Missouri
Department of
Natural Resources

WATER QUALITY COORDINATING COMMITTEE

DNR Conference Center
Roaring River Conference Room
1730 E. Elm Street
Jefferson City, Missouri

July 19, 2011

10:00 a.m.

MEETING AGENDA

Sustainable Site Design and Upcoming Stormwater Regulations
Ruth Wallace, Water Protection Program, DNR

Geohydrology and Stream Impairment in the Ozarks, Neil Elfrink, DGLS

Other

Agency Activities

Meetings & Conferences

Missouri Department of Natural Resources

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MINUTES

Attendees:

Ruth Wallace	DNR, Water Protection Program	Anna Nowack	DNR, Water Protection Program
Greg Anderson	DNR, Water Protection Program	Colleen Meredith	DNR, Water Protection Program
Neil Elfrink	DNR, DGLS	Mandy Sappington	DNR, Water Protection Program
John Johnson	DNR, Water Protection Program	Valerie Hentges	DNR, Water Protection Program
Johnny O'Dell	DNR, Water Protection Program	Darlene Schaben	DNR, Water Protection Program
Suzy Higgins	DNR, Water Protection Program		

Introductions were made.

Sustainable Site Design and Upcoming Stormwater Regulations, Ruth Wallace, Water Protection Program, DNR
PowerPoint Presentation

Ruth said this presentation is about sustainable site design and how it will be driven by the upcoming stormwater regulations. She indicated that the Environmental Protection Agency (EPA) is getting prepared to regulate the quality of urban stormwater runoff. The federal regulations are being based on a report, Urban Stormwater Management in the United States, put together by the National Research Council. The federal rules were to be proposed in Sept. 2011 (but are now scheduled for proposal in January 2012). These are for 40 CFR Parts 9, 122, 123, 124 and 125. They may be proposing a watershed permitting approach, post-construction runoff quality standard, an expanded MS4 universe, and TMDL clarity in MS4 permits (more guidance). Section 438 requirements for federal facilities are already in place requiring control of the 95th percentile storm. Studies have demonstrated though that the 90th percentile may make them more in line with affordability. This is driving the sustainable site design to optimize existing site conditions. For the last 30-40 years, stormwater management was based on flood control only; but in the last 10-15 years research has been focusing on incorporating small storm management into stormwater regulation and requirements. Eight recommendations via the report were submitted. The first recommendation was that the greatest improvement to EPA's program would be to convert the current piecemeal system into a watershed-based permitting system.

Ruth talked about some considerations in moving toward a watershed-based permitting system—implication of discharges for preservation or improvement of prevailing ecological conditions for watershed aquatic systems; cooperation among political jurisdictions sharing a watershed; and coordinated regulation and management of all discharges having the potential to modify the hydrology and quality of receiving waters. Watershed based permitting would require additional resources and regulatory program support. This could include some resources that would shift from point source to watershed-based; strategic planning and prioritization that shifts federal and state grant and loan programs; new levels of public funds would need to be secured; and additional resources from citizens and businesses would be needed.

Ruth also talked about additional regulatory and legal implications. In order to have a fully developed and functioning program, it would need to be rooted in science, transparent in aim, fairer than the current program and better for the aquatic environment. EPA should seek congressional funding to support states and MS4s, give states broad authority for policies, and institute a pilot program to provide experience in municipality-based regulation and watershed-based predictable impediments. Whole cost considerations should include society, economy, and environment.

In the transition from basins to rain gardens, the significance of sustainable site design has been overlooked. Missouri Guide to Green Infrastructure: Integrating Water Quality into Municipal Stormwater Management is a book scheduled to come out spring 2012. Ruth felt this book will be a good tool to move watershed-thinking forward as municipalities continue to build their programs. A series of five workshops will be held across the state to introduce the EPA-funded-guide.

Small storm importance may be what's driving the watershed approach. Seventy-five percent (75%) of urban runoff pollution comes from storms between 0.5 and 1.5 inches, according to Robert Pitt, et al. There is a standard set of steps to the design for all projects. Ruth showed a design for the proposed Bear Creek Prairie Project and talked about the purpose for the locations of rain gardens and bioswales. Experts in this field can use the SUSTAIN model. Similar models are rapidly evolving in the industry to aid in meeting regulations. Ruth discussed some of the confusions and myths, like clay soils and rain gardens; even in clay soils rain gardens will work when modified.

