Water Quality in Alabama: Non-point Source Pollution, Present Status & Future Directions

Proceedings of a Symposium
October 20-21, 1988
Sponsored by
Alabama Agricultural Experiment Station
Auburn University, Alabama 36849
Lowell T. Frobish, Director

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J.H. Dane, Chairman

Symposium Committee and

Editor of the Proceedings

Department of Agronomy and Soils

Auburn University

FOREWORD

The Alabama Agricultural Experiment Station at Auburn University has identified environmental quality as a major research priority. Within this broad framework, non-point source pollution is a significant issue that must be addressed. There is little doubt that Alabama farmers' use of agricultural chemicals pollutes surface and ground water. There is also little doubt that agriculture in its present form would be difficult to sustain without the use of these chemicals. The dilemma lies in how to minimize the risk of using these chemicals without having too much of an adverse effect on production and income. Other sources of agricultural pollution, such as concentrated poultry and livestock operations and erosion from croplands, are rapidly growing problems which must also be addressed.

There is a need to identify priority problems and appropriate strategies to deal with these problems. The Alabama Agricultural Experiment Station wants to play a role in protecting Alabama's most precious resources. The purpose of this symposium was therefore to bring together key legislators, policy makers from state and federal agencies, and representatives from environmental organizations and the agricultural and chemical industries to discuss these priorities and strategies.

The symposium was divided into six sessions. Each speaker had 15 minutes to make a presentation. Upon completion of the presentations of a session, a 40-minute discussion period was held, with the speakers of that session serving as the panel. All presentations and panel discussions, as well as the dinner and luncheon speeches, are reported in these proceedings.

February, 1989

The Symposium Committee

Jacob H. Dane, Chairman
L. Conner Bailey
B. Graeme Lockaby
William R. Thompson

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SESSION I

LEGISLATIVE BRANCH

Presiding

Dr. Paul F. Parks

Vice President for Research
Auburn University

Fred Clark

Legislative Assistant
to Senator Howell Heflin

Washington, D.C.

Thank you, Dr. Parks. It is certainly good to be here. I'm somewhat of a poor substitute, I know, for Senator Heflin and Congressman Harris. They would both have liked to have been here today. Congress was supposed to get out on September the 31st or thereabout, but continues to meet. Maybe they'll be through shortly. The items delaying adjournment right now are the tax technical corrections bill and the drug bill. They'll vote on these bills as soon as they come out of conference.

Senator Heflin told me a story last week, which I will relay to you. Some of you have heard this before, so bear with me. There was a Congressman that got a beating on the House floor one night last week and he was feeling kind of rough at that time. In fact, he was feeling so bad that he went out in Virginia and did a lot of things that he shouldn't have done. About 3 o'clock in the morning he got home, making all kinds of noise. He couldn't get into his house and woke his wife up, who came running downstairs, jerked the front door open, and the Congressman fell into the house onto the floor. She said, "what do you have to say for yourself?" The Congressman looked up and said, "well, I don't have an opening statement, but I'll take questions from the floor."

It's always good to be here, back in Auburn. The Congress has been very busy in the last two years regarding legislative matters, and groundwater has been a very important issue. Legislation has begun on many areas regarding groundwater as well as surface water. This emphasis on water in general, groundwater as well as surface water, has come about, not only because we have problems, but in the Southeast, and here in Alabama, we've had continuous droughts for the last several years, and the problems are calling everyone's attention. I know when I was in Auburn a few years ago, you couldn't water your lawns. There was proration, I think, of water use. And, of course, we have had drought problems on our farms for the last several years. It will become much more of a problem as this goes on.

The General Accounting Office has done several surveys during the last few years, since around 1984, and has found nearly 8,000 wells and other contaminated water sources throughout the United States. Generally, the state of Alabama has good quality water, but I think there are growing concerns regarding the quality of our water in the future.

Many of you have heard Senator Heflin talk about water in general during the last few months, but especially regarding the droughts, because of their continuing occurrences. We feel like concern for water and water quality, not only for drinking, but also in terms of the farm sector, is growing greater each year. We continue to have droughts and farmers continue to go out of business because of poor crops. We will not always have the

kind of assistance that Congress provided this year. So we have to start looking for future solutions to these problems. From that standpoint, Congress has looked at several goals. Senator Heflin added a section to the drought assistance bill, which provided authorization for water management activities such as research, guaranteed loans, and other types of assistance which we have to work for in the future to make them come about. This isn't going to happen this year, but working with the State as well as with our other members in Congress, we're hopeful to get additional monies for water management. Senator Heflin was able to secure research dollars that will be going to Auburn University this fiscal year. We got in agricultural appropriations which will act somewhat as seed money for research in water management. We like to know, for example, how things can be done at the State level as well as at the Federal level in terms of financing, what are the best ways to irrigate, and which areas in Alabama are suitable for and can sustain irrigation. Some areas cannot, some areas can. That's what this seed money is supposed to be used for.

To address the subject of this symposium, non-point pollution, we must look at several bills that have come about in this session of Congress. Congress has tried to address several different issues that are becoming troublesome and problems that we know exist. The Clean Water Act was passed by Congress in February of 1987. This year's HUD appropriations, which funds EPA, contained 1.95 million dollars in grants for sewer systems and other types of waste disposal systems that the State can qualify for. It also contained matching funds for appropriate cases. From that standpoint, this legislation came about at a very opportune time, because of all the troubles we have in our cities, municipalities, as well as rural areas.

As we look at groundwater itself, there are two pieces of legislation that have been dealt with in this session of Congress which address the more specific question of non-point sources of pollution. We're dealing here primarily with pesticides, i.e. with the FIFRA reauthorization. FIFRA is an acronym for the Federal Insecticide Fungicide Rodenticide Act, which deals with reauthorization, how chemicals are registered, who pays for the registration, the indemnification of a chemical should that chemical be canceled or suspended by the EPA when they find, through testing, that a chemical is harmful to the environment and to human health. The Act also contains a provision on how to deal with storage and disposal of pesticides, and who will pay for that. Now, this legislation was less than most of us had hoped for. Senator Heflin sponsored a bill regarding pesticide registration and other provisions. It turned out that this bill was basically what they call the FIFRA-light, which addresses only part of the many things that have to be done to start attacking the problems with pesticides and other problems that are occurring. This bill would call for industry paying for some 110 to 125 million dollars of the cost of registration. Although as a result of this bill, it's now going to take approximately 9 years to get complete registration of pesticides, it would have taken possibly twice that long with current EPA

funding. From that standpoint we pushed hard to get this legislation through. There has been difficulty with the outside or perimeter issues regarding FIFRA, including groundwater regulatory actions, additional provisions such as farmer liability, patent term restoration for pesticides, and other provisions.

We have several problems in groundwater. The Congress right now is debating, in conference, groundwater legislation. Both the Senate and the House have passed groundwater research bills. In this legislation, there has been somewhat of a deadlock between the House and the Senate. I don't know if there's a lot of difference from the standpoint of substance. It went through five Committees of the House before they came up with a uniform groundwater statute that they wanted to offer as a bill. It came then to the Senate, where it moved forward and passed and now they're in conference. Hopefully, before they get out we'll have a groundwater research bill. This is extremely important, because groundwater is becoming more and more a part of our daily life. Back in 1950, some 34 billion gallons of groundwater were being used daily. In 1980, according to a GAO study, this has increased to 89 billion gallons per day. Since we're using a lot more, everything regarding groundwater, quantity and quality, is becoming more important.

There has been a debate, and this debate will continue, not only in the agriculture sector, but in all sectors of our daily life. The debate concerns as to what is causing groundwater quality problems. Adding to the complexity of the problem are questions such as what to do, how to do it, and when to do it. From that standpoint, we have problems with waste disposal cleanup. After you find out there's a problem, how do you clean it up? We have problems with leaking of underground tanks, sewage disposal systems, which, we hope that the Clean Water Act will start to address, and agricultural practices that exist today. During the last 50 years there's been a great change in the way we farm. I remember when I was a student in agriculture here in Auburn, I took an Agronomy class in which we were studying minimum tillage. We learned that, if you till the soil too much, you can create a plow pan that causes reduced production and reduced yields. From that standpoint, if we discontinue the use of pesticides, which have allowed us to go to minimum tillage, we have to find other tillage practices that will help to make up for the non-use of pesticides. This is the debate in Congress now, "What happens when you start cancelling or set standards that disallow the use of pesticides or certain types of pesticides."

Other problems are with nitrates. We're seeing a greater number of occurrences of nitrates in groundwater. Congress is looking at possible solutions to deal with it. Possible sources of nitrogen contamination are manure, lagoons, and commercial fertilizers.

The Soil Conservation Service is going to cover a great number of these things. The Soil Conservation Service, because of in the 1985 Farm Bill, requires conservation plans, and thus conservation compliance within those plans. Through additional conservation practices we are trying to achieve a reduction in

soil loss and address other problems that occur on the farm because of soil loss. Now these practices will help from the standpoint of groundwater and surface water contamination, but then you get back to the question of what do you do about pesticides. You're having to balance the coin of what we are going to do on the farm and how we are going to use pesticides.

In the past we've dealt purely with efficiency and economics of farming. The environment really didn't play a part. It only did from the standpoint of soil conservation, i.e. which practices reduced soil loss the most. During the last ten years we've gone away from the environment because we've had farmers going out of business because of the economics of the times. Now that we're getting back into the environment, we're doubling the problems for the individual farmer, and this issue is part of the national debate. We are pushing everything onto the farmer, whether it be record-keeping, or restrictions on what he can do, such as conservation compliance, where he can't plant or where he can plant. We are just adding to the burden of the farmer. These are some of the things we're having to look at, and the environment is certainly going to be a part of that in the coming years.

Senator Heflin is known in the Senate for generally trying to work out compromise legislation. He'll usually come up with something that is reasonable and fair from the standpoint of legislation. He'll try to find the middle ground between both extremes, i.e. either no protection of the environment and the complete doing away of pesticides, fertilizers, and certain types of practices that farmers use. So, as we develop groundwater research legislation, it might not pass this Congress, but it will certainly be high on the agenda of either Vice President Bush or Governor Dukakis, as they have already stated in their campaigns. It is going to be a high priority and will be dealt with in the Congress to come.

In 1984, the GAO conducted, at the request of the Department of Public Works and some Senators, a survey in 57 states and territories to identify what is needed and what should be done. As a result of the survey they found out that there were several things that the states wanted to have more information about. Some of these were related to potential health effects caused by pesticides, whatever use or practice, while others were related to the existence of guidelines and standards regarding pesticide use from the standpoint of health effects.

The environmental fate of contamination--what happens after contamination. How do you clean it up? How do we monitor the presence of pesticides or other contaminants in groundwater, wells or streams? How do we detect the amounts and locations of disposed sideproducts? If you find it, then what do you do? What is an acceptable risk level? What would be the effect on the population as a whole? What is the technical feasibility of cleaning it up? In rural areas today 97% of drinking water comes from groundwater. For the total population it's in the neighborhood of 50%. From that standpoint, groundwater legislation has a high priority in both the House and the Senate, as well as at the State level.

The groundwater research bill, that has passed both houses, basically puts research and information in the hands of the states. We believe that this is probably the best way to go, because each state, each region, each area within a state, has a different soil type, a different topography, and therefore a different impact on the groundwater.

The debate is not over who should be in charge, the Federal or the State government. This is an ongoing practice, that will no doubt take a great deal of debate, take a great deal of study, as regulations go into effect regarding e.g. the concentration level of a pesticide in the groundwater above which you can no longer use that pesticide. At what concentration levels do pesticides become a health hazard? All of these are questions that certainly have been on the minds of many people from the standpoint of what to do, and when to do it.

We have to make a commitment to the quality of our groundwater and all of our surface waters. If we don't make that commitment, in effect, we're saying, it's all right to do anything, and that's certainly not what Senator Heflin believes. I know personally, when I have a family and have children, I want them to have the same opportunities that I have in the use of water. Unless we make some changes and do more monitoring and have better regulations, they won't have these same opportunities.

We have to promote best management practices through the Soil Conservation Service. Mr. Todd, I know, is going to talk about this later. We have to address agriculture. Basically, agriculture is on the hot seat here. You've got agricultural producers that want to continue to produce. At the same time you have consumers that want the safest possible food supply. Not to say that it's not safe today, because it is. But in the future, we need to have a balance, which may mean that we'll have to pay more for food. That's something that needs to be looked into.

I've rambled, I've run through this. It's hard to go through this subject in a very uniform way and cover everything that is to be covered, this will be an ongoing debate. This is a very important time to be reviewing this. I want to commend the Alabama Extension Service and the Experiment Station personnel. I thank Dr. Frobish for having this symposium in this very critical time. We're looking at future ways of managing water in rural areas, what is the best way to do this. The legislation in the Federal government right now is directed at research and identifying the problems. I believe it will be a quick process from the standpoint of regulatory requirements when action will be taken, probably in the next Congress. Certainly within the next five years there will be drastic changes, because the next Farm Bill will be coming out in 1990. The environment and environment statutes within that Farm Bill will certainly be much more to the forefront than they have in the past. We saw a good deal in the last Farm Bill concerning conservation, conservation practices, the protection of wetlands, pesticides, groundwater, and record-keeping. These issues will certainly be on the forefront of the next Farm Bill.

That's basically my presentation. Dr. Parks, thank you.

Ann Bedsole

Chairman, Senate Agriculture,
Conservation, and Forestry Committee

Alabama is blessed with an abundance of water. We have more navigable waterways than any other state. Water is a major natural resource for Alabama with 14 major river systems or basins, 40,600 river and stream miles, 545 square miles of lakes and reservoirs, approximately 3,000,000 acres of marshes or wetlands, 50 miles of sea coast and 625 square miles of estuaries. In fact, we have so much water we tend to take it for granted.

Although our groundwater resources are of high quality, water quality is an issue in Alabama, as it is in other states. There is concern about deterioration of even these abundant resources, and at this time we do not know what effect continued droughts may have on water quality.

The principal state agency responsible for groundwater management is the Alabama Department of Environmental Management (ADEM). The Department is the regulatory agency for protection of Alabama's water resources.

In 1985, the ADEM and the United States Geological Survey (USGS) entered into an agreement to delineate the major aquifers in Alabama, their recharge areas, and areas vulnerable to contamination.

In 1987, the ADEM requested that the USGS classify those aquifers according to U.S. Environmental Protection Agency (EPA) and department guidelines for the use of aquifers and their vulnerability to contamination.

Contaminants from agricultural and other sources are increasingly being identified in water supplies.

In order to accelerate protection against agricultural and other contaminants, we must create better public awareness of the effects of pollution on water resources. Over the last few years farming methods have improved in many ways, including an understanding of the limitations of insecticides.

Farmers are beginning to learn how to manage their fertilizer application. As a result, we should be seeing fewer problems related to run-off. Still, research is needed more than ever to identify pollution sources and health hazards associated with contaminants and to identify more fully the effect of water pollution on the environment.

Groundwater is the source of drinking water for about 40% of our population. According to ADEM, 80% of public water supply systems have a groundwater supply source and all but three counties in Alabama depend on groundwater for at least one public water supply. Approximately 100,000 private wells also supply drinking water to homes throughout the state. Almost all farmers in Alabama depend on well water. Thus, knowledge of the quality of groundwater is a matter of survival for them. But it isn't just an agricultural problem. Non-point source impacts may occur as a result of agricultural, mining, construction or silvicultural activities. Although responsibility for

development of a comprehensive non-point regulatory program has been placed with the Mining/Non-Point Source Section within the Water Division of ADEM, protection of our water is a collective responsibility.

We have some good programs, like the Alabama Resources Conservation program which makes funds available to landowners to pay for portions of approved soil conservation and water quality practices. The Agricultural Conservation Program has been assisting Alabama farmers and landowners with soil erosion control projects since 1936.

The new Federal cost sharing Conservation Reserve Program promises to have an even stronger influence on preserving and, in some cases, restoring water quality.

Everyone knows that many farmers have serious economic difficulties right now. Farmers are having to become better managers from a business standpoint. They are going to be looking very closely at all their inputs to crop production, including farm chemical inputs, using just about everything in a more exacting manner. So as farmers become more efficient economically they will become more efficient environmentally. Generally speaking, best management practices are environmentally sound.

Much of the legal authority for groundwater protection in Alabama resides in ADEM through the Alabama Water Pollution Control Act. Additional authorities related to groundwater protection are provided by the Hazardous Wastes Management and Minimization Act, and the Alabama Underground Storage Tank and Wellhead Protection Act of 1988. Under these laws, ADEM feels they have authority to promulgate all regulations necessary for protection of our groundwater resources. Their lawyers advise that some additional legislation may be necessary.

Many states are passing new laws to protect groundwater resources and we, on the agriculture committees, have looked at model bills, but until a consensus is formed setting clear directions, legislation would be premature and might do more damage than good. The model bills we have seen are not applicable to the structure of our state government, nor do they seem to address the problems of Alabama's unique environment.

The Agriculture Committees of the House and Senate are not unaware of the problems, but they look to the experts like those of you here today for guidance and direction. When the exact requirements are known, making clear what further legislation is needed, I am certain you will find the Alabama Legislature most responsive. In spite of the bad rap our Legislature gets, it is always responsive to the needs of the farmer.

Let me commend Auburn University for their effort in identifying the problems and taking such a positive action as this Conference to address groundwater protection.

Ben Richardson

Chairman, House of Representatives Agriculture, Conservation, and Forestry Committee

Thank you, Dr. Parks, Ann Bedsole, and Fred Clark. I feel honored to be here with such a distinguished group. My speech will come from the hip, and from experience, more than from any other place. As you listen to my background, you'll realize that I've been involved in agriculture all my life in one form or another.

I'm going to make some profound statements. The first one is, without clean water, there's nothing. The next one is, we're several years late with this meeting. We, as American citizens and as people who have been used to all the nice things in the world, wait until there's a crisis before we react. That's no criticism, that's just the way it is. That's the way it is in almost anything we set about in doing. We wait until there's a crisis.

The time is now to get underway with this very important problem of ground water quality in Alabama and this United States. Now, any legislation that's passed, not only in the national Congress, but in the state legislature, is going to be, ladies and gentlemen, a very, very emotional issue. When you start talking about restricting the use of water, restricting the use of pesticides, restricting the use farmland and the way in which we farm, this becomes a real emotional issue.

Before we take any actions we have to have the research done. Let me say, before I move on, I had the opportunity last week to be in North Carolina in a rural development meeting, during which we toured the Experiment Station and we saw one piece of work going on in North Carolina having to do with the movement of pesticides in the soil. I have a copy of that, which I'll turn over to Dr. Frobish so that, if he doesn't have it, he can study it, and ask for more information from North Carolina. Also, while I was there, Dr. Weestig (?) from Florida, who is director of the Cooperative Extension Service in Florida, told us that they have already developed software on the movement of pesticides in the soil. So, there are research results available. Let's not duplicate research, let's do this thing cooperatively, so that we can move faster than we would if we had to do all the research here.

Now Auburn University's agricultural research and its extension are going to play a key role in this. We've got to re-educate our citizenry, including our farmers, on the way we conduct ourselves. Down through the years we've used pesticides without any regard to whatever it may be, to the environment. We didn't know what was happening. It has finally caught up with us, in the sixties, with the excessive use of DDT in those days. We've got to have the research, and we've got to have the know-how, so that we can educate citizens, farmers, whoever, in the use of pesticides. We not only have to educate the farmers, we've got to educate homeowners. They use a lot of pesticides. It's got to start with the high school students. It's got to

start in the Ag schools, in the veterinary schools, you know, they need to be doing some research and work on how to dispose of animals. And the poultry department.

You know, another thing that's very important to our rural areas, you realize that only about 8% of the people that live in the rural areas of the United States, it'll vary in Alabama from 8 to 12, maybe a little higher in some areas, only 8 or 10 or 15% are involved in agriculture. The rest of the people out there in the rural area are rural residents, just like people who live in town. And they are polluters, too. On Sand Mountain, where we now have a project going with the Soil Conservation Service, I noted on the information sheet on that project that there are close to 11,000 septic tanks on soil that's really not conducive to percolation and to the utilization of that sewage into the soil. In my area, we are being polluted in the lakes by hydrilla and other weed products, the growth of which is promoted by the nitrate that has been leaching into the rivers. So we're being polluted by nitrogen. So many of our wells already have levels high above what EPA says is safe as far as the area of nitrogen. Now, I'm a great proponent of rural economic development, but it seems like we are trying to re-invent this thing. You hear a lot about it today, and the thing that we are talking about today is going to bear heavily on rural economic development.

We can't have more industry in the rural areas unless we have research on how that industry can come in and be developed without polluting the environment. Our livestock, we've got to have research on the livestock waste so that we can enhance and move more of our people into the staple production of poultry and swine. There's a movement now in the area of swine. When we bring new homes into the rural areas, it brings in more septic tanks. There are areas on Sand Mountain now that really need to be on sewage systems in order for us to be safe there.

Another thing that's so important to the thing that we're talking about today is rural water systems. Many wells are contaminated. About 20 years ago I did a survey of wells for health reasons. Over 50% of them in my area had the coliform concentrations so high, it was not suitable for drinking water. And with the soil structure, and the rocks, and the limestone crevices in our area, it's real easy to contaminate the groundwater. We all have to look at that aspect of the pollution by pesticides.

Now, we must use a little common sense in what we do. For years, we've promoted soil tests, we've tried to get farmers to follow soil testing, but they didn't stop with what we recommended. They went above that, and of course, that put more than was necessary into the soil systems, and caused the leaching of nitrogen and other things. They also did away with the terracing in my area. They'd plow over them and this would pollute the streams in the valleys and the lakes in our area. We just have gone away from the things that we really know that are important from the standpoint of our quality life as we have known it in the past.

One of the things that was mentioned earlier by Fred Clark,

is that nearly every day we had some kind of mandate come down from the Federal government on pesticides, such as the amount of different pesticides that can be allowed in your drinking water.

So, we've got a real problem in front of us, and I want to re-emphasize what I've said before. Auburn University must, and I'll underscore "must" be the leader, and take the leadership in research so that we who live out in the State, and in particular in the rural areas, can have an environment that is safe for our citizens to live. And it's going to take us all working together, it's going to have to be a team effort, and we can't be worried about turf. You know what burns me up a lot of times about agriculture and other things, is people claiming "that's my turf, stay off of it." When it comes to the environment and quality of life and survival of this society, we've got to work together. And, I just want to emphasize the fact that if we are to continue to live as we have lived in this State and in this Nation in the past, we must find out, find the answers to the things that we hear about today. If we don't, our quality of life in this country, will go downhill. It's a great country, we've got the expertise, let's put it to work, and let's solve this problem of water quality and non-point source pollution. Thank you for the invitation to be here.

Session I

Panel discussion

Paul Parks
While the audience is thinking, mulling over their questions, let me, Fred, ask you one question. Representative Bedsole pointed out in her comments that best management practice in terms of use of fertilizers and pesticides is sound environmental policy, and I wondered, in the groundwater legislation that's passing through the Congress now, is there incentive for best management practice written into it?

Fred Clark
In a practical way, no, there's not. This groundwater legislation, which has not quite passed, is primarily dealing with research in terms of what you must do to prevent groundwater contamination from happening. Implementation of the farm bill legislation, which deals with issues of soil loss and how we farm, is taking place over a long period of time. The practice that I'm talking about, is primarily getting farmers to plow only contour. The legislation is telling them to do something in a certain way. This was hard for Congress to do, I believe, or either Congress didn't know what they were doing, one or the other. I wasn't there at that time, but, basically, you're telling the farm community of specific plans that they must do to meet a conservation compliance provision. Now that, in itself, will go a long way in meeting some of the goals of both saving the soil as well as reducing pesticide losses into the environment. So we are expecting a trend in the research.

Jerry Miller
Given the widespread nature of some of the aquifers that are in this region, is the Congress expected to form some super-agency to move authority away from just simple state or local areas to improve groundwater quality?

Fred Clark
From the standpoint of Congress, the debate of who will regulate and who will do the regulation, whether that's the State or the Federal government is still a debate. There have been several provisions that have passed committees of Congress but have not passed the full Senate. To give you an example, when the FIFRA bill passed in 1986, the House passed it three times but the Senate did not pass it, because certain individuals and committees in the Senate felt it should be harder, and there was opposition to it from all sides. The 1986 bill was a compromise between the environmental groups and others. It set a national tolerance for groundwater contamination. If a pesticide concentration exceeded a certain level, there was a Federal regulation requiring its use to be discontinued. In the legislation recently passed on FIFRA, there was no groundwater legislation involved. The debate is ongoing, and it has passed one House of Congress. The groundwater section, which Senator

Heflin sponsored in our FIFRA bill this time, passed the Senate agriculture committee. However, the debate again raged, and it was held up in the Senate. And that's why we came out with this shorter FIFRA legislation.

Jerry Miller
There is also a development of some water resources research regions. Do you know how that's proceeding? Are some of these research centers being set up?

Fred Clark
I do not deal with Senator Heflin's environmental work and Senator Heflin is not on the environmental committee. Some of the research regions were not in this groundwater research legislation, as far as I know. Now, EPA might be doing it independently, which they very well could, because they have got a national policy regarding groundwater contamination under existing law. They might be setting those up, but I'm just not aware of those.

Tom McCaskey
With agriculture as it is in a depressed state, economics are such that many farmers are finding it difficult to make ends meet. To control pollution on the farms will cost money, obviously. I'd like to get your views on support programs for these people to put in waste management systems or whatever in order to comply with the regulations. Otherwise, if the present trend continues, the number of farms will decrease, and the water pollution problem may solve itself, at least in terms of agriculture pollution.

Fred Clark
The question you've raised is the debate. That's the question Mr. Richardson pointed out in his comments. Any legislation regarding groundwater regulations and its subsequent effects is the debate. I think it would be far-reaching to say the Federal government requires compliance with all kinds of regulations and then doesn't have the money to help support it. I would say, within budgetary constraints, Congress will try to be as reasonable with these regulations, and their implementations, to the individual farmer as possible. Simply because of the points you've raised. Senator Heflin recently stated at a conservation hearing, "We don't want to put farmers out of business, but we want something reasonable that addresses the environment as well as continued production agriculture." Coming up with that balance has been the debate for the last ten years. I think that answers your question from the Federal level.

Ann Bedsole
I just have to say that it certainly is good news to me to hear that Congress doesn't want to put the farmer out of business. We have appropriated, in the State legislature, $2 million that's used in the Richardson-cost-share program. If we used every dime of that in the area of animal waste disposal or whatever, it

would just be a drop in the bucket. It would really be nothing. But we do have something like 37 thousand dollars per county, per year, to be used in cost-sharing, covering all the different practices. But, the thing you're talking about is going to take millions and millions of dollars, not only from State and Federal, but, I'm sorry to say, and I guess rightfully so, farmers are going to have to share a part of that burden, too.

Ann Amacher
Can either Mr. Richardson or Ms. Bedsole address the issue of the legislative authority for controlling animal waste, which may be getting bacteria and nitrates into drinking water sources? I presume it is being dealt with in Mr. Jenkins' non-point source section of the water division of ADEM, but I was wondering if you could point to whether there is a legislative basis for that?

Ann Bedsole
Well, as I said earlier, the chief of the groundwater section told me that she felt that they had the regulatory authority to promulgate any regulation for non-point source pollution. And so I suppose that it would be in the mining non-point source section within the water division, I suppose. I don't know any more, Do you, Ben?

Ben Richardson
In the last legislature, Act #88-602 provides that all Federal funds are available to the State agencies for financial assistance on cost-share grants to land users, as was the case with this program on the Sand Mountain region. It should go through soil conservation and water conservation districts. Now, ADEM has the authority as far as regulating animal waste. You know, a lot of times I have seen dead animals along the roads, but whose authority is it to pick them up? Really, no one has that authority, to my knowledge. I know in the cities, the city sanitation people will pick them up, but out on the highways, the highway patrol may have that authority, but I really don't know. Maybe the health department has the authority over animal waste getting into drinking water supplies, i.e. if a lagoon is not operating properly, or running into a stream or whatever. I suppose someone from ADEM might answer that question.

Jim Warr
I'm pinch-hitting today for Mr. Pegues. The question raised, as I understood it, is where does the statutory authority lie. It's under the state water pollution control act, which regulates most established standards and those activities which would prohibit or interfere with the maintenance of that standard, which falls under the regulatory pursue of the department. So I think, that Senator Bedsole's statement in her presentation is correct--ADEM does believe that it has the authority under the State water pollution control law for both surface and groundwater as it is impacted by agricultural practices.

Jacob Dane

Mrs. Bedsole was talking about model bills. I was wondering if she could expand a little bit on the contents of these model bills. She also mentioned that she is looking for expertise. I'd like to know what kind of expertise she is looking for.

Ann Bedsole
Well, we're looking for the kind of expertise that, I think, is present in here today, and we are looking for the kind of decisions that will come from this meeting and other meetings like this.
Regarding the model bills, ALEC, the American Legislative Exchange Conference, has written, and it took them several years, a model bill. We spent about a day analyzing it, and have concluded that it just really didn't work for Alabama, because it required a joint authority between the Dept. of Agriculture and the Environmental Management Department. This is not practical in Alabama, I believe, because for one thing, the head of the Dept. of Agriculture is elected and the other is appointed. So we asked them about that and they said, "Well, we never thought of a state having a situation like that." Generally, that model bill was written broadly, and I believe it's been pretty much put into the Mississippi state law. But we didn't really feel that it covered the situation in Alabama, it just did not apply to the specifics of our state.
The other bill that I have seen is promoted pretty much by the Fertilizer Institute. However, I don't think that either of those bills add anything to the authority that ADEM already has in this state and would do anything to improve what we already have in the law here. Do you agree, Ben?

Ben Richardson
I agree, Ann. I wouldn't be for promoting any legislation in the State of Alabama until the total community was involved in the preparation of the bill, because we all got to live with it. Farmers have to remain in business, and we cannot put them out of business and we cannot cause higher cost of food and fiber by putting up restrictions, so we're going to have to come down to some common sense approaches in this area of water quality and non-point source pollution. Now we didn't get where we are in a day. It has taken us about maybe 40 or 50 years to start using pesticides, so it's going to take us a while to work our way out of it. And it's going to take all the expertise we've got in this room and then some more. Now, let me re-emphasize that no legislation will pass as long as I am involved, until the farming community is involved in this preparation.

Dean Earlix
I've had some linguistic training and I would like to bring up a term that we seem to be using differently in the scientific community and in the legislature. I hear "water quality", the word "quality" meaning "good," and the "water quality" meaning "good water." In research, we tend to use quality as a characteristic and water quality as the characteristics of water. I don't think we're meeting head-to-head there, although the

difference is an important one. I'm thinking in particularly of a cannery in California that was polluting the water. It had been doing so for a number of decades, but it built up a spectacular fishery, until the EPA closed it down. The fishery collapsed. The other problem is, we're using pollution as something bad. Water pollution just means that we're putting things in the water that don't belong in there, but it's not necessarily harmful. Most of the nitrogen pollution in water causes over-abundance of life. It is not a poison as we think of it with air pollution.
I really just want to urge the panel to remember that we're not dealing with black and white. We're not dealing with good and bad all the time, but in a lot more shades than that. When you evaluate these situations in the legislature, please remember that water quality is a lot broader than just good and bad, and the pollution is a lot more complex than just existent or gone. Thank you.

