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PROCEEDINGS OF THE TWENTY-SECOND ANNUAL NEW MEXICO WATER CONFERENCE

Water In The Future: 208 And You

April 28-29, 1977

New Mexico Water Resources Research Institute

New Mexico State University ● Telephone (505) 646-4337 ● Box 3167, Las Cruces, New Mexico 88003

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NEW MEXICO STATE UNIVERSITY

LAS CRUCES, NEW MEXICO

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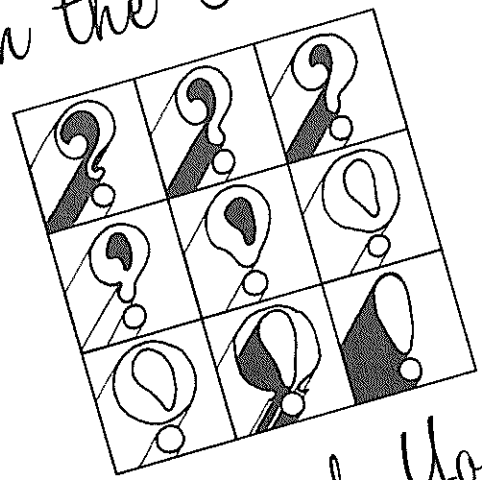
Art Showing Highlights Conference

Art and technology find common ground as an art showing highlights this year's New Mexico Water Conference. The showing by local artists features a variety of southwestern themes, particularly water in the desert. Artists whose paintings are on exhibit include Marcine Cunningham, Norma ("Jonzee") Jones, Drucella King and Margaret Swimson.

The paintings will be on display in the lobby of Stucky Hall (New Mexico Water Resources Research Institute) throughout the conference. Be sure and visit the Institute to see the exhibit.

Artist Marcine Cunningham displays one of her paintings, currently on exhibit at Stucky Hall.

Water in the Future



208 and You

Twenty Second Annual New Mexico Water Conference

April 28-29,'77

Carbine Auditorium
Anderson Building (PSL)
New Mexico State University
Las Cruces, New Mexico

PREFACE

The Twenty-Second Annual Water Conference, held at New Mexico State University, April 28-29, 1977, focused on agency, industry and researcher perspectives of PL 92-500, Section 208 planning. Section 208 provides for planning to reduce non-point pollution of rivers and streams. Papers published in this proceedings offer a good overview of Section 208 planning, with key inferences such as:

* understanding Section 208 requirements is "harder than nailing jello to a tree";

* public participation in the planning process is essential but apathy is rampant;

* if state and local governments do not assume 208 planning responsibilities, the Environmental Protection Agency will;

* New Mexico's 208 planning is well ahead of most other states, but completion on schedule will be difficult;

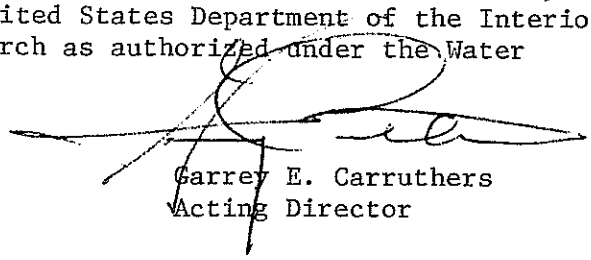
* some planning efforts - such as on Indian Reservations - are hindered by lack of institutions to effect the 208 program;

* researchers should devote more time and resources to developing "best management practices" for reduction of non-point pollution;

* section 208 plans will reflect the close relationship between land and water use.

I attribute success of the Conference to careful planning and deliberation by the Advisory Committee, excellent paper preparation and presentation by invited speakers, sterling moderation by the distinguished chairpersons (who kept the conference right in time), active audience participation, and super staff work by the WRRI team. My thanks to all.

The papers are reproduced in the form in which they were received. Funds required for publication of the Proceedings were provided by registration fees and by the United States Department of the Interior, Office of Water Resources Research as authorized under the Water Resources Act of 1964.



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Introductory Comments
22nd Annual New Mexico Water Conference

Gerald W. Thomas
President, New Mexico State University

It is a pleasure to welcome you to the 22nd New Mexico Water Conference. We are here to talk about water for the future with special reference to 208 planning. However, it is in the broader context -- that of providing food and fiber for the world -- that I wish to shape my opening comments.

During the past two decades, the environmental awareness movement has been primarily concerned with the "absorptive" capacity of the environment -- in other words, problems of pollution, contamination, waste control and disruption of natural ecosystems. As the energy crisis developed and as new attention was focused on world hunger, the emphasis has changed back again to more concern for the "productive" capacity of the environment.

Appropriate questions are now being asked about the amount of land, water and energy required to produce food and fiber for the people. These limitations in the resource base must be considered as we look at the critical question of "How many people can the earth support?" Also, with this renewed concern for resources, we are observing a more balanced approach to environmental awareness -- an approach which places emphasis on "management" -- management rather than "protection" per se.

Consequently, if we look at the resource base -- and resource management as the key to food production, questions must be raised about our land area, our water resource and our energy supplies. It is becoming more and more apparent that, for the near term at least -- that is, for the next 10-15 years, the availability and cost of energy will be the most critical factor limiting

world food and fiber production. Even in the Less Developed Countries (LDC's), where agriculture is less "energy intensive," the supply of fertilizers and petrochemicals, the food delivery system, and the dependence of mechanization (though limited) are critical to agricultural development. Energy is particularly crucial to the future of irrigated agriculture. Energy costs or perhaps natural gas curtailment in the Western U.S. may lead to a shift from irrigation back to rain-fed agriculture -- another reason for emphasizing rainfall management. President Carter has restated the energy problem -- conservation.

It is my hope that by the year 2000 -- perhaps sooner -- we will have developed alternative sources of cheap energy -- at least we know that there is an abundance of energy in the universe if we can convert it to man's use. On the other hand, water becomes more and more critical with time. Water is a renewable resource, but the supplies are limited. Consequently, over the long term water will likely be the most limiting factor in world food and fiber production. This does not mean that I am not concerned about the amount of land available for agriculture -- because I am concerned -- particularly when the statistics show that in the United States we are losing 1.5 million acres of prime farm land each year to cities, industries, recreation, asphalt and concrete. In the last 8 years alone, the U.S. has lost nearly 10 percent of its top-quality farm land. These statistics are alarming -- but, still, there is more flexibility in the land resource than in the water resource. And, at least a part of the land loss to cultivation over the next 20 years will be associated with lack of water to sustain cultivation. This transition is already taking place in some areas of the west.

Because of unusual weather conditions in the U.S. this year, we are anticipating substantial reduction in food and feed crops in the Western States. Irrigation allotments have been cut drastically in California, Arizona, Colorado and New Mexico. Vast acreages of dryland farms in the mid-west are suffering from severe wind erosion and moisture deficiencies. And, keep in mind, that the rest of the world is dependent upon U.S. agriculture -- to the extent that the production of one acre out of every four in the U.S. goes to supply the export market.

The overall world food situation has improved somewhat since I attended the World Food Conference in Rome. Both the U.S. and the Soviet Union had good grain crops this past year. Nevertheless, the worldwide picture is not healthy due to the continuing population explosion. World grain reserves, as measured in terms of days of world consumption, continue to fall. For example, in 1962, there was enough grain in storage to feed all the world's people for 105 days. In 1976, world grain reserves could only feed the world's people for 31 days. Certainly, grain reserves are a valid measure of food security. The small carry-over supply -- 31 days -- is also an indication of our dependence upon yearly production -- an indication of our vulnerability to weather and other production conditions in a given year. So much of our agricultural technology -- our food production capability -- is dependent upon water supplies. There would not be a "Green Revolution" without adequate water. Complacency about water, complacency about weather, complacency about energy, and complacency about the loss of prime farm land can lead only to world famine. Will we have the foresight, will we have the vision, will we have the research and analysis, will we have the political power to insure an adequate food and fiber future for our people? Well, one reason we are here today is because we are concerned.

Welcome to the conference.

ENVIRONMENTAL PROTECTION AGENCY PERSPECTIVE

James L. Agee
Western Coordinator for Water Quality Management
Environmental Protection Agency
Seattle, Washington

Ladies and Gentlemen, it is very nice to be with you today and to participate in this, the Twenty-second Annual New Mexico Water Conference. As Steve Reynolds will recall, this is not the first time that I have participated in the conference. In the Spring of 1967, I was here to discuss what was then a new Federal requirement for water pollution control - the adoption of Water Quality Standards for interstate waters. My message today is not much different from my remarks to you 10 years ago.

Let me go back a little bit to 1965. In 1965, the Congress amended the Water Pollution Control Act to provide for the establishment of water quality standards, standards across the country. The states were required to adopt water quality standards for all inter-state and coastal waters, and those water quality standards were to be based on the beneficial uses of water. That is because we are really to rehabilitate the nation's streams and determine what beneficial uses we are really trying to address, provide for, and maintain. The Water Pollution Control Program at the federal level was then in the Department of the Interior and from the legislation we derived twelve guidelines to assist the states in adopting water quality standards. Incidentally, these standards had to be submitted to the Federal Government and had to be approved by the Federal Government. If the state failed to adopt the standards or failed to come up with standards that we, the Feds, would approve, we would then adopt the standards for them, and Congress provided for this. It was really the first, I think, pre-emption by the Federal Government through Congressional action in the water pollution control area, thereby supplanting a primary state role, up to that point in time.

Two of the guidelines that I made reference to were these: Guideline No. 1 said that no water quality standards would be acceptable if it was less than existing water quality. It became known as the anti-degradation policy. That guideline was inherent in the 1965 Act and is still inherent in the Water Pollution Control Act. Anti-degradation was a "no-no", if you will. The second guideline in 1965 was Guideline No. 8; it said in a sense that any waste discharge that was amenable to treatment or control shall be treated or controlled whether or not the

receiving water needed that degree of treatment. Now, this was kind of contrary to this beneficial use concept that I stated previously, but there was a fundamental incongruity in the Water Pollution Control Act even back in 1965. The states did adopt the water quality standards, submitted them to the Federal Government and ultimately they were approved, but they were limited to coastal and inter-state waters. The states also came forward with a plan of implementation and it was generally directed toward point sources of pollution - municipal and industrial waste discharges.

Well, then in 1972, the Congress made some very fundamental changes to the Water Pollution Control Act. It provided for the extension of water quality standards to all waters within a state (intra-state waters) not just limited to inter-state and coastal waters. It provided for some fundamental water quality goals, the 1983 goal, most of you are familiar with, says our waters in this nation should be fishable and swimmable by 1983. There are two other words in the legislation that does say "where attainable", and I think a lot of us forget those two words; but it should be "fishable and swimmable waters nationally where attainable." I cannot answer the attainability question for you, but it certainly has an economic constraint, it certainly has a technical constraint, and it also, I think, has a political constraint or "what will the public accept?" But, nonetheless, fishable and swimmable waters by 1983.

There is also in the Act the "no discharge" goal of 1985. The law was provided with a massive permit program for point sources - municipal and industrial waste discharges. A permit program that was administered by the Federal Government until the Federal Government could and would delegate that permitting function to the state water pollution control agencies. At this point in time, we have roughly half the states across the country that have been delegated the permit program. In those other states, the Federal Government is still writing waste discharge permits for municipalities and industries; a very strong federal involvement. The law also provided for an extension of the enforcement responsibilities by the federal agency prior to 1972. Our antecedent agencies were limited to enforcement on inter-state waters when the waste discharge from one state impacted a water use in an adjacent state, but that was the limit of the enforcement powers. Today, EPA has the responsibility, the authority, to take legal action almost anywhere that people are not meeting the permit conditions for municipalities and industries. We have a big question today, "How does this apply to non-point source waste discharges?" which I will deal with in a few moments.

We have really moved in 1972 from a water control standards program to a technology-based program. Congress provided for best practicable treatment by industries by 1977 and the best available treatment by 1983. This indicates a high level of technically achievable waste discharge control measures by municipalities and industries. So, we went from

this water quality limited program to a technology-based kind of a program, again, a major change in the thinking of the Congressional people dealing with water pollution control. The law also provided for a very significant planning effort, of which 208 is the major piece of planning. The law also provided for the first approach nationally to dealing with non-point sources of pollution, basically through 208. The important element as far as 208 planning and non-point source is the absence of federal involvement. The responsibility really goes to the state and the locals. This was reinforced not too many months ago by a court action where the judge ruled in a sense that EPA could not limit the size of animal feedlots, for example, or irrigation return flow discharges. We could not permit it on a basic number, so many head of cattle or so many irrigated acres. The court rendered that that was not permissible under the law. We could have areawide waste discharge permits, but fundamentally, our approach is that state and the locals are to come up with the regulatory mechanisms to deal with non-point source. The legislation says, in dealing with non-point sources, that the states and the locals and/or the locals shall have a process to identify the discharges and a regulatory program to control it to the extent feasible. The process is to identify and a mechanism to regulate to the extent feasible. That is very simply what the law says.

How we move into this and where we go from here, I will be discussing with you this morning. The 208 program got off to a rather slow start as compared to the point source program. In EPA, we made our number one priority the municipal and industrial waste discharges and we deferred attention on 208 until two or three years after the law was passed. We started providing for the planning grants in FY '74, continued in 1975 and we are still continuing. The legislation provided for $300 million to support state programs and/or designated agency programs, a designated agency by the Governor. $300 million: $50 were to be used in one fiscal year, $100 and $150 in the other two fiscal years. We were permitted by the Office of Management and Budget to authorize $163 million out of the $300, which we did, and funded 149 designated agencies. Again, these are local agencies that had been designated by the Governor. But we did not fund any state water pollution control agencies or other agencies identified by the Governor for statewide 208 kind of planning. We were sued on this matter by the National Association of Regional Counsels, it was an impoundment suit, and as most of you know, our track record on impoundment suits is near perfect. We've lost them all. I will leave that to you as to whether you think that is good business or bad business, but as such we have been sued, we have lost that suit so we are now faced with the proposition of obligating an additional $137 million. $137 added to the $163 bringing it up to about $300 million. We have not as an agency made our decision as to whether or not we will appeal that court suit. We have until about the first week in September. The smart money is betting if we do appeal, we will lose again. So I think we can look forward to more funds in that particular program.

We were also sued again on the basis that we had administered this program or were starting to administer it primarily as a designated planning program, planning at the local level. Again, planning agencies designated by the Governor. The Judge heard that EPA was responsible not only to fund but to require 208 planning to be done by the states in all areas that were not designated by the Governor. So we have a requirement that we have to have statewide 208 kind of planning and that EPA has to fund the states to do this. We were permitted again by OMB, and we had Congressional authority, to spend an additional $53 million, and we have that money out working today. We have started now to fund all the states and an additional 26 agencies, so we essentially have now, out working, something like a little over $300 million, $350 million or so in this program at this point in time. The Congress is also considering additional funding which may well bring the total aggregate level for 208 planning up to somewhere around a half a billion dollars. A good many of you have worked in the past on comprehensive planning for water resource projects or other kinds of comprehensive planning and realize that just the magnitude of the dollars is kind of staggering, at least it is to me. It is a very, very significant amount of money to get out to do this kind of work, and most of it is directed toward the non-point source piece of the water pollution control problem in this country. We are having some problems with the 208 program. I will be pleased to share some of these problems with you. First of all, there is an attitude problem, an attitude within the Environmental Protection Agency, I think an attitude within a lot of the traditional water pollution control agencies in this country. This developed from the standpoint that we had added new actors into the planning business. Some of the planning grants in the early going went to Council of Governments and local agencies, but these were agencies that traditionally had not been involved with water pollution control. So we have seen an awful lot of resistance, not only in the state water pollution control agencies, but also in EPA. EPA people, and you might count me among them, have some real fears, had some real fears at least, on whether the locals would do the job. Could we trust the locals to pick up this very significant piece of the water pollution control program in the country, and a lot of people, I think, pre-ordained 208 failure from the very beginning? I submit to you today that it is not a failure and will not be a failure, and I think just the fact that this many people are assembled here today to learn, talk and find out how we can have good non-point source programs administered, again by the state and local people, is evident in itself that we have a high probability of success in the non-point source activities in this country.

We do have this attitudinal problem; it is still with us to a degree, and also, I think another problem we have had is that there are an awful lot of new actors in water pollution control. Agencies, people, that have traditionally not worked in water pollution control. At the state level, we have the State Departments of National Resources, State Forestry Departments, Minerals and Geology Departments, Planning

and Developing Agencies within the State. All have a significant role in planning in the non-point source activity. The same thing holds true at the federal level.

The one thing that EPA cannot do from a technical standpoint is provide you good solid technical assistance in non-point source control measures. We do not have the technical expertise in that area. One example is in sediment transport, the federal agency that knows how to deal with sediment is the Soil Conservation Service. It is that federal agency that EPA is primarily looking to provide the technical know how, the technical assistance to the state and to the local people working in sediment transport. I would be masquerading if I said EPA can help you in best management practices. Best management practices are site specific and only local solutions to local problems will work. However, EPA will not come out with uniform regulations that say that anybody dealing with forestry or anybody dealing with irrigated agriculture or non-irrigated agriculture are going to have to conform to these national standards. Our approach is that the states and the locals have the authority and the responsibility to come up with solutions to those particular problems.

Another question has been the funding and funding has been a problem. It is kind of like alternating a current. One day it's on and one day it's off, and I have given you the litany about the money story. The big question today is will the federal government provide for continuing funding in the 208 program, and I cannot tell you yes nor can I tell you no, today. I think to a good measure, the continual funding support by the federal government will depend on how successful we are in planning at the state and the local level. But, the funding is a big question. Most of the funds have to be expended and the reports and implementing programs completed by November of 1978. Then the big question is, "what after 1978?" The law requires a continuing planning and implementation program. It is not to stop with a plan on a bookshelf. It is one of the plans that can be implemented in a continuing planning re-evaluation to control water pollution in this country. That is a big question mark and I am sorry I cannot tell you today as to whether or not the Federal Government will continue to support these kinds of planning and implementation activities. To a degree, it will be up to the Congress and the Administration to come to an agreement on this particular matter. Perhaps as we see the Congress deal with the fundamental amendments to the Water Pollution Control Act, they may well deal with the funding issue.

Another problem that we are having with 208 is the regulatory nature of the program. Again, a process to identify and a regulatory mechanism to control, to the extent feasible, those waste discharges from non-point sources. But, we are finding a great deal, not as much resistance, as we are questions about what kind of regulatory program does EPA expect out of the state and locals. Is EPA going to hold out, for example, to get soil and water conservation districts with regulating authority

to take legal action against the farmer? Where is that regulatory stick going to be? Is it going to be in soil and water conservation districts? Is it going to be in the state water pollution agencies? Is it going to be in the department of natural resources? Where within that state and that system is this regulatory responsibility going to rest?

These are some of the questions that people are dealing with and that we are faced with across the country in 208, and it is a problem that we have today. People are just warming up to the idea that it is a regulatory program. Again, we do want a plan that can and will be implemented and starts coming to grips with non-point source programs. The other problem is that 208 is 75% political and 25% technical; and I say that because I think a synonym for "208" is "environmental policies by decisions, by elected officials." Not only in the legislative arena and in the Executive Department, but at the local level - in the county courthouse and in the city halls where elected officials make decisions to implement these water pollution control programs. I do not mean to down-grade our need for technical data and technical know-how, but I do submit that we have far more technology available to us today in non-point source control than what we have and are implementing. The solutions have been known for years in sediment transport; for example, the Soil Conservations Service has book after book on design criteria and methods that can be used to retard sediment transport: "Keep the soil on the land." This activity is directly compatible to the water pollution control program, and I think one of the big areas of concern in 208 today is to really support in a dollar sense and a regulatory sense the sediment control programs that SCS and local soil and water conservation commission have been trying to do since the mid-thirties.

But there is, to a degree, another problem that we have not recognized - the political nature and the fact that elected officials are going to have to vote for the regulatory programs. They are going to have to vote for some funding to support those regulatory agencies. This is a problem that we face nationally. An additional problem is the fact that EPA has really not tipped our hand as to what we expect out of a non-point source program. This is sort of what we used to do in comprehensive planning and other kinds of work in the Environmental Protection Agency. I used to work for a boss and would take something to him and he would look at it and hand it back. He would always say, "I don't know what I want, but it ain't it," and in so many cases, I think this is where we are with 208 today.

I alluded to the fact today that EPA is not going to come up with a set of rules and regulations and how-to-books that tell you what you have to do at the state and local level. We are giving you ample leeway, to come up with site specific solutions to your particular projects. Now there is no question that that project (208) and how it is implemented, will have to be submitted to the Governor. The Governor will

have to approve it, and the Governor will have to submit it to EPA for review and approval. But some of the tests that we will look at may well give you some ideas as to what directions we expect, in EPA Headquarters, the program to go. We will look to see, "Will these kinds of activities, these best management practices as are implemented, will it improve the water quality? At what rate will the water quality be improved, to what extent is it a regulatory program? To what extent is it a voluntary program? Can it be implemented? Is there funding locally or at the state level to support sediment control efforts in the districts to carry out a sediment control program, sanitarians to deal with the septic tank problems, building inspectors to deal with the construction problems."

We have yet to prove 208 program, although we have some excellent examples nationally of what has been done. We have about sixteen recent improvements in state-wide sediment control acts. They are starting in the direction of a regulatory program which provides funding programs for these expanded sediment control acts. We have recently seen forest practices acts in states of Oregon, Washington, Idaho, California. Alaska is considering a forest practices act which starts getting down to the practices, with the purpose being to start implementing those practices and keep the pollution impact of these activities at a minimum.

One of the major policy problems that EPA is wrestling with today is the fact that where we will ultimately approve a best management practice and begin depending upon that piece of non-point source practice that we are dealing with. As an example, some of the best management practices in the logging industry say not to use caterpillars on such steep slopes. We would use high speed logging in certain areas and we would need to use buffer strips that would not be logged to provide for filtration of sediment that would run down the slopes. In your sediment control activities it may be the use of grassed waterways or the application of terraces and all those kinds of activities that you folks know far more about than I. But, in the event that we would come up with best management practices that can and will be implemented at the state and local level, what happens if we still have a violation of water quality standards? Will EPA force the states, or will EPA come up with a regulatory mechanism that starts enforcing that particular activity on the land? That is a question that has been nagging us for a number of years. Our position is this: That as best management practices are adopted, and we will ask the Soil Conservation Service to review those best management practices for a local area, EPA will hold our water enforcement until 1983. We will give the application of best management practices a chance to work, evaluate it over the time frame between now and 1983, and then address the issue as to whether or not water quality standards should be adjusted or the best management practices should be adjusted. So, what we have to come to is the accommodation of water quality standards and best management practices for the non-point source pollution in this country, they have to mesh.

