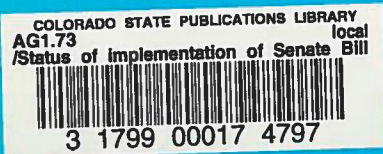


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Report to the General Assembly State of Colorado

Status of Implementing S.B. 90-126, the Agricultural Chemicals and Groundwater Protection Act

Submitted by Steven W. Horn, Commissioner

Colorado Department of Agriculture

December 31, 1990

In accordance with Title 25 Article 8 Section 205.5 (9), C.R.S. (1990 Supp.), the following report of the progress made to date in implementing the provisions of the Agricultural Chemicals and Groundwater Protection Act ("Act") is hereby provided.

Memoranda of Understanding

Memoranda of Understanding as provided for in Section 25-8-205.5 (3) (f) and (g) have been signed between the Colorado Department of Agriculture and Colorado State University Cooperative Extension (Appendix I); and between the Colorado Department of Agriculture and the Colorado Department of Health (Appendix II). Progress reports from Cooperative Extension and the Department of Health are contained in Appendices III and IV respectively.

Database Management System

A database management system has been established to assist the implementing agencies with groundwater quality information. Resistance among many public agencies to providing existing information is being encountered at all levels. Consequently, little data has been entered into the system. This has been identified as one of the major hurdles which must be overcome in the implementation of this Act.

Approach to Implementation

The immediate impacts of the Act will be few, but in the long term, the Act could have a major impact on many Colorado citizens. For that reason, the department has approached the implementation process in a manner which will encompass the broadest public involvement possible. In order for the public to accept the principles laid out in the Act and to create a synergism which will result in a successful program, the three implementing agencies will pursue public outreach aggressively. This will be a program which evolves as knowledge increases about groundwater, agricultural chemicals, and the quality of the groundwater in the state and as public concerns and ideas are incorporated.

Pilot State Project

After consulting with the prime sponsor of S.B. 90-126, the State agreed to serve as a pilot project for the U.S. Environmental Protection Agency to develop a model which could be used throughout the United States on how to implement an agricultural chemicals and groundwater protection program. Region VIII EPA selected Dr. Sandra Davis of Colorado State University to develop EPA's model. While developing this model approach for EPA, Dr. Davis will be able to assist the implementing agencies of S.B. 90-126 in better defining the approach needed for community outreach and in identifying the major obstacles to the implementation of S.B. 90-126. An interim progress report of Dr. Davis' activities and findings to date can be found in Appendix V.

Developing Agency Understanding of S.B. 90-126

Several sessions were held with the Attorney General's office to make sure the three implementing agencies had a clear understanding how the Act worked and had a firm grasp of the steps necessary to achieve implementation.

Education

Educational material explaining the functioning of the Act are continually being developed, including a paper (Appendix VI), slide shows, and transparencies. This material is being used at various meetings throughout the state (see Appendix V) to inform the public of S.B. 90-126. In addition, there have been press releases (see Appendix VII) and radio shows to inform the public about the Act.

Storage Regulations

It was determined that storage regulations, required under the Act, would not be developed until the US EPA releases their proposals for agricultural chemical storage, mixing, loading, and handling facilities. This determination was made to ensure that state regulations are consistent with the federal regulations which are expected to be released in proposed form in the first quarter of 1991. The state must not compel dealers, applicators, growers, and other regulated parties to invest in devices or improvements unless the affected parties can be assured the improvements meet federal specifications. However, it may be necessary immediately to adopt some storage regulations under the Fertilizer Act due to safety concerns and storage practices for certain types of fertilizers. All regulations developed by the Inspection and Consumer Services Division of the Department of Agriculture will be closely coordinated with S.B. 90-126 activities.

Monitoring Projects

The groundwater was monitored in the northern high plains in 1989 and in the San Luis Valley in 1990. The results of these studies can be found in Appendix VIII. Proposals are being prepared for further monitoring in the San Luis Valley and for monitoring on Orchard Mesa.

Networking

The team of implementing agencies has established a network among public agencies involved in groundwater quality and agricultural chemicals.

Advisory Committee

Pursuant to section 35-1-106, C.R.S. (1984), The Colorado Agricultural Commission will appoint an advisory committee to help address policy questions and draft guidelines for rules and regulations. Appendix IX shows the composition of the advisory committee.

Fiscal Status

Rules raising the pesticide product fees to include the statutory surcharge of \$20/product have been adopted for products registered for 1991 and after. Determinations as to the applicability of the fertilizer tax to small bags and how the surcharge will be administered under the revised Pesticide Act have been made. Revenues from these programs will not be realized until the second half of the fiscal year.

Personnel

There has been a definite lack of success by all implementing agencies in this area. Qualified persons are being sought all over the U.S. to address groundwater issues, and as a result, there is a shortage of expertise.

Major Emerging Issues

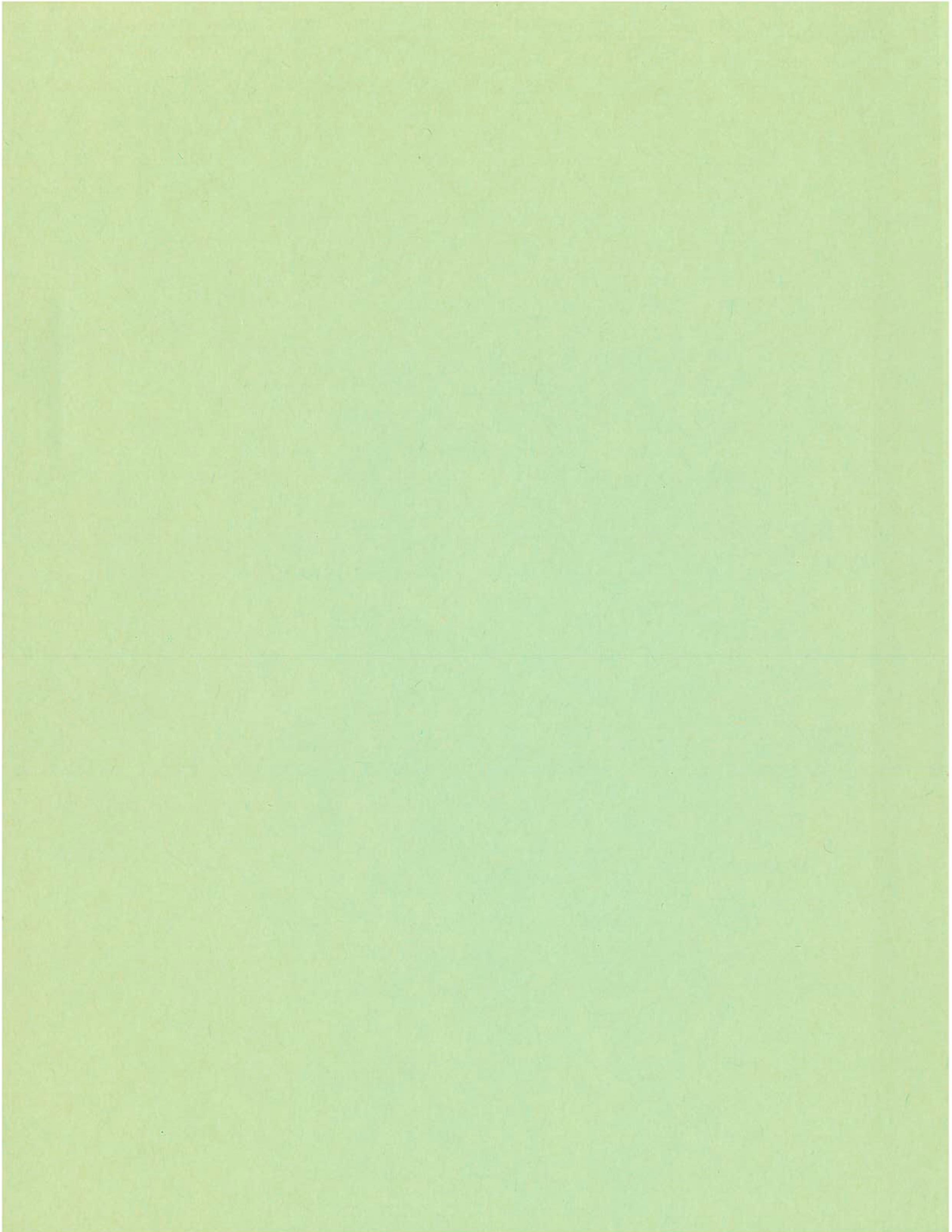
The major emerging issues to date are: enabling the program to provide for meaningful local cooperation, the status of chemigation facilities under mixing and loading regulations, and an unwillingness among many agencies to share already developed data concerning groundwater quality.

Goals for 1991 Determined

The implementing agencies have established the following goals for 1991:

- Further refine the network of public agencies involved in groundwater quality and agricultural chemicals;
- Hire specialists as authorized by the Act;
- Develop a process for identification and distribution of Best Management Practices (BMP's) from the technical end to the practitioner;

- Appoint the Advisory Committee and have them begin to advise on the development of goals, objectives and assessment of the strategies;
- Receipt of final report by Dr. Davis and consideration of such;
- Identify limited number of monitoring wells;
- Respond to FIFRA storage regulation proposals;
- Begin to develop storage regulations;
- Collect data on groundwater quality (ongoing);
- Hold seminars with county cooperative extension agents about water quality, including groundwater protection;
- Work with Dr. Davis to hold a conference on groundwater and agricultural chemical issues;
- Distribute materials of rudimentary BMP groundwater education; and
- Evolve strategy and approach to implementation.



MEMORANDUM OF UNDERSTANDING
BETWEEN
COLORADO DEPARTMENT OF AGRICULTURE
AND
COLORADO STATE UNIVERSITY
COOPERATIVE EXTENSION

This Memorandum of Understanding (M.O.U.) is made and entered into by and between the Colorado Department of Agriculture, hereinafter referred to as C.D.A. and Colorado State University Cooperative Extension, hereinafter referred to as C.S.U.

WHEREAS, the C.D.A. is statutorily authorized to enter into an agreement with C.S.U. to provide training and education for agricultural chemicals and groundwater pursuant to Title 25, Article 8, The Water Quality Control Act.

WHEREAS, it is the intention of the parties that such cooperation shall be for their mutual benefit and the benefit of peoples and environment including the groundwaters of the State of Colorado.

NOW THEREFORE, it is hereby agreed that

1. SCOPE OF SERVICE. In consideration for the monies to be received from the C.D.A., the C.S.U. shall perform and carry out, in a satisfactory and proper manner, as determined by the C.D.A., all work elements indicated below:

(a) Develop, publish and distribute to soil and water conservation districts, water conservancy districts and other interested parties two thousand (2,000) copies of a compilation of best management practices (BMP's).

(b) Outline and draft script of an educational videotape concerning Colorado's BMP's and voluntary adoption of such practices for distribution to soil and water conservation districts, water conservancy districts and other interested parties.

(c) Develop 100 sets of 2 x 2 slide set/audio cassette describing Colorado's BMP's.

(d) Items 1(a), (b), and (c) will be completed by June 30, 1991. The agreement may be renewed annually contingent upon funding from the general assembly.

(e) Work in conjunction with the C.D.A. and the Colorado Department of Health to identify the agencies involved in groundwater protection; continue to refine BMP's; provide input and expertise into the development of rules and regulations for bulk storage facilities and mixing and loading areas where at least 55,000 pounds of finished product of agricultural chemicals are handled each year; disseminate information on any agricultural management areas that may be defined; and provide a written report detailing progress toward implementation of SB 90-126, the protection of groundwaters of the state from contamination by agricultural chemicals including, but not limited to, items 1(a), (b), (c) no later than November 1, 1990.

(f) No indirect cost will be allowed.

2. PERFORMANCE.

(a) Responsible Administrator: Performance of service provided under this contract shall be monitored by and reported to the Pesticide Section of the C.D.A.

(b) Evaluation: The C.S.U. agrees that e CDA has the right to conduct periodic evaluations of the development of materials in item 1(a), (b), (c), and (e).

(c) Time of Performance: The project contemplated shall commence upon the execution of this memorandum of understanding and shall be terminated on June 30, 1991.

(d) Compensation: C.D.A. shall reimburse C.S.U. for actual, reasonable and necessary expenses incurred in providing services pursuant to this agreement. Total compensation shall not exceed fifty-three thousand one hundred dollars (\$53,100). No indirect costs shall be allowed. Payments shall be made upon receipt by C.D.A. of billings itemizing costs by work elements. Payments shall be made as follows in accordance with the following schedule:

- a. The first billing shall be submitted December 30, 1990.
- b. The second billing shall be submitted March 30, 1991.
- c. The final billing shall be submitted June 30, 1991.


(e) Maintenance of Records: C.S.U. shall maintain all records, documents, communications, and other materials which pertain to the operation of programs or the delivery of services under this agreement. Such materials shall be sufficient to properly reflect all direct and indirect costs of labor, materials, equipment, supplies, and services, and other costs of whatever nature for which payment was made pursuant to this agreement. Such information shall be available for a period of three years following the termination of this agreement for audit in compliance with State Fiscal Rules.

