Drainfield to Surface Water Setback Distance Subcommittee
Teleconference Meeting Minutes
Friday, 06/11/2010, 10:00 am

Teleconference
Date: 2010-06-11
Start: 10:00 am

Attendance: Athol: George Miles, PE
Boise: Bill Holder, PE; AJ Maupin, PE
Coeur d'Alene: Allen Worst
Hayden: Dick Martindale
Idaho Falls: Nathan Taylor
Kimberley: Dr. Jim Ippolito, Ph.D. USDA

Missing: Joe Canning, PE; John Corcoran (Realtor Association Representative); Brett Skidmore (Building Contractors Association Representative);

Meeting called to order at 10:03 am.

Past Meeting minutes:

14 May 2010 Minutes: Prior meeting minutes presented. Motion made to approve the minutes as presented, the motion was seconded and the minutes passed unanimously.

Modeling:

The latest results of the vadose zone modeling were presented. The tables present the expected life of a drainfield given set phosphorus input concentrations (4.5 mg/L, 9 mg/L and 20 mg/L), with the terminal condition defined as that time span (in years) when the same concentration exits the vadose zone. This time span reflects the theoretical time required to consume all available soil sorption sites in an ideal situation. Modeling this ideal situation is justified because the subcommittee already agreed that these drainfields must be pressure distributed. Pressure distribution will evenly distribute the effluent across the entire drainfield assuring unsaturated flow. Unsaturated flow requires the effluent flow over the soil particle's surface where effluent contact with available sorption sites is maximized. Unsaturated flow will not fill the void spaces between soil particles which would allow effluent to flow past sorption sites and possibly reach ground water unaltered. The calculated drainfield life spans are influenced by the phosphorus concentration discharged to the drainfield, the aluminum (Al) and iron (Fe) amorphous mineral content of the receiving soils, the depth of the vadose zone and the Bulk Density of the receiving soils. (*Note: the Bulk Density, vadose zone depth and amorphous mineral content of the soil all combine to identify the quantity of sorption sites available beneath the drainfield*).

The Bulk Density impacts the amount of available amorphous Al & Fe, higher bulk density providing more amorphous Al & Fe, which impacts the slopes of each curve. The graphs for each soil and phosphorus concentrations are plotted for two bulk density values; 1.27 g/cc and 1.89 g/cc. The resulting curves are approximately linear. In these calculations, the effluent borne phosphorus is converted to mg of phosphorus per kg of soil (mg/kg). Considering the facts that bulk density varies for each soil horizon and that the bulk density is not determined when evaluating soil suitability for drainfields, a characteristic equation was developed that attempts to remove the variable soil density from the equation. This yielded the last curve, a nonlinear equation.

A suggestion was made that the bulk density be determined for sites requesting reduced setback distances to surface water. The lab costs for determining bulk density were thought to be relatively low, but the means of collecting suitable samples may be difficult and hard to ensure the proper sample collection techniques are used.

A question was presented concerning how these vadose zone results are going to be used to establish drainfield setback distances to surface water. It was pointed out that the phosphorus concentration discharging to ground water will gradually approach the concentration discharged to the drainfield. Additionally, ground and surface water will dilute these concentrations significantly. A methodology was proposed to develop a spreadsheet and/or tables to assist the permit writer determine the necessary setback distance to surface water. Concerns were voiced about the extremely low phosphorus surface water concentrations proposed by DEQ in the Surface Water negotiated Rule making (2 μg/L). This 2 μg/L limit was used in the ground and surface water modeling.

The ground and surface water modeling results presented at a previous meeting, showed the 0.002 mg/L (2 μg/L) limit on the graph as a red line. These graphs showed how the various drainfield phosphorus concentrations impacted surface water after 20 years of drainfield usage. The dilution provided by the surface water, even though modeled stream flows were small (1 cubic foot per second (cfs)), the surface water dilution surpassed the ground water dilution.

