

National Acid Precipitation Assessment Program Analysis

Michael Uhart – National Acid Precipitation Assessment Program (NAPAP)

I am here to provide you a little bit of background, not to share any new information. You will be hearing the new information from people who are much more capable of providing it than I am.

I am here to tell you what has happened in the past as far as NAPAP is concerned, and to provide some perspective on what you might hear from the remaining speakers today and tomorrow.

Basically, I have broken this talk down into two pieces. One is NAPAP in the 1980s. It was a focused monitoring and research program. Altogether, agency contributions were about \$500 million.

There was, as you have heard, quite a bit of NGO and utility and state involvement. The result, not only from the assessment, but also from the annual reports, the hearings, as Dr. Bernabo mentioned before, was Title IV of the 1990 Clean Air Act Amendments.

In Title IX of those Amendments, NAPAP was reauthorized to continue, but its role was changed.

NAPAP still must monitor all that is necessary to produce assessments. Basically our role now is to assess the effectiveness of Title IV and the costs and the benefits, which is good, because it is not very often that somebody gets a chance to actually tell Congress how good a job they did in enacting legislation. That is essentially what NAPAP does.

NAPAP's mandate was to coordinate federal acid rain research and monitoring, evaluate the status and trends of certain variables I will talk about, and to conduct periodic assessments.

Those assessments basically come out every two years. We are asked to essentially answer two questions, and I say "we" meaning the NAPAP agencies which, besides NOAA, also include the Departments of Energy, Agriculture, Interior, EPA and NASA.

We are asked to answer two questions, what are the costs, benefits and effectiveness of Title IV, and what reduction and deposition rates – notice this is deposition rates and not emissions – are needed to

prevent adverse ecological effects. One major challenge to us is to define what is an adverse ecological effect that is measurable.

Our report to Congress was delivered to Congress in 1998. It is available on the web. It is also available on CD ROM.

Of the statistics I have for 2001, we have had over 10,000 requests from 2,000 different users in these first few months.

The scope of the assessment was emissions, amine concentrations and deposition up through 1995. Costs and benefits were often in sections of the assessment.

The assessment focused on what we have learned since 1990. Basically, we had the 1990 integrated assessment and the benefits of those 10 years in the 1980s to work from.

Assessments are incremental. We don't reinvent the wheel. It is a lot easier to see what has happened since the last time we did an assessment.

Assessments provide incremental improvements in scientific knowledge. For that reason, assessments shouldn't be considered to be separate items. I think it is important to connect periodic assessments. Otherwise, you really don't have an improvement and a general consensus of knowledge over a period of time.

We also emphasized that the first year was bad timing. We were asked to do the first assessment in 1996. Yet 1995 was the first year of compliance as far as sulfur dioxide was concerned. As far as looking at the effectiveness of Title IV, it was rather difficult, because we only had one year to work with.

We broke down the assessments into several specific questions. What are the economic benefits related to effects areas? What is the effect of Title IV?

We used several measures of effectiveness. Basically, we looked at state variables or what might be considered state variables.

The effectiveness variables that we looked at were emissions, amine concentrations, depositions

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and, to the extent possible, actually the response of sensitive receptors, and you will see the list of sensitive receptors that we included in the assessment.

Also, if you are going to understand what the is going on, you have to look at the relationship between those sensitive receptors, how do you get from emissions to deposition, how do you get from deposition to responses of sensitive receptors.

Those effectiveness measures I mentioned – emissions, deposition, et cetera – here is where my pitch comes in. Those come from monitoring.

They don't come from anything else. They come from consistent monitoring and, since this is a national program, it has to be some sort of nationally coordinated or cooperative kind of monitoring.

Without that kind of monitoring, we would not have an assessment. Even the poorest assessment, you couldn't do, unless you had monitoring. If we didn't have any continuing emissions monitors and we didn't even have the old method of coming out with emissions, how would we know what happened with emissions. So, monitoring is absolutely necessary to any kind of assessment.

If you are also going to take a look to satisfy policy makers as to what is the cause and effect relationship, how do we know this is what causes that, and also to help them decide what they are going to legislate or what kind of rules they are going to implement or what kind of programs they are going to design, you have to give them some sort of scenario, what the is going to happen in the future.

For these two factors, you need models. Many of the people you are going to listen to today run these models. These models are absolutely important if we are going to understand the relationships that are going on, and be able to predict the relationships in some future scenarios.