Ann Bedsole
Well, I don't think we do approach it from a scientific point. We do approach it from a legislative, or really a popular point, and when we use these terms, we're speaking in layman's terms because we are laymen, and the people we represent are.

Ben Richardson
That's true, and we approach this from the standpoint of our constituency. We are political beings. Never forget that.

Fred Clark
I think you're right in terms of a specific characteristic, no matter what it is, good, bad, indifferent. What you have to evaluate are the effects of legislation, and in many cases that takes a lot of study and a lot of research. Let's assume we discontinue the use pesticides in the Tennessee Valley. How many cotton farmers does that put out of business? What are the effects if you continue the use of a particular pesticide at a certain rate? What does that do for the population that lives in that area? Those are the types of questions that you deal with when specify what the standard should be. What should EPA establish as a good standard, and how should you go about evaluating the use of pesticides at that particular level?
But I think you're exactly right. Many times you can't tell by the definition--you have to ask somebody what the definition of whatever term you're using is. Whether that's quality or a standard. You say, well, we want a standard. Well, what kind of standard, what number? I wholeheartedly agree with your statement.

Ben Richardson
I'd like to make one other comment. I agree that there are many gray areas that have to be cleared up, but we are working in the area of pesticide reduction, as you all know. Some of you may or may not know, we're involved in boll weevil eradication. Once that's done, there will be very small amounts of pesticides

placed in the fields and in the atmosphere. That is an environmental concern. Not only will this assist the farmers in lessening of cost, but it will also reduce the amount of pesticides available for pollution of groundwater. Like I said before, we've got to use some common sense approaches along with the scientific information that you've put together here at Auburn University. And then, the message must be carried to the people, and we have the mechanism to do that with the Alabama Cooperative Extension Service.

Ann Bedsole
Yes, we have the Cooperative Extension Service helping the farmers. But you mentioned something earlier that bothers me a great deal and I don't know if there has enough attention being given to the very casual use of pesticides, insecticides and fertilizer by people in the cities in and around their own homes. Nobody has ever really looked into, at any depth, trying to warn people about the dangerous products that they are using right in and around their homes. I'm not sure that we're not really endangering more lives, by not having proper warnings.
A friend of mine went to spray her roses this summer and she had a small cut in her thumb. She spent two weeks in the hospital and nearly lost her thumb, because she had no idea how important it was to wear gloves. Well, you know, it's just as important for her as it is for a farmer. I think when we address legislation we better look at the effects that it has on everybody, not just farmers.

Ben Richardson
There are other polluters involved in this other than in agriculture. And if we correct the agricultural situation, we have not solved the problem.

Connie Perez
I recently moved to Auburn from California. I'm involved in a Master's degree study and my interest is in environmental problems, specifically, in the communication and public education areas. I'm wondering if, in Alabama, there's any structure, any organization, at the state level or at the county level, that bridges the gap between the findings through research and the public.

Ben Richardson
Yes, we have an organization that's been in place since 1909 and 1914. It has the expertise to do that, that's the Alabama Cooperative Extension Service. They're in every county and they have the expertise to do it, and we've got to provide them with the information so they can educate not only the farmers, but also homeowners, rural residents, and every body concerned. Now there may be a possibility that this could go further, not by the Cooperative Extension, but through the school systems of the State of Alabama.

Jacob Dane

To follow up on this question, do you feel that the state government has any responsibility in educating the public regarding pollution issues?

Ben Richardson
Yes, I just stated that. The Alabama Cooperative Extension Service is state government. It's funded by state government. It is the educational arm of this University, and of the USDA, and it's their responsibility.

Jacob Dane
President Martin was talking about the American West where there are large areas with water shortages. Therefore there are many water right laws in that part of the country. I think irrigation is becoming more important in Alabama as well. Are there any laws in the making governing water rights in Alabama?

Fred Clark
I'll head that one off. Water rights are becoming important. If we had an abundance of water and didn't have any droughts, we wouldn't need any water rights because everybody would have water. You run into problems, however, when you do have droughts. That's when water rights become an issue, and different states take different approaches to solve that issue. From the standpoint of rights, and I'm sure that the individuals here on the panel have looked over all of these things, there is a big debate about to whom the water belongs. Does it belong to the person in town, or can I on my farm, if I have a pond, use the water however I want to. Can I stop it, dam it up any way I want to if I have a stream on my property? That's the debate. I'm sure that water rights will become a bigger issue. If we continue to have these droughts, which no one can foresee, then we're going to have a state law. That's why Auburn University, as well as other Universities in the state, need to be looking at policies and do the research.

Ann Bedsole
I'd like to say that, what we're trying to tell you is that we don't want to have to consider legislation that affects water rights, or water quality, or anything else until we have gotten a consensus from the experts and from the people involved and those who will be affected, like the farmers. But like Fred said, we don't have a problem with water rights in Alabama. I have been on a farm in California and saw a little stream running beside that farm, which is dry most of the year. If you put something upstream that is going to stop or slow down the water, then the person downstream is really going to be in trouble. We just don't have that kind of problem, because we have so much water, so far. If we do have continued droughts then maybe we will have to look at something. We would expect you people, and people like you, to tell us what is needed and when it's needed.

Jacob Dane
It seems like I'm getting somewhat contradictory information

here. Mr. Richardson mentioned that this symposium is several years late and that we have a tendency to wait until we have a crisis. So why don't the politicians try to be ahead for on time?

Ben Richardson
If the researchers would present us with the information, we'd do it.

Jacob Dane
That's why I was asking what type of information you would like to have. We first have to define the problem.

Ben Richardson
That's the reason we have you on a string.

Ben Richardson
Can I say one more thing about water? Fishing, catfish production, and other fish production, are becoming a big business in Alabama. Water pollution is going to be a real problem for our people in the production of fish, so it's imperative that we get about the job.

Jerry Miller
I'd like to pursue Dr. Dane's question a little further. Since, really, Alabama is, one might say, at the bottom of the water stream, we inherit a lot of our water from states to the north, east and west of us. What kind of cooperation is there in place to provide regional legislation for water rights and water quality and quantity?

Ann Bedsole
I don't know of any. I would tell you that I come from Mobile, and you talk about being at the bottom. All the water in Alabama and, I think, one third of all the water in the southeastern part of the United States goes out through Mobile Bay. But the bay is in better shape environmentally than it was 15 years ago, or 10 years ago. And it certainly is in better shape than it was 25 and 30 years ago. So we're doing something right somewhere.

Fred Clark
The only problem we have with water from the standpoint of connecting states is in the east, where everything falls under Corps of Engineers projects. The water's primary purpose has been for generating hydro-electric energy and for transportation, which has become a problem in some areas where they have built dams for recreational purposes. Those are the only things from a regional standpoint that tie things together to some degree.

John Richburg
I'd like to follow up on Dr. Dane's questions and comments a moment ago regarding water rights. We think of Alabama as having an abundance of water, yet during the drought of past summer

there were some streams being pumped down to the point that certain farmers downstream did not have enough water to irrigate because farmers upstream had already pumped the water out. So we do have a problem here in Alabama. About three weeks ago I heard a gentleman from the Geological Survey speak about the several test wells the Survey has in the state. The one, I believe in Linden, Alabama, has been showing a steady decline of the water table for the past 15 years. Just a steady straight decline in the depth of the water table. So maybe, as he said, it's time that we look into these issues. So my question is this: Do we have a group, an organization comprised of legislative representatives, farm organization representatives and environmental groups, that is really studying water right needs in Alabama and that will develop a policy now instead of waiting until a crisis comes?

Ann Bedsole
I don't know of any. I do not believe that we have any such organization in place.

Ben Richardson
We could possibly put together a group for that purpose with a resolution and we'd need some guidance on who should be appointed and how that resolution could be presented. I think it should be done.

Ann Bedsole
We have the authority to pass a resolution setting up such an organization, such as a study committee. But we need to have you all tell us whom to put on it and how to write the resolution.

Ben Richardson
That is, whom to put on it besides legislators.

Paul Parks
Any other questions or comments from the audience? Well, thank you for your participation. Let me just ask if the three panel members would like to make any closing comments?

Ben Richardson
I think I've said enough already.

Fred Clark
I can probably second that. It's good to be here.

Ann Bedsole
Well, I want to thank all of you for being here and tell you that I am very sincere about wanting your help and your guidance. Ben is an expert, he is a county agent and extension agent, and I'm not that. But I need your help and I need your guidance and I need your advice, and I hope that you will stay in touch with me, individually and collectively. Let me know your thoughts on these issues. Thank you.

Paul Parks
Well, let me thank all three of you for participating. I think you certainly indicated your interest and concern about this issue and we appreciate your interest in working with Auburn University on it.

SESSION II

REGULATORY AGENCIES

Presiding

Ernest V. Todd

State Conservationist
Soil Conservation Service

Bruce R. Barrett

Regional Administrator

Environmental Protection Agency

Good Afternoon! I have been asked to address the issue of Water Quality and Non-Point Source Pollution from the perspective of the U.S. EPA, and on the role of Auburn University in solving the problems as I perceive them. I am pleased to have this opportunity, and will discuss the legislative mandate from congress, the impacts and control of point source pollution versus non-point source pollution, some examples of non-point pollution, and finally some approaches to deal with the problem.

As you know, the Water Quality Act Amendments of 1987 created a new section 319 entitled Non-Point Source Management Programs. At the heart of this statutory provision is a requirement that states develop an Assessment Report which must identify navigable waters impacted by NPS pollution. It must also identify the category or source of the pollution, describe a process for reducing it and identify state and local programs in place to reduce NPS pollution. The law then requires states to prepare a management program.

The Management Program Proposed for Implementation Requires Several Elements Including:

- Identification of best management practices used to control NPS pollution.
- Identification of programs to implement NPS controls including enforcement, technical and financial assistance, education, training, technology transfer, and demonstration projects. Auburn University could play an important role in several of these programs.
- A schedule for implementation of the above.
- A certification of legal authority to implement the various programs.
- Sources of funding.
- An evaluation of the effect of federal financial assistance and development programs on water quality.

The law also specifies that the state use local public and private agencies and organizations which have expertise in control of NPS pollution in developing and implementing the management program. Again, Auburn University could play a role here.

The law authorizes $100,000,000 per year for FY 89 and 90, and $130,000,000 per year for FY 91, but as yet congress has not appropriated money. The law also authorizes grants to states for protection of groundwater quality from NPS pollution. While money has not been appropriated under Section 319, limited funding ($100,000 or 1% of construction grant allocation) is

available under Title II of the CWA.

Throughout the law and its legislative history, congress expressed its intent that Federal and State Governments should develop new institutional arrangements and come up with a better division of the roles and responsibilities to get the job done. The language of the amendments also indicates that congress places high priority on an open decision making process, with the idea that public consensus-building will lead to creative, practical, and productive approaches to the NPS pollution problem.

A regulatory program has been in place since 1972 for the control of point source pollution from municipalities and industry, and much progress has been made in pollution reduction. While work remains to be done with point source control, a greater percentage of the remaining pollutants originate from non-point sources.

Water resources in Alabama are abundant and generally of high quality. However, the past three years of drought have made us more aware that supplies of surface and ground waters are not without limit, and that they are subject to degradation of quality. Today our attention is being focused more on lakes and estuaries as point sources are being better controlled and non-point sources are being recognized as a larger factor. These water bodies serve as sinks for the pollutants originating in the drainage basin, and the effects are magnified over time as the pollutants continue to build up.

Examples of NPS pollution abound. As the brochure announcing this symposium notes, the use of agricultural chemicals in some cases pollutes both ground and surface water. Concentrated animal feeding operations and erosion of soil also contributes to water quality degradation. But NPS pollution goes far beyond the farm. Construction activities, examples of which we see here on this beautiful campus add to the problem. Urban runoff adds many kinds of NPS pollution such as toxins, oil and grease, bacteria, organics and nutrients.

In short, people cause pollution, and society will have to change its habits to correct the problem. Control of point source pollution was easy (if not inexpensive) compared to NPS pollution control.

Fortunately, control of the problem has already begun. Awareness of the problem is the essential first step. I applaud the Alabama Agricultural Experiment Station at Auburn University for hosting this symposium, because gatherings of this type help increase awareness of NPS pollution.

Necessary ingredients to solve the problem also include research, monitoring, and demonstration programs. Research is being conducted on artificially created wetlands to treat wastes of various types. TVA has been a leader in this area, and I note that TVA is a part of this symposium. TVA's land and water 201 project, in which EPA and other parties are active participants, is probably one of the leading examples of NPS control in the country. I am sure that Dr. Ralph Brooks will

share the details of this program with you.

The National Estuary Program, and related coastal programs such as the Gulf of Mexico Program Office that EPA has recently established, will have NPS control programs as a central focus. As I noted earlier, lakes and estuaries are sinks for pollutants, and pollutants such as those bound up in estuary sediments are, we believe, a substantial problem to be addressed.

We have many problems to be dealt with in NPS pollution control, but the good news is we have recognized the problem, and have begun to address it.

Thank you for the opportunity to participate in this symposium.

Non-point source water pollution in Alabama current status and future directions

Jim Warr

Alabama Department of Environmental Management

Introduction

The Federal Clean Water Act of 1972 established a goal of fishable and swimmable quality for all waters of the United States, which is consistent with the Alabama Water Pollution Control Act's stated purpose of conserving the waters of the state and protecting, maintaining and improving the quality thereof for public water supplies, the propagation of wildlife, fish and aquatic life and domestic, agricultural, industrial, recreational and other legitimate beneficial uses, while providing for the prevention, abatement and control of new or existing water pollution.

ADEM has approached these clean water goals by controlling industrial and municipal pollution via administration of the National Pollutant Discharge Elimination System (NPDES) permit program. This program provides for the establishment of pollutant effluent limits for these sources to protect water quality in receiving streams by using the best available control technologies.

Much progress has been and continues to be made using this approach. Approximately $500 million has been spent in Alabama since 1972 through the Construction Grants Program for the construction of municipal waste water treatment facilities and their pollution abatement measures. Although an even greater amount has been spent by industry for water pollution control in this same period, water quality goals are still not being achieved, as measured by maintenance of applicable standards, in a significant number of Alabama streams.

In 1987, Congress enacted amendments to the Federal Water Pollution Control Act designed to "provide for the renewal of the quality of the Nation's waters." This amendment, known as the Federal Water Quality Act of 1987, focuses attention on Surface Water Toxics Control, Nonpoint Source Pollution, Estuaries, Clean Lakes, and The Great Lakes. In response to these new requirements, ADEM has developed a State Clean Water Strategy encompassing environmental data collection and assessment which will then be followed by development and implementation of pollution control strategies for targeted areas. Section 319 of the Federal Act addresses non-point source issues, and is the section of the law most widely affecting agriculture.

The single greatest contributor to water quality standards non attainment in Alabama, and nationally, was determined by a 1984 EPA study to be non-point source (NPS) pollution. NPS pollution is attributable to diffuse sources that are not regulated as point sources and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc.. In practical terms, nonpoint

source pollution does not result from a discharge at a specific, single location (such as from a pipe), but generally results from land runoff, precipitation, atmospheric deposition, or percolation.

ADEM has been working with the problems associated with NPS water pollution for many years, on a case by case basis, through response to public complaints and regulatory programs for mining operations. The majority of NPS complaints which the Department has received have been associated with concentrated animal feeding operations, including layer operations, dairies, hog parlors, beef cattle feedlots, etc.. Complaints involving logging operations, construction activities, and row crops have also been received and have recently been on the increase.

The agricultural community has, in general, been very cooperative in alleviating any identified problems. Technical assistance provided by the USDA Soil Conservation Service and the Alabama Cooperative Extension Service and the financial assistance provided to farmers through USDA Agricultural Stabilization and Conservation Service cost share grant programs have been a tremendous assistance.

Overview of section 319

Since Section 319 of the Federal Clean Water Act of 1987 can have a significant impact on agriculture and sets forth the requirements for State NPS Management Programs, it is appropriate to review its major points.

Section 319 requires that the Governor of each State, after notice and opportunity for public comment, prepare and submit to the Administrator of USEPA for approval, a report which outlines the state's NPS Management Plan. The plan will have four major components. First, the navigable waters of the State which cannot reasonably be expected to attain or maintain applicable water quality standards without additional control of NPS pollution must be identified. Second, the categories and subcategories of NPS pollution or, where appropriate, particular NPS pollution sources which are preventing attainment of quality standards must be identified. Third, a set of best management practices (BMPs) must be developed to insure control of the various categories and sources of NPS pollution. These BMPs must be developed through intergovernmental coordination and public participation. Fourth, the plan must identify and describe any State or local programs which may help control NPS pollution either through the grant process or the regulatory process.

In response to these requirements, in September of 1987, Governor Hunt designated ADEM as the lead management agency for nonpoint source pollution in Alabama for purposes of the Clean Water Act and its amendments and ADEM began the process of assuring State compliance.

Assessment

The first step in development of the NPS Management Plan is the NPS assessment. This assessment has begun in Alabama and

has been largely confined to existing water quality data because extensive non-point source stream studies could not be supported. However, the Department has identified approximately 114 stations on 31 streams believed to be impacted by NPS and these will have been sampled by the end of this calendar year.

In addition to analyzing water quality data, the perceptions of other governmental agencies, professional organizations and citizen groups on NPS pollution in Alabama are being assessed. A questionnaire, developed in a cooperative effort between ADEM, the U.S. Department of Agriculture's Soil Conservation Service, and the Alabama State Soil and Water Conservation Committee, is being used for the assessment.

Also, as part of the development of the State Clean Water Strategy, public meetings were held in Jackson, Ozark, Mobile, Montgomery, Tuscaloosa, Sylacauga, Birmingham, Decatur, Russellville, and Guntersville to solicit input from the general public on water quality in Alabama. NPS pollution concerns were raised in many of the meetings and several streams were identified as being NPS impacted.

In addition, the Alabama Forestry Commission has assisted in identifying several streams which are reported to be impacted by NPS pollution from silvicultural operations.

The Alabama State Soil and Water Conservation Committee, with the assistance of the County Soil and Water Conservation Districts, evaluated approximately 2,800 miles of streams with potential NPS impacts on a county by county basis. Of those miles impacted, 2,400 miles were estimated to be significantly impacted by some form of NPS pollution.

The surveys noted above, citizen water pollution complaints, fish kill reports, and existing ambient water quality data have been evaluated using best professional judgement to develop a list of NPS impacted streams and lakes. This list, which will be submitted to EPA, represents those waters which cannot reasonably be expected to attain or maintain water quality standards without additional action to control non-point sources of pollution. Table 1 (shown on slide) gives a list of these waters along with information on the extent of impact, nature of impact, and means of assessment. The majority of the waters listed were selected without the benefit of site specific water quality data.

As earlier noted, ADEM is beginning to address the lack of water quality data with sampling programs conducted this year and those programmed for subsequent years. ADEM is conducting NPS stream Studies in the Cullman, Winston, and Tuscaloosa county areas and in the Sand Mountain/Lake Guntersville area. Stream studies not specifically designed for NPS effects, but which are expected to provide additional data are also being conducted in other parts of the state under the Clean Water Strategy monitoring program. While ADEM is doing its best, more effort is needed in this area, both to assess the magnitude of the NPS problem and to document successes in controlling NPS pollution.

To date there is little evidence suggesting widespread groundwater contamination in Alabama due to NPS pollution. There are, however, indications of localized problems in some

areas and the potential for additional problems in others if preventive actions are not taken.

Studies of failing septic systems indicate that contamination exists in the Cedar Creek area of Franklin County, the Gulf Shores - Fort Morgan Peninsula, Dauphin Island, and the Sand Mountain area of northeast Alabama. Failing septic tanks occur in virtually every county in the state. Other studies indicate that shallow groundwater in Baldwin County and Sand Mountain may be impacted by agricultural sources, and the Tuscumbia aquifer, which is heavily karst, may be impaired by urban runoff from the Quad-cities area. Additionally, studies performed in the late 1970's indicate sporadic encounters with low concentration of Ethylene Dibromide (EDB) in shallow groundwater.

Management

Best management practices (BMPs) and measures to control many forms of NPS pollution have already been developed. The Alabama Agricultural Runoff Management Plan, published in April of 1979, identifies BMPs for agriculture and the September 1981 Silvicultural Runoff Management Plan identifies BMPs for silviculture. In addition, the Birmingham Regional Planning Commission developed a manual entitled Best Management Practices for Controlling Sediment & Erosion from Construction Activities in August of 1980.

Agricultural BMPs focus on three basic points; 1) controlling water leaving the farm, 2) controlling runoff and erosion on individual fields and 3) controlling animal waste so that it does not enter streams and lakes. None of the practices identified require advanced technology nor expensive and extremely complex pollution treatment systems. However, most practices do require careful management to be effective. They rely on the principle of preventing pollutants from being generated, as with runoff from row crop areas, or on containing material on site so it doesn't become a pollution problem, as with animal waste.

Problems associated with storm water runoff leaving the farm can be alleviated by maintaining vegetated drainage courses and slowing runoff velocity through use of terracing or other means. On fields, measures which limit erosion such as contour plowing, minimum tillage farming, vegetated filter strips on borders, cover crops, terracing, etc. are very good NPS pollution control practices. In order to control animal wastes, the waste must be collected using a lagoon or other such system, and land applied at appropriate rates using a "honey wagon" or spray irrigation system. Additionally, animal access to streams and other natural waters may need to be limited by fencing and providing alternative water supplies on site.

Management practices for NPS pollution control from silvicultural operations encompasses logging along stream banks and control of highly erodible components of the operation such as haul roads and loading decks. The impact of logging along stream banks can be minimized by allowing understory vegetation along the banks to be left in place to act as a filter strip for

erosion control, and by preventing any felling of trees or placement of limbs and other debris in stream channels. Logging roads can be constructed so as to minimize erosion by limiting the grade and using water bars, wing ditches, or other water control structures. Additionally, roads or skidder trails crossing streams can be limited to the maximum extent possible and properly designed using culverts, bridges, or other means when necessary. When the logging operation is complete, erosion from roads and loading decks can be minimized by revegetating those areas.

BMPs for construction sites may be grouped in one of two categories: source controls; and discharge controls. The primary NPS pollution problem associated with construction runoff is sediment. Source controls offer the means of preventing or limiting the erosion from these sites. Erosion can be limited by providing ground cover in the form of vegetation, mulch, jute mats, or other means; or by limiting construction adjacent to streams, rivers, and lakes in areas where soils are highly erodible. Discharge controls involve the construction of containment structures which retain or detain storm water runoff in such a way as to prevent sediment from leaving the construction site. These structures, primarily basins, work by detaining the water long enough for solids to settle out before the water is discharged, or by retaining the water on site and allowing it to percolate into the ground. Discharge controls have been reported to be more effective than source controls.

Regulatory programs have been developed for controlling NPS pollution from mining operations, industrial facilities, hazardous waste disposal, treatment and storage sites, solid waste disposal sites, and on-site waste water systems. BMPs will be reviewed frequently and updated to be effective in reducing, to the maximum extent practicable, the level of NPS pollution resulting from each identified category, subcategory or source. If revision to BMPs are warranted, any state, local, or federal agency or group with expertise and interest in BMPs and NPS pollution will be invited to assist with the effort. Involvement of other agencies and the public in this procedure will be essential and will be openly solicited since management of NPS pollution requires the coordination of all affected agencies and organizations.

Implementation

The key to effectively implementing the NPS pollution control program and improving water quality is Cooperation. ADEM will cooperate fully with other agencies and organizations to inform persons affected by this program, as well as the general public, on the need for NPS pollution control and the means by which adequate control can be achieved. All available information which will aid in the implementation process will be provided and all affected parties are encouraged to coordinate efforts to maximize available resources and limit duplication.

Section 319 of the Federal Act provides for the allocation

of any available funds for a cost share program and for demonstration projects to publicize various NPS pollution control methods. To date, no monies have been appropriated by Congress for these purposes, although states continue to urge their availability. With the funds that are currently available and any monies which may become available under Section 319, it is felt that a targeted watershed approach should be taken. By targeting any watershed where there are known problems that can be adequately addressed with the funds available, we can better demonstrate improvements in water quality and therefore, the effectiveness of NPS pollution control. It is felt that each successful demonstration would send a strong message on the value of such funding and make a good case for continued support.

When NPS pollution complaints are received from the public, ADEM will continue to investigate and take appropriate action. If a water quality problem is identified, the responsible party will be given a reasonable opportunity to take corrective action. In cases where repeated violations are documented and no corrective actions are taken, an appropriate enforcement action is likely.

Verification of water quality improvements and documentation of the degree and extent of NPS pollution impacts through ambient monitoring studies is an important component of the program. ADEM will continue these studies already begun and implement additional studies as funding will permit.

Summary

As Alabama progresses, there are increasing demands on the state's abundant natural resources. ADEM is dedicated to the wise management and protection of those resources and will continue to strive toward the goal of fishable and swimmable water quality in our streams, rivers, and lakes. This goal, however, cannot be achieved without addressing non-point source pollution and an expansion upon previous site specific successes will require the cooperative efforts of the public, farmers, foresters, construction contractors, and affected government agencies.

Groundwater Contamination
Agriculture the problem: are regulations necessary?

Dr. John Bloch

Alabama Department
Agriculture and Industries

We all depend on water. Water is essential for life and health; crucial to agriculture, commerce and industry, and has become in the last several years the subject of public concern and political action in the United States. We see today that the public perceives the agricultural industry as a polluter of groundwater, similarly to any other polluting industry.

Public awareness about the widespread use of agricultural chemicals dates from 1962, when Rachel Carson published her book, "Silent Spring." Since "Silent Spring," agricultural chemicals have been increasingly indicted as probable human health risks. The initial response from the agricultural community, chemical companies, and university systems was a denial that some agricultural chemicals were probable health risks. Although Carson's book focused public attention in the 1960's on widespread chemical use, it was not until the late 1970's that attention to groundwater concerns appeared. The discovery of aldicarb in groundwater in Suffolk County, New York, and DBCP in a number of California wells caused many states to initiate groundwater monitoring. Since that time, evidence of agricultural chemicals contaminating groundwater has been accumulating.

At this time, little is known regarding the extent of agricultural chemicals having leached to groundwater. Additionally, the health effects, i.e. carcinogenicity and mutagenicity, are inconclusive. Today, our ability to detect pesticides in groundwater far exceeds our understanding of their significance. Because analytical chemists are able to detect pesticides at very low levels, we must assume that, if it is man-made and introduced into the environment, it will eventually be detected at some level in either soil, air or water.

Why should there be concern over small amounts of organic chemicals in groundwater and are regulations necessary? Groundwater naturally contains some organic chemicals in addition to minerals, bacteria, viruses, and sediment deposits. The levels of these natural products and some water properties, i.e., salinity, odor, pH or turbidity, can affect potential uses of water for industrial, domestic, recreational or agricultural uses.

The general public has learned to accept naturally occurring contamination in groundwater and will tolerate certain levels of these contaminants. However, the public has resisted any acceptance of contaminants such as those caused by current agricultural practices. One may argue whether concern over residual levels of pesticides is rational when these health

risks are compared to other risks in which the public voluntarily participates, e.g., smoking, driving an automobile, or flying. The general public does not view involuntary risks, such as those associated with consuming contaminated water, in the same way it views voluntary risks. When nature is the blame for contamination, the general public is more willing to accept the consequences; however, when an industry, such as agriculture, is to blame for contamination, we find that the only acceptable recourses are regulation and/or litigation.

Groundwater protection programs must be reasonable and must be constructed on the philosophy that the public recognizes agricultural activities will have some impact on environmental quality; however, the public must also demand that such programs not be a license to pollute.

Some of the points to consider in groundwater protection programs are as follows:

1. Strategy plan that focuses on prevention.
2. Monitoring program that is scientifically sound.
3. Role of each state agency delineated.
4. Mechanism to relate the significance of positive detection to human health.
5. Adequate education and enforcement measures.
6. Adequate funding to initiate and maintain a state groundwater management program.

As the ocean is the last frontier to be explored, groundwater is the last area of our environment to receive protection. As such, it no doubt will receive extensive regulatory protection to the point that it may appear overregulated or over-protected. However, since groundwater is critical for life and health and crucial to agriculture, commerce, and industry; vulnerable to contamination; difficult to clean up, once contaminated; and in some cases, not useable once contaminated, protection of our groundwater is necessary.

Onsite Sewage Disposal In Alabama

Wade Pitchford, P.E.

Director, General Sanitation Branch
Alabama Department of Public Health

We have learned that septic tanks are not necessarily temporary systems and that we cannot extend sewer lines to all areas. Septic tank systems that have been properly sited, designed, constructed and maintained can be economic and efficient alternatives to public or private sewer systems. Density and design life of systems may need to be taken into account.

Soil can in many cases serve as a medium which absorbs and filters effluent and provides a high level of treatment before the effluent reaches groundwater.

The real key to the utilization of soils for subsurface disposal systems is that the systems be located in unsaturated permeable soil horizons where aerobic bacteria can biologically treat the effluent. Adequate separation from groundwater is also necessary for this filtration and treatment.

About 68 percent of the land in the U.S. is not suitable for conventional onsite sewage systems due to limiting soil conditions.

Approximately 63 percent of Alabama's 55 soil associations are rated severe for septic tank use due to slope, depth to rock, slow percolation, wetness or flooding, or a combination of these factors.

The use of shallow placement of conventional trenches and alternative systems such as low-pressure pipe, alternating soil absorption field and mounds can overcome many of our limiting soil and topography conditions.

Periodic surveys or evaluation of the functioning of these alternative systems is needed for proper assessment of these technologies in varying site conditions.

Our onsite sewage and local health department staffs have performed some limited joint surveys on alternating field, raised bed and mound systems and aerobic treatment plans and have found that short and long term maintenance is a real concern and must be addressed.

Why the concern with septic tank systems? Over 22 million housing units nationwide, or one third of all housing units, dispose of domestic waste water through septic tank or other onsite sewage disposal systems. That is, over 70 million persons are served by onsite sewage systems that discharge over one trillion gallons of waste water annually into the soil through subsurface disposal fields. It is estimated that nationwide use of onsite systems is increasing by one-half million new systems annually.

According to the 1980 census, 47 percent of the housing units in Alabama were, or should have been, served by onsite sewage disposal systems. That translates into more than 680,000 housing units, which represents over 1.8 million people. In addition, many schools, businesses, small industries, camps, and other facilities are not served by public sewers. Approximately 40 percent of the

required onsite sewage disposal installations each year are not inspected or approved by the health department.

Our public health goal is for the disposal of this sewage in a manner that will protect the public's health and prevent groundwater and surface water contamination.

Contaminated or inadequately treated groundwater is responsible for a large percentage of all waterborne outbreaks and waterborne illnesses reported to the Centers for Disease Control. Some illnesses associated with drinking groundwater contaminated by untreated septic system effluent include hepatitis, typhoid, and cholera. These pathogenic organisms may have a slow die-off rate in the soil and groundwater.

During fiscal year 1987, statewide, plans for over 30,000 onsite sewage systems were reviewed and approved in Alabama. These included privies, septic tanks, grease traps, aerobic and alternative onsite sewage systems. Over 450 subdivisions with a total of over 5,000 lots were approved for onsite sewage disposal.

