disinfection credit as well. Kathy said there are very different types of filtration and the type needs to be defined in the rule.

Kathy said it sounds like the group supports requiring a five log virus removal/inactivation after secondary treatment and no more than one log removal credit for filtration without a challenge study or approval from the agency. Kathy asked if the group would support including something to say that the agency will accept third party sources as well. Jim suggested including this in guidance. Craig agreed that the challenge study should allow the use of other peoples work.

Proposed rule:

- 5-log removal of viruses after undisinfected secondary treatment
  or
- a multiple barrier technique including filtration and disinfection (see guidance)
  or
- 4-log virus removal after biological treatment and membrane filtration

Kathy said the panel still needs to address how MBRs fit into the requirement. Craig suggested identifying a multiple barrier approach in the rule. Jay suggested including another bullet in the rule to include a log removal requirement after biological or membrane treatment.

The group discussed the need to include a filtration requirement in the first bullet. Jim suggested saying the five log removal requirement has to include filtration but not allocating a removal credit for filtration. Jay explained that there was interest in making this requirement broad to promote innovation in treatment design. Kathy discussed the log removal capabilities of sand filters vs. MBRs. Kathy pointed out that MBRs could produce more than one log removal, in which case requiring four log removal after the MBR would make the rule more stringent. Bill thought that the practical differences are not that great and the rule should be kept simple; any extra credits could be demonstrated. Craig felt that the evidence from the drinking water world shows that there is variability within membrane treatment, some methods achieve three log removal and others achieve one log. Craig advocated for treating all the methods equivalently and using a multiple barrier approach.

Kathy asked if there is any data to show what log removal you could expect across the membranes or micro filtration following secondary treatment. Jay said the National Water Research Institute (NWRI) panel thought that one log removal was conservative. Kathy said she was still concerned about whether the rule should require four log removal after media treatment. Jay said typical secondary effluent fecal coliform levels run from 50,000-400,000 bacteria; filtration would remove 30-75% of that. The current proposal

would require the same after an MBR, but the fecal count would be different after an MBR. Kathy suggested a clarification: requiring four log removal after coagulation/flocculation and filtration. Jay thought it would be useful to have one option in the rule to encourage innovation and suggested the first option just require two barriers but not coagulation and flocculation.

Jim asked if the rule should outline some prescribed treatment train that would be equivalent. Angie suggested that this would be done in guidance under the first option. Kathy suggested saying in the rule that the department may establish pre-approved treatment trains to meet this requirement and then a list can go in guidance. Craig suggested updating the pre-approved list annually to accommodate new technologies.

Final proposed rule:

- 5 log virus removal after un-disinfected secondary with at least two barriers
  or
- 4 log virus removal after secondary treatment and coagulation/flocculation and filtration
  or
- 4 log removal after MBR

* The Department may come up with preapproved technologies, see list in guidance.

Jim suggested that he and Craig work together to refine the language for this proposal and come back in September with the final recommended rule. Angie suggested that they circulate the final language before the September meeting to get feedback from panel members.

Task #3 Discussion on groundwater recharge topics

Surface percolation and vadose zone

Jim summarized the previous discussion on this topic. He asked panel members to continue to discuss the groundwater recharge criteria, decide if discharge to the vadose zone could have the same requirements as surface percolation, and start listing criteria for what goes in the rule and what goes in guidance.

Jim began the discussion by asking what water quality criteria should be used for surface percolation. Kathy said the statute right now says the groundwater criteria should be followed; Ecology can add parameters for contaminants if it is necessary to be consistent with the goals of the chapter. Kathy said Ecology feels that there should only be one set of state groundwater standards. Craig said the Department of Heath (DOH) will resist that because there are many compounds not on Ecology's groundwater list. Craig thought the statute says that the federal list of constituents should be adopted, not the state list that is included in the groundwater standards. Kathy asked if Craig would be okay with saying

whichever is more stringent. Craig thought that would be okay as long as you could say the chemicals could be monitored on a consistent basis.