Nationally, monitoring is jeopardized. You might hear it here or there but the National Atmospheric Deposition Program (NADP) is under constant threat of being reduced.

Aquatic monitoring networks are being reduced. Some of these monitoring networks that are essential for future assessments, not only for

acid rain but for also other environmental issues, are being jeopardized.

A lot of those efforts are, for the most part, coordinated through the federal government. As far as modeling is concerned, the federal government has a significant part, EPA doing much of that, NOAA also doing parts, and all the other agencies involved.

Also, a lot of it is done by institutions and people like Dr. Driscoll.

What NAPAP does is to put all this together and to come up with some sort of unbiased consensus as far as the executive branch of government is concerned.

Now, in the last assessment, just some very general findings that we came up with. We had good SO₂ reductions and NO_x reductions were very limited. Both of those outcomes were expected.

Following that, you would expect sulfate deposition decreased, but little change in nitrate deposition.

A lot of these things were pretty much known to everybody. NAPAP assessments aren't designed to come up with the newest things. The reason that we do the assessments is to bring a lot of different people together, a lot of information together, and to come up with some sort of consensus, so you don't have the "I say this" and "I say that" kind of business.

There are limited observable ecosystem responses to Title IV. A lot of this has to do with confounding factors, the lack of monitoring information and just lack of information on anything other than on a very local basis.

As was mentioned, even though in 1990 it was known that nitrogen does play a significant part, I think over the years we have been getting more and more appreciation for exactly what the role of nitrogen is.

Compliance costs – you have heard this. The compliance costs are less than what we thought they were going to be. Emissions trading has been effective. Brian McLean touched on this, so I won't waste your time.

Aquatic ecosystems – you will see updates on most of this stuff over the next day and a half or so. Many lakes and streams have experienced decreases in sulfate concentrations.

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There is evidence of some recovery in the New England lakes. Mind you, this is what NAPAP came up with in its 1996-1997 assessment. So, things might have changed since then.

It was said throughout the report in many sections that additional reductions of sulfur and nitrogen deposition would be necessary for recovery of sensitive Adirondack lakes, as well as other ecosystems.

Other ecosystems – including forest ecosystems, we reiterated the fact that high elevation spruce fir forests are the most sensitive and are seeing quite adverse consequences directly related to acidic deposition.

Most forest ecosystems in the east, south and west are not currently adversely affected, and the key word there is currently.

There were statements in the assessment saying, basically, if you continue deposition, even though they are not currently affected, they will become affected, and if they are not reduced especially in areas where deposition is already high, then those forests could see some very adverse consequences, mainly due to chronic multiple-decade exposure.

Obviously, high deposition rates have an impact on episodic acidification also. There is a gradual leaching of soil nutrients. You have heard this and you will continue to hear it in the next day and a half. At least as far as sulfur is concerned, its role in these soil nutrients, reductions in sulfur deposition, at least in the short run, will see some improvements in sensitive forest.

Visibility was a difficult problem because a lot of the modeling that we had hoped that we could take advantage of wasn't there.

Luckily, visibility is a pretty much straight physics kind of question. Atmospheric science is very well known as far as visibility is concerned. So, pretty much general models can be used. There is a very good relationship between ambient concentrations and visibility.

However, sulfate concentrations were 15 percent lower, and this is just in the eastern United States.

We looked at particular areas, as far as visibility was concerned, but we didn't have exactly the modeling to show what exact sources impacted those areas.

Even though the concentrations were 15 percent lower, we didn't see the atmospheric science reduction of eight percent that would have been expected. That could have been for a variety of reasons.

Materials and cultural resources – the important factor here is that cultural resources are at greater risk, or the monetary value of that risk is higher than purely operational sources. These assets include buildings, bridges, cars, those kinds of resources.

Then we got into the physics, a little bit of it, exactly what the causes were of some of these problems. That was also referred to in a book by the National Park Service that was mentioned earlier.

One of the things that NAPAP did was bring human health into the forefront a little bit, and basically make connections. This is where the most troubling part in our clearance process was, how exactly we worded the relationship between fine particles and human health, since they are based on epidemiological studies.

Those studies don't prove a cause and effect relationship, but they are pretty good at saying what most people believe is actually happening.

There was a lot of talk back and forth of exactly how much we could say as far as fine particles, sulfates and nitrates included, which are a large fraction of total fine particles.

It turned out that human health effects are a significant part of the benefits of reducing acidic deposition, primarily its precursors.

I mention agriculture. I don't know why; I guess it is that everybody expects to see agriculture there.