COLORADO STATE UNIVERSITY
Cooperative Extension

COLORADO DEPARTMENT OF AGRICULTURE



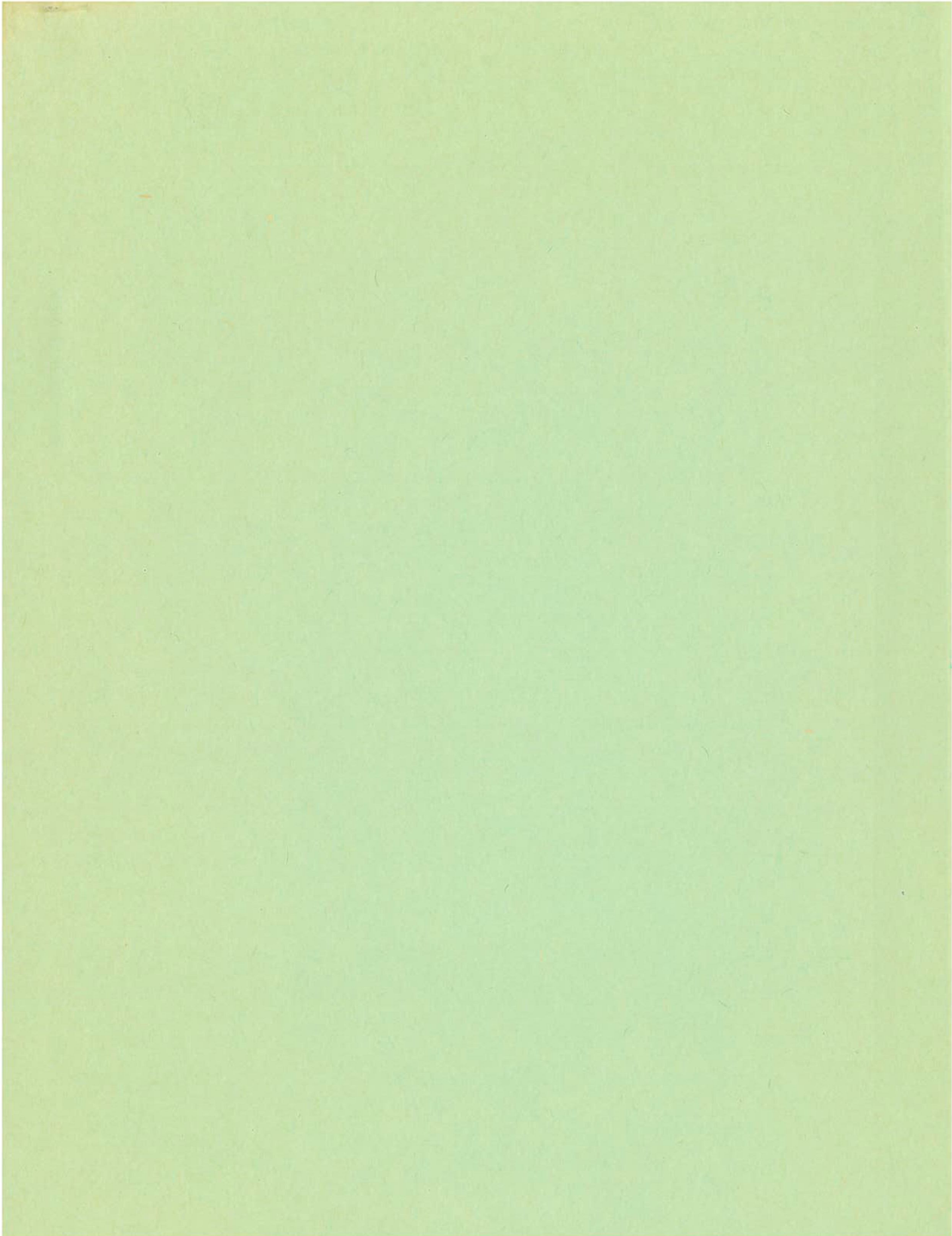
Milan A. Rewerts
Interim Director



Steven W. Horn
Commissioner

7-31-90
DATE

8-3-90
DATE



MEMORANDUM OF UNDERSTANDING
BETWEEN
COLORADO DEPARTMENT OF AGRICULTURE
AND
COLORADO DEPARTMENT OF HEALTH
DIVISION OF WATER QUALITY CONTROL

This Memorandum of Understanding (M.O.U.) is made and entered into by and between the Colorado Department of Agriculture, hereinafter referred to as C.D.A. and the Colorado Department of Health, Division of Water Quality Control, hereinafter referred to as C.D.H.

WHEREAS, the C.D.A. is statutorily authorized to enter into an agreement with C.D.H. to assist in the identification of agricultural management areas and to perform monitoring to determine the presence of agricultural chemicals in the groundwater or the likelihood that an agricultural chemical will enter the groundwater pursuant to Title 25, Article 8, the Water Quality Control Act.

WHEREAS, it is the intention of the parties that such cooperation shall be for their mutual benefit and the benefit of the peoples and environment including the groundwaters of the State of Colorado.

NOW THEREFORE, it is hereby agreed that

1. SCOPE OF SERVICE. In consideration for the monies to be received from the C.D.A., the C.D.H. shall perform and carry out, in a satisfactory and proper manner, as determined by the C.D.A., all work elements indicated below:

(a) Transfer data from State Engineer's Office and applicable data from the U. S. Geological Survey and continue to gather, assemble and evaluate existing data on Colorado's groundwater quality in areas where agricultural chemicals are used from such sources as the Colorado Geological Survey, Colorado State University, the U. S. Environmental Protection Agency, water conservancy districts, the Soil Conservation Service, et. al.

(b) Develop a database for information in item (a) and make it available to interested parties.

(c) Items 1(a) and (b) will be completed by June 30, 1991.

(d) Work in conjunction with the C.D.A. and C.S.U. Cooperative Extension to identify the agencies involved in groundwater protection; identify the state's groundwaters most vulnerable to the potential contamination from agricultural chemicals; consult on the development and refinement of best management practices; assist in defining agricultural management areas; and provide a written report detailing progress toward implementation of SB 90-126, the protection of groundwaters of the state from contamination by agricultural chemicals including, but not limited to, items 1(a) and (b) no later than November 1, 1990.

(e) Indirect costs shall not exceed \$12,692.

2. PERFORMANCE.

(a) Responsible Administrator: Performance of service provided under this contract shall be monitored by and reported to the Pesticide Section of the C.D.A.

(b) Evaluation: The C.D.H. agrees that the C.D.A. has the right to conduct periodic evaluations of the development of the information and database in item 1(a) and (b).

(c) Time of Performance: The project contemplated shall commence upon the execution of this memorandum of understanding and shall be terminated on June 30, 1991. The agreement may be renewed annually contingent upon funding from the general assembly.

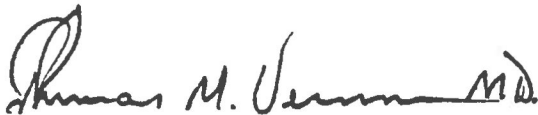
(d) Compensation: C.D.A. shall reimburse C.D.H. for actual, reasonable and necessary expenses incurred in providing services pursuant to this agreement. Total compensation shall not exceed seventy-eight thousand four hundred fifty-two dollars (\$78,452). Payments shall be made upon receipt by C.D.A. of billings itemizing costs by work elements. Payments shall be made as follows in accordance with the following schedule:

- a. The first billing shall be submitted December 30, 1990.
- b. The second billing shall be submitted March 30, 1991.
- c. The final billing shall be submitted June 30, 1991.

(e) Maintenance of Records: C.D.H. shall maintain records, documents, communications, and other materials which pertain to the operation of programs or the delivery of services under this agreement. Such materials shall be sufficient to properly reflect all direct and indirect costs of labor, materials, equipment, supplies, and services, and other costs of whatever nature for which payment was made pursuant to this agreement. Such information shall be available for a period of three years following the termination of this agreement for audit in compliance with State Fiscal Rules.

COLORADO DEPARTMENT OF HEALTH

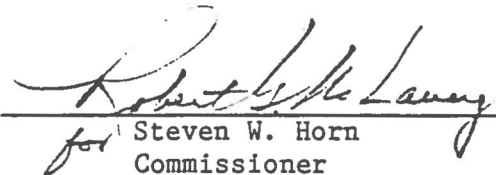
COLORADO DEPARTMENT OF AGRICULTURE



Thomas Vernon, M.D.
Director

27 Aug 90

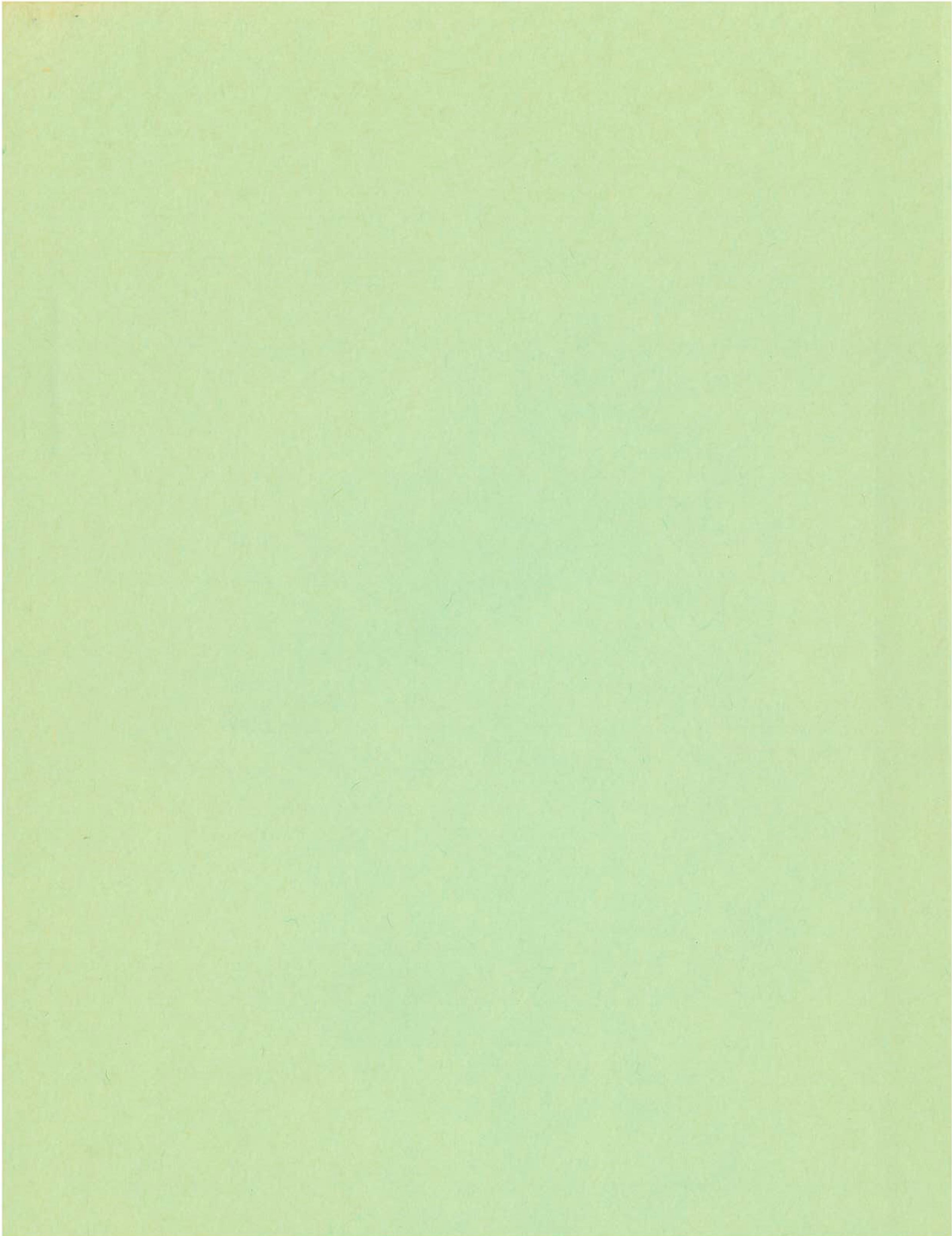
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for Steven W. Horn
Commissioner