Craig discussed his concerns regarding monitoring contaminants on a consistent basis and dealing with non-detects. Ken asked if there are currently situations where the standards are lower than detection limits so Ecology accepts non-detects. Kathy said there are. Ken asked why that couldn't be done the same way in this case. Craig said his concern is that this water is being used to charge a potable aquifer and if a standard is set, you should be able to measure it, or it does not exist. Ken thought that if the monitoring shows the water quality is below the drinking water standard, and they get consistent non-detects, that should be acceptable until a lower detection method is approved.

Kathy asked if panel members thought the standard should be different for surface percolation than direct injection to the aquifer. Kathy said if water quality is being measured in the groundwater then it should not have a different standard, it has the same impact to human health and the environment. Jim asked if the point of compliance is where the treated water enters the aquifer. Bill said for direct recharge the point of compliance is where the end of the pipe enters the groundwater.

Angie asked if panel members would support using the current approach for direct injection and apply it to surface percolation as well. Kathy clarified that the recommendation would be groundwater or drinking water standards, whichever is more stringent, as measured in the groundwater. Kathy said Ecology could set the compliance point. Ken warned that the point of compliance needs to be down gradient and if it isn't, it could degrade an aquifer. Ken suggested monitoring the direct discharge and if the water is consistently in compliance then you can be assured you are not degrading the aquifer. Ken said if a limited number of compounds were above the limit, you could monitor the groundwater for those to assure compliance. Bill thought there could be some change from direct discharge through the vadose zone.

Lynn Coleman said the point of compliance now is where you take the water out of the ground. Craig thought the point of compliance for reclaimed water should be different because of the chemicals in the source water. Bill asked if the groundwater you are discharging to has a native background level for arsenic at fifteen parts per billion (ppb), would the pipeline discharge have to be ten ppb or can it match what is there already. Craig said under the proposed recommendation it would have to be ten ppb even though it is higher than background levels. Kathy suggested adding a clause about being able to establish a lesser standard where there is an overriding consideration of the public interest (OCPI). Panel members supported the idea of including this clause.

Angie summarized the proposed recommendation:

- Follow groundwater or drinking water standards, whichever is more stringent, using the current list.
- Point of compliance is the direct discharge point, i.e. end of the pipe, but monitoring may occur at the downgradient boundary of the application site.

- May not need to measure the full suite of contaminants in the groundwater, but at one of the monitoring points you have to accomplish 100% removal.

Ken thought the existing clause about the contaminant list should stay in the rule to address industries that may have an exotic compound not on the list. Ken suggested adding a statement to the proposal to say if the compound is not on the list the department may establish a limit consistent with the goals of this chapter.

Kathy said the panel needs to discuss the alternative points of compliance further. Kathy suggested measuring water quality prior to recharge, above ground after it comes out of treatment. Angie said what was suggested previously was two points of compliance, one prior to discharge from pipe where you measure the full suite, then again for the constituents that were close to compliance levels at a downstream point in the aquifer.

Dave Nazy asked if you would need to go through all known and reasonable technologies (AKART) if you have a contaminant above standards before the alternative point of compliance. Jay thought the treatment train would be considered AKART. Jay thought that an analysis could be performed to look for prevention and control for a specific pollutant that would include an evaluation of an effort to reduce or further treat the constituent. Dave said the city of Kennewick is an example where their discharge is not of a high enough quality to meet the current groundwater so they are going through an AKART analysis so Ecology may have a basis for applying OCPI or alternative plans for compliance. Dave said unless Ecology has that analyses they cannot go to OCPI or an alternative plan of compliance.