Information on the Site Development Plan has been included in Chapter 3 of the department's "Protecting Water Quality Field Guide." There needs to be an awareness of the sustainable design when construction is taking place on the ground. The site development plan should be carefully examined for ways to optimize stormwater control. As a result of these changes in the stormwater industry, site designs will likely look different from what contractors are used to.

Geohydrology and Stream Impairment in the Ozarks, Neil Elfrink, DGLS
PowerPoint Presentation; handout: Ozark groundwater flow patterns

Neil is a Registered Geologist and has worked with Division of Geology and Land Survey (DGLS) since 1992. He said they are finding the Ozark Aquifer more complex than they thought. USGS has a tool they use to drop into a well that shows which way the water is flowing. Some are found to be flowing different than originally thought. Through fractures there are a lot more complex flows happening inside the aquifers. Some waters are rejecting recharge and that's how a lot of pollutants end up in streams. Karst is a specific kind of fluid circulation system capable of self-development and self-organization. The karst system is an integrated mass-transfer system in soluble rocks with a permeability structure that is dominated by conduits dissolved from the rock and organized to facilitate the circulation of fluid in a downgradient direction. Downgradient doesn't necessarily mean down.

Some karst (hypogene) is formed as a result of sulfuric acid or other aggressive waters welling up from below instead of carbonic acid percolating down from above (epikarst). Neil explained hypogene as deep water that we don't know where it comes from and is very old. He mentioned that some springs in Missouri are huge. In 2007, Jeff Imes, USGS, looked at geochemistry of water from Big Spring. He determined that a lot of the water at a mean residence time was more than several hundred years old. Neil explained that base flow cannot be dye traced.

Dolomite and limestone rock do not hold a lot of water unless there has been a fracture or gone through a karst process. In looking at some of the differences of the Ozark caves, water can be found at different levels. Caves may be older than the joints which are formed as erosion continues. They believe the sandstones were

confining and pulling the water down. The flow meters showed water was actually coming out of the sandstones. They act as confining units because they are pressurized. Neil showed a map of Round Spring Cave. The map showed that cave routes do not follow the joint patterns. USGS noticed that ninety-five percent of caves are associated with sandstone.

He showed a diagram of Ozark groundwater flow patterns and cross-formation communication between aquifers. Rain water falls on the surface and seeps into the ground (1.5-2" rainfall event). Most of the rain in the raising stream is pre-event water that has been sitting in cracks and fissures near the surface. It gets flushed out. This happens in a natural system. Not long ago a lot of the losing streams were gaining. Neil felt this was due to the line of upward pressure pulling the water up which was suddenly dropping.

The Viburnum trend is at the top of the Ozark divide and should be the recharge zone for the Ozarks. The USGS drilled a series of wells designed to hit the top of the water table to test if the deep aquifer was drawing water down from the Ozark aquifer. A hydrograph showed the wells in the middle had a very subdued reaction to rainfall events. Neil felt this was because the wells are pressurized. He indicated an earthquake that happened in Alaska affected the water levels in Missouri. It actually caused a dewatering of one of the upper levels of the pressurized unit. Concentrations of lead and zinc in bed sediment and fish tissue were substantially higher at sites with historical or active mining activity. Lead and zinc will not degrade over time. One of the best management practices (BMPs) used is to limit the amount of water contact with the mine tailings. Surface water diversion, mine waste removal, consolidation, and stabilization, capping settling ponds and neutralization systems and revegetation are other BMPs used. Trees are good for stabilizing soils and taking up small quantities of metals. Zinc is more readily taken up by wood. Some of the questions they are still trying to understand are: Where is the lead is coming from? Is lead in stream systems from tailings? More knowledge is needed of atmospheric transport and deposition of fine metals. Are lead and zinc in soils bound to organic compounds or are they in residual fractions such as sulfide minerals? And, are nickel and cobalt problems?

Neil mentioned the Ozarks is eroding faster than people think. Both sides of the New Madrid fault are going down which is having a huge impact on groundwater and recharge. People think the Mississippi River has been there a long time but there is really no evidence.

Neil can be contacted at the Department's Division of Geology and Land Survey if anyone needs more information.

Agency Activities
Nothing reported.

Meeting adjourned.