

Minutes of the TAC Meeting for the Water Reclamation and Reuse Regulations  
May 31, 2006

The TAC meeting began at approximately 9:30 a.m. DEQ staff briefly addressed administrative issues and then gave the floor to the Chairs of the Disinfection and Nutrient Subcommittees to present what recommendations and findings they had available, to the TAC.

The Chair of the Disinfection Subcommittee, Dr. Marcia Degen, spoke first. Since the last TAC meeting (3/30/06), the subcommittee (consisting of seven members of the TAC) has had three conference calls. The most recent conference call was held on 5/26/06 and minutes have been drafted. Dr. Degen informally summarized the subcommittee's finding and recommendations.

The first recommendation of the subcommittee was to define the term "non-detect" used in the bacterial standards of treatment. "Non-detect" needs to be defined by the analytical method used (i.e., non-detect would be  $< 1$  if using the plate method, or  $< 2.2$  if using the tube method).

The second and probably the most important recommendation of the subcommittee was to use a geometric mean rather than median for the bacterial treatment standards. The rationale for using a geometric mean was based on the fact that it is more consistent with what is currently in place for the VPDES Permit Regulation and would make it easier for facilities to move between discharge and reuse. Also, a review of the EPA Water Reuse Guidelines (2004) and the reuse regulations of eight other states that have treatment comparable to Level 1, revealed that about half of the states were using a median value and the other half were using a geometric mean for their bacterial standards. Therefore, Virginia wouldn't be alone if deciding to use a geometric mean value rather than a median value for the bacterial standards. A maximum value with the geometric mean was recommended for both treatment Levels 1 and 2.

Another critical issue addressed by the subcommittee concerned a "never to exceed" maximum. All state regulations reviewed by the subcommittee have a "never to exceed" maximum with their median or geometric mean. The logistics of trying to implement a "never to exceed" maximum would be extremely difficult. By the time you get the data back showing an exceedance, the batch having the exceedance has already gone to the reuse system. Therefore, the subcommittee recommended a process similar to what is done for drinking water. For a positive value or an exceedance of a maximum value, the reclaimed water must be immediately resampled and treatment operations adjusted to correct the problem. If results of the resample also exceed the maximum value, the reclaimed water must be diverted to reuses requiring a lower level of treatment, to a discharge or to storage for subsequent retreatment. TAC members representing utilities on the subcommittee felt that this was something they could work with and it would be an approach consistent with other programs.

The Disinfection Subcommittee has also been trying to establish numbers to use for the geometric means and maximum values of the bacterial standards for both Levels 1 and 2. For Level 1, the subcommittee recommended using a geometric mean  $< 14$  CFU/100 ml for fecal coliform with a maximum of 49 CFU/100 ml. This geometric mean is consistent with what North Carolina is using for a treatment comparable to Level 1 in their water reuse regulations and the maximum is consistent with Virginia's shellfish water quality standards. Using a calculator formula, DEQ staff found that this equates to a geometric mean of 11 CFU/100 ml for both *E. coli* and enterococci and maximum values of 35 and 24 CFU/100 ml for *E. coli* and enterococci, respectively.

For Level 2, the subcommittee recommended bacterial standards very similar to what are in the proposed regulation, except that geometric means will now be in place of median values. The geometric mean for fecal coliform, E. coli and enterococci will be 200, 126 and 35 CFU/100 ml, respectively. Maximum values for fecal coliform, E. coli and enterococci will be 800, 235 and 104 CFU/100 ml, respectively. The species used for a particular reclamation facility would match the species used in the VPDES permit for the effluent discharge. The question came up as to what species should be monitored in the reclaimed water when a facility has no discharge, as in the case of an activity authorized under a VPA Permit? The subcommittee decided to mimic the monitoring requirements for a discharge and select species according to the location of a facility. If a facility is within a fresh water zone, the species monitored would be E. coli; in a saltwater or transition zone, the species would be enterococci; and within watersheds of special standards waters, the species would be fecal coliform.

The findings and recommendations of the Disinfection Subcommittee are still in the process of being finalized. There remain some other issues to be further researched, such as monitor requirements for UV disinfection alternatives. Currently, there exist standards for UV disinfection in the SCAT Regulations but only for treatment of sewage that equates to Level 2 in the proposed regulation. Treatment standards for UV disinfection need to be developed for Level 1.

The Co-chair of the Nutrient Subcommittee, James Golden, presented the subcommittee's findings and recommendations. The subcommittee came to consensus on some concepts for recommendation, but may need to discuss some issues further.

A significant issue addressed by the Nutrient Subcommittee was differentiating irrigation reuse from disposal of water. It was established that reuse of reclaimed water for irrigation would be supplemental to rainfall to meet the water requirements of the crop.

The Nutrient Subcommittee also sought to establish nutrient treatment levels that would eliminate the need for the end user to have a nutrient management plan (NMP). Assuming the nutrient removal treatment to be biological nutrient removal (BNR), the discussion of the subcommittee focused on what would be acceptable treatment levels for nitrogen (N) and phosphorus (P) to be achieved by BNR. Below some level of BNR treatment (yet to be discussed), there would be no NMP requirement for either a residential or bulk user of reclaimed water. Urban or residential reuse would be limited to that level of BNR treatment. Bulk users of reclaimed water with nutrients above that BNR level, would be required to have an NMP.