Too often in the past we have had problems with even the point source program where the point source permit dictates an amount, we have a certain degree of treatment and we have a water quality standards program that sets the water quality level in the stream and they often do not meet. I often tell the story related to the way they used to build tunnels in Ancient China. There would be a mountain, so they would start a group of coolies on one end and a group of coolies on the other end and they would drill toward the center. If they met, we would have a tunnel. If they did not, we had two tunnels. To a degree, we are running a two-tunnel program today. The water quality standards not only in the point source but in the non-point source area, have to mesh. We must work toward bringing these two pieces of the water pollution control program together and have the degree of compatibility needed.

People frequently ask the question, "What happens if we (state) don't have a regulatory program to deal with non-point source?" They have asked us and we have normally shied away from dealing with these kinds of issues. If a state absolutely refused and the locals absolutely refused to come up with a non-point source control program, then EPA is going to be left holding the sack. We are going to have to do something. Some of our people, our lawyers, tell us, "You can withhold the construction grants," that is the grant program to support the construction of municipal sewage treatment plants. That is a possibility. I did not say that it is a probability. I do not think politically we would ever get away with that and besides it is not in the best interest of water pollution control to do it. We have not dealt with the sanction issue to this point in time.

I think most of you people know enough about EPA to recognize that fact that we spent our first five years in EPA establishing ourselves as a regulatory agency. Of course, that is what the law says, "You are regulators." And believe me when I say that we have the capability to write regulations. In fact, we have flooded the Federal Register with regulations by the hundreds and there is a rumor going around Washington D.C. which I would like to stop: "The Federal Register is not going to be re-named the EPA Journal." Sometimes it looks like it. However, I think in the non-point source area, we have provided a great opportunity for the states and local people to develop programs that can meet your requirements. You would then have EPA in the position where we would not have to come in and start regulating. But, we have the option, if the states and locals fail, to come up with some regulatory programs. And if we do come up with some regulatory programs, they always have to be applied uniformly across the country. We make everybody lock step and do it the same. This obviously is not the answer to water pollution control. Again, I come back to each state's specific nature, as they have particular solutions available to deal with the problems that are out there.

In summary, let me say that we have come a long way in solving the nation's water pollution problems in the past 10 years. This is particularly true with point source discharges of municipal and industrial wastes. Today and in the near future, the task at hand is to start dealing effectively with non-point sources of pollution. The state and local communities have the opportunity today to plan, through the 208 program, and to implement the control measures to deal with your water problems.

"SECTION 208 PLANNING: NEW MEXICO'S PROGRAM AND PERSPECTIVE"

Catherine A. Callahan
Section 208 Project Manager
NM Environmental Improvement Agency

Section 208 is one of three planning programs mandated under various sections of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). New Mexico has been involved with the other two programs, facilities plans for sewage collection and treatment systems and river basin water quality management plans, for some time. Facilities plans identify community needs for the collection and treatment of sewage, what areas should be served, what system should be designed based on cost-effectiveness of a number of alternatives and the environmental effects of the selected system over the other alternatives. River basin plans deal with the identification of sources of water pollution in a geographic area, a summary of existing water quality and water quality problems in that area, a review of the water quality management systems in the area and a set of plan recommendations to address significant water quality problems. The river basin plans are essentially Phase I of a continuing planning process for water quality management in New Mexico.

The river basin plans basically dealt with point sources of water pollution, that is what comes out "the end of the pipe". An example would be the discharge from a sewage treatment plant. Water quality planning under Section 208 addresses two significant issues, regional wastewater management or treatment needs and nonpoint sources of water pollution. The issue of Regional wastewater management or treatment needs raises questions about the most cost-effective and environmentally sound way of collecting and treating sewage in urbanizing areas adjacent to established municipalities. There are several regional facilities plans currently in the review process including Albuquerque, Eastern Valencia County and Central Grant County plans. Non-point of water pollution are quite difficult to define; they are "diffuse" or areawide sources such as a concentration of septic tanks in an area or urban stormwater run-off. In a sense nonpoint sources are everybody's problem since they are not coming out of the end of a pipe: How many septic tanks in an area create a nonpoint source problem? Whose septic tanks are responsible? Identifying and controlling significant nonpoint sources is a difficult and time-consuming task; they are hard to quantify and extremely complex to manage. Because water quality planning efforts under Section 208 focus on non-point sources of water pollution they supplement and further develop the continuing planning process begun in preparing river basin plans. New Mexico's Section 208 program is primarily focused on the identification and control of nonpoint sources of water pollution.

The state has received a 75% Federal grant of about a million dollars to carry out water quality planning under Section 208 by November 1, 1978. The state is providing 25% match in state salaries. Almost 80% of the grant is going to contract work. Three areas have been identified in New Mexico for Section 208 planning (See Figure 1): The Navajo Nation lands in New Mexico, the Albuquerque Metro area and the rest of the state. The Navajo Nation is conducting its own water quality planning with monies from New Mexico and other states' grants. The Albuquerque Metro area was identified for two reasons: First, it is the major urban-industrial area in the state and second a number of water resources planning activities are currently underway, including, the Corps of Engineers Albuquerque Greater Urban Area water resources study, and a couple of regional facilities plans. In addition, a number of the technical studies under Section 208 being conducted along the Rio Grande, include the Albuquerque Metro Area. The third identified Section 208 area is the remainder of the state.

The Water Quality Control Commission has been designated as the water quality planning agency for Section 208 planning (See Figure 2). In turn, it has delegated "lead agency" responsibility to the New Mexico Environmental Improvement Agency, which is responsible for administering the grant, managing the contract work being done, assembling the elements of the plan and presenting the plan to the Water Quality Control Commission. Two other state agencies have been delegated specific responsibilities for portions of the Section 208 program. The Natural Resource Conservation Commission has been delegated the responsibility for studying sediment production and its impact on water quality and the Department of State Forestry has been delegated the responsibility for assessing forestry management practices and their impacts on water quality. An interagency agreement has been entered into with the Middle Rio Grande Council of Governments to carry out the public involvement program in the Albuquerque Metro Area.

Public involvement is crucial to the planning process; each of the agencies involved in a portion of the Section 208 program has an advisory committee to represent constituencies in the general public. The middle Rio Grande Council of Governments will draw on its Board of Directors composed primarily of local elected officials, for the Albuquerque Metro Area Section 208 Policy Advisory Committee. Both the Natural Resource Conservation Commission and the Department of State Forestry are using committees composed of people with specific expertise in sediment and forest practices. The Environmental Improvement Agency works with the overall Statewide Section 208 Policy Advisory Committee whose members represent major constituencies in the so-called "general public". Committee members represent interests from agriculture to Federal land management agencies to New Mexico's counties to the League of Women Voters in the state. The New Mexico Section 208 public involvement program is discussed separately; only brief references are made to the program here.

Water quality in New Mexico is generally good. We don't have the same type or complexity of problems as other areas with more rainfall

or more people. There are some problems, however; fecal coliform counts exceed the standard along part of the Rio Grande, algae growth occurs in reservoirs across the state and salinity increases in general from north to south along the Rio Grande. Nonpoint sources may have significant impacts on sediment and salinity loadings to a water course, for example. At this point, we don't know; we have some ideas on what the impacts are but no supporting data. The focus of much of New Mexico's Section 208 program, then, is on identifying and hopefully attaching some numbers to nonpoint source problems.

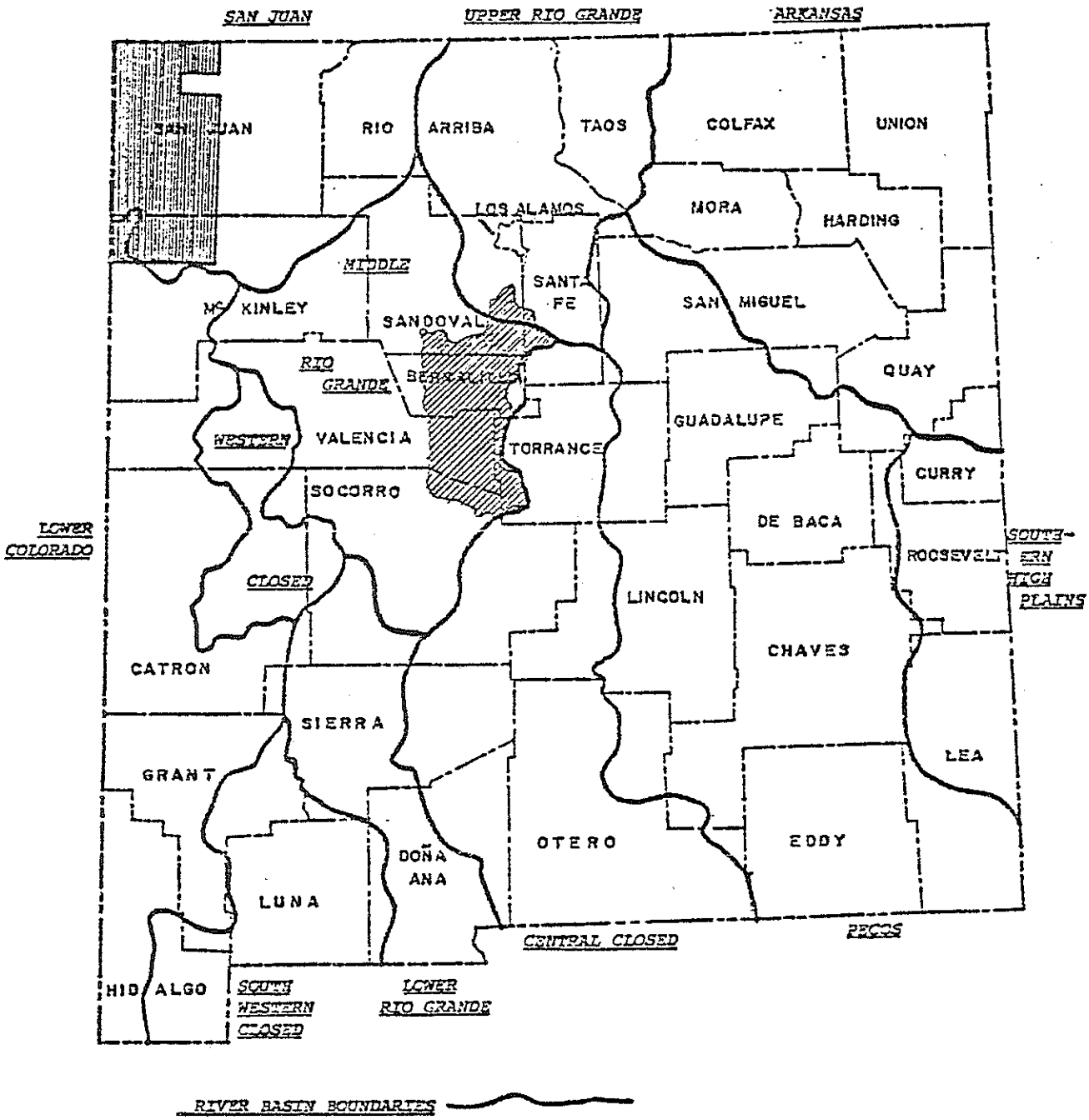
Table 1 is a brief summary of the major technical studies being carried out in the planning program. In a sense it is one-sided; public participation is an integral part of the program's effort but is discussed separately. It should be noted that most of the work being done under contract is to collect data. The Environmental Improvement Agency will take the data to use in developing plan recommendations. The contractor does not do the actual planning work. The academic community has a substantial body of expertise. Five of the thirteen contracts have gone to university researchers and of those five, two have been awarded to people at New Mexico State University. The state is fortunate to be able to draw on university expertise for work under this program.

A few general comments need to be made about the Section 208 planning program. First, New Mexico's program addresses New Mexico's water quality needs and priorities. A lot of public involvement went into the development of work to be done in the Section 208 program; the study of the impacts of toxic substances, particularly "PCBs" and mercurys on food chains in the Rio Grande was the direct result of comments made by concerned citizens at a spring, 1976, Section 208 meeting in Santa Fe. We are not working with a blueprint from Dallas; the Environmental Protection Agency has been flexible enough in this program to accept the state's priorities. An example is the emphasis on ground water in our program: Collecting existing ground water quality data statewide and organizing them into a computer data base and looking at the regional impacts of uranium industry activities on water quality in the Grants Mineral Belt. Looking down the road at implementation of plan recommendations, what's needed will depend on the problems identified. "Attainability" is going to be a key concept in implementation, as is the identification of costs and benefits. We're focussing on nonregulatory approaches but we realize nonregulatory approaches aren't going to work for everything. The intent is not to reinvent the wheel but to develop solutions with which New Mexican's can live with, solutions which address New Mexico's needs. This makes public participation in developing plan recommendations especially critical. The Water Quality Control Commission has adapted a policy of implementation at the lowest appropriate level of government. The problems which the Section 208 planning program addresses are simply not amenable to national standards or regulations.

The Section 208 program should address water quality issues. There is a tendency to make the Section 208 program one of "great expectations", the universal answer to all the coordination difficulties

Figure 1: IDENTIFIED STATE 208 PLANNING AREAS:

1. Albuquerque Metro Area[1/] — —
2. Navajo Reservation — —
3. Remainder of State

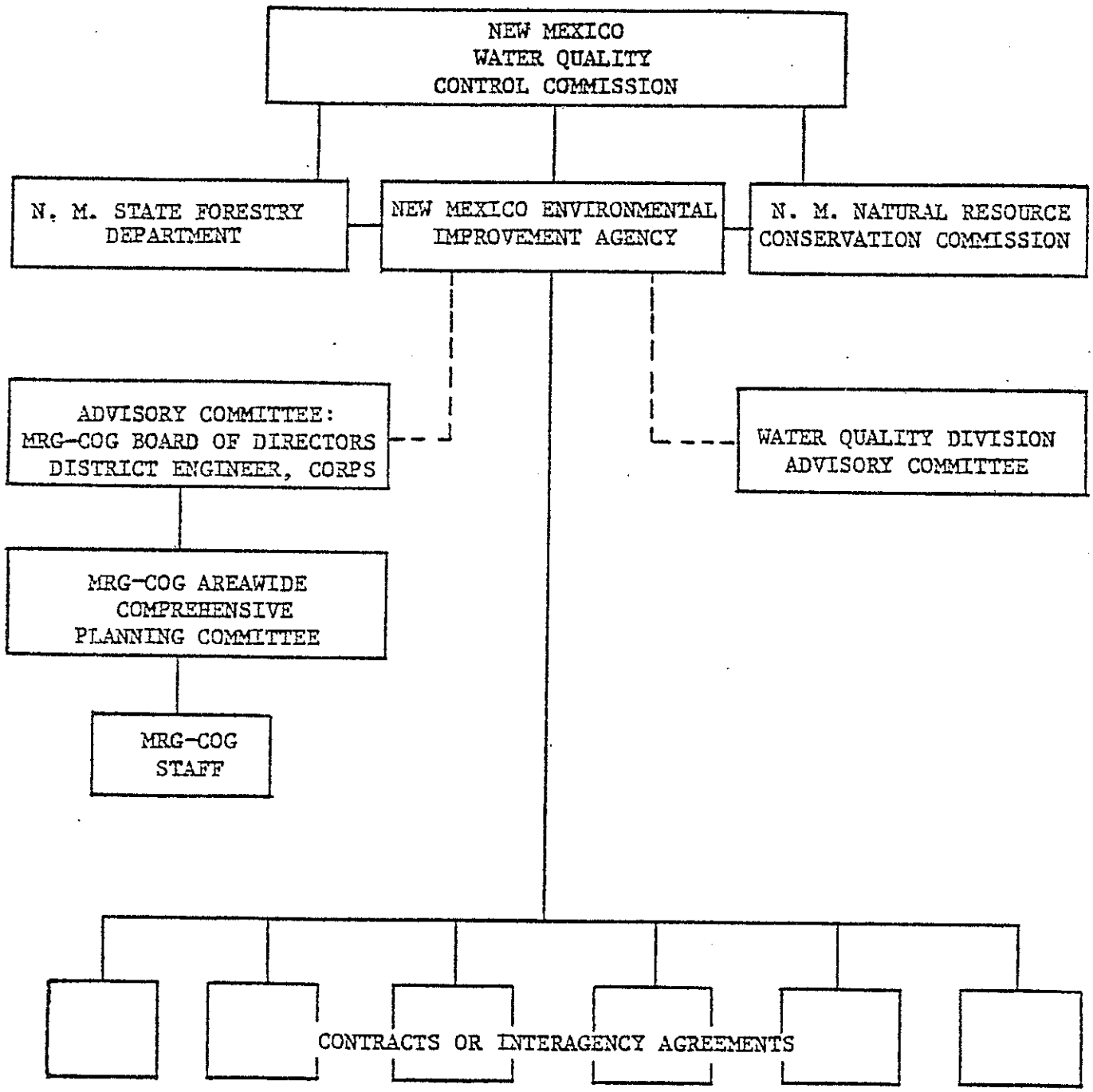


1/ Coincides with Corps of Engineers Urban Study Boundaries

Figure 2: Water Quality Management (Section 208) Planning, Program Management

Albuquerque Metro Area

Statewide Area



or the gaps in other programs. It is a continuing planning process rather than a final product, a process which is not going to solve all problems. While the planning process is going to take more time than we have available to meet the November 1, 1978 deadline, it will, with the help of concerned New Mexicans, provide the basis for water quality management efforts in years to come.

Table 1

SECTION 208 WATER QUALITY
STUDIES IN NEW MEXICO

1. Sediment production and its effects on water quality throughout the state.

2. Forest activities---including timber harvest, planting, fertilization, application of pesticides and herbicides, wildfire, prescribed fire, all recreational activities, and road building---and their effects on water quality. This project is being conducted on all forested lands in New Mexico.

3. Irrigated agriculture: Practices that degrade water quality.

4. The nutrients nitrogen and phosphorus: Their presence, and effects on plant growth in reservoirs.

5. Management of sewage in rural areas: Feasible and workable alternatives to central sewage treatment facilities.

6. Ground water quality information: Compilation and evaluation of statewide data, formation of computer storage bank.

7. Ground and surface water quality monitoring program, to determing regional long term impacts of uranium industry activities.

8. Toxic or hazardous substances: Their uptake and biomagnification in food chains associated with the river system.

NATURAL RESOURCE CONSERVATION COMMISSION PERSPECTIVE AND ACTIVITIES

Robert D. Bishop
Planning Coordinator
New Mexico Natural Resource
Conservation Commission

The Water Pollution Control Act Amendment PL 92500 sets out some specific goals for cleaning up the nation's water. Section 208 of this act calls for a planning process to include an assessment of pollution problems, a strategy to solve these problems and a procedure for applying the solutions.

The prime target of Section 208 is non-point pollution and non-point pollution is the result of overland flow. Sediment is the largest single pollutant by volume in our country. From two to four billion tons of sediment are washed into our streams and lakes each year. New Mexico has the distinction of the highest average annual sediment yield of any state in the west. I have been flying over much of the state recently and I can tell you the sediment problem is real. Therefore, one of the most important elements of New Mexico's water quality management plan will be sediment control. Since this plan (208 plan) addresses itself mostly to non-point pollution, the strategy is to solve the problem through preventive measures, rather than effluent treatment. This simply means conservation treatment of land where the problem occurs.

Soil erosion is the displacement or relocation of soil particles resulting from the erosion force of wind or water. Here we are considering water erosion. Lets take a quick look at sediment. Sediment is eroded soil deposited in water or on land downstream from the eroded site.

Some have said that because of our low rainfall, New Mexico should have no sediment problems. All who are familiar with the high intensity summer storms, which result in high rate of run off, know this is not so. We have sediment problems! A rough estimate of the problem in New Mexico shows that 12,000 square miles are seriously eroding and have high sediment yields. Of the 112,000 miles of stream channel in the state, 40,000 miles have moderate to serious bank erosion. Although we have large areas of sheet and rill erosion, most of our erosion problem occurs as gully, channel and streambank erosion.

Sediment alone is a serious water quality problem but in addition, many chemicals, pesticides, herbicides and plant nutrients are carried into streams on soil particles.

Controlling sediment calls for a planning process outlined in Section 208 of the law. First there must be an assessment to determine the magnitude and location of erosion and resulting sediment problem. Much of this information is already known but it must be drawn together into one assessment. Next, the procedure calls for determining best management practices (BMP's) to prevent erosion and the resulting sediment. These best management practices can be conservation practices familiar to us, which have been used successfully for many years. There also may be new or different practices needed to solve special problems. The treatment planned must seek to prevent erosion rather than attempt to trap sediment some place down stream. The law - the regulations and Environmental Improvement Agency requires states to develop a plan. They do not tell the states what to include in the plan, but they do stress implementation of the plan. This being the case, then the people who will implement the plan must be involved in its development. For sediment control this means those who own and operate land.

NRCC Role

New Mexico's Natural Resource Conservation Commission has accepted responsibility for preparing the sediment control portion of the water quality plan. The legislative authority and responsibility of the Natural Resource Conservation Commission makes it well suited for this job.

The Commission is a state agency whose purpose is to help local Conservation Districts. It is also charged with developing and carrying out a soil and water conservation program through Conservation Districts.

Natural Resource Conservation Districts are organized by petition and referendum of land owners within the District. The District activities are directed by a locally elected board of supervisors. Each District is to develop and carry out a program of soil and water conservation with help from cooperating state and federal agencies.

In New Mexico, there are 49 Natural Resource Conservation Districts. Each one has a long range plan for soil and water conservation. They have technical assistance available from cooperating agencies to help land owners. Through the District, the individual land owner can have the assistance he wants to plan and carry out conservation treatment on the land.

The Conservation Plan which is usually the basis for technical assistance reflects decisions of the land owner.

Environmental Protection Agency representatives have stated many times and here again today, they expect to make maximum use of existing institutions. The institutional arrangement between the Natural Resource Conservation Commission, Conservation Districts and cooperating agencies make the commission ideally suited to prepare the sediment control part of the state 208 plan.

To get started with the sediment control plan, an advisory committee was set up to suggest procedures and to help the planning coordinator. This committee is made up of federal and state agency representatives such as Forest Service, Bureau of Land Management, State Land Office and State Forester. This committee has advised on procedures and techniques for planning. It meets on call to review progress and help coordinate work with their respective agencies.

Technology Application Center of the University of New Mexico has been working with Land SAT photos to gather many kinds of resource data. The commission entered a contract with T.A.C. to provide Land SAT photo base maps. They will also map general land types, check maps in the field and make area measures.