August 31, 1990

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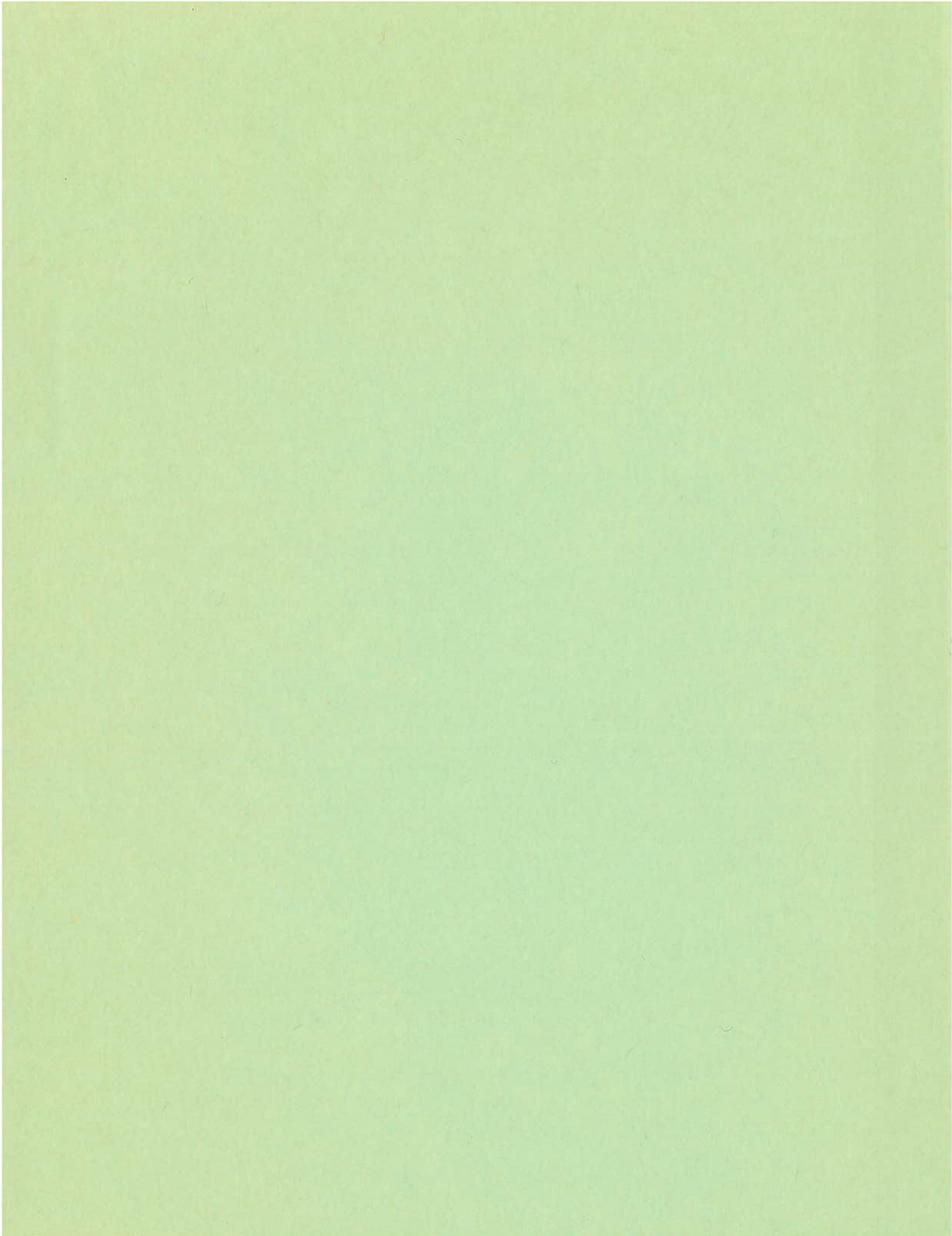
SB 126 ANNUAL REPORT

By
Lloyd Walker

Accomplishments:

1. Produced an article describing the goals, methods and focus of the act. This article served as the basis for other awareness activities.
2. Gave presentations on the act to various audiences including Colorado Corn Growers Administrative Board, Colorado Crop Protection Institute participants, Colorado Beekeepers Association and Sedgwick County Ag Producers.
3. Prepared radio and newspaper releases describing the act for distribution statewide through the CSU Public Relations Department media contacts.
4. Participated as members of the 126 implementation task force. Through regular meetings, activities were planned and coordinated.
5. Initiated a search for a person to fill the Water Quality Specialist position created by this act. The person in this position will conduct Extension's education and training activities.
6. Prepared overhead transparencies and a slide set to be used as visual aids in presenting 126 information to audiences.

Attachments: Overheads
 News Release
 126 Article
 Water Quality Specialist Job Announcement



SB-126 ANNUAL REPORT

The Colorado Department of Health, Water Quality Control Division completed a Memorandum of Understanding (M.O.U.) with the Department of Agriculture, August 31, 1990, for the implementation of SB-126. This M.O.U. covers the first year of the implementation process and sets specific service objectives and performance for the Division.

Work elements to be carried out by the Division are listed under "Scope of Service." The status of each work element is as follows:

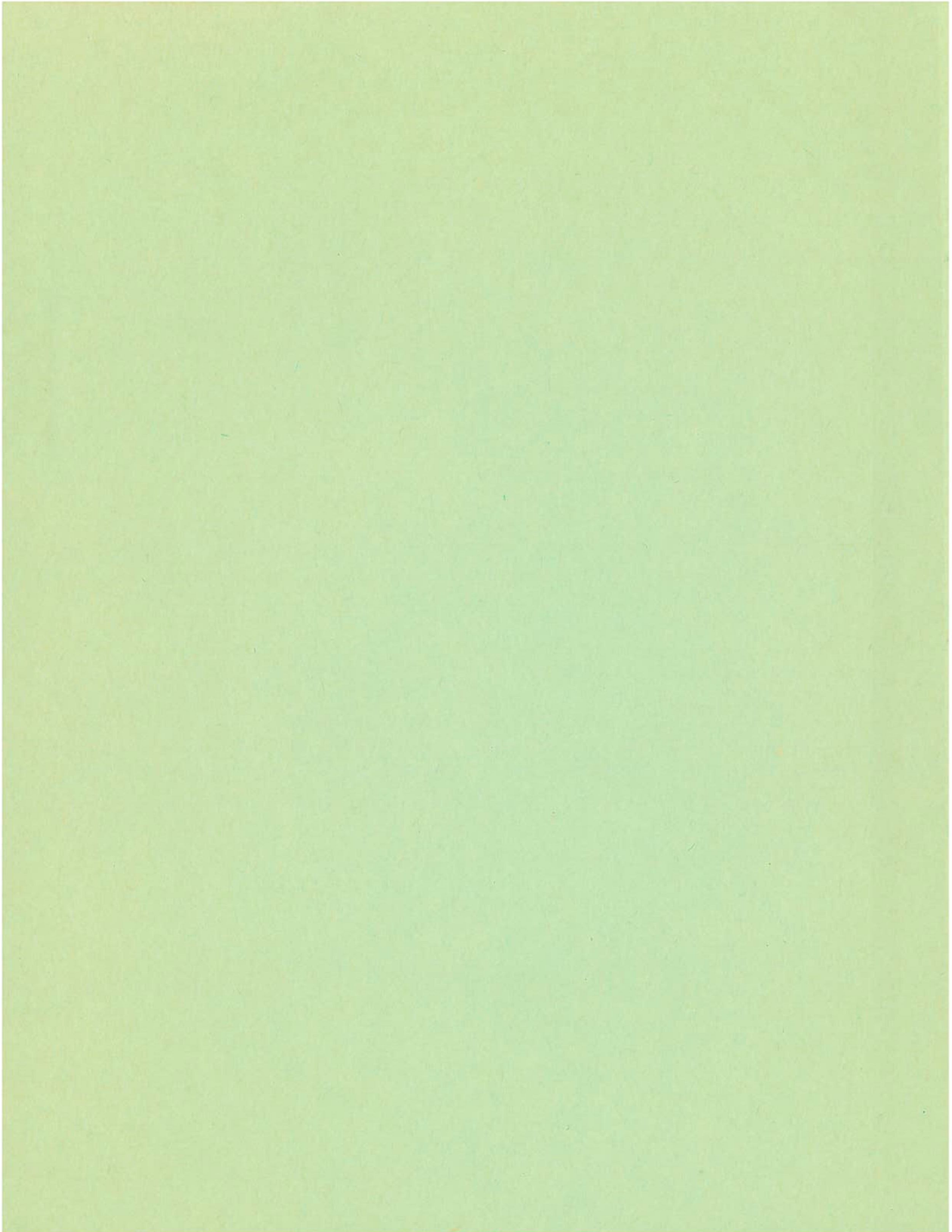
1.(a). The Colorado State Engineer's well permit computer data base was transferred to CDH Water Quality Control Division in September, 1990. A letter of understanding limiting use of this information was signed by CDH and the State Engineer's Office to preserve confidentiality and propriety. The well permit data base contains ground water use, depth and location information necessary for ground water vulnerability analysis of agricultural areas. Additional ground water information is available by computer modem from data bases maintained by the U.S. Geological Survey and U.S. Environmental Protection Agency. Other government and private organizations collecting ground water quality information are being contacted to share their data.

1.(b). The Water Quality Control Division has purchased a P.C. computer capable of storing and processing large data bases up to 640 megabites. This computer is dedicated to ground water quality data base management. A comprehensive ground water quality data base program, including a specific data base for agricultural chemicals, has been set up on the computer. Pesticide and agricultural chemical data from CDH ground water sampling programs have been entered, and additional data from other sources will be entered as soon as possible. This information is available to the public upon request.

The data base program written by the Water Quality Control Division is available for use by the public.

1.(c). Progress on items 1.(a). and 1.(b). is on schedule and should be completed by June 30, 1991. Collection of ground water quality and agricultural chemical ground water information, and maintenance of a comprehensive data base will be an on-going effort.

1.(d). Work in conjunction with CDA and CSU Cooperative Extension is being carried out by existing WQCD personnel. A search to hire additional personnel qualified to conduct the task listed in 1.(d). has not been successful todate, but these positions are expected to be filled early in 1991.



Progress Report

Developing and Testing a Model in Colorado for
Implementing the Agricultural Chemicals in Groundwater Strategy

Prepared by the CSU Team
Sandra K. Davis
John Wilkins-Wells
John Redifer

Submitted to:

Environmental Protection Agency, Region VIII
Colorado Department of Agriculture

on

December 18, 1990

Progress Report

Developing and Testing a Model in Colorado for Implementing the Agricultural Chemicals in Groundwater Strategy

INTRODUCTION

This is a two tier project to develop and apply a model process which builds capacity in the pilot state of Colorado to produce a pesticide and fertilizer management plan to protect groundwater. The first tier of the project responds to the Environmental Protection Agency's call for the creation of a State Pesticides Management Plan (SPMP) which will implement their Agricultural Chemicals in Groundwater Strategy. In developing and applying a model process in the pilot state, information and experience will be gained to refine and expand the model process so that it is flexible enough to be applied to states across the nation.

The second tier is the creation of a state management plan for pesticides and fertilizer management to protect groundwater that was passed as Senate Bill 126 by the Colorado General Assembly. This Act initially calls for efforts to prevent groundwater contamination that would be coordinated through the Commissioner of Agriculture's Office and includes:

1. Development of rules and regulations for bulk storage facilities and mixing/loading areas where at least 55,000 pounds of finished agricultural product are handled each year.
2. Establishment of best management practices (BMPs) that are appropriate to local conditions and types of agriculture. The CSU Cooperative Extension will assist in educating and training applicators and the general public regarding agricultural chemical use and BMPs.
3. Establishment of a state-wide groundwater monitoring program by the Colorado Department of Health to determine the presence of any agricultural chemical in groundwater that meets, exceeds or has a reasonable likelihood of exceeding drinking water standards.

The CSU team selected to develop and test the process model has been asked by the three lead agencies established in Senate Bill 126 (Colorado Department of Agriculture, Colorado Department of Health and CSU Cooperative Extension) to help educate interested individuals and organizations and to solicit their information and views about how Senate Bill 126 should be implemented. All information is channeled to state officials who are responsible for the administration of Senate Bill 126. The information will also be used in the report of the process model which is to be presented to EPA at the end of the twelve month project. The progress made on the project, future activities, a preliminary model and CSU team observations are now discussed.

ACTIVITIES ACCOMPLISHED

The CSU team has spent most of its time on the activities which are basic to Senate Bill 126 and the process model that other states will have to

complete. These activities provided a sense of the agricultural community reactions to state government and EPA involvement in this area. Reactions were negative enough make cooperation difficult. Our observations indicate that a successful process model must mitigate these concerns.

Compilation of a List of Interest Parties

An initial research task was identifying a list of organizations and individuals concerned with agricultural chemicals and groundwater. A list of 632 agencies, individuals and organizations were drawn up (see Appendix A for numbers of names and addresses in each category). This list has been and will be helpful for identifying types of organizations to should receive information and invitations to meetings. While most of the work to produce the list has been completed, a limited number of names and addresses continue to be added as representatives of the CSU team travel to different meetings. This list will continue to be a useful tool for state agencies after this project has been completed.

Presentations at Meetings

The CSU team has also attended meetings held by different agricultural organizations to discuss the development and implementation of Senate Bill 126 (see Appendix B for a list of the meetings). In most of these presentations, a representative of the Colorado Department of Agriculture or CSU Cooperative Extension discussed the Act and the CSU team explained their role in soliciting input to shape the administration of Senate Bill 126.

Meeting with CSU Advisory Committee

The CSU team relied upon the CSU Advisory Committee (see Appendix C) for advice on water, pesticide and political issues. A meeting was held on November 26, 1990, to discuss progress and future activities in the project.

Distribution of Informational Letters

Informational letters were mailed to many of the agencies, organizations and individuals compiled on the list of interested parties (see Appendix D for a copy of the materials). The package of information contained

- 1) a letter from Steve Horn, Commissioner of Agriculture, which introduced Senate Bill 126 and the CSU team,
- 2) a description of Senate Bill 126 and
- 3) a letter from the CSU team which described its role in soliciting information that would help state officials develop and administer the program.

Interviews

The most important source of information was been a series of 30 interviews of individuals who had various connections with agricultural chemicals and groundwater issues (see Appendix E for a summary of the type of organizations and interests represented). The following five issues were communicated to the CSU team in the interviews.

First, the vast majority of those interviewed noted the need for greatly increased government-sponsored educational programs to provide agricultural producers and other users with information on the potential hazards of agricultural chemical use to groundwater. They noted the need to identify and use appropriate media outlets to provide simplified management procedures that enterprise owners can incorporate into their application programs. The role of Cooperative Extension was favored over most other educational networks, although considerable recognition was given to educational materials already being provided through the private sector. Key areas for educational focus include all phases of chemical handling and, particularly, irrigation scheduling. In addition, homeowner usage of pesticides and fertilizers was identified as a potential major contributor to groundwater contamination, requiring extensive education for this sector. In general, the perception was that the more one moves in the direction of strong regulatory measures, the less flexibility there is in using local government and user association resources and responses to address groundwater protection.