The concept discussed by the subcommittee was to have no permitting requirements for end users. Assuming some level of BNR treatment was achieved that didn't require an NMP, generators could develop a reclaimed water management plan that would address concerns regarding end users within the area receiving reclaimed water. This would be used in lieu of permitting the end users. The plan would also address many items that don't need to be specifically stated in regulation. This concept is an approach similar to what is currently being used in Florida. Florida does not require BNR but does require advanced secondary (filtration and high level disinfection) for certain irrigation reuses of reclaimed water.

A member of the Nutrient Subcommittee indicated that consensus was not necessarily reached on the issue of appropriate BNR treatment level, at or below which nutrient management planning would not be required. Some of the subcommittee members felt advanced secondary was sufficient while other members felt that BNR treatment was needed to prevent nutrient impacts to groundwater.

Another concept discussed by the subcommittee was to require bulk users of reclaimed water with nutrients above the BNR level, to obtain NMPs through the generator's water reuse permit. The reclaimed water management plans previously mentioned would describe a process by which generators could verify that bulk users were complying with their NMPs. This concept is similar to what is done by the VPDES Pretreatment Program which delegates pretreatment responsibilities to POTWs.

There were some issues raised, but not addressed by the subcommittee. It was decided that these issues should be addressed by the TAC and are as follows:

- Should BNR be a minimum reclaimed water treatment requirement for small facilities (<1.0 MGD) that provide reclaimed water for irrigation reuse?
- Are any additional controls needed where the permittee is the predominant user of the reclaimed water, particularly for irrigation, to avoid disposal rather than reuse?
- Is a chloride limit needed for reclaimed water used for irrigation, particularly in coastal areas?

Issues concerning chlorides in reclaimed water pertained to aesthetics due to the toxicity of chlorides to plants, and the need to require chloride limits to protect groundwater. Virginia does have groundwater criteria for chlorides. Levels at which plant stress occurs are much higher than levels at which impacts to groundwater will occur.

BNR level treatment contained in the Nutrient Subcommittee findings and recommendations are currently 1 mg/l Total P and 8 mg/l Total N. Virginia has a more robust nutrient management planning program compared to other states, administered through DCR. This results in some unique concerns in Virginia that may not exist elsewhere. BNR level treatment and research results generated by Dr. Greg Evanylo (Va. Tech), were topics of considerable discussion by the subcommittee.

The floor was left open to the TAC to discuss the findings and recommendations of the Nutrient Subcommittee.

It was pointed out by DCR and DEQ members of the TAC that the objective of creating a BNR level of treatment was to establish a quality of reclaimed water not requiring any restrictions of its use from both a public health and environmental perspective. This would not preclude the use of reclaimed water with higher nutrient levels from being used but would require NMPs and possibly other restrictions for the use of such water.

Another TAC member agreed, in part, with the objective to establish a reuse product requiring no restriction on its use but pointed out that the written recommendations of the Nutrient Subcommittee prohibit the use of reclaimed water not meeting BNR level treatment for residential irrigation reuse.

The reason this prohibition was added was that the subcommittee could not come up with any reasonable way to apply the concepts of nutrient management planning on an individual residential lot within a development that is utilizing reclaimed water.

A possible solution or alternative to the prohibition was something previously mentioned by Dr. David York (Florida DEP), whereby the generator prepares a reclaimed water management plan for the entire subdivision rather than for individual lots.

There shouldn't be any health effects resulting from the application of advanced secondary treated water to residential lawns. There is the presumption that nutrients will be taken up by the lawns that are irrigated within residential communities.

Anyone familiar with how plants work knows that the major mechanism for nutrient removal is through diffusion gradients, not through mass flow or root contact. A root system of a plant can actually remove nutrients from water as it flow by. Ninety percent of nitrogen uptake is by diffusion gradients. Therefore, it should be expected that nitrogen content of reclaimed water used for irrigation will be reduced as the reclaimed water passes through the root zone. Turf grasses have tremendous potential to remove nitrogen from water and much more efficiently than, for example, corn. Typically, 25 to 30 percent of the nitrogen applied to a corn crop is leached, while nitrogen leached from turf grasses it is well below five to ten percent. There are other issues that need to be considered. Warm season grasses in Virginia don't start growing until May so potential leaching losses will be greater when reclaimed water is applied on these grasses in March or April. There is a wider window of application for cool season grasses, such as Fescue.

The question was raised as to whether or not that amount of irrigated water applied to impervious surfaces and associated runoff in an urban setting, represents a substantial concern with regard to nutrients reaching surface waters. Compared to other sources of pollutants entering stormwater collection and drainage systems, such as leaves, oil and grease from vehicles, etc., the amount of nutrients from runoff of lots irrigated with reclaimed water would be inconsequential.

There seems to be significant concern regarding nutrients from irrigation reuse on residential lots, while ignoring the nutrient impacts of on-site septic tank systems. Why is the proposed regulation being more stringent regarding the reuse of reclaimed water for residential irrigation when you may have an entire community using on-site septic tank systems? Nutrient problems associated with on-site septic tank systems are regulated by the VDH and are not something than can be addressed in the proposed regulation. DEQ acknowledges that there are other sources of nutrients contributing to nutrient problems in the Chesapeake Bay. Through this regulation, DEQ is attempting to minimize nutrient inputs from water reuse in addition to nutrients sources not within its authority to regulate, such as on-site septic tank systems and residential fertilizer applications.

The best way to reduce nutrients to the Chesapeake Bay is to have an aggressive reclaimed water program. To the maximum extent possible, try to increase plant uptake of nutrients rather than treating the reclaimed water to high levels to remove the nutrients, thereby increasing the cost of the treatment. The difference in costs to remove nutrients to 1 mg/l Total P and 8 mg/l Total N in addition to advanced secondary treatment will vary depending on the chemicals needed but both the initial investment and long term maintenance costs will be significant.