We have 87 septic tank manufacturers with over 100 permitted septic tank designs. Local health departments have permits issued to over 250 sewage tank pumpers. The number of septic systems approved and the number of permitted septic tank manufacturers and permitted pumpers continues to increase each year. We are pressed to monitor these systems and prevent sewage from reaching the ground surface or the water table.

In 1986, we started looking for a way to more efficiently serve the people of Alabama in all of our public health program areas, but in particular in our environmental health and onsite sewage disposal programs. We began using the American Public Health Association's model standards for community preventive health as a guide in our program planning to establish approximate goals and objectives. Goals are set which express the outcome desired from the program effort. The goal addresses desired outcomes over a three year planning period. The program goal for onsite sewage disposal is: by the end of FY89, residents of the county will not experience disease or adverse health effects from substances associated with the management of onsite sewage disposal systems.

Briefly the FY87 objectives were: to review and approve all onsite systems, private wells, septic tank manufacturers, sewage pumpers, bi-annually survey all public schools and camps using onsite sewage disposal, and establish and conduct education programs for sanitary management of onsite sewage disposal.

FY88 objectives and activities were expanded from 6 to 17 and this year include development of certified site evaluators and certified onsite sewage system inspectors programs.

Our planning committee met several times in January in planning for FY89. This Committee is made up of local, area, and state health personnel; a soil scientist, Mr. Charles Montgomery USDA-SCS; and Auburn University Agronomy and Soils Professor, Dr. Ben Hajek.

We began working on some of these objectives last year. The subdivision program was decentralized to most of our local health departments in order to increase program efficiency and be more

responsive to local needs. We also began training our Public Health Environmentalists in the concept of site evaluation.

While most states have had a consolidated set of statewide onsite sewage disposal system rules for several years, Alabama did not begin to implement statewide regulations until 1981. Prior to that time, the state provided guidelines, but each county followed its own rules.

In July 1988, the health department changed the onsite sewage rules to offer better and more uniform protection through the use of more advanced technology and more efficient procedures.

Some of the improvements in rules concern soil and site evaluation, private water supplies, expanding the definition of conventional systems to include other tested and proven systems, clear delineation between lot modifications and alternative systems, National Sanitation Foundation certification on aerobic waste water treatment systems, and proper maintenance for all onsite systems. Currently we have three counties utilizing site evaluation in place of percolation tests for standard septic system installation.

As a part of the department's management improvement program implementation plan, mandated by Governor Hunt, we appointed an advisory committee on onsite sewage disposal. This committee is made up of local, area and state health personnel, onsite sewage associations and industry representatives, and two members of the general public. This committee has recommended changes to the onsite sewage program to Dr. Fox. One recommendation of the implementation plan committee will be tried next week in North Alabama. A pilot program of voluntary certification of septic tank installers will be tried. This voluntary program will require mutual cooperation between the installers and the local health department. The voluntary program will be tried in Colbert, Franklin, and Lauderdale counties.

There are several important aspects of onsite sewage system management and control programs which are necessary to protect the groundwater and prevent adverse health effects.

I believe Auburn University can play an important role in improving onsite sewage disposal in Alabama by:

1. Assisting in the development of site and soil evaluation criteria.
2. Identifying programmatic requirements which will provide for better onsite sewage system design.
3. Providing educational and public outreach programs directed to a wide audience, including homeowners and farmers.
4. Promoting water conservation to extend the life of soil absorption systems.
5. Promoting proper operation and maintenance for all onsite systems.
6. Identifying and developing sewage disposal management alternatives.

SESSION II

PANEL DISCUSSION

Jerry Miller
I have a several questions. First, do you have any idea of what kind of costs we are talking about in developing these monitoring assessments and regional plans? Second, what type of timetable are we talking about for implementation of these plans? Also, it was mentioned earlier today that ADEM was involved in groundwater assessment at this time, and I wonder if you could make some statement as to when we might expect release of the information from that assessment and are you developing some permanent monitoring sites?

Bruce Barrett
Jim Warr might be able to address this question better than I, since I don't have to develop them myself. I don't know what it is costing, so I'll let him tell you about that. In terms of the timing of the implementation, actually, some of the implementation is ongoing as we talked about already some today. But the management plans, presented pursuant to section 319, do lay out the timing for the various programs that they will be undertaking and what those management programs are. We now have them in a draft form, and my staff is reviewing those concurrently with Jim's people here in Alabama.

Jim Warr
I'm not sure if I could estimate the cost other than to say that about half of our total budget, particularly in the water area is spent on monitoring. Monitoring is a very costly activity. It costs a lot of money to get people and sampling devices to the right places and get the samples collected, and get them back to the laboratory and have them analyzed for a variety of different parameters. With respect to the assessment, the overall assessment plan is in a draft form, and will be, or has been forwarded, as Bruce Barrett mentioned, to EPA and as soon as they have it finalized, it is public information and will be available. I don't recall at what point we will go through public participation procedures and make that information available in an organized manner to tell the general public what we have found and what we intend to do about it. Based on the assessments, we are proposing to go on a watershed or water sub-basin basis where we have identified problems, and then try to work backwards from that to figure out what types of activities are causing the problems.

Jerry Miller
Does that include the groundwater assessment?

Jim Warr
There are some people here from the Geological Survey that are probably in a better position to answer that question than I am.

Generally speaking, we don't have as much groundwater quality data statewide as we do surface water quality data. We do not have the same number of stations nor is the duration of those studies nearly as long as it has been for surface water quality. So it's going to be a while before you get really get a comprehensive look. We have a problem also in that management of the data, once produced, heretofore has not been centralized. We collect groundwater data, USGS does, and so does GSA. One of the things that we're trying to do now is to make all of those data available to whomever needs them. It has not been that way up to this time.

Jerry Miller
Is the process of collecting the data such that permanent monitoring stations can be established?

Jim Warr
GSA has 19 permanent stations in place now.

Larry Curtis
I have two questions. First, nitrates are a concern, particularly in Nebraska and Iowa. I was wondering if any counties or locations in Alabama have been targeted for analysis of nitrates in groundwater. The second question relates to landfills and, I believe the Senator earlier pointed out some of the potential problems with homeowner use of a variety of chemicals and the disposal of these chemicals in landfills. Are landfills being targeted as a potential source for groundwater contamination? This is for any of the panel.

Wade Pitchford (?)
Let me start with the last question first. Beginning about 5 years ago, all sanitary landfills were required to install monitoring wells, both upgrade and downgrade from the landfill site, and they are required to monitor that groundwater on a recurring basis. Those data are submitted to the state for analysis. Under the new subtitle D regulations of the federal solid waste nonhazardous part, liners, either synthetic liners or compacted clay liners, will be required on all new sites that are permitted in the future.

Larry Curtis
How about the nitrates, can anyone answer that one? We do have a problem with nitrates on Sand Mountain, that we know.

Earnest Todd
I think the Geological Survey was the one that did a survey. On Sand Mountain, 30% of the wells had nitrate concentrations that exceeded EPA drinking standards. This survey was done about 2 years ago.

Tom McCaskey
Is there any concern about trying to prioritize potential public health hazards associated with water? There are so many potential

hazards associated with fertilizer, excess fertilizer, nutrients, or animal waste nutrients, excess nitrate in the soil and in the groundwater, pesticides, microorganisms, and toxic waste. There is a whole variety and when you hear on the news of a potential problem associated with, say toxic waste, how do we know that that is potentially affecting only a few people, or is it affecting the whole state? Aren't we going to have to prioritize, and look at it on the basis of, what is the most potential hazard in terms of affecting most people in the short term rather than in the long term? Are we going to have enough money to attack everything?

Jim Warr
Everything that needs attacking or everything that everybody thinks need attacking?

Tom McCaskey
Well both.

Jim Warr
Let me just make one comment. I know Bruce Barrett can add to it from the federal perspective. You use the word toxic waste, and unfortunately we often get caught up in the terminology of hazardous waste, hazardous material, toxic waste, and toxic materials. Often we use those terms interchangeably, but they're not necessarily the same thing. There is some degree of prioritization, if you want to call it that, for hazardous waste of uncontrolled sites, i.e. sites that have a potential to be superfund sites and which are subsequently listed on a national priority list. There are somewhat less than 500 of those potential sites in the state that have to be evaluated. We have been in the process for the last 3 years of assessing those sites and going through the procedure of assigning relative priorities to indicate if, in fact, a given site is a hazard or if it would take minimal action to correct the problem. How the prioritization from one medium to another, that is to say from water to air pollution, relates to a given superfund site, and how that relates to a control on a water discharge, is set by Congress, by what they dictate in each of several laws, and sometimes they don't necessarily fit together that well.

Bruce Barrett
As Jim alluded, Congress sets some of those priorities for us. Another federal statute in which they've done that is the Safe Drinking Water Act, in which they dictated certain acceptable maximum contaminant levels for pollutants that might accumulate over a period of years. A total of 83 of them, I believe. And so, in that context, there has been some prioritization. Jim mentioned that in the approach that the state and others, including EPA, have taken, some problems are more acute than others. So in that sense, there is a prioritization that is ongoing there as well. But in a very real sense, as I believe it was said by the Alabama legislator on the previous panel, we act to crises, and we respond to putting out fires, and that is what we really do.

Earnest Todd
Let me relate to the priority that has been established in relationship to the non-point agricultural pollution. The reason we are looking into the Sand Mountain area is because complaints came in to ADEM. Now, we thought there was a problem because you can look in Lake Guntersville and see there is a problem. There has been some monitoring taking place. Also, we knew there were some problems with some wells, but when we got in there and started investigating, we found there is a real problem. The point is, we set priorities on the basis of complaints.

Bob Mount
I'm Bob Mount. I'm a Senior Citizen from Auburn. If I'm breaking the law, and my neighbor or somebody happens to see me, and says "You ought not to be doing that," I ain't going to pay him a bit of attention. But if the Sheriff comes up and says "Fellah, you're breaking the law," you stop. You know, that's going to get my attention real quick. I think you made the statement that somebody not from the regulatory agencies ought to be out here apprising folks that they're breaking the law. Did you say something to that effect?

Wade Pitchford
No sir, not at all. My comment was that homeowners often can relate to information from non-regulatory agencies as to what to do and what not to do, as being more correct than they can with the health department coming out there saying, "We're going to throw you in jail if you don't clean it up."

Bob Mount
I believe that's exactly what I'm talking about. That fellow would clean his sewer up and get his sewage out of his yard a hell of a lot quicker if you go out there and tell him that, than if I say, "Please clean your sewer up."

Wade Pitchford
Well, believe it or not, some of this relates back to the way the homeowner perceives a problem. I know of people that think a septic tank should be discharging sewage directly out of the bathroom into the ground.

Bob Mount
I know it, I've seen them myself.

Wade Pitchford
I mean, they think it's no problem. And we can tell them it's a problem.

Bob Mount
But it's the law that says you can't do that.

Wade Pitchford
It is. And sometimes the fact is, if somebody can just make them realize the problem, they'll fix it. But they have a hard time really understanding what the problem is. It's like the three, four, five hundred open dumps we have statewide, that just continue to grow. Also, people will go and throw their garbage out on the roadside instead of paying $8 a month for garbage pickup service fee.

Bob Mount
But Wade, I say the problem is with the regulatory agencies and law enforcement authorities not doing their job, because they're afraid they might lose the vote. If you want to know my opinion, because I've heard Dr. Earl Fox get up and expound at length on Aids, and he'll talk about infant mortality, and he goes on and on about these things. But I have not heard the Public Health Department one time, get up and say we got this problem with the sewage and all that in the countryside.

Wade Pitchford
We do have the problem. And you know, it is very frustrating to the people who are trying to make offenders cleanup, too. If you cannot get them to comply, you can take them to court. But if the judge fines that person $5 and a court fee, and says, "See you later," you don't have much incentive to go after the problems thereafter.

Bob Mount
Well, we need Dr. Fox on TV talking about something else than infant mortality. He should talk about some of these problems. That's just my opinion. And I'd like to ask Jim, did you earlier say that ADEM has regulatory authority over non-point source pollution offenders?

Jim Warr
Yes sir.

Bob Mount
And you've developed best management practices, or they have been developed, for farming and for silviculture? Could ADEM go out and say, "Okay, we're going to make these best management practices mandatory"?

Jim Warr
What we would prefer to do, and have done, is to say there is a problem, if we encounter a problem, and go to whomever we can determine is causing the problem and talk to that person. In the past when we have done that the farmers generally have responded. They've gotten in touch with SCS who has helped them develop whatever kind of control measures they needed to employ and those have been put in place and it has generally been successful. If that does not work we have taken other reinforcement mechanisms with

agricultural or silvicultural activities just as we have with municipalities or industries.

Bob Mount
Well has any action been taken, that you recall, on that Blue Creek episode up in Tuscaloosa/Jefferson County 2 or 3 years ago. They are now beginning to complain, because of the oil, or I guess, gas well exploration up there?

Jim Warr
Was it a logging operation?

Bob Mount
It was a logging operation. There was a big deal about it in the Tuscaloosa area, in Birmingham.

Jim Warr
We had involvement with more than one logging operation in Tuscaloosa county. We have one about to reach the boiling point now.

Earnest Todd
Bob, so that we don't leave this room with any sort of misunderstanding where we are in this non-point source pollution. Jim has the regulatory authority to do that, but we are operating now in a volunteer manner. When he gets a complaint, he goes out and has the regulatory authority to make that individual clean up that problem. But only on the basis, Jim, that you have a complaint, do you go out there. He's not going out to farmers every day, and say, "You do this." He doesn't have the staff to do that. And across this country, non-point, as of right now, Bruce, is still in a volunteer mode to clean up the problem that we have out there. We're hoping that that's what this is all about here, that we can step ahead of the regulatory agencies, that we can keep doing this in a voluntary manner, and get the job done.

Bob Mount
Yea, well I thought that; I got that impression; that's what I've always assumed. I was a little surprised, he said he had the regulatory authority, because somebody is going to say, "Well, God almighty, why hadn't you put out the regulations."

Earnest Todd
When he gets that complaint, and he goes out there, he has the authority to cause something to happen.

Jim Warr (?)
Let me comment a little further on that. I mentioned that the agricultural and silvicultural BMPs were developed primarily by the agricultural and silvicultural community, and we have relied heavily on that community as a whole to do really what amounts to being a good neighbor to whomever is their downstream property owner or, in

the case of groundwater, down gradient property owner. It's like everything else, it works good in some cases, and in others it doesn't, and where it has not we have had to do other things.

Jacob Dane
My question is somewhat related to Bob Mount's question, because I do not totally understand your answer. Do we have regulations specifying that a farmer cannot use more than a certain amount of a certain chemical or do we just have guidelines? For example, there was some talk about aldicarb. Can they apply as much as they want to or is it restricted?

John Bloch (?)
Aldicarb is a restricted use pesticide which has to be applied by persons who have received educational exposure. For private applicators, such as our farmers, that education is supplied through our Cooperative Extension Services on a face to face basis. Now that training might run from 30 minutes to probably an hour, in addition to what they receive in the way of communications on pesticide safety from the county extension coordinator or agent. They receive additional handout material concerning that pesticide and they can only purchase the pesticide from a restricted use pesticide dealer. They must be, what I call, card-carrying holders of a certification number.

Jacob Dane
Are there limits to the amount they can apply?

John Bloch (?)
I think that in those areas where the situation on aldicarb has been addressed specifically, in Wisconsin for example, they have limited the amount. The industry, or the manufacturer itself, in their good stewardship program, has changed their labels. Labeling modifications are a mechanism by which the rates of application are limited. I think in Alabama rate changes eventually will come about. The aldicarb management plan is supposed to be developed in two years. I don't think that timetable can be reached, but we hope that it can be reached.

Jacob Dane
But my problem actually is how can we say somebody is breaking the law, if you don't have any regulations.

John Bloch (?)
There is a law under pesticide application that very plainly says that if an applicator does not use the product in accordance with label directions, he can be fined. That fine is, under state law, a misdemeanor. That fine under civil law, under federal law, can be a criminal action as well as a civil penalty. We had an incident of aldicarb misuse in our tomato growing area about two years ago. Aldicarb was used on tomatoes, and it is not labeled for that particular use. Besides, the used rates were excessive. We went

in on our agricultural commodity monitoring program, which is tied to the residue lab here at Auburn University, detected those particular levels, and even though there were no established tolerances for aldicarb in tomatoes, we confronted those private applicators and those farmers and suspended their crop from sale and harvesting. Now that was a first for the Department of Agriculture. A lot of the neighbors got together and other tomato producers, and decided, that their crops were endangered, even though they hadn't been using aldicarb. They went in and, I believe, eventually assisted the individual paying off some of his debts that he incurred, or some of his loss that he incurred, by the action of the Department of Agriculture. The authority there is already intact for misuse of chemicals, misuse of pesticides, specifically.

Arthur Gardner
My question relates to the pesticide monitoring wells in Talledega County. I believe there's one established there. How long has it been in operation, and have any pesticide residues been detected by this time?

John Bloch (?)
I commented that that was a community well system and is part of the overall pesticide monitoring program that EPA has on a national basis. I don't know what the sampling timetable is, but I believe there are about four community wells. I can get that information.

Jesse Bush
Mr. Pitchford, you mentioned that there are several companies licensed to pick up or to empty septic tanks. What happens to this material and is their permit open ended or does it come up for renewal? Do you check on just what happens to this?

Wade Pitchford
The county health departments are required to permit the sewage tank pumpers each year. Within the application, the pumpers must tell the health department where they take the sewage that they haul. In the past, most of them have gone to municipal sewage treatment plants. This past year that has become almost a no-no. Due to limitation on discharge permits and all, we've had a real hard time finding places for these people to put the septic effluent. Under our new rules now under solid waste, we can land-apply some of that effluent on farmland. We've had no one to take us up on that option yet. Finding appropriate sites for disposal of the septic tank effluent is very difficult.

Roland Johnson
I'm the mayor of Garden City, Alabama. Now Garden City is in Cullman County right on the Mulberry River. I have been the Mayor there for 24 years. I was raised there; my daddy was a truck farmer. Since I've been the Mayor there, the Mulberry River has really become polluted. Of course, the Soil Conservation Service and environmental agencies, they've been helping me. I reported it

to them. But we did lose our nursing home, and we lost 50 jobs. We had to move a lot of our elderly people from Garden City to different nursing homes. I asked the health department for help, and they came down and they ran a survey on the septic tanks in our town. They found better than 90% failure in septic tanks. We're about to lose our school, which goes to the 7th grade. At this time we're getting cooperation from the superintendent of education. He is kind of supporting me. We dispose our waste from the school in Cullman. But I sent in applications and also applied for a water tank and sewers. I got turned down. I've reapplied. In the meantime though, a fellow came from Montgomery. I took him over town and explained what I've just told you, and he says, "Well," he said, "you've got a sleepy little town, a bedroom town." I said, "Yea, and hell, I'm trying to wake it up!" But now this man, even though we pay tax in Garden City, too, he evidently, by his statement, wasn't very much interested. We have had homes turned down because of failing perk tests. As a matter of record, a man was going to build eleven FHA homes at one time. He started and got turned down on the perk tests. At this time, I'm working with the Soil Conservation Service and EPA, and they're doing the job. But these are the kind of things that I came down here to report. I think everybody better get concerned about our water, food, clothing and shelter, because that's where it all begins. That's what my dad said. Food, clothing, and shelter, comes first, before anything else. It's been a pleasure to be down here with you, and anything you can do for Garden City, we certainly would appreciate it. (lots of applause for this man.)

??????
He's just saying there are real problems out there. We need answers.

SESSION III

PRODUCERS

Presiding

Dr. Ann E. Thompson

Vice President for Extension
Auburn University

NON-POINT SOURCE POLLUTION

John H. Dorrill

Executive Director

Alabama Farmers Federation

Our organization represents over 300,000 farm families in Alabama. We are pleased to be a part of this event, and we appreciate the opportunity to appear on the program to represent the interests of the farmers of this state on the important topic of non-point source pollution.

As most of you know, farmers and agriculture play an important role in the economic life of Alabama. By almost any measure, agriculture and agribusiness are the most important components of the economy of the state, creating more jobs and injecting more income into the economy than any other sector. Because of the efforts of our farmers, Americans have an abundant supply of food and fiber at reasonable costs. In fact, we in this country spend a much smaller percentage of our disposable income--income after taxes-- on food than any other nation in the world.

Farming, however, is hard and virtually unceasing work. Most farmers work from daylight to dark; many hold jobs off the farm in order to survive. Thus, farmers, just like everyone else, are receptive to ideas for easing their workload. If any of you have ever pulled coffee weeds from peanuts or been aware of the devastation that insects can cause to crops, then you can appreciate the willingness and, indeed, the necessity of farmers to use pesticides as part of their normal farming operations. Pesticide use is the focus of my presentation today.

Farmers need pesticides to control pests. By controlling pests, they can maintain their livelihoods while producing abundant food and fiber supplies which we all depend upon for our survival. Like so many things these days, pesticides are miracles of modern technology. Therefore, it is not surprising that our farmers have become dependent upon them for a variety of crops. In short, chemistry has eased the farmer's burden and helped him to produce more food and fiber on less land, increasing his productivity to higher and higher levels. With the assistance of modern farming practices, including employment of pesticides on a broad scale, our farmers have become the envy of the rest of the world.

The same technology that has provided pesticides and other modern marvels of chemistry has also provided the means for determining the presence of pesticides at very low concentrations. As a result, there has been a general increase in concern about the potential effects of ingesting even minute amounts of certain chemicals, pesticides being one such category of chemicals.

Thus, we are faced with a dilemma. As is true in most of life's activities, there are trade-offs involved. What constitutes a benefit to certain individuals or groups may create

a cost to other members of society. In this case, the dilemma involves the question of how to use pesticides for the public good through production of abundant and inexpensive foods and fibers while also protecting the health of the public. The latter can be accomplished by striving to eliminate ingestion of pesticides or by attempting to minimize the effects of pesticides on the environment. Both are legitimate concerns; both must be dealt with in a rational, objective manner.

The Alabama Farmers Federation has a responsibility to represent the interests of the farmers in Alabama. This has been our legacy since the beginning of our organization. That responsibility includes assisting in determining ways to minimize the application of pesticides while at the same time maximizing the output of Alabama's farms. This, of course, is no easy task. For us to perform that responsibility most effectively, additional research is needed regarding the use and persistence of pesticides. Further research is also needed to prevent or, as a minimum, to minimize non-point source pollution due to pesticides. For example, much additional information is needed regarding the transport of pesticides, alternatives to problem pesticides, identification of contamination-prone areas in the state, and tolerance levels for pesticides. Research in other states has shown that tillage practices can reduce loadings of pesticides by decreasing runoff to streams. However, loadings and concentrations can increase in groundwater because of increased infiltration.

Much more needs to be done. Assessments are needed to identify areas of the state that are particularly susceptible to non-point source pollution resulting from use of pesticides. Once these areas are identified, there will be a need for research to determine why these areas are susceptible and what can be done to eliminate or to minimize effects of use of pesticides. For example, farmers can be advised regarding use of fall plowing or no-till farming as well as frequencies and amounts of pesticides to be applied to control pests without causing non-point source pollution.

It should be kept in mind that non-point source pollution can result from overland transport by washoff of soils that contain pesticide residues. All areas of the state could benefit from research into the use of no-till farming or changes in fall plowing practices. How can tillage and farming practices be modified to reduce this washoff? In contrast, what can be done to minimize infiltration of pesticides into groundwater in areas where reduced washoff leads to increased infiltration? Applications of pesticides might be modified to provide more time for breakdown of pesticides before they infiltrate to local groundwater.

Further research is also needed to determine the persistence of pesticides in soils and rates of breakdown of pesticides after application. Persistence and rates of breakdown should be correlated with soil types in Alabama.

It goes without saying that all of us need to remind ourselves constantly of the correct methods for handling and disposing of pesticide containers. Think how much potential

pollution could be prevented by safe handling of containers.

A very special area of needed research relates to the all-important topic of the effects of pesticides on shallow ground water supplies. The Alabama Department of Environmental Affairs reports that, in 1986, 68 river miles in Alabama had been impacted by pesticides. Our farmers are concerned about this. They want to see that number, if possible, reduced to zero. To achieve that goal, research is needed regarding the causes of this impact on the state's waters and what actions farmers can take to eliminate those impacts.

Scientists typically talk about development of computer models to solve various problems. At the present time, we in Alabama desperately need a model for predicting the effects of nutrients and pesticides on surface and ground waters. Such a model is currently not available. We urge development of a model or models as expeditiously as possible.

In closing, let me state that our farmers are ready and willing to do their part to reduce non-point source pollution caused by pesticides. It is to their distinct advantage to reduce pollution. After all, they are just as interested in a clean environment as other citizens. Farmers, however, are also aware of the financial burdens that regulations can impose. Ever mindful of the new requirements and regulations regarding site assessments and monitoring of underground storage tanks, our farmers do not want regulations requiring placement of monitoring wells at the corner of every field. Nor do they want to have to finance the burdensome cost of sampling surface and groundwater after every pesticide application.

In the final analysis, cost-effective measures for minimizing non-point source pollution must be developed. Farmers must be both able and willing to implement such measures. This can be accomplished only through research, technology transfer, and cooperation. Farmers need accurate and timely information regarding appropriate practices to minimize non-point source pollution so they can enhance protection of the environment while improving productivity and profitability.

WATER QUALITY IN ALABAMA

Sidney Meadows

Flowerwood Nursery, Inc.
Mobile, Alabama

Present Status

Growth of the nursery business has been very impressive since the end of World War II in 1945. As a result of this progress the nursery business has gained a position of economic importance throughout Alabama, and particularly Mobile and Baldwin counties in South Alabama.

In terms of dollar value, nursery stock ranks first as an agricultural crop in Mobile County by a large margin. Nursery stock is a labor intensive product so there are more workers producing plants than for any other agricultural crop.

Water quality has continued to be of growing concern to all producers of agricultural products and certainly nurserymen are no exception.

The hopes of every nurseryman is to have regulations with which they can comply and compete.

Every nurseryman needs to ship nursery stock free of pests and diseases into other communities and states. This takes chemicals to do the job. We must find ways to get this job done effectively, economically and without detrimental effect upon the environment.

Alabama nurserymen, through no fault of their own, are operating under fire ant and white fringed beetle quarantine regulations at the present time. This chore becomes more difficult each year because most of the better chemicals have been eliminated from the program.

Even so, we can say, "So far, so good", because the regulatory officials have continued to give us chemicals and rules that we can live with.

All nurserymen are facing a problem with the usage of pesticides, of course. Fertilizers and silt are also a cause for concern. We all have run-off water as a result of our irrigation practices. We also have the hazards of flash floods and periods of heavy rainfall when hurricanes either skirt the coast or hit the area head-on.

Future Direction

First, we must hope that we are given a set of rules on water quality that we can live with. Second, we can hope for a reasonable amount of time to fully comply with these rules. Sound regulations do not come from thin air. They can only come from sound research data. Auburn University is in an advantageous position to render a great service to all the people of Alabama in giving us this guidance. It will serve everyone's purposes to preserve the environment, and at the same time allow the related businesses to progress.

Generally speaking, nurserymen are environmentalists, because that is their business. They also believe that we can have a wholesome environment and thriving business and are dedicated to that end.

GAYLON GRACE

Alabama Poultry and Egg Association

First of all, I want to thank you for allowing me to speak to you about our great industry and would like to tell you, today, unofficially, we're no. 2 in broiler production in the U.S.. If projections will go as we see them right now, we will surpass Georgia by a pretty good number. Georgia has been no. 2, and Arkansas is no. 1. In the state of Alabama we have 14% of the total poultry production in the U.S.. We're ranked no. 9 in table egg production. 82% of all the poultry income in this state comes from broilers. These figures are from 1986. We've produced 587 million broilers in the state, giving us a total income from those of 776 million dollars. 86% of the total farm income in the state is from broiler production. Now, one thing for the ones that don't know about the poultry industry in the state, we're basically in two areas, in the Enterprise and Dothan area in south Alabama, and in Cullman and Marshall counties in north Alabama. We now have 34 counties of the 67 in the state that have some broiler production. The poultry industry has been in existence for over a hundred years, but only in the last 50 years have we really become viable. The main reason for being so viable in the state of Alabama is because of the small farms, especially in north Alabama where you had farmers that have 40, 50 acres. They needed something to subsidize their income. So they built a couple of broiler houses and let their wife take care of them while they either farmed or worked away from the farm. The main reason that our production is so great right now is because of the mass production technology that has evolved in the industry. We have a rapid growth and in the next 12 to 18 months we're probably looking at another 1000 or 1200 broiler houses built in the state of Alabama. It's not uncommon to see hatcheries that put out a million baby chicks a week, broiler chicks. Then there are 11 companies represented in the state that are in broiler production, and they consist of 14 complexes. We have in those complexes feed mills, hatcheries, processing plants, rendering plants, and then, all the other facilities and equipment they need for the broiler production. At this time we are producing just over 14 million broilers a week in the state. In the facilities that we have, back to the technology part of it, we've gone from bag feed to bulk feed that's hauled on large trucks to the farms everyday. The houses that are out there have controlled environments, controlled temperature and humidity, and all the water and feed. Once produced, we can get processed poultry to a housewife in one to two days from the time it leaves the loading dock.

There are a lot of other areas that I could cover, but I won't get into those. But I do want to explain a little bit about the way the broiler industry is in the state, and in the southeast. We are considered vertical integration companies. What we mean by that is, the company owns the feed mills, the hatcheries, the processing plants, all the equipment to handle that, and then the producer is on contract to produce the poultry

meat. He furnishes houses, equipment, labor, and all utilities.

Now, getting into the water quality, I surveyed some of the folks around the state and one of the concerns I thought most everybody would be looking at was water treatment and treatment of waste before it leaves processing plants, hatcheries, etc.. But I found that not to be a major factor in our industry, because there are so many government regulations that make them have their water treated before they can dispose of it.

The next area of concern is litter. Most farmers use pine shavings in their broiler houses and they are responsible for disposing of it once it has been used. My survey revealed that the main problem we need to work on is the disposal of litter coming out of the houses. To give you a little information on that, these people spread that litter on their own land, pastures or fields, or they sell it to a neighbor that has land, or they just give it away. They will do whatever it takes to get rid of it. As most of you probably know, in the last few years there has been a good bit of work done on feeding broiler litter to beef cattle. So that's another aspect of it. We produce approximately 2.5 tons of manure, that is not including the shavings or sawdust that's in there, and that's on a yearly basis per one thousand birds. If you take a 50,000-capacity broiler farm, you produce 125 tons of waste per year. Now I need to tell you that that amount does not come out of those houses every year. Companies have found out that you can leave that litter in there for relatively long time periods, and put birds on built up litter and only clean out the houses one or two times a year. After they remove the litter they wash the houses, disinfect them, and get ready to go back in with the next chicks.

The Poultry Department here at Auburn told me that, if you take broiler litter coming out of houses, including the shavings and sawdust, it contains about 4% nitrogen. That would be 80 pounds per ton that you are putting out on the soil. For ammonium nitrate, which contains 35% nitrogen, this amount to 700 pounds per ton. So that gives you an idea of what's going out in the litter.