We decided to start work in Eddy County since it represents many complex problems of erosion, land ownership and land use. Eddy County offered a good place to develop and test the procedure for planning. Using General Soil Maps prepared cooperatively by Soil Conservation Service and New Mexico State University TAC prepared a map showing similiar land types. The map is compared with the Land SAT photo to refine land type boundaries. Technology Application Center checked maps in the field and will make area measurements. This map, along with the photos and base maps, were furnished to me, the planning coordinator.

I met with local technical agencies people SCS, BLM, Forest Service and the Agriculture Extension Agent and reviewed other soils information and erosion maps available. Additional information needed was assigned to agency technicians, to complete the erosion map. In Eddy County, BLM made the assessment east of the Pecos. Forest Service made the assessment for the National Forest in the southwest part of the county. Soil Conservation Service completed the map. This map shows erosion rates in terms of acre feet per square mile per year. Special problem areas were located during the assessment and based on local knowledge.

When the erosion assessment was completed, I met with the local Conservation District to review the maps and help them develop Best Management Practices designed to control erosion and sediment.

In most cases, the Best Management Practices will be the conservation practices now being used in the District. The NRCD Commission is relying on Districts to select levels of treatment which are reasonable and practical.

Plans will be developed and coordinated county by county. Information will be tabulated for all counties and county plans combined into one state plan. The water quality plan must include costs and implementation procedure. The commission is consulting Conservation District Supervisors and local people on methods of implementing the plan. To date, they see primary emphasis placed on voluntary application of Best Management Practices based on the county plan. Technical assistance would be provided through Conservation Districts.

For those practices requiring capital expense where return would be very long term, cost sharing incentive programs should be provided. This would be appropriate where the practice can show direct need to improve water quality. As a last resort, for those areas where sediment control is still needed, enforcement would be necessary.

The Commission proposes the local Conservation District serve as the Management Agency reviewing problem areas, recommending site specific treatment to reduce erosion and sediment, and provide detailed planning assistance to the land operator.

We are learning as we go about developing these plans. One thing we are sure of is local people must be involved and the plan must include their ideas if it is to succeed. So far, local leaders and Conservation District Supervisors have been very positive about participating in preparing the plan.

There is a short time to complete this job, but with local cooperation, I expect to complete the plan on schedule.

In summary - The Natural Resource Conservation Commission fully recognizes the need to improve water quality and control sediment. The 208 planning and implementation program offers an excellent opportunity to get this done. Until now Conservation treatment of land has been carried on for the sake of land improvement even though we knew good land treatment reflected favorably on water quality. Now water quality improvement is a recognized purpose for conservation treatment on the land.

The planning process outlined in Section 208 is sound - use existing institutions - assess the problem - plan treatment to solve the problem - develop strategy for implementing the plan. Throughout this process, involve local people keeping the plan reasonable and practical.

"WATER IN THE FUTURE:
208 PLANNING AND YOU"

J. Paul Comola
Assistant Regional Administrator
for Congressional and Intergovernmental Relations

You all are to be congratulated for rekindling every year since the mid-fifties a deep and intelligent interest in water resources in the State of New Mexico.

I am particularly pleased to join you this year in discussing the process by which you and other citizens will help forge the strategy for assuring that by 1983 your waterways will be clean enough for swimming and will be teaming with fish.

Water quality and water quantity are closely related. And because your water supply is limited, you have wisely been most concerned about both. Your ground water quality standards, I understand, were the first in the nation to be adopted.

Against this background, then, the future of the 208 planning process looks bright in New Mexico.

When Congress passed Public Law 92-500 in 1972, it recognized that the talents and imagination of both state and local governments would be needed to deal with water pollution. Moreover, it recognized that if the citizens were going to support those projects eventually tagged as essential in cleaning the water, they must be meaningfully involved in the identification of problems and in the selection of alternate solutions from the start of the planning process. After all, citizens are the ones who will "vote the question" on water pollution controls -- directly in bond issues or indirectly through their local officials and the budgetary process.

You have heard this morning the status of 208 planning from several perspectives, giving added dimensions to current activities -- Jim Agee and the Environmental Protection Agency; Cathy Callahan and the Environmental Improvement Agency in Santa Fe; Bob Bishop and the National Resource Conservation Commission in Albuquerque.

Perhaps now we can indulge in the intellectual luxury of looking at the philosophical issues surrounding the process of planning on such a large scale.

1. The environmental movement as we know it is a relatively new phenomenon arising out of widespread public demand. Yet, we mustn't think for a minute that concern for the environment is new to our generation. The first White House Conference of Governors -- in the year 1910 -- included a record of agreement "that the beauty, healthfulness and habitability of our country should be preserved and increased." The Governors' report continued, "It is much to be regretted that officials of the conservation movement -- that which nothing is more important in this country -- have never shown a cordial, much less an aggressive interest in safeguarding our great scenery on the one hand or in gaining an economic understanding of development on the other."

The Report Card on our generation's effectiveness in managing the environment is not good. Early this year the Columbus, Ohio Dispatch reported results of a survey of 200 Central Ohio students. The poll revealed that 33 percent of the elementary, junior high and high school students questioned believe that Americans are seriously trying to eliminate pollution: The other 67 percent said the causes of pollution are not being vigorously attacked.

One elementary schoolboy wrote, "Some people are trying to get rid of pollution. But some aren't and it is easier to make pollution than to get rid of it."

2. The determination of problems and selection of alternate solutions based on scientific data are to be made by the many publics. If nothing else, the Congressional mandate for broad public participation in the baseline studies and project planning processes for 208 water programs has brought -- and is bringing -- many professional environmental "Alices" back from what many citizens perceive as the Wonderland of Bureaucratic Isolation.

No longer can those of us who develop strategies, implement plans and enforce regulations designed to restore and assure the continuance or plentiful and high quality national water resources perform our tasks without the continuing involvement of -- and accountability to -- not only the Congress, but, importantly, also to those general and specific publics which may be impacted by our research, interpretations and actions ... impacted economically, aesthetically, emotionally or physically.

Not only must we hear the voices of each of these publics, but we must listen. From the perspective of the Environmental Protection Agency, and from our individual perspectives, it is important that we listen with the same care to the voices of our adversaries as we do to the voices of our advocates. It is not sufficient for us to seek out -- and identify with -- only the scientist, the government administrator and the environmental activist. The law clearly compels us to identify, seek out, communicate with and receive feedback from the broadest possible range of citizens. (Bankers, contractors, non-public decision-makers, real estate investors and developers, utilities, industrial and tourist development agencies, chambers of commerce, city managers, reporters and analysts from all public mediums.) These are just a few of the many

publics we must reach. Certainly, the engineer, the public works specialist, the state, regional and local planning bodies and public interest groups which are oriented to the environment are essential publics for input, analysis and feedback. But we must reach out in a substantially more organized manner to assure general public involvement in our planning process for 208 programs.

3. The planning process as devised involves all levels of government. The areawide planning process was devised to help communities develop action programs for dealing with their local water pollution problems.

It begins when a State Governor designates a statewide or a regional agency to oversee planning in a designated area. As you all know, the Environmental Improvement Agency is responsible in New Mexico for 208 planning. The Environmental Protection Agency has made grants nationwide, funding totaled $216 million, going to 49 states and 174 designated areas. New Mexico's share was $1,038,000 with an additional $352,000 coming from state matching funds.

Contracts have been let, then, by the EIA in Santa Fe to consulting firms, an area COG, originally to the Navajo Nation, to members of the academic community, and other governmental agencies in gathering data for developing a strategy.

4. Planning for clean water must come to grips with questions of future growth and with planned use of the land, public and private. As a nation we have been going through a long and difficult debate over patterns of growth and whether or not there should be some direction given by governmental bodies to that growth. The historic approach is that free enterprise prevails. People are free to use their property the way they please, and growth occurs wherever anyone so chooses. Against that has been a recognition of irreversible damage to the environment that can result from unrestricted growth.

People are grappling for the answers -- answers that can come only from debate between parties who share a mutual respect for the opposing viewpoint.

5. The groundwork being developed for a national strategy from identification of the problem to implementation of the solution may well serve as a model for other major concerns of national scope. Materials and techniques being prepared now have potential application to most other government/public programs: Conduct of a meeting, use of the media, identification of publics, resolution of conflict. Inter-relationship of the federal agency (EPA) with state and local planning agencies and governmental bodies is a new affirmation of the decentralization of the federal government with major responsibilities resting outside Washington and the regional offices.

In many types of planning, the planners do their thing and the rest of society goes ahead and does its thing, and there is no connection between the two. Moreover, the carefully drawn plans take their place among others on a dusty shelf.

In 208 we have some unusual advantages for trying to crack through this historic problem. We can see the mistakes that have been made. Our statutory authority places a special emphasis on implementation. It also authorizes enough money to provide proper leverage if used wisely. We believe this time the combination of factors will work!

6. Planning for clean water involves other environmental programs within the Environmental Protection Agency: Solid waste, drinking water, air, noise, radiation, pesticides. The pollution washed out of the air by rains contributes to water pollution in the streams and urban runoffs. The pesticide programs utilized on farmlands provide a source for non-point pollution of streams. The mining of radioactive materials in your Grants Mineral Belt has a definite impact on the water quality in that area.

My challenge to you today is that we together begin by understanding the principles involved and the programs proposed. Together we can develop alternate solutions to solve various problems involved in creating a clean and productive environment. We know that right here -- as well as in those forums in which public participation will subsequently take place -- there will be conflict. Where conflict exists, there is opportunity for learning and progress if we properly manage it.

Let us turn conflict into a positive force for planning and executing a plan for water quality that is consistent with good technical and economic management without compromising scientific and aesthetic principles.

AGRICULTURAL PERSPECTIVE ON SECTION 208 PLANNING

Gerald W. Hagaman
American Farm Bureau

Water Quality management programs apply to many farmers and ranchers across the nation.

There are those in fact that feel nearly every farmer and rancher will be affected. I would not go quite that far, at least under normal conditions. In fact, the broad definition of non point sources refers to agricultural run off as rain washing fertilizers and pesticides and top soil into water. In view of the existing water conditions across the western states, you might be inclined to retort, "What rain and into what water."

There are several concerns that, at this time, are not totally clear as it relates to the effect of Section 208 on agriculture and as one person rather humorously put it, "It is a great deal easier to nail Jello to a tree than it is to totally understand 208."

Most of the time limits or deadlines seem to apply generally to 92-500 rather than 208 specifically; primarily because while most point sources of pollution are easily identified and treated, non point sources generally are spread over much broader territory, are less readily visible, and certainly evolve from many different sources, often producing less discernable affects.

It is questionable at this time whether agriculture as a whole can possibly meet any of the deadline dates.

There are several terms that are not really defined so as to give clear-cut understanding as to what is expected as far as agricultural compliance is concerned.

One of these terms appears frequently--it is "if appropriate." There seems to be no concensus of opinion as to what "appropriate" means in this instance and who will make such determination, and at what level.

A second rather nebulous term is "to the extent feasible." Again, what is the "extent feasible," and which level of government will necessarily determine the criteria by which this term will be defined. Are we talking about a national standard or a situation by situation approach? Obviously, these are definitions that must be forthcoming, and it will be a complex problem to apply such criteria to the varying agriculture across the nation.

Generally, there are two major agricultural operations which are affected by point source control programs. They are animal feedlots and irrigation return flows.

For concentrated animal feeding operations, national guidelines have been established that require discharge permits. All animal feedlots of 1,000 or more animal units are required to obtain such permits. A permit is also required if a feedlot containing 300 or more beef cattle or their equivalent animal units, has a stream crossing the feedlot or has a man-made ditch through which animal wastes can be discharged into a waterway. Smaller feeding operations may also be required to obtain permits if the discharge has a significant affect on the waterway.

Irrigation return flows can be major contributors of water pollution. These discharges will by included in general permits and are most usually covered under a regional or district permit within a state. But what about non point sources?

In this case, it is very difficult to determine what is and what is not a pollutant. It depends mainly on where it is. Sediments, nutrients, and salts can be found on any farm and are not pollutants until they interfere with the beneficial uses of water.

Land erosion, however, has been established as a major pollutant of surface waters.

A recent study published by the Senate Committee on Agriculture and Forestry shows that about 400 million acres of cropland are responsible for approximately 2 billion tons of sediment entering our nation's waters annually, and with it, just to add to the complexity of the problem--nutrients and pesticides which are most beneficial and important as a part of our agricultural industry, but in the waters--just another pollutant.

There are six very important components of the food and fiber production which are generally regarded as pollutants. They are: Sediments, nutrients, salts, organics, pesticides and herbicides, and disease-producing organisms.

The planning process for water quality management for agriculture is generally no different than any other segment of the population, except that ALL agricultural lands, whether in a designated or undesignated area are included in the water quality management process.

If a farmer is regarded as not causing a water problem, he will probably not be in any way affected by the 208 planning process. However, if a farmer's land is identified as a source of pollution, then he will be expected to employ best management practices to minimize the pollution.

The biggest problem in agriculture is the same problem as in all other segments of the populace; getting understanding and equally important, getting involvement.

It is important especially to get farmers and ranchers involved in the early planning process, and this will require a massive educational program.

Farm Bureau has developed a short slide presentation which, hopefully, makes the 208 program more clearly understood and points out the need for individual involvement. It is our hope to get this tool into use in counties and local areas throughout the country, so that farmers can realize how important a stake they have in a sound local program.

I would like to show you our presentation, which we hope can turn suspicion, distrust, and confusion into knowledge and cooperation and participation.

SECTION 208 PLANNING: PERSPECTIVE FROM A RESOURCE MANAGEMENT AGENCY

Robert G. Adams, Jr., Forester
U.S. Forest Service
Southwestern Region
New Mexico Department of State Forestry
208 planning

It is a pleasure to be here today, to participate in the Annual Water Conference, and to bring you greetings from the State Forester, Raymond R. Gallegos. Mr. Gallegos is keenly interested in meeting the goals and objectives of the Federal Water Pollution Control Act Amendments of 1972, (PL 92-500) and he shares the concerns of the speakers at this Conference as New Mexico develops its 208 plan and implementation procedures. The State Forester's direction is clear as to the involvement of the Department in the planning process - and its final product.

Previous speakers have established the role of the Environmental Protection Agency at the national level; the Environmental Improvement Agency at the state level; and the Natural Resource Conservation Commission in their state-wide efforts to conduct sediment studies and to develop agricultural best management practices. Further in the Conference, we will hear about public involvement through the statewide Public Participation Program that State Forestry actively supports. Our purpose then, is to describe the relationship of forestry in New Mexico to the overall process as we proceed through these comments, today.

Before going on, we felt that to help you understand what we are doing, some definitions are in order: First, the law utilizes the word "silviculture" throughout. Silviculture may be simply defined as the art and science of growing trees and is analogous to agriculture. However, we most often think of silviculture in the broader term of "forestry" or "forest management" that generally is defined as all activities that take place in the forest or woodland environment. Consequently, you may hear, in this paper and others, the terms silviculture and forestry used almost interchangeably. Second, some forestry activities that we will examine as potential sources of non-point water pollution are:

Planting

Wildfire

Pesticide, herbicide, and silvicide application

Thinning

Slash disposal

Fertilization

Prescribed fire

Harvesting

Road Construction

We are also concerned with forest uses such as grazing and dispersed recreation. Third, as you have heard from earlier papers, we, too, are concerned with best management practices. Best management practices are defined in Federal Regulations, but for our purposes they may be described as processes to attain water quality objectives - such as the analysis needed to determine the number and location of water bars (road drainages) on a forest activity road.

Direction for our involvement is found in P1 92-500, and in delegated responsiblity by the Water Quality Control Commission in coordination with the Environmental Improvement Agency. In addition the U.S. Forest Service, Bureau of Land Management and others are working very closely with us.

Potential impacts of 208 planning on resource management agencies and private or industrial land owners are at best difficult to gauge. Perhaps one way to view the process is that it is a codification of common sense forest practices backed by professional expertise and field knowledge. Our Technical Advisory Task Force is approaching 208 from a standpoint of review and assessment of current practices, to determine their relationship to water quality and to find out what our problems are. Then, we may recommend the development of new methods or techniques to achieve water quality goals and standards.

As a measure of the current impacts on forest management concerns in the State, perhaps it is appropriate to review activities in the field at this time. Nationally there are interdepartmental agreements and policy statements that provide direction to federal agencies. For example, the Forest Service of the Department of Agriculture, in its role of providing national leadership in forestry, is supporting the Environmental Protection Agency through the development of analysis procedures and guidelines for the selection of best management practices related to forestry activities nationwide. Closer to home, the Forest Service, Southwestern Region, and the Dallas Region of the Environmental Protection Agency have entered into an agreement that provides for support to New Mexico's planning process, including my present position.

At the state level many inter-agency agreements and memoranda of understanding directly, and indirectly, are a beneficial influence on the 208 planning process. The most striking example has been presented here today: The close relationship of the Department of State Forestry, the Natural Resource Conservation Commission, and the Environmental Improvement Agency has been discussed in this paper and by previous speakers.

The greatest impact on forest management agencies and institutions is time, itself. Time to study the intricate threads of inter-agency cooperation; time to assess and evaluate field practices and problems; time to study best management practices and alternatives in order to select the "best-of-the-best"; time to study existing institutional arrangements and programs to utilize them to the fullest in the implementation of 208 programs; time to study possible legislative needs in order to meet State and National clean water goals and objectives - all in time to meet a court imposed November 1, 1978 208 planning deadline!

In the long run implementation of 208 planning will influence forest land management. However, we feel that the application of forestry best management practices related to water quality will be an acceptable impact on management agencies, landowners and industrial operations because, in general, we are already doing most of these things and 208 gives us the opportunity to evaluate practices and reorder priorities in relation to water quality. We believe the early involvement in the planning process of representatives of broad aspects of forestry in New Mexico is the key to the development of acceptable best management practices and alternatives that will meet or exceed New Mexico's needs and the National goals and objectives for clean water. Further, our close working relationships with the other agencies involved is, we feel a strong point in the ultimate success of our program.

REMARKS OF WILLIAM F. DARMITZEL

Executive Director, New Mexico Mining Association

Mining has gained a national reputation as a significant cause of water pollution, and in some parts of the country the reputation has a reasonable basis in fact. In New Mexico, however, a number of factors combine to present a picture which is significantly different from what exists east of the Mississippi. Let me hasten to add that I will not be spending my time on this program trying to prove that mining can be excluded from 208 planning, but I do intend to try to show that we are not as bad as we are frequently painted.

Potential water pollution from mining is primarily from two sources: Surface disturbances and mine discharges.

Under surface disturbances there are four types that may cause water pollution:

1. Waste Dumps - This is the material that is removed from both surface and underground mines which is considered waste because it contains mineralization in very small quantities and is not recoverable. In many instances there are sulfide materials which can combine with rainfall to create an acid drainage. Fortunately or unfortunatley, in New Mexico we do not have sufficient rainfall to make this a problem in most areas of the state. There can also be other minerals present in the waste dumps which could be leached out by rainfall that would be detrimental to ground water, but again in most instances there is insufficient rainfall to cause a problem.

2. Tailings - This is the material left from the milling process in which the ore is ground to a very fine consistency and the mineral is removed from the waste, which is usually disposed of as a slurry by discharging into tailings ponds where the solid material is deposited and the water is either collected or evaporated. Tailings always contain traces of the sought after mineral along with other minerals and chemicals. Pollution can occur by seepage through the tailings pond or from the washout of the tailings dam. Because of the limited rainfall, we have little danger from washout of dams, but seepage through older tailings ponds which were not lined with clay or other material can be a problem in New Mexico.

3. Low Grade Ore Stock Piles - These have about the same potential for polluting water in New Mexico as do the waste dumps. There are minerals which could be leached out and run off into a stream or could get into ground water, but the limited rainfall keeps this from being much of a problem.

4. Strip Mining - In many areas of the country there have been problems with siltation from the erosion of strip mined land which was not properly reclaimed. Again, we believe that New Mexico's Coal Strip-mining Act will prevent inadequate restoration, and along with the limited rainfall, strip mined lands will probably contribute less to the erosion and siltation problem than the land did in its natural condition.

The other potential source of water pollution from mining is from mine discharges:

1. Dewatering - When mining is conducted, water may be encountered and must be removed from the mine. This water may contain pollutants naturally and these may be increased or added to while the water is in the mine. This discharge then becomes a pollution source and will have to be treated before release. For those mining activities which encounter water in their mining activities, and the mining process increases the amount of pollutants contained in the water discharged in the dewatering, those mines will have to develop some reasonable process for the treatment of this water.

2. Mine Drainage - In many parts of the country inactive or abandoned mines continue to produce water in sufficient quantities that it runs out of the mine opening. These waters often contain dissolved minerals which pollute surface or underground water. Usually this is not a problem in New Mexico. In most instances abandoned or worked out mines do not have water flowing from the mine opening.

In general, the scarcity of water in New Mexico has eliminated major water pollution potential over large areas and leaves mostly specific and individual pollution problems to solve.

In conclusion it is our view that the two mining areas which have already been selected for special study - the brine disposal in the potash basin near Carlsbad and the uranium belt near Grants - are probably the areas which most nearly meet the requirements of 208 and that the other situations which exist or might arise can be adequately handled under the existing water quality law and regulations covering both surface and underground waters.

PUBLIC SECTOR PERSPECTIVES

Mally Ribe
League of Women Voters
New Mexico

When Garrey phoned me on a beautiful morning in January, he asked me to fill this spot on the program, and I understood that he was covering all the angles, and wanted someone to represent public interest groups. There were more than twenty League of Women Voters members in my house that morning, planning our legislative action organization, and I forgot all about this for weeks. When I finally did begin thinking about this assignment, I wondered: What does this mean, the possible impact on public programs and activities? And how can I avoid saying what other speakers have covered? No matter, I will take my turn at not speaking on the assigned topic.

It turns out that no one knows what the impact will be, except planning and more planning and then some implementation. The benefits from non-point source controls will not be visible for some time. Some presumed impacts on public programs and activities are being discussed for you by other speakers.

How does the challenge of 208 look to the non professional, the private citizen, or even to the agency people? First, it is generating a flood of words and printed matter. There is a carton on the floor by my desk that is already full of 208 stuff. There have been a number of EPA seminars and conferences to provide guidance for state and local officials on (what to; who to, how to, and who to pay for it). I attended one in Dallas in January, and one in Denver last week. We heard some case histories for metropolitan areas, and some smaller communities which were very impressive, but none had problems or conditions similar to those of the southwest arid regions. Mixed with this was much explanation of how to administer the last by mechanisms most appropriate to the local conditions.