There was a suggestion that water reclamation facilities should anticipate that they will not be able to reuse all their reclaimed water 100 percent of the time, and should be required to meet 1 mg/l Total P and 8 mg/l Total N during those periods of the year when a discharge is necessary. Some TAC members representing municipal WWTPs indicated that their VPDES permits already contained nutrient caps that were higher than 1 mg/l Total P and 8 mg/l Total N, and objected to additional treatment needed to achieve nutrient levels below that required to meet their annual loading caps. In

some cases, their current treatment facilities removed enough nutrients to meet the nutrient caps of their VPDES permits, but would be unable to meet 1 mg/l Total P and 8 mg/l Total N. Consequently, they could not use their reclaimed water to irrigate residential lawns due to the prohibition proposed.

North Carolina is the only state that has a nutrient limit for ammonia. No other states have nutrient limits specific to a reuse (i.e., irrigation), nor prohibitions for certain reuses due to nutrients. Other states appear to be addressing nutrients via nutrient management plans and groundwater monitoring.

Should there be groundwater monitoring for nutrients associated with irrigation reuses or should we rely on water balance calculations rather than actual data? What happens if you find something?

Irrigation reuse is the best alternative to reducing nutrients in the Chesapeake Bay. Studies conducted by the United States Golf Association and Golf Course Superintendents Association of America found that irrigation with reclaimed water on golf courses did not adversely impact groundwater quality. There needs to be compromise on both sides of the issue or irrigation with reclaimed water will not be feasible for golf courses. Golf courses can have NMPs for fertilizers but they shouldn't be required for irrigation with reclaimed water. There was some disagreement over this. NMPs could account for the nutrients contained in the reclaimed water to offset the need for additional fertilizer.

DEQ staff interjected to clarify objectives of the Nutrient Subcommittee. Virginia has other regulations, the object of which are to reduce and control the amount of nutrients going to the Chesapeake Bay. The agency doesn't want this regulation to be an opportunity for generators to irresponsibly redirect nutrients from surface waters to groundwater via land application, and in some cases, back to surface waters. There are other permitting mechanisms for land treatment. The Nutrient Subcommittee was attempting to find a way for residential property owners to use reclaimed water to irrigate their lawns, for example, without a permit or an NMP. The Nutrient Subcommittee may still need to determine at what level of nutrients this is permissible. For golf courses, it is not a problem to apply nutrients and BNR level treatment should not be required.

There was not consensus among Nutrient Subcommittee members on the level of nutrients, N and P, that would define BNR treatment for residential reuse. There were two issues. The first issue was from the generator's point of view. If water reuse is to be promoted, it must be done in a way that does not make it excessively expensive. The second issue was that a reasonable standard must be developed that can be applied without being a concern. It shouldn't be inferred that the amount of nutrients applied shouldn't be accounted for.

For residential users, generators can use educational programs to encourage the appropriate application of reclaimed water. Furthermore, residential users that must pay for the reclaimed water will be more conservative with its use.

Raising the nutrient levels for BNR treatment (as defined by the Nutrient Subcommittee) would do little to worsen the potential for groundwater contamination from residential irrigation. This should be done in conjunction with an educational program informing home owners of the reduced need for fertilizer. Groundwater monitoring is not going to promote reuse and it does not identify groundwater impacts as they occur.

What guidelines should a regulator go by when reviewing a reclaimed water management plan where, for example, a reclaimed water containing 15 mg/l Total N will be applied to residential lawns? Rather than focus on the N content of the reclaimed water, particularly at 15 mg/l Total N, determine with

appropriate models the amount of supplemental water that will be needed to irrigate the lawns. Based on the amount of water to be used, it is then possible to calculate the amount of nutrients that will be applied via irrigation reuse. Home owners can be educated to deduct these irrigated nutrients from the total nutrients applied to their lawn. This approach may or may not be practical for the purposes of reclaimed water management plans. This is not inconsistent from what is being done in other states. The regulating agency of water reuse in Virginia needs to be familiar and capable of running such models if this approach is to be considered.

Based on the preceding discussion of the TAC regarding the Nutrient Subcommittee's finding and recommendations, there remain a couple significant issues that DEQ staff will need to consider more thoroughly and, if necessary, reconvene the Nutrient Subcommittee.

The TAC focused next on the "Standards of Treatment and Reuses" for the proposed regulation. DEQ staff reviewed materials sent to the TAC prior to the meeting. Currently the "Standards of Treatment and Reuses" are in Part III of the regulation and "General Requirements" are under Part II of the regulation. DEQ staff proposed to move the Standards of Treatment and Reuses to Part II and the General Requirements to Part III. One TAC member pointed out that general requirements typically precede more specific requirements in water regulations. What is the purpose in reversing this order? The rationale for this change was to identify what reuses would be covered by the regulation before getting into general requirements for reuses. Are all parts of the regulation equally enforceable or are parts arranged in order of significance with regard to enforceability, the more significant parts placed before less significant parts in the regulation? DEQ staff indicated that all parts of the regulation should be equally enforceable. DEQ staff will check to make sure that this proposed change will not conflict with any agency policies and requirements of the Virginia Registrar.