We have a lot of waste coming out of the broiler houses. Our thoughts are that the research needs to be done in that area. We have helped a lot of the land, especially in north Alabama, by putting this litter out on the soil. But we need more research in this area and whether that's done by the Poultry Department or some other department here at Auburn University doesn't matter. We think this needs to be done. This is our main concern and we, the poultry industry, would like to work with you any way we could to get this research done so we would know and let our producers know about the best possible solutions to the litter problem. Right now we probably have 8 to 9 thousand houses in Alabama operated by something over 4,000 producers. We need to let them know how they can best handle their litter. I think right now there's some work being done in DeKalb County on runoff from the watershed up there into Lake Guntersville, so maybe we'll get some figures on that. In closing, I'd just like to tell you that broiler production in Alabama is going to be increasing. Thank you for allowing me to speak.

Billy Powell

Alabama's Cattlemen's Association

On behalf of the Beef Cattle Industry, I certainly appreciate the opportunity to come here and participate in this symposium on water quality in Alabama. I'll give you a brief background on the beef cattle industry, and then make a few points of concern that we too may have.

The beef cattle industry in Alabama started its main expansion in the thirties and forties, when we really got away from a one crop commodity in this state. We now rank 14th in the nation in cow numbers. We have been at that ranking probably for the last 10 to 15 years. We've seen cow numbers here in Alabama go from a peak of about 2.8 million head in 1977 to currently about 1.8 million, and it's probably going to be closer to 1.6 next year. So we've had a decline in cattle numbers, which is similar to the national trend. Nevertheless in 1986, we sold 400 million dollars worth of cattle and calves in Alabama, which is an all time record for the state. So we've seen a fluctuation in numbers as we have been going through some pretty tough economic times in agriculture in general. But we do have a major cattle industry here in Alabama. We traditionally are a cow/calf producing state. Over the years, our main source of income has been from selling calves, primarily in the late summer and fall. That's fairly typical of the southeastern states, where we have benefitted from an abundance of rainfall in most years, at least our averages are good, and from the ability to grow grasses. As Gaylon Grace indicated, one of the reasons for the growth in the broiler industry was the many small farms we have. The same is true for the cattle industry, because you can run one bull unit of cattle on 40 acres, and not have a lot of investment in farm equipment. Probably 80% of the cattle farmers in the state are part-time farmers. The cattlemen, I think, have prided themselves as being, to some degree, conservationists, or a plus factor in non-point source pollution. This is because most of the cattle farmers have only 40 to 100 acres, which is in pasture; and they do very little row crop farming. However, our larger cattlemen are big row crop farmers as well, and are engaged in the agriculture practices that John Dorrill spoke about. We, in the cattle industry, are really blessed with a lot of water. Our cattle need a source of fresh water daily, because they use a lot of water. You know, the reason to have a cow is to convert byproducts of the row crop industry or roughages into a high quality protein for human consumption. Cows can do that because they have big fermentation vats. They can take in cellulose, which is then broken down by micro-organisms into products that the stomach can use and convert into protein (as with simple stomach animals). In the process they need a lot of water. So cattle are consumers of our water, and because of that, I would say most farms in the state that have cattle also have running streams through them. At least they would certainly like to try to get property that has running water on it. If you don't have that then you have to have a well

as a source of water for the cattle. So we are users of water from that standpoint.

As we look a bit to the future of the cattle industry, especially here in Alabama and in the southeast, we see a real potential for expansion. Now the economic equation, obviously, has to be right for this to happen. But as we have gone to a leaner product, cattle spends less time in the feedlot and there is less demand for grain. Under these circumstances we can certainly produce a very high quality beef and we can keep the cattle in Alabama until they weigh 1000 pounds and we can finish a great many of them here.

One thing that has really helped the consideration of expanding the industry is that we now have the largest packing and processing plant in the southeast, located here in Montgomery, Alabama. They slaughter over 200,000 head of finished cattle each year, and I would say probably 85% of that cattle comes from feedlots.

Traditionally, our cattle producers, like most Alabamians, have been blessed with an abundance of water. We have tremendous water resources in the state. I think I've read that 10% of the river systems and the water sources in the nation are in Alabama, and certainly we have, as an industry, enjoyed this abundance of water. I think those of us who have gone to national meetings, national cattle industry meetings, probably were not too interested in going to the sessions where they discussed water problems. Over the years, that has primarily been a problem for our western ranchers. They been fighting water rights and battled over water availability for 100 years. In fact, that's the reason the first state cattlemen's association was formed. It was because of the issue of water rights, who owns rights to the water. And we probably didn't feel much concern about that. However, over the last two or three years, as we've gone through extremely dry periods, we may have become more concerned about this issue. We've actually had producers say, for the first time in 100 years, that their well or the stream that runs through their pasture, and provides water for their cattle, has dried up. So we started to tune in a little bit more to the availability of water.

Only two weeks ago, when I was at a regional meeting of the Southeast Cattle Association's states, I asked one of our lobbyists from Washington what issues we were looking forward to facing to try to get some background for 1989, and certainly as we move into the 1990 farm bill. Well, Fred Clark, I was quite surprised and alarmed, that two of the first four issues he named had to do with water quality, particularly in the area of non-point source pollution. In his opinion, one of the major battlegrounds for us involved in agriculture would be over the issue of groundwater pollution from non-point sources. Who is liable for polluting the groundwater? He gave an example that kind of got my attention: if you are a farmer or cattleman and you're using some herbicides to spray on your pastures and you do just as the label on the can says, 25 years from now somebody might bring up a case that you were the one that contaminated the groundwater. Are you liable? Maybe the other side has a

better chance of winning a liability case against a farmer than against a large corporation, because a farmer doesn't have the corporate lawyers and that sort of assistance. Well our lobbyist felt like this issue would be discussed in Washington as soon as the new Congress is sworn in after the first of the year.

Another point right along the same line of the non-point pollution, that I think addresses us, is tied in not only to quality of water, but to the aesthetic value of our environment. The Scenic River Act, for example, may hamper farming. We have a scenic river in Alabama and I've certainly enjoyed crossing it and fishing in it, and canoeing in it. But what do we do if a creek or stream, five, six, ten, forty miles away is causing some type of contamination or pollution of that scenic river? Can we be told that we have to stop letting our cows cross this creek? Or, if we let them cross the creek, do we have to meet certain specifications? Will they tell us, for example, that we have to fence the entire creek, and that we need a 10 foot alleyway, and that this alleyway is going to have to be concreted, and that no more than two cows can cross the creek at a time, and that they can spend 5 minutes or maybe 3 minutes in the creek? I realize that this is the extreme, but the facts of life are that some people think that we should operate our land that way. And then you get into the broader issue of private property rights. Many people feel that the community as a whole, not the landowner, should have the final say as to what happens on his land. We certainly agree with the pollution aspect of that, but then you really get into a very complex issue, that's going to take much research, much thought, a lot of sound thinkers sitting down and trying to solve these type issues.

Certainly we, as a cattle industry, are concerned about maintaining water quality, we are concerned about water availability. As the urban areas grow and expand, as Mr. Meadows mentioned in the case of Flowerwood Nursery, which used to be way back in the woods and now it's in the middle of town, we will all be faced with these type issues. Certainly I think, we as an industry, want to be involved in the discussions that will affect our future, and we commend Auburn University for having this conference. We know there are answers, but we need sound answers, we need answers that are based on sound research, and if the land grant institutions are not doing that research, who is? Who's going to look out for agriculture?

In closing I'd like to say, and I agree with John Dorrill's statement, that all of us in agriculture want good pesticides, herbicides, chemicals, and fertilizers, that are economical, that do a good job, and that have no harmful effect on the environment at all. Again, I'd like to thank you for the opportunity to participate in this conference and I certainly appreciate Auburn University sponsoring this symposium and getting involved in this very important research that's going to affect all of us for many years to come.

John McMillan

Executive Vice President

Alabama Forestry Association

The Clean Water Act of 1987, Section 319, addresses nonpoint source pollution. A part of this section deals with silvicultural activities which are forest management practices such as harvesting, site preparation, and roadways. In addition, forest management activities in wetland areas are included.

Alabama's forests supply raw materials to support the State's largest manufacturing industry and thereby provide the necessary resource for the production of essential commodities. At the same time, these forested lands provide scenic beauty, recreation, wildlife habitat, and help protect our watersheds. All these interests and activities certainly have the potential to impact water quality.

Since 1978, Alabama has had Best Management Practices (BMPs) for silviculture. (Incidentally, the Auburn University Department of Forestry, now School of Forestry, provided expert assistance to the development of these BMPs.)

The Alabama Forestry Commission (AFC), working with other interested groups, was responsible for developing the voluntary guidelines that have been in place since that time.

Without treading on later presentations, which will be made by agencies, I will try to relate to you where I perceive us to be in this process and make suggestions from a practical standpoint as to how the job of better implementation of and education on BMPs can be accomplished. These are also the two areas in which, I think, Auburn University can play a major role.

As I understand the current status of BMPs, the AFC, working through ADEM, which has primary responsibility, has completed an assessment of the adequacy of our BMPs (including any specific problem areas) and prioritized how to address these areas. This assessment of silvicultural nonpoint sources has been submitted to ADEM, as has a plan for redefining the 1978 BMPs and developing BMPs for wetland sites.

During the development phase of the wetland BMPs, the AFC got input from virtually every agency and group that is or should be interested in the process. For example, our Forest Practices Committee at AFA established a subcommittee that worked at length with AFC personnel responsible for drafting the BMPs.

This type of cooperation was and is essential to the effort which lies ahead in successfully implementing the plan and guidelines which EPA eventually approves.

The 1978 BMPs and the 1988 Plan both advocate a program of voluntary compliance. The premise is maintained that, if properly informed and educated about the potentials of erosion and water pollution in forestry operations, natural resource professionals, government agencies, wood using industries, forest operations and owners of timberlands will make the necessary commitment to comply with voluntary BMPs.

A part of the 1988 Plan is devoted to a general description

of plans for monitoring, educating, demonstrating, etc., for generally "getting the word out" on how BMPs relate to and complement good forest management.

If the 1978 BMP effort had a shortcoming, it was probably in the efforts that were made or not made by all of us in "getting the word out."

The renewed effort, starting with the 1988 Plan, needs to recognize the need for maintaining compliance and monitoring in a fashion which is not "on again-off again," but a long term commitment.

Generally speaking, the 1978 Plan efforts for compliance have been targeted at agencies, forest industry, and professionals such as consultant foresters, all of whom have made a commitment to comply with voluntary BMPs. A major push needs to be aimed at private "independent" logging contractors and non-industrial private landowners.

The AFA Geographic District Organization, for all our programs, has recently been realigned to the same ten districts that the AFC and Extension Service utilize. This should contribute to the ability to reach the grassroots level for conducting seminars or demonstrations to provide technical assistance and training to forest operators and landowners concerning the use of BMPs.

The effectiveness of BMPs for forest products harvesting, prescribed use of fire and pesticide use, are all areas where additional research will be useful. Certainly, there is a role for AU in this aspect.

The construction of forest access roads and stream crossings probably provides the greatest potential for erosion followed by skid trails and log landings. The School of Forestry's forestry engineering curriculum certainly affords a giant opportunity in these problem areas.

AFA has started a new statewide recognition program for loggers. Compliance with BMPs will be one of the criteria for judging in this program.

In summary, those responsible for organizing this symposium are to be commended and if the agencies and organizations represented here all pledge to assist and support the implementation of goals for better water quality, these will become reality.

Session III

Panel Discussion

Ernest Todd
I'd like to direct a question to Mr. Grace. Mr. Grace, of course you know, we in the Soil Conservation Service are deeply involved with the farmer. In reference to the waste disposal, I think you verified that the poultry industry, the vertical industry, is leaving the waste management to the farmer, having them put in pits for the disposal of the dead animals, and having them put in sewage lagoons and things like that. We are a little concerned about that. Should not perhaps the industry get a little bit more involved? One of the industries, particularly in Montgomery, was telling me that before they would let a farmer participate in their industry, that they had certain requirements about the waste disposal. For example, they require a farmer to have so many acres of land, so that they could be sure that the waste could be put out on that land. Don't you think that the industry itself should become a little bit more involved in the waste disposal side of it? Because, as you know, in some places we're having some real difficulty with some of the waste that's coming from chicken houses.

Gaylon Grace
Yes sir. Let me state in answer to your question that each integrated company states in their contract with the farmer that they will not put birds on any farm that does not have an incinerator or a pit that has been approved by the county, city, or whatever. As far as the litter going out on the farms, most everyone has their own property. The integrated companies have no control over what they do with that litter. Now, agreed, maybe our association should get with those integrated companies. Like I said, we have eleven of those companies represented in the state, but very few of them have headquarters here. It is therefore hard to get some agreements made between our association and the industry headquarters. I think once the integrated companies go out and try to force a producer what to do with the litter, then contracts are going to be changed. In the way the vertical integration has evolved, they've left that part of the management to the producer, so they cannot tell him what to do. The industry is responsible for the birds and for taking care of them. The producer is responsible for getting rid of the litter. I think if you look at the size of the broiler operations, you would see a trend towards more and more large business people becoming producers. We are getting away from the mom and pop operations. Of course, we still have a lot of those, but the majority of the people that are getting in broiler production right now are doing it for their sole income. So we're having bigger farms that have the capability of absorbing that litter.

Ernest Todd
I think that we would like to get involved with the industry at a level a little bit higher than the farmer, or with an organization, so that we can begin to see what some things are that we can do in a more proficient and better manner out there.

Gaylon Grace
Yes sir, one more comment. One of the things the association has done over the years is have seminars such as this one, where we bring in the service personnel from the integrated companies and the producers, if they want to come, and we discuss those management practices that best help them produce a good quality product.

Tom McCaskey
I 'd like to ask John Dorrill, and perhaps all of you on the panel, who should pay the cost of research associated with use of pesticides, and particularly their impact on the environment? Should chemical companies, who develop these pesticides be responsible for their fate in the water and in the tissues of animals that consume products that may be contaminated, or should public institutions and state institutions pay for that cost?

John Dorrill
Well, I am not sure if I really know the answer, but I'll just comment a little bit. I think the company has a moral and legal responsibility to put out safe products. But then I think the public has a legal responsibility to make sure that they're doing it. And I think, too, a spirit of cooperation ought to prevail. And, getting back to the point that Bill Powell made about the pollution from the waste of animals walking in streams, I'll show you another little point that gets real complicated. You know, up the stream, a long ways from any drinking water, how strict can we get with the farmer? Aren't we coming to the point that we have to have some public financial support for the treatment of that water? We do this for the handling of human waste, so I think it gets really complicated when you get out there. But, generally, that's kind of how I feel about it.

Ann Amacher
At the risk of showing extreme ignorance, I ask this question, because it is representative of questions that I have from time to time when I read in the newspaper that a certain pesticide has been canceled or that it is coming up for public comment. I'd like to know what the forest industry's current information about Silvex is. I remember that in the early 80s, when I was attending a citizen's advisory committee in Montgomery, Mr. Cody discussed a best management practice book, or manual, he had compiled on forestry. I seem to remember that in that book, Silvex was said not to contaminate the water and so it was in good shape. But now I've got a 1987 League of Women Voters handbook on drinking water, which says that 2,4,5-TP or Silvex causes liver and kidney

effects. Of course, it doesn't say whether it has been shown to have leached into water in forestry areas. It doesn't say that because it is looking at it from the standpoint of drinking water. Actually, if it does get into the water it is bad. But in this manual it says that it was canceled in 1984. Well, we have a little piece of land with some trees on it. We haven't used any herbicides or pesticides on this land. In fact, I didn't even use herbicide on my driveway, and I got grass growing through it the day it was blacktopped. But I am curious, both because of the job I have as a volunteer on drinking water, and having, as I said, attended these meetings in Montgomery at ADEM. In this League of Women Voters' handbook it says that Silvex was canceled in 1984--was it canceled? I'm just curious.

Jerry Michael
2,4,5-TP was canceled at the same time as 2,4,5-T. This means that it is no longer legally being used in forestry operations.

Dean Earlix
After I graduated from Auburn, I worked on a farm for 6 months and I found to my amazement that the farmers don't rush out and try these new techniques and best management practices until they have to. With the enforcement and the additional attention on non-point source pollution, will you, as producers, start considering some of these other management practices? And do you have any in mind when it becomes more expensive not to use them?

Sidney Meadows
I might go back to the question originally asked. How should these things be financed? I will just give you my personal opinion. I feel that the manufacturer should produce a safe product and give the directions on how to use it. But what we're talking about now is management practices, run-off water, irrigation water, the use of pesticides, and all of that would fall under the responsibility of farmers. But now, getting back to your suggestion about these better practices. I might say that all nurserymen, and I know we are, are basically ornamentalists, because it's our business to improve the environment, and we certainly have to support that with our actions. If there's a better way to do something, in terms of the quality of life around our nurseries, we have the obligation to do it. Regarding the things that come up in my neighborhood, we respond to them. We don't ever ask a whole lot of questions. Like one lady called me one day to tell me that her boatslip was full of trash. I cleaned it out for her. It wasn't my trash, but I could clean it out a lot quicker than I could argue about it for instance. Just to show you how it paid off, a month later, and this lady is a self-avowed anti-socialist, she tells the neighborhood, I was having trouble getting my dogs in the pen and I was calling, here Pat, here, and she was in the shower and thought I was hollering help. So she put on a housecoat and something over her head and came running out to help me, so,.. We can get a lot of people off

our back just by responding to their whims. And sometimes it might be a whim, and then again, it might be a real complaint. A neighbor called me the other day and said, you know, my well water smells. Well, I didn't ask her any questions, and by the way mine smells too. But I know what makes mine smell--there's all that iron and sulphur in it. So, I sent a boy over and got a sample of this fellow's water. First we checked it for bacteria. It was loaded and I didn't put them there. But then later I sent it to a chemical company to have it checked, and it cost us $200 just to do this thing. But we are under suspect, because we are using irrigation water, and we are using pesticides, and we all have wells, and we monitor our own wells, but they have government agencies monitoring these things and certainly we don't want to be guilty. We want to be good neighbors and a whole lot of this can be voluntary. But there still has to be some legislation to cover it.

Jerry Miller
I'm really struck by what seems to me is a very defensive posture on the part of the agricultural industry in this state in regard to this issue. I'm curious. Is there an effort underway to inform the public from your perspective, to let them know that they are probably the main beneficiary of any efforts to sustain water quality. It really are not the producers who are going to be the number one beneficiaries. Have you undertaken any kind of joint group effort to get out this information?

John Dorrill
Well, maybe yes and maybe no. There's a lot of work going on in, let's see, e.g. Farm City effort, to show the importance of agriculture and the contribution by the farmer. But you know, agriculture today is in a defensive posture. The Farmers Federation, for instance, is viewed as an anti-tax organization. We are accused of having a pulpwood mentality. That's the kind of attitude some self-serving politicians have as they try to distort agriculture just because they can't get it their own way, and so they attempt to misuse us. So we are in a defensive posture. But you are right, we ought to be on the offensive. Farmers comprise a great resource, and they are great conservationists. We're helping to conserve soil. Just leave it out there for the kudzu and everything else and see what happens. And so they are making a great contribution, but certainly more needs to be done, because I think we do have a good story to tell. I find that people have a very good attitude toward farmers. It doesn't really matter to us if politicians are trying to discredit us. It really doesn't work, because the people really do have a good attitude towards farmers. Of course, if they find somebody who is violating the law, who has done something illegal, done something harmful, they're not going to have a good attitude about that person, whether it's a farmer or anybody else, but, generally speaking, people have a very good attitude about farmers.

Jerry Miller
I guess my real concern is that, as much of the voting population is really not in direct contact with the farmer and with the producer, are we maintaining a dialogue to insure the general public that the benefits of the regulations are going to fall on them too, as well as any detrimental effects.

John McMillan (?)
One of the real challenges is with the legislative process, whether it is in Washington or here in Alabama. As we move to a more urban society, which Alabama rapidly is, our legislature will become more urban. Just to get them to understand the issues and to get our people to be concerned enough up front, way before it becomes a real crisis, and the farmers are already on the defensive, is a real challenge when you are in a minority position as agriculture is.

Ken Sanderson
I would like to join in with Jerry here regarding the defensive posture. I find the industry, my particular industry, attacking regulations rather than trying to write the regulations themselves. My feeling is, like the late Senator Humphrey once said, the question here is, not what are the problems, but what are the solutions? I've heard you talk this morning, and I haven't heard any examples of solutions, except incineration, which may not be a solution, to some of the problems that we have in contaminating the environment. Do any of you have any examples in this area?

John Dorrill
Well, I'm not sure that I do, but I'm also not assuming that we are flagrantly abusing the environment. It may be a lot better off than it has been. How good is it or how bad is it compared to when and what, you see? You know, the thing we're dealing with today, when we could have we'll just say substantial pollution, is that we wouldn't even know about it if it wasn't for the minute quantities we can measure, which makes you more aware of whatever we do have. But I want to come back to the remarks made by the young man who mentioned that the farmers sometimes didn't seem to be trying the latest techniques. Of course, all farmers are different. Some are slower to try new things than others. But I find the younger, modern farmer is almost like a scientist, and he will try something new if it's better or safer and if he can do it without a substantial increase in cost. The younger farmer is an excellent manager and scientist. I think that's one plus we have going for us. They are better equipped and better qualified to make changes. So, first, I don't think it is as bad as we may fear. Second, we're doing many good things, and thirdly, the farmers and producers are becoming better qualified to do even more and do it better.
But don't forget, we've got to make a profit. If we don't do that, we can't really do anything. If you come out with a deficit

bottom line, you won't even be operating. Somebody else, some corporation will be trying their hand, and they'll be doing worse, in my opinion.

Ken Sanderson
Well, my accent, I believe, indicates I am not from this area. I come from what I now describe as ugly New Jersey. You have a beautiful state here in Alabama, and unless some things are done, you're going to have ugly Alabama.

Bob Mount
We've been arguing about these kinds of things, I guess, for twenty years. One way that the agricultural interests and the silvicultural interests could show a tangible dedication to the idea of improving our water quality and reducing the non-point source pollution and so forth, would be, to advocate mandatory practices. Of course when we developed the forestry association and forestry industry, the comment was made, well, you know, we got all these folks behaving except for just a very few, and we're trying to get this small minority straightened out. Well, I ran into the same thing when I got into a controversy with the coal companies. Oh, we're all doing a pretty good job, but you know, there's a few outlaws out there, but we don't want regulations, we don't want it mandatory. This attitude of, we gonna do this, and ya'all trust us to do it, but we don't want to be mandated, doesn't seem to wash with the environmental community.

Billy Powell
Bob, if you could mandate a profit, you could go a long way toward mandating some requirements and regulations. That's one of the problems, since it is an option to farm, versus an industry that is under some control.

Bob Mount
Well Billy, to an extent we do advocate a mandated profit. We've got to decide the payments for boll worm damage, beet armyworm damage, drought damage, crop insurance, subsidies, and so forth. So to an extent, there are some mandated profits in some of the areas of agriculture.

John Dorrill
Bob, regarding the mandated best management practices, and I think you were talking mainly about silviculture, ADEM has almost unlimited power to regulate, for instance, the pollution of streams. In fact they're using some of that power here in Lee County. We have just had an occasion to research all the laws, and ADEM can absolutely stop any act that they determine, after certain procedures, harmful to the stream. In fact, we are concerned about the breadth and the depth of their power in doing that. It is an area where, I don't think legal authority is lacking. What I'm concerned about is, is the lack of definitive guidelines.

Bob Brewer
I think the Poultry industry, and Gaylon Grace mentioned this very well in his presentation, probably has a problem in the waste disposal area that we really need to do some close looking at. But I just want to point out to you that the whole livelihood of the broiler industry and the commercial egg industry in the state depends upon clean water. And we've been emphasizing this in in-service training schools and within companies for 25 or 30 years. We never go to a meeting without hearing some talk, some emphasis put upon the need for clean sources of drinking water for the poultry. Most of the companies test water coming from the wells or other sources. A lot of people in the rural areas put chlorinators in their water. So clean water is extremely important to the poultry industry, and I think it is to the other animal industries as well. We just don't let our product, Billy, drink out of the creek like a lot of cattle do. So we do have some control there. But our industry is production oriented, it is profit oriented, bottom line oriented, and the only way to get there is to put that chicken in the best possible environment you can create in that chicken house, which includes the use of clean water. This topic is discussed in virtually every meeting we have.

Jacob Dane
It is obvious that farmers need to make a profit. Do you feel that the use of chemicals should be dealt with on an international basis? Because if we set certain regulations upon ourselves, but in overseas countries they don't, then we lose our competitive edge.

John Dorrill
I think that's certainly a good point, and it certainly should be dealt with on an international basis. I think any trade that comes into this country should be subjected to the same regulations and guidelines that our producers have to abide by. That product should be just as wholesome, should be produced under just as intense a situation as ours, so that we can play on equal footing. And I don't think that's the case in many instances. I think it is very important, that we can't subsidize these foreign producers like we too often have done, and are still doing. I think the American farmer can compete if we play by the same rules as the foreign farmer, but it has to be fair with respect to various programs. Pesticide control and use is one of them.

Jerry Michael
I have a comment, not necessarily a question. Yesterday we heard a linguistics person say that if we use the word pollution or contamination, good and bad, we're not all talking about the same thing. Yesterday also, the question was raised, how are you prioritizing pollution? What are the priorities? Where should

we be working because we can't afford to do everything? We danced a wide circle around it, but I don't think we ever came to an answer. John Bloch, yesterday, indicated that we can do analytical work at low levels, much lower than we've ever been able to do before, down to ten parts per trillion, relatively easily on many pesticides. John Dorrill talked about analytical chemistry today. And again, we talked about clean water. What does it mean? It seems to me that we've gotten away from the real point, and that is, what constitutes a health effect? What is the level at which we have to start getting concerned? I think we're getting away from that by talking about many aspects which assume that we have a terrible problem, when I believe that our analytical capability allows us to measure contaminants at levels far below those at which they constitute a health effects or at which health research is actually being conducted.

SESSION IV

ENVIRONMENTAL ORGANIZATIONS

Presiding

Dr. D. Phillips

Director
Center for Environmental Research and Service
Troy State University

CONTROLLING NONPOINT-SOURCE WATER POLLUTION: A SIERRAN'S PERSPECTIVE

James L. Taylor

Alabama Chapter of the Sierra Club

The United States has made substantial progress in improving the quality of its rivers, streams, and lakes since the early 1970s. The President's Council on Environmental Quality reported in 1983 that a majority of U.S. surface waterways were meeting the Clean Water Act's 1983 goal of being "fishable and swimmable" (1). Despite this progress, several problem areas remain. Toxic waste contamination and nonpoint pollution of both the nation's surface and subsurface waters remain issues to be resolved. It is this latter problem--nonpoint pollution created by runoff from farms, city streets, and construction sites--that we address today.

Some estimates suggest that such uncontrolled runoff may account for more than half of the pollution now entering U.S. waterways (2). One report by The Conservation Foundation estimated that non-point sources contribute as much as 73 percent of total BOD loadings, 99 percent of suspended solids, 83 percent of dissolved solids, 88 percent of nitrogen, 84 percent of phosphorus, and 98 percent of bacteria loads in U.S. waterways (3). Another study by the U.S. Fish and Wildlife Service, conducted in association with the U.S. Environmental Protection Agency, identified non-point sources as the probable cause of water-quality problems in 367,244 stream miles in the United States. This was 38.4 percent of the total miles surveyed (4). Agricultural sources of nonpoint pollution were responsible for water-quality problems in 29.5 percent of the stream miles surveyed (5). In 1984, the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) asked state officials to identify the primary causes preventing their streams from supporting their designated uses. Nonpoint Sources of pollution were ranked first by 26 states and second by 13 others. Agriculture was reported to be the most significant source of nonpoint water pollution (6). These figures indicate clearly that much needs to be done to protect the quality of the nation's water.

The Sierra Club Perspective

I was asked to address the topic of nonpoint-source water pollution from the perspective of the Sierra Club and the Alabama Chapter of the Sierra Club. This I will attempt to do. The Sierra Club is a national environmental organization and the Alabama Chapter is its state affiliate. Generally, the Sierra Club supports the provisions on controlling nonpoint-source water pollution outlined in the Water Quality Act of 1987. This is the law passed by the U.S. Congress in February 1987 that amended the Federal Clean Water Act. Sierra club volunteers across the state

and country worked for the passage of this law and now support its implementation and enforcement as intended by Congress.

This law, among other things, directs the states to develop and implement an effective program to control nonpoint-source pollution. Specifically, the law requires each state first to identify and to quantify the nonpoint pollution problem in the state in an "assessment report." The assessment report must identify those bodies of water that cannot meet state water quality standards because of nonpoint-source pollution and must describe the sources causing those bodies of water not to be in compliance. Next, the state proposes solutions to the problem of nonpoint pollution by developing a "management program." The management program must identify the best management practices (BMPs) for controlling specific nonpoint pollution sources, identify existing programs and propose new programs to encourage or require the use of the BMPs, and set up a time schedule for implementing the management plan. The assessment report and the management program were to be submitted to EPA by August 4, 1988. Finally, following approval by the EPA, the state has four years to implement the management plan (7). States face no penalty for not participating in the nonpoint program except for the loss of grant money to administer the program. If a state does not complete an assessment report, EPA is required by law to do so. Nevertheless, EPA is not required to develop a management plan for a state refusing to do so (8).

Fortunately, Alabama has elected to participate in the nonpoint program. Both the draft assessment report and the draft management program have been completed and submitted to EPA for approval. Following approval by EPA, the opportunity for public comment on the draft proposals will be provided (9). Thus, the Alabama Chapter of the Sierra Club and other citizen groups will now turn their attention to evaluating the draft proposals worked out and, if needed, attempting to modify or strengthen them.

Sources of Nonpoint-Source Water Pollution

Activities related to agriculture, silviculture, mining, construction, and urban development are the major sources on nonpoint-source water pollution. Other sources include solid waste landfills, hazardous waste sites and septic tanks. Nonpoint-source pollution results from storm water and snow melt runoff in the presence of these sources (10). Agricultural activities related to nonpoint pollution include irrigation practices, tillage methods, animal waste management, stream bed management, pesticide use and fertilizer applications. Major silvicultural activities related to nonpoint pollution include timber harvesting techniques, road building, and pesticide use. The slope of the land and the proximity of the agricultural and timbering activities to bodies of water are important contributing factors.

Improperly regulated operating mines and old abandoned mines are common sources of nonpoint pollution. The major culprits

associated with mine-related nonpoint pollution are mine drainage and leaching, erosion of spoil piles and mine tailings, and runoff from roads used in hauling equipment and materials. Urban development produces pollutant-rich runoff from construction sites, industrial sites, golf courses, streets, lawns, roofs, and parking lots.

Finding Solutions

A state's management plan must identify specific management practices or BMPs for controlling the various nonpoint sources described in its assessment report. A wide array exists of BMPs that can be used-- BMPs that differ widely in their costs and effectiveness. Some BMPs involve simply changing operating procedures (e.g., relying on "integrated pest management" to reduce pesticide use) while others involve elaborate control mechanisms (e.g., constructing terraces and sediment basins to control erosion, (11)). Congress wisely did not attempt to dictate specific BMPs to be adopted by all states. Each state has the option to adopt the BMPs that are most appropriate to solving its nonpoint pollution problem. In effect, Congress has acknowledged that it does not care how a state gets the job done as long as it gets it done.

