Phosphorus Task Force Phase 2 Meeting
February 6, 2013
Riffe Tower, Rm. South B & C 31st Floor

Attendance

Task Force

Larry Antosch, Dave Baker, Tim Berning, Anne Cook for Doug Busdeker, Steve Davis, Libby Dayton, Kevin Elder, Karl Gebhardt, Gail Hesse, Todd Hesterman, Kevin King, Amy Klei, Greg LaBarge, Joe Logan, Terry McClure, Kevin O'Donnell, Jeffrey Reutter, Peter Richards, Jeff Tyson, Chris Wible, Rick Wilson, Ron Wyss

Observers

Mike Bailey, Chris Henney, Laura Johnson, Linda Merchant-Masonbrink, Trinka Mount, Tadd Nicholson, Caitlin Ruza, Anthony Sasson

Handouts

Agenda
Minutes from January 9 Task Force meeting
Phosphorus Loading and Concentration Recommendations from the Loading and Concentration Subcommittee (for discussion only, do not distribute)
Drainage Management Discussion Paper (for discussion only, do not distribute)
Phosphorus Task Force Meeting Locations
Point Source Discussion PowerPoint

Announcements

The March meeting will be on March 14 in Room 1960 Riffe.

Presentation: Point Source Discussion - Paul Novak, Ohio EPA

The discussion centered on wastewater (sewage) treatment plants (WWTPs) and overflows from municipal sewer systems (CSOs).

In 2011, 188 WWTPs statewide had total phosphorus (TP) limits (most 1.0 mg/l monthly average). In the Lake Erie basin, major WWTPs (flow greater than 1 million gallons per day (MGD)) are permitted to discharge no more than 1.0 mg/l TP. Statewide, 353 WWTPs monitor TP.

WWTPs typically adjust plant operations to ensure that they don't exceed their permit limits; thus, those with a permit limit of 1.0 mg/l may actually discharge a closer to 0.7 or 0.8 mg/l. Most plants can operate as low as 0.5 mg/l using chemical precipitation. To achieve a limit of 0.5 mg/l or lower requires chemical precipitation and filters (many WWTPs do not have filtration). Special membrane filters and chemical filtration can meet limits of 0.1 mg/l, but this technology is very expensive. The Northeast Ohio Regional Sewer District (NEORSD) in the Cleveland area spends several hundred thousand dollars per year to meet TP limits of 1.0 mg/l monthly average.

Smaller WWTPs (discharging less than 1 MGD) sometimes have limits of 1 mg/l TP as a result of total maximum daily load (TMDL) analyses. Smaller plants have more difficulty in meeting the limit and

sometimes run into operational issues because extra attention is needed to maintain the effluent quality.

Because the population and number of WWTPs is expected to be stable, phosphorus loading from WWTPs should also be stable.

Combined sewer overflows (CSOs) happen when a combined sewer system (storm water and wastewater through a single pipe system) is overloaded and discharges to surface waters. While CSOs can deliver high volumes of untreated wastewater to surface water, the first flush from a large storm event does get processed through the WWTP. There are 101 CSO communities in Ohio, 62 are in the Lake Erie basin.

CSO communities are required to develop Long Term Control Plans (LTCPs) that address how they will reduce the volume and frequency of overflows. LTCPs are legal documents negotiated as part of consent decrees or NPDES permit requirements. Practices used to address CSOs include sewer separation, storage tanks, WWTP upgrades and other methods of physical and chemical treatment. Almost all of the Lake Erie basin CSO communities have completed LTCPs with the exception of Lakewood and Lima.

The largest volumes of CSOs are from NEORSD, Akron, Toledo, Fremont and Sandusky. Significant progress is being made in each of these communities. NEORSD will complete their LTCP implementation by 2035. Akron will complete implementation by 2028. Toledo will complete implementation by 2020.

Costs for the implementation of LTCPs are borne by ratepayers. Cleveland area residents have seen $60-$80/month rate increase.

CSOs contribute a smaller overall loading than municipal WWTPs. The volume and loading from sanitary sewer overflows (SSOs, i.e., dry weather overflows) are smaller than from CSOs. Communities must report the occurrence of SSOs on the monthly operating reports they submit to Ohio EPA as a condition of their permit.

Questions/responses:

Some of the smaller dischargers discharge a concentration of 4-7 mg/l. The first Task Force evaluated the relative contribution of small dischargers collected together. Most facilities are not violating their permit.

Detroit sewer plant update – Ohio EPA is looking at their NPDES permit. It is complex. Overflows may not be reflected in the NPDES permit. The required treatment of CSOs by the State of Michigan is not as stringent as what we seek in Ohio. Their treatment does not remove TP.

Ohio asks for TP testing if we believe it is likely that there will be TP in the effluent.

Has there been improvement since the 1990s?