Basically, nitrogen and sulfur are nutrients, but the biggest factor for agriculture is ozone damage not damage directly from NO_x or SO_2 .

The economic benefits – Dr. Burtraw will be talking more about the economic benefits later. The human health and visibility were two things that we were able to evaluate. I think Dr. Burtraw did a very good of evaluating those.

They are very significant. They are much greater than what the compliance costs are, and basically, the economic benefits in the future are pretty well unknown at this time. It depends on a lot of economic factors. I think Dr. Burtraw can

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tell us exactly what is going to happen to the economy over the next five or 10 years.

The linkages we did mention. I think the linkages are important when we talk about control of multiple pollutants.

We have tropospheric ozone – fine particles and health, sulfates and radiated forcing as a climate issue, energy production and deposition of nutrients and heavy metals.

Those are all linkages that have to be considered. They are not being strictly considered by NAPAP, but I think they should be considered. It is not in our mandate to look at those things.

Also, as I mentioned before, this is an incremental assessment. We are going to be doing another one. The drafting is in progress.

We will undergo peer and agency review and clearance. I have no idea how long that will take. It took at least three times longer last time than everybody told me it would take, but it is a necessary process.

The whole idea is that the assessment will be delivered to Congress hopefully late in this calendar year. This is an executive department report to Congress. So, basically this is an agency document, although we had several authors who were not in the agencies and the peer reviewers are not in the Federal Government. They are all external peer reviewers.

I want to make one last point. Assessments are primary. I mentioned that before. I think periodic assessments are necessary so that you can improve the science or at least improve the understanding of the science by the people who are making the decisions. With that, I will end.

QUESTIONS

MR. KAHL: Steve Kahl, University of Maine. You commented on the New England situation and whether there might be an update. Indeed, the conclusion that there is recovery in the northern New England lakes is no longer correct. That might have been true through the early 1990s, but it is not true today.

I cannot speak for Vermont because they are represented, but for New England – New Hampshire, Massachusetts – we cannot say we are in a recovery phase.

MR. UHART: I know it is not a question, but I am going to take your statement and run with it. You know, you have Maine, Vermont. That is one of the problems when you do a national assessment, is how to put those thing together.

As I mentioned before our last assessment, we were put at a disadvantage in coming out with an assessment when acid rain controls under Title IV were only in existence for one year. That is what happens. That is another reason why you have to do assessments every four years. You can't just do a snapshot.

MS. BRADT: Patricia Bradt, Muhlenberg College in Allentown. We haven't seen any recovery in eastern Pennsylvania either, to reinforce what was said for Maine.

MR. PENNINGTON: Peter Pennington, Shepwood(?) Environmental Institute. You said that monitoring is under threat, and that your aquatic monitoring in particular is decreasing. Could you give some more information on that, and are you likely to be using NGOs to bring in that information?

MR. UHART: As far as atmospheric deposition monitoring, our NADP program, there are many non-federal members of that network, who are the mainstays of the network. After all, we are asked to talk about deposition and not necessarily emissions.

There are a lot of partners in that network. It is a very long-standing network. There are budgetary threats from the federal side and there are also continuing budgetary threats from the states that are involved, because some of their budgets are going down, too. So, that is a problem.

MS. LAMBERT: This is Kathy Lambert from the Hubbard Brook Research Foundation.

Just to give a few specifics, some of us have worked to put together a two-page description of monitoring needs, that outlines five major monitoring programs related to acid rain and their funding needs.

We will make some copies and put that out on the table. As many of you know, we are in the middle of the budget process, so this is a good time to get familiar with these needs and contact your members of Congress.

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So, the need is quite substantial, both in terms of annual operating costs and modernizing equipment which is, in many cases, World War II vintage equipment. I will put these out there, if someone is interested.

MR. UHART: I will follow up on that just a little bit. The Committee on Environment and Natural Resources also put out a document on the need for continued monitoring.

In regard to reviews, besides the external peer review, there are two primary reviews that this next assessment will come under. One is from the CENR itself. NAPAP is made up of six agencies.

Those six agencies are principals in the CENR. So, rather than go through the agency review, it was felt a couple years back that it would probably be more efficient to go through a CENR review, and those agencies would be included anyway.

Following that is a review by the National Science and Technology Council (Office of Management and Budget).

Obviously, a lot of the statements that are made here are going to have funding implications. That is where OMB jumps in and that is where probably the most interesting part of the clearance process will occur.

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