The Sierra Club supports the approach adopted by Congress. The Sierra Club has no model management plan that it would like to see used by all states. What the Sierra Club does care about is that BMPs adopted by a state be adequate for preventing nonpoint pollution, that the management plan be properly implemented, and that timely monitoring and strong enforcement be provided to ensure compliance with the plan. The Alabama Chapter of the Sierra Club will be evaluating Alabama's management plan with these objectives in mind. Unfortunately, one troublesome issue already seems to be apparent.

Alabama's assessment report asserts that the BMPs and measures to control each category and subcategory of nonpoint sources identified in the report have developed previously. The assessment report cites the Alabama Agricultural Runoff Management Plan (published in 1979) as identifying BMPs for agriculture, the 1981 Silvicultural Runoff Management Plan as identifying BMPs for silviculture, and the manual Best Management Practices for Controlling Sediment & Erosion from Construction Activities (developed in 1980) as identifying BMPs for construction. The report also asserts that regulatory programs have been developed for controlling nonpoint pollution from mining operations, industrial facilities, hazardous waste disposal, treatment, and storage sites, solid waste disposal sites, and on-site wastewater systems (12).

These are plans that were developed and published seven to nine years ago. Yet, the assessment report acknowledges that in Alabama there are 527 miles of streams and 1,850 acres of reservoirs, lakes, and bays that fail to meet established water quality standards and 1,101 miles and 32,000 acres that only

partially meet standards due to nonpoint pollution (13). The report describes the miles of streams and acres of reservoirs, lakes, and bays impacted by nonpoint pollution from agriculture, silviculture, mining, construction, and urban sources--the same sources for which BMPs or regulatory programs are supposed to exist. The nonpoint pollution impacts of the various sources described in the assessment report are summarized in Table 1 (14).

These figures suggest that the BMPs envisioned for Alabama's nonpoint-source pollution control program are either inadequate or not being used. The BMPs contained in the documents cited in the assessment report may not be adequate to prevent the problem of nonpoint pollution; or they may not be mandatory and, consequently ignored by affected parties; or they may be mandatory, but not being enforced. For Alabama's nonpoint-source pollution control program to work, the BMPs adopted must be adequate for the task, mandatory for the relevant parties that create the problem, and enforced.

Congress did not intend for the nonpoint pollution control program to be a program on paper alone. It was meant to work. This demands something more than adopting BMPs that have been in existence for years without preventing our waters from being polluted by nonpoint sources. I urge everyone--both citizens and public officials--to carefully evaluate the draft management plan when it is released with a view of ensuring that the program established does what Congress intended--protect the quality of our streams, our lakes, and our bays.

Table 1: The Impact on Alabama Waters of Various Nonpoint Pollution Sources

Source	Impact on Streams (in miles)	Impact on Reservoirs, Lakes, & Bays (in acres)
Agriculture	1,196	232,400
	(774)*	(69,100)
Silviculture	249	--------
	(53)	--------
Construction	217	--------
	(62)	--------
Urban	222	32,000
	(105)	--------
Mining	576	70,950
	316	1,850
Land Disposal	238	170,200
Hydro/Habitat	170	1850
Modification	(81)	--------
Other	172	130,050

*Figures in parenthesis represent water bodies in which nonpoint-source pollution has a "major" impact.

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6. Association of State and Interstate Water Pollution Control Administration, America's Clean Water: The States' Evaluation of Progress, 1972-1982, prepared in cooperation with the U.S. Environmental Protection Agency (Washington, D.C.: Association of State and Interstate Water Control Administrators, 1984), pp. 10-11.

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13. Ibid., p. 7.
14. Ibid., pp. 7-8.

Ed Passerini

President

Alabama Conservancy

I come to you directly from Atlanta, where I was yesterday, at a nine-state regional conference on water quality where we were looking at national and international aspects. I'll offer you some practical solutions this morning, some of them you may not want to hear. I'll also offer you some problems that you may not have thought about. I heard a lot about profit earlier, and one of the best ways of making doggone sure that you have a profit is to eliminate as many losses as possible. And anyone of the problems in all of these areas of non-point source runoff, represents a loss. So let's look at some ways in which we can eliminate some losses. I will start off by asking you to broaden your idea of what non-point source pollution is, and how in a very broad context we might do something about it. Certainly the whole problem of carbon dioxide falls into this category. The Toronto protocol says that we must reduce carbon dioxide production by at least 20% by the year 2005, and the question is how do we go about it. Consider acid rain's impact on catfish, consider acid rain's impact on soybeans and peanuts, a very strong impact that has something to do with what we're talking about here. It has an impact on tourism--Alabama's biggest dollar, now. I've been looking at methods of dealing with stability, and the best ones seem to be to reduce usage of pesticides, with methods such as integrated pest management. Integrated cropping of various kinds is another possibility. There are such things, for example, as perennial soybeans. They don't produce well, but we need to do the research in order to start building perennialism insofar as we can. There already are a number of perennials, and the reason for that of course is that perennials don't require anywhere near as much attention as annuals do. They're also nowhere near as erosive as the annuals are. We should move away as much as possible from monocots. One of the big problems with a stalk of corn, or wheat or oats or anything else is the shape of the darn thing. As a result the average acre of corn land erodes 10 tons of topsoil per acre per year. So there are a lot of these things that, we need to realize, are intimately connected to other issues, and if we just look for a quick, short range solution, we're going to raise problems in other areas. We've got to start looking at long range solutions. The longer ranged solution, such as integrated cropping, integrated pest management, perennials, and so on, are tree crops. Something that we've given almost no attention to here in the United States, but one which drives that input/output curve up again. Trees are interesting. A pecan orchard, for example, collects 8 times as much solar energy per acre as a corn field does. Trees are wonderful solar collectors, and the good news is in what they do with that stuff. They not only produce high seed yield, very high in protein and oils and

the kinds of things that we were discussing. A pecan orchard also adds a ton of soil each year per acre rather than stripping it away. It also reduces non-point source pollution. Now, as we move into these areas it amounts to an agricultural revolution. It won't be rapid, I am sure. It will be more of an evolution than a revolution, but these are the directions in which we must begin to go. Those are basic issues and ideas that I wanted to present to you this morning and that we'll talk more about when we get to the question and answer session. Thank you.

Water Quality
Non-point Source Pollution
A Perspective

Z. Douglas Schofield

Executive Director
Alabama Wildlife Federation

The Conservation Movement is alive and well in Alabama! I'm so happy to see it. I want to believe that it is a serious awakening of environmental consciousness. One of the greatest frustrations of volunteer and professional conservationists is the great propensity of the public at large to remain apathetic toward environmental issues right up to the moment that they can no longer breathe the polluted air, or find safe drinking water. There is a story told about a man-on-the-street reporter who asked a passer-by "which do you think is the greater problem in America today, is it apathy or ignorance?". The man replied, "I don't know and I don't care."

It is certainly evident that there are people here who care. The Alabama Agricultural Experiment Station is to be commended for this very wise approach to one of the most serious challenges facing modern civilization. Dr. Frobish and his contemporaries have made some very meaningful contributions to agricultural technology, and to the quality of life through their efforts. This symposium could well be the single most important contribution of all to future generations.

Water quality is a major problem, facing not just Alabama, but America. For too many generations we've built the outhouse over the well. One of the earliest slogans of the environmental movement was "dilution is not the solution to pollution." We've learned the hard way that simply lowering the standards we are willing to accept for the quality of water in our lakes, rivers and streams is not an appropriate way to manage the effluents of our affluent lifestyle. I think we've learned well the lesson 'what goes up must come down' in addressing the problem of air pollution; but yet we seem not to fully understand that what goes down also comes up, in the drinking water. There is an increasing rate of pesticides and other contaminants which we've poured down the drain, or down the ditch or just spilled on the ground, coming up in well water.

Addressing the problem is not as simple as installing a filtration gadget on the tap at the kitchen sink. In fact, I am greatly insulted by the profiteers who always seem to come out of the woodwork, selling everything from divining rods and snake oil, to deactivated charcoal filters and bottled water every time there is something in the news about the quality of drinking water.

Just prior to the 1988 regular session of the State Legislature the Alabama Wildlife Federation conducted a public awareness Campaign to create support for groundwater protection

laws. The Legislature did indeed pass the Groundwater Protection Act and the Wellhead Protection Act, two important steps toward a meaningful program of protecting water quality in Alabama. Unfortunately, our public awareness campaign fueled a sharp upsurge in pyramid sales schemes using water filters as a product base. The National Wildlife Federation's recent report of EPA's failure to enforce the Federal Safe Drinking Water Act, and our follow-up reports of ADEM's record, have started a major marketing drive by companies selling bottled water.

Ladies and gentlemen, the appropriate response to the very real problem of water quality is to seek meaningful ways in which responsible stewardship of this precious resource may be implemented, not simply looking for the shortest route to the nearest dollar. That is exactly the mentality which has led in large measure to our present dilemma.

Responsible stewardship of the ecology of our habitat must be a total effort. The monitoring and reporting requirements of the Federal Safe Drinking Water Act are simply one component in the total picture of maintaining safe water supplies. The cumulative impact on our ecology must be assessed as part of the total effort. The cumulative impact of non-point source pollution on a lake, river or stream must be considered in evaluating water quality standards before permitting industrial or municipal discharge.

Recently the Alabama Development Office let it be known that they were doing a cumulative impact study. Initial reaction from the conservation community was great appreciation for what we thought was a very responsible attitude toward the ecology. We soon learned however that ADO's purpose was to evaluate the cumulative impact of environmental regulations on industry. A perfect example of the importance of a total effort can be seen in Mobile Bay. A little at a time, some here, some there, numerous stress factors have been imposed on that delicate ecosystem. No one seemed to notice, or even mind too much that marine life resources were declining. In fact I am greatly puzzled at the lack of public outcry over the fact that we have virtually destroyed oyster production in Mobile Bay. There is historical evidence which indicates that area was at one time one of the most productive shellfish areas in the world. Yet within the past 25 or so years the number of productive oyster reefs in the bay has been reduced from more than 3 dozen to only 1.

Failure to consider cumulative impact, lack of a total effort, led to the biological destruction of the Chesapeake Bay, and has brought Mobile Bay dangerously close to the same fate. Hopefully someone has kept the plans for inventing the wheel. The question of water quality certainly must be addressed with a total effort, including full consideration of the cumulative impact from all sources on the resource.

"Non-point source" pollution has been defined with increasing accuracy over the past few years. In fact, most of the pollution referred to by this term is no longer from "non-point" sources. It is now a fairly simple matter to trace many contaminants to

their source. The knowledgeable use of chemicals and pesticides can indeed be accomplished with dramatic increase in efficiency and decrease in non-target contact, compared to just a few years ago.

It is clear that there must and will be considerable legislative attention focused on the problem of pure water, both at the state and federal levels. Last February the first comprehensive groundwater protection legislation was introduced in the U.S. Congress. The National Wildlife Federation legislative staff reports that in its initial form, Senate Bill 2091 would create a regulatory scheme for nationwide groundwater protection, requiring all major sources of groundwater pollution to be controlled by states. It is clear that so-called "non-point" source pollution is indeed a major source - and to the extent that it can be pin-pointed, it is going to be subject to regulation. The stated goal of the bill is "nondegradation of groundwater." Other bills in Congress seek to establish a federal framework for state groundwater programs, and to improve and coordinate groundwater research. Major conservation organizations have urged Congress not to let groundwater research legislation delay enactment of groundwater pollution prevention legislation.

The State of Iowa has become one of the first farm states to target agricultural pollution of groundwater, and the first to propose that polluters pay for their regulation. The Iowa legislature has called for a vigorous campaign to reduce the amount of fertilizer and pesticides applied in the field, and to assure the proper disposal of hazardous wastes. (Disposal of unused materials, spillage, and washdown of tanks and equipment accounts for far too much pollution on the farm.) The money for Iowa's program comes from a tax on agricultural chemicals and on toxic household materials such as wax and paint thinner.

Meaningful success has been recorded in the cleanup of many "point" sources of pollution. The goal of the original Clean Water Act - to make the country's freshwater 'swimmable and fishable' once more - has largely been met across the nation. Yet authorities in New York continue to warn the public not to eat more than one meal a week of any fish taken from any waters in the state.

According to testimony heard by a Congressional subcommittee last Spring, many fish in the Great Lakes region have high concentrations of toxic chemicals that could cause cancer in humans. Moreover, many of the fish suffer an exceedingly high incidence of cancerous growths themselves.

There is continually mounting evidence that groundwater is more vulnerable to contamination than previously thought. Early last year, the General Accounting Office released a report criticizing the EPA for its inability to regulate the handling of hazardous wastes. Less than 10 percent of the 5,000 types of wastes considered potentially dangerous are being regulated. Such wastes, handled improperly, are a leading cause of groundwater pollution. There has been great progress made in the way hazardous wastes are handled. For example, Chemical Waste

Management no longer puts liquids into its landfill at Emelle. They are first solidified to reduce the chance of leaching into the aquifer. This significant change in disposal methodology is but one of many advancements developed in the management and disposal of hazardous wastes.

Toxic materials handled by licensed and properly regulated disposal facilities do not pose nearly as much of a threat to the health and welfare of our citizens as do pollutants and contaminants which are not managed properly - including so-called "non-point" source pollution. I'm afraid we are living in glass outhouses when we view those who are endeavoring to properly manage and dispose of the toxic by-products of our lifestyle as villains. I submit to you that it is we who are the villains when we condone weak and inadequate regulation and legislation, or ineffective and inappropriate agency response to the total question of toxins in the environment. Are we not the villains when we persist in our business, agricultural and household practices in being a part of the problem instead of helping to find a solution?

Since we know that feed lots, and poultry and swine operations are in fact "point" sources of water pollution, it should be a relatively simple research project to find ways to reduce and control their impact on surface water and groundwater.

Since we know that cropland erosion is a contributing factor to water quality degradation, and since such meaningful progress has been made in recent years to reduce and control soil erosion, the challenge to extend this knowledge to the problem of water quality should be a welcome opportunity to apply technology we already have.

Land stewardship practices so effectively advanced by the Soil Conservation Service and other agencies might do well to include a conscious effort to address prevention of pollution of surface and ground water supplies. The old story of the farmer who told the fellow trying to sell him a book on how to be a better farmer is still all too true. "I ain't farmin' as good now as I know how," he said. I am convinced that we already have at our fingertips vast amounts of knowledge and technology as well as an unused supply of simple common sense, all of which put to good use might surprise us at how far it would go toward solving our problems.

Streamside management zones in harvesting forest resources have long been recommended, but seldom observed in actual practice. It is clear from observation that voluntary compliance with "recommended" management practices for the forest industry are not always sufficient to prevent serious water quality degradation. The industry itself is cognizant of the need for increased self-policing of good stewardship practices, both to avoid mandatory guidelines, and for the long term good of the ecology.

Some of the more apparent solutions might include researching alternative methodologies for existing practices, for example leaving uncultivated zones along streamsides. Such a practice

would reduce soil erosion, create a natural buffer between the stream and the application site where agricultural chemicals and pesticides must be used. Research might be focused on utilization alternatives for these zones. In the urban setting, strip parks and even properly planned residential developments might be considered. In the rural setting, economic benefit could be derived from creating wildlife habitat, and developing related recreational opportunities. Land use planning research should incorporate considerations of non-point source pollution. Most needed is an effective program to educate the public about viable alternatives which are available for many chemicals and pesticides both on the farm and around the household.

We must keep in clear perspective that while economic progress is a major component in the quality of life which we value, it cannot be isolated from the wise use - sound management - responsible stewardship concept which we owe to our environment. We must maintain a balance between economic expedience and environmental stewardship.

The forward thinking leadership which has brought us together at this time and place, and focused the best thinking of a diversity of minds on the subject, is indicative of a bright hope for the future. I call upon every participant to carry the message to the citizens of this state that this is an important and serious challenge we face. It must be addressed without allowing politics to dilute the effectiveness of the efforts invested; and it must become a basic objective of every agency, organization and group - indeed of every citizen.

SESSION IV

PANEL DISCUSSION

Doug Phillips
Let me briefly say a bit to wrap this up. First of all, I'd like to acknowledge the valuable efforts that the Agricultural Experiment Station has put into organizing and carrying forth with this session. It's badly needed in the state, I'm just pleased to see the turnout. Dr. Taylor, as you heard, says things are not as they should be in the state. If we have the best available management practices, then why is there so much evidence of a problem yet? Dr. Passerini notes that our problems are more complex than sometimes our immediate solutions would suggest. They go beyond a quick technological fix. We need a new perspective, an ecological systems approach. Dr. Schofield suggests, in addition to other things, that a fair amount of the problem is in the way we live. We need public awareness, public understanding of the complexity, we need society's role in it, if we ultimately want to achieve a proper perspective towards total stewardship of the resources. Within that context, we will have the panel discussion.

Jerry Miller
Dr. Passerini, you presented some rather innovative solutions assuming technological advances in plant breeding, etc.. I wonder if you might address another side of that issue, and that is, how to convince the society, that maybe has a Burger King and McDonald's mentality and likes to eat monocot products, to accept these different products that you're suggesting to, maybe, base our dietary system on.

Ed Passerini
I'm not a sociologist, but I'll take a shot at it. One of the ways in which that happens is largely evolutionary. A lot of environmental problems do tend to be self-correcting. They raise problems along the way. For example, let's say we did get off the top of the food chain and ate less meat and milk and fish and so on. Yes, it might be healthier for us, but it's going to have a terrific impact on the folks who have built those products. I think for a while, range fed beef, for example, is going to remain important in feeding the population, but we probably have to move away from feedlots, to more range fed beef. As far as the public goes, the public is unfortunately, or fortunately, already beginning to understand that meat and milk aren't quite the terrific foods for them that they thought some years ago. A diet consciousness, a health consciousness is emerging in this country, so some of that is going to self-select out. Even McDonald's is offering salad bars and things like that now. And so that may solve itself.

Jerry Miller

Do you have any idea of the time frame to accomplish these things?

Ed Passerini
No. The predicting things in terms of human beings is a little bit difficult simply because a problem can be evident for years and years and years and nothing happens, and then all of a sudden people catch on and it turns around overnight. So no answers on that. It certainly will happen within the next few years because the problem has been building for so long.

Jacob Dane
We had several politicians here yesterday, and I'd like to quote Ann Bedsole, who chairs the Senate's Agricultural Committee. Mrs. Bedsole told us "Mobile Bay has never been so good." Ben Richardson, chairman of the Agricultural Committee in the House of Representatives, was also here and he made the statement that he was not going to pass any legislation until he had a consensus of all groups involved. Doug Schofield was talking about preventive legislation and I agree with him. Now I think it is a pity that these legislators are not here today. I think we should have locked them up until you had a chance to speak and then get a debate going. Could you comment on this?

Doug Schofield
I have to defend the lovely Senator from Mobile because she is a very dear friend, and I think I understand what she was saying when she said that Mobile Bay has never been better. There is a very positive side of that. Because Mobile Bay has sure been a hell of a lot worse than it is now. There was a time, not many years ago, when swimming was prohibited in Mobile Bay. The general quality of the water in Mobile Bay is much better now than it was 20 years ago, and yet, the marine life resources that are there are being depleted from a number of different factors at a very alarming rate. I cited the decline of the oyster reefs for example. The Gulf Coast Conservation Association is another citizens organization that is putting a great deal of effort into addressing the population of certain fin-fish species that are declining, and the great difficulty that we are having with the Corps of Engineers over their operation and maintenance plans and the disposal of dredged bottom materials and that sort of thing, for example. They wanted to fill in 2,000 acres of shallow bay bottom adjacent to the Brookley(?) Industrial Complex in 1986. That would have destroyed a large area of very important nursery ground for numerous marine life species as well as land-based wildlife. Fortunately we were able to get language into the 1986 water resources development acts specifically prohibiting that fill. So, yes, things are much better in Mobile Bay, and yet we take a good lesson from that, things are better in Chesapeake Bay today than they were 10 years ago, but that's not to say they are all right. Representative Richardson is also a very dear friend and an extremely knowledgeable politician, but I wouldn't describe him as being a very practical person. I would want to think, in

his absence of being here to defend himself, that the reference he made to consensus would be that he'd like to see those of us in the conservation community, or should I expand that term and say the environmental community, come to agreement among ourselves. I made some statements just a few moments ago, of which I'm quite sure that the learned gentleman to my left will take great issue with. For example, I don't happen to feel that chemical waste management is the villain, I think we are the villain, allowing such a weak enforcement in regulatory agencies to exist. So I believe that is the area of consensus that Representative Richardson might have been talking about, and in such case, I agree with him.

Ed Passerini
One comment, Doug is a absolutely right about Mobile Bay. On the other hand, there are also two other issues with respect to Mobile Bay. We've cleaned up a number of things there a lot. Unfortunately, some of that clean up is too little and too late, because the impact continues. The other problem with Mobile Bay, and other bays, is a kind of a time bomb. It is like the guy jumping off the Empire State Building and as he passes the 40th floor says, hey, everything is fine. The milfoil that is accumulating sharply in all our bays around here, which is clearly due to agricultural runoff, is eutrophying, is choking out the other marine life. This is a problem we've just barely begun to face. As far as the question about consensus is concerned, what you all should realize is that the conservation community, the environmental community, is indeed speaking with one voice these days. We are all lobbying together on similar bills. So that has been a wonderful bit of progress that has taken place in the last few years.

James Taylor
I'd like to comment on something. I think it was Jerry Miller, who asked how we can encourage people to change the lifestyle and how long would it take. When I'm not masquerading as an environmentalist, I masquerade as a professor of marketing, so that's my other hat. And one thing I wanted to say, addressing that question, is that sometimes, we assume that supply follows the demand, and it's not always that way. Many times the demand follows the supply. You can't buy a product until it is available. I think back to some of the great debates when I was a kid growing up. The assumption was that people wouldn't buy small cars, people wanted large cars. And during that time, when the American producers were saying that, the Japanese and the Germans were building small cars and people were buying them, and we still are. Our automobile industry is suffering from that. When the television was first introduced, people said, people will never buy it, they'll listen to the radio, because nobody is going to sit there in front of that tube and stare at it. They want to be able to get up and walk around. Clearly, you know, when the product was actually introduced, the sales of televisions since

belie that argument. I would suggest that people don't buy acorn bread because nobody sells it. A lot of people don't purchase vegetarian meals in restaurants, except for salads, because they're not available. If you try to find them, you would understand. The demand is there, it's just that nobody has helped encourage it by finding the supply.

Jerry Michael
I'd like to follow up on Dr. Dane's question. You said 20 years ago, when you couldn't swim in Mobile Bay, apparently there were a lot of shells and reefs for oysters. Water has been greatly cleaned up now and we have only one reef left. There is an apparent contradiction there and I think I hear you offering eutrophication as the explanation for that. Is that real or are there other reasons for that, not related to water quality?

Doug Schofield
There are many reasons not directly related to water quality. I used that example to illustrate the importance of a total approach. The fact that cumulative impact of all of the stress factors that have been imposed on Mobile Bay, for example, must be taken into account when addressing that. One very direct and specific reason for the absence of oyster reefs now is the fact that we've been dredging the shale and selling it for a nickel a pound for so many years. I mention this as just as another case in point.

Jerry Miller
I'd like to follow up a little further on that. We've been in the business of polluting throughout history, probably at a much accelerated rate in the last 40 or 50 years. I remember, Dr. Taylor, you said that even though the state had, in their assessment reports, said that they had in place best management practices etc., that still in the report they discussed a severe pollution problem in a number of bodies of waters in the state. Even assuming that we did, in fact, put in place the best management practices today, given that we have been accumulating this waste for a long time, realistically, can we expect to see sharp turnaround tomorrow, next year?

Jim Taylor
But it needs to happen as soon as possible.

Doug Schofield
I'm reminded of the story, as you were winding up your question. It reminded me of the story I heard a preacher use one time about the fellow who was having trouble disciplining his child. Every time the child would misbehave, he'd go and drive a nail into the gate post at the end of his walkway. Then when the child would do something good, he'd go and pull a nail out, but there was always a nail hole left.

Jim Taylor
Jerry, one comment. Congress did set up a time frame of four years. I'm not suggesting that that's realistic or not realistic, but that sort of implies their intent wasn't that automatically, tomorrow, we are going to put this into effect. And then the day after, the problem's going to be gone. The whole idea was to give us a time frame to take care of it. To be able to do it within four years, if it's possible, we've got to start tomorrow.

Tom Gilding
I have some questions for Dr. Passerini on the graphs he drew. On what crops are they based? Do they apply to crop production in Alabama? Does it also mean that the yield per acre is declining? And are you also saying then, that without the use of agricultural chemicals, the profits would be better?

Ed Passerini
Those are weighted averages for all food crops in the United States. I am sure Alabama would vary somewhat from that but probably not a great deal. In terms of yield per acre, no, of course, yield per acre is quite good. One of the reasons for that, of course, in recent times has been agricultural chemicals. The problem today is in terms of the cost of those agricultural chemicals in maintaining a profit level, a bottom line consideration. What we are finding is that those farmers, who are moving toward integrated pest management and integrated cropping, are maintaining their profits. They are going bankrupt at a lower rate than those who are using intensive practices.

Vic Payne
A couple of folks did either raise the question, I think Dr. Turner asked, why are these practices not implemented. Dr. Schofield mentioned that we have the technology and that we ought to be applying it. With regard to animal waste, which we, at the Soil Conservation Service, deal a lot with, there are certainly problems out there. I think Dr. Taylor's figure was that about 1100 miles of streams were possibly impacted by agriculture. In a recent study, that we did in conjunction with ADEM, the potential impact from agriculture might be closer to 6 or 7 thousand miles here in Alabama. That's potential impact. But with regard to applying these practices, there's a certain amount of cost involved. There are some cost share programs, but in the hog industry in particular, probably 90% of the hog producers are small scale producers, who produce about 45% of all the hogs in the state. The net income for these folks is probably about $3000 to $5000 a year. Usually they are part-time farmers. A lot of them do have pollution problems. Now, the problem for these folks is, again they produce 45% of all hogs in the state, if we regulate and tell them they have to clean up, that could put a lot of these folks out of business. The question is, who do you think should pay? Now, these folks who are making that little money, if we ask them to put in a waste management system, again using

this available technology we're talking about, it would cost them 15 or 20 thousand dollars. They just couldn't bear that cost. So, the question is, who should pay?

Ed Passerini
Well, I've got to start on that because, as it happens, one of the conferences last week was with some hog producers in north Alabama, and one of the biggest problems that they are having are indeed their sewage lagoons and runoff from those sewage lagoons and what happens during a storm, and all that. The solution in general that these folks were advocating was less intensive hog production. Another problem they were having was diseases, due to the intensive management or factory conditions under which they had been producing their hogs. A lot of them were letting their hogs out, letting them distribute their defecation a little more widely, rather than having a kind of a feedlot management technique. I don't know whether this is going to work over the long run, but it's an interesting experiment, and it was interesting that the hog producers came to those kinds of conclusions. They would have less disease among the hogs. At the same time they would have less of a runoff problem and all that, if they managed the hogs a bit less intensively.

Jim Taylor
I'd like to add one thing to that. You know, the example of building waste treatment facilities you gave is a control procedure. Control procedures typically are more expensive. A less expensive alternative is to change the density of hogs that you have and change your practices. The proximity to the water of your operation affects the extent to which it becomes a pollutant or a nonpollutant source. So maybe these are some of the things, among others, that we ought to look at. The slope of the land is another factor to consider. Now there's nothing that says that everybody's going to have to go out and have a little wastewater treatment plant for their hog operation as the only solution. There are other solutions that we need to look at, other than just those control mechanisms.

Vic Payne
We're well aware of the kind of things that are going on out there. You are talking about intensive operations rather than these small scale operations. You know, in the Bear Creek Watershed, up in Franklin and Marion Counties, we were just amazed. We had to close a whitewater rafting stream up there because of these hog operators. These are small scale operators. They have their hogs down there under the bluff. We've seen many of them would have a fence right on down to the stream, you know, loosely, we call it pastured hogs. There's not a blade of grass out there when you get a bunch of hogs out in a place like that, and have a fence across a stream and that stream becomes the place where they drink the water and ends up being a source of pollution. But, you still didn't answer the question. Who pays?

Doug Schofield

Let me address it. The Alabama mafia tried to deflect it, so I'll just take it. Let me back up and take a running start at it, though, hopefully being able to hit it with enough impact to move it a little bit. Soil Conservation Service has probably achieved one of the greatest records of conservation in terms of reversing soil erosion, and their practical accomplishments certainly are the basis for a lot of lessons. There is no one fix, that would apply equally to all installations. But there are places, as Dr. Taylor indicated, where their proximity to streams allows the implementation of a buffer zone for example, or where the utilization of an artificial wetland as a waste treatment disposal alternative certainly could have some beneficial aspects. But who pays? We spent a great deal of time and energy wrangling with this question of discharging drilling mud and the effluents from off-shore hydrocarbon exploration rigs in the Gulf of Mexico and particularly in Mobile Bay. In Mobile Bay we have zero discharge. Now, by agreement, since the legislature chose to remove the regulation, who ought to pay for that? In Mobile Bay on an Exxon rig, you will find that there are very carefully constructed gutters to catch every drop of rainwater. It is against the operating rules to even allow a drop of perspiration to fall off your head and go overboard on one of those rigs--it goes to that extreme. Exxon alleges that it costs between 1 and 4 million dollars per hole. Who pays? The oil industries have greatly resisted controlling these discharges and have said, we want to be able to discharge drilling mud and treated wastewater, etc. into the marine environment. And we have come back and suggested, well, perhaps it could be paid for with some kind of break in the severance tax. We don't have the answer to that question either. But it's a cost of doing business. And costs of doing business are ultimately passed on to the consumer.

Ed Passerini

I'll take another quick shot at it. Robert Frost has a poem called, "Provide, Provide", and at the end of it he says, the last words are, "Provide, Provide", and then he looked up with an impish twinkle in his eye every time he used to read the poem, and say, "Or somebody else will provide for you, how would you like that?" Whether it's hog farming or oil platforms, or anything else, the question is whether or not the industries themselves will take intelligent, voluntary action, in which case they'll probably arrive at a least cost solution. So there won't be as much to pay on anybody's account. If that least cost solution happens also to be an environmentally sound one, then I think we all win. If they don't, then of course there are going to be regulations, and as we know, sometimes the regulations aren't the most intelligent things in the world, and it costs more, so everybody loses. So I would say, it's "Provide, Provide, or somebody else will provide for you."

Jim Taylor
It seems like we got a roll going, everybody wants to comment on that. Sorry about that, Vic. You know, all the discussions on these type of issues always center on the cost of taking action and cleaning up. There's another cost that we haven't mentioned. That's the cost of not taking action. And I am always amazed when we talk about something like acid rain, for example. Somebody will always get up and talk about your bills going up. Well, what they don't talk about is the other cost of not taking action, and the additional money you're going to pay for housing, because of shortages of lumber and the additional money that you're going to pay for products because business people have to modify and renew their buildings because of the erosion, the additional health cost, I mean there are vast amounts of cost of not taking action, so we can't just look at one side of it and say, well who's going to pay, the public or the industry, or the government, or what have you, which is the public. We've got to look at both costs, not just one.