Toledo constructed tunnels in the 1990s. The next significant improvement was storage and treatment at the Toledo POTW in the mid-2000s. Additional system storage is being installed. Cleveland (NEORSD) made significant investments to cut their discharge in half since the 1990s and will cut in half again in another 10 years.

Once tunnels are filled, their volume is usually designed to be processed through the WWTP in 24 hours. How do they deal with accumulated sediment? The tunnels have to be maintained.

How does the intensity of storms affect design? We haven't had a normal rainfall for many years. We may find that additional controls are needed as storms become more intense.

Members suggested that this information needs to be reflected in the task force report. We need graphic representation to show reductions in CSO discharges and WWTP loads since the 1970s and 1980s. Dolan graphs would be helpful but CSOs not pulled out separately. Paul will work on this.

Subcommittee Report on Phosphorus Loading and Concentration Recommendations

The subcommittee advocates adaptive management and a robust monitoring program to assess effectiveness of targets. At a minimum, we want a target that will minimize or eliminate HABs.

The subcommittee is proposing spring and annual target loads for TP and a spring load target for dissolved reactive phosphorus (DRP). 2012 told us that loading is everything and timing is important.

Spring load is predictive of HAB size. 2011 allowed us to test a number of models. NOAA predicted the size of 2012 load to be similar to size the in 2007. The 2012 load turned out to be about double what was predicted, more like 2004.

One's viewpoint affects how the bloom season is perceived. But we are looking at the big picture.

<u>TP in spring</u> - not to exceed 800-1000 metric tons (3-22% reduction from average spring TP load for 2000-2012 and a 56-65%% reduction from the highest TP spring loading year (2011))

<u>TP annual</u> - not to exceed 1600-2000 metric tons (9-27% reduction from the average annual TP load from 2000-2012, and a 44-55% reduction from the highest TP loading year (2008))

<u>DRP in spring</u> - not to exceed 150-170 metric tons (17-27% reduction from the average spring DRP load from 2000-2012 (60-65% reduction from the highest DRP spring loading year (2011))

No annual loading target for DRP is recommended because of the complexities and variables in the system. If we concentrated on all algae and not just HABs, then we could calculate an annual target. We are focusing on the western basin, not the rest of the lake. And we wanted to compare what we did in the past. We don't have that historical information in all watersheds draining to Lake Erie.

Annual targets use USGS water cycle year of October 1-September 30. Spring targets use the NOAA spring season from March 1 to June 30.

Concentration targets are more challenging because algae take up (or use) the phosphorus during a bloom. Preliminarily we might state that consistent/prolonged TP of 50ug/l or higher or a consistent DRP concentration of 10 ug/l or higher in a river or lake will produce a HAB. The subcommittee needs to further investigate this. HABs observed in the western basin when DRP was at 6 ug/l. Also TP in the Maumee River exceed 50 ug/l 100% of the time at Waterville between 2004 and 2012 and the 10 ug/l DRP target was exceeded 76% of the time. Lower targets may be needed for the lake.

So, we should base targets not on concentration, but on TP and DRP and have an annual and a spring target to minimize or eliminate HABs. We should see immediate and long-term improvement. Loading and timing are the guiding factors.

How do we reach the targets?

First Task Force and 4-Rs should address how to reduce the P in the Maumee. We're narrowing down the practices. The CEAP study for the Maumee is a modeling effort that will allow you to put in BMPs and it will give appropriate loading. These targets could be plugged in and scenarios developed.

Loading is affected by the weather. More reduction is required in a wet year than a moderate year. We can use flow weighted mean to address this.

Soil testing can result in a 2-3 ppm P reduction/year. Getting from 40 ppm to 15 ppm (desirable) at 2-3 ppm reduction/year will take 10 to 15 years.

Was the assumption that everything else was static?

We could reasonably apply targets to most of the Lake Erie basin rivers other than Maumee. Not only the Sandusky, Toussaint, Portage, but also consider the Raisin River in Michigan. What about allowing increased loads in Maumee if loads are reduced in the Raisin River? The Maumee River contains a significant amount of contributing acreage in western basin.

Maumee	1,100,000 acres	Watersheds with similar soils
Cedar-Portage	613,000	
Ottawa	446,000	
River Raisin	680,000	

The less we delineate who is responsible and emphasize what needs to be done, the better the messaging and the more acceptable to the public. The key will be milestones and time to get to the targets. Education of producers will be important.

Not all land is equal. So how are you going to target which field needs what type of BMP?

Phosphorus from the Detroit River does not contribute much to HAB formation in the western basin, but the Raisin River might be good to add to our focus. The Raisin has lower export than the Maumee or Sandusky because of soil differences.

We really want phosphorus reduction implemented throughout the watershed. Every watershed contributing to the western basin should do something, including out of state tributaries. We can focus the monitoring on the Maumee, but because of budgeting, we can't monitor other areas and we don't have a lot of recent historical data for the other tributaries for comparison. We need to determine if we are making progress quickly on the Maumee watershed. We would be able to track progress on the Maumee.