Second, local government and user association supervision and monitoring of agricultural chemical usage was greatly favored over state and federal control measures, although the majority of those interviewed perceived the need for state and federal guidelines and oversight of local government and association initiatives in these areas. It was consistently argued that there is better program accountability, ability to sanction non-compliers, and better trust and regard for local government and association initiatives than for state or federal initiatives. This viewpoint was particularly strong within the agricultural community, while less so for environmental group representatives.

Third, the majority of those interviewed suggested there was a need for a statewide groundwater monitoring program to acknowledge and solicit the increased role of local water organizations in developing and implementing the program and providing or sponsoring educational programs. In particular, this included groundwater districts and related groundwater associations, mutual irrigation companies, conservancy and conservation districts, soil conservation districts and county health departments. An emphasis was placed on making use of on-going efforts by such organizations or associations to monitor groundwater, and learning from their current cooperative monitoring program. Some concern was expressed regarding financing of groundwater monitoring by local government and water organizations, although many suggestions were advanced and the issue was viewed as resolvable.

Fourth, the vast majority of those interviewed perceived the need to improve relations between environmental organizations and the agricultural community through joint cooperative efforts. This included identifying examples from other states where environmental groups and agricultural groups have worked together on specific problem areas having to do with agricultural chemical usage and groundwater protection. The interviews suggested that, although there is substantial disagreement between these groups, there are significant instances where their interests do in fact correspond, and that such instances provide avenues for joint cooperation in education and the development of cost-effective best management practices.

Fifth, there was great concern expressed through the interviews that the approach to groundwater protection was being bureaucratized, and that in addition to the potential failure to acknowledge local organization or association involvement, there was a tendency for agency approaches to be fragmented into a multitude of non-cooperative efforts. The vast majority of those interviewed suggested that the efforts of Senate Bill 126 ought to be folded into the non-point source pollution program, the well-head protection program and cooperative extension activities in developing best management practices under the general rubric of sustainable agriculture. There was some concern that the Colorado Department of Agriculture and the Colorado Department of Health have quite different viewpoints regarding their approaches to the problem of groundwater protection, and that these viewpoints need to be reconciled to meet environmental concerns while at the same time addressing citizen need for the protection and enhancement of private property and maintaining current levels of food production.

In summary, Senate Bill 126 was viewed favorably by a majority of those interviewed, and there was fear that special interest groups would make an attempt to rescind the bill. There was considerable interest in knowing how and when to participate in the formation of further rules and regulations, and a general fear that the average citizen was not being given the opportunity to do so.

Focus Group

The first focus group was held with four environmentalists on December 10, 1990. The format of the focus group includes three sections. First, the CSU team introduces itself and describes the plan to develop and administer a state pesticide and fertilizer management plan to protect groundwater. It is explained that the meeting is an opportunity for the team to gather information from informed individuals; moreover, the meetings provide an opportunity for participants to exchange views and produce creative suggestions for problem solving. Second, three basic questions of interest are addressed to the participants. Third, those attending the meeting are asked hypothetical questions to get a sense of what is most important to them.

Distribution of One Page Survey and Project Descriptions

A one page survey and project description have been mailed along with an explanatory letter inviting organizations and agencies to distribute the description and survey to their members via the mail or a newsletter (see Appendix F for a copy of the letter, description and survey). One hundred eighty-eight envelopes have been mailed. The description and survey are provided so that organizations may educate and provide their members with a convenient way to have input in the implementation of Senate Bill 126.

FUTURE ACTIVITIES

The CSU team will continue to compile the list of interested parties and to provide presentations at a limited number of meetings called by other

organizations. Gathering and analyzing survey information will become an important activity. The period from January through April will also be a time when more focus groups and meetings will bring together representatives who need to exchange ideas and coordinate activities. These activities will be undertaken by the Principal Investigator, Outreach Specialist and the Facilitator/Mediator. Attention will also turn toward the development and refinement of the process model. A more detailed discussion of these activities follows.

Coordination with Advisory Committees

Contact will be established with two additional advisory committees. An EPA Advisory/Outreach Committee will be established to provide oversight and guidance for the project and to ensure that the program has broad application to other states and regions. A Colorado Advisory Committee will be convened to guide the administration of the state pesticide management plan in Colorado.

Longer Survey

A longer survey will be produced that can cover more than the six questions found on the shorter questionnaire. This will be mailed to respondents representing interested parties in the state.

Additional Meetings with Agencies and Organizations

Additional meetings will be held with agencies, organizations and individuals having expertise for the pesticide and fertilizer management plan. Several more focus groups will be held to bring together agricultural groups that will be asked respond to questions that are most central to the implementation of Senate Bill 126. The CSU team will call together combinations of private and public sector individuals to discuss issues identified as crucial to the short and long term success of the project: education of the agricultural and general public; cooperation on groundwater monitoring; future research needs that will have to be addressed in the next few years; and coordination with local water and soil organizations.

March Conference

A one day conference will be held on March 11, 1991, at the Lory Student Center in Ft. Collins (see Appendix G for a tentative schedule of the conference). Invitations to the conference will be mailed to the 632 individuals and organizations on the list of interested parties. The purpose of the conference is to educate those who attend and, in turn, to solicit views and suggestions from them.

DEVELOPMENT AND REVISION OF THE PROCESS MODEL

Although many of the activities described above were specifically designed to help in the development and implementation of Senate Bill 126,

they have also been providing the CSU team with a great deal of information about the basic process of creating a State Pesticide Management Plan (SPMP). A preliminary model identifying the most important parameters affecting the creation of a state pesticide and fertilizer management plan has been included in this report (see Figure 1). This is preliminary in that it lists the factors thought to be important for the process model but it lacks a critical element: it does not describe the communications process through which the different parameters interact to form the SPMP. The communications process interaction will be described in the forthcoming months.

The model indicates that the goals are threefold: agricultural productivity and efficiency, equity and groundwater protection. While this project focuses on the groundwater protection goal, the policy process makes consideration of agricultural production and equity imperative. The fact that numerous agriculture programs are already in place (many of them long standing) that affect Colorado farmer's and rancher's ability to make a living impinges upon the creation of pesticide and fertilizer management plans. Also, questions of equity are important to numerous individuals and organizations interested in this process. For example, the agricultural community does not want to be blamed for pollution resulting from sewage treatment or urban runoff. Likewise, small rural towns and individual families which depend on well water do not want to be forced by groundwater contamination to use bottled water or costly diversion pipelines to supply their domestic needs.

The factors which affect the process to create an agricultural chemical management plan to protect groundwater include the following.

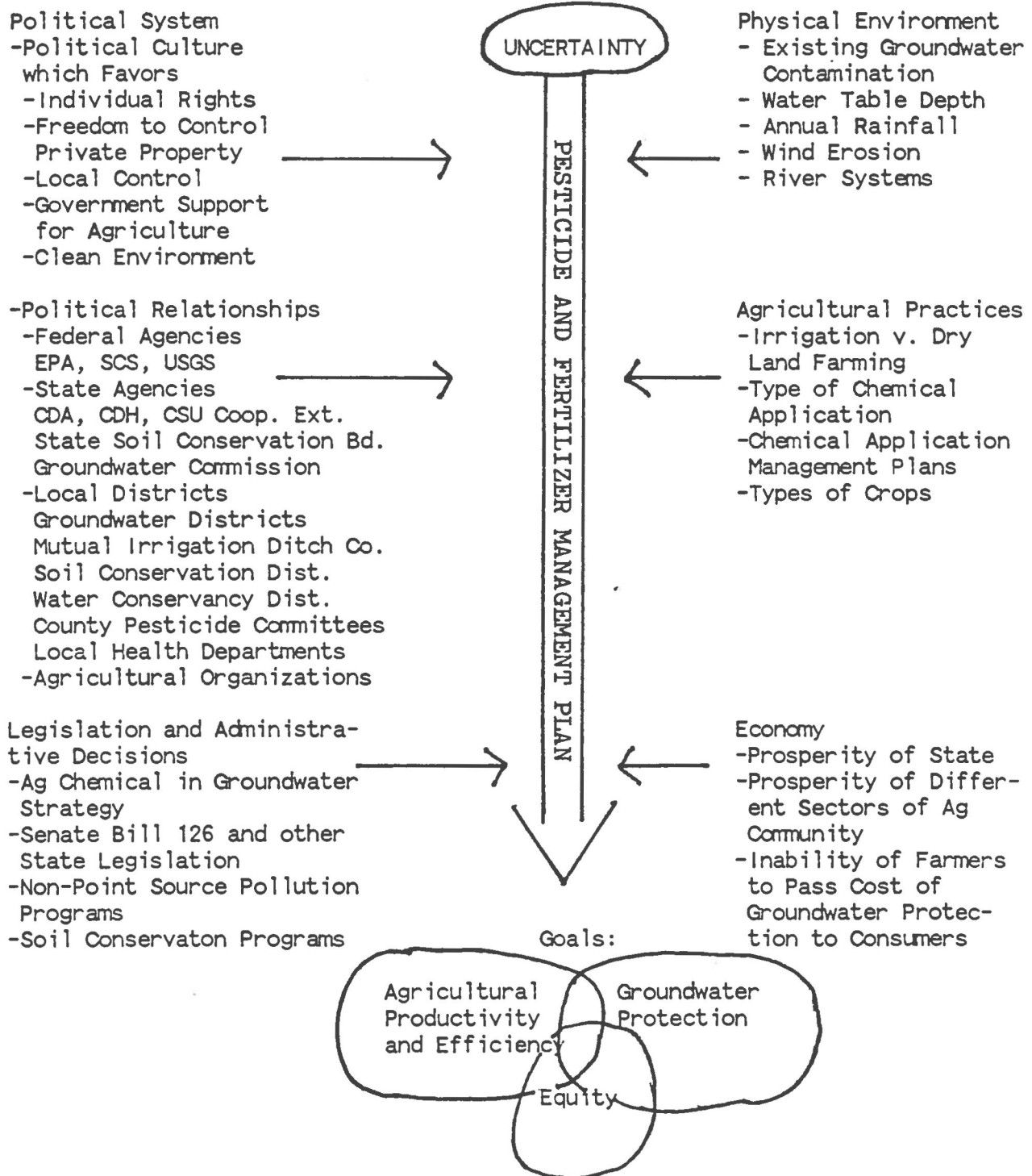
Political Culture. This culture includes values and expectations favoring individual rights, freedom of the citizen to control private property, local control, government support for the agricultural community and a clean and liveable environment.

Political Relationships among the Private and Public Sectors. A large number of individuals, agencies and organizations are active and interested in policy concerned with agricultural chemicals and groundwater. Federal officials include the Environmental Protection Agency, the Soil Conservation Service and U.S. Geological Services. State agencies are more numerous: the Colorado Department of Agriculture, the Colorado Department of Health, CSU Cooperative Extension, the State Soil Conservation Board and the Groundwater Commission. Local districts concerned with water and soil include the groundwater districts, mutual irrigation ditch companies, soil conservation districts, water conservancy districts, local health departments and county pesticide committees. Then there are agricultural producers and their organizations and a few environmentalists.

Legislation and Administrative Decisions. A variety of laws, decisions and resulting programs are of interest. The forthcoming EPA Agricultural Chemical in Groundwater Strategy and Senate Bill 126 are key elements that will shape the Colorado pesticide and fertilizer management plan. Other state acts affecting wellhead protection, chemigation, licensing of chemical applicators and so on are also important. The pesticide and fertilizer

Figure 1

Preliminary Model*
 Parameters Affecting the Creation of
 a State Pesticide Management Plan (SPMP)
 (with illustrative examples)



* Model drawn from: David R. Givers and Jay A. Leitch. "Modeling Water Management Realities." *Hydata* (November 1990), pp. 19-21.

management plan must also be coordinated with non-point source pollution and soil conservation programs.

Physical Environment. Environmental factors such as annual rainfall, river basins, water table depth, wind erosion, soil types and existing groundwater contamination will constrain the creation of an agricultural chemical management plan.

Agricultural Practices. Existing practices such as irrigation versus dry land farming, type of crops, type of chemical application (aerial, ground rig or chemigation) and existence of chemical application management plans will also affect the creation of a state plan to manage fertilizer and pesticide use.

Economy. The health of the state-wide economy as well as the prosperity of different sectors of the agricultural community in Colorado will affect the willingness and ability of state officials and individual producers to evaluate their current practices and make changes.

Uncertainty. Uncertainty exists in many facets of this project. It often stems from inadequate information about existing conditions and makes it difficult to gauge the effect of a management plan on important sectors of the agricultural community. For example, little is known about existing levels of groundwater contamination. Furthermore, much still needs to be done to define key requirements that must be met in a state agricultural chemical plan. This information will be forthcoming in the final draft of the EPA Agricultural Chemical Strategy in Groundwater and additional definitions of 55,000 pounds of finished product (Senate Bill 126) which will be produced in the rule making process. Much is yet to be learned about the specific conditions under which the Colorado Department of Health will be able to collect and analyze groundwater samples. Exacerbating these problems is the uncertainty of how such a management plan will affect the many diverse agricultural communities that exist in the state (which vary according to crop, water availability, soil conditions, irrigation practices, economic health and allegiance to local water or soil districts).