Kevin Watson
I'm at Auburn University, but I'm also from Virginia and I would like to take issue with you about the Chesapeake Bay. Virginians have started to clean up the bay. We've outlawed phosphates and we've done a lot of other things, a lot by public referendum, and I'd just like to state that for the record.
My question is, how do people become informed enough to make decisions on these referendums? This symposium will get a small article on page 3 of the newspaper, probably, and no one will ever learn anything except the hundred or so people that come through these doors. There are 20,000 kids on Auburn's campus, and there are maybe 50 of us here today. How are you going to get the message out, and how are you going to get the people to learn?

Doug Schofield
Thank you, Kevin, and you are absolutely correct. Things are better today in Chesapeake Bay than they were 10 years ago. But it has cost millions of dollars. And Chesapeake Bay did have to die biologically--completely--before there was sufficient public outcry to say, wait a minute folks, we messed up. We're going to have to try to put it back like it was, and yes, the story of recovery is a beautiful. It is a glowing story of success of what we can do, but we use that as an example of saying, why go to that extent and then have to pay the cost of not taking action earlier, as Dr. Taylor indicated. And that's the reason I sought that example. But yes, your lovely state is certainly making a great comeback. The public information question is one of the main points that I suggested as a means of addressing this problem, and that is, creating more awareness of viable alternatives. I am seeing, by the way, an awakening of awareness among the public media. We probably got more TV coverage on this drinking water violation thing, that the National Wildlife Federation started week before last, than on any real significant environmental issue

during a dozen years. I really am optimistic.

Ed Passerini
The Chesapeake is improving, there are fish in the Thames River, there are fish in the Merrimack River, which didn't use to be there. The Kiahoga River(?) no longer catches fire. We are very much encouraged by these things. Nonetheless, they are nowhere near what they used to be when the early explorers first went up the Merrimack, and camped on its shores. They were kept awake at night, because of all the leaping salmon. We've got a long ways to go. As far as referenda goes, sadly, Alabama does not have referendum government. So unfortunately, we don't have that option. We must work through our legislature. As far as ways to get it beyond the hundred people in this room, there are dozens of ways. You all go out and do some teaching. Certainly the people on this stage are willing to come and chat at the drop of a hat, join the Sierra Club, the Alabama Conservancy, the Wildlife Federation. All of these are ways in which we can multiply the impact which we'd like to have.

Doug Phillips
It's about time to wrap it up. Probably, as an environmental educator, maybe I could add my two cents worth on this particular point about how do we make the people aware. The kind of activities as we have here today are a first step, of course. I think also, sometimes, the way we think about the problems interfere with continuing to press through with the solution and with the public awareness. It concerns me a bit when I hear questions about, who's going to pay, and how do you get the public to buy a product. As Dr. Taylor was saying a while ago, that's going to cost the manufacturer up front before the demand is established. I sometimes wonder, and those are definitely fair questions, and working out the solution is critical, but I sometimes wonder if we don't really mean, well, I'm not going to pay, and therefore, I'm scared to really delve into the solution. I'm not implying that anybody who raised those questions today is suggesting that. But what I am, I guess, warming up to, is that the problems are evident, but we know somebody's got to pay. The big point, which has been repeated throughout, is that Alabama would like to beat the record, so to speak. Let's not get as bad as Chesapeake Bay, where we all have to pay severely at that point. Public awareness, public education can be most instrumental. The importance of this kind of session is, as the youngster from Yankee land almost was trying to suggest, the ongoing awareness, which is of prime concern. And I think rather than have a session like this and let it die and we all go about our happy ways, there really needs to be a formal, official continuing structure for this type of dialogue. I think as you heard from these three speakers today, and during some of the interaction, not only are these major issues, but there are major differing perspectives as what the correct approach is. Some folks even have different data regarding the solutions. Yet the

fact remains, they're major issues, they have major implications for our future, and we've got to get down to brass tacks to figure out here and now which data applies, which data needs yet to be gotten, and whose perspective is really most appropriate. That goes way beyond just coming to a meeting and me giving my perspective, you giving yours, and we go home and say well, I was right and they were wrong. It requires a kind of, I think, innovative interaction and dialogue that has been woefully lacking in the past. Perhaps this is a first step, but I would recommend to those in power that a continuing structure be maintained to really delve into the issues and the answers. Before I forget, by way of public information and awareness, I'd like to mention our public television program, Discovering Alabama ...

SESSION V

AGRICHEMICAL INDUSTRY

Presiding

Dr. David H. Teem
Associate Director
Alabama Agricultural Experiment Station
Auburn University

MANAGING PESTICIDES AND GROUND WATER: INDUSTRY'S RECOMMENDATIONS

Thomas J. Gilding

Director of Environmental Affairs
National Agricultural Chemicals Association

The National Agricultural Chemicals Association (NACA) supports ground water protection programs for pesticides which are designed to: 1) protect public health and the environment; 2) minimize pesticide movement into ground water; and 3) maintain agricultural productivity. Fostering these criteria, NACA has adopted prevention as its primary ground water protection objective. This, we believe, is very much achievable through the use of good management practices by pesticide users and product stewardship programs of pesticide manufacturers. Product stewardship, on the part of manufacturers, plays an important role in the definition and implementation of management practices for users, and in the design and improvement of new pesticide products with respect to the potential for leaching.

In order for ground water to be effectively protected from any potential source of contamination, the exact causes of contamination must be properly identified and understood. With respect to pesticides, it is important that greater attention be placed on finding out why any pesticide that is detected in ground water got there in the first place. If we are to prevent future occurrences of pesticides in ground water, then the causes of past occurrences must be properly identified and corrected. This is true whether occurrences are the result of actual pesticide use according to label instructions, or are of point source origins such as spills at vulnerable locations where they are mixed prior to application, waste disposal practices, or the results of substandard well construction.

As our understanding of the extent and causes for pesticides getting into ground water improves, our attention must focus on those areas which are most significant in risks to health and the environment. It is extremely important that in designing and implementing ground water protection programs, emotions and incorrect perceptions be kept to a minimum. Emotions must not replace reasoning.

To effectively manage the safe and beneficial use of pesticides and protect ground water, pesticides must be evaluated on a product and site specific basis. To do otherwise, would only mean sacrificing the quality of effective ground water protection strategies and the possible removal of pesticides as viable economic tools to agricultural producers in areas where such action in reality would not be warranted.

Pesticides, among themselves vary widely in physical, chemical, and toxicological properties. Two recognized properties which greatly influence a pesticide's potential to leach or not to leach into ground water are: 1) the rate that it degrades in

the environment; and 2) its ability to attach to organic materials in the soil or soil particles. It is these two properties in combination with certain properties of soils, i.e. organic content, porosity, etc., that hold the key for developing strategies for managing pesticide risks to ground water. Whether an aquifer actually exists at a specific site and its depth below the surface, including the levels of natural protection available to it, are equally important considerations when determining the potential for any pesticide to reach ground water.

Providing pesticide users with the proper information to assure the safe use of pesticides relative to ground water protection is the overall thrust of manufacturers' product stewardship. Obviously, the major issues associated with the implementation of effective user communication programs center around: 1) the kinds of decisions that pesticide users should reasonably be expected to make; 2) the type of information necessary to support their decision-making needs; and 3) the respective and coordinated responsibilities of the U.S. Environmental Protection Agency, U.S. Department of Agriculture (Cooperative Extension and Soil Conservation Services) and manufacturers in developing and disseminating information to pesticide users.

The overall goal in providing information to pesticide users is for them to achieve a working knowledge of the pesticides they use under the kinds of environmental and use conditions represented in their agricultural operations. The relationships and effects of the soil types, rainfall (or irrigation practices), and methods and timing of application on the mobility of pesticides are of particular importance. Of overall significance, is to provide the pesticide users with an ability to recognize conditions and locations on their lands where ground water could be susceptible to contamination.

In registering pesticides with the Environmental Protection Agency (EPA), manufacturers generate extensive information on the environmental and toxicological characteristics of their products. Part of this data requirement includes the environmental fate properties, mobility, and degradation. Manufacturers can be the source from which pesticide users obtain environmental fate information, but in order to make this information meaningful to the specific use conditions at a given application site, the relevant soil characteristics and ground water vulnerability assessments must be known. Perhaps assistance from local officials, such as Soil and Water Conservation District representatives, could provide the necessary expertise for this need.

More recent ground water monitoring programs conducted in various states are indicating that point sources are significant factors for pesticides getting into ground water. As such, it is essential for manufacturers to work with pesticide users to define sound management practices to prevent those situations or conditions responsible. NACA, along with representatives from federal and state agencies, pesticide user groups, and academic

researchers, has been actively involved over the last four years in defining waste management strategies for empty pesticide containers and application equipment rinse water. Written proceedings from two separate national conferences were published by EPA. A final report on four regional workshops which were held as follow-ups to the conferences is also available.

The term "prediction technology" is being referred to more frequently as the important management tool in ground water protection. NACA is focusing its attention to advance this technology as a viable management tool for assuring the safe and beneficial use of pesticides and the protection of ground water.

Prediction Technology involves using our knowledge and understanding of the physical, chemical, and biological processes involved in the degradation and mobility of pesticides in the environment. This can be done through simplistic numerical index models or more complex mechanistic models with the aid of computers. The success of prediction technology techniques is solely dependent upon having a realistic representation of the complex interactions that take place between pesticides and soils without exceeding the limitations of the specific technique used.

Computer modeling can provide the most realistic simulation of the leaching characteristics of pesticides under specific application conditions. Within computer modeling, there can be a wide range of sophistication and applications. There are some basic models that only have value as educational tools, while more complex models can be used to evaluate alternative management practices or make regulatory risk assessments. Models are also being used by manufacturers in their research and development programs on new products.

For manufacturers to specifically design new pesticides with minimal leaching properties is frustrated by the fact that other criteria must also be considered in the commercialization of pesticides. Solving the defined pest problem, health and safety factors, and adaptability within existing crop production systems, are but a few examples. In addition, the process involved is time consuming and extremely costly.

It is estimated that as much as 10,000 individual chemicals fail a screening process for every product that is successfully registered and commercialized. Deciding to commercialize a pesticide means that the manufacturer ultimately may have to commit to spend $30-$40 million or more for research and development, not including costs to build new or remodeling existing production facilities. The time from initial screening, through research, development, and final EPA registration approval normally takes 8-10 years.

NACA is committed to the protection of ground water. We recognize that this is a goal we all share. Likewise, preserving our nation's agricultural productivity is also a goal we all share. These parallel goals are complex, but achievable, provided that the problems and their solutions are clearly defined along with commitment and responsible action on the part of all.

A statement in a video program, "Ground Water and Agricultural

Chemicals: Understanding the Issues," recently released by the American Soybean Association and the National Corn Growers Association, summarizes to the point what needs to be done. The statement is "In balancing the parallel needs for protecting ground water and preserving agricultural productivity, it is important that the agricultural community recognizes that this is simply not a productivity issue. The millions of people that are served by the bounty of America's farms must recognize that it is simply not an environmental issue. The best interests of all parties are served when ground water is aggressively protected and agricultural productivity is maintained."

Arthur W. Gardner

President

Alabama Agricultural Chemical Association
Rt. 1, Box 322A, Fosters, AL 35463

On behalf of the Alabama Agricultural Chemical Association (AACA), I appreciate the opportunity to be with you today. The AACA is an industry trade association supported by businessmen in Alabama with common interest in agricultural enterprises that result in more economical production of food and fiber for mankind. Recently, I had a chance to look up some facts and figures of how much agricultural chemicals benefit farmers as well as consumers. If pesticide usage was to stop today, food production would drop by as much as 1/3. If food production drops, food prices go up. A 10 % drop in production can cause as much as a 15 % rise in food prices at the retail level. One thing that the United States has done better than the Japanese is to keep food prices down. In the U.S. only 11 % of the average disposable family income is used for groceries. USDA studies showed that farmers have been able to reduce production costs by 11%, of which 7% was through herbicide use versus mechanical weed control. Tests have shown that pesticide usage has increased potato production by 35% and cotton production by 100%.

Throughout my presentation I will be using the term CHEMICAL very loosely. When looking at agriculture and groundwater, many different chemical substances can reach groundwater under certain conditions. So, when I use the term chemical, I may be referring to fertilizers, pesticides, fuels, household products, animal wastes, and many other substances.

There is a growing tendency or desire today to come up with a very simple chemical rating system to predict the likelihood of a chemical reaching the groundwater and which is acceptable by leachers on one end and non-leachers on the other end of the scale. However, in the real world, it isn't that simple.

You must also look at the environmental and management practices, and how all of these fit together. If you don't have the right fit, then the likelihood of deeper leaching certainly increases. Let's take a look at each one of these factors in a little more detail.

First, the chemical parameters. There are many different layers between the soil surface and the groundwater. Each of these zones may be subjected to different processes and may have different properties, which are important in determining the behavior of a chemical. For example, at the soil surface breakdown by sunlight is important, but below the surface it is no longer significant. In the root zone, aerobic microbial action is important, but if you move below the root zone, where the oxygen supply is much more limited, anaerobic microbial degradation is more important. In the groundwater zone, hydrolysis may determine if the chemical persists for any length

of time. Therefore, if you want to assess the likelihood of a chemical moving through the entire profile, you need to be asking questions about how it will behave in each of these zones.

Next, let's look at the environmental parameters. Rainfall is probably the most important one, because it is the source of water that is pushing the chemical down to the deeper layers. Not only is the amount of rainfall important, but also the distribution and the intensity. We generally would expect to find greater depths of leaching in areas where heavy rainfall events occur frequently during the application season. Temperature is another environmental parameter that needs to be considered, because it affects the rate of breakdown of most chemicals. We expect chemicals to break down faster in the warmer months than in the colder winter months. Evaporation is also important. As water evaporates from the soil surface, soil water, along with the chemicals it contains, will move toward the surface. So, chemicals can move downward and upward in the field.

Within the soil, the texture, the permeability, and the organic matter are key factors influencing the leaching of applied chemicals.

At a particular site, the depth to the aquifer is very important. For example, the chance of a chemical reaching the groundwater is obviously much greater if that groundwater occurs at a depth of 2 feet compared to 200 feet.

Let me illustrate the effects of rainfall and soil type on the leaching depth of a hypothetical chemical using the Pesticide Root Zone Model developed and still maintained by the EPA. First, let's look at rainfall patterns. This slide shows the total monthly rainfall in 2 areas from a month before application until a month after harvest. During this time period the amount of rainfall in Area 1 is 1.5 times the amount in Area 2. No numbers are used on the rainfall scale since we're not interested in absolute values, but in the relative changes in leaching caused by the differences in these two patterns.

Our hypothetical chemical has a KOC-value of 100, which means that it is moderately mobile. The half life of the chemical in the upper part of the root zone of the soil is 45 days. To maximize the amount of chemical available for leaching I've minimized other routes for loss, such as photodegradation and volatilization. Also, runoff losses are not a concern.

Here we see the predicted leaching patterns for our chemical in a loamy sand soil type. The difference in rainfall patterns is the sole cause for the difference in the leaching patterns.

Now, let's look at soil conditions, because they not only influence the speed of movement through the soil, but also the amount of adsorption of the chemical. We'll consider two soil types, one being a loamy sand soil with low organic matter content and the other a silty clay loam soil with high organic matter content (< 5%). The predicted leaching patterns of our hypothetical chemical show that the higher organic matter and clay content in the silty clay loam soil restricted the downward movement of the chemical.

Let's now turn to some of the management parameters that influence leaching. Crop, tillage, irrigation, and chemical application rates and methods are above ground factors to consider. Drainage conditions within the soil and the cropping and tillage history influence the permeability of the soil and the organic matter content, which in turn influence the leaching of chemicals.

An interesting and important question is what would happen if four times the recommended rate was applied? Our pesticide root zone model predicted that for the loamy sand soil (Area 1) the higher rate resulted in a greater depth of movement and that the chemical was present in the soil for a greater time period. This is important, since the longer the chemical is in the soil, the greater the chance for additional heavy rainfall to carry the chemical down even further. The bottom line is that using the recommended rate is the only way to go.

An atypical situation to consider is a chemical spill. You can think of a spill as an application at an incredibly high rate over a very small area. Assuming that the quantity to be used over an acre is spilled in a 4 - 5 square foot area, there is a the dramatic effect of the spill on the leaching pattern compared to the normal application pattern. Preventing spills is one of the most important steps that can be taken to prevent chemicals from reaching groundwater.

The important question is, of course, how to prevent chemicals from leaching to the groundwater? In other words, recognizing that many factors influence the leaching process, how do we determine whether or not a chemical will move through the soil and possibly reach the groundwater. Let me attempt to answer this by reviewing the following steps.

- Evaluate the area. Map the area and pinpoint sites which have a higher leaching potential, e.g., wells, springs, sink holes, deep sand soil types, etc.. Be especially careful handling and applying chemicals in those areas.

- Evaluate your operation. Discuss the consequences of certain mechanical control methods compared to chemical control programs with local personnel of agricultural agencies.

- Evaluate the product. Technical information sheets exist on every pesticide available in the U.S.. They contain information about the chemical and the toxicological properties of the compound along with discussions on its environmental characteristics, including expected leaching patterns in the field.

- The most important step is to evaluate the total package. Determine if you have the right product, rate, and management practices for the soils and environmental conditions at that site. Our goal with the farmer is to

find the right fit.

In conclusion, when you want to assess water quality in Alabama from the standpoint of non-point source pollution, you must remember to evaluate the total package, i.e. the product, the use or management practices, and the environmental conditions. You can't look at just one aspect alone, but you have to consider all three and how they fit together. The best way to insure an environmentally safe operation is to be sure that you have the right fit of all three factors.

Thanks for your attention.

SESSION V

PANEL DISCUSSION

Jerry Michael
Tom Gilding said that we need better environmental base data. I'd like for him to expand on that if he could. Does he mean that we need more site specific data, for example more field data, or is he suggesting that we need more laboratory data, i.e. more basically applied?

Thomas Gilding
We need more real world data. For years EPA has required companies to submit environmental data. But how do we relate that information, some of which was determined in the laboratory, to e.g. Auburn, Alabama? So, I am trying to address the conditions that a pesticide is subjected to at the site of application, because there is quite a lot of variability across the country, as well as within local areas.

Jerry Miller
First, I'd like to commend you on what you said. I think if we would implement those things on a large scale there would be considerable improvement. However, I do see some problems, since a number of characteristics that are important to chemical transport through the soil are not readily recognizable from the surface. So how are we to go about it? It is just unrealistic, cost wise, to go out and evaluate every site like we do for solid or liquid disposal.

Thomas Gilding
I think some of this information is coming out of the EPA strategy and I think a lot can be accomplished by looking at the properties of your pesticides and your soils. Regarding soil properties, you can get a lot of information from your soil survey. That allows you at least to do some screening. I think the other important obvious thing is the water table. The state geological survey has information about the locations and depths of aquifers. During my presentation, I didn't mean to say we're all there. But I do feel that a lot of this information is available. It is just not in the proper hands or being used properly. Maybe we need a better information system.

Jerry Miller
Some of the screening models you referred to have been used to make wide area predictions. Of course, these models are helpful in the sense of an overview, but they're not very useful to the individual operant in the field who is applying the chemicals.

Thomas Gilding
Do you not think that a person, a land steward, if you will, knows his land, that he knows where the water, the groundwater, the height or depth of it from the surface is, or where something is vulnerable?

Jerry Miller
I think that can be questioned, yes. For example, somewhere in the midwest it was assumed that water moved straight down, but it was actually diverted by some unusual rock formations.

Thomas Gilding
The only thing I said in my talk was, that you can look for areas where you might have a red flag, such as a stream. Therefore, in those areas, you should be able to sort out whether or not you may have a problem. The red flag should trigger maybe further detailed assessments. The question then arises who will provide the necessary information. Well, there are the SCS, the Extension Service, whatever, but I guess I'm suggesting that the information be properly put together so we can hopefully improve our decision making process.

Ed Passerini
Mr. Gardner said if pesticide use were to stop today, production would drop as much as one third. I noted the "as much as", but I read a series of monographs (rather definitive monographs) from Cornell University on energy and soil chemistry in the United States, and the conclusion of those monographs was that if pesticide production were to stop tomorrow, production would drop as much as 3%. Would you comment on the sharp difference in those two estimates.

Arthur Gardner
That was from data I had received through the USDA and National Agricultural Chemical Association.

Jacob Dane
I agree with Mr. Gilding that we have to look at the vulnerability aspects of groundwater contamination by pesticides, but who's going to fund this type of investigations? Should the cost be borne by the chemical industry, government agencies, universities, or should it be a cooperative effort?

Thomas Gilding
You're saying site specific to a farm?

Jacob Dane
Not so much site specific as well as maybe related to soil classification. We have classified many soil series across the country, and we could start to relate these soil series to contamination vulnerability. For example, we could investigate how fast certain chemicals move through soil profiles of different soil series.

Thomas Gilding
I think that for a specific farm there should be enough information relative to types of soil as well as depth to groundwater, and it should not be too costly to obtain that information. My point is that this information exists, we just don't have it put together in the proper information systems. Now, you seemed to say that we do need a system, so that, if you

have a specific pesticide of which you know such properties as structure, persistence and degradation rates, you can relate that information to the various soil properties and come up with a number 10, 9, 8, I don't care what, to indicate its potential for leaching towards the groundwater. To me that seems unnecessary, and maybe I'm wrong, but I do think most farmers do know their soils. Some of them may need some help to determine the depth to the groundwater table.

Jacob Dane
I don't think your first step is too difficult, the chemical companies will provide us with the chemical properties of the pesticides and we can easily do laboratory experiments for determining adsorption, desorption and leachability. But when you take that information to the field, it often doesn't perform like you're expecting it to perform.

Thomas Gilding
I agree with that statement. We have the responsibility to provide the information on how a pesticide will behave in given environments. We cannot control, however, how and where the pesticide is going to be used. It points out, again, that we have to work together. I don't know who should be involved, the SCS or the Experiment Station, I don't know.

Arthur Gardner
I'd like to make a comment along that line. My job puts me in touch with farmers during most of the year, and I see them realize a lot more about their soil than we, in this room, might think. They know where the weak spots are in their fields. When I say weak spots, I am referring to spots with soil types that are different enough from the rest of the field to cause significant yield reductions. Most farmers realize that it is a waste of money to put seed, fertilizer, and pesticides in those areas, and generally they won't. So it is not even a concern.

Thomas Gilding
I also have one more comment. I'd like to make a plea for better defining the information systems that we are talking about. We should also keep in mind that the decision making processes may not be the same for all of those involved. The registrant, the EPA and other regulatory agencies, and the pesticide user all have different objectives. We need to define these information systems with that in mind. I guess that's what I tried to say in my comments and my speech relative to the need to know the type of decisions that the pesticide user needs to make. We have to develop the information to support his decision making process. So I'm making a plea here to help define the necessary information systems.

Jacob Dane
I don't think we disagree at all at this point, but I think I heard you say that you need some real world data. Who is going to obtain that real world data and who is going to pay for it?

Thomas Gilding
Real world data about a pesticide that would save the pesticide registrants?

Jacob Dane
No, I'm talking about the leachability.

Thomas Gilding
If you mean specifically the leachability of a site, which could leach anything in addition to pesticides, I personally don't see why a pesticide manufacturer registrant should use that information. I mean if you are talking about a specific site where anything, whether it is petroleum, oil, fuel, or anything could leach. I think it is important for a person who is going to apply a pesticide to know that, given the property of the pesticide, and the conditions of the site, that he could have a problem. You can apply that across the board to any type of activity that goes on at that site.

Jacob Dane
I think that is why it is very important that we know the properties of the chemical and the properties of the soil, so, like you said, we can put the two together. Maybe certain chemicals should not be used at all on certain soil types.

Arthur Gardner
We agree.

Bob Mount
Mr. Gilding, the boll weevil eradication program caused some concern in this part of the country some time ago. When the environmental groups and the farmers filed federal suit to force AFIS to make an environmental impact statement, AFIS very quickly agreed to make the environmental impact statement and to cease their involvement in the program until the statement was completed. About a week later they announced that they would proceed with the program. I have pretty good evidence that the Alabama Farmers Federation and several of the other farm bureaus were involved in the lobbying process that got AFIS to change its mind and that the National Cotton Council was involved. I just wondered if your organization lobbied in Washington to convince AFIS that they should go on with the program?

Thomas Gilding
I, individually, can't comment. I'm not even aware of it.

Bob Mount
Fifth Amendment?

Thomas Gilding
No, ignorance is a better term. I'm not even aware of it, I mean, I'm going to be fair to you and fair to myself.

Bob Mount
Well, we have had a lot of fish kill because of it.

Thomas Gilding
Well, I know.

Ann Amacher
Since certain people have been asking me questions about drinking water quality, and I have answered them by using the League of Women Voters' "Safety on Tap" handbook on drinking water, I thought I better tell you that I am here in the function of state liaison for the League of Women Voters National Safe Drinking Water program. Since I do not represent a subversive group, I was sitting there thinking about 1959, when my husband and I, on the advice of the Agricultural Extension Service, took buckets of chlordane and crawled on our bellies under our house and tossed it out around the foundation. Years later we read that it was not such a good idea to have done that. What evidence is there that we are not going to have some more surprises about chemicals that are being registered today, maybe as substitutes for some that have been deregistered, decertified since I did my crawling around in 1959? My question is addressed to the chemical industry, the scientists, and the Extension people. I think it was the Extension that recommended that we use the chlordane, I'm not positive of that. By the way, I crawled around later and removed it. That is the kind of bad environmentalist I am. But, I figured that it might be coming up through my heating and air conditioning ducts, and that it would be better to get it over with at one time. I put one of these little surgical masks on while I did it. I believe in a little real life information into this setting here. I was encouraged by some things that were said.
Regarding air quality, I recently overheard at Wendy's some young people, who were going around tearing out ceilings and tiles because of the asbestos they contained. Well, I hope that the kind of research we are doing will avoid some of those toxic surprises. I'm not really sure about just small amounts of pesticides, but I want to know whether any amounts are bad to the people who are applying them.

Arthur Gardner
I'll try to reply to your comment about the chlordane and other persistent chemicals that are no longer registered for use. Let me say that current procedures in registering new compounds for pesticide use are much more stringent than in the past. The laboratory measurements are much more exact. We are now able to determine concentrations in the parts per trillion range, whereas years ago the technological limit of our measurements was in the parts per million range. Therefore, we are now operating as close to zero tolerance as we can in detecting concentrations of new products.

Ann Amacher
Are you saying that you produce more degradable products now,

products that degrade in the environment before they're taken up by the water?

Arthur Gardner
Yes ma'am, that would be a generality. I can't say that for every product, because all chemicals are different. My company makes a replacement termiticide product now that does last a long time when applied in the proper manner, but it should only by applied by folks that have been trained in proper application techniques. It is not a product that we want the general public to handle.

Conner Bailey
I wonder if I might follow up on the question of Ed Passerini. There is a big difference between 3 (Cornell University) and 30 (USDA and NACA) percent yield reduction. Which of these two figures might be more accurate? Are we talking about one or the other, or is there something in between? In other words, what is it that agricultural chemicals offer us in terms of productivity increases?

Arthur Gardner
The information I presented was assembled in 1986, I believe, by the USDA.

Jacob Dane
Several people, especially the producers, were saying that they want to have safe, non-messy chemicals. I think everybody would like to see that. It is, however, very expensive to develop these kind of chemicals. Do you feel that the chemical industry ought to be carrying the total burden? Do you know of any universities that are trying to develop pesticides that are completely safe to use? Does the chemical industry give money to universities to do this kind of research?

Arthur Gardner
I don't know of any compounds that are coming out of universities. Most of our chemical research is related to compounds that we are already marketing to the general public and on which we are already making a profit. But, if a compound was developed at a university, we would certainly offer any assistance that we can to patent that product for a royalty payment to that university.

Thomas Gilding
I would just like to comment that the marketplace should dictate the development of new chemicals. I am often asked why we can't come out with a pesticide that degrades as soon as you apply it. But you've got to consider several things here. For example, how is it supposed to affect the pest that it is being applied to? The fact is, and I think you incorporate some of it in the cost, that the effect of chemicals on groundwater is obviously getting much more attention during the development of new products than in the past. Application rates, for example, are becoming smaller. But you have to look at the marketplace. Rough

estimates are, and this is general, that it takes 8 to 10 years to go through the process of doing your tests, submitting the results to EPA and obtain approval (registration). It costs something like 30 to 40 million dollars to bring out a new product. The commercialization aspects, such as the size of the market, will therefore have quite a lot of influence. It is not just something you turn on. And I think another thing to consider is that, in general, only one out of about 10,000 chemicals that are being screened is successfully registered and commercialized. So it is a time consuming and costly process.

Tom McCaskey
Are there some new chemicals coming out that are safer? I am asking this question, because there is quite a bit of interest these days in genetically engineered microorganisms to take the place of some of the chemicals, particularly, I guess, to control some of the diseases in the soil. Are you people addressing that as well as the safety issues related to it?

Thomas Gilding
We, at NACA are not. But I think it is fair to say that several of our member companies are. Again, I think the marketplace will dictate in which direction we will be moving to best serve our needs.

Tom McCaskey
Well, will that come under your jurisdiction or will it be entirely under someone else's authority?

Thomas Gilding
I hate to say, there goes our future.

Ed Passerini
Just a quick reflection on what we were talking about earlier. There were a number of other reasons why the Cornell estimates were 3 percent. But mainly it was that the USDA had overestimated the effect of pesticide on production for many years. So what Cornell did, was to go out and do large scale studies in order to establish precisely what the numbers are. I'll be happy to pull loose that information for anybody who would like to have copies of it.

Arthur Gardner
One question, if you don't mind, Dr. Passerini. Where were those tests conducted? Were they done nationwide?

Ed Passerini
Yes, it was a national study.

Arthur Gardner
The twenty years that I have worked with Dow Chemical, of which the last five years in Alabama, have been interesting to me. Having lived in North and South Carolina prior to Alabama, I noticed a tremendous increase in the pest problem that Alabama farmers face as compared to the farmers in the Carolinas,

particularly with soil diseases (soil nematodes). It also has many more insect species that affect our crops. In fact, it is amazing to me that we still have farmers in south Alabama that want to grow cotton, because of the expense involved in controlling those pests. So, it is interesting, and I can take statistics and show you one thing and I'm sure you can take statistics and show me an entirely different thing.

Ed Passerini
I would certainly agree with you, say, with respect to pests in Alabama, especially on non-food crops.

Jerry Miller
We were talking a moment ago about safer products. I wonder, is the chemical industry today working on better targeting mechanisms. I know there have been some large advances in looking at active components of chemicals, but are you also looking at better vehicles to deliver the chemical to the target?

Arthur Gardner
As far as carriers of pesticides is concerned?

Jerry Miller
Right. In other words, to eliminate some of the broadcast applications.