The table contained in the "Standards of Treatment and Reuses" was discussed. DEQ staff received written comments from some TAC members in late April and early May to remove "Additional Requirements" from the table, indicating that such requirements were not typically contained in regulation, were not enumerated and would be difficult to reference, and were merely guidelines adopted from the EPA Water Reuse Guidelines (2004). During the February meeting of the TAC, DEQ staff reviewed the EPA Water Reuse Guidelines, Table 4-13, with the TAC and they had agreed to incorporate portions of Table 4-13 for specific reuses, unchanged into the table of the "Standards of Treatment and Reuses". In response to the written comments, DEQ staff developed a second version of the table in the "Standards of Treatment and Reuses", which removed "Additional Requirements" from the table and put them into sections under broader reuse categories following the table. DEQ staff reviewed other changes made to the revised or modified table. Column headings of the table were changed to "Reuse Categories", "Reuse", and "Minimum Treatment Requirements". Reuses were grouped into one of seven broad Reuse Categories and the Reuse Categories were numbered to allow more specific and simplified referencing. DEQ staff endorsed the use of the second (or modified) version of the table for the proposed regulation. It was suggested that numbers or letters used in the table for the Reuse Categories be made to correspond to what was used to label sections following the table that were formerly the "Additional Requirements".

One TAC member re-emphasized that "Additional Requirements" in the proposed regulation, were merely guidelines from the EPA Water Reuse Guidelines. DEQ staff noted that if incorporated into the regulation, they would no longer be guidelines but become requirements. The guidelines that were added to the regulation, however, could be discussed further by the TAC.

Another TAC member noted that some of the guidelines used as requirements in the proposed regulation, contain the word “may”. This seemed to be permissive rather than specific. DEQ staff indicated that the proposed regulation is a technical rather than permit regulation and cannot be overly specific or it will become inflexible. Another TAC member suggested using the language “shall be determined on a case-by-case basis” rather than using the word “may”. It was pointed out that a similar issue regarding the use of “shall” vs. “should” exists in the VDH Water Works Regulations. “Shall” means you must do it a specific way or provide an appropriate design or operational equivalent. “Should” means this is the agency’s recommendation and it may be made a requirement at some point, but normally this is the best practice that the agency believes the permittee should follow. Who determines when something “may” or “may not” be required? This is a determination made by the permitting authority on a case-by-case basis and allows the agency flexibility.

A TAC member representing VAMWA objected to the inclusion of the guidelines from the EPA Water Reuse Guidelines (Table 4-13) into the proposed regulation, stating that these should be more appropriately used in guidance for agency permit writers. The individual requirements in the proposed regulation that were adopted from the guidelines could be re-evaluated as the TAC reviews the “Standards of Treatment and Reuses”.

DEQ staff referred the TAC to the “Standards of Treatment and Reuses” containing the modified table for review. Comments provided by the TAC are listed as bulleted items as follows:

For “Standards of treatment for reclaimed water”:

- Delete item A. as this simply restates language already in the “Purpose” of the regulation under 9 VAC 25-740-20 of Part I.
- For Level 1 minimum standard of treatment, how and when would total suspended solids (TSS) monitoring be used in lieu of turbidity monitoring? This language came from the EPA Water Reuse Guidelines. It would appear that it gives the option of monitoring TSS daily vs. continuously monitoring turbidity on-line.
- For Level 1, should the TSS monitoring be used as a backup to turbidity monitoring in the event that your turbidity meter goes down? For certain size drinking water treatment facilities, VDH requires continuous on-line turbidity monitoring defined as a sample taken every 15 minutes. If the turbidity meter does go down, grab samples must be collected every four hours until the turbidity is repaired within a maximum of five days. TSS monitoring is not substituted for turbidity monitoring.
- The Disinfection Subcommittee did discuss the issue of when TSS monitoring for Level 1 in lieu of turbidity monitoring may be appropriate. There was consensus that turbidity monitoring should be required for larger facilities, but smaller facilities should be allowed the option to monitor TSS because of the operational costs involved in maintaining an on-line turbidity meter.
- DEQ staff will further research the option of using TSS monitoring in lieu of turbidity monitoring.
- For both Level 1 and 2 minimum standards of treatment, the option to monitor CBOD instead of BOD<sub>5</sub> should be included to be consistent with VPDES permit monitoring requirements. Such would be the case for a facility that reclaimed water for reuse and maintained a point source discharge with a CBOD limit.
- For item C., it states “Turbidity or TSS for Level 1 treatment shall be achieved before disinfection.” This is appropriate for chlorination disinfection, but if you are using a physical

barrier for disinfection, such as ultra membrane, then turbidity or TSS would need to be monitored after disinfection.

