Sediment Bioaccumulation—A National Pollutant Discharge Elimination System (NPDES) Program Perspective

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I am going to talk briefly about what the National Pollutant Discharge Elimination System (NPDES) Program does in the area of sediment and bioaccumulation and what we think we are going to be doing in the future. For all of you who have dealt with the NPDES Program, you may believe that half of the program staff are engineers and the other half are attorneys. You could probably ask why these people are talking about bioaccumulation and whether they know enough to talk about it in the first place. We would respond that bioaccumulation is of interest to us both in terms of setting permit limitations and collecting information that may be needed for making future watershed assessments.

I am going to spend most of my time talking about both of these, but will preface my talk with a couple important points. One is that what I will be talking about is going to be in the future. And the future does not mean tomorrow and maybe not even next year. In a couple of instances, I will be referring to what is occurring now, but in most cases I will be talking about activities in the 5- to 10-year horizon. That is when the majority of permits may have to be dealing with these considerations where necessary. The second is a point of clarification that, in contrast to the Superfund Program which deals with remediation, the NPDES Program deals with discharges today. By that I mean we take care of current point source pollutant discharges in the waters of the United States. For example, a facility that had discharged high levels of pollutants in their wastewater years ago may be discharging very good quality wastewater today. We regulate their discharge today without taking into account discharges that polluted the environment 10 to 20 years ago.

In the ideal surface water protection program, water quality criteria are first developed by a combination of Agency research and program staff. The Office of Science and Technology's (OST's) Health and Ecological Criteria Division (HECD) is responsible for criteria development. States then use that information to adopt water quality standards. States are assisted in this process by the EPA Regions and program staff in OST's Standards and Applied Science Division (SASD). The next step is to take that information and devise a total maximum daily load (TMDL) and a waste load allocation (WLA) using water quality models. That process will produce a number in terms of how many pounds of a pollutant a facility can discharge without exceeding water quality standards. Finally, the NPDES permit writer incorporates that information into the terms of the permit to be issued.

The problem with the ideal world is that it is so seldom realized. In the last 22 years of my experience, the three steps prior to issuing permits are not always there. For example, we do not have water quality criteria for every pollutant. We especially do not have criteria for all the pollutants that bioaccumulate. We may have some raw data and results from some good studies conducted at universities, but we do not have criteria for every contaminant. Even where we have the criteria, the states may not have adopted a numeric water quality standard that includes all those criteria. There is a catch-all phrase in water quality standards called a narrative standard. It is worded something like this: "There should be no toxics in toxic amounts." This gives the states a standard that can be used, but it puts the burden on someone to figure out what "toxic" and "toxic amounts" mean.

Not many waste load allocations have been developed for the bioconcentratable, bioaccumulative types of pollutants. This means that permit writers now have to figure out what to do. All of a sudden, they have to become someone who knows water quality criteria, who knows how things bioconcentrate, and who knows the chemistry and biology behind that. They must also become a mathematical modeler and figure out how pollutants cycle through the environment. And, of course, they do not usually have the training for that, except for a 5-day course that the Permits Division conducts. But nevertheless, that is the type of information they must learn to integrate.

Let us consider how sediments fit into the permitting process. In dealing with sediments, we look at bioaccumulation data when we try to interpret the narrative for those "no toxics in toxic amounts" standards.

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If you have sediment quality criteria, and you can figure out the fate and transport, you can walk through the same process of interpreting nontoxic and toxic amounts, figuring out the cause-effect relationships, and determining which facilities are discharging which pollutants that are causing problems in the sediments. But you also have to recognize that when you are dealing with the impact of discharges on sediments, you are having to take into consideration a number of different factors from discharges into water. For sediments, you have to consider important factors like the physical composition of the sediment and chemical interactions with sediments. If you find a hot spot below a facility, you also need to determine whether it is due to the facility's discharge or to something that happened 20 years ago that just got washed downstream in the last flood. Bioaccumulative pollutants in sediments may not always originate from point source discharges. They may originate from agricultural uses where there is runoff and erosion from farms. This is another factor that the permit writer must consider.

When we look at the information we have available to address sediments today in the NPDES Program, we have some challenges or barriers to overcome. No official sediment criteria have been published, although we have five proposed criteria. We do not find TMDLs that deal with sediments because you have to have sediment criteria to develop them. It is a difficult challenge to factor in unquantified nonpoint source contributions. It is also difficult to accurately define fate and transport when you deal with physical things that scour during flooding events. The calculations done by the typical NPDES permit writer are steady-state calculations, and storm events do not fit into a steady-state calculation. So what do we do?