Much of the CSU team's time in the spring and summer will be spent analyzing survey data and working on a more complete communication model. A small conference will be held in late July for the purpose of critiquing a draft of the process model. Individuals who are knowledgeable and have paid particular attention to agricultural chemicals and groundwater issues will be invited to review and comment on the model. It is expected that many of these persons will be federal and state officials.

OBSERVATIONS AND CONCLUSIONS

It has become apparent that the twelve month participation of the CSU team is not congruent with the longer time frame of 3 to 10 years envisioned for the different stages of the implementation of Senate Bill 126. This realization suggests two considerations. First, while the CSU team will devote considerable time to meetings and analysis of survey data in the next three or four months, its attention will need to be firmly focused on the

process model by late March or April. The team, EPA and state officials need to discuss whether the future activities in this report constitute the best plan for the team.

Second, the CSU team and state officials need to plan longer range activities that are responsive to the issues that confront the implementation of Senate Bill 126. Interviewees have indicated that while regulations, groundwater monitoring and best management practices are produced or called for at the state level, producer and agricultural producer compliance and acceptance of groundwater protection will be greatly enhanced by education and incentive programs. One set of activities based on this perception calls for programs in which

- 1) the general public learns about applying chemicals in a urban setting and becomes more familiar with current agricultural practices,
- 2) Cooperative Extensions become more active in offering educational programs for homeowners, producers and agricultural chemical dealers and
- 3) ways should be found to build some bridges between the agricultural and environmental communities.

Over a period of several years, public service television advertisements could be created to educate urban and rural citizens about the importance of protecting groundwater. These TV ads plus different extension programs targeting homeowners, agricultural producers and agricultural dealers could be offered. Research for the ads is an initial area in which participation from the agricultural community, the environmental community and CSU Cooperative Extension would be feasible.

Also, the CSU team, the EPA and state officials might consider incentive programs that would harness the expertise that exists among individuals and organizations across the state to undertake limited research and education projects. For example, producer groups might determine the extent of and solution for chemical runoff into dry creek beds. Or producers might consider the least costly construction of acceptable cement pads. Incentives could include small grants (\$100 - \$500) to reimburse motivated producers who develop practical responses to regulations or best management practices and make educational presentations to other producers at meetings held by agricultural organizations. The pool of producers likely to be recruited to undertake such activities is only a tiny proportion of all producers, but even a few key participants could have a great impact. While it is unlikely that environmental groups could play an extensive role in the agricultural community, attempts to look for areas of possible agreement would be useful. In addition, environmentalists could be encouraged to consider approaches in community outreach to urban dwellers.

Appendix A
List of Interested Parties

AGRICULTURAL CONCERNS (subtotal 47)
45 agricultural crop producers/growers
2 crop marketers
0 *cooperative extension agents

AGRICULTURAL INTEREST GROUPS (subtotal 46)
12 all purpose - Farm Bureau, etc
18 crop specific producer groups - Certified Potato Growers, etc
6 crop marketing - Colo Cooperative Council
8 type of agricultural techniques - organic producers, sustainable ag
2 crop/producer trade association

CONSULTANTS & RESEARCH GROUPS (subtotal 16)
13 private, for-profit
0 university, non-profit
3 law firms

ENVIRONMENTAL GROUPS (subtotal 41)
22 general - Sierra Club, EDF, NRDC, etc
6 specifically oriented toward pesticide
3 environmental health

GOVERNMENT & QUASI-GOVERNMENT (subtotal 366)
federal agencies (subtotal 28)
3 EPA
1 Soil Conservation Service SCS
4 US Geological Service USGS
2 Forest Service FS
1 Park Service
2 Bureau of Reclamation BOR
1 Bureau of Land Mgt BLM
7 US Dept of Agriculture
2 other

state agencies (subtotal 51)
0 Colorado Dept of Agriculture CDOA Staff
10 Advisory Committees for CDOA
4 Colo Dept of Health CDOH Staff
12 CDOH - Water Quality Control Commission WQCC
6 other
4 Dept of Natural Resources
8 State Engineer
7 Soil Conservation Bd

city, county, municipal (subtotal 23)
4 water depts: utility, public works, water & sewer
15 health depts
3 *parks and golf courses
1 *depts responsible for weed control along roads and highways
0 other

local district (subtotal 257)
10 irrigation
45 water conservancy
81 soil conservation
13 ground water management

1 water conservation
12 water user assoc
2 water authorities
0 water dist/water and sanitation dist
11 208 water quality management agencies
12 ditch companies
associations of government officials (subtotal 12)
3 councils of government
3 special district associations, etc
6 other

1 MEDIA

PESTICIDE (& AGRICULTURAL CHEMICALS) INDUSTRY AND USERS (subtotal 106)

1 manufacturers/formulators
72 dealers
applicators
16 agricultural (private service for agricultural customers)
4 public (golf courses, parks, rights-of-way)
10 turf ornamental
0 *growers
3 limited commercial (Coors; golf courses)
0 structural pest control (domestic)
0 chemical trade association

PESTICIDE (& AGRICULTURAL CHEMICALS) INTEREST GROUPS (subtotal 1)

0 manufacturers
1 dealers
0 applicators

8 WATER AND OTHER INTEREST GROUPS

Total: 632

Appendix B
Agricultural Organization Meetings Attended or Scheduled

11/8/90	Colorado Crop Protection Institute Ft. Collins
11/16/90	Colorado Agricultural Aviation Association Annual Meeting Colorado Springs
11/16/90	International Society of Arboriculture Golden
11/29/90	Colorado Corn Administrative Committee and Colorado Corn Growers Association Board Meeting Denver
12/1/90	Colorado Beekeepers Association Annual Meeting Ft. Collins
12/1/90	Colorado Association of Wheat Growers Annual Meeting Denver
12/11/90	Cooperative Extension Meeting in Sedgwick County Sedgwick
12/12/90	Colorado Weed Management Association Annual Meeting Ft. Morgan
1/3/91	Rocky Mountain Plant Food and Agricultural Chemical Association Annual Meeting Denver
1/30/91	WY Ground Water Management District Board Meeting Yuma
2/15/91	Colorado Ground Water Commission Board Meeting Denver

Appendix C
The CSU Advisory Committee

Neil S. Grigg, Director of Colorado Water Resource Research Institute
Bert L. Bohmont, CSU Pesticides Program Coordinator
John A. Straayer, Professor of Political Science.

DEPARTMENT OF AGRICULTURE

1525 Sherman Street
Denver, Colorado 80203
(303) 866-2811



Roy Romer
Governor
Steven W. Horn
Commissioner
Robert G. McLavey
Deputy Commissioner

October 5, 1990

Dear Agricultural Leader:

As you are aware, last year the Colorado General Assembly adopted legislation to prevent groundwater pollution from agricultural activities. The Colorado Department of Agriculture has been assigned as the lead agency in implementing the law. This letter will serve to introduce to you Dr. Sandra Davis with the Department of Political Science at Colorado State University.

Dr. Davis is heading a team of CSU professors and graduate students which will work with the agricultural industry and relevant state agencies in an important task. That task will be to develop an effective process to protect Colorado's groundwater resources from agricultural chemicals and fertilizers.

In addition to the implementation duties assigned to the Colorado Department of Agriculture, Senate Bill 126 also assigns certain activities to Colorado State University Cooperative Extension and to the Colorado Department of Health.

Dr. Davis and the CSU team will assist in the development of an overall process to implement Senate Bill 126. Our hope is that with this assistance, we can achieve the best possible working relationships among the various state agencies involved and with the agricultural industry.

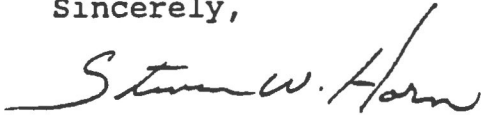
Region VIII of the U.S. Environmental Protection Agency has taken particular interest in Senate Bill 126 because it embodies a unique concept utilizing voluntary cooperation to achieve groundwater protection. EPA has provided the funding for Dr. Davis and the CSU team in order to promote the voluntary concept in other states.

Page 2

The enclosed fact sheet better explains the task in front of us as required under the legislation. If you have any questions about the legislation or about how we intend to begin the process of implementing it, please do not hesitate to contact Dr. Davis. You can reach Dr. Davis at (303) 491-5281, or you can leave a message at 491-2490.

I look forward to working with you in this important task.

Sincerely,

A handwritten signature in cursive script that reads "Steven W. Horn". The signature is written in dark ink and is positioned above the printed name.

Steven W. Horn



Department of Political Science
Fort Collins, Colorado 80523
(303) 491-5156

October 12, 1990

Dear Colorado Citizen:

Citizens, organizations, state officials and a CSU team will be working on a project to create Colorado's pesticide and fertilizer management plan to protect groundwater (please see the enclosed description). You may already have received a telephone call from me, John Redifer or John Wilkins-Wells as we have been working to determine those who might be interested in the project. The three of us are serving on a CSU team which plans to discuss the project in the community and, in turn, funnel information and views from citizens and organizations back into the project.

We plan several means of distributing and receiving information:

1. We will send representatives to some annual meetings of organizations which have members who would be interested in learning more about the creation of the plan.
2. We will prepare a one page survey that could be distributed in newsletters to provide an opportunity for organization members to feed their views into the process.
3. We will hold meetings at which organizational representatives can come together to discuss concerns and propose solutions.
4. We will hold a two day conference in April of 1991 to discuss the progress that has been made on the project and to hear participants' views.

If these activities, or others you may think of, would be of interest to you, please let us know.

Sincerely,

A handwritten signature in cursive script that reads "Sandra K. Davis".

Sandra K. Davis
CSU Team Leader

enclosures

Information Letter

Description of the Project to Create Colorado's Pesticide and Fertilizer Management Plan to Protect Groundwater

The Colorado General Assembly recently passed Senate Bill 126 to create an agricultural chemical management strategy which protects Colorado's groundwater resources. Three agencies were given a key role in developing this plan, the Colorado Department of Agriculture, the Colorado Department of Health and Colorado State University Cooperative Extension. These agencies recognize that this plan can best be developed and implemented only with the active participation of the public.

The development of this strategy comes at the same time the Environmental Protection Agency is urging states to produce a state plan for pesticide and fertilizer management for groundwater protection. Colorado has agreed to serve as a pilot state to develop such a plan and Colorado State University has received an EPA grant which pays a CSU team to assist in the process of developing the plan. The role of the CSU team is to strengthen the plan development process by informing interested parties about the planning and by bringing interested individuals and organizations together to discuss and contribute to the plan.

Objectives as stated in Senate Bill 126 include the following elements.

First, the Cooperative Extension and Colorado Department of Agriculture will draw up best management practices for the use of agricultural chemicals.

Second, Cooperative Extension will providing training in the application of these best management practices.

Third, there will be regulations for bulk storage facilities and mixing and loading areas where at least 55,000 pounds of finished products are handled each year. The draft regulations will be subject to the regular public comment process.

Fourth, while it is intended that educational processes and storage and mixing regulations will prevent groundwater contamination from occurring, the program will also include acceptable responses to contamination of groundwater and situations that are likely to result in contamination of groundwater.

Fifth, the Water Quality Control Division of the Colorado Department of Health will analyze existing groundwater monitoring data and conduct monitoring programs to determine the quality of groundwater in the state.

Sixth, health advisory levels for pesticides will be adopted by the Water Quality Control Commission.

Individuals interested in obtaining more information and/or participating in the process should contact the CSU team (C/O Prof. Sandra Davis, Department of Political Science, Colorado State University, Ft. Collins, CO 80523, 303-491-5211 or message at 303-491-2490).

Appendix E
List on Individuals Who Were Interviewed

Between September 5, 1990, and December 11, 1990, thirty in-depth interviews of one to two hours were conducted with representatives of the following types of organizations:

- 3 water conservancy/conservation district
- 6 agricultural chemical dealer/applicator
- 4 environmental group
- 4 groundwater organization
- 6 producer organization
- 2 local government
- 1 golf course association
- 1 weed district
- 1 mutual irrigation company
- 2 individual farm operator.

STATE OF COLORADO

DEPARTMENT OF AGRICULTURE

700 Kipling Street
Suite 4000
Lakewood, Colorado 80215-5894
(303) 239-4100
(303) 239-4125 FAX



Roy Romer
Governor

Steven W. Horn
Commissioner

Robert C. McLavey
Deputy Commissioner

Dear Organization Leader:

As you are aware, the Colorado Department of Agriculture is responsible for designing and implementing an effective and workable groundwater protection program under Senate Bill 126.

The new law, adopted in the last session of the Colorado General Assembly, utilizes a voluntary approach to groundwater protection from agricultural sources. It is a unique approach designed to ensure that those who are sensitive to the needs of agriculture also have a voice in groundwater protection. Mandatory programs and enforcement will only occur in those areas where voluntary programs are not working. If monitoring indicates that contamination in a localized area is increasing in spite of voluntary efforts, stricter measures will then be undertaken to minimize the threat from agricultural chemicals and fertilizers.

I am confident that this program can effectively address this important issue. In order to formulate the best program possible however, we need to better understand the concerns of the public regarding groundwater protection. I would appreciate your help in distributing copies of the enclosed questionnaire. Some of the questions are designed to help us address several issues we are confronting. Other questions are included to help other states design their groundwater protection programs using Colorado's law as their model.