Overall, Task Force members were uncomfortable with targets that apply only to the Maumee. Members acknowledged the Maumee River is the largest contributor and observed that other watersheds also deliver phosphorus to the western basin. We would not want to convey a message that we only need to address loading from the Maumee basin. Given the lack of loading date from the other basins, different options were discussed.

We need to acknowledge that some areas may need a higher level of reduction to hit the specified mark. But we would have to collect data with site-specific circumstances in smaller drainages.

We could just use the same percentage reduction for each tributary. Then through adaptive management and monitoring, we could adjust the target for that watershed.

Should 30% reduction be spread out around the other watersheds or have each reduce by 30%? What about looking for 30% reduction at mouth of Maumee by reducing other watershed contributions?

We can use the mouth of the Maumee River to track overall progress. We can convert reduction to tons reduction in each watershed to achieve the 30% reduction measured at the mouth of the Maumee River.

We need to explain that the numbers are not hard and fast and we propose to use adaptive management to address any changes in the target values over time.

The targets are grounded in science. But we need to include caveats. "Caveats are better than intentional ambiguity." We need to simplify this for the producer and the public.

Target numbers can apply to the Maumee, and the goal applies to the western basin.

How does the NOAA model approach this? Does it include watersheds contributing to the Maumee and the western basin? The NOAA model only included Maumee load data. Implicitly to accomplish this, we have to look at contributions to the discharge resulting in HAB development; 90% of the variants in the model explain the HABs developed.

Somewhere we need to define or describe HABs. The NOAA model does.

30% reduction across the basin would result in a total reduction of 1500 metric tons?

A member suggested that the task force report should show progress from 1970s to now, and explain that the change is TP vs. DRP and intensity of storms.

Summary:

Maumee TP spring load target = 800-1000 metric tons

Western Basin (defined as from Monroe to Sandusky) TP spring load target = 1200-1500 metric tons

Annual TP target for the western basin = 2400-3000 metric tons

Spring DRP Load for the western basin as defined by specified watersheds = 225-255 metric tons

No annual DRP target proposed.

Maumee will be the indicator.

The subcommittee will consider the input from the task force and develop a revised recommendation for presentation at the March 14 meeting.

Drainage Management

The Director of Ohio EPA wanted the Task Force to look at drainage management. If it is not preferred, we need to explain why.

We need best management practices installed so when it does rain, we are ready. In a drought year we will be achieving targets. But we have to be prepared for rainy years.

Very poorly drained and poorly drained soils must be tiled to be farmed. There is no total accounting of the number of acres actually tiled in the Maumee basin or the change in tile installation over time. In the Sandusky and Maumee drainage, there are 1,320,957 acres that was probably tiled at one time because the soils are either very poorly or poorly drained.

It would cost $22 million if one water control structure is installed on every 30-40 acres-very expensive.

With an estimated average of 50% reduction from drainage management structures, there would be 0.15 pounds/acre DRP reduction per control structure on an annual basis equaling approximately 50,000 pounds P per year, if 11,000 control structures are built. Essentially there would be $1 million to get 1 ton of P reduction.

How are we going to measure implementation and effectiveness of water control structures?

Would anaerobic conditions that may be created by these structures (phosphorus cycling within the tile) cause the release of P from the soil or standing water? There could be a slight increase in DRP concentration for short periods, but the load is held back, so there is an overall benefit, based on two Canadian studies.

What is happening to DRP in soil? Soil may process DRP as long as the soil is not saturated.

Soil tests will only tell you if you have enough P to feed the plant. But these tests reveal only a small portion of what P is in the soil.

Instead of water control structures, would it be better to use cover crops or fertilizer injection? How much reduction in P if fertilizer is incorporated is unknown.

Starting from the practices in the Directors' agriculture report, what more do we want to say?

There needs to be a smorgasbord of practices. Let farmer use what applies to his/her farm. Farms fall into types, probably half a dozen "systems" and we need to find the right point of intervention for each system. Farmers need to understand the mechanics of dissolved phosphorus. We need to know what is happening to tile out there -- replacement, density, measurement. We don't have that information and this should be part of the discussion in the report.

The report should mention that certain practices are appropriate in some locations but may not be in other locations. For example – wetlands are difficult to utilize on flat land like in Henry County. But control structures would work well. Wetlands would work better in areas with more terrain relief. Wetlands have a limited usefulness unless managed.

The report should give management options to select for specific circumstances. We should be clear that we don't trade P reduction for sedimentation problems. Highlight when fertilizer should be applied. Overarching principles are: don't leave soil with no cover and don't leave phosphorus on the surface. Unacceptable practices: applying on frozen ground or before rain.

We can discuss what research is needed and ongoing and that the outcome may impact future recommendations.

We need to start writing the report. There will be written sections by different people on the Task Force.