- For wastewater treatment, there is no physical disinfection process recognized by the state of Virginia.
- For drinking water treatment, you can receive credits for filtration disinfection.
- Per the LT2 Rule, VDH gives full credit for cyst removal by membrane processes. On a BIN 1 raw water source, you can achieve a three log requirement via a properly operated membrane system. VDH does not recognize membrane processes for virus removal. Therefore, other disinfection will be required for virus removal. Chemical disinfection easily provides four log removal or inactivation of viruses, but only provides about a half log removal of Giardia.
- Is this an issue to be concerned about if there are very few membrane disinfection systems that may be used for disinfection? Membranes that can achieve physical disinfection are already available and are likely to become more popular as their efficiency improves.
- DEQ staff will attempt to reword item C. to consider how turbidity or TSS will be monitored relative to membrane filtration processes used for disinfection.
- Clarification was requested for item D. Direct discharges from reclaimed water treatment facilities to surface waters of the state, including wetlands, would be regulated as a point source discharge under the VPDES Permit program. An example would be reclaimed water discharged to a water reservoir for indirect potable reuse. This discharge would be regulated under a VPDES permit.
- Item E. is difficult to read. Switch the clauses in the first sentence. The intent is to state that end users may need a quality of water other or better than the minimum standards of treatment for the protection of human health and the environment, and additional treatment to achieve that quality quality may not be regulated unless otherwise determined by the Board. An example would be an end user that wants to use Level 1 reclaimed water for boiler feed but must additionally treat the reclaimed water before putting it into the boiler.
- Should the end user determine what “alternative and additional treatment” will be required as indicated in item E? In most cases, the end user will make this determination. However, the Board needs to have some flexibility to require treatment in addition to that required for Levels 1 and 2 on a case-by-case basis to protect human health and the environment. The Board may do this in response to comments from other state agencies, such as the VDH, DCR, etc.
- Rework item E. to better clarify the intent as discussed.
- For item F., eliminate the third sub item listed (“Both E.1 and E.2 above.”) and insert “or” between the first and second sub items. Where did “five percent” sewage in the first sub item come from? The VPDES permit manual requires chlorination disinfection for industrial waters when it contains greater than ten percent. The five percent threshold came from VDH Guidelines, which indicated that an industrial wastewater containing from five to ten percent sewage will require disinfection. These thresholds may also be specified in the SCAT Regulations. DEQ staff will research this further and make corrections if needed.
- HRSD requires that industrial wastewater containing any sewage must be disinfected as a sanitary waste. Federal regulations not do specify a percentage of sewage in industrial wastewater at or above which disinfection of the industrial wastewater is required.



- The origin of the VDH Guidelines for disinfection requirements of industrial wastewater (i.e., five to ten percent sewage) originated from the ten state standards. This was included in the VDH Sewerage Regulations and then transferred to the SCAT Regulations.
- Industrial wastewater that is being reclaimed and which contains any portion of sewage, may be unable to meet the bacterial standards in Level 1 or 2 without disinfection. However, the need for disinfection may also be influenced by the nature of the industrial wastewater. Some industrial wastewaters will be toxic to the organisms in the sewage. On the other hand, there are industrial wastewaters, such as those from forest products manufacturing, which will consistently have fecal coliform, Klebsiella, that give positive test results. This is inherent of the wood product.

For “Reclaimed water monitoring requirements for reuse”:

- What will happen when there is an exceedance of a standard observed during monitoring? Will the reclaimed water be diverted to another location or will further monitoring be required with no other action? The Disinfection Subcommittee has proposed that for the first exceedance of disinfection standards, immediate resampling should be required and adjustment to the treatment process made to bring the reclaimed water back into compliance with the disinfection standards. If the resample also exceeds the disinfection standards, the reclaimed water treatment facility should divert the reclaimed water to a VPDES permitted surface water discharge, back for reclaimed water retreatment, or to reuses that can accept reclaimed water with a lower level of disinfection. Similar action is already described by item C. of the preceding section of the regulation, “Standards of treatment for reclaimed water”, that applies to all monitored parameters. Item C. should go into greater detail regarding progressive corrective action in response to the first and second exceedances of disinfection and non-disinfection treatment standards.
- Is it practical to hold reclaimed water after disinfection until bacterial results come back to verify that it complies with the applicable standards? It would not be practical to store reclaimed water after disinfection and until bacterial analytical results for that water become available (i.e., as long as 48 hours for E. coli), and would discourage reclamation and reuse.
- Exceedance of parameters monitored on-line can be detected much more quickly and the reclaimed water diverted as discussed in item C. of the preceding section.
- A big part of public acceptance, particularly for public access reuses, is assuring the public that what they are receiving is safe. If you continue to put reject reclaimed water into the distribution system when it is not in compliance, you will have a hard time assuring the public that you have a safe product.
- “Exceedance” needs to be defined. Is it an instantaneous value or an average over a certain period of time? What is an exceedance for continuous on-line turbidity and chlorine residuals monitoring? In the Drinking Water Regulations, VDH requires continuous on-line monitoring but the measurements are taken every 15 minutes. A continuous signal is monitored over 15 minutes and then averaged, but only one reading is taken per each 15 minute interval for compliance assessment. The standard requires that a facility meet its assigned turbidity level in at least 95 percent of the readings for that month. There is also a maximum never to be exceeded by any of the 15 minute readings.
- Turbidity meters are subject to fluctuations and faulty readings due to interference by the signals of other equipment, such as two-way radios. The Drinking Water Regulations appear to allow some excursions by requiring at least 95 percent of, but not all, turbidity readings to meet the facility’s assigned turbidity level.