We have also included a description of Senate Bill 126. You may wish to reproduce the description and/or the questionnaire in an upcoming edition of your organization's publication. Or, we can provide as many as several hundred copies of the questionnaire that you would need to include with a mailing to your membership.

We will make the results of the questionnaire available when they are compiled. Thank you in advance for your cooperation.

Sincerely,

Steven W. Horn
Commissioner

Sandra K. Davis
CSU Team

encl.

Appendix F-2
Questionnaire

The Colorado General Assembly passed Senate Bill 126 to create a pesticide and commercial fertilizer management plan to protect Colorado's groundwater resources. The Colorado Dept. of Agriculture, Colorado Dept. of Health and CSU Cooperative Extension believe this plan can best be developed and implemented with your participation in this study. This survey provides you with an opportunity to relay information and views to the agencies working on this task. Since no names or identification numbers are used, all responses will be confidential.

1. Would you say pesticide and fertilizer contamination of groundwater in your area is
 a severe problem a moderate problem a minor problem _____
 not a problem not sure

2. What level of government is best able to deal with agricultural chemicals and groundwater issues?
 federal state local not sure _____

3. Senate Bill 126 calls for groundwater monitoring. Do you have concerns about this monitoring? [Mark all the answers that express your views.]
 I don't have major concerns _____
 I worry about which government agency will conduct the monitoring _____
 I worry about which officials will have access to the groundwater data _____
 I worry about who will pay for the monitoring _____
 Other _____
 Not sure

4. What agency would you like to see most involved in assembling groundwater monitoring data?
 Colorado Dept. of Agriculture _____
 Colorado Dept. of Health (Water Quality Control Division) _____
 conservancy, conservation, groundwater or other water districts _____
 other _____
 not sure

5. Which of the following occupational categories or groups do you belong to? [Check as many as are appropriate.]
 farm organization or farming occupation _____
 agricultural chemical applicator occupation or group _____
 agricultural chemical manufacturer or dealer occupation or group _____
 environmental organizations _____
 other _____

6. What is the one piece of advice you would like to give to people working on the state pesticide and fertilizer management plan? [Please attach additional comments if the space provided isn't sufficient.]

Please fold this survey along the lines drawn on the opposite side of this paper to produce an addressed envelope. Thanks for taking the time to answer the survey!

Appendix F-3
Survey Letter

THE AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT
(SENATE BILL 126)

This Act is concerned with protecting Colorado's groundwater from pollution due to agricultural chemical use. The legislation stresses voluntary compliance and educational methods to promote the proper and correct use of pesticides and commercial fertilizers. It calls for education and training of agricultural chemical applicators and the general public regarding groundwater protection and agricultural chemical use.

Three state agencies are responsible for implementing the Act. The Colorado Department of Agriculture has overall responsibility for implementation of the Act. This includes identifying problem areas, developing methods for mitigating the problem and promulgating rules and regulations as needed. CSU Cooperative Extension provides education and training in methods designed to reduce groundwater contamination from agricultural chemicals. The Colorado Department of Health will conduct a groundwater monitoring program to assist in identification of problem areas.

The Act calls for efforts to prevent groundwater contamination that would be coordinated through the Commissioner of Agriculture's Office and include:

1. Development of rules and regulations for bulk storage facilities and mixing/loading areas where at least 55,000 pounds of finished agricultural chemical product are handled each year.
2. Establishment of best management practices (BMPs) that are appropriate to local conditions and type of agriculture. The CSU Cooperative Extension will assist in educating and training applicators and the general public regarding agricultural chemicals use and BMPs.
3. Establishment of a state-wide groundwater monitoring program by the Colorado Department of Health to determine the presence of any agricultural chemical in groundwater that meets, exceeds or has a reasonable likelihood of exceeding drinking water standards.

The Colorado Department of Agriculture, Colorado Department of Health and CSU Cooperative Extension believe that Senate Bill 126 can be best developed and implemented with input from local communities in Colorado. To assist them in making the Act responsive to local conditions and needs, a CSU team is preparing surveys, conducting interviews and holding meetings to gather information and views about the administration of the Act. All the information is channeled to state officials who are responsible for implementing the Act. If you are interested in obtaining a survey or attending a meeting, please contact Prof. Sandra Davis, Department of Political Science, Colorado State University, Ft. Collins, CO 80523, 303-491-2490.

Appendix G
March Conference

draft

Date and Time: Monday, March 11, 1991 from 9:00 am to 3:30 pm
Place: West Ballroom of Lory Student Center, CSU, Ft. Collins

Purpose:

Large conference to educate interested individuals and organizations about Senate Bill 126. The conference will also provide an opportunity for CSU Team and state officials to get feedback from participants.

Invitations:

Invitations to the 600+ individuals and organizations on our mailing list will be sent out in early to mid-January. A brief description of the programs and registration fee will be included. We will ask that interested parties mail in a registration form and fee by February 28, 1992.

Registration Period:

9:00 - 9:30 Registration and Coffee

Speakers and Programs:

9:30 - 10:00 Welcome and Benefits of Senate Bill 126 for Colorado
Representative from Colo. Dept of Agriculture
Tom Senator Norton

10:00 - 10:45 Presentation from EPA National Groundwater Survey
Speaker: Randy Brown or someone from EPA Groundwater Section

10:45 - noon Need for Cooperation in Groundwater Monitoring
Speakers: 1) Representative(s) from local organizations that have already done some groundwater monitoring and 2) George Moravec or someone else who can address the need of the Colo. Dept. of Health to acquire data

noon - 1:00 Lunch in the East Ballroom: Deli Platter

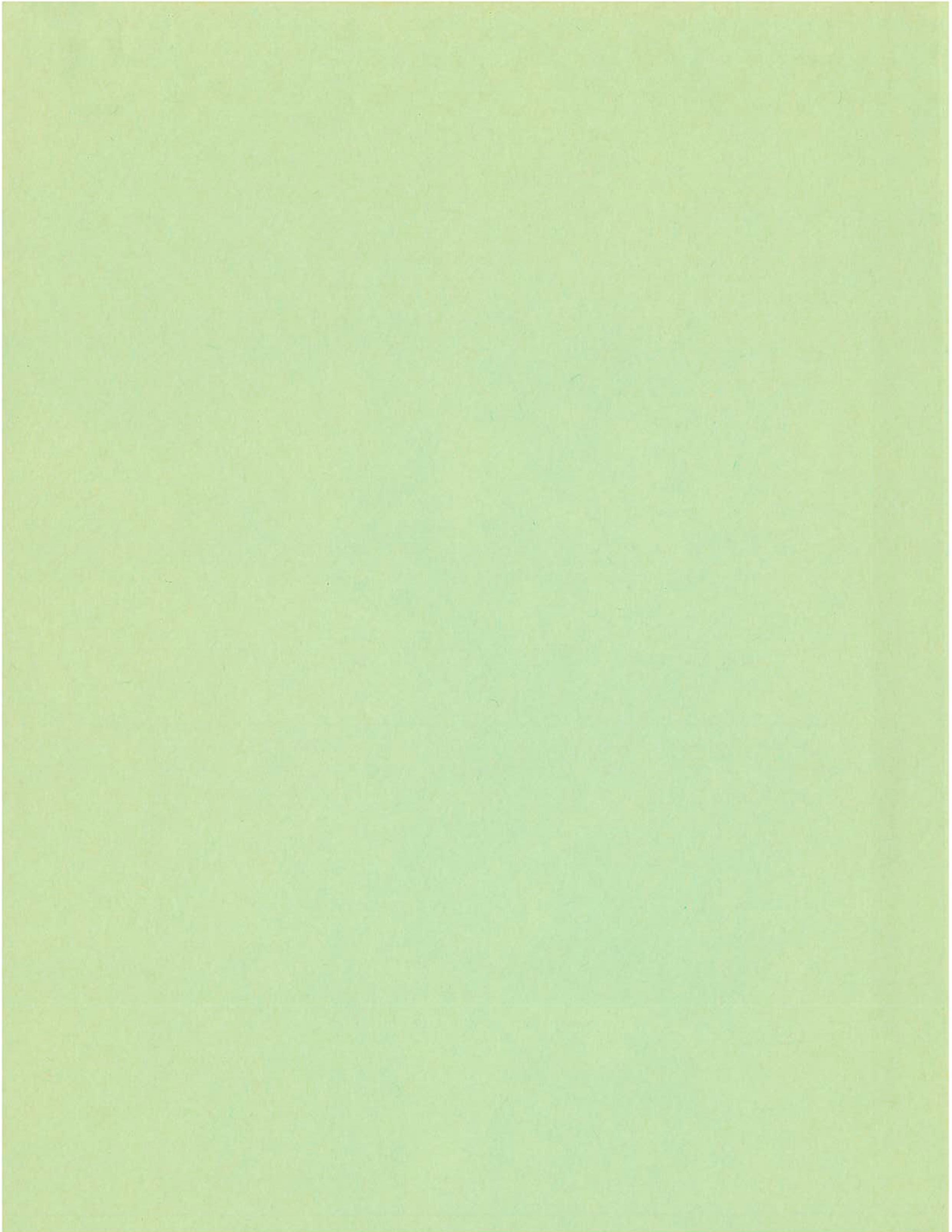
1:00 - 3:30 Concurrent Workshops (2 Possibilities)
Groundwater Data Collection and Analysis
Goal: Get people from ground water districts, local health departments, planning districts and Colorado Dept. of Health to talk about strategies for cooperation.

Techniques/Construction to Minimize Contamination from Storage, Mixing and Loading

Goal: Provide discussion of practices and mixing site or storage facility construction that would minimize contamination.

Registration Fee:

The grant cannot provide the money to pay for room use, coffee or meals. A registration fee will be charged to cover lunch (\$6.95), a head tax for the use of the rooms (\$1.95) and coffee and tea (between \$1.00 and \$2.00). The total registration fee will be between \$9.90 and \$10.90.



THE AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT

(SENATE BILL 90-126)

**Lloyd R. Walker
Extension Agricultural Engineer
Colorado State University
Cooperative Extension**

This Act took effect on July 1, 1990, and concerns the regulation of activities which could result in agricultural chemicals in the groundwater of the state. Such chemicals include pesticides and commercial fertilizers. Three state agencies are responsible for implementing the Act. The Colorado Department of Agriculture has overall responsibility for implementation of the Act. This includes identifying problem areas, developing methods for mitigating the problem and promulgating rules and regulations as needed. Colorado State University Cooperative Extension provides education and training in methods designed to reduce groundwater contamination from agricultural chemicals. The Colorado Department of Health will conduct a groundwater monitoring program to assist in identification of problem areas.

The Act requires the Commissioner of Agriculture and the Water Quality Control Commission to work cooperatively in assessing the effectiveness of measures employed to prevent or mitigate groundwater pollution. If the measures do not prove effective, the Water Quality Control Commission shall have final authority to promulgate control regulations.

The Act declares that the public policy of Colorado is to protect groundwater and the environment from impairment or degradation due to the improper use of agricultural chemicals while allowing for their proper and correct use. The Act calls for education and training of agricultural chemical applicators and the general public regarding groundwater protection, agricultural chemical use and best management practices (BMPs). BMPs are recommended practices established to prevent or remedy the introduction of agricultural chemicals into groundwater to the extent technically and economically practical. BMPs might include: (1) soil testing, (2) split nitrogen applications, (3) use of slow release nitrogen fertilizers, and (4) irrigation management.

The Act also requires creation of rules and regulations for bulk storage facilities and mixing/loading areas where at least 55,000 pounds of finished agricultural chemical product (tank mix) are handled each year. These rules and regulations are designed to prevent spills and leaks from contaminating groundwater. Those covered by the rules and regulations will likely include commercial applicators (both agricultural and urban), public applicators (municipalities, weed districts), some farmers including those applying agricultural chemicals via chemigation, and agricultural chemical dealers. These regulations will be developed through a public hearing process and once adopted will have a three-year phase-in period.

The Act specifies a three tiered response in addressing potential and actual groundwater pollution due to agricultural

chemicals. The first level of response would be considered prevention efforts. These would be coordinated by the Department of Agriculture through the Commissioner's Office and include:

1. Development of rules and regulations for bulk storage facilities and mixing/loading areas where at least 55,000 pounds of finished agricultural chemical product are handled each year;
2. Establishment of BMPs appropriate to local conditions and type of agriculture;
3. Education and training in implementation of BMPs by Colorado Cooperative Extension;
4. Establishment of a state-wide groundwater monitoring program by the Colorado Department of Health. Such a monitoring program is designed to determine the presence of any agricultural chemical in groundwater which meets, exceeds or has a reasonable likelihood of meeting or exceeding drinking water standards as adopted by the Water Quality Control Commission;
5. Designation by the Commissioner, of Agricultural Management Areas (AMA) in the state. An AMA is a designated geographic area where there is a significant risk of contamination or pollution of groundwater from agricultural activities. An AMA might be designated based on features such as soil type, depth to groundwater, intensity of agriculture, or results of the groundwater monitoring program. An AMA designation would

serve to focus the activities of the involved agencies toward prevention or mitigation of the identified problem.