Craig said he understands how AKART is applicable under anti-degradation, but said this is beneficial use. Craig said the legislature has said if it is beneficial recharge then it is not anti-degradation. Kathy said she interpreted what the legislature said differently; anti-degradation means you do not degrade it any more than absolutely necessary. Jim read the state statute for reference. Lynn said AKART applies to all other discharges to groundwater so this should be consistent. Kathy said the Rule Advisory Committee (RAC) preferred using adequate and reliable treatment as a standard instead of AKART because of how people interpret AKART. Angie asked if the concept of AKART could be incorporated without using the word. Panel members supported this approach.

Kathy said the concept in AKART is a technology standard: regardless of receiving water you should at least treat to a certain standard. The reason you should be able to treat to this standard is that the cost and technology are reasonable to achieve. The second consideration is the suitability for the use in the reclaimed water standard which is above and beyond AKART. You are doing the minimum treatment but how you are using the water has additional needs and requirements and you have to meet those as well. Ken said AKART is referred to when a pollutant shows up that violates a standard so you apply AKART to lower the concentration of the pollutant or you can't use the water the way you might want. Craig said drinking water does not follow AKART, either you meet maximum contaminant levels (MCL) or you do not. Lynn said the health based standards

may be modified, Environmental Protection Agency (EPA) considers those things when establishing the drinking water standards.

Ken thought that the rule could incorporate a trigger mechanism to say you have to go back and mitigate a certain pollutant. Reclaimed water is different than drinking water because the source water has been used and added to by people, whereas drinking water comes from a river/lake and you do not have industries dumping stuff into it. Jay asked if a single occurrence of exceeding the limit would trigger AKART. Angie said monitoring and action levels still need to be determined for pathogens and suggested setting that topic aside to make the standard consistent across topics.

Jim said the panel needs to consider residence time in the rule. Bill said the panel may need to consider characteristics of soil. He asked if the rule needs to consider the geologic matrix of the soil to make sure there are not pathways that would have an impact. Kathy said most of EPA guidance has set six or twelve months as a residence time before you withdraw the water. There are many places in eastern Washington that have fractured basalt where the travel time is very short from one place to another and setting a residence time might preclude their ability to use reclaimed water. Bill said his home is sitting on glacial outwash and goes straight to groundwater. Jim said California has a draft rule out right now for residence times and dilution factors. Kathy asked that Jim circulate the California rule to panel members for consideration in the Washington rule.

Angie asked if residence time is relevant to surface percolation and if this is something that would need to be included in the rule. Bill thought the residence time topics seem to be getting into the details of guidance. Kathy thought the panel should talk about how residence time relates to groundwater recharge in general. For direct recharge the current standard is a minimum of twelve months residence time (+2000 feet separation) if the withdrawal is for drinking water, if it is for any other use it can be withdrawn anytime. Craig said the requirement for twelve months for direct recharge in saturated zones is based on minimum retention time for viruses and pathogens to ensure dilution and inactivation in that environment. Craig thought this would be very different for surface percolation. He said California is requiring six months for surface percolation, which is based on granting five log removal for treatment and one log in-situ per month for a total of eleven log between secondary effluent and withdrawal point.

Bill asked if there is a way to capture the issue of poor soils indirectly. Angie asked if the water has met all the standards at the end of the pipe if it could be put it into poor soil. Panel members thought that if you meet all the standards at the end of the pipe you can put the water into the ground anywhere. Kathy said residence time is assuming you are pulling it out for drinking water without doing any additional treatment. Bill asked where the residence time is calculated. Craig said the concept going into the Water Environment Federation (WEF) manual is the application of the river bank flow model, from the property line to the point of withdrawal. Panel members decided that residence time would be covered in the rule as it is proposed.

Final recommendation for surface percolation and vadose zone:

- State groundwater standards or drinking water standards, whichever is more stringent.
- Point of Compliance:
    - Direct discharge – uses a trigger mechanism to address water quality standards (include concept of AKART).
    - Point of withdrawal - based on use.
    - May not need to monitor full suite at both discharge point and point of withdrawl.*

*Include OCPI clause.