Right now we are focusing more on the aqueous part of the equation. We are not doing much with sediments in our program today. On the aqueous side, we have put out some guidance on how to deal with that "no toxics in toxic amounts" phrase. We have two sources of information that we refer people to. One is a technical support document produced in 1991 for water quality-based toxics control. In there, we have laid out the equation similar to the water quality criteria program approach where they are primarily protecting human health from adverse affects for either a cancer or noncancer endpoint. We start out with how many ounces of fish a person can eat a year, the typical weight of an American who eats that fish, etc. From that information, you can determine what a water quality standard should look like. The technical support document also talks about a bioconcentration factor. Since that was 1991, we know the information needs to be updated. In the intervening years, we have been working on how to bring bioaccumulation into that evaluation process.

Through some work with our Office of Research and Development, we have worked out how to estimate or calculate bioaccumulation factors that can be added to the equation. The best source of that information today is the Great Lakes Initiative (GLI) rule. The rule only applies to the Great Lakes basin, but the science in it is universal and can be used across the country. So, this is the type of guidance that we point people to when they want to use bioaccumulation in making assessments in the NPDES Program. There is also some discussion in the GLI rule about what to do with fish tissue data. If you have nothing in your aqueous phase chemistry, but you find fish tissue that is high in a certain pollutant, can you make regulatory decisions based on the fish tissue data? The GLI rule shows how to translate the fish tissue data and determine what its equivalent water quality concentration would be.

That is where we are today. We are trying to work out a companion process for dealing with sediments in developing permits. Some of the focus is on simplifying modeling that currently works on a large mainframe computer to an assessment tool that an average permit writer can use. This could take five to ten years. Another important area of focus is to conduct evaluations on a watershed scale rather than the traditional approach of evaluating each individual facility. The NPDES Program was initiated under the Clean Water Act of 1972 to permit facilities to reduce pollutants. At this time, it was easier to identify major sources of pollutants. The program targeted the most obvious sources of pollution from the big pipes or from areas with signs of pollution like foam on the rivers. The program was successful in getting treatment technology established at plants to combat pollution. Now the program is in a more difficult stage. Every two years the states are required to provide assessments of their water quality that are compiled in the 305(b) reports. Lately, they are indicating that nontraditional sources are causing more problems. These are either urban point sources such as discharges from a storm sewer or a combined sewer overflow (CSO) or nonpoint source runoff from agricultural lands or forestry sites. Now we are having to open our doors for the first time and begin talking to programs in the Bureau of Land Management and the Forest Service to decide how we are going to apply a holistic approach in protecting our waters. Working with programs that are entirely voluntary to develop responsible water quality management is perhaps our biggest challenge. NPDES is still part of the equation, but no longer the primary part of the equation. Sediments come into play in this process. We need to identify watersheds where sediment contamination is the greatest source of impairment and to work with other agencies to deal with the sources of sediment problems. And we may find out that, in some cases, NPDES may not be the answer.

What do we expect today? We still expect that the permit writers use their best judgement on how to deal with bioaccumulation and sediments. And best judgement does not mean to find an ounce of science and start leaping miles ahead of that. What best judgement means is taking the current science, taking the current data, and using it responsibly to take a look at watershed-based water management decisions. If in looking at this information, a permit writer determines that a point source is not the cause of the problem, then their best professional judgement will say, "Don't deal with it." But if the permit writer finds that a point source is discharging a

bioconcentratable or bioaccumulative pollutant at levels causing impairment today, then they should use the information to include the right requirement in the permit to limit that pollutant.

We do believe that NPDES permits still need to be issued. We do not want to spend 25 years studying issues before we can take any action. But we also recognize that issuing permits on time does not necessarily mean every 5 years regardless of the situation. Issuing permits on a timely basis means doing it when you have enough data that it makes good sense. And that we will do.

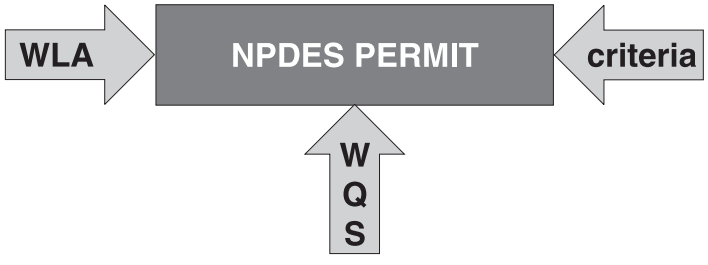
WHY IS A NPDES PROGRAM MANAGER TALKING ABOUT SEDIMENT BIOACCUMULATION?

- ⇨ Is sediment bioaccumulation a permitting issue?
- ⇨ Is sediment bioaccumulation strictly a monitoring issue?