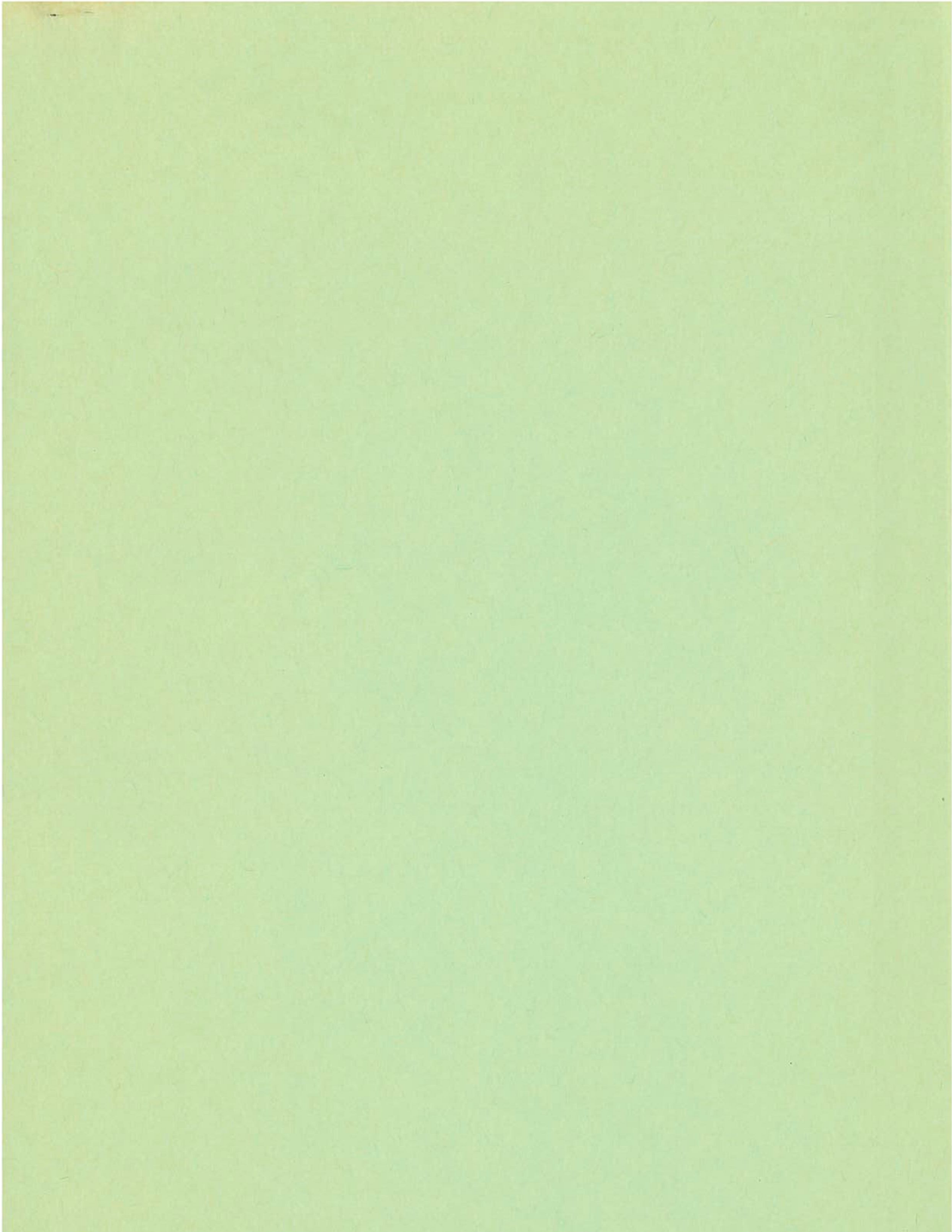
A second level of response would be considered mandated practices. If prevention efforts mentioned above fail to remedy a groundwater pollution problem, the Commissioner of Agriculture can adopt rules and regulations which become an Agricultural Management Plan (AMP). AMPs are any activity, procedure or practice to prevent or remedy the introduction of agricultural chemicals into groundwater to the extent technically and economically practical. AMPs can be designated for an area or a specific chemical. An AMP would likely mandate selected best management practices.

If continued monitoring reveals that AMPs are not preventing or mitigating the presence of agricultural chemicals, the third level response of regulation will be employed. At this level of response, the Commissioner of Agriculture and the Water Quality Control Commission will confer and determine the appropriate regulatory response. The first regulatory response would be made by the Commissioner of Agriculture. The Commissioner may promulgate rules and regulations regarding the use of any agricultural chemical which has been identified through monitoring of creating or is likely to create a pollution problem. If continued monitoring reveals that the rules and regulations are insufficient to correct the problem, the water quality control commission may promulgate a control regulation. The Water Quality Control Commission has final authority over the content of the

control regulation. In developing a control regulation, substantial weight will be given to recommendations from interested water conservation districts, water conservancy districts and soil conservation districts.

The use of the three tiered response must be kept in perspective in order to understand the intent of the Act. The Act ultimately is concerned with protecting Colorado's groundwater from pollution due to agricultural chemical use. However, it favors and stresses voluntary compliance and educational methods to accomplish the goal. Moving from one tier of response to another will be done with careful consideration and adequate monitoring data to support such action. The Act states that proper and correct use of agricultural chemicals is also an intent of the Act.

The Act focuses on the handling of agricultural chemicals. Such chemicals are handled by a number of groups including: agricultural producers, commercial applicators, municipalities, and homeowners. All these groups must assume responsibility for groundwater protection, and the intent of the Act is to involve all groups in addressing the issue.



Cooperative Extension

Colorado State University, Fort Collins, Colorado 80523

Cooperative Extension and Agricultural Communications

(303) 491-6432 FAX (303) 491-6433

NEWS
NEWS

EDUCATION AND PREVENTION CORNERSTONES OF COLORADO'S GROUNDWATER
PROTECTION ACT

FORT COLLINS, Dec. 4--Education and prevention are perhaps two of the most important provisions of Colorado's Agricultural Chemicals and Groundwater Protection Act.

"Senate Bill 126, which took effect July 1, 1990, concerns the regulation of agricultural chemical use that could affect groundwater quality," said Lloyd Walker, agricultural engineer, Colorado State University Cooperative Extension.

"The Act declares that Colorado's public policy is to protect groundwater and the environment from impairment or degradation due to improper use of agricultural chemicals," Walker said. "But it is important to note that the Act does allow for proper and correct use of these chemicals."

Under SB126, agricultural chemical users--including agricultural producers, commercial applicators, municipalities and homeowners--must assume responsibility for groundwater protection.

The Act specifies that a three-tiered response be used to address potential and actual groundwater pollution caused by agricultural chemical use.

Prevention, the first level of response, is coordinated
-more-

through the Commissioner's Office of the Colorado Department of Agriculture.

Prevention measures include:

--development of rules and regulations for bulk storage facilities and mixing and loading areas where at least 55,000 pounds of finished agricultural chemical product are handled yearly;

--establishment of best management practices appropriate to local conditions and agricultural practices;

--education and training in implementation of BMPs by Colorado State Cooperative Extension;

--establishment of a statewide groundwater monitoring program by the Colorado Department of Health;

--designation of Agricultural Management Areas based on such features as soil type, depth to groundwater, intensity of agriculture or results of the groundwater monitoring program.

An AMA is a designated geographic area where a significant risk of contamination or pollution of groundwater from agricultural chemical activities exists.

Mandated practices comprise the second level of response and are implemented if prevention measures fail to remedy a groundwater pollution problem.

"If prevention measures fail, the Commissioner of Agriculture can adopt rules and regulations that become an Agricultural Management Plan," Walker explained.

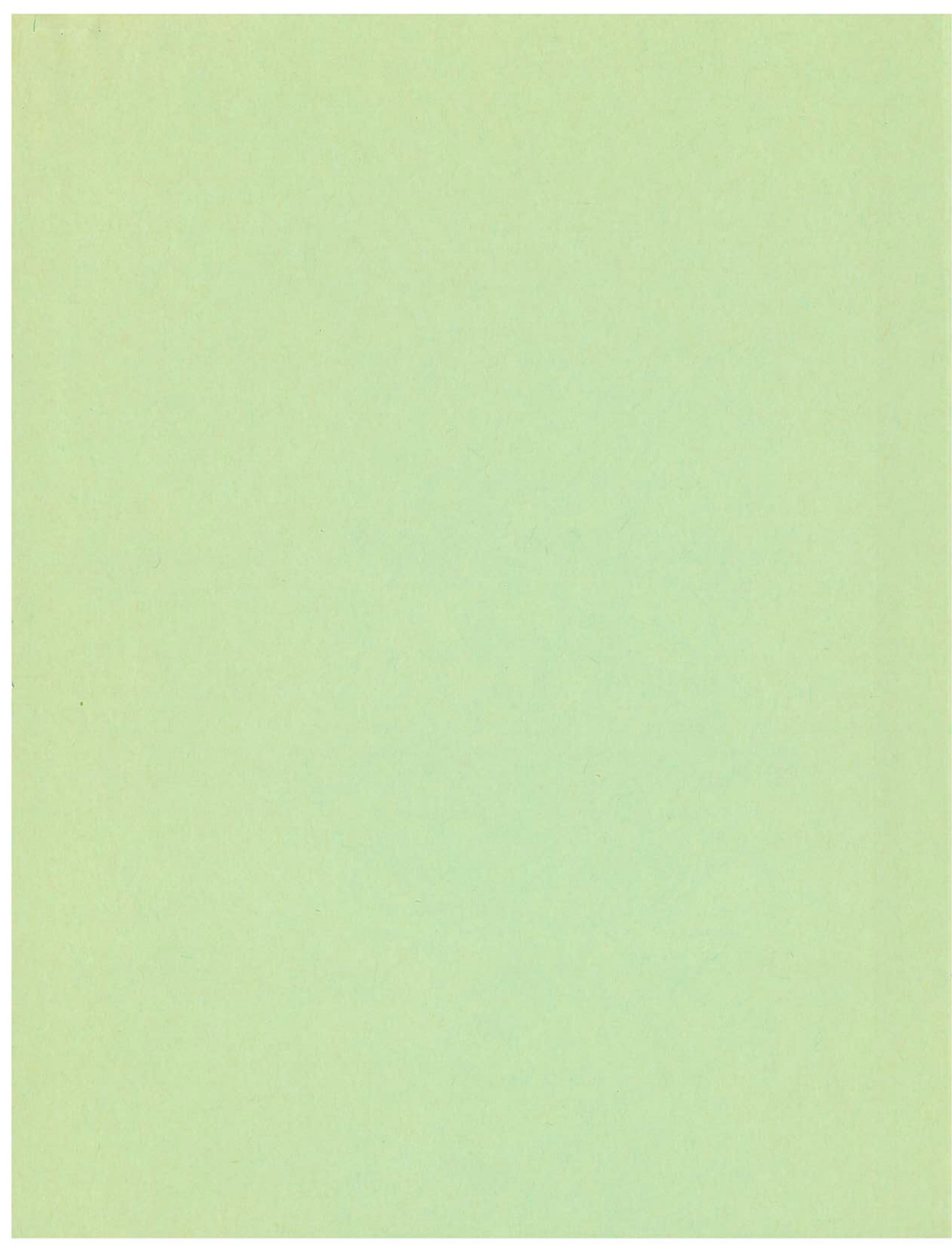
If continued monitoring reveals that AMPs do not reduce the presence of agricultural chemicals, the third level of response is employed.

-more-

At the third level of response, the Commissioner of Agriculture and the Water Quality Control Commission confer to determine the appropriate regulatory response.

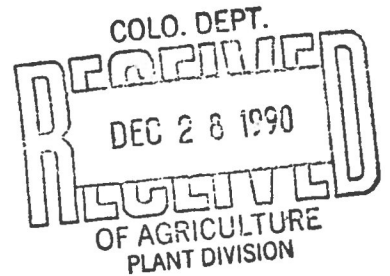
"In developing a control regulation, substantial weight is given to recommendations from interested water conservation districts, water conservancy districts and soil conservation districts," Walker said.

"The Act ultimately is concerned with protecting Colorado's groundwater from pollution caused by agricultural chemical use. However, it is important to remember that it favors and stresses voluntary compliance and educational methods to accomplish the goal."



COLORADO DEPARTMENT OF HEALTH
WATER QUALITY CONTROL DIVISION
GROUNDWATER UNIT

NORTHERN HIGH PLAINS, COLORADO
GROUNDWATER QUALITY ASSESSMENT PROJECT
Summer 1989



A Pilot Project

In an effort to develop methodologies for a state-wide aquifer sampling program, a group of wells has been selected for sampling this season in the Northern High Plains of Colorado. This pilot study will serve to determine alluvial and shallow bedrock baseline groundwater quality in the Northern High Plains of Colorado, and establish a mechanism for evaluating the quality of groundwater in all of Colorado's major aquifers. Statistical analysis of the water quality data may yield correlations which could be used as predictive tools in other regions.

Yuma County was selected for initial sampling because of low depth to groundwater, local land-use practice, and cooperation of local groundwater authorities. Neighboring areas, including Philips County, will hopefully be included in the study in the near future.

Quality of groundwater will be assessed for thirty shallow irrigation wells in the region. Well selection was completed using permit records held by the State Engineer's Office, and was based on high vulnerability of underlying groundwater as a function of hydrogeologic setting and local land use practices. Wells with low depth to groundwater and shallow screened intervals were selected. Locations where significant clay layers exist above the saturated zone have been avoided. Only wells which overlie irrigated land, for which access is gained, and only wells with a tap preceding chemical injection will be sampled in this study.

Sampling will commence in July or August as chemigation generally occurs in the region during this time period. In order to gain insight to long-term trends in groundwater quality, wells will be sampled at least once more during a different time of the year; seasonal variability of land use practices as well as climatic impacts on groundwater quality could be incorporated into the interpretation of the results. Sampling will be performed by Scott Davies of CDH.