Arthur Gardner
To relate your question specifically to my company, we have an insecticide compound that has a very broad spectrum of activity. Environmental conditions in Arizona and southern California, however, prohibited the sale of this compound in those areas because it would not stay where it was intended to be applied. This problem was caused by the very dry conditions in this arid region. We subsequently improved the formulation to the point that, when it was introduced this year, it worked exceptionally well. We try to do formulation research that will put the chemical to the best use at the lowest amount of active ingredient per acre applied. We don't want to sell more than it will take to get the job done.

Jerry Miller
This may be a little naive, but doesn't it work against your interests to reduce the output of these chemicals?

Arthur Gardner
Certainly. We are a profit oriented organization. We exist by making a profit.
Jerry Miller
Does that put a damper on your seeking better vehicles to apply the chemicals?

Arthur Gardner
We are always seeking something new to sell. A salesman likes to have as many tricks in his bag as he can tote, and it is

always nice to have a new trick. Something that is going to be more effective, yet doesn't harm the environment, and is very low in cost should be very attractive to everybody.

Thomas Gilding
I'd just like to add that, overall, the safe use of pesticide is very important to the chemical industry. You can talk about financial risk, you can talk about liability, you can talk about anything you want, but we are very much committed to the idea of safe use of pesticides. Safe use does include groundwater risk aspects.

Arthur Gardner
We recognize if we eliminate our market we are out of business.

Thomas Gilding
I also might add that NACA has been working with the agricultural research institutes on this off-target, or non-target drift, if you will, as it relates to the efficiency of application equipment. There have been some workshops about this problem. There was one just back in June. I think, the issue that you brought up involves everyone.

Arthur Gardner
Yes, I chaired a session at that meeting recently and, in Washington, on precision application of pesticides and I must say that there is a lot of interest in that area, but not nearly enough.

David Teem
We've had a good discussion, but it is time for a break. I'd like to, again, thank our panelists, and I'd like to make one comment myself. I've stayed out of this, intentionally, but one of the main things Tom Gilding talked about was commitment, and I'd like to make a comment about that. You can either be involved or you can be committed. I think, to a great extent, many of us have been involved, and that includes myself. We do a lot of talking, we are certainly interested. We talk about that we need to do something, but I'm not sure if we are really committed the way that we need to be committed. One of the things I heard about the difference between involvement and commitment was, that it is sort of like the bacon and egg breakfast--the chicken is involved, but the pig is committed. And Dr. Frobish, I'm not sure if we want to get quite that committed, but I am really pleased to see what has happened here today, and I think it does demonstrate a greater commitment.

SESSION VI

COOPERATING AGENCIES

Presiding

Dr. Lowell T. Frobish
Director
Alabama Agricultural Experiment Station
Auburn University

Water Quality - The District Prospective

Charles A. Holmes

President, Alabama Association
of Conservation Districts

The 67 Soil and Water Conservation Districts of Alabama which make up the Alabama Association have played an important role in protecting our soil and water quality in the past and will play an increasingly vital role in the future.

For those of you who may not be familiar with the Soil and Water Conservation Districts, I'd like to give you a brief history. The district movement began in the late 1930's. This movement came about as a result of severe widespread soil erosion problems in this nation. Much of the early soil conservation work was in the form of demonstration projects and was done by the Civilian Conservation Corps (CCC) and Works Progress Administration (WPA).

It was recognized that this method was inadequate for any kind of long range solution and was not reaching enough landowners to insure widespread application of conservation practices on the farms of this country. A proposal that a local Soil and Water Conservation District was the best organization to insure the farmer assistance was favorably considered by President Franklin D. Roosevelt and the Standard State Conservation Districts Law was sent to each governor in 1937. The District Law was signed by the Governor of Alabama, Frank Dixon, in 1939. Creating the Soil and Water Conservation Committee and allowing for the formation of Soil and Water Conservation Districts.

We've got over 50 years of experience in protecting the resources of our state. In fact, the Soil and Water Conservation Districts are the only sub units of state government at the local level which have the authority to protect our state's natural resources.

Water quality problems from non-point source pollutants can no longer be ignored. The expertise of the districts lie mainly in addressing agricultural related non-point source problems. 335 dedicated SWCD supervisors in Alabama create a unique situation that no other group enjoys. These supervisors create a conservation network that provides a vital grass-roots link to farmers and land users statewide. There is a district office in each county in the state. The district works closely with other agencies which furnish technical assistance in carrying the district's program to landowners. A good example would be the close working relationship with the Soil Conservation Service and Alabama Forestry Commission, and the technical assistance they provide. This arrangement has proven itself over the many years and allows for the districts to routinely work with farmers who have grown to trust the districts and rely on their direction.

The districts understand farming practices because they themselves are farmers and this strengthens their credibility at

the local level. Districts have a direct knowledge of local conditions and know where the problems are and how to go about correcting these problems.

Districts over the past 50 years have compiled an outstanding track record of developing and implementing conservation and water quality programs. Because of this past experience the districts are respected by the State Legislature. This can be illustrated by the passage of Act 88-602 this year which designates all federal funds for financial assistance to land users for non-point source pollution control be directed to the state Soil and Water Conservation Committee.

Districts provided the leadership role under section 208 of the Clean Water Act of 1972 in identifying those streams, on a watershed by watershed basis, which had been impacted by agricultural non-point source pollution.

Again this year, under Section 319 of the Water Quality Act of 1987, districts assisted in identifying the problem streams of our state, identifying the nature of the impact and identifying that segment of the streams impacted.

When congress sees fit to appropriate funds for this much needed program the districts will be there to fulfil our role in implementation. One of the most desirable methods of correcting non-point source problems is to put proven practices on the ground. These approved practices are called best management practices and the districts could be very involved in persuading farmers as land users to accept these practices through an education and coordination effort and could provide financial assistance to these farmers through a cost-share program.

Conservation Districts can provide valuable assistance in creating interest, organizing an effective effort, and coordinating a multi-agency and group involvement in solving NPS pollution problems.

The districts work very closely with federal, state and local agencies and conservation groups. We are proud of this relationship and the spirit of cooperation with which we all work. Cooperation is the key to achieving our long-term goals in water quality. It will take all of us working together to make the progress necessary to tackle the problems we face in water quality.

In order to have a successful water quality management program we need to include several elements. These are research, education, information, technical assistance and financial assistance.

Auburn University can take the leadership role in three of these basic elements including research, education and information. Most problems with pollutants, whether it be pesticides, fertilizers, sediment, nutrients or animal wastes can be solved by implementing proven best management practices. Effective educational programs can provide information on those BMPs economically employed to reduce the impact on water quality. Educational programs conducted through ongoing agricultural programs should focus on the statewide effort to obtain the

highest visibility possible for the role of BMPs in improving water quality.

In those areas identified as priority problem areas, more intensive educational efforts should be employed. Auburn could be active in promoting available educational material, encouraging landowners' participation, and writing new publications that will impact favorably water quality.

I would like to commend you for the programs Auburn is presently involved with in the water quality areas, including the resource management conservation farms, agronomic systems, best management practices, water quality education and animal waste disposal projects.

The research effort must be a continuous ongoing aspect of a comprehensive water quality program. We would hope that this effort could be expanded in the future.

It is time that water quality be stressed in the curriculum at Auburn. We need to be producing graduates who are equipped to address our water quality problems. Students need to be taught how water quality can be integrated into fully successful farming operations.

BEST MANAGEMENT PRACTICES
for
NON-POINT SOURCE POLLUTION

Jim Hyland

Alabama Forestry Commission

History

In 1987 the U.S. Congress enacted legislation known as the Clean Water Act of 1987. Section 319 of this Act deals with non-point source pollution, a part of which includes silvicultural activities (harvesting, site preparation, and roads). Also included are activities in wetlands. This act requires each state to prepare a non-point source assessment report and a management plan to be submitted to the U.S. Environmental Protection Agency (EPA) for approval. The Alabama Department of Environmental Management (ADEM) is responsible for this report in Alabama. The Alabama Forestry Commission (AFC) has been designated as lead agency for silvicultural activities by ADEM.

The Forestry Commission's task is to submit an assessment of silvicultural non-point sources, to develop Best Management Practices (BMPs) for wetlands, and redefine silvicultural BMPs. Keep in mind our overall concept is voluntary compliance of the Clean Water Act using an educational and monitoring approach (training sessions, brochures, videos, etc.).

The Forestry part of the Assessment was written and submitted to ADEM in March. One of the areas in the Assessment was identification of known water quality problem areas. We divided these into formal complaints, AFC monitoring reports, and Water Conservation District reports.

There were 3 formal complaints:

County	Watershed	Water Course	Category
Tuscaloosa	03160112070	Blue Creek	Harvesting
Bibb	03150202110	Caffee Creek	Harvesting
Crenshaw	03140301030	Conecuh River	Harvesting

All but the Blue Creek area have been resolved. ADEM is processing that complaint through its regulatory procedures. We have had excellent results in working with both the landowner and forestry sectors in correcting any problem areas.

AFC Monitoring

The Commission monitors forestry operations routinely throughout the year. Ten of these reports had notation on not following BMPs. These were:

County	Location	Category
Chilton	S34T24R13	Road, Harvesting
Elmore	S4T18R20	Harvesting
Fayette	S27T17R12	Road, Harvesting
Lowndes	S36T12R14	Road, Harvesting

Mobile	S5and6T1R1	Harvesting
Morgan	S36T6R4	Road, Harvesting
Perry	S3T18R8	Road, Harvesting
Perry	S3and4T18R8	Road, Harvesting
Washington	S18T3R1	Road, Harvesting
Washington	S16and17T3R2	Road, Harvesting

Soil and Water Assessment

Each Soil and Water Conservation District filled out a questionnaire on each stream and indicated if they thought there was a problem. Seventeen streams were listed as having "logging erosion" problems. The specific locations and miles of streams affected were not clear. We felt these areas would be covered when we prioritized the areas.

Identification of Potential Problem Areas

Another phase of the Assessment was to prioritize areas. We used a system based on the Major Land Resource Areas (their soil erosion rates) and the quantity of forest activity. Generally, a higher erosion rate and a high forest activity (volume cut per year), the higher the priority. The high priority watersheds will be where the emphasis on training and demonstrations will be intensified.

The second phase of the ADEM contract was a Management Plan to address how we were dealing with the priority areas. We will use two Best Management Practice standards. Silvicultural BMPs were developed in 1978 and were updated in 1988. These BMPs deal with harvesting, roads, and site preparation. In addition to promoting good forest management, they keep an eye open for and plan for practices that will enhance and not degrade water quality. Items to be considered are:

- keeping debris out of streams
- crossing at right angles
- stream side management zones
- operating equipment in stream

The second set of BMPs deals with wetlands. Here we listed the major wetlands, their soils, and what can be done to enhance water quality. The wetland BMPs have been reviewed by AFA, Alfa, Wildlife Federation, Soil and Water, ADEM, and Forestry Planning Committee.

The Management Plan gives a general description of plans for the future--monitoring, educational training, demonstrations, videos, articles, and generally getting the word out on good forest management.

ADEM will incorporate the Assessment and Management Plan into an overall report to EPA. A public review phase will be held in October or November with meetings in Guntersville, Birmingham, Montgomery, and Mobile to get input as required by EPA.

Good quality water is one of our most important resources,

and through our leadership in this area, we can ensure a clean and healthy environment for future generations.

THE ROLE OF THE ALABAMA COOPERATIVE EXTENSION SERVICE IN WATER QUALITY AND NON-POINT SOURCE POLLUTION EDUCATION

Dr. Ann E. Thompson

Vice President for Extension
Auburn University
and Director, Alabama Cooperative Extension Service

Water is essential to human health and agricultural production. Except for droughts such as the summers of 1986 and 1988, Alabamians, accustomed to an abundant 4.5 feet of rainfall annually, take water pretty much for granted.

It is true that few states can match Alabama's water resources. We have 14 major river systems or basins with 40,600 miles of rivers and streams, 348,826 acres of lakes and reservoirs, 50 miles of coast, 400,000 acres of estuaries, and 3.5 million acres of marshes and wetlands. In addition, we have considerable groundwater resources that provides water to agriculture, communities and businesses.

As ACES was developing its strategic plan, it became apparent that issues on water quality--and quantity--were becoming increasingly significant to the people that Extension serves. For that reason, water quality and quantity became a major program in the ACES strategic plan, Priorities for People.

Point source pollution from municipal waste treatment facilities and industrial sources creates the bulk of current pollution problems in the state. However, non-point source pollution, which includes any substances of widespread origin which will run off, or seep through the ground, is emerging as a major problem and is of paramount concern to ACES.

Increased sensitivity to environmental quality issues and the growing trend toward urbanization in rural areas have led to dramatic increases in the number of agriculturally related complaints received by the Alabama Department of Environmental Management (ADEM). Many of these complaints are related to animal wastes, pointing to the need for renewed and intensified educational and technical assistance efforts with livestock and poultry producers.

Groundwater is a major source of water for agriculture and industry and is the drinking water source for more than 2 million Alabamians. According to the Environmental Protection Agency, groundwater withdrawal tripled between 1950 and 1985, creating concerns for both quantity and quality. ADEM figures show that 9 percent of the state's community water systems and 25 percent of the non-community systems had unsatisfactory tests due to bacteria counts.

These conditions raise serious concerns among all of us with responsibilities for assisting rural people and enterprises. We must maintain the integrity of the groundwater resource and reduce the possibility of widespread contamination from agricultural chemicals and other sources.

Protection of water resources involves managing agricultural

chemicals, controlling contaminants, and understanding regulations and water use policies. Public awareness is needed of the potential impacts of contaminated water on human health and the importance of testing water to determine quality, understanding test results, reducing nutrient levels in waste water, preventing contamination or making contaminated water safely usable, and practicing water conservation.

Competition among agricultural, recreational, industrial, and municipal demands for water supplies, declining groundwater levels, and increasing water needs for agricultural production head an array of issues and challenges which must be addressed.

In response to this situation, ACES's long range plan identifies three major water quality objectives :

- Increase awareness among the general public, both adults and youth, of emerging water quality problems and the importance of protecting ground water from contamination and the need for water conservation on the part of home owners and farmers.
- Increase awareness of potable water quality which will lead to the doubling of the annual testing of private water sources for rural homeowners.
- Reduce non-point source pollution in selected streams by providing pesticide and animal waste disposal information and technical support to pesticide users, applicators, and livestock producers.

To implement these objectives, we are taking the following actions:

- Create and staff a state specialist position to facilitate the involvement of relevant disciplines across units at Auburn University in the development and delivery of programs in water quality, to include non-point source pollution. This specialist will be housed in the Agronomy and Soils Department, but she/he will be expected to establish program relationships with other agencies and organizations to help achieve a coordinated effort. We visualize that this Extension faculty member will chair an Extension water quality task force.
- Provide information to policy makers for developing sound water use and management laws and regulations.
- Develop information materials for mass media, groups, and individuals on water quality and conservation.
- Develop educational projects for youth with emphasis on water quality and conservation.
- Provide farmer assistance in evaluating, planning, and designing irrigation and water management systems.
- Develop water testing interpretation and referral services for rural homeowners and provide assistance with development and maintenance of private water supplies.
- Develop training materials to encourage proper disposal

of pesticide containers and residual materials.
- Provide information and training on alternative animal waste management practices.
- Cooperate fully with all state and federal agencies working in water quality.

In June of this year the USDA Extension Service and the USDA Soil Conservation Service signed a Memorandum of Understanding to establish a framework to increase cooperation and coordination for implementing water quality policies and programs. This document specifies, among other things, that the two agencies will cooperate in encouraging each State CES and SCS to develop guidelines and appropriate pesticide and nutrient management components for use in landowners '/operators ' conservation plans. It also calls for cooperation in identifying water quality training needs and developing training materials and programs to address these needs with initial emphasis on pesticide and nutrient management practices. ACES looks forward to working with its sister agency, SCS, in initiating state level activities in the spirit of this Memorandum.

Water quality is high on the national agenda. It is a priority for Extension programming in Alabama. We have not only the opportunity, but a responsibility to help families, farmers and community leaders better understand the causes and consequences of actions which reduce the quality of both surface and groundwater. We must also be prepared to recommend alternative practices and behavior based on the best research and information available which will lessen the risk of contaminating this critical resource.

Alabama's Water Quality
Auburn University's Role in Agricultural Pollution Abatement
A Soil Conservation Service View

Ernest V. Todd

State Conservationist
Soil Conservation Service

Pollution of America's surface and ground waters from non-point sources is the next environmental crisis facing this nation. Non-point source pollution, by definition, has many origins and agriculture is a major contributor. Agriculture in Alabama is contributing to serious pollution problems in our lakes, streams, and ground water. Data collected in a recent non-point source pollution assessment of the streams in Alabama indicates that about 7,200 miles or 48 percent of the stream-miles surveyed have a significant potential for pollution by agriculture. I give you two specific examples: On Sand Mountain, where a major chicken industry exists in a densely populated rural area with over 10,000 septic tanks, 30 percent of the wells tested have nitrate levels exceeding the EPA drinking water standard. The Bear Creek floatway, a TVA Project in Northwest Alabama where a reservoir was built to release water for floating and canoeing, has been closed since 1985 because of high coliform counts caused by cattle and swine discharges directly in the streams.

The Soil Conservation Service (SCS) cooperates with state and federal agencies in providing assistance to state and local units of government, individuals, and others in conservation of our soil and water resources, including improving water quality through the application of erosion control and waste management practices. Soil Conservation Service programs provide both technical and financial assistance to project sponsors and individuals to plan and apply conservation systems and pollution abatement measures.

The State Soil and Water Conservation Committee and local Soil and Water Conservation Districts have been our traditional partners in the conservation community. Numerous federal and state agencies, Auburn University and the state's other fine educational institutions, local governments, agribusiness, environmental groups, farmers, and citizens have also played an important role. I believe that as we face the increasingly complex problems of reducing the threat of agricultural pollution of our surface and ground waters, this partnership will be even more important.

More recent partners such as the Environmental Protection Agency, the Alabama Department of Environmental Management and others will be lead agencies in controlling non-point source pollution. The fact that we are here today to examine together where we are, and look at where we need to go, is testimony to the importance of these partnerships. Auburn University in its teaching, extension, and research roles has always been an important part of the natural resource conservation partnership.

This meeting is testimony to the vital role that this university must play as we face the problems of agricultural non-point source pollution in the years ahead.

Most water quality problems must be solved on a watershed basis. We in the SCS are concentrating our efforts on the high priority watersheds and streams identified by assessments conducted under Section 208 of the Clean Water Act Amendments of 1972 and more recently under Section 319 of the Water Quality Act of 1987.

Several agricultural water quality projects are already under way in Alabama. The Soil and Water Conservation Districts and SCS are providing leadership and technical coordination for many of these. Most of the agencies represented here today, including Auburn University's Extension Service and Agricultural Experiment Station are involved. Those of you who are familiar with such initiatives as the Sand Mountain-Lake Gunterville Project, the Bear Creek Project in Marion and Franklin Counties which I mentioned earlier, the Lake Tholocco Rural Clean Water Project in Southeast Alabama, and several smaller ACP and other such special projects know that it requires everything in our collective bag of tricks, including technical and financial assistance, information and education, research, data gathering and monitoring, and an occasional regulatory nudge to successfully solve water quality problems.

Erosion control and animal waste disposal systems have historically been the primary methods used by SCS in reducing pollution from sediment, nutrients, bacteria, and organics. Application of the various erosion control and waste management practices requires skills in many natural resource disciplines. Issues such as integrated pest management and groundwater pollution are requiring that we add new specialties to our skills bank. We depend on Auburn University and other institutions to ensure that these skills are available -- by instruction of the students who will become SCS employees and leaders in the farm and agribusiness communities of Alabama; by updating active farmers through extension, demonstration, and information programs; and by providing, through research, the knowledge SCS employees need to assist farmers in protecting soil and water resources while successfully competing in "high-tech" agriculture.

Auburn University must be a leader in the field of water quality and non-point source pollution abatement. Leaders must set the example, and I believe that there are some areas where internal factors are testing the credibility of your leadership. For example, an SCS employee was recently providing on-site assistance in solving a severe pollution problem on the main stream feeding a municipal water supply lake. The pollution was caused by disposal of dairy barn waste directly into the stream and by use of the stream as a loafing area for the herd. The bacteria levels in the stream below the dairy were astronomical, dissolved oxygen was virtually nonexistent, and nutrient levels exceeded acceptable levels. In short, the stream had become an open sewer. An Auburn University Veterinary Medicine Professor and his class were visiting the dairy. The farmer asked the

professor to tell the SCS employee and others interested in cleaning up the stream why it was important for the cows to loaf in the creek. The professor supported use of the stream by the cows, and said that it was needed to keep them cool. I wonder if he realized how seriously they were fouling the water that he would later drink. How can one side of the Campus support non-point source pollution control, while the other condones contamination of public water supplies with dairy waste? The professor is teaching that the cows should be kept in the stream while the tax payer is paying hundreds of thousands of dollars to get the cow out of the stream in Bear Creek.

Another example -- a recent issue of the Alabama Agribusiness Newsletter featured Alabama's poultry industry. Nowhere was the critical issue of disposal of poultry waste and the water quality problems resulting from improper disposal mentioned. In fact, an article outlining the entire cycle of the integrated poultry industry did not even consider waste disposal. One could gather from the article that high-tech poultry production utilizes or recycles everything but the cackle and the manure. I am sure this was simply an oversight. But it illustrates that teachers and researchers interested in the production side of agriculture need to be fully aware and be concerned about the potential impacts of production on the environment.

A third example -- pesticide rinsate and used container disposal is a problem for most farmers. The Auburn University Experiment Stations are no exception. Some stations have had their own problems with rinsate and container disposal. If the farm community looks to you for leadership -- and they do -- then you must go the extra mile and set the example. Your disposal methods must be above reproach. You can't wait on a grant to improve your procedures. You must recognize and demonstrate that safe disposal is a normal part of doing business.

As I mentioned earlier, USDA and other agencies are beginning to focus on non-point source pollution. If we are to be successful in cleaning up our waters, we all must do more. I believe that we must have a long range strategy that includes not only current programs, but also an educational program that begins in our elementary and high schools and continues into every college and university of the state. Appropriate water quality concerns should be included throughout the agricultural curriculum at Auburn University. Let future agricultural leaders know how agricultural activities affect our streams and lakes. Teach them about integrated pest management to help them understand that alternatives to pesticides are available. Let them know how many diseases are transmitted between animals and man, and vice versa. Show them the economic advantages of reduced use of fertilizers and pesticides and the attendant benefits to our water supplies. Then let them return to their farms and apply what they have learned. Let them serve as county agents, SCS employees, and agribusiness leaders or in other jobs where they can convey this message to the farm community. <u>Productive farming and good water quality are not incompatible</u>.

The agricultural schools of this state must set an example,

not only in their curricula, but also at their on-campus farms such as the swine breeding unit and the poultry facilities on the Shug Jordan Parkway. Show students and farmers how dairy wastes are affectively utilized at the E.V. Smith Experiment Station, and give them on-farm instruction in insect scouting and related integrated pest management procedures.

In addition, we need demonstrations around the state that illustrate how to properly manage pesticides and animal wastes. We need more demonstrations of cost-effective erosion control practices that both maintain soil productivity and prevent off-site pollution.

Finally, we need more aggressive research programs that specifically address water quality as related to agriculture. Those of us who are providing technical assistance on the farm need answers to a number of important questions related to water quality. I give you some areas where we need answers. What crops or cropping systems should be used to handle the large amounts of phosphorus and nitrogen applied in broiler litter? What is the capacity of various soils to assimilate high phosphorus and potassium loads over a long period of time? What are the long-term effects of various pesticides on groundwater? What is the potential for leaching of various pesticides in various soils and under different cropping systems, including conservation tillage? What agricultural waste management systems are suitable to the limited resource farmer? (Those small scale farmers with limited income who cannot afford expensive methods of waste disposal for small livestock operations.) How can fish farmers manage their ponds to avoid creating problems downstream with waste generated by heavily stocked operations? The list could go on. In short, we desperately need answers to many perplexing problems related to agricultural pollutants -- and we need them soon.

The SCS technical staff here in Auburn has had a very close working relationship with Auburn University over the years. We rely on your research to help us provide state-of-the-art assistance to farmers and livestock producers. We have had several excellent cooperative agreements with the Fisheries Department, the Agronomy and Soils Department, the Agricultural Economics and Rural Sociology Department, and the Civil Engineering Department during the past several years, and all of these have advanced the cause of resource conservation. In addition, we have relied upon the School of Agriculture to update SCS employees on the latest farming technology. This has been a vital part of the continuing education process for our technical personnel.

In summary, we are very proud of the working relationship that we share with Auburn University. You have helped us tremendously, but, as I have pointed out, there is much more that we still need to know. Moreover, there is much more that the agricultural community at large needs to know, and which the researchers at this fine University are quite capable of providing. We look forward to working with the University and with many of the other agencies represented here today as we address the all important issue of non-point source pollution

from agriculture. Cooperation will be the key to our success.

PAUL MOSER

Geological Survey of Alabama

It's a pleasure being here. I'm very glad to be here to share things with you. I bring you greetings from Tuscaloosa, the University. I am with the Geological Survey of Alabama at Tuscaloosa. Don't let the word "geology" or "survey" fool you. Our main function at the Geological Survey of Alabama is water, mineral, and energy resource investigation. I am in the Water Resource Division, therefore of course, my comments today will be about water, and particularly, groundwater.

Water, as we have heard for the last day and a half, has become an increasingly valuable commodity. You've heard that from just about every speaker that's been up here. Water cannot be made or destroyed. It can be used, cleaned, and reused.

When I was in New York several years ago, I took a field trip on Long Island, or as they say up there, "Long Giland." Long Island, has had quite a bit of trouble with its water supply. They are dependent on groundwater. Surface water is almost an impossibility for them, because New York city has the majority of the surface runoff in New York state tied up. Therefore, they'd have to go a long distance to get surface water, so they must rely on the groundwater supply. Being an island consisting of permeable material, much like our coastal plain, as they pump water from under Long Island, they are suffering from salt water intrusion, both from the Atlantic and from the Bay side.

They realized they had to do something. One option would be to move away, but that's not viable. They have established a tertiary treatment plant down on the southwestern corner of the island, and they collect their sewage and treat it just about as well as technology will permit. They take this treated waste water and inject it through a series of wells along the edge of the Island into the aquifer. That does two things -- it sets up a barrier to keep the salt water encroachment from getting even worse, and it maked the water circulate toward the center of the island, where the withdrawal wells are located. It's a recycling process.

The water going through the aquifer will pick up a little bit of "body" or a little bit of taste, and that's good. After going through the tertiary treatment plant, we were invited to take a drink. It was fine, but it was flat. It had no taste. It had no body. They have gotten around this by recirculating it.

The hard part, we were told, was not necessarily the technical aspects of setting this system up by the engineers and hydrologists. The hardest part was convincing the people of Long Island that it was ok to drink recirculated sewage water. This process works, and we do what we have to do. Those on Long Island did not want to move away so they chose the alternative just described.

So, indeed, water is becoming a valuable commodity. We do know that; we are trying to do something about it, and that's what we are doing here.

I would like to spend the next few minutes by showing you a few slides. And if someone could douse the lights for me I would appreciate it. I will be very brief, but I would like to show you some of these slides. The GSA or Geological Survey of Alabama, is what is referred to as a research organization. We do research projects, we have cooperative agreements with many of the people represented here today. We also carry on a monitoring program. Our interest, in the Water Resource Division, is maintenance of the quality of the groundwater and the surface water, and to document these qualities.

The next few slides will be about some of the programs that we have. There are 11 mini-monitor sites. In Tuscaloosa County, we are interested in making methane gas out of coal. We are conducting research to determine biota at various concentrations of salt water as it is disposed of in the streams. Salt water disposal is legal. We are trying to establish quantitative data to establish guidelines, so we will know how much salt water we can dispose of in the streams. Salt water is a byproduct of the oil and gas producing process. The oil fields are located in southwest Alabama, in Choctaw County around Gilbertown and in Mobile County around Citronelle. The law says that this salt water must be disposed of by deep well disposal, instead of by indiscriminate dumping in your back yard or field or the creek. By monitoring these creeks, we are hoping to determine if someone is improperly disposing of salt water.

Each mini-monitor, we call it a "can", is a multi-thousand dollar piece of equipment. It is basically a computer. The probes go down in the creek and the cables on the far right send a message back to the can. That can then sends a message to the recorder, and a tape punches out the values of the quality of the water. The whole thing is operated by a battery, to be replaced every 6 weeks. It is housed in that little house, just like a small-sized outhouse or refrigerator, on the side of the bank. The tape will be collected and put through a computer, and a readout will tell us what the quality of the water is. We have eleven of those mini-monitors.

We have water quality stations, and I don't expect you to remember all these sites, but I want you to see how they're distributed throughout the state. We have 120 wells, 30 springs, and about 50 surface water sites for a total of about 200 total sites that we monitor. We visit these sites at least twice a year to collect samples to determine the quality of water. Some of the tests, such as pH, are run at the site because they are likely to change.

Some of the samples are taken back to the lab. Most of these sites contain municipal supplies. We try to keep track of the quality at these sites to chart any kind of short term or long term changes that might be occurring. We hope to anticipate degradation of the water. As part of this process, we stream gage to determine the quantity of water that is going across that particular site, and this will help us with the quality.

We also have about 160 surface water sites. This is a program that we are carrying out with ADEM, and you heard reference to that already several times during this day

and a half. We have visited these surface water sites every month for five months. We just finished the sampling process last week. We haven't submitted all the data back to ADEM yet. We are trying to determine if the municipalities are having any effect on the water system. We are trying to sample above a discharge point and below a discharge point. The discharge point could be anything, municipality, industry, sewage treatment plant, chicken processing plant, feedlot, or, non-point pollution area. We are then able to compare the upstream with the downstream quality of the water to see if things are in compliance with the permit.

We have a groundwater program by which we monitor groundwater fluctuation at 528 sites throughout the state. We look at the wells, and the springs at these sites. We visit these twice a year, once in the spring of the year when commonly the water table should be high after the winter and spring rains and in the fall of the year, when we should have low water levels. We are now in the process of making fall observations. In this way, we hope to monitor the extremes. We are keeping long term records and are hoping to be able to document how much fluctuation is taking place.

Yesterday, someone alluded to a well, he said in Linden, it's actually in Greensboro, where we have documented a general, gentle decline over the last 10 to 15 years. In this particular well, we have records for about the last 50 years, and we are able to document the fluctuation. In this particular case - there has been a slight decline. We are interested in wells. High capacity, high yield, municipal or industrial wells, and in some low capacity wells. We also try to document domestic wells.

Another program we have is 19 continuous recording observation wells. These are recorded every hour. The level is punched on a tape through a float mechanism, and we are able to chart short term and long term trends. Again we hope to anticipate any drastic lowering of water tables. We do have some of this in the state. We are trying to get as widely divergent wells as possible, trying to get a recorder on a variety of aquifers, to be able to get a general picture of how these wells are reacting to the rain and the groundwater fluctuation.