Second, it is the opportunity of the decade for EPA to interrelate with other agencies in jargon. This new program is identified by a number, a secret code, whose key is another number, PL92-500, which is not easily understood by the average person, do you say AWWTMP in plain english? Also jargon is used for not answering questions, or for asking questions which may not mean anything. In Denver I listened carefully to a consulting firm man read 18 pages of jargon on financial management. He used such terms as "data collected on existing financial management systems and attendant financial systems; economics of scale; solid base data systems and identify data gaps and strategies for improving base over time; impact input to analysis process; marginal returns; user charge structure; and non-sewered alternatives". I wondered if anyone would know the difference if he got his pages mixed up. All these words make

life difficult for the agency people who must comply with and interpret them. What is the cost to the taxpayer of developing, disseminating and explaining all this jargon? Could it be an institutionalized put-down?

The irony of this is that the primary objective of the 208 program is to involve the public in planning and implementation at the local level, and to gain public acceptance and financial support for the proposals produced. Courageous Lucy will explain how she hopes to accomplish this. There is a tremendous challenge for her to translate the jargon into ideas for action which the public she will be working with can respond to; "in order to attain cost-effective feedback where feasible within the time frame specified by Congress."

A third point is that no one, generally speaking, has heard of 208. Certainly, many people who are aware of the importance of water to the economy, may also be aware of their local pollution problems, or they may think they don't have any. But the man on the street who is directly affected by the cost of pollution abatment and the safety of his water supply, has not seen 208 explained in his newspaper. He may not realize that growth produces problems in his environment. Nor may he know that pollution control spending produces jobs and a new technological industry, and that a million people are now employed as a result of environmental expenditures. PL92-500 was passed in 1972, and still awareness is minimal. There is a way to go for the key issues to be identified and public input to develop the benefits to be derived by individual communities. Informational meetings will be held over the next few months, and if people don't avail themselves of these opportunities, they will have no squawk coming.

Continuing along this line of thought, one remembers that there is a tremendous resistance to federal legislative and regulatory interference with every day life. In New Mexico the land user hostility to the implicit threat of planning, or of any change is a strong political reality. Farmers know that irrigation runoff causes "reasonable degradation" of streams, and they have done nothing about it, because they can't afford to treat the runoff to improve its quality for the downstream user. And the Legislature has concurred. That is why it is called "reasonable". This is a political problem. Will 208 alter this fact of life? Can BMP and federal money persuasion do it?

One anticipated impact of 208 will be the necessary relationship of land use and water quality. Planning for one implies planning for the other. Since non-point sources are often land related and diffuse, long term land use regulatory decisions will be involved in terms of water pollution controls. The hoped for result would be that differing points of view will be reconciled and that planning will be acceptable to local people to protect their resources. And, oh yes, 208 planning must be consistent with other established planning programs. Mr. County Commissioner, are you ready for this?

There is one hopeful element to this challenge which has been placed in the hands of state governments, and that is that EPA understands that each state and region has a wide variety of water management problems and geographical

conditions, and the planning proposals which will be submitted for their approval will all be different. This is new. No blanket nationwide standards are being imposed. Much of the authority to develop plans will lie with existing units of government such as conservation districts.

The planning process will be facing up to such questions as these:

How much development and increased population can be tolerated by the existing or planned waste treatment facility capacity?

What are the health hazards or other environmental effects of growth and development?

What will be the long range impact of pollution?

What activities are increasing the burden of contamination?

How can they best be controlled?

Are some streams to be protected for fish?

Can attitudes be changed by more awareness of water quality problems?

How can available funding assure water quality improvement locally?

How can we protect our scarce water resource for today and tomorrow?

208 offers us the opportunity to make the right decisions to promote wise use of water resources in the public interest.

"WATER IN THE FUTURE: 208 AND YOU"

Thomas R. Tippeconnic
Renewable Resource Consultant

(The 208 Water Quality Planning Program is another example of Federal legislation creating programs that fail to include Indian Tribes).

Today's society is faced with the growth of public decision making, matters of public concern which public authorities must resolve. The fact is that Governmental Administrative efforts have yet to develop effective mechanisms to deal with increasing social problems, particularly in the areas which enhance quality of life, health, education, social opportunities, recreation and land use.

The 1960's brought with it governmental awareness and commitment to normative social policies which included, civil rights, housing, health care, income support, and environmental policy. The Federal government also undertook to redress the impact of all economic and social inequalities. Such commitments have created new concerns and conflicts in today's society. Present issues of direction of the economy, priorities, and goals, all have become matters of debated social policy. Public policy concerns have become the area for expressions of both private wants and public needs. The sociological dilemma for public policy is that it has to provide for public needs and must attempt to fulfill private and group wants as well.

The demand for society for equality has changed into demands for rights, political, civil, and social, by all groups within the Society. This has resulted in an expansion of human, professional, and technical services by Government. In the present decade health and education, along with government employment is becoming the fastest growing sector in society. Because of increasing roles of government, the major aspect of the public concern is the federal budget, the level of revenues and expenditures, as the mechansim for allocation of funds to support the new programs. How much should be spent and on whom becomes the major political question of the decade. The question also is being asked under whom's regulation and supervision should programs and funds be administered.

The question of utmost importance of Indian tribes has to be the quest for public policy, establishing regulation and procedures to allow adequate support systems and services along with direct funding for tribal program initiatives.

The Indian Tribes of Arizona represents approximately 40% of the national Indian population and 40% of the total Indian land base. Indian land resources make up 27% of the land base within the interior boundaries of the state of Arizona. The Navajo Tribal land consists of approximately 25,000 square miles or 16+ million acres or one-fifth of all Indian lands in the United States. The Navajo Tribe is an independent, self-governing dependent sovereign under the Constitution of the United States as are the other tribes of Arizona and New Mexico. In this regard none of the tribes are subject to the jurisdiction of the states, or any political subdivision of the state(s).

Identification of Problem Areas

1. There is a lack of adequate public policy for Indian self-determination and self-reliance. Funds are unavailable for the development of codes, regulations, and standards. The absence of such instruments limit opportunities in housing, education, renewable resource development and management, and various services to people.

2. Funding sources through various federal organizations are very minimal and insufficient to run existing programs.

3. Environmental standards and policies for the protection and development of Indian natural resources, both non-renewable and renewable have yet to be developed.

4. Indian lands are continually referred to as private lands. This improper designation has prevented the development of policy to initiate multiple use management. Indian lands are public lands of Indian people and should be so reflected in policy.

5. Recent trends of the Federal Government to fund programs through states present real problems for reservations. Such issues as jurisdictional problems, water rights, state monitoring and possibility of state taxation. Administration of programs by states interferes with the tribal right of self-government, the right to govern and administer the affairs of persons residing within the exterior boundaries of the reservation and the jurisdiction with the tribe.

Problem solving cannot be achieved by the separation of one component from all its integrated parts. Man is a integrated part of his surroundings, and has to be a useful segment of his environment with purpose and meaning. In this respect the renewable resources of the Reservation represents an important means for addressing social problems of unemployment, education, juvenile delinquency and malnutrition. Human problems have become a major factor affecting the use,

development, and management of land resources on Indian Reservations. It is man not nature who determines the potential of resources.

Water resources will determine present and future potential of total resources because water dictates growth and development. The 208 program may prove to be an effective mechanism for land use planning. Since water represents the very existence of people, water rights becomes an issue that cannot be taken lightly by any Indian tribal group.

Direct funding to Tribes is needed to provide independence for Indian people to become involved in their own affairs and to take on immediate concerns and responsibilities that belong to tribal governmental organizations.

NEW MEXICO'S SECTION 208 PROGRAM:
Public Participation

Lucy Fox
Section 208 Program Planner
New Mexico Environmental
Improvement Agency

A lot has been said today about public participation. Every speaker we've heard, and many of the audience participants, have addressed the problem of public involvement: how do we obtain it, how do we use it, and is our effort worthwhile.

We are all talking about public participation. I can only conclude, then, that the concept is of importance to us, the participants in this conference. In fact, this gathering is a beautiful illustration of real public participation. I've done a lot of listening today, and I've tried to observe the audience. I get the distinct impression that people have felt involved and have maintained an extraordinarily high level of interest in what's been said. In fact, I haven't observed any sleeping people! That is remarkable, considering that it's 4:00 p.m. and I am the last scheduled speaker.

The New Mexico Environmental Improvement Agency feels it is important to stimulate public interest in water quality issues and problems. The Section 208 water quality program provides us with a means of accomplishing two specific things:

1) Informing citizens about water quality in New Mexico;

2) Involving citizens in developing strategies for abating existing pollution and especially for preventing future pollution.

The process of "informing and involving" is not just desirable, it is also essential in the Section 208 planning program, if EIA is to produce a plan that has any chance of being successfully put to work. (Please note that I deliberately avoided the use of the term "implementated" here, in light of Ms. Ribe's comments about the language employed by bureaucrats). Everyone is fed up with studies and plans that sit on library shelves and collect dust. In order that the Section 208 plan not suffer that fate, it's vital that all citizens potentially touched or affected by water quality problems get into the act early, and make their needs known. Jim Agee, from EPA, told us that "208 is 75% politics and 25% technical information." We cannot forget this fact; it's the crux of public involvement's success, and thus of planning's success. But one of the first things

we must do is convince people that there are problems, or that there is the potential for problems relating to water quality. My able colleague, Catherine Callahan, told you our water in New Mexico is of good quality. How true - and how difficult, as a result, it is to make the case that Section 208 is worth the citizen's time today, before our problems become monstrous crises.

How are we obtaining this public participation? There are several points, rather philosophical and general concepts, which we stress:

1) Information and involvement must take place from the beginning to the end of the program;

2) Information and involvement must reach out to everyone affected by water quality problems; and

3) Information and involvement opportunities must cover the entire state of New Mexico.

Let's go back to point 1. Many aspects of the Section 208 program, such as our Detailed Work Plan, were presented to the public as early as summer 1976. We published issue #1 of the newsletter last August. We produced the Public Participation Program Work Plan in December 1976, before most of the work for Section 208 began. Both these documents set out what EIA and other agencies are doing, in both the technical and the public participation portions of the Section 208 program. We wanted to commit ourselves to producing certain outputs, conducting certain studies and activities. We wanted New Mexicans to know what to expect from 208, and how they might be affected. We don't want to surprise anyone.

Please look over the Public Participation Program Work Plan, to get a better idea of how the public can be informed and involved between now and November, 1978. If you would like a copy and did not pick one up before they disappeared, please tell me and I will send you one.

Point 2, that everyone affected must be involved: Well, everyone is affected--we all drink! How does this translate to "208"? EIA has identified a wide range of interests, which are receiving special attention. These include city and county officials, COG's, federal and state land management agencies, agriculture interests, mining and other industries, environmental and citizens' groups, and the unaffiliated citizen.

How are these interests being reached? The statewide Policy Advisory Committee, which was discussed in the morning session, has 11 representatives covering the above interest groups. The committee functions as an exchange point, informing EIA of its constituents' viewpoints and needs, while at the same time it carries information and status reports back to those it represents.

The Technical Advisory Task Force, which Bob Adams told you about, also brings a number of interests into the Section 208 planning process -- forest land owners and managers, lumber companies. and the like. The

Task Force is additionally providing guidance to EIA, assisting us in designing certain elements of the statewide Public Participation Program. EIA is conducting a number of activities and projects, to reach concerned interests directly. These include our quarterly newsletter (Section 208 News), a slide show, a traveling exhibit, mini-libraries in 35 locations around New Mexico, a photography contest, possibly a television program, meetings, workshops, and other activities. Many are designed primarily for the lay citizen, who lacks extensive technical knowledge.

The third point I made earlier, that public participation must be statewide, is one deserving emphasis. Too often in programs which make an effort to involve citizens, places like Albuquerque and Santa Fe receive attention while others are ignored. This approach is not being taken by EIA. Certainly the emphasis of the technical program varies throughout the state. However, water quality issues are important everywhere in New Mexico. Additionally, the results of a Section 208 project addressing a specific area could have relevance for other parts of the state. Five EIA regional office environmentalists are conducting a number of public participation activities, so that citizens everywhere in New Mexico can learn about the Section 208 program and how it affects them, and make sure EIA hears their opinions. For the Albuquerque Metro Area, the Middle Rio Grande Council of Governments is taking charge of public participation in Section 208 planning, using a program of activities similar to EIA's for the remainder of the state. As a number of speakers have mentioned, the inclusion of local officials in public involvement programs is crucial. The Council of Governments is working closely with elected officials in the Albuquerque Metro Area. EIA feels that local officials in the Albuquerque area are going to play a bigger role in "208" than those around the rest of the state will. For the remainder of the state, other interest groups, particularly those I have mentioned, many of which are represented at this conference, are important components of the Section 208 program.

My talk is an excellent example of what many bureaucrats tend to do: Talk endlessly about encouraging the public to talk. For this reason, I'm going to let you know just how you can become involved and speak up. First, if you did not receive a copy of the Public Participation Program Work Plan or the March Section 208 News, or if you wish to have your name placed on the Section 208 mailing list, please tell us. Everyone on the mailing list receives the quarterly newsletters, plus other announcements of interest. Your statements, both formal and informal, are welcome at any time. It is not necessary to bite your tongue until a meeting or hearing is scheduled.

Information on the program is available at the 35 mini-libraries around the state. We can supply you with a list of locations. In addition, we encourage you to contact the individual in your part of the state who is representing EIA for the Section 208 public participation program. These people -- and we, the planning staff -- can supply you with information and let you know about upcoming events in the program. The regional contacts are:

1. Regions I & III - EIA
   Ken Cable
   Los Lunas, New Mexico

   Phone No.: 865-9797

2. Region II
   Gerald Silva
   Santa Fe, New Mexico

   Phone No.: 827-5271

3. Region IV
   Carl Woolfolk
   Tucumcari, New Mexico

   Phone No.: 461-1671

4. Region V
   Victor Jones
   Las Cruces, New Mexico

   Phone No.: 523-4513

5. Region VI
   Chuck Hennessee
   Roswell, New Mexico

   Phone No.: 623-6984

We are happy to speak to people about the program at any time. And in reference to Mally Ribe's comments on the lingo of bureaucrats, I must say that I really try not to use jargon where a substitute exists. I find that people - even those who work for governments - much prefer communicating in plain English.

As we were told by Mr. Comola, EPA reviews the public participation programs of its Section 208 grantees. New Mexico's program was evaluated in March of this year by a team visiting from Dallas. They seemed quite pleased with our public involvement efforts and plans. To my knowledge, New Mexico's statewide Section 208 program was unique in producing a public participation program work plan document. We stand behind it. However, it's not immutable. This work plan -- and we planners must be flexible. We must remain energetic, continue to reach new groups, and bring them into the program. Revisions must be made when necessary, so that components which aren't necessary can be dropped, and new activities or tactics added. This is a beginning; the idea of a "continuing planning process" implies "perpetual" public involvement in water quality planning issues. And, just as the technical Section 208 plan focuses on the special problem of New Mexico, we must ensure that the public participation program meets the needs and addresses the concerns of our state's citizens.

Thank you very much.

RESEARCH NEEDS FOR SECTION 208 PLANNING

Peter J. Wierenga

Continuous improvements are made in the control of point sources of pollution. However, even with the application of best available treatment to all sources of pollution, it is doubtful that the goals of the Federal Water Pollution Control Act Amendment (FWPCA, PL-92-500) will be attained by 1983. To a large degree this is due to pollution from non-point sources. In many regions of the nation non-point sources of pollution contribute significantly to the overall pollution problem. Unless efforts are made to control non-point sources of pollution, the 1983 interim national goals on water quality cannot be attained.

The National Commission on Water Quality reported in 1976 that non-point sources will contribute at least half of the following major pollutants to the nation's waters, after achievement of the 1977 practicable technology standard:

total phosphorus	80%
total nitrogen	50%
coliform bacteria	50%
biochemical oxygen demand	50%
suspended solids	50%

EPA estimates that 50% or more of the nation's current water quality problems are caused by non-point sources. Furthermore, non-point sources are also major carriers of toxic substances, whose effects may overwhelm pollutant reductions from point source control. For example, toxic material from urban runoff frequently exceeds that from typical industrial discharges (Westman, 1977).

The significant contribution of non-point sources to water pollution was recognized in the FWPCA of 1972. Yet, until 1975, little was done to

combat non-point sources of pollution in a systematic way. On the other hand, much money has been, and is currently being, spent on reducing pollution from point sources. Federal grants for sewage-treatment plant construction for FY 1977 alone are estimated at $3.8 billion, close to what is being spent for the combined costs of hydroelectric dams, flood control projects, and public power plants (Westman, 1977).

If indeed 50% or more of the nation's water quality problems are caused by non-point sources, it may be expected that spending levels for non-point source pollution control will eventually be greatly increased.

Examples of Non-Point Source Categories:

The following categories are generally considered in conjunction with non-point sources of pollution.

Urban runoff: This is defined as storm and combined sewer discharges and overland or sheet urban flow. It is estimated that during intense storms 95% of the BOD load is directly contributed to runoff. Also a moderate size city may discharge between 100,000 to 250,000 pounds of lead and 6,000 to 30,000 pounds of mercury each year through storm water runoff (Pisano, 1975).

Construction activities: Pollution by runoff from sites of residential and commercial construction during the period of construction. It is estimated that about 1 million acres per year are disturbed for this purpose, generating much sediment.

Residuals disposal: This includes pollution resulting from the disposal of waste residuals (e.g. garbage, refuse, sludge from waste treatment operations, etc.) It consists primarily of runoff and leachate from improperly managed disposal sites. This category may become of significant importance in New Mexico in view of proposed storage of radioactive wastes.

Mining: Pollution generated through the extraction of minerals, ores, fossil fuels and other materials from the earth.

Forestry: Pollution caused by man-made disturbances associated with timber harvesting (i.e., timber harvesting, reforestation, fire fighting, fire prevention, etc.).

Agriculture: Activities associated with irrigated and non-irrigated crop production and animal production. Over 400 million acres are in cropland, and deliver 2 billion tons of sediment annually to streams and lakes, containing much of the 440 million pounds of pesticides used annually. Irrigated agriculture contributes to increased salt loads in rivers downstream.

Estimating Non-Point Source Pollution:

Non-point source pollution is very difficult to quantify, because it generally occurs over large land areas, and because its magnitude varies greatly with time. For example, the two billion tons of sediment contributed annually to streams and lakes comes from 400 million acres of cropland. Also a major portion of the pollutant contribution from land runoff may occur during a few intense rainstorms.

Loading of the runoff with pollutants or toxic metals is furthermore extremely variable in time and may depend on factors such as how long it has been since the previous storm, or whether or not chemicals were applied on the soil just prior to the storm.

A complicating factor in assessing non-point source pollution is further the fact that sediment and nutrients are discharged by natural processes and are part of natural aquatic ecosystems. In order then to assess non-point source pollution the natural background has to be determined, and subtracted

from man-made causes. A point in question is the quality degradation of river water along the Rio Grande in New Mexico (Wierenga and Patterson, 1972). Although the increase in total dissolved solids along the Rio Grande was more than twice as great in an irrigated portion of the river as compared to areas with no irrigation, the natural increase in total dissolved solids is significant. Studies in the San Joaquin Valley in California have shown that a large percentage of the nitrates found in drainage from the valley originates from sub-surface deposits and not from application of fertilizers. These two examples illustrate that background or natural pollution can be quite extensive, and that an assessment of non-point sources of pollution should take into account these background levels of pollution.

Efforts to manage non-point sources of pollution should be aimed at first determining the relative contributions of non-point sources to water quality degradations in a specific drainage area, for example in relation to existing point sources of pollution. Secondly, all significant contributing sources should be determined, as well as their levels of background pollution. And finally, an economic analysis should yield information as to what levels of non-point source control are achievable and at what costs.

Determination of the relative contributions of non-point sources to water quality degradation is no small task, however, either because the proper data are not available or because models used to estimate the contributions from non-point sources have not been adequately tested. To quote a recent report prepared for the EPA on loading functions for assessment of water pollution from non-point sources, "The estimation of non-point pollution is an approximate science, in its present stage of development. In some instances the term science is not appropriate." (McElroy et al. 1976). It appears therefore that research in pollution from non-point sources is very much needed. Research is necessary to determine the present contribution of non-point sources to water

pollution. Research is further needed to predict the effects of alternative management strategies on pollution from non-point sources. Thirdly, models which allow the prediction of the effects of alternative management techniques on water quality, should be combined with economic models to evaluate the costs of alternative management schemes, including cost estimates of maintaining present practices.

Research Needs for Non-Point Source Pollution:

In view of the large number of categories of non-point source pollution a complete review of past, present and future needs for 208 planning is clearly beyond the scope of this presentation. However, in reviewing the various categories of non-point sources of pollution, it becomes obvious that non-point source water pollution, whether caused by mining, agriculture, or construction consist essentially of two main mechanisms:

A. Runoff of water with soil and toxic chemicals into open waters

B. Transport of water and chemicals through soil into drainage systems, or into groundwater.

All categories listed in the introduction contribute to either surface runoff, or groundwater pollution, or both. Furthermore the processes involved in surface runoff or in movement to groundwater, whether from cropland, construction sites or mining operations, are very similar, and the same physical principles apply to all of them. Thus although parameters used in equations to predict sediment loss may be quite different for cropland as compared to parameters used to predict losses from a construction site, the general equations should be quite similar, and basic research performed in one non-point source category should have application in other non-point source categories. The same is true for chemical transport. The prediction of leaching from a waste disposal site is not essentially different from the prediction of nitrate losses to the groundwater from an irrigated farm. Because the physical and chemical

processes for the various 208 categories are very similar and center around runoff of water with soil and/or toxic chemicals, as well as around flow of water and chemicals in subsoil we will restrict our discussion of research needs to these two areas.

Water Pollution from Surface Runoff:

Water pollution by runoff from watersheds is a result of the sediment carried with the water and the various chemicals, associated with the runoff, either adsorbed on the sediment, or in solution. The control of non-point pollution therefore is, to a large extent, determined by adequate control of erosion. Estimating surface runoff is of primary importance, because surface runoff causes enormous losses of soil and subsequent pollution of streams and lakes with sediment laden water.