- Even when a water treatment plant is above the maximum never to be exceeded level, the water is still distributed. When this occurs the water treatment facility must notify VDH within a specified period. In response, VDH may declare a tier 1 violation which then requires the facility to notify the public through TV and radio announcements.
- What should be done in response to exceedances of reclaimed water standards? Exceedances should not necessarily trigger a violation but should initiate a management response to correct exceedances. However, repeated recurrence of exceedances might be considered a violation.
- What is a resample for parameters monitored continuously, on-line? If you are monitoring chlorine residuals and you have a 30 minute contact time, it could take an hour before you've made a management change and see the effects at the continuous on-line monitor.
- If the regulation establishes that, for example, fecal coliform levels below a set threshold are safe, the message sent to the public is that fecal coliform levels above that same threshold are not safe. If it takes 48 hours to determine that fecal coliform exceeded the threshold, it is possible that unsafe reclaimed water was sent to reuse for 48 hours. This could negatively affect public acceptance of reclaimed water.
- Chlorine residual and turbidity monitoring are predictors of the bacterial results and are more immediate because they're monitored continuously and on-line. No facility has the luxury of holding disinfected reclaimed water for 48 hours before releasing it for reuse. By using chlorine residual and turbidity, a facility can correct possible bacterial exceedances more quickly and divert flow for a much shorter period of time.
- The issue of spurious on-line readings was discussed again. Because you are getting a continuous reading, you do not resample but must use a set period of time to determine if the reading is spurious and of no consequence, or sustained and requires the flow to be diverted. Other states, such as North Carolina, have established a time period of five to ten seconds for sustained elevated continuous on-line readings, beyond which the reclaimed water must be diverted. The Disinfection Subcommittee can research how other states have addressed spurious continuous on-line monitoring results for turbidity and residual chlorine.
- Florida does not specify how long you must maintain a maximum reading before diverting, but requires reclaimed water treatment facilities to submit an operation protocol as part of the reclaimed water management plan or permit application that states what the facility will do when maximum levels are exceeded. It was felt that this approach might provides greater flexibility than establishing a set time period for sustained maximum reading before diverting. Such a period might need to be specific to the reuse(s) and discharge options (i.e., reject water ponds, surface water discharge, etc.).
- For reclaimed water treatment facilities that are supplied by STPs that do not discharge daily, how can you require continuous on-line or daily monitoring? The approach used for VPDES permitted point source discharges that are intermittent could also be applied to water reclamation facilities that are intermittently discharging. Essentially, when discharging or producing reclaimed water, monitoring must be performed. This issue may also be addressed when discussing possible minimum size requirements for reclaimed water treatment facilities.
- For TSS monitoring, clarify that it is required for Level 2 and may be done in lieu of turbidity monitoring for Level 1. For Level 2, it appears inconsistent to monitor TSS daily and BOD<sub>5</sub> weekly. For WWTPs, both are done at the same frequency. What is the basis for monitoring TSS more frequent than BOD<sub>5</sub>, particularly for Level 2 where TSS monitoring will not be done in lieu

of turbidity monitoring? Make TSS monitoring for Level 2 weekly and leave it at daily for Level 1.

- What is the purpose of having TSS monitoring in lieu of continuous turbidity monitoring at Level 1? Continuous on-line turbidity monitoring gives you more immediate notice of a problem, while TSS results will not be available for > 24 hours. It was previously suggested that TSS may be used as a backup for continuous on-line turbidity monitoring, particularly when your turbidity monitor goes down. However, some TAC members felt that manual sample collection and analysis of turbidity was still preferable to TSS monitoring as a backup, even for smaller facilities.
- Should TSS monitoring be available in lieu of turbidity monitoring for Level 1? The consensus of the TAC was that TSS monitoring for Level 1 should be eliminated but maintained for Level 2.
- For Level 2, should TRC monitoring be continuous on-line? Disinfection Committee may need to examine the monitoring frequency for TRC in Level 2. Continuous on-line TRC monitoring of reclaimed water treated to secondary level may be excessive.
- For Level 1, should turbidity monitoring be continuous on-line or could grab samples be used? If it is considered safe for water treatment facilities producing drinking water to monitor turbidity with grab samples, why would it not also be safe for reclaimed water? It is likely prudent to set sampling frequency according to the amount of reclaimed water generated. The Disinfection Subcommittee will examine the issue of grab samples vs. continuous on-line monitoring for turbidity.
- Monitoring for bacterial parameters should no longer refer to median values but to geometric mean values. This will be noted as “subject to change” contingent upon the final recommendations of the Disinfection Subcommittee.
- Methods of analysis for all parameters that are monitored should be EPA approved methods in 40 CFR Part 136. This is typically specified in DEQ guidance or permit manuals. However, methods for drinking water analyses not contained in 40 CFR Part 136, might also be used for reclaimed water analyses. Therefore, the regulation might more appropriately require the use of analytical methods “accepted by the DEQ” which would include those of 40 CFR Part 136 and methods used for drinking water analyses.
- The Disinfection Subcommittee was asked to examine the need for Giardia and Cryptosporidium monitoring. Monitoring for these organisms is currently required for specific reuses in Florida. The monitoring is intermittent and periodic, but increases in frequency when the number of organisms is detected above a specified threshold. There is no other action required by Florida, so the purpose of the monitoring was not clear to the subcommittee. The VDH does not require monitoring for Giardia and Cryptosporidium in drinking water so why would you want to require this monitoring for reclaimed water which will not be used for direct potable supply? The subcommittee felt that if no action would be taken in response to Giardia and Cryptosporidium detected in the reclaimed water, monitoring should not be required. In addition, there are a limited number of laboratories that can analyze for Giardia and Cryptosporidium and the analyses are very expensive.

For “Minimum treatment requirements for reuses of reclaimed water”:

- Changes to the structure of the table contained in this section were previously discussed. Some reuse categories were removed from the table and explanations were provided within the table for these deletions.