PERMIT ISSUANCE (WITHOUT SEDIMENT CONTAMINATION FACTORED IN)

Permit Writing Factors:

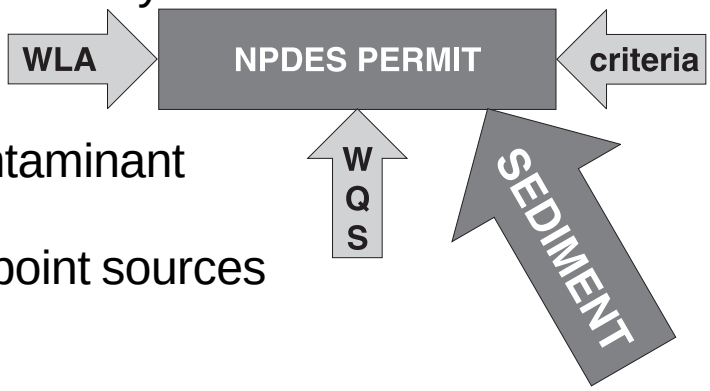
- Develop criteria
- Adopt Water Quality Standards (WQS)
- Develop Waste Load Allocation (WLA)
- Issue permits, based on the WLA, for each point source



PERMIT ISSUANCE (WITH SEDIMENT CONTAMINATION FACTORED IN)

Sediment Characteristics to Consider:

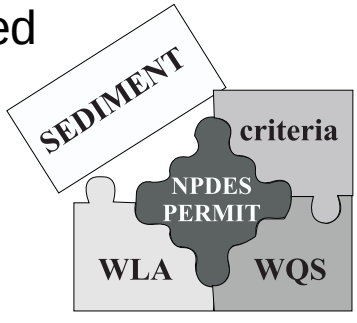
- Different sediment types (physical and chemical composition)
- Sediments are not stationary (Fate/Tranport Issue)
- Sediments may have pre-existing contaminant contributions from: natural, point or non-point sources



PERMIT WRITER'S CHALLENGE

Permit Writer's Challenges When Developing a Permit with Sediment Contamination Factored in:

- No sediment criteria, therefore no WQS for sediment
- No total maximum daily loads (TMDLs)
- Non-point source contributions not factored in
- Transport-Fate issues are not addressed for sediments

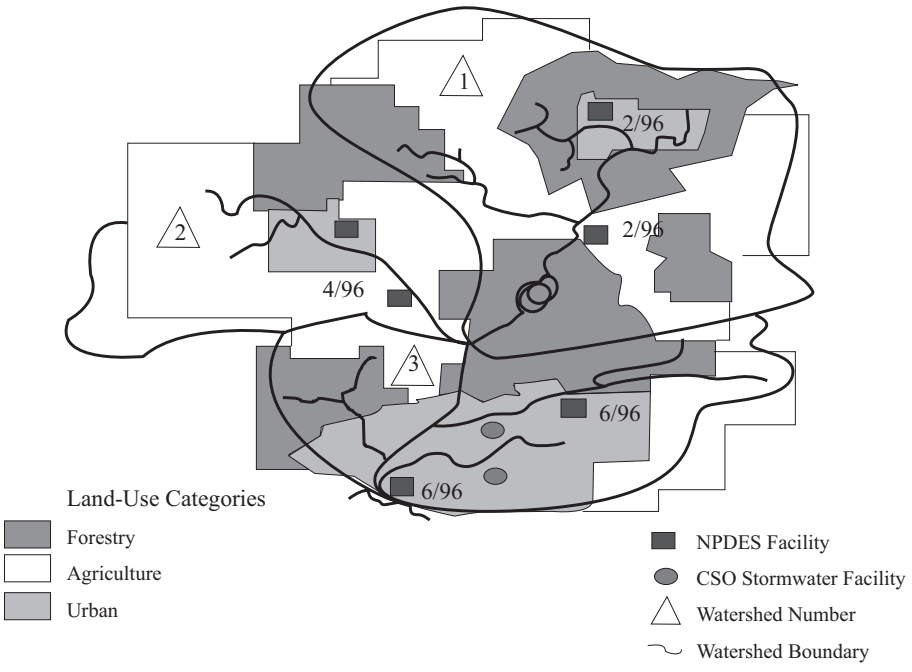


ADDRESSING THE CHALLENGES

What's Available:

- National Guidance
  - Technical Support Document (TSD) (pages 36-44)
  - Great Lakes Initiative (GLI) (pages 15400-15406)
- Watershed Permitting Approach

PERMITTING BY WATERSHEDS



WHAT IS EXPECTED FROM EPA, STATE, AND TRIBAL PERMIT WRITERS?

Minimum:

- Using all available EPA permitting guidance, issue permits based on Best Professional Judgement (BPJ).
- Issue NPDES Permits on time.