Substantial progress has been made in recent years in the development of basic mathematical models to predict runoff and soil loss. Unlike the Universal Soil Loss Equation which is an emperical equation and is discussed below, mathematical models combine fundamental principles, concepts and relationships of erosion mechanics, hydrology, hydraulics, soil science, and meteorology to simulate the erosion and sedimentation processes (Wischmeier, 1976). The advantage of such models is that they lead to a much better understanding of the actual erosion and sedimentation processes. The models have potential for predicting soil losses from specific events and for predicting spatial distribution of erosion and sedimentation. However, they are very complicated to use, and much additional research and information is necessary to allow their use on a routine basis.

A quite different approach is the use of the Universal Soil Loss Equation. This equation which combines the principal factors that influence surface soil erosion by water, has been successfully used to compute sediment losses from agricultural land.

The equation takes the form:

$$A = R.K.L.S.C.P. \quad (1)$$

where

A is the average soil loss, in tons per acre,

R is the rainfall factor, K is the soil erodibility factor,

L is the slope length factor, S is the slope-steepness factor,

C is the cropping and management factor, and P is the erosion control practice factor.

The equation has been used successfully by the Soil Conservation Service for predicting soil losses and conservation measures on agricultural land for more than a decade in the 37 states east of the Rocky Mountains, and to a limited extent in the western states. The Universal Soil Loss Equation is an empirical approach toward predicting soil loss. It is based on data from 10,000-plot-years of erosion studies at 42 research stations (Wischmeier, 1976), and as such is well founded. However, because of the need to predict soil losses other than cropland, e.g. construction sites, rangelands in the western United States, forested areas, etc., further studies are needed to improve the applicability of the Universal Soil Loss Equation. For example, a primary difficulty in using the University Soil Loss Equation for predicting soil erosion on construction areas is the evaluation of the erodibilities of subsoils, which are commonly heavier in texture than the surface soils for which existing relations have been derived. For urban construction sites an improved method of relating the soil erodibility to basic soil parameters must be developed (Roth, Nelson and Römkens, 1974).

A major difficulty with the Universal Soil Loss Equation, apart from its applicability in a certain region, is that although the equation allows prediction of erosion rates in croplands it does not predict the percentage of this eroded soil that reaches a continuous stream. The equation was developed

for soil conservaton and not for sediment control, even though sediment control is presently of interest from the standpoint of non-point source pollution control. According to Wischmeier(1976), development of a better understanding of the basic sedimentation and erosion processes involved between the time when runoff leaves a field area and when it reaches a continuous stream system is one of the greatest erosion and sediment research needs. For New Mexico additional research with the Universal Soil Loss Equation is also needed for application to strip mine areas and spoil banks, and to burned areas in forests. Particular attention should be given to predict soil losses from specific high intensity rainstorms, since these cannot now be predicted accurately.

Although, as shown above, much additional research is necessary to make the Universal Soil Loss Equation a reliable tool for predicting sediment delivered to a stream, the need for quantiative estimates of non-point source pollution, the relative ease of its use, and the lack of alternative methods resulted in extensive use of the equation for prediction of sediment loading in streams and lakes. Because pesticides, nutrients and toxic chemicals are present in surface soils, stream pollution with these substances has also been predicted with the Universal Soil Loss Equation.

The principal method by which this is done is by first calculating the sediment yield and then multiplying sediment yields by factors which denote concentrations of these substances in the soil and enrichment in the erosion process. As an example let us consider phosphorus, since phosphorus is strongly adsorbed on soils and does not readily leach into the subsoil. Thus phosphorus is carried almost entirely on sediment. According to the equation (1) the average soil loss from an area is:

$$A = R.K.L.S.C.P. \qquad (2)$$

The loading function, or the amount of sediment delivered to a stream is then:

$$Y = B\ (R.K.L.S.C.P.S_d) \qquad (3)$$

where B denotes the surface of the source area and S_d the sediment delivery ratio. This is the portion of sediment delivered from the erosion source to the receptor water. The load of phosphorus coming into the stream is now obtained from:

$$YP = Y. CON. RF \quad (4)$$

where CON is the concentration of the phosphorus in the soil and RF the enrichment factor. The enrichment factor is a measure of the increase in the concentration of a pollutant associated with the sediment that actually reaches a stream compared to the concentration in the watershed soil. According to Stewart and Woolhiser (1976) the concentration usually increases because more nutrients and pesticides are adsorbed on fine-textured particles than on coarse particles, and more coarse particles are deposited as the sediment moves from the field area to the stream.

McElroy et al. (1976) used this procedure to predict sediment loading, and loading with nutrients, organic matter, pesticides and heavy metals.

The use of loading functions on the basis of the Universal Soil Loss Equation for estimating non-point source pollution by overland flow, has the same restriction as the Universal Soil Loss Equation. In addition, the approach suffers from lack of data on the enrichment factor, which is different for different surface soils and chemicals. The sediment delivery ratio also needs further study. For example, the delivery ratio takes into account both the deposition of sediment as it moves toward the stream and the gains from channel erosion. However, pesticides and nutrients are usually not associated with sediment from channel erosion (Stewart and Woolhiser, 1976). It should also be recognized that loading functions yield average values, usually on an annual basis. Because of the lack of data it is still difficult to make predictions of extremes over a period of years. This is of importance for New Mexico since much sediment is transported during extreme rainstorms.

Transfer of Chemicals Through Soil

When chemicals are applied on a crop or onto the surface of soil it is quite likely that a large portion of the chemical will enter into the soil with rainwater or irrigation water. In the soil a number of different processes can interact with the chemical, each of which greatly affects its ability to move to the groundwater table. Some of these processes are adsorption, ion exchange, microbial degradation, radioactive decay, plant uptake, and chemical precipitation.

The main mechanism for chemical transport in soil is mass movement with water. Diffusion is important for uptake by roots, but this process is too slow to play a significant role in the transport of chemicals to the groundwater. Pollution of groundwater is therefore largely dependent on the presence of water movement to the groundwater table. Without such water movement the risks of polluted groundwater from surface application of chemicals are virtually nil. This is one of the reasons why arid areas have frequently been proposed as storage repositories for radioactive wastes (Winograd, 1974). In order to predict whether surface applied chemicals will reach the groundwater table and in how much time, one has to know fairly precisely the rate at which water is moving through the unsaturated zone above the groundwater table. Determination of the rate of percolation of water through the unsaturated zone is extremely difficult, and remains, after many years of research, one of the most difficult tasks. The rate of percolation through subsoil depends on rainfall rates, evapotranspiration, vegetative cover, the soil water storage characteristics, the root zone, the soil and geologic conditions below the root zone, and the amount and timing of direct runoff. Stewart et al. (1975), estimated the annual percolation potential of land in the United States. According to their estimates the percolation potential vaires from more than 7 inches/year in the east, to between 0 and 1 inches per year in the central United States.

Most of the western United States was omitted, because rainfall is too variable, and much of the area is irrigated. With low rainfall rates, prevalent in much of the western United States, the amount of water percolating to the groundwater becomes especially difficult to estimate. In New Mexico relatively little is known about the rates of deep percolation in the various areas of the state. Extensive research is needed, not only with regard to groundwater pollution, but also to determine if and at what rate aquifers are being recharged. This information is further needed to estimate the efficiency of irrigation systems and to predict consumptive use of crops.

As mentioned before, the rate of transfer of surface applied chemicals to the groundwater table is also dependent upon a number of physical and chemical processes in the unsaturated zone.

Adsorption is one of the main mechanisms delaying downward movement of surface applied chemicals. An example is adsorption of phosphorus on soil. Phosphorus is strongly adsorbed on most soils, and little if any pollution has been found as a result of phosphorus being leached into the groundwater. On the other hand, surface water pollution may occur due to surface runoff and erosion of surface soil containing adsorbed phosphorus. Many pesticides are also strongly adsorbed, especially on organic matter in surface soils. Unfortunately the adsorption characteristics of most pesticides and soils vary enormously, and determinations have to be made on each soil and pesticide to be able to predict leaching potential of a given pesticide. In view of the large number of pesticides continuously being introduced, it would be quite helpful if with the introduction of each new pesticide data were presented on their degree of adsorption on standard soils, and also on their rate of degradation under standard conditions. With this information soil scientists, knowing the physical and chemical characteristics of local

soils with respect to the standard soils, could at least predict the leachability and rate of degradation of the new pesticide under local conditions, and estimate its local environmental impact.

Degradation is another main mechanism which slows down the rate of movement of surface applied chemicals to the groundwater table. According to Stewart et al. (1975) the persistence of pesticides in soils is highly variable and under moderate climatic conditions may vary from less than eight months for phenoxy herbicides to more than two years for organochloride insecticides. For example, Scifres et al. (1977) found that 2,4,5-T applied to range land at three locations in east Texas (mean annual rainfall $\pm$ 100 cm) was reduced to trace levels in soil within 7, 28 and 56 days, respectively. No residues were found below 15 cm in the soil. On the other hand the highly mobile picloram was reduced to trace levels within 56 to 112 days. Some picloram was found as deep as 60 cm, but most was restricted to the upper 15 cm. Monitoring of cumulative residues in water, soils, and vegetation showed that about 75% of the picloram was dissipated from the ecosystem within 28 days after application and over 90% was lost after 112 days. These data show the great importance of degradation on leaching to the subsoil and pollution of groundwater.

Ion exchange can also delay the downward movement of chemicals through soil. Many soils have a fairly large ion exchange capacity, particularly soils with high clay content and high organic matter content. Ion exchange reactions may be important for some pesticides, and are of great interest for predicting the composition of irrigation return flow. Because of ion exchange, precipitation and dissolution reactions accurate prediction of the composition of irrigation return flow is difficult. The chemistry of the various reactions taking place in the unsaturated surface soil during leaching with irrigation water is not completely understood and models developed to predict changes in irrigation return flow quality need more testing under field conditions.

The rate of decay of radioactive chemicals is well known, and incorporation of decay in predictive models offers no particular difficulty. A very beneficial effect of radioactive decay is that it delays the transport of radiochemicals through soil even further. In addition to radioactive decay, radiochemicals are also subject to adsorption and precipitation, which further delay the movement of these chemicals through soil. Accurate predictions of travel times of these chemicals to the groundwater cannot be made however, unless information is available on the chemical and physical interaction between the chemical and the soil or soils through which the chemical must pass.

Movement of nitrates to groundwater is also of interest, because high levels of nitrate make this water unsuitable for drinking water purposes. During the past ten to fifteen years much research has been done to determine the pollution potential of surface applied nitrates. Nitrates move quite readily with water, and several instances of high levels of nitrates in groundwater have been reported. Yet, even though much has been learned about the behavior of nitrates in soil, it is still difficult to predict for most field conditions the rate of movement of nitrates to groundwater. According to McElroy et al. (1976) methods to predict leaching of nitrates to groundwater are not available, and "local experience, data and expertise must be relied upon". The problem with nitrates is that they are subject to transformation. Thus NO_3^- may be reduced to NH_3^+, which is adsorbed and does not move readily. Nitrogen may also be reduced to nitrogen gas and escape into the atmosphere. This reduction takes place mainly in saturated soils in the presence of a carbon source, but has also been reported for unsaturated soils in microsites. Present knowledge of the conditions in the soil, which determine the form of nitrogen in soil is far from complete. Unless more is known of the various reactions taking place in a given soil

profile or in geologic formations accurate predictions of nitrogen movement into groundwater cannot be made. Plant uptake of chemicals in the root zone of crops reduces the chance for such chemicals to be leached to the subsoil. Plant uptake is one of the main factors which cause a reduction in nutrient concentration in surface soil. Nutrients which are not taken up or otherwise interact with the soil, may be lost by leaching to the subsoil.

Precipitation of salts in soil added with irrigation water is of importance in irrigated areas. It has been shown that precipitation of salts in soil can be encouraged by minimized leaching, and that precipitation can result in a substantial reduction in the salt burden of drainage water (Rhoades et al. 1973b). However, results depend on the composition of the irrigation water, the type of soil and many other factors. Additional research is needed to determine the conditions in which minimized leaching can be practiced successfully without harmful effects on crop yields.

Modelling transport of water and chemicals

Because of the above mentioned interactions between the soil and chemicals and the frequently slow movement of water in the unsaturated zone, it may take many years before surface applied chemicals reach the groundwater table. In order to predict the effects of surface applied chemicals on water quality and the impact of management practices a large number of computer programs have been developed in recent years. An example is ACTMO, an agricultural chemical transport model which links together a hydrology model, an erosion model and a chemical model. It is used to predict the concentration and amount of pesticides and nutrients on a storm-by-storm basis for a farm-sized watershed (Frere, 1976). Other models have been developed for N and P loads in water (Hagin and Amberger, 1974), and for predicting the quality of irrigation

return flow (Shaffer and Ribbens, 1977). Although many models are presently available to predict long term trends in water quality, few of these models have been adequately tested under field conditions. Future research in water quality modelling should be directed toward field evaluation of these models. In addition, the description of the spatially varied aspects of soil, crop and aquifer systems needs further study.

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DEMONSTRATION OF IRRIGATION RETURN FLOW SALINITY CONTROL IN THE UPPER RIO GRANDE*

The general objective of this demonstration project funded by EPA through the New Mexico Water Resources Research Institute is to show the feasibility of alternative water management practices on the quantity and quality of drainage return flow and soil salinity in the Upper Rio Grande basin (Figure 1). The project consists of a 450-acre demonstration site in the Mesilla Valley, a four-acre test site on the New Mexico State University Plant Science Farm, and a hydrosalinity model. On the 450-acre demonstration site, a combination of present-day irrigation techniques is being used to show how, through modern water management, the irrigation return-flow quality and quantity can be improved (Figure 2). The feasibility of irrigating at or near 100 percent efficiency with water of medium salinity (1,200 ppm), while maintaining optimum crop yields over a period of years is being demonstrated on the four-acre test site. A third major effort involves preliminary testing in the Mesilla Valley of a hydrosalinity model developed

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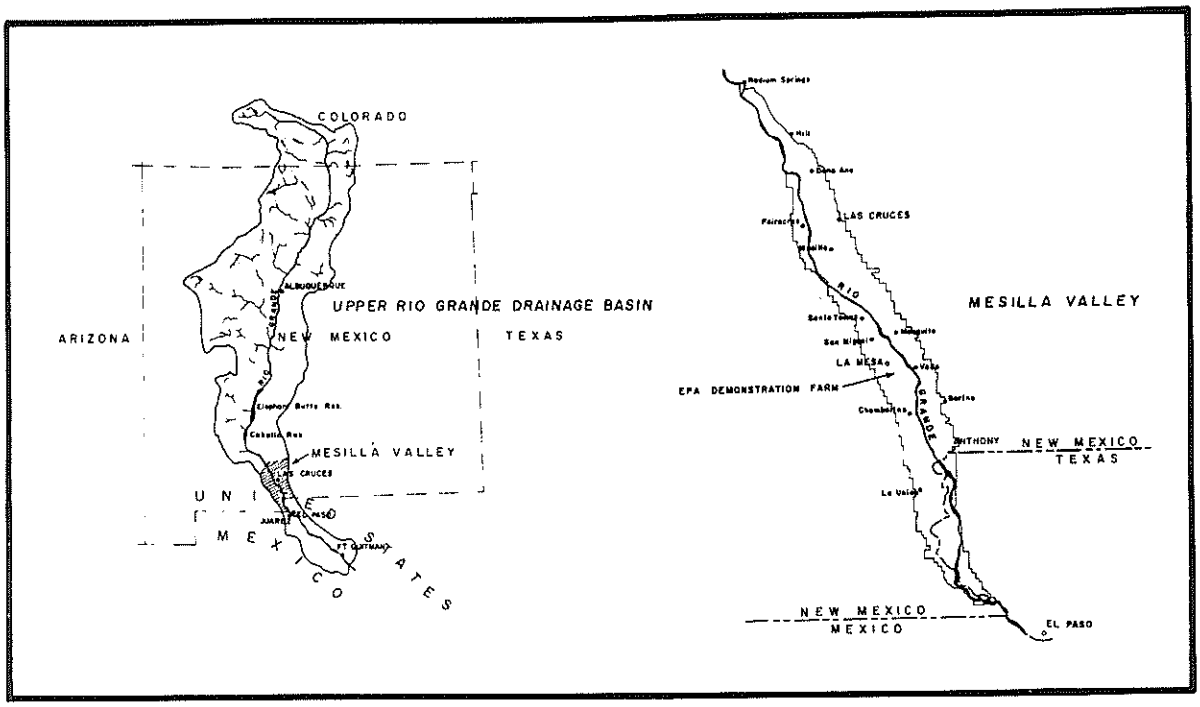
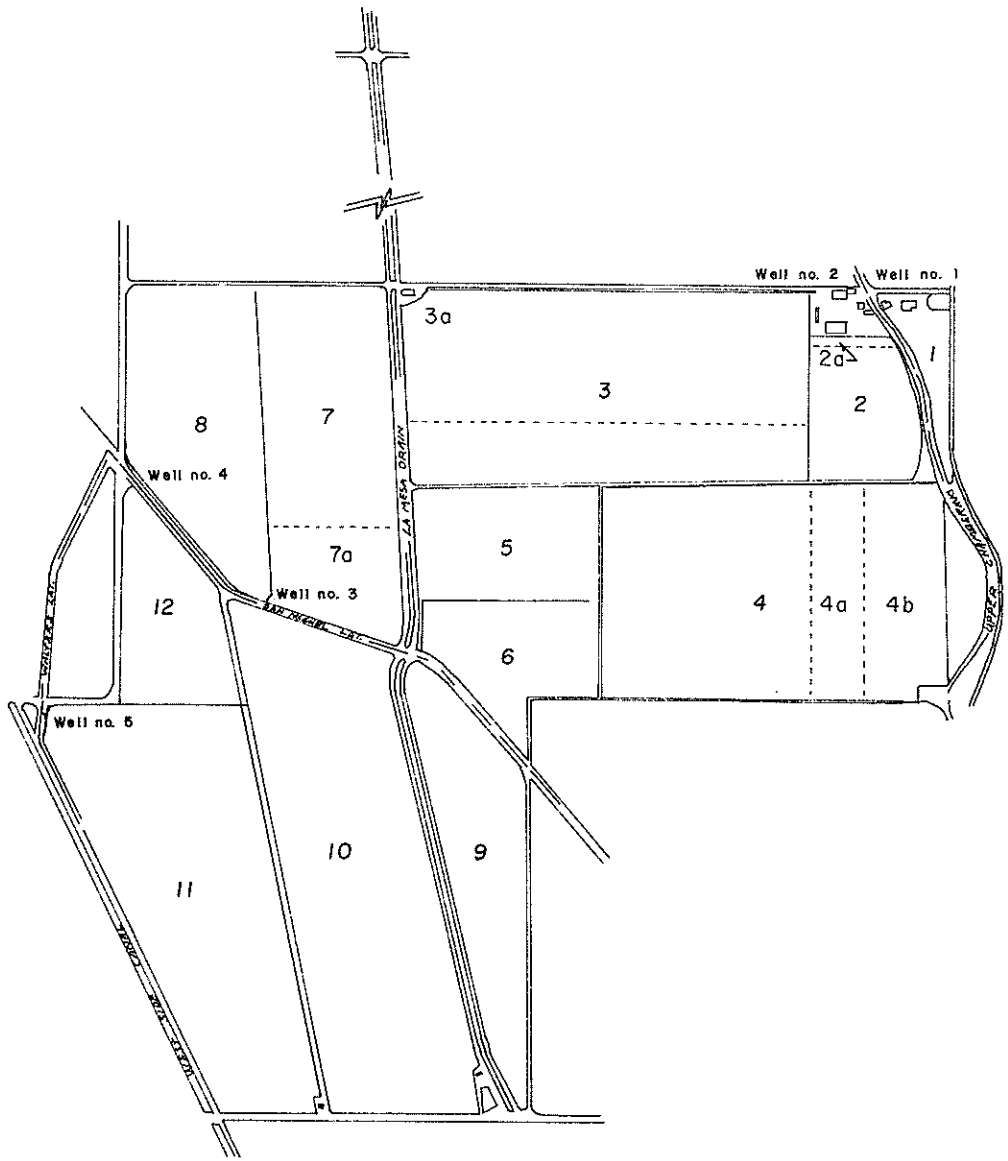


Figure 1. Location of irrigation return flow salinity control demonstration farm in the Mesilla Valley and Upper Rio Grande drainage basin, New Mexico



1976 Crop Year

Field Number	Crop
1	Pecans
2	Cayenne Chile
2a	Trickle vegetables
3	Wheat
3a	Wheat/Lettuce
4	Cotton
4a	Chile 6-4
4b	Floral Gem Chile
5	Wheat
6	Wheat
7	Cayenne Chile
7a	Grain Sorghum
8	Tomatoes
9	Cotton
10	Alfalfa
11	Tomatoes
12	Cotton

1975 Crop Year

Field Number	Crop
1	Pecans
2	Wheat
3	Tomatoes
4	Cotton
5	Floral Gem Chile
6	Chile 6-4/Corn
7	Lettuce
8	Cotton
9	Chile 6-4
10	Alfalfa
11	Chile 6-4
12	Chile 6-4

Figure 2. Crops and well locations on demonstration farm, 1975 and 1976 crop years.

by the Bureau of Reclamation for the Environmental Protection Agency. This model permits prediction of the quantity and quality of irrigation return flow from a drainage basin.

At lunch today, you will have an opportunity to briefly visit the four-acre test site at the Plant Science Farm, and after lunch you will be able to see first-hand and ask questions about the 450-acre demonstration farm located near La Mesa, New Mexico. The farm operator is Orlando Cervantes.

Demonstration Farm

The research on the demonstration farm consists primarily of monitoring the operations of the farm. Two alternative water management practices are being evaluated to reduce the quantity and hopefully improve the quality of irrigation return flows. The first practice is irrigation scheduling where the correct amount of water at the right time is applied. The second alternative management practice is trickle irrigation on pecans and chile. All irrigation water applied on the farm is measured either by parshall flumes for surface water deliveries or meters on the irrigation wells.

Trickle Irrigation Well

An irrigation well for the trickle system was developed utilizing data developed by Clyde Wilson of the USGS. The trickle well supplies water for the chile and pecans. During the 1976 crop year, .71 acre-feet per acre was applied which is considerably below the typical three

to four acre-feet per acre for trees of the same size of those on the demonstration farm.

Observation Wells and Piezometers

A nest of three observation wells was developed to test groundwater at 25 feet, 50 feet, and 75 feet, respectively. In addition, piezometers were installed to measure the water table changes during the growing season.

Drains

The flow of the La Mesa Drain is monitored as it enters the demonstration farm and as it leaves the farm in an attempt to determine the affect of the farm on the flow and quality of the drain. The data indicate that our instruments are not sensitive enough to measure either additional flow resulting from the demonstration farm or the quality of return flows resulting from the farm.