- Members of the TAC had expressed a desire to include groundwater recharge for both indirect potable and non-potable reuses in the proposed regulation. However, House Document No. 92 states that DEQ will need more data regarding the quality and quantity of groundwater resources in Virginia before authorizing groundwater recharge as a reuse. The effort to collect this data has been initiated but will take time to generate meaningful information. Because adequate information regarding groundwater resources in Virginia is not yet available, the DEQ has determined that groundwater recharge with reclaimed water will not be recognized as a reuse in the proposed regulation. This could be changed in amendments to the regulation as data becomes available regarding groundwater resources.
- Disposal of water via an underground injection well can be permitted in Virginia through the EPA's UIC Program. Virginia did not seek primacy of this program so underground injection must be permitted by EPA. It should be noted that the EPA UIC Program prohibits injection into or above a potable water aquifer. Injection into other aquifers is allowed.
- Where do rapid infiltration basins fall in the scheme of things? Rapid infiltration basins (RIBs) are identified as a form of land treatment in the SCAT Regulations. They must be reviewed on a case-by-case basis. RIBs are differentiated from groundwater recharge in that they are a disposal method and not a reuse. While not covered in the proposed regulation, they are addressed in the SCAT Regulations and can be authorized under a VPA permit.
- Is there any language in this proposed regulation that prohibits groundwater injection of reclaimed water for indirect potable reuse? This issue will be discussed when the TAC reviews Part I of the proposed regulation, specifically 9 VAC 25-740-50 which identifies exclusions and prohibitions of the regulation.
- Treatment Level 1 was previously recommended for aquaculture under the "Industrial" reuse category. However, treatment Levels 1 and 2 are based more on human health protection than for the protection of fish. Most aquaculture facilities would not use Level 2 reclaimed water not because of human health concerns but due to the effect it would have on the health of the fish. There are no worker safety concerns regarding the reuse of reclaimed water for aquaculture. Level of treatment established for all other reuses in the table are based on human health concerns. Is it acceptable, therefore, to require Level 1 treatment for aquaculture for other than human health concerns? It demands a Level 1 treatment due to end user requirements and not for human health protection. Only Level 2 is required for livestock watering except for lactating animals where human health may be adversely affected by consumption of the milk from these animals. Also, boiler feed requires only Level 2, although the end user would want it to be treated to Level 1. For consistency with other uses and based principally on human health concerns, aquaculture should be moved to Level 2 treatment under the "Industrial" reuse category.
- For reuses under the "1. Urban – Unrestricted Access" reuse category in the table, include "public parks and athletic fields" among "All types of landscape irrigation of public access areas," and insert "(i.e., lawn watering)" after "Outdoor domestic or residential reuse".
- For reuses under category "3. Irrigation for Food Crops Commercially Processed – Restricted Access", it states "And food crops, including ...". The word "And" should be replaced with "Any".
- Because reuse categories 3. (Irrigation for Food Crops Commercially Processed – Restricted Access) and 4 (Irrigation for Non-Food Crops and Turf - Restricted Access) both require Level 2 treatment, would it be possible to combine them into one reuse category and subdivide them under the "Reuse" column?

For “Reuses of reclaimed water”:

- This section of the regulation consists of what were previously the “Additional Requirements” removed from the table in the section on “Minimum treatment requirements for reuses of reclaimed water”. The “Additional Requirements” have been regrouped under subsections that are reuse categories comparable to, but not exactly the same as those in the modified table of the preceding section of the regulation. The subsections are: A. Urban – Unrestricted Access; B. Irrigation; C. Landscape Impoundments; D. Construction; and E. Industrial.
- Under subsection A (Urban – Unrestricted Access), item 3 describes “controlled access irrigation” that would require a lesser level of treatment, such as Level 2 rather than Level 1. If you are restricting access to allow a lower level of treatment, the reuse shouldn’t be under “Urban – Unrestricted Access”. However, there may be some reuses in urban areas that should be restricted. Some possible solutions are to change the title of the subsection to “Urban” without reference to unrestricted access.
- It was thought that the basis of item A.3 was for urban reuses by municipalities that may have an area where they wanted to use reclaimed water but where they could also restrict access. It would allow the option for some urban reuses, where appropriate, to require a treatment Level of 2 rather than Level 1.
- Is item A.3 already addressed under subsection B., item 3 where it states “Reclaimed water treated to Level 2 may be used for spray irrigation if the area to be irrigated restricts access to the public and has appropriate setbacks”?
- Controlled access, such as that for commercial park lawns with fences, is not the same as restricted access. Controlled access limits the number of people accessing the area and the times at which access is allowed. Controlled access should still require Level 1 treatment.
- There was consensus that item A.3 should be deleted.
- One TAC member suggested that subsections A, B, C, D and E be put into a permit manual rather than included as requirements in the regulation. These were formerly “Comments” that were obtained from the EPA Water Reuse Guidelines, Table 4-13. Most are not appropriate as “Additional Requirements” for regulations but would be more appropriately used as guidance for permit writers.
- There was general consensus that many of the requirements under the subsections A through E might be excluded as regulatory requirements, but be made part of agency guidance or as items possibly required in a generator’s reclaimed water management plan (i.e., as part of an education program).
- The TAC proceeded to review each of the individual requirements to maintain or exclude from the proposed regulation.
- Some of the items in subsection A (Urban – Unrestricted Access), such as item 2 regarding nutrient management plan requirements and limits for metals, total dissolved solids and free chlorine residual; may be better addressed in the reclaimed water management plan.
- At some point, the TAC will need to discuss the concept of a reclaimed water management plan for inclusion in the proposed regulation, and the agreements to be established between generators and users via the reclaimed water management plan. This is a significant issue that will tie back into earlier discussions on BNR and restrictions or no restrictions for irrigation reuses based on

nutrients. The reclaimed water management plan should be considered a general requirement and should, therefore, be addressed under Part III of the proposed regulation.