We are working in the Lake Guntersville drainage area in DeKalb County with TVA, SCS, and ADEM. Last winter we did a study up there, and the preliminary analyses indicate, as Ernie Todd was saying, that about 30% of the wells have excessively high amounts of nitrates. The preliminary analyses indicate that it is not, apparently, coming from the 10 to 11,000 septic tanks that are on Sand Mountain. Preliminary indications are that it might be from chickens. Right now, we are going to do a follow up study with ADEM, and of course, with the cooperation of TVA and SCS. We will be checking 30 indicative wells on Sand Mountain in DeKalb County quarterly. During the next year we will visit each of these 30 wells 4 times, and run samples in the field and back at the lab to try to determine exactly where the pollution is coming from. We hope to determine what the source is and be able to recommend some kind of remedial work.

Lastly, the Geological Survey has county reports. We now

cover the entire state of Alabama. All of the counties have county reports on groundwater and surface water. If you have any particular problem or questions about the water supply of a county, we should be able to help you out with some data. County reports are an ongoing process. We are trying to go back and update some of the older ones, as more and better data becomes available.

At the GSA we are very much interested in maintaining high quality water, both surface and groundwater. We are trying very hard to do a good job with this. Alabama has plenty of water, but it is not unlimited. We need only think back to last summer, when we had a drought. Suddenly, people realized that they didn't have any water. I attended the Governor's Drought task force in Alexander City, and one of the gentlemen there had a marina, or a house on the lake. He commented to the Drought Task Force that "this is drastic, this is terrible, this is absolutely awful. What are you going to do about it?" He said, "last week I could not launch my 27 foot boat." Well, I don't know that I feel so sorry for him, but we are probably going back to our complacent attitude because we had some rain. A drought will come again. I don't know what caused it, and I don't know how to prevent it. We are trying to document the groundwater and surface water resources in the state. If the GSA can be of assistance to any of you, please call us.

It has been a good day and a half. Has it done any good? I would like to think so. Will something be done this week? Not likely. This year? Not likely. Will anything come from all this verbiage? I hope so. At least, I hope our consciousness has been raised, and that we are able to exchange some information with each other, so sometime later on, someone might say, "I remember that Ernie Todd said so and so, and I wonder if we could contact the SCS and maybe get them to help us do something." You have been attentive, you have been patient, and for a Friday afternoon, you have been very good. I thank you.

Dr. Ralph H. Brooks

Tennessee Valley Authority

Status

Alabama has its share of problems from non-point source (NPS) water pollution:

- Bear Creek Floatway, which winds through 25 miles of a scenic, undeveloped gorge in northwest Alabama, is contaminated with animal waste and levels of bacteria high enough to cause concern for recreational use. To discourage contact with this contaminated water, TVA in 1984 discontinued the supplemental weekend and holiday releases from Upper Bear Creek Dam that had made possible this popular canoe floatway.
- One egg producer on Sand Mountain, above Guntersville Reservoir in northeast Alabama, has 60,000 laying hens that daily produce the waste equivalent of the untreated sewage of a town of 6 ,000 people. Conventional treatment facilities for that much waste could cost $1 million. However, there are an estimated 9 million broiler and layer chickens on Sand Mountain, and some 100 new poultry farms were added last year. There are also 15,000 swine, each producing a gallon of waste daily for each 100 pounds of body weight. There are also about 174,000 people with 10,700 septic tanks, many of which are malfunctioning. Runoff from eroding fields is depositing excessive silt in Guntersville Reservoir. That silt is reducing reservoir capacity and creating large areas of shallow flats that offer increased habitat for expansion of an already severe infestation of aquatic weeds. A single watershed on Sand Mountain--Town Creek--contributes less than 1 percent of the inflow to Guntersville Reservoir but contributes about 4 percent of the lake's nutrients. Excess nutrients set the stage for nuisance blooms of algae, especially blue-green algae that can affect taste and odor in water supplies, are potentially toxic to fish, and contribute to dissolved oxygen depletion when they die and decompose.

These are only two of the many priority NPS sites in the State, and many are related to agriculture.

However, TVA views Alabama's NPS problems from a regional perspective, not only because TVA is a regional agency, but also because water--especially flowing water--is inherently a regional resource. Both sources and effects of water pollution often trespass with impunity across arbitrary political boundaries, no matter how boldly these boundaries are printed on maps. Many small problems from many different areas add up to big problems for the region:

- Most of the pollutants entering the waters of the 201-

county Tennessee Valley region no longer originate from point sources. Non-point sources now contribute 2.5 times more phosphorus, 5 times more nitrogen, 5 times more oxygen-demanding waste, 36 times more fecal bacteria, and 800 times more suspended solids.

- The Valley States report water quality is threatened or already degraded by NPS pollution in two-thirds of the 104 small water-sheds in the region.
- The region's 85,000 livestock farms produce 4.7 million cattle, 1.7 million swine, and 103 million poultry. They also produce waste equivalent to the untreated sewage of 47 million people--almost six times the region's population. The estimated cost of controlling this pollution is $650 million.
- Cropland erosion rates are twice the national average. Each year another 60 million tons of silt is deposited in Tennessee Valley waters and over a million tons accumulates to reduce the capacity of TVA reservoirs. Yields for cotton and soybeans are below national averages and 25 to 30 percent below potential regional levels.
- Almost everything deposited on or in the land eventually ends up in the water. Agricultural chemicals are no exception. TVA and most Valley States have now begun monitoring fish for toxins from pesticides and herbicides. Chlordane, which may no longer be used, has been found at levels high enough to warrant further testing, and in a few areas residues of toxaphene and DDT continue to reach streams from eroding cropland, even though application ceased long ago. So far, however, it appears that the problem of agricultural chemicals pales beside the problem of toxins from urban runoff, leaching dumps and landfills, sediments, and atmospheric deposition.

TVA Perspective: Partnership

Effective solutions to NPS problems cannot be expected from fragmented strategies developed in isolation. There is work for all. The key is partnership.

TVA has regional responsibilities for managing the quantity and quality of the Tennessee River system, and its staff resources are among the best in the world, including experts in hydraulics, water quality, aquatic biology, and many other fields. However, TVA cannot control the land-based sources of pollution that enter the water it is charged to manage. Out of practical necessity, TVA water resource managers must have partnerships with landowners and with land resource managers and agencies.

Partnership means coordination of efforts to avoid wasteful duplication and cooperation to take advantage of strengths and compensate for weaknesses. TVA's internal and external partnerships have led to developments that illustrate the value of this approach.

Internally, a partnership between TVA mapping photo analysts and water quality specialists recently developed a new tool--which neither alone could have produced--for identifying and screening the relative importance of non-point sources. Working together, they applied low-altitude aerial photography and photo interpretation techniques, which TVA has long used for its mapping program, to the successful identification of failing septic tank systems near the Bear Creek projects. On color infrared film, failing systems are typically revealed as red patterns of more lush vegetation over failing drain fields or as gray patches of surfacing effluents or "straight-pipe" bypass discharges.

Although not a substitute for site inspections, these photo analyses provide a valuable guide for targeting likely trouble spots needing further investigation. Use of these methods to inventory an area and zero in on specific sites sharply reduces the time and expense that would otherwise be required to field a small army of investigators to comb the countryside in search of these small, scattered, but cumulatively significant sources of pollution. Because of the success of the studies at Bear Creek, TVA has since then surveyed 42 other areas where septic tanks were suspected of contributing to chronic NPS pollution.

In an external partnership, working with agricultural agents familiar with local conditions in test areas, TVA was able to extend the capabilities of these aerial techniques to inventory and estimate waste loads from individual livestock operations. Then, in cooperation with agricultural agents and soil conservation agents skilled in use of the Universal Soil Loss Equation, TVA was able to extend the technique to provide site-specific estimates of erosion potential from farm fields and other land disturbances in only 10 percent of the time required for traditional field studies but with 90 percent of the accuracy. Aerial surveys have now been used to inventory about 25 percent of the Tennessee Valley during the last five years at a cost of only pennies an acre. Partnership produced a tool that gave this region an advantage in dealing with land-based sources of water pollution.

In the past, labeling a water quality problem the result of NPS pollution was essentially the same as saying little could be done to pinpoint and correct it. Thanks to the cooperative development of the powerful tool of aerial inventory, that is no longer a valid excuse.

For example, after conventional field surveys failed to locate the source of bacterial contamination that forced closing Bear Creek Floatway, aerial photo analysis was used. It revealed 140 livestock operations that were individually small but collectively the source of large quantities of animal waste. Many were inconspicuously tucked away in steep ravines or secluded valley forests, farther from the creek than conventional surveys might usually check. Nevertheless, aerial photographs showed that they were connected to the creek by a "microdrainage" network of trickling streams and wet-weather washes--a kind of outdoor plumbing system that kept these operations neat and tidy by flushing all the wastes to Bear Creek every time it rained.

The aerial inventory and preliminary screening assessment showed water quality specialists and biologists where to target their studies. Standard water sampling was combined with another relatively new and useful tool, the Index of Biological Integrity (IBI). While water samples indicate conditions only at the time and place of monitoring, aquatic organisms are continuously subject to the cumulative effects of conditions as they vary over time and with changing inflows from upstream areas. By assessing the total stress on the aquatic community at key locations, IBI often allows a more accurate assessment.

In another area of the Valley, for example, each of 13 tributaries of a river basin was assigned a priority ranking after aerial inventory and water quality sampling. However, when they were reevaluated in terms of IBI, the stream originally ranked third was shown to deserve first priority. Although subject to less total pollution, this stream's main sources of pollution were clustered along its middle reach. Overloaded at this point, it was never able to recover sufficiently to support a healthy diversity and abundance of species in its lower reach.

Using this technique at Bear Creek, TVA was able to whittle down the inventory of 140 sources to 75 sources that deserved high priority for cost-sharing assistance because of their impact on water quality. With a clear objective and a smaller number of sources to address, TVA began enlisting partners to help solve the problem.

Specialists from the United States Department of Agriculture (USDA) developed site-specific plans for each operation. They specified such remedies as terracing, runoff diversions, animal-exclusion fencing along streams, dry stacking of barnyard wastes for later use in fertilizing appropriate fields, waste lagoons, and innovative use of grass filter strips to receive lagoon effluents.

TVA offered to share installation costs with landowners, and soon there were many willing partners. Each completed system became an educational demonstration to neighboring farmers, encouraging them to join the program. Now, 40 systems have been completed, 10 are under construction, and the remaining 25 will be completed by October next year. This cooperative program is expected to improve stream quality and allow reopening the floatway.

Bear Creek was a special case. TVA created the floatway and was mandated through special add-on appropriations to correct the NPS problems to return it to safe operation as soon as possible. TVA does not have the resources to provide similar cost-sharing programs for all the NPS problems in Alabama, much less in the Tennessee Valley region. Bear Creek made it clear that partnerships and priorities are needed.

Unlike Bear Creek, in most cases USDA cost-sharing programs are the largest source of funds now available for implementing solutions to agricultural NPS pollution problems. State land-based cost-sharing programs in many States, including Alabama, are a second important source of implementation funds.

The problem is that there are many needs competing for the same funds, and there are not enough funds to meet all needs.

From TVA's perspective, it would appear that the needs most likely to receive funding are those that can be demonstrated to provide the greatest benefit to the economic, land, and water resources. These benefits must be clearly and specifically defined and presented within the context of a well-planned course of action under the oversight of an established institutional framework. A hand-wringing proposal that says little more than "We think there's a problem of some sort out there somewhere that somebody should do something about to correct" stands little chance of being funded.

The answer to this problem is partnerships that provide the necessary detailed information about specific NPS problems, sources, priorities, and the benefits of proposed remedies. Much of the work of necessity falls upon local conservation districts, USDA, and the State agencies for conducting research, monitoring, and gathering other information, determining priorities, and identifying and implementing solutions. There is also a role for the Environmental Protection Agency (EPA) in setting targets for water quality improvement that will help guide the local delivery system and program implementation; in conducting and sponsoring research and technology demonstrations; in monitoring and analyzing water quality improvements that result from projects to facilitate midcourse corrections and develop future strategies; and in working with USDA on draft regulations for their programs to ensure their effective application. TVA can facilitate cooperation among Federal, State, and local partners; conduct aerial surveys and water quality monitoring to provide source and effects data; conduct limited research and technology development; and participate in technology demonstrations.

Such cooperative interactions have become more and more common in this region in recent years. To provide an umbrella organization for promoting such partnerships, all seven Valley States in 1984 joined force with USDA, EPA, and TVA in the Land and Water 201 Program for the 201 counties that comprise the Tennessee Valley region. This program does not replace any of the activities already being conducted by the members, either independently or cooperatively, nor is it a separately funded program with projects of its own. Instead it provides an institutional framework for cooperatively determining priorities, integrating and coordinating existing programs, and applying available resources most effectively. It is one of four national NPS management demonstrations (the others being Chesapeake Bay, the Great Lakes, and the Colorado River Basin Salinity Control Projects), and it is the only one demonstrating regional cooperative management in a predominantly rural river and reservoir system. One of its first cooperative efforts in 1986 produced a comprehensive State-by-State list of priority watersheds in need of NPS control. The States are now revising and updating this priority list, taking into account recent information from TVA' s aerial inventories and monitoring as well as other new information.

Through various cooperative arrangements, NPS control demonstrations are already in progress in 15 priority watersheds in the Tennessee Valley region.

Because of the extent and severity of its NPS problems, the 626-square mile Sand Mountain area draining to Guntersville Reservoir is one of the highest priority watersheds in Alabama and the region. There are undoubtedly similar areas with similar needs in many other States and regions. The difference is that this need is well on its way to being met.

Here, as elsewhere, landowners are free to apply for their share of various nationwide cost-sharing programs. However, the Sand Mountain-Lake Guntersville Water Quality Committee has also received from the Agriculture Conservation Program a special $500,000 initial grant--one of only a few such grants awarded in the entire country--and there is every reason to expect that similar funds will continue to be provided in succeeding years. In addition, three watersheds on Sand Mountain have been approved for first-phase planning funding that could eventually lead to a total of $15 million in Federal and local cost-sharing projects under Public Law 566, the Watershed Protection and Flood Protection Act of 1954. These three projects were among only 21 projects in 18 States that were approved.

The credit goes to the hard-working partnership that has developed between local groups, State agencies, and locally based services of the USDA. Taking advantage of their established working relationship, as well as the specific information on available water quality problems and inventories of priority sources, they developed targeted plans for corrective action. As a result, special funding proposals for this area had a definite advantage over proposals from other areas.

Future Directions

For the future, Alabama and the region must continue working through partnerships to attack NPS problems on a priority basis. For that work to be successful, there are some needs for research and for education that must be met.

More work is needed on both the water side and the land side of the NPS problem. Much of the water work is traditionally done by State water quality agencies, EPA, and TVA. Similarly, much of the land work is traditionally done by State land agencies, local conservation districts, and USDA agencies. In both areas, however, there needs to be much greater interaction and coordination of effort across these traditional but arbitrary lines of distinction, because it is impossible to separate what is done on land from the effects in water. There is work in each area for all who are willing, including the State university agricultural experiment stations and the companion extension services. Research is needed to develop information and technologies, and education is needed to communicate the results to landowners and the public. Again, however, this work needs to be done through cooperative partnership on the basis of mutually recognized priorities. Fragmented efforts can only lead to fragmented results.

Water Research

From TVA's perspective, water-oriented research needs to focus on three main areas: monitoring, targeting, and regional assessment.

Cooperative work by water quality specialists and aquatic biologists has increased monitoring sensitivity and effectiveness through use of IBI and similar techniques. Perhaps additional techniques can be developed that will further reduce the time, labor, and expense required for water monitoring. That would free human and economic resources for use in planning and developing corrective measures. In the same way, water and land specialists need to combine forces to develop similar techniques for monitoring the pollution potential of land sources.

Cooperative work by TVA water quality and remote sensing specialists and State and USDA agricultural and soil conservation specialists produced a new tool of aerial survey and assessment that has greatly speeded the process of inventorying and targeting the most significant potential contributions to NPS pollution. With more than a quarter of the Valley surveyed during the last five years, this region is now far ahead of most areas of the Nation. Land and water specialists now need to work together to develop techniques for rapidly and accurately assessing and tracking the rates at which pollutants are actually delivered to water from various types of potential land sources. A desired end product of such studies would be analytical techniques that could not only describe the mechanisms of pollutant transport from land to water but also interactively simulate these processes to predict the effects of various management options.

Managing NPS pollution requires an integration of land and water data. Regional perspectives on these integrated data are needed for setting priorities, targeting programs, and presenting needs to the public and decision makers. A cooperative effort is needed to develop and demonstrate economical methods for synthesizing diverse sets of data on sources and effects and presenting them in formats that highlight regional needs and priorities and also demonstrate accomplishments. The need is to integrate and present rather than analyze data.

Land Research

Again from TVA's perspective, land-oriented research needs to focus on three main areas: development of alternative farm enterprises, better cost-benefit balances for landowners, and corrective and preventive measures with simpler operating and maintenance requirements.

Land specialists, working in cooperation with water specialists, need to develop alternative farm enterprises for lands with high NPS pollution potential. If studies show, for example, that erosion or wastes from livestock operations in certain types of areas have especially high NPS pollution potential and are also especially difficult or expensive to control because of soil type or complex microdrainage with features such as sinkholes, the simplest and most cost-effective solution might be to convert those areas to other uses. That

requires development of alternative types of enterprise that are specifically suitable for such areas, that have lower NPS pollution potential, and that are sufficiently economically attractive to encourage landowners to convert their operations.

It is not enough to coin catchy phrases such as "pollution prevention pays" and make vague promises to farmers that the cost of NPS pollution controls will somehow be offset by unspecified savings. Economic analyses of specific control measures are needed to provide specific dollar values of benefits to the landowner. Cooperative research is needed to develop improved control methods and find new sources of savings. Work that is already in progress needs to be intensified and expanded to find economic uses for animal wastes as horticultural fertilizer, cattle feed, and similar applications. In areas like Sand Mountain, for example, there is simply too great a volume of waste and too limited an area of suitable sites to permit reliance on land application for waste disposal. Other economic uses for wastes must be developed.

It may appear to be a contradiction in terms, but research is needed to develop better "best" management practices--specifically, management practices that have fewer and simpler requirements for operation and maintenance. It does little good to convince a farmer to share costs to install an expensive animal waste control system if he soon finds it too time consuming to use it routinely or too complicated to maintain it in proper working order.

Education

That leads directly to another area of need: the need for effective education programs. Demonstration programs in many parts of the region have shown a need for continuing contacts with landowners to refresh their understanding of operation and maintenance requirements for NPS control measures. TVA recently signed a contract with a college graduate who served an internship with USDA on the design of the Bear Creek animal waste systems. His job will now be to maintain contact with landowners there who have installed systems to ensure that they continue to operate and maintain their systems correctly. There is need for similar educational services throughout the region.

There is also a need for educating landowners before projects are implemented. When either a demonstration program or a full-scale corrective program is planned for an area, it needs to be preceded by a two-phased educational program. One phase needs to be directed toward educating the owners of priority targeted lands, to ensure that they understand the needs and economics and to enlist their participation. The other phase needs to be directed toward encouraging all landowners in the area to use best management practices, whether or not their lands are targeted as priority problems.

Beyond these, there is need for a general program of public education. The general public still thinks of water pollution primarily in terms of point source pollution; NPS pollution is a less familiar concept, even though it now accounts for perhaps 80

percent of the Nation's water quality problems. Public understanding of the needs and public support for research, demonstrations, and control programs are essential for success. Research is needed for developing more effective and economical NPS control and waste utilization systems; demonstration projects are needed to bring these systems to public attention; and large-scale implementation programs are needed to improve water quality. All require public funding, and that depends on public education to build public support.

Control systems are usually beyond the economic reach of individual landowners without funding assistance. However, use of public funds to share the costs of controlling NPS pollution from private farms is still illogically perceived by the public as somehow different from use of public funds to finance municipal treatment plants and sewer systems, which control point source pollution from private residences and businesses and industries. Educational programs must stress the need to protect the public water resource from pollution--whatever its source--by use of public funds in the most cost-effective way.

Demonstrations have already indicated that agricultural NPS pollution can often be controlled at a small fraction of the cost for providing municipal treatment for an equivalent amount of point source pollution. The public needs to know that.

Summary

There is work for all who are willing, but fragmented efforts are bound to fail. Water and land specialists must work together. Federal, State, and local governments must work together. University-based experiment stations and extension services must work together. All must work aggressively in partnerships with one another and with private landowner and the general public to attack the problems of research, education, monitoring, targeting, demonstration, and implementation on the basis of mutually established priorities. If that happens, TVA is convinced that water quality improvement can be achieved in Alabama and in the entire Tennessee Valley region and that it can be achieved in ways that are not impossibly expensive.

SESSION VI

PANEL DISCUSSION

Passerini
This symposium was put together in order to gather information and then do something with it. What are your thoughts at this point as to where we need to go, what resources we need, and what resources you feel we already have available?

Thompson
We were video tape recording most of the conference. We also have the conference audio tape recorded. I had the thought today how great it would have been if we had a satellite, and we had had our audiences throughout the state listening to this conference. One of the challenges we have for the future, is, to get the knowledge base and interpretations to the broader audiences. I keep hearing something that we may have lost in this state. I am alluding to the question of land use and zoning, and some of the things that affect the water. But this is a challenge.

Jerry Miller
Mr. Moser, could you tell us on how many counties you have actually prepared water resource reports and what kind of information might be contained in those reports.

Paul Moser
Sixty seven counties. We are predominantly interested in quantitative aspects. If you want data regarding water quality, you almost have to go with site specific wells, springs or streams within the county. We do not have county-wide water quality studies.

Jerry Miller
Do you collect both ground and surface water data?

Paul Moser
Both. Some of them are combined, some of them are individual. But we do have surface and groundwater data on all counties.

Jerry Miller
Are there some primary recharge areas in the state of Alabama or do we have a more general recharge through the soil throughout the state?

Paul Moser
We do not have a general state wide study on areas. We do have individual data which indicate that for a particular stream, or a particular well, the recharge area has been outlined or designated. For instance, Coldwater Spring, the water supply for Anniston. This recharge area (close to 100 square miles) is predominantly to the north and northeast, up as far as

Jacksonville. So the recharge area for that one spring has been delineated. We have similar individual studies for some other places. For Madison County we have a few. But as far as a general recharge area, the whole state is a recharge area. Fifty-two inches, plus or minus a few inches, falls across the state, and a lot of that water does go into the ground and recharges an aquifer or a spring somewhere.

Jerry Miller
Are there any efforts being made to incorporate this data with the soil survey through SCS?

Paul Moser
No, I don't think so.

Ernest Todd
The soil survey goes about 5 feet deep. The Geological Survey goes beyond that, so it is correlated.

Bob Mount
What do you know about Bazemore's Mill Spring in Houston County? It disappeared in the year of 1982. It was one of the largest springs in southeast Alabama.

Paul Moser
Probably just a lowering of the water table.

Bob Mount
Well, it disappeared all of a sudden. I looked in The Springs of Alabama, and the data indicated that the spring had been discharging at a rate of 6 or 7 thousand gallons a minute for a long period of time. Then all of a sudden, it went to zero. The thing disappeared.

Paul Moser
More than likely, it had to do with a lowering of the water table, particularly in that aquifer.

Bob Mount
I would just like to follow up on and re-emphasize what Ed Passerini said. I've counted 14 or 15 different agencies, federal and state, that are concerned with water quality. I would certainly hope that someone, Dr. Frobish or Dr. Thompson, will take the lead in getting a task force together to bring these mules together and get them all pulling in the same direction.

Ann Thompson
I think we have some plans for that type of thing. Of course, you know how hard it is to corral some mules. I think we will certainly try to get the interested parties together, so that they can get to the point of having a dialogue based on common interest and geared toward solutions.

Ernest Todd
Bob (Mount), so you won't leave here thinking we're not doing anything. The whole arena that we talked about, is a multi-agency effort, we are working together out there.

Bob Mount
Good. I also wanted to ask Jim Hyland a question. You were talking about the loggers that you educate. But then you find out that they are still not conforming to your best management practices. Are these new loggers, or are they loggers that should know better?

Jim Hyland
I don't know what a new logger is, but, there are loggers going in and out of business, so I was talking about both. Generally, the ones that are doing the logging are not the ones coming to the training sessions, but the supervisors may come. The supervisor doesn't get in contact with the loggers or doesn't stay out there when the loggers are logging, and the logger gets lazy and starts messing up, so, it's both. We have some new ones that are coming in, and we've got some old ones that maybe just getting a bit lazy.

Bob Mount
Have you considered licensing logging operations?

Jim Hyland
In March, we were running about 85 to 95% compliance, depending on the location in the state. We checked that against compliance with speed laws, and we were doing better. We don't have the task force that the Department of Public Safety has, when you add regulation there is a cost, because somebody has to enforce it. The cost ends up with the citizens who pay for it as customers, consumers, or taxpayers.

Bob Mount
The Public Service Commission uses proceeds of fines to pay for their regulatory functions, I believe.

Jim Hyland
Mr. Moody is committed to voluntary compliance because we think it will work.

Bob Mount
If it is going to work, fine, and I hope it will. And finally Ernie (Todd) I am going to nominate you for the honorary membership in the Alabama Conservancy. I am really glad you are telling it as it is.

NON-POINT SOURCE POLLUTION OF ALABAMA'S WATERS

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I. Introduction

During this luncheon address, I will argue (as have several speakers before me) that we need look at more than agriculture when discussing non-point sources of water pollution. I recognize that sponsorship of this Symposium by the Alabama Agricultural Experiment Station (AAES) inevitably leads to emphasis being placed on agriculture. There certainly are problems to be addressed by those of us in the agriculture sector. However, AAES researchers have an obligation to look at problems of non-point source water pollution in a holistic fashion without restricting ourselves to one sector of the state's economy. The AAES mandate is sufficiently broad to warrant this approach.

I will begin my remarks by developing the argument that our attention must be broader than agriculture to solve problems of non-point source pollution in Alabama. Next I will turn to issues relating to the agriculture sector. Finally, I will discuss strategies for resolving problems of resource degredation.

II. Focus of our attention must be broader than agriculture

Recognizing the special importance of agriculture to Auburn University and the AAES, nonetheless, we need to look at more than agriculture when discussing non-point source water pollution. Many other non-point sources have been mentioned at this meeting. These include urban and residential runoff, ground and surface water pollution from mining operations, heavy sediment loads from construction, and leaking underground fuel tanks. Waste dumps scattered around the state also represent potentially serious threats to water resources. Finally, Alabama has not escaped the problem of acid rain, which may be having a serious impact on our state's forest, lakes, and streams.

Surface and groundwater resources are important to society for a variety of economic, aesthetic, recreational, and public health reasons. Pollution of these resources affects not only lakes, rivers, streams and underground aquafers but also coastal and marine resources. The oyster beds of Mobile Bay, for example, are directly affected by pollution which may occur hundreds of miles away. Largely as a result of declining water quality in the Bay, the number of commercially viable oyster beds in the Bay has declined from a dozen twenty years ago to only one today.

This case of Alabama's oyster fishery underscores a significant feature of non-point source water pollution in Alabama: pollution originating at one point imposes costs on downstream users. Certainly

there is evidence that soil erosion and runoff from agricultural chemicals and animal wastes is having a negative effect on water quality in Alabama. But agriculture is only one source of non-point water pollution that, may affect others and may also be affected by others. Ground and surface water pollution, for example, could have a serious effect on catfish production. Similarly, crops that depend on irrigation could be affected by groundwater pollution from underground storage tanks and illegal disposal of hazardous wastes, to mention only two possible sources. Moreover, acid rain from public utilities and industrial facilities hundreds of miles away may be having a negative effect on agriculture and forestry in Alabama.

Agriculture is part of society. I doubt we serve the interests of agriculture by focusing on this sector alone. Citizens have a right to wholesome food produced in a fashion consistent with public and environmental health. Growth in recreation and retirement oriented communities will lead to increased public pressure to alter agricultural practices by those moving to rural areas seeking clean air and water. Most farm families are careful guardians of their land and strongly support erosion control and careful application of agricultural chemicals. Those in agriculture have a right to expect that the rest of society will not create water quality problems for agriculture. The problems are societal in nature; solutions must be similarly broad in scope.

III. Issues relating to agriculture

Plainly put, the dilemma facing agriculture is to alter production practices that threaten surface and groundwater resources, or suffer limitations and constraints on property rights--the politically dictated regulation of key production activities. The justification for this will be that farmers obtain private gain by imposing public and environmental health costs on others. These costs, what an economist calls "externalities," have both short and long term consequences, including foreclosed opportunities for future economic development.

Yesterday the question was asked, "who will pay for needed changes in agricultural production." The answer to this is the consumer and, in all likelihood, the taxpayer, if recent farm policy is any guide. The real question, however, is "who will pay the costs of doing nothing to reduce and minimize the effect of agricultural production on water quality." These costs will be borne by others, including succeeding generations.

As researchers, we must be willing to rethink our priorities, focusing on production packages that minimize dependence on chemical inputs rather than merely seeking maximum production from a given unit of land. Long-term environmental consequences of alternative production systems must be factored into cost equations to identify the best set of recommendations for a sustainable agricultural sector. The leadership and staff of the AAES must be prepared to deal with possible opposition to this approach coming from certain vested interests. Nonetheless, if the agriculture sector itself begins the process of minimizing overreliance on chemical inputs, external pressures and controls on farmer decisions

will be minimized. Failure to respond in a timely fashion to public concerns will mean significant loss of control by farmers over land use practices. Farmers enjoy significant public support but could lose this if they do not take steps to protect ground and surface water resources of the state. The leadership of the AAES is to be commended for convening this Symposium as a first step in focusing attention on these issues.

IV. Strategies for resolving problems of non-point source water pollution

As a nation we've made significant progress in improving environmental quality by focusing attention on major "point" sources of pollution (i.e., industrial facilities). The next major challenge, that which brings us together here today, in non-point source water pollution. Over the past twenty years we've made good progress at what could be handled by engineers working with concrete. The problems we now face are far more complex. Solutions are not to be had through the funding of big projects, nor are there easy technological fixes. Further, the diversity of non-point sources means that state - and nation-wide programs may not be applicable. There is, instead, a need to decentralize decision making and utilize local knowledge. We have to abandon the approach of relying on technical experts to make decisions for particular communities. Instead, we need to put the community in charge of the technical expert, who should work as resource person for the community.

In short, what we need is to move towards greater citizen involvement in decision making. To be sure, the solutions arrived at using this approach are likely to be messy. But, as is clear from our state and national politics, democracy often is a rather messy process.

Why not leave the problem of non-point source water pollution to experts? I would argue, first, that scientists are too cautious a lot. By professional training we want to have "adequate data" before responding with recommendations. I do not wish to urge precipitous action, but neither is it possible to await perfect information before dealing with environmental problems.

Secondly, the diverse and location-specific nature of non-point source water pollution necessitates local involvement at all stages of the decision-making process, from data acquisition to formulation and enforcement of policy. Neither government nor technical experts can be everywhere, but a public aware of the stakes involved in water quality can play an important preventative function. Citizen involvement at community level helps build consensus and serves a valuable educational function. Education cannot be simply a matter of seminars and brochures and mass media, though these have their role. Self-directed learning with assistance of resource personnel from the Cooperative Extension Service and the AAES can be a highly effective way of increasing public awareness of the need to protect water quality. In addition, this approach increases community capacity to deal with other environmental concerns and increases likelihood that changes made will be sustainable over time.

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