Seepage Test

Seepage tests have been conducted on a section of a farm irrigation ditch and on a section of the Upper Chamberino lateral. In the case of the on-farm irrigation ditch, the transmission losses per hundred meters of length was approximately 2.7 cubic meters per hour. On the Upper Chamberino lateral, the infiltration rate in the lateral was considerably less than in the irrigation distribution ditch amounting to a loss of .4 cubic meters per hour/100 meters of canal.

Hydrosalinity Modeling

The objective of this section of the study is to implement, test and modify the USBR mathematical model for predicting changes in water quality due to irrigation activities in the Mesilla Valley. The sensitivity analysis indicates that the initial chemistry of the aquifer and the consumptive use estimates play an important role in the predicted TDS output. The simulation results also demonstrated the importance of the manner in which water is transferred from the aquifer to the river or vice versa.

The initial simulation of the model is encouraging as Figure 3 and Table 1 indicate, however, the results of the sensitivity analyses indicate a need to improve the input data and model structure (see McLin and Gelhar, 1976).

Economic Analysis

The objective of this portion of the project is to project the changes in the quantity of irrigation return flows as a result of alternative water management practices that could be adopted by farmers in the Mesilla Valley. They are (1) irrigation management scheduling, (2) trickle irrigation on tree crops, and (3) sprinkle irrigation for vegetable crop emergence. The effects of these practices will be simulated for the approximately 100,000-acre Mesilla Valley.

The analytical system consists of two specific models sequentially linked to simulate the agricultural production and hydrological adjust-

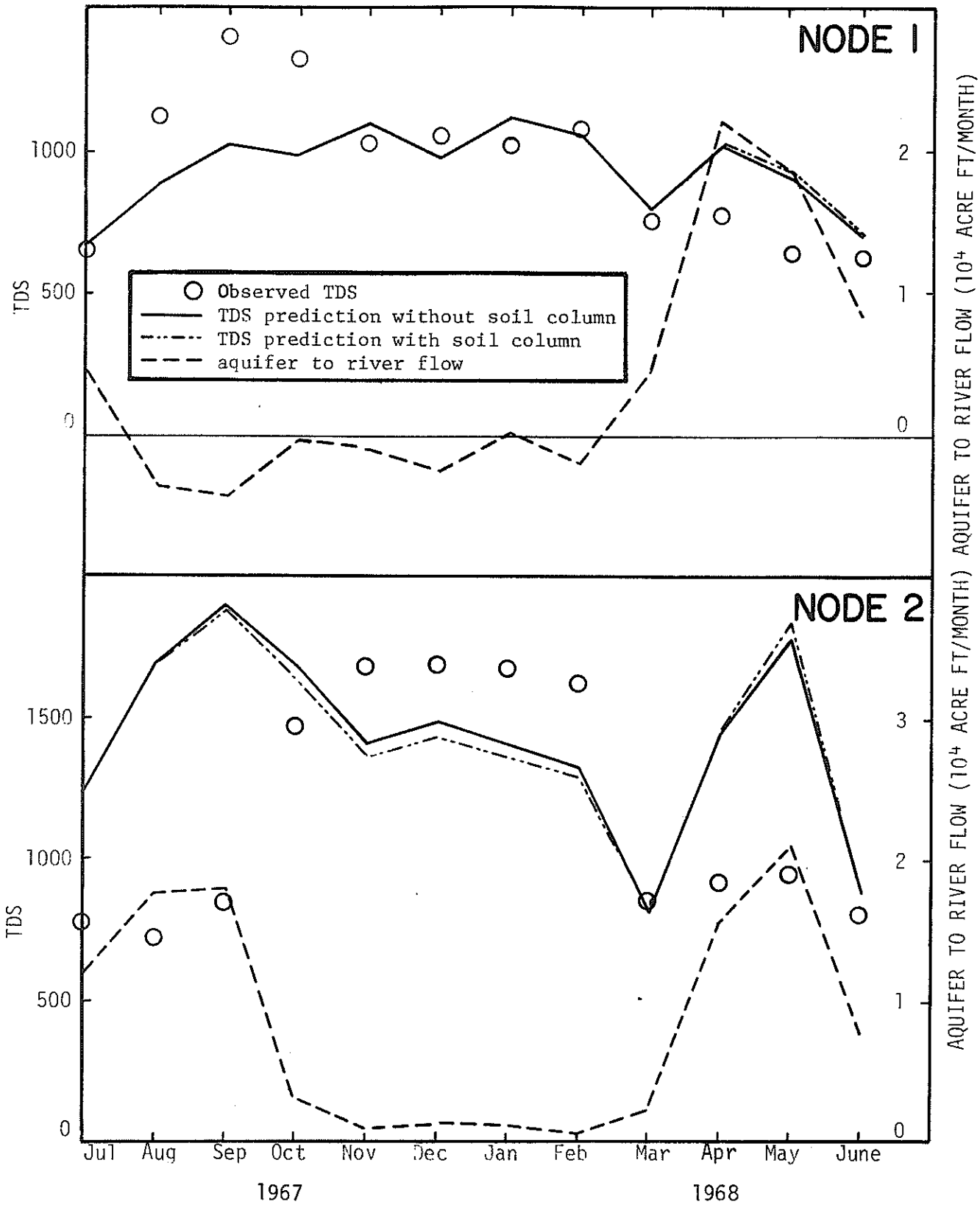


Figure 3. Model predictions for July 1967 to June 1968.

Table 1. Results of model sensitivity analysis

Physical Feature	(1) 25% reduction in initial aquifer pore volume	(2)* 50% reduction in chemical concentration of aquifer waters	(3)* Consumptive use; 2 ft/yr Irrigation efficiency, 50%	(4) 50% increase in initial chemical concentration in the soil
Effect	No appreciable difference from original predicted TDS output (i.e. identical to Figure 3).	Large systematic differences of several ppm were noticed as compared to the original predicted TDS output.	Produced systematic differences in predicted TDS output. The transfer of water from the aquifer to the river remained practically unchanged.	Produced only minor differences in TDS from that originally predicted for node 1. Node 2 differences are somewhat larger.

*Soil chemistry subroutine was omitted for clarity.

ments that would occur as a result of implementation of the alternative water management practices. The first is a linear programming model to estimate the economic impact and the irrigation water requirements. The solution is constrained by the usual physical, institutional, and market restrictions. The results of the LP model serve as inputs to the physical hydrosalinity model.

The linear programming model derives a cropping pattern that maximizes returns to water in each of the nodes, subject to the amount of surface and groundwater available and the crop rotation and marketing requirements of the area. The locations of crops were specified in the base year, with the location of additional acreages of crops only being constrained by market characteristics. Water use in the base year approximated actual water use reported by the area irrigation districts. Average commodity prices for 1967-76 are justified by constraining the LP crop production.

Alternative crop production activities and coefficients will be developed by utilizing a submodel budget generator to derive engineering cost approach crop enterprise budgets. The base year budgets are being designed to simulate the cost and returns and input requirements for typical farming operations in the Mesilla Valley. Alternative crop production budgets incorporating irrigation water management practices are being developed by modification of the base year budgets, thus providing a series of levels of irrigation water management practices in the Mesilla Valley.

Field Plot Demonstration

The field plot design described in the first Annual Report (Lansford, et al., 1976) was employed during the second year also, except that a pre-

viously bare area next to each plot was also planted. As a result, the total planted area was doubled in size. The irrigation treatments applied to previously planted plots were also used for the new plots. By merely extending the size of the plots, we were able to get yield and salinity date from "new" (B) plots which had undergone no treatments, as opposed to the "old" (A) plots which had been irrigated at various efficiencies and depletion rates for four years. The final plot layout and the numbering of the plots are presented in Figure 4.

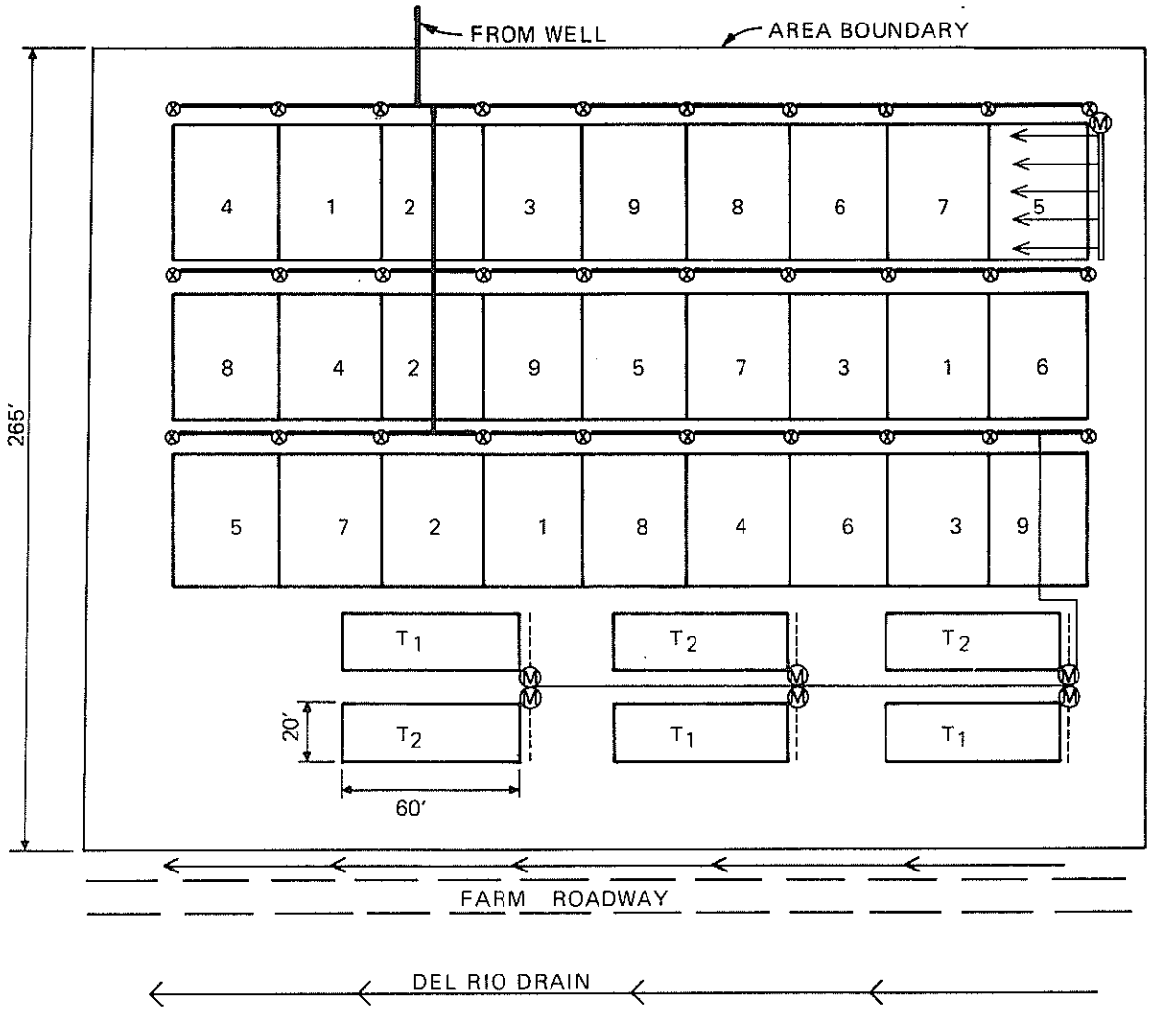
Data on consumptive use of cotton at the experimental site indicate that about 60 cm of water would be required for a crop of cotton. On this basis, total irrigations of 50 cm, 60 cm, and 70 cm (20, 24, and 28 inches, respectively) were planned for 1976. These amounts were applied over the irrigation season, according to a previously developed curve relating consumptive use and days after emergence. Irrigations were scheduled at one-week, two-week, and three-week intervals, resulting in nine treatments (3 efficiencies and 3 depletions).

The "wet" trickle plots were irrigated when the soil water tension at eight inches below the trickle line reached a value of 0.2 bars. The "dry" treatment received 70 percent of the water applied to the "wet" treatment. Irrigation of the field plots was terminated on August 20, 1976.

The amounts of water applied during the 1976 growing season (May 6 to August 20) are listed in Table 2 for the surface irrigated plots, and in Table 3 for the trickle irrigated plots.

Figure 4.

LAYOUT OF EXPERIMENTAL SITE ON THE NMSU PLANT SCIENCE FARM WITH TREATMENTS



TREATMENT	WATER APPLIED	IRRIGATION INTERVALS
1	20"	1 Week
2	20"	2 Weeks
3	20"	3 Weeks
4	24"	1 Week
5	24"	2 Weeks
6	24"	3 Weeks
7	28"	1 Week
8	28"	2 Weeks
9	28"	3 Weeks
T_1	Irrigated at 0.2 Bar	
T_2	Irrigated at 0.6 Bar	

Table 2. Water applied to surface irrigated plots from May 6 to August 20, 1976*

Irrigation Interval	Planned Irrigation Efficiency					
	100%		90%		80%	
	Plot No	Water Applied (in)	Plot No	Water Applied (in)	Plot No	Water Applied (in)
	8	18.2	9	22.1	2	25.9
1 week	12	18.2	18	22.1	14	26.1
	26	18.2	24	22.1	28	26.2
	7	18.4	1	22.1	4	26.1
2 weeks	17	18.2	15	22.0	19	26.1
	27	18.2	29	21.6	25	26.1
	6	18.3	3	21.3	5	24.2
3 weeks	13	18.3	11	21.3	16	24.5
	22	18.2	23	21.2	21	24.1

*The amounts of water listed do not include rainfall of 3.5 inches over this period.

Table 3. Water applied to the trickle plots from May 6 to August 20, 1976*

Irrigation Treatment			
0.2 BAR		0.7 of Amount at 0.2 BAR	
Plot No	Inches	Plot No	Inches
3	19.15	1	16.87
4	19.72	2	16.89
5	19.04	6	16.60

*Not including rainfall of 3.5 inches over this period.

The plots were not pre-irrigated, but it is quite possible that residual water was present in the soil from irrigation of the barley during the preceding winter.

Note from the data that the average amount of water applied to the trickle plots (19.3 inches) is only one inch or 5.6 percent higher than the average amount of water applied to the 100 percent surface treatment. This indicates that the 100 percent treatment was indeed close to the planned irrigation efficiency of 100 percent. It also suggests that trickle irrigation management based on tensiometer readings is an efficient method of applying water.

The effects of irrigation efficiency and irrigation interval on cotton yield are presented in Table 4. Table 4 shows the considerably higher yields for the B plots than for the A plots, possibly because the B plots had been bare before planting for several years. This was the first year that irrigation treatments had a significant effect on yield. The 100 percent efficiency treatment on the A plots resulted in a significantly higher yield, possibly as a result of less leaching of nutrients from the plots in this treatment over the past four years. Irrigation of the B plots at three-week intervals resulted in reduced yields. This indicates that if the total water applied is nearly equal to the consumptive use, more frequent irrigation will produce an increased yield.

The yield and quality of the cotton from the trickle plots are presented in Table 5. There were no significant effects due to irrigation treatment on either cotton yield or quality.

Table 4. Effects of irrigation efficiency and irrigation interval on the total fiber yields of cotton for the surface irrigated plots A and B, 1976

Irrigation Interval	Irrigation Efficiency			Average
	80	90	100	
(weeks)	(Kg/ha)			(units)
		A Plots		
1	1,084	1,082	1,434	1,200
2	1,071	1,286	1,480	1,279
3	1,342	1,318	1,354	1,338
Average	1,166a	1,229a	1,423b	1,272
		B Plots		
1	1,557	1,459	1,528	1,515a
2	1,562	1,618	1,514	1,565a
3	1,424	1,326	1,318	1,356b
Average	1,514a	1,468a	1,453a	1,478

Yield means followed by the same letter are not significantly different at the five percent or less level of probability.

Table 5. Yield and quality of cotton for the trickle irrigated plots 1-6, 1976

Treatment	Yield	Lint	2.5% Span	Uniformity Ratio	Mil	Strength	Elongation
	(kg/ha)	(%)					
.2 bar	1,280	38.61	1.167	46.60	3.93	23.17	6.93
70% of .2 bar treatment	1,308	38.66	1.197	44.57	3.53	22.77	6.53

No significant differences.

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"ALBUQUERQUE GREATER URBAN AREA WATER RESOURCES STUDY"

Major Stuart MacKenzie
U.S. Army Corp of Engineers

I would like to take this opportunity and talk to you about Corps of Engineer involvement in regional water resource planning through the Urban Studies program.

The Corps got into the business late in 1970 when Congress and the Office of Management and Budget indicated an interest in having the Corps of Engineers undertake wastewater management pilot studies for several major metropolitan areas. The objective was to produce for each study area a report that would identify feasible alternative means of reaching very high standards of water quality on a regional basis. A further requirement was that land treatment be considered as an alternative to advanced treatment plant systems. The five areas selected for study were:

1. Cleveland-Akron area in Ohio
2. Chicago metropolitan area
3. Detroit metropolitan area
4. San Francisco Bay area
5. Merrimack Basin in New England

The alternatives developed by the studies would be used to assist the State and local governments in solving their wastewater management problems. Thus, the studies would encompass the formulation and evaluation of wastewater systems and their impacts, the required engineering design considerations, identification of associated institutional arrangements, and public involvement. The Urban Studies Program evolved from these regional wastewater planning efforts. The focus was expanded to include all water problems that presently exist in urban areas, as well as water problems which appear to be emerging in the future. I might mention that all five pilot programs have been completed and are currently undergoing review.

The Urban Studies Program is the newest type of planning study conducted by the Corps of Engineers. Through this program, the Corps

seeks to provide a range of urban water resource plans that are compatible with comprehensive urban development goals of the region under study. These plans will provide an integrated approach to water resources management and will be designed to meet applicable State and Federal requirements for implementation. In other words, the Corps will provide water resource plans that are acceptable to the public, compatible with the urban development goals and implementable by its institutions.

The kind of concerns that receive attention in the Urban Studies Program are:

1. Urban flood control
2. Flood plain management
3. Wastewater management
4. Bank and channel stabilization
5. Regional harbor and waterway development
6. Lake, marsh, and estuarine restoration and protection
7. Water supply
8. Recreation, fish and wildlife

Other concerns which have to be considered and included in the evaluation of water resource problems include land use, population and regional growth, current institutional arrangements, energy requirements of the considered alternatives, urban renewal, and many others of this nature.

These concerns are then examined within the framework of the following basic principles.

1. State and local governments have responsibility for, and leadership of, urban comprehensive planning.
2. Corps urban water resource planning must not duplicate other Federal programs.
3. Where the plan includes an element under regular Corps authority (such as flood control), the plan developed for that specific purpose will be in accordance with established Corps policy for that element.
4. Wastewater management components of alternative urban water resource plans must fulfill the intent of PL 92-500. Also, study funds for this element must include a 25-percent, non-Federal cost share.

That's the program in a nutshell. The impact that it has on the State of New Mexico is this: There is presently an Urban Study ongoing in Albuquerque, conducted concurrently with the Albuquerque Metro 208 planning effort. The study is called the Albuquerque Greater Urban Area Water Resources Study and, typical of the military, we promptly found an acronym that goes with it--AGUA. Its goal is prudent use and effective management of our water resources.

The study area is located in the Middle Rio Grande Valley of central New Mexico. The watershed of the main stem Rio Grande from Cochiti Dam to the confluence of the Rio Puerco, an area of approximately 1500 square miles, will be examined, with emphasis given to the urbanizing area from Bernalillo to Belen. It was chosen based on its hydrogeologic integrity. This choice has subsequently haunted us, but I will discuss that in a minute. The study procedure used for AGUA can be divided into three parts or stages. These are:

1. Development of the plan of study

2. Development of preliminary plans

3. Development of final plans.

Also, the following processes will be performed during the conduct of the study:

1. Problem identification

2. Formulation of alternatives

3. Impact assessment

4. Evaluation

These four actions are to be continuously reiterated throughout the study so that continuous sifting and winowing occur to insure the best selection of final plans. The interrelationship of the three-stage, four-phase process is shown below:

At the present time, we are just a little more than halfway through the study. The areas of concern that have been identified and which are currently under investigation are:

1. Flood control and flood plain management. Very briefly, the problems in this area are:

   a. Main stream flooding

   b. Tributary and arroyo flooding

   c. Aggradation of the Rio Grande and erosion control

   d. Identification of flood hazard areas for flood insurance.

2. Water Supply Management. Again, without getting into great detail, we have identified:

   a. Problems caused by uneven distribution and limited quantity of the supply.

   b. Problems caused by the variable quality of the supply.

   c. Problems caused by the unknown capabilities of the aquifer.

3. Recreation, Fish and Wildlife. There are in this area:

   a. Problems caused by the fact that sites for water related recreation within the geographic boundaries of the study area are limited.

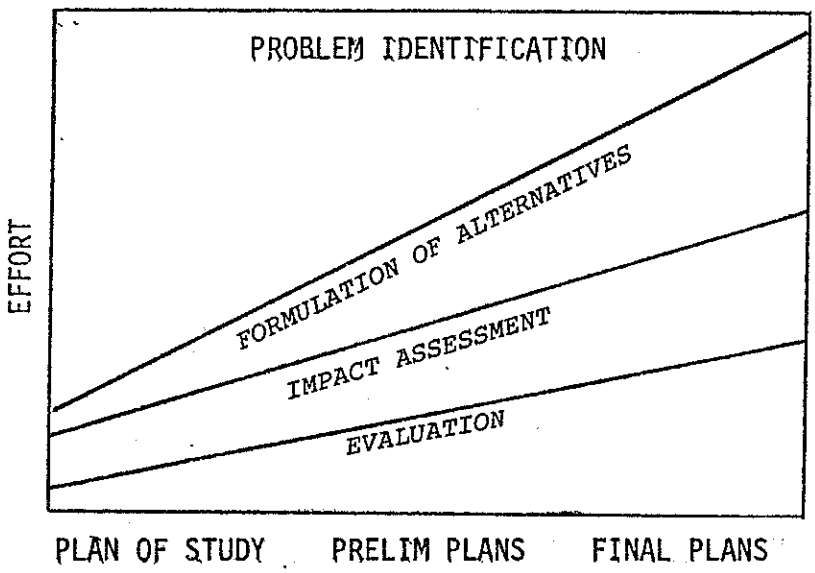
   b. Problems with the reduction of habitat for fish and wildlife populations produced by ongoing changes in land use.