- There was general consensus that all requirements under subsection A should not be included in the regulation.
- Under subsection B (Irrigation), setbacks are mentioned under item 3. Are setbacks determined according to the level of nutrient removal? Setbacks are established for the protection of public health. They are based on the level of disinfection of the reclaimed water and not the nutrient content of the reclaimed. Reclaimed water treated to Level 1 would have fewer or no setbacks compared to reclaimed water treated to Level 2.
- If effluent treated to secondary level and receiving standard disinfection is considered fishable and swimmable per Virginia Water Quality Standards, why then would you require setbacks for reclaimed water treated to Level 2? Setbacks for reclaimed water treated to Level 2 are consistent with restricted access for reuses which utilize reclaimed water treated to Level 2. Setbacks or restricted access for irrigation reuses of reclaimed water treated to Level 2, may be required.
- The following items under subsection B (Irrigation) may be more appropriately used as regulatory requirements under “Application and Preliminary Engineering Report” of Part III – General Requirements in the proposed regulation:
  2. Irrigation reuses may require a nutrient management plan and limits for metals, TDS and free chlorine residual.
  4. For irrigation with reclaimed water treated to Level 1:
    - a. It is advisable to characterize the microbiological quality of the reclaimed water prior to implementation of a reuse program.
    - b. A higher chlorine residual, a longer contact time or both may be necessary to assure the viruses and parasites are inactivated or destroyed.
- Item B.3 as follows should be maintained in this section of the regulation:

“Reclaimed water treated to Levels 1 or 2 may be used for surface irrigation and reclaimed water treated to Level 1 may be used for spray irrigation. Reclaimed water treated to Level 2 may be used for spray irrigation if the area to be irrigated restricts access to the public and has appropriate setbacks.”
- Setbacks mentioned in B.3 will be discussed as a general requirement under Part III of the proposed regulation. Reference the section under Part III that applies in B.3.
- Item B.5 as follows should be maintained as a regulatory requirement, but may need to be moved to Part I of the proposed regulation under “Exclusions and Prohibitions.”

“For irrigation with reclaimed water treated to Level 2, lactating animals shall be prohibited from grazing for 15 days after irrigation with reclaimed water ceases. Level 1 disinfection shall be required for exclusion periods less than 15 days.”
- Do we envision some of the design criteria for reuse becoming part of the SCAT Regulations? This is a possibility as Level 1 disinfection is not addressed in any other regulation.
- Under subsection C, item 1 pertaining to treatment requirements for reclaimed water discharges to surface waters, is already addressed by item D. under the section entitled “Standards of treatment for reclaimed water”, and should be deleted.

- Under item C.2, the following requirements for reclaimed water treated to Level 1 and used for landscape impoundments should be deleted from the proposed regulation:

- a. Reclaimed water should be non-irritating to skin and eyes
- b. Reclaimed water shall be clear and odorless

Frequently, the quality of water in landscape impoundments is worse than that of reclaimed water treated to Level 1. Therefore, it seems unnecessary to impose these requirements. Furthermore, how would this be monitored?

- Is a landscape impoundment allowed to discharge? Most landscape impoundments are not designed to discharge but may have a spillway that allows them to overflow in the event of storm. This protects the integrity of the impoundment.
- The definitions in Part I of the proposed regulation should include a definition for landscape impoundments as referred to in this subsection. A landscape impoundment with a flow through to surface waters should have a VPDES Permit and would be exempt from the requirements of the proposed regulation. A landscape impoundment with a storm spillway or overflow might not require a VPDES Permit and would be subject to the proposed regulation. A landscape impoundment having neither flow through to surface waters or an overflow would be subject to the proposed regulation.
- Item C.2.c as follows may be more appropriately used as a regulatory requirement under “Application and Preliminary Engineering Report” of Part III – General Requirements in the proposed regulation:  
 “It is advisable to characterize the microbiological quality of the reclaimed water prior to implementation of a reuse program.”
- The regulation should not require fish caught in a landscape impoundment receiving reclaimed water, to be safe for human consumption. Delete item C.2.d.
- Item C.3, pertaining to additional treatment for Level 2 reclaimed water used for landscape impoundments, may be more appropriately used as regulatory requirements under “Application and Preliminary Engineering Report” of Part III – General Requirements in the proposed regulation.
- Subsections D. (Construction) and E. (Industrial) will be evaluated by DEQ staff to consider what additional requirements should be maintained, deleted or moved to other sections of the proposed regulation.

The TAC was asked if their next schedule meeting on July 6, 2006, should be cancelled and rescheduled for a later date. July 6th date will conflict with holiday/vacation plans for some TAC members and may not allow enough time for DEQ staff and TAC subcommittees to complete further work on the proposed regulation before the next meeting. Another option would be to cancel the July 6<sup>th</sup> meeting and not reconvene until the following scheduled meeting date of August 3, 2006.

DEQ staff anticipated that a second round of corrections and TAC comments could be completed for Part II (Standards of Treatment and Reuses) by early July, and portions of Part III (General Requirements) developed for TAC review by early August. Although Part I has yet to be reviewed by the TAC, there are not as many changes to be discussed.

It was decided to cancel the July 6<sup>th</sup> meeting and reconvene the TAC on August 3<sup>rd</sup>. In the interim, DEQ staff are to make corrections to Part II of the proposed regulation based on comments received earlier in the day and written recommendations of the Nutrient and Disinfection Subcommittees.

Corrected Part II will be sent out to the TAC members for their review and further comment before the next TAC meeting. More information regarding nutrients will also be developed and sent out to the TAC.

Comments were solicited from any persons at the meeting not on the TAC. Mr. Bernard Nagelvoort spoke briefly on irrigation reuse and provided written comments to the DEQ staff. It is important from a cost perspective, that as much water as possible be applied to an agricultural crop without interfering significantly with crop production, rather than irrigating the minimal amount that will maintain the crop. The amount of water applied should be something between supplemental and disposal.

No other comments were received.

The TAC meeting was adjourned at approximately 3:20 p.m.