Since effluent breakthrough to the aquifer will not be instantaneous, the time to breakthrough was identified as a crucial duration to know. Breakthrough is defined as when the effluent concentration leaving the vadose zone exceeds ½ of the effluent concentration being discharged to the drainfield. The subcommittee asked Dr. Ippolito whether his model could calculate the time to breakthrough given a 9 mg-P/L input concentration to the drainfield and 4 feet of vadose zone. Dr. Ippolito said he would try and we can discuss at the next meeting.

It was proposed that combining the drainfield life span to breakthrough with the aquifer transport delay could yield an estimate of time before a measurable impact to surface water could be detected. This would allow a setback distance be established by accounting for the time required to attain vadose zone breakthrough and then adding the time required for concentrations to travel to the surface water in sufficient concentrations to impact the water.

A concern was voiced about "stacking" drainfields so that both the initial and replacement drainfields overlie the same streamlines in ground water flow. The concern was that once drainfield phosphorus sorption sites were consumed then transferring the wastewater to the replacement field may be problematic because they were both overlying the same impacted ground water. The response clearly identified that the vadose zone of the replacement drainfield would have ample sorption sites to sequester phosphorus contributions prior to reaching ground water. This delay in adding more phosphorus to the ground water would allow the ground water to flush and rejuvenate.

Modeling situations where the receiving surface waters are lakes or reservoirs will be difficult, since these water bodies do not flush as rapidly as streams and rivers. Lakes and reservoirs have a finite volume of water available for dilution of phosphorus from ground water. This may impact the setbacks recommended near these water bodies.

A phosphorus reaction kinetics question was raised about the time required to sorb phosphorus onto the available amorphous metal sites. Lab studies have shown this occurs in about 24 to 72 hours (1 to 3 days). Other references indicated about 5 days (120 hrs). The concern was that the effluent would traverse the vadose zone more quickly than the time required to sorb the available phosphorus. The time frames required for sorption appear to be comparable with the time frames for effluent flow in the vadose zone. This condition should be attained as long as the drainfield is maintained in a unsaturated flow state through pressure distribution. The references will be researched and shared with the subcommittee.

Discussion and White Paper Outline

Discussion started on how to address and present the subcommittee's findings. A suggestion was made that the subcommittee may recommend that the setback distances be retained in Rule and requirements for surface water setback reductions be documented in the Technical Guidance Manual (TGM). Another suggestion indicated that the subcommittee may recommend that DEQ enter into negotiated rule making to change the Individual/Subsurface Sewage Disposal (SSD) Rules (IDAPA 58.01.03). A question was posed about whether the Legislature would receive a copy of the White Paper documenting our efforts, findings and recommendations. It was determined that the Legislature will be made aware of the subcommittee's findings and recommendations, but the subcommittee should report these to the TGC and DEQ administration first, providing the Director the opportunity to share the white paper with the Legislature.

The format and content of the White Paper was discussed. As mentioned in last meeting's minutes, the White Paper should address the Focus Groups' findings. Additionally, an Introduction will need to be composed. The following content headings were proposed:

- Summary
- Introduction
- Constituents of Concern
    - Nitrogen
    - Phosphorus
    - Pathogens
    - PPCPs & EDCs
- Modeling
    - Vadose Zone
    - Saturated Flow and Surface Water dilution
- Technologies
    - Pressurized Drainfields/Drip Dispersal
    - Expendable Media Unit Processes (PhosRID, Phosphex, PhosRock, …)

- Permitting
- Recommendations
    - TGM
    - Rule
- Appendices

It was suggested that the place to start is the previously supplied Focus Group summaries. This should provide a rough draft for the first few sections. AJ committed to composing a draft of the introduction.

Next Meeting Schedule:

The next meeting is scheduled for Wednesday, 28 July 2010, from 10:00 am MDT (9:00 am PDT) to 12:00 pm MDT (11:00 am PDT).

Meeting adjourned at 11:55 am.

Next Meeting Topic:

- Vadose zone modeling progress
- Pressurized dispersal drainfield
- Phosphorus sequestering technologies
- Discuss permitting schemes for phosphorus removal technologies: enforce replacement of expendable media; enforce O&M requirements; what monitoring and reporting requirements are needed
- Discuss documentation of Subcommittee's findings and recommendations for White Paper to submit to TGC