4. Wastewater Management. This area of the urban study will be carried out through the 208 planning process. As the State's designated planning agency, the Environmental Improvement Agency will manage this effort. Ms. Callahan has mentioned the specifics of this program previously, so I will only mention the 208 Plan will be fully coordinated with the AGUA Urban Study and will be incorporated into the latter to produce the complete Urban Study. Both will use the same baseline data for their congruent areas of study.

The next two items I will mention not as problems but as broad considerations which I think, in the long run, will be the most significant developments of the study. The first is water quality which we consider to be the fabric on to which all our water resources are embroidered. The alternatives will be based not only on the long

range demands made of the total resource, but also on the fact that the preservation of the quality of the resource is essential to those making the demands. Thus, while attempting to provide alternatives for the entire gambit of water resource problems, it must be recognized that the fabric of the resource is quality. Specific solution can not levy greater demands against the already stressed resource. Instead, alternatives must maintain and reinforce the integrity of this vital fabric.

Finally, Environmental Enhancement, Economic and Human Resource Development. This is a hodge-podge of vocabulary, but we consider it to be the dynamic forces that shape a region; those which create the problems as well as the opportunities, the attractions as well as the blights. Looking at the study area, we find that political and cultural boundaries are not necessarily coincident with natural boundaries. How do these interact? What are the financial arrangements? If alternatives are developed, can they be implemented by existing institutions? It is these types of questions which we hope to answer, and it is in this area where we feel the greatest strength of the Urban Study Program lies.



TOXIC SUBSTANCES CONTROL AND SECTION 208 OF THE WATER POLLUTION CONTROL ACT

by

Jay B. Sorenson

WRRI ABSTRACT

The Toxic Substances Control Act of 1976 (TCSA) significantly increases the potential for federal action wherever and whenever toxic substances in water pose a threat to people or the environment. TSCA most notably broadens the scope of Section 208 of the Pollution Control Act Amendments of 1972, which covers diffuse source contamination. However, the new measure appears to be as ambiguous as it is powerful, and it will take some time to grasp its implications in full.

Because TCSA may bear heavily on the regulation of toxicity in ground and surface water, such 208-related fields as mining, agriculture and construction are likely to feel its impact. In New Mexico this means that pollution from pesticides in farm runoff and industrial waste deserves attention. However, the main issue, particularly in the northwest part of the state, is radiochemical contamination from uranium mining. There is a pressing need to clarify how TCSA will affect this activity. New Mexico researchers seeking ways to dispose of fluids used in solar heating and cooling and ways to use treated sewerage sludge as fertilizer and animal feed supplements also need to consider how 208 and TCSA will combine to influence their work.

New Mexico chemical standards for treating toxic substances should give the state some leverage in dealing with the federal government. Nonetheless, TCSA is very vague on a number of important points, and a certain amount of conflict between state and national agencies appears inevitable as officials seek to define areas of authority and make specific decisions.

TOXIC SUBSTANCES CONTROL AND SECTION 208 OF THE WATER POLLUTION CONTROL ACT

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INTRODUCTION

The main problem we examine at this session of the Water Resources Conference is that of the impact of toxic/hazardous substances in toxic amounts on water quality. We are particularly concerned with toxic substances as they apply to the diffuse sources of water pollution provisions under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and as they may apply under the Toxic Substances Control Act of 1976 (PL 94-469).

Late in 1976 a new law, the Toxic Substances Control Act (TSCA), PL 94-469 was enacted. Its primary objective is to prevent human and environmental exposure to dangerous toxic substances. To this end, the law appears to be focused at the pre-manufacture stage as a preventive measure. The law permits the regulation of the production, processing, transportation, distribution, use, and disposal of any substance, be it a commercial substance, a by-product of a commercial operation, an impurity, or a naturally occurring substance. Some types of substances that are specifically regulated under other statutes and administrative regulations are formally exempted from the Toxic Substances Control Act, but the act appears to be very broad and powerful, and also ambiguous, and some of these exempted substances may actually end up regulated under TSCA.

When waters are contaminated by a toxic substance and pose population or environmental risks, they are subject to review under the Water Pollution Control Act. But they are also subject to the Toxic Substances Control Act.

The author wishes to express his appreciation for the assistance provided by the Office of Environmental Policy Analysis, Sandia Laboratories, the Inhalation Toxology Research Institute, Lovelace Foundation for Medical Education and Research, and the N.M. Environmental Improvement Agency. The opinions expressed in this paper are solely those of the author.--J. B. S.

Thus, the toxic contamination/water quality situation falls within the purview of both Acts. Persons concerned with the Water Pollution Control Act should, therefore, be aware of the possible application of TSCA.

Because the Toxic Substances Control Act is new, its provisions still subject to interpretation, the specific nature of its implications in the area of water pollution is somewhat unclear. No final answer to a strict or a broad interpretation of the Act is possible yet. Uncertainty and unpredictability are more the rule than not at this early stage of intrepretation of the Act passed last October. Because of the possible implications of this Act, and its application to 208 problems and industrial mining involving toxic substances, most of the remainder of this paper is devoted to a discussion of these implications. Further, to realize a wide range of impacts under this Act a liberal and permissive examination has been attempted.

Toxicity

Before proceeding to a discussion of the interaction between these two acts, an area which is fundamental to this discussion is the nature and meaning of toxicity. Under TSCA the toxicity of a substance is determined by its effects on public health, the environment, and life forms, and by the risk assessments of undesirable events occurring in a given period of time. Standards may be prescribed on the basis of:

- carcinogenicity, mutagenicity, teratogenicity
- levels of human and environmental exposure (lifeforms: vertebrates, invertebrates, microorganisms, and plants)
- behavioral effects (very uncertain at times): acute, chronic, subacute, absorption, excretions, and metabolism
- synergistic and cumulative effects with the substances, and
- any other effects that may present an "unreasonable risk" to man and his environment.

There is no better illustration of the difficulty of doing this in a meaningful way in practice than the recent, well publicized regulation of saccharin by the FDA and associated public comments of the forms: "Caution; saccarin, when taken in very large quantities, may be harmful to the health of your Canadian rat!" The problem is clear; well defined human or environmental effects often stem from occurrences which we are attempting to avoid. Reliance on recognizing effects only as they occur in the "real world situation" poses problems of:

- Potential unexpected occurrences.
- Long term periods. For example, recognizing a carcinogen from population data may require decades.
- Recognition of an effect. For example, will a general increase in population irritability (behavior) be recognized as stemming from a pollutant?

- Large economic penalties. Large pollution control expenditures or restrictions on production of substances after large facility expenditures.

For these, and other reasons, a high degree of reliance is placed on experimental systems from which extrapolation to humans or complex ecological systems will be necessary. Such extrapolations are fraught with pitfalls and may require considerable judgment in assessing the "risk" potential of a given situation.

We are also concerned with workpoint numbers:

- 4, Nonpoint Source Assessment
- 8, Municipal Waste Treatment Systems Needs[3]

Parameters of interest include radium, selenium, PCBs, pesticides, manganese, gross alpha, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, barium, boron, nickel, zinc, pathogenic organisms.

Water contaminants resulting from toxic substances in New Mexico may not be as serious as in other more industrialized states. New Mexico does not have the PCB problem of Michigan, nor the carbon tetrachloride problem of Mississippi. We do, however, have a toxic chemical substances problem as a result of mining in the northwestern part of the state and which the energy boom is exacerbating.

Shallow ground water contamination results from infiltration of: 1) effluent from mill tailings ponds, 2) mine drainage water that is either discharged directly into arroyos or is introduced into settling ponds and then seeps into watercourses, and 3) discharge (tailings) from ion exchange plants. Deterioration of water quality results from conventional underground mining as a result of penetration disruption of the ore body. The effluents contain concentrations of dissolved uranium, radium, gross and trace chemical constituents. Available evidence indicates that radium concentrations in the discharge waters tend to increase substantially as the ore body is developed. While natural background radium concentrations are generally about several piocuries/liter (pCi/l), 100 to 150 pCi/l appear in the effluents of operating mines. The discharge of such highly contaminated mine effluents to streams and seepage from tailings creates a long-lived source of ground-water contamination.[4]

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[3]New Mexico Environmental Improvement Agency, Section 208 Detailed Work Plan, approved by EPA, Oct. 1976 (S.F.N.M.), P 5ff.

[4]Robert F. Kaufman, Gregory G. Eadie, and Charles R. Russell, "Effects of Uranium Mining and Milling on Ground Water in the Grants Mineral Belt, New Mexico," (Office of Radiation Programs - Las Vegas Facility, U.S. Environmental Protection Agency). Ground Water - Sept. - Oct. 1976, Vol. 14, No. 5

Radium, selenium, nitrate and, to a lesser extent, uranium, are of most value as indicators of ground-water contamination. Gross alpha results are not consistent indicators of radium or uranium in water, although uranium isotopes 234, 235, 238 appear to be the principal contributor of alpha activity. Accurate radium-226 analysis yield the most information for radiological evaluation of potable water. Sorptive or biouptake of radium in the Grants area is pronounced.[5] Hence, concentrations of radium now in ground water are not perceived to be representative of the ultimate concentrations.

We have a number of problems. For a water scarce region we are pumping radio-contaminated water from mines and mills at prodigous rates. One mine presently pumps 2,000 gallons a minute, and in areas planned for future mining predictions run as high as 8,000-10,000 gallons per minute. One mining operation (Ranchers Exploration) has turned an intermittent stream into a permanent one. On another level, while settling ponds capture radium dissolved in water. No regulations exist at present that require the companies to remove the radium. Kerr-McGee is now voluntarily using a Barium Chloride Precipatation Process at its Ion Exchange Plant to capture the radium that is discharged with excess water. However, an acceptable methodology for monitoring radium remains to be standardized. A related problem is that of toxic chemical spills resulting from the failure of containment ponds. While the spills have not been many and have been confined to company land, they have to be considered insults to the environment.

Another instance is that of United Nuclear, Churchrock, which at this very time is considering the construction of a secondary containment system to gain the insurance of an additional half mile should its primary radon containment system suffer a failure. What makes the United Nuclear, Churchrock, situation so significant is that a failure of the primary containment system without a backup system could lead to contaimination of the waters that flow into Shiprock, Space and secondary containment systems appear to be useful ways of dealing with the problem. The waste management of tailings is a critical problem. The average size of mill tailings piles is reported by the State Environmental Improvement Agency to be 50 acres. They report that 49 billion tons of tailings exist with one billion tons of uranium left in them. (Table I affords a picture of the companies and tailings up to 1976). Rainfall, stormwater, and seepage into water courses is a major contamination of shallow ground water and surface drainage courses in the state.

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[5]U.S. Environmental Protection Agency, Water Quality Impacts of Uranium Mining and Milling Activities in the Grants Belt, New Mexico, Sept. 1975, 906/9-75-002 P 3.

Clearly, radiochemical contamination, gross and trace chemical constituents is a prime concern in New Mexico and the lowest practical levels is a policy objective.[6] What is needed is clarification regarding: 1) mine discharges, 2) mine waste discharges, 3) stabilization of tailings. What remains unclear is the biopathways of radionuclides, and the possible somatic and genetic effects on people.

TABLE I

Tailings to January 1976

Company	Location	Status	Acres Tailings	Tailing Solids Tons 106	Total Ci
Foote Mineral	Shiprock	inactive (1954-1968)*	37	1.55	7,800*
Homestake	Milan	inactive	40	1.22	6,100
Phillips	Ambrosia Lake	inactive (1958-1963)**	55	2.68	13,500**
Kerr-McGee	Ambrosia Lake	active	200	20.18	100,927
Anaconda	Bluewater	active	260	13.00	65,225
United Nuclear-Homstake	Milan	active	105	14.89 51.97	74,657

* 950 Ci of Ra reported in pile

** 1,520 Ci of Ra reported in pile

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[6]New Mexico Water Quality Control Commission, New Mexico Water Quality Standards... P 3 and Amended Water Quality Control Commission Regulations, Jan 11, 1977, Pp 3, 15.

Other federal regulations

Much with which we in New Mexico are concerned under Section 208 as a toxic substance fails under one of federal acts. Paradoxically, this creates an ambiguous legal situation, and a rather complicated one for us.

In the area of chemical, federal regulatory authority up to 1976 related to highly specific uses of chemicals (i.e., drugs), or to chemicals related under rigidly specified conditions (i.e., into the work place).

This regulatory authority was stipulated in the following Federal Statutes:

1. OSH Act (OSHA), PL 91-596 (1970),
   29 U.S.C. §§ 651 et seq.
   Standards, 29 U.S.C. § 655

2. Clean Air Act (CAA), PL 91-604 (1970),
   42 U.S.C. § 1957 et seq.
   Hazardous Pollutants, § 122, 42
   U.S.C. § 1857c-7

3. Federal Food, Drug, and Cosmetic Act (FFDCA),
   21 U.S.C. § 321 et seq.

4. Consumer Product Safety Act (CPSA), PL 92-573 (1970),
   15 U.S.C. § 251 et seq.

5. Federal Hazardous Substances Act (FHSA),
   84 Stat. 1673 (1970),
   15 U.S.C. § 1261 et seq.

6. Atomic Energy Act (AEA), 42 U.S.C. 2201 et seq.

7. Poison Prevention Packaging Control Act (PPPCA),
   84 Stat. 1670 (1970),
   15 U.S.C. § 1471 et seq.

8. The Federal Insecticide, Fungicide & Rodenticide Act (FIFRA),
   7 U.S.C. 136 et seq.

Regulation of chemicals, with the singular exception of FFDCA, occurred only after the chemical substance had already been introduced into commerce. An objective need existed for preventive regulatory authority to control toxic chemicals rather than merely corrective authority, The need for "before the fact" regulatory authority proved to be a major impetus to the creation of the Toxic Substances Control Act of October 1976, TSCA.

TOXIC SUBSTANCES CONTROL ACT (TSCA)[7]

Background

Congress had a difficult job with the Act. The issue of toxic chemicals touches on the very frontiers of the costs and benefits our society derives from an industry whose activities have become essential for enhancing, protecting, and extending our lives and whose earnings represent more than 6% of our Gross National Product.

The Act reflects a full awareness of those areas where we have a high level of technical understanding and knowledge as well as those areas of technical uncertainty and social and economic obdurance to improved practices.

In 1971 The President's Council of Environmental Quality (CEQ) issued a report which provided alarming prospectives on the serious regulatory deficiencies in the control of chemical substances which could pose an unacceptable hazard to human health and the environment.

The report revealed that approximately two million chemical compounds were known to exist and that 250,000 new chemical compounds were introduced globally each year. Although most of these chemicals were made in small quantities for research purposes, it was estimated that 300-500 new chemical compounds were introduced into commerce each year.

The Environmental Protection Agency (EPA) estimated that 10-20% of those being introduced would have adverse effects on human health and the environment and only a fraction of these were covered by existing regulatory authority.

Of primary concern was the observed long latent period in humans for the development of chemically induced cancer (20-30 years), and the possibility that without measures to preclude introduction of new chemicals or new uses of old chemicals society was faced with the potential for future epidemics of chemically related diseases.[8]

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[7]"Toxic Substances Control Act," Oct. 11, 1976 15 U.S.C. 2601

[8]Cited from the Inhalation Toxicology Research Institute & Sandia Laboratories' office of Environmental Policy Analyses, "Analysis of Potential Impact of Toxic Substances Control Act on the U.S. Energy Research & Development Administration," Vol. I Policy Overview, Feb. 1977. Sandia Laboratories, N.M. Limited Distribution.

The problem was clear.

The Act emerged as a product of several years of deliberations and hearings held by a number of committees of both houses of Congress.

Goals of TSCA

The general goal of TSCA IS:

- TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT FROM UNREASONABLE RISKS PRESENTED BY CHEMICAL SUBSTANCES NOW AND IN THE FUTURE.

This overall objective is to be secured by reducing the probability of chemical incidents harmful to man or the environment without unnecessarily raising the costs of products, retarding R&D, distorting the configuration of U.S. industry, or jeopardizing our international competitive position.

The purposes of TSCA's implementation activities are fourfold:

- to control toxic substances directly,
- to support other governmental and nongovernmental programs
- to control toxic substances,
- to stimulate new patterns of approaches to toxic chemicals in general, and
- to diversify strategies regarding buying, selling, and disposing of toxic materials.

The act applies control at the point of manufacture, distribution into commerce, processing, use, and disposal.

When necessary, EPA is authorized to take steps to limit manufacturing, processing, use, or disposal of a chemical substance which may present an unreasonable risk.

Of particular concern are chronic effects of toxic substances; thus the attempt to reduce the adverse health effects. TSCA represents an abatement strategy.

Major considerations of TSCA:

1. The first major intent of the legislation was to preclude the introduction into commerce of chemical substances or mixtures which would cause or significantly contribute to an unreasonable risk to public health or the environment.

2. The second major consideration related to pre-market testing to assure that if a chemical substance were introduced into commerce it would not pose an unreasonable risk to health and the environment. Congress assigned to the chemical industry the obligation of bearing the costs of health and environmental effects testing. The legislators used the FFDCA as a model in developing the provisions with TSCA. Thus the pre-market notification means prior to the introduction into commerce of a new chemical or an existing chemical for new uses. The act differs from FFDCA by requiring the EPA to specify acceptable tests before testing is required.

3. The third major intent of the act was to provide a Central Information, Storage and Retrieval System, available to all governmental agencies, which would maintain a current inventory on all chemical substances and mixtures with respect to: structure, potential human and environmental exposure, and toxicology.

4. The fourth intent of the act was to provide the EPA Administrator with broad regulatory authority for the prevention of "unreasonable" damage to health and the environment from chemical substances.

Congress added a qualifier. It stated that the EPA Administrator "should carry out this act in a reasonable and prudent manner" which meant consideration of the environment and health but also the economic and social impact of any action undertaken under the act.

Restrictions

The application of TSCA was also restricted to two stipulated conditions:

1. Where risk to environment and health may not be prevented or reduced to a sufficient extent by actions taken under other federal law administered by EPA.

Exclusions

Quite noteable were the chemical substances or mixtures excluded under the act. They are regulated under other federal statutes. These include:

1. Any nuclear source material, special nuclear material, or by-product material regulated by the Atomic Energy Act (AEA), 42 U.S.C. 2201, et seq.

2. Any pesticide regulated by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), 7 U.S.C. 136, et seq.

3. Tobacco or any tobacco product.

4. Firearms and ammunition subject to taxes under sections 4181 of the Internal Revenue Code 26 U.S.C. 4181.

5. Food, food additives, drugs, cosmetics, or devices regulated by the FFDCA, 31 U.S.C. 301, et seq.

6. Meat and meat products regulated by the Federal Meat Inspection Act (FMIA), F 31 U.S.C. 601 et seq.

7. Eggs and egg products regulated by the Egg Products Inspection Act (EPIA), 21 U.S.C. 1031, et seq.

8. Poultry and poultry products regulated by the Poultry Products Inspection Act, 21 U.S.C. 451, et seq.

Problem areas

TSCA leaves us facing many uncertainties and problems of law due to the exclusions, to vagueness of language and clauses, and to its newness and general lack of interpretation. The central element of TSCA implementation is the concept of "unreasonable risk." Yet, the term is used in an ambiguous, if not in a contradictory manner.

Congress recognized that some level of risk must be accepted. It also recognized that the welfare of future generations as well as the needs of the present generation must be of concern. Congress put all this in the act, and further specified that for a risk to be determined unreasonable a balancing of the following considerations had to occur:

1. the adverse effects of the chemical on health and the environment;
2. the magnitude of human occupational and non-occupational exposure;
3. the magnitude of exposure of the environment;
4. societal benefits for various uses and the availability of substitutes;
5. the economic consequences of any restrictive rule with respect to the national economy, small business, technological innovations, national security, the environment and public health.

Points four (4) and five (5) certainly provide an escape clause, but even more serious are a set of other problems:

1. If the term "unreasonable risk" is used, so is the term "substantial risk" (section 8 (3)). So too is the concept "imminent hazard," (7 (a)).

2. The "burden of proff" for establishing the degree of risk varies in different sections. The less severe risks would appear to require levels of testing or information gathering activities of a different order. Further, sections 4 (a) and 5(a) require the proponent of "use" to establish that the new chemicals on a risk list do not constitute an unreasonable risk. Yet, section 6(a) requires that the EPA must make an explicit finding of risk to take regulatory action.

3. Compounding the problem, is the "overreaching requirement," mentioned above, that social and economic impacts, as well as environmental impacts, be taken into consideration under any provision of TSCA. How is this to be done? What is the priority?

4. The criteria when evaluating risks also vary. Some provisions, including the legislative history, emphasize the importance of considering carcinogenesis, teratogenesis, and mutagenesis when evaluating risks. On the other hand, while there are no specific references to acute toxicity, there is no reason for not considering such risks.

5. Marginal cases are a particular problem. What happens when risks are marginal? What happens when assessment of the same chemical or the same environmental problems lead to marginally conflicting determinations? Is regulatory action warranted?

"Toxicity" tests also leave many questions to be answered:

1. What types of toxicity tests (oral inhalation, aquatic, phytotoxicity, or dermal penetration) should be required?

2. Should a single test or a battery of toxicity tests be required?

3. What quantitative toxicity data are available on wastes or leachates of wastes?

4. Should toxicity level or LD 50, LC 50, ILm, TLm, be neglected to define toxic wastes?

5. What is the level of risk associated with a particular toxicity level?

6. What methods or test procedures can be utilized as predictive tools to estimate toxicity -- the tendency to bioconcentrate, carcinogenicity, mutagenicity, or teratogenicity of leachates?

7. What are the effects of low level exposures to individuals vs. populations?

8. How should chronic exposures be reflected in identifying the characteristics of hazardous waste and listings of particular hazardous waste?

Other uncertainties

A number of other uncertainties exist that are important and that can have a direct bearing on the influence of TSCA:

1. The interpretation of the word "commerce" is vague. By the language of the act, anyone who processes or manufactures chemicals or mixtures for shipment across state lines, even

though a sale is not involved, would fall under the provisions of the act. Virtually all ERDA laboratories could fall under this provision, especially those processing isotopes for other users.

2. Chemicals used in small amounts for research purposes could conceivably be jeopardized by this act. What chemicals will be available for research purposes will depend upon the EPA administrator's determination as to what chemicals are to be on a research list.

3. It is not clear whether all agencies of government like ERDA and its laboratories fall under the jurisdiction of the EPA Administrator. Nor is it clear whether they have to submit ERDA toxicological and relevant scientific data to EPA. It would appear, however, that all ERDA labs would have to comply with the regulations issued by EPA under TSCA.