Aquifer storage and recovery

Angie asked if anything should be changed from the surface percolation recommendation to accommodate ASR standards. Craig said a section of the ASR statute says permits that include recovery from aquifer must comply with ASR project criteria to show suitability as a project. He said he did not think this meant that reclaimed water was going to be covered by ASR rules, but the projects themselves had to assure they looked at these issues so they could be designed adequately. Lynn said the TAP just needs to make the technical decisions for reclaimed water and Ecology will look at statute to decide if statutory changes are needed to support the TAP recommendations. Kathy said the statute ensures the same technical standards are met as other ASR projects.

Angie asked if the surface percolation standards discussed today meet other ASR standard, given that ASR for reclaimed water has to meet the same standards of other ASRs. Panel members thought that the surface percolation standards were adequate.

Bill said the issue of how to define down gradient still needs to be resolved and whether the water can be withdrawn from the same pipe it is being discharged from. Craig said the original concept at Kennewick was to use the same hole to put the water into the ground as you would to extract it. Angie asked if the same standard could be used for discharging the water, and then another standard could be developed for what comes out of the aquifer depending on the use. Panel members supported this approach. Jim thought that it might be worthwhile to include a clause to allow people to demonstrate that they do have soil treatment because this approach assumes a worst case scenario.

Lynn said Ecology is interested in allowing the use of reclaimed water for stream flow augmentation which may include an ASR. Lynn said if the panel recommends doing whatever is most stringent, it should addresses this issue. Bill said aquifer storage has strict criteria at end of reclaimed water process, almost similar to direct injection, and does not allow for vadose zone treatment. It becomes a buried storage tank in essence. Angie asked if there was much difference between ASRs and direct injection; the panel did not think so.

Kathy thought the group might be talking about different kinds of ASRs. She said one type of ASR is when water percolates through soil and another is direct injection. Jay thought that an ASR with surface percolation is the same as surface percolation and an ASR with direct injection is same as direct injection. Lynn said the intent of ASR is to talk about ground storage. Lynn read the definition. Bill said surface percolation has additional residence time that you may not have with ASR. Ken said most cases stream flow augmentation includes an infiltration basin or wetlands, not direct flow so you are getting some added treatment. Craig said Sequim has a pipe that goes directly to an aquifer.

Angie asked if the alternative point of compliance based on use should be part of the surface percolation standard too. Panel members thought both recommendations should include the point of compliance based on use.

Jim pointed out that under the current standards for direct recharge you have to install a reverse osmosis (RO) filter. The recommendation the panel is putting forward does not require RO. Kathy said there are other water quality standards for recharge the panel has not talked about separate from the drinking water and groundwater standards that may address this change.

Ken asked if total organic carbon (TOC) is included in groundwater and drinking water standards. Kathy said it is not. Angie asked if the requirement for direct injection to only to meet the drinking water and groundwater standards presents an issue for TOC. Bill said the current regulations are more stringent than that. Jim thought the current standards are over protective. Ken agreed and said the current regulations include a technology based requirement, this recommendation focuses on discharge limits instead of RO. Craig said the current regulations were written for recharge into aquifers where the flow continues down. There are no current examples of the recharge being the predominant source of water. Kathy said when those regulations were created there was an annotated version that would be good for panel members to look at.

Jim said the discussion today has been focused on traditional contaminants and based on that it was determined that direct injection does not require additional monitoring parameters. Jim said with endocrine-disrupting compounds (EDC) and pharmaceuticals and personal care products (PPCP), RO might be necessary. Kathy said that will be a good lead into the next meetings discussion. Bill Backous said the salt water intrusion barrier concept was a residence time issue. Bill was a little unsettled by the idea of walking away from RO requirement. Jay wondered if the panel might be able to come up with standards that could require an equivalent treatment but allow for innovation. Kathy suggested that panel members think about this some more and continue the discussion at the next meeting.

Proposed recommendation for direct injection/recharge:

- State groundwater standards or drinking water standards, whichever is more stringent.