4. Confusion also exists on how the EPA is to handle the problem of "impurities", "intermediate byproducts", and the "commercial" production of research chemicals.

5. Protection of the environment is more nebulous than it is the protection of human health which itself suffers from problems described earlier. The basic policy consideration is the protection of man and the environment, but Congress appears not to have been able to be as definite in the protection of the environment and its life forms as it was in its provisions for public health. The provisions on disposal are almost non-existent.

6. A national defense waiver exists in the act. It makes possible to set aside the provisions of the law regarding any chemical or substances that are deemed essential for national security.

There are other uncertainties in the act, but the above are the ones that touch on the key provisions of the law, and that will cause difficulties in enforcing it and make its impact on 208 activities uncertain. We surely will witness much interesting litigation. The act seems to be written to guarantee it.

TSCA applicability to 208

To return to the relevant applicability of TSCA to water pollution. For the most part, toxic substances as water contaminants are treated under PL 92-500. However, TSCA directs the Environmental Protection Agency (EPA) administrator to use PL 92-500 unless the administrator determines that it is in the public interest to protect against such risks under TSCA.

How does TSCA specifically bear on 208 mining, agriculture and construction problems? How inclusive is it in terms of toxic substances -- including nuclear materials and byproducts? What can we expect, if anything, from TSCA?

While it is the case that PL 92-500 is the law that more closely applies to most instances of water pollution control, it may very well be the case that TSCA will prove to have great utility in treating ground and surface water contaminated by toxic substances from point and non-point sources. TSCA deals more specifically and comprehensively with chemicals, risks, and controls, allowing regulation of man-made or naturally occurring chemical substances at various steps including processing, transportation, use, or disposal than does Pl 92-500. EPA appears to be moving cautiously, yet EPA will most likely apply TSCA to point and non-point radio-active mine contamination and toxic agricultural pollution.

One of the most critical points regarding radio-chemical contaminated mining activities is that the definition of nuclear waste under the Atomic Energy Act (AEA) or Nuclear Regulatory Commission (NRC) guidelines is unclear.

The AEA covers nuclear source material, special material, and by-product material. However, the AEC (now the NRC) never perceived or defined byproducts as wastes, or included wastes as part of byproducts. Waste products like tailings were considered to be special problems, and ignored for years. The U.S. Regulations 10CFR20 provides that all persons "who receive, possess, use or transfer source material "shall be controlled by general or specific license issue by the U.S. AEC (NRC) or any state conducting a licensing program." Under the regulations ion exchange plants and mills are licensed. The regulations set forth the maximum concentrations of various radionuclides which are permitted in effluents "to unrestricted access." An unrestricted area is defined as any area to which access is not controlled by the licensee to protect individuals from exposure to radiation and radio-active materials. Personnel badge monitoring is not required in unrestricted areas. The maximum allowable concentration of radium 226 in a water effluent to an unrestricted area is 30 pCi/1. All mills and plants are controlled by this regulation from the initial start up of the facility. Tailing piles and wastes are not mentioned.[9]

Wastes thus remain a concept in limbo. The NRC is now refining its position. It is particularly sensitive to the tailings problem. It is claiming jurisdiction over them as "special material", and covered by the AEA. Since the nuclear waste issue remains unresolved and as it impacts on health and the environment as a toxic substance, the door appears open to the EPA effort to apply TSCA, should EPA proponents who favor this course of action succeed in having their way. The NRC will probably resist and a conflict is in the making.

Two points are of interest; a U.S. Supreme Court decision giving EPA authority over radium and a New Mexico chemical standard to treat a toxic substance improved the state's bargaining position.

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[9]Quoted in EPA 906/9-75-002, Pp 16-18.

The U.S. Supreme Court in June of 1976, in the case of Train vs. Colorado Public Interest Research Group (PIRG), ruled that while nuclear source material, special material, and byproduct material were all under the exclusive jurisdiction of the Nuclear Regulatory Commission (NRC) pursuant to the Atomic Energy Act, radium and accelerator produced isotopes were not, and that the EPA had jurisdiction over them.[10] The legislative history cited by the Court also establishes that the EPA, under its definition of water pollution in the Federal Water Pollution Control Act could regulate radium and accelerator produced isotopes.

With this legal precedent and authority over radium EPA should have little difficulty applying TSCA to nuclear wastes and toxic water problems.

New Mexico, in addition, may treat the problem of toxic contamination of water under an agreement with the federal government and its own statute.[11] The uranium standard as supported by NM EIA is a chemical standard dealing with picuries (pci/L).[12] Unless preempted by the federal government, New Mexico can treat a toxic substance which "alters the physical, chemical or biological qualities of water" and which with "reasonable probability injures human health, animal or plant life, or... unreasonably interferes with the public welfare or use of property."[13] While the New Mexico chemical interpretation has legal implications which are still uncertain, and while the toxicity of radium as a chemical is unimpressive to some, the chemical interpretation has strengthened New Mexico's bargaining position in environmental matters. It is not inconceivable some TSCA provisions could be applied to the regulation of other dimensions of selected radionuclide problems.

Major points apply to various clauses and DPA judgments. One important interpretation relates to TSCA's application to minerals, including uranium ore, on its list of candidate chemicals to be excluded from TSCA coverage on the grounds of no immediate toxological concern. However, in the Federal Register of April 12, 1977, the EPA commented, regarding the placement of uranium on its candidate list, that because of its "toxological effects...uranium ore...may be considered inappropriate for Appendix A."[14] The net effect would appear to be that uranium as a mineral will fall under EPA jurisdiction to be regulated under TSCA.

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[10]Train V. Colorado PIRG, 8 ERC 2058, No. 74-1270 (June 1, 1976).

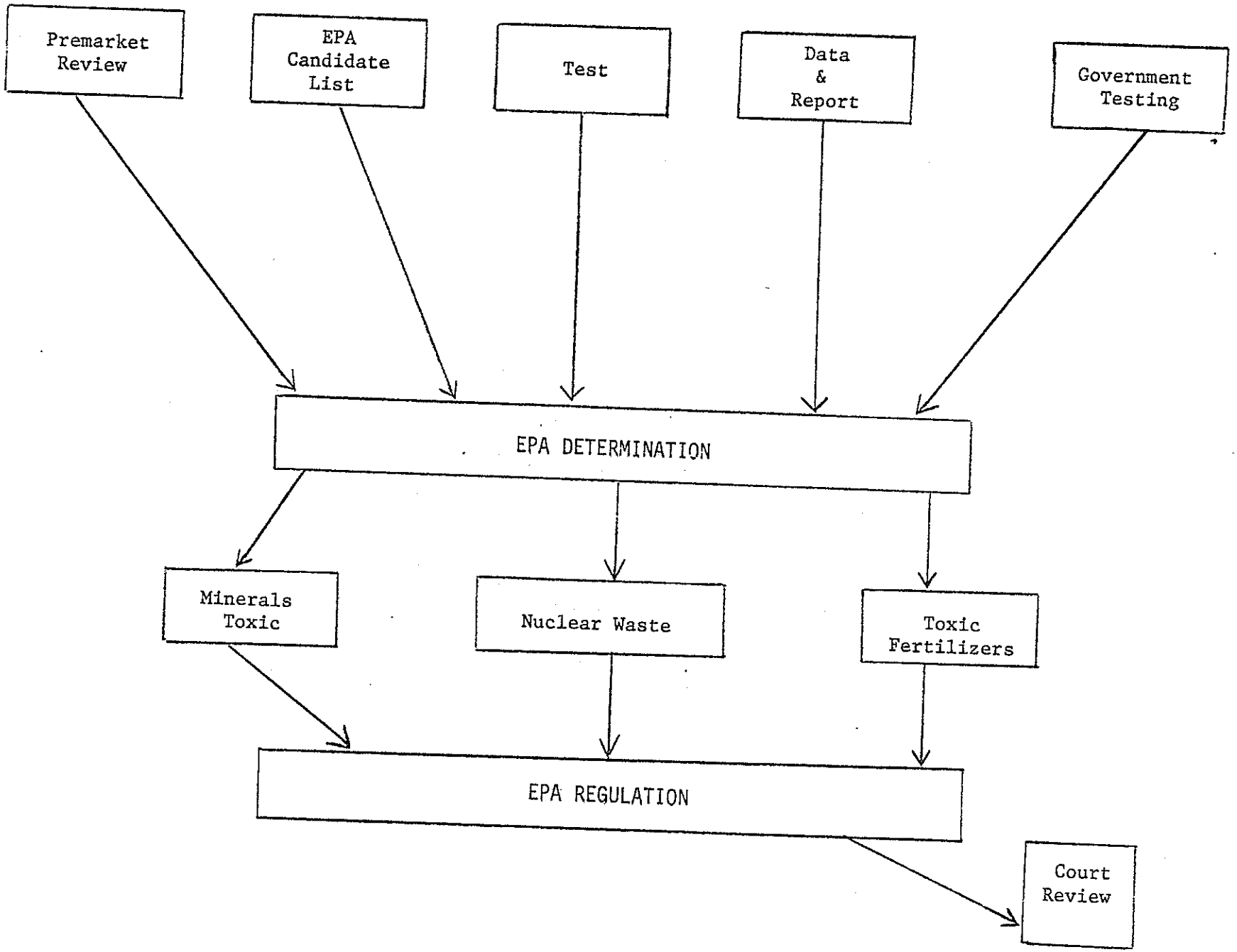
[11]Radiation Protection Act Chapter 284, Laws of 1971 12-9-1 through 12-9-11 NMSA 1953 Compilation.

[12]Environmental Improvement Agency, "Statement for the Record, Water Quality Control Commission Authority to Adopt Groundwater Standards for Uranium, Radium 226 and Radium 228" (S.F., 1976), P 2. Also, New Mexico Water Quality Standards...P 3. Aug. 1973.

[13]§§ 75-39-2 (A), N.M.S.A., 1953 Comp.

[14]Federal Register, Vol. 42, No. 70, Tuesday, April 12, 1977, P. 19308

EXPANDED EPA JURISDICTION



Other points lead to the conclusion that the act will be interpreted broadly, and EPA will claim jurisdiction over many toxic substances even though the act excludes substances covered by other legislation. Some of the more pertinent points are:

- Chemical "substance" is very broadly defined. It applies to anything that is a chemical. So too with "byproducts"; if a manufacturer of a substance produces toxic byproducts that pose an unacceptable risk his activities can be regulated or shut down.

- Regulation or control is to occur not only at the point of processing and manufacture, distribution, use, but also disposal. There is nothing in the act that deal with disposal. In this area EPA could perceive it has a free hand.

- The major requirement for record keeping and reporting turns on the exposure of workers to adverse health and environmental effects. Thus, EPA can apply its authority under the record keeping and reporting sections of the act.

Regarding the criteria for pesticides and the application TSCA to agricultural activities the following statement in the Federal Register would appear to open the door to EPA's application of TSCA: "a chemical substance is not a 'pesticide' within the meaning of FIFRA until its value for pesticide purposes has been established."[15]

These provisions, like the candidate list, are considered by EPA to be tools and to be open to change at any time. In the final analysis it is EPA that makes the final determination, and if EPA has a problem, TSCA applies.[16]

In short there is a real possibility EPA will apply TSCA to mining and agriculture, particularly in the case of 208 pollution, if a toxic substance migrates into the water table.

If a broad interpretation of the Toxic Substances Control Act is adopted, the accompanying tables summarize those areas of 208 concern which would also fall under the meaning of TSCA and outlines specific areas where impact could occur.

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[15]Conversation at Kerr McGee, Grants, New Mexico, May 4, 1977. Kerr McGee executive reported this was the view of the EPA Kansas office. On the other hand, an EPA authority believes the act will be ineffective. It is so vague little will be accomplished under it. Everyone will bog down as attempts are made to apply it.

[16]Federal Register, Vol. 42, No. 46 - Wed., March 9, 1977, P. 13132.

Functions	Work Point	Areas of 208 Concern	Problem	Chemical Substances by-product Y= Yes N= No ?=Uncertain P=Probably	TSCA IMPACT	SPECIFIC IMPACT										
						Pre-MKT	Inventory	R&D	Processing	Districts	Disposal	Monitor	Data	Report	Unreasonable Risk	Regulation
Industry Mining a) Uranium	9,11,12	Mines - Pumping / Discharging } surface water	Radium Contaminated Water	Y	P/Y	N/?	N/?	N	P	?	P	Y	Y	Y	P	Y
		Ion Exchange Surface and ground water	Radium Contaminated Water	Y	Y	N/?	N	N	Y	P	Y	Y	Y	Y	P	Y
		Waste stabilization ponds Wells - surface & sub surface Surface and ground water	Effluent Seepage	Y	Y	N/?	N/?	N	Y	N	Y	Y	Y	Y	Y/P	Y
		Tailings surface and ground water	Effluent Seepage	Y	Y	N/?	N/?	N	N	N	Y	Y	Y	Y	Y	Y
		Stormwater	Effluent Seepage	Y	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y
		Boomtown	Effluent Seepage	Y	Y	N	N	N	?	N	Y	Y	Y	Y	Y	Y
b) Copper	11	Mining, Milling, Leaching Smelting-Refining Wastes, tailings, chemicals and oil, slag Surface and ground water	Effluent Seepage	Y	Y	N/?	N	N	N	?	Y	Y	Y	Y	Y	Y
Agriculture Civiculture	466	Irrigation, timber harvesting, Roads, sediments perscribe (chemical stage)	Seepage	Y	Y	N	N	?	N	Y	Y	Y	Y	Y	Y	Y
		Surface and ground water		Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Municipal Waste Treatment	8	Sludge Stormwater Sediments Bacteria & Viruses Bio-Life Systems Surface and ground water	Heavy metals, toxic chemicals	Y	Y	N/?	N/?	N	?	N	Y	Y	Y	Y	Y	Y
Industrial Waste Treatment	9	208 area-wide uptake & concentration in aquatic/terrestrial food chains in Middle Rio Grande Surface and ground water	Heavy metal chemical and toxic substances	Y	Y	N/?	N/?	N	N	N	Y	Y	Y	Y	Y	Y
Urban & Industrial Stormwater	12	Rainwater, Cumulative Concentrations, Sediments, Etc. Surface and ground water	Heavy metals chemicals, solids, oil, grease, etc.	Y	Y	N/?	N/?	N	N	N	Y	Y	Y	Y	Y	Y

Research into water quality and toxicity

What of other problems regarding toxic substances and water contamination? It is at this point I'd like to turn to some of the research at some ERDA laboratories, particularly in New Mexico, that is underway.

Solar

One of the most significant environmental concerns of Solar Heating and Cooling (SHAC) is associated with heat transfer and storage media. Sandia Laboratories' Divisions of Environmental Research and Biosystems Studies have undertaken a study of this problem as part of the Laboratories' assigned responsibility in the solar area.[17]

Ordinary water cannot be used as a heat transfer or storage fluid in most cases because of freezing temperatures encountered in many parts of the country. Many of the materials used for these purposes are toxic and combustible, hence creating health hazards to the user and his environment if system leaks develop or if the liquids are discarded improperly. The heat transfer fluids are commonly classified into three broad categories; hydrocarbon and silicon oils, and glycol-water mixtures.

The toxicity of the hydrocarbon oils or fluids are similar to but less than those of ordinary unused motor oil. The toxicity is also less because the working fluids have fewer additives. The oils are usually stable compounds as long as they are not used near their cracking temperatures or catalytic metals are not present. They are generally biodegradable, but in some cases this may be a slow process. In sum, the toxic effects of these compounds will be much the same as ordinary motor oil, but human and environmental exposure may be much greater. A total risk determination has yet to be made.

The silicon oils are much more stable than the hydrocarbons and are very difficult to biodegrade. They are assumed to be practically nontoxic since similar compounds are used in cosmetics. The difficulty in biograding these compounds makes them of particular concern to the environment if they are improperly discarded. Their persistence is particularly interesting in light of the current environmental concern with other similar long lived materials such as PCB's, DDT, and the flourocarbons.

Unlike automobile motor oils which are conveniently recycled through service stations, there is no readily available means of disposing of silicone oils except by recycle.

Glycol-water mixtures are probably the least stable and most toxic of the three types of fluids considered. Their estimated lifetimes are less than two years because of the relatively rapid breakdown of the glycol. Hence, they must be changed periodically. The two compounds presently being considered are ethylene- and propylene-glycol. Ethylene glycol is the major ingredient in ordinary automobile antifreeze.

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[17] The Environmental Issued Associated with Heating and Cooling of Residential Dwellings Pp 1-4.

Ethylene glycol is currently the most widely used heat transfer fluid. It is a sweet-tasting poisonous fluid which could be an immediate ingestion hazard to small children and animals if a leak developed in the SHAC system. The lethal dosage is less than a pint for a small child.

Since this fluid has to be changed periodically, a disposal problem arises as to what to do with the old fluid. Disposal through the sewage system reduces the direct environmental dangers because of the large dilution factor, but the effects on waterways and sewage treatment systems are unknown and may still be significant.

Since it is most probable that people will replace the fluid seasonally during a period no longer than one or two months, there are likely to be significant seasonal variations in its concentration in the sewage system. The actual concentration could be higher since the fluids would normally be changed during the daylight hours.

It should be noted that the disposal of toxic effluents into public sewer systems is specifically prohibited by the Water Pollution Control Act. However, if one potential method of SHAC fluid disposal is through sewers which run directly into bodies of water or through waste treatment facilities, the effects of these fluids on the appropriate life forms and on the treatment works must be studied.

In addition, the biological conversion of these fluids in such treatment works (whose effluent is regulated) should be understood.

Disposal directly into the environment (backyards, e.g.) could have serious environmental consequences.

The total effect of SHAC fluid disposal on a community basis will need to have continued serious study.

Waste management

Another Sandia Laboratories project on toxic substances concerns work with surplus radio-active materials to modify sewage sludge for safe disposal with possible safe application as a soil conditioner, fertilizer or an animal food supplement.[18] By the application of radiation and/or heat and radiation combinations, rapid inactivation rates for salmonella species, coliforms and fecal streptococci were attained. The treated sludge was then applied as a food supplement for sheep and rats and a fertilizer. These application studies were performed at New Mexico State University. Rat experimentation after five months of feeding treated sludge at 25% of the diet indicated no evidence of

[18]Waste Management & Environmental Programs Dept., Waste Resource Utilization Program, Interim Report, June 30, 1976, SAND 76-0350 Unlimited Release.

toxicity. Sheep feeding indicated a nutritive value that could sell amount to an economic value at about half the value of cottonseed meal when used to supplement fibrous, low quality forage diets for ruminants. The potential economic impact on New Mexico could be very large. The initial fertilizer trials with heat and radiation treated digested sewage sludge, using grain sorghumsas a test crop demonstrated significant quantities of available plant nutrients, with no symptoms of toxicity.

Though I have not seen the final results, it would appear at this point that this disinfection process of toxic wastes as compared to pasteurization or more severe heat treatment systems is a question of trade-offs. The critical questions turn on the costs of drying, transportation, and tolerance for odor. Dry treatment - a concomitant of radiation - is cost effective if transportation is more than ten miles, though much depends on the city and area involved. Unless the seage and treatment plants are right next door to the farms, wet use of the sludge offers no advantage over dry treatment. Further, pasteurization and the more severe heat treatment systems have the disadvantage of accentuating odors that are unpleasant to humans. Radiation is a faster process than pasteurization, and "bagging" the treated substance maintains its integrity. Aside from these questions, however, there is the larger one of whether the sludge can be left around and untreated at any cost.

Other ERDA lab's R&D

Current research spans many aspects of toxic substances and water research. Much of its is duplicative and some of it has only indirect bearing on 208 problems. One of the main effects of TSCA is that is certainly will lead to more research on every spectrum of toxicity, including water research.

Some of the other ERDA labs are doing some interesting and very relevant research. Let me briefly cite some key projects.

Argonne National Laboratory is a lead laboratory in assessment of impacts to aquatic ecosystems due to Uranium milling. It is presently responsible for "The Uranium Milling Operations Generic Environmental Statement." The area covered runs from the headwaters of the San Juan to the confluence of the Rio Grande, including the Rio Puerco drainage.

Pacific Northwest Laboratories is more involved in water research than any other of ERDA's laboratories. It is currently proposing a study of: "Analysis of the Impacts of Water Pollution Control Levels and Programs on the Development and Use of Energy Production Technologies."

Los Alamos Laboratories has just been assigned a major responsibility for water resources and quality studies. Entitled "Water in Energy" LASL will undertake an assessment of water resources in the West for the development of energy. They will cover everything from legal and institutional considerations to inegrated decisions on water uses. Work is to begin on parts of this study this summer.

The Lovelace Inhalation Toxicology Research Institute, one of the few toxicological labs in the nation, is presently undertaking many and various studies in the area of toxicity, though none in the area of 208 water research. It has just joined with Sandia Laboratory's new Office of Environmental Policy Analysis, and the two have been assigned major responsibilities in all aspects of toxic substances, including those that bear on the Southwest region of the U.S.

Thus, we can see an immediate promise of TSCA for our region and perhaps water research as well.

Conclusion

To sum up some of the pertinent comments on 208 water quality -- while it may be that water contaminants resulting from toxic chemicals and substances are not as serious as in other states, we do face problems of considerable concern regarding radionuclides as well as gross and trace element constitutents as a result of the impact of mining and milling. Because of our general scarcity of water and our potential for energy production with heavy water requirements, Section 208 problems deserve our utmost attention. In all probability, degradation of water cannot be prevented as water is used and recycled; but we in New Mexico cannot afford to allow any of our scarce water or its quality to go unattended, if we have any choice.

A potential new tool, the Toxic Substances Control Act, has been passed by Congress to assist in assuring maintenance of water quality. Since the act is new, there is considerable ambiguity in the interpretation of its immediate applicability. TSCA by statute applies to water pollution problems. Where it is applicable, TSCA offers a law with greater utility than PL 92-500, for its permits federal action, including control before the fact rather than after pollution has occured at the stage of production, processing, transportation, use, or disposal of nearly any chemical substance - man made or naturally occurring. From the point of view of public health and environmental protection, the act offers numerous advantages, and it is difficult to believe attempts will not be made to apply TSCA on a broad basis. The pertinent question is what impact will TSCA have on mining and milling activities and ultimately on energy resource development in New Mexico? While the act is not supposed to cause economic disruption, and while a shutdown of the industry is unlikely, it certainly will pose greater difficulties than in the past. What the level of acceptability is, cannot be stated at this early stage. Conflict over the act would appear to be unavoidable, and the final judgment is not yet in.

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