- Point of Compliance:
  - Point of entry (end of pipe) – groundwater or drinking water standards, whichever is more stringent.
  - Point of withdrawal - based on use.

Assumes:
- No soil treatment
- No residence time

Task #5 Develop tasks for August meeting

Corrective Action Levels

Ken asked what the action level is for drinking water. Craig said it depends, there are actions that are required when a plant exceeds a certain level, but there are at least three triggers or approaches. Craig thought that the ability to have something that prevents regulatory violation is useful.

Jay said Virginia's new standards are interesting. Jim read Virginia regulation; the standard requires less than or equal to 49 colonies per 100 mL for a single sample. Craig said that sounds like it would be in the 85-90 percentile. Jim said Oregon and Colorado use E. coli at 126 as an average/mean with a max of 406. Jay said in Washington there is an existing total coliform standard which the panel has not talked about changing, but the panel has considered adding an action level on top of that. Jim said the panel also needs to decide if they want to add or change the current indicators.

Jim thought it might be worthwhile to research other states standards and determine how they came up with the numeric limits. Angie asked who would like to be in charge of that research. Jim, Craig, Eugene, and Jay volunteered to work on it together. Kathy asked that the group be sure to find the annotated basis for our own standards as well (Dr. Crook's work).

Monitoring

Jim asked if there are other organisms that should be monitored for reclaimed water. Bill said right now it is just total coliform. Jim said turbidity is also currently monitored. Jay said that Frank Loge had discussed some additional pathogens to monitor but was not sure what his basis was for doing so. Ken said there are some indicators that we may not have the tools to monitor. Jim said there are also issues with finding a lab to do the sampling and with the length of time it takes to conduct the test.

Bill asked what other states are doing in terms of testing. Jim said fecal and E. coli are common. Bill Backous said if you set a level you want to meet or exceed, then you could use monitoring to validate certain levels. Craig said Dr. Crook has said all treatment prior to disinfection is to ensure adequate disinfection. Dr. Loge has also said disinfection

efficiency is dependent on particle size. Craig said this gets back down to particle size as an indicator for how good treatment is.

Bill suggested including an OCPI clause to allow the use of new tests that may come along in the future.

Jim said Oregon does not use a total coliform standard for Class C&D, they measure E. coli. Kathy thought that Oregon did this to be consistent with their wastewater standards. She said Washington strongly considered E. coli but stayed with fecal coliform. Kathy thought that the panel should discuss the benefits of keeping the standards consistent at a future meeting.

Action Items

August meeting tasks

Jim reviewed the bullets under future topics on the agenda. Kathy thought the panel should finish other topics (wetlands, streamflow and EDC) before putting everything together for the rule. Angie suggested that any draft material be circulated prior to the next meeting so folks can read it and then come back in September to finalize. Jay suggested moving the meeting to the beginning of September instead because many people will be gone in August.

Angie said the next meeting will address wetlands/stream flow, PPCP and EDC. Angie asked if there was material that could be prepared in advance for these discussions. Jim said he is bringing in experts for the micro-constituents discussion. Ken said in August there is an EPA and Ecology study on PPCP removal at the LOTT treatment plant, it is a one day event and was not sure how much data will come out of it, but offered to share the results with the panel. Jim said he will post some documents to SharePoint on this topic. Angie said other state examples would be good too.

Meeting Attendees

Department of Ecology
Katharine Cupps, Agency Lead (phone)
Angie Thomson, Facilitator
Emily Neff, Note Taker

Committee Members and Alternates	**Guests**
Bill Persich, Brown & Caldwell	
Bill Backous, CH2M Hill	
Craig Riley, Department of Health	
Jay Swift, Gray & Osborne	
Ken Butti, LOTT Alliance	
Ecology Staff	

Lynn Coleman, Department of Ecology	
Tim Gaffney, Department of Ecology	
Dave Nazy, Department of Ecology	
Jim McCauley, Department of Ecology	
Eugene Radcliff, Department of Ecology	