Laboratory analysis will be performed for a wide variety of parameters for each sample collected as shown in Figure 1. Concentrations of all major ions, including nitrate, plus selenium and TDS, will be determined. The inorganic analysis will be performed by the laboratory at CSU with five percent of samples split with the CDH laboratory for QA/QC evaluation. In addition to inorganic analysis, concentrations of 79 major pesticides will be determined by the CDH laboratory as shown in Figures 2 and 3.

The analytical data produced from this study will be incorporated into a state-wide database of groundwater quality in Colorado. Cooperation between various agencies involved in baseline groundwater quality projects will have an impact on the quantity and quality of data in this database. Specifically, formulation of a standardized set of monitoring parameters used by all agencies involved in groundwater sampling would be very beneficial to the overall success of this long-term program in Colorado.

CSU Laboratory - Chemistry Analysis

Routine Water Package	Cost (total)	CDH Cost
Parameter (Detection Limit)		
	\$12.50	
Boron		\$10.25
Bicarbonate		\$6.00
Calcium		\$6.00
Carbonate		\$6.00
Chloride		\$7.25
Magnesium (hardness)		\$6.00
Nitrate		\$11.00
pH		\$3.50
Sodium		\$8.50
Specific conductance (TDS)		\$5.00
Sulfate		\$11.00
Potassium		\$8.50
		total = \$89.00
Metals Package		
	\$10.00	
	or \$2.50 per	
Aluminum		\$10.25
Cadmium		\$12.00
Chromium		\$12.00
Copper		\$6.00
Iron		\$6.00
Manganese		\$6.00
Nickel		\$6.00
Molybdenum		\$12.00
Phosphorous		\$15.00
Zinc		\$6.00
		total = \$91.25
Other tests		
Fluoride	\$2.50	\$8.50
Arsenic & Selenium	\$8.00	\$41.00
	total, CSU Lab	\$33.00
	total, CDH Lab	\$229.75

Figure 1 - Inorganic Analysis

CDH Laboratory - Pesticide Analysis Spreadsheet

Triazine Herbicides	\$100.00 (approx)	Quantification Limit (ug/l)
Atrazine		0.1
Propazine		0.1
Simazine		0.1
Ametryn		0.1
Prometryn		0.1
Simetryn		0.1
plus others		
Chlorinated Pesticides	\$85.00	
Aldrin		0.1
Chlordane		0.1
DDD		0.1
DDE		0.1
DDT		0.1
Endrin		0.1
Endosulfan-1		0.1
Heptachlor		0.1
Heptachlor Epoxide		0.1
Isodrin		0.1
Lindane		0.1
Methoxychlor		1.0
Toxaphene		0.1
PCBs		0.1
plus others		
Organophosphate Pesticides	\$85.00 (with above, \$50.00)	
Diazinon		0.1
Dimethoate		0.1
Dieldrin		0.1
Ethion		0.1
Ethyl Parathion		0.1
Malathion		0.1
Methyl Parathion		0.1
Thimet		0.1
plus others		
Phenoxy acid Herbicides	\$135.00	
2,4-D		0.1
2,4,5-T		0.1
2,4,5-TP (Silvex)		0.1

Figure 2 - CDH Pesticide Analysis Summary

CDH Laboratory - Detailed Pesticide Analysis Spreadsheet

When the Triazine Herbicide, Organophosphate, and the Chlorinated Pesticide screens are run at the CDH Organics Laboratory, these compounds will be detected if present in adequate concentrations.

Triazine and Organophosphate Analytes		Chlorinated Pesticides	
	Q/L (ug/l)		Q/L (ug/l)
Alachlor	0.1	Aldrin	0.1
Ametryn	0.1	Chlordane-alpha	0.1
Atraton	0.1	Chlordane-gamma	0.1
Atrazine	0.1	Chlorneb	0.1
Bromacil	0.1	Chlorobenzilate	0.1
Butachlor	0.1	Chlorothalonil	0.1
Butylate	0.1	DCPA	0.1
Carboxin	0.1	4,4'-DDD	0.1
Chlorpropham	0.1	4-4'-DDE	0.1
Cycloate	0.1	4,4'-DDT	0.1
Demeton-S	0.1	Dieldrin	0.1
Diazinon	0.1	Endosulfan I	0.1
Dichlorvos	0.1	Endosulfan II	0.1
Diphenamid	0.1	Endosulfan sulfate	0.1
Disulfoton	0.1	Endrin	0.1
Disulfoton Sulfone	0.1	Endrin aldehyde	0.1
Disulfoton Sulfoxi	0.1	Etridiazole	0.1
EPTC	0.1	HCH-alpha	0.1
Ethoprop	0.1	HCH-beta	0.1
Fenamiphos	0.1	HCH-delta	0.1
Fenarimol	0.1	HCH-gamma	0.1
Fluridone	0.1	Heptachlor	0.1
Hexazinone	0.1	Heptachlor epoxide	0.1
Merphos	0.1	Hexachlorbenzene	0.1
Methyl paraoxon	0.1	Methoxychlor	1.0
Metolachlor	0.1	cis-Permethrin	0.1
Metribuzin	0.1	trans-Permethrin	0.1
Mevinphos	0.1	Propachlor	0.1
MGX 264	0.1	Trifluralin	0.1
Molinate	0.1		
Napropamide	0.1		
Norflurazon	0.1		
Pebulate	0.1		
Prometon (a)	0.1		
Prometryn	0.1		
Pronamide (a)	0.1		
Propazine	0.1		
Simazine	0.1		
Simetryn	0.1		
Stirofos	0.1		
Tebuthiuron	0.1		
Terbacil	0.1		
Terbufos (a)	0.1		
Terbutryn	0.1		
Triademefon	0.1		
Tricyclazole	0.1		
Vernolate	0.1		

Figure 3 - CDH Pesticide Analysis

Northern High Plains Groundwater Sampling

In order to realistically classify and set standards for the State's groundwater resources, baseline groundwater quality must be determined within individual aquifers being classified. In an effort to refine methodologies for a state-wide aquifer sampling program, the Groundwater Unit conducted a pilot groundwater sampling project in Summer 1989. The project was designed to characterize alluvial and shallow bedrock groundwater quality in an aquifer considered vulnerable to agricultural contamination. The Ogallala Aquifer in the Northern High Plains (NHP) region of Colorado was selected as the study area for the pilot project. An area within Yuma County was chosen due to low depth to groundwater, local land-use practice, and cooperation of local groundwater authorities in that county.

Quality of groundwater was assessed for 23 irrigation wells in Yuma County. Sampling of irrigation wells occurred in late July through early August 1989. Highest priority for well selection was based on aquifer vulnerability determined by a combination of depth to groundwater, screen interval, soil type, and subsurface geology. Only operating wells on irrigated land for which access was gained were included in this study. Only wells with a tap preceding chemical injection were sampled.

Groundwater was analyzed for 33 inorganic parameters (including 13 metals) and 82 organic substances including chlorinated, organophosphate, triazine, and phenoxy-acid pesticides. Inorganic analyses were performed at the CSU Soil Testing Laboratory. Three split samples were run at the CDH lab to verify CSU results. Five blank samples were taken. A mobile laboratory was used in the field to filter (0.45 μm) samples used for metals analysis. Pesticide analyses were performed at the CDH Organic Laboratory. All samples were kept on ice and hand-delivered to the CSU and CDH laboratories within 72 hours of sampling.

Locations of Groundwater Samples, Yuma County, Colorado, Summer 1989

<u>Township</u>	<u>Range</u>	<u>Section</u>	<u>Sample Date</u>	<u>Inorganic Lab(s)</u>	<u>Pesticides Found</u>
1 N	43 W	25	08/09/89	CSU	None
1 N	44 W	10	08/09/89	CSU	None
1 N	45 W	16	08/02/89	CSU / CDH	None
1 S	44 W	28	08/09/89	CSU	None
2 N	42 W	4	08/02/89	CSU / CDH	None
2 N	42 W	8	08/02/89	CSU	None
2 N	42 W	30	08/02/89	CSU	None
2 N	43 W	5	08/03/89	CSU	Atrazine, trace
2 N	43 W	12	08/03/89	CSU	None
2 N	44 W	1	08/02/89	CSU	Atrazine, trace
2 N	45 W	10	08/03/89	CSU	None
2 N	46 W	30	08/09/89	CSU	None
3 N	42 W	17	07/25/89	CSU	None
3 N	43 W	13	07/25/89	CSU	None
3 N	43 W	24	07/25/89	CSU	None
3 N	43 W	26	08/03/89	CSU	Atrazine, 0.7 $\mu\text{g}/\text{l}$
3 N	43 W	32	08/03/89	CSU	Atrazine, trace
3 N	45 W	12	08/09/89	CSU / CDH	None
4 N	44 W	14	08/09/89	CSU	None
5 N	42 W	17	08/08/89	CSU	None
5 N	43 W	8	08/08/89	CSU	None
5 N	45 W	2	08/08/89	CSU	None
5 N	45 W	25	08/08/89	CSU	None

Groundwater Sampling - Yuma County, Summer 1989
Inorganic Parameters - Summary of Results

<u>Parameter</u>	<u>Number Samples</u>	<u>Min/Max</u>	<u>Units</u>
Alkalinity, total as CaCO ₃	26	120. - 203.	mg/l
Alkalinity, Phenolphthalein	3	4. - 26.	mg/l
Bicarbonate Ion, as HCO ₃	23	157. - 248.	mg/l
Calcium, diss. as CaCO ₃	26	31.2 - 57.0	mg/l
Carbonate Ion, as CO ₃	23	1. - 1.	mg/l
Chloride, total	26	2.1 - 11.3	mg/l
Fluoride, diss.	26	0.53 - 1.87	mg/l
Hardness, total as CaCO ₃	26	116. - 198.	mg/l
Nitrate, total as NO ₃	23	< 0.4 - 50.3	mg/l
Nitrate, total as N	23	< 0.1 - 11.3	mg/l
Nitrite Nitrogen, total as NO ₂	3	1.9 - 5.2	mg/l
pH	26	7.6 - 8.2	s.u.
Specific Conductance	26	97. - 476.	uohms/cm
Total Diss. Solids	26	239.9 - 407.0	mg/l
Sulfate, total	26	7.6 - 26.0	mg/l
Aluminum, diss.	26	< 0.1 - 1.0	mg/l
Arsenic, diss.	26	< 0.001 - 0.02	mg/l
Barium, total	26	0.001 - 0.290	mg/l
Boron, diss.	26	< 0.010 - 0.140	mg/l
Chromium, total	26	< 0.005 - 0.010	mg/l
Cadmium, total	26	0.3 - 10.0	µg/l
Copper, diss.	26	< 0.01 - < 0.025	mg/l
Iron, total	26	0.01 - 0.190	mg/l
Magnesium, diss.	26	7.8 - 16.9	mg/l
Manganese, total	26	< 0.01 - 0.04	mg/l
Nickel, total	26	< 0.010 - 0.110	mg/l
Molybdenum, diss.	26	< 0.010 - 0.020	mg/l
Lead, total	26	< 0.050 - < 0.050	mg/l
Phosphorous, diss.	26	< 0.1 - 7.6	mg/l
Potassium, diss.	26	7.2 - 11.9	mg/l
Selenium, total	26	< 1. - 20.	µg/l
Sodium, diss.	26	7.3 - 24.9	mg/l
Zinc, diss.	26	< 0.010 - 0.210	mg/l

The analytical data gathered from the Yuma County sampling has been incorporated into the CDH Water Quality Database System that has been developed by Scott Davies of the Groundwater Unit. User interface programs have been written in to enable agencies state-wide to enter, store, transmit, and output water quality information. Inorganic, organic, pesticide, and radiological parameters have been incorporated into the system. It is hoped that local, state, and federal agencies state-wide will use the system to report water quality information to CDH as well as for their own data management needs.

An expansion, or Phase II, is planned for summer of 1990, and will serve to characterize baseline alluvial groundwater quality in the San Luis Valley. A cooperative project with Colorado State University, this study will generate much needed water quality data from this unique and important agricultural region of Colorado.

If you would like more detailed information about the 1989 NHP groundwater sampling, feel free to contact Scott Davies of CDH at (303) 331-4557.

Revised April, 1990

COLORADO DEPARTMENT OF HEALTH
WATER QUALITY CONTROL DIVISION
GROUNDWATER UNIT

GROUNDWATER QUALITY ASSESSMENT PROGRAM
SAN LUIS VALLEY, COLORADO

Phase II
Summer 1990

Introduction

The Colorado Water Quality Control Division (WCQD) is proposing a groundwater monitoring project for FY 90 nonpoint source funding. The Colorado Nonpoint Assessment Report (April 1988) notes that a lack of groundwater data has prevented an accurate assessment of nonpoint source impacts to groundwater quality. This project is consistent with the overall intent of the NPS Management Program, and will be specifically identified as a priority project when the Management Program is updated later in 1990.

The proposed project will provide for groundwater monitoring in one of Colorado's major agricultural regions. The proposed project will provide the WCQD with 50% of the funds necessary to conduct such a project; the remaining 50% shall be provided through state funding. The project will include sample collection, laboratory analysis, and data analysis and storage. This project will provide the basis for determining groundwater quality, and any necessary nonpoint source control efforts in these regions.

Project Proposal

In an effort to further establish the extent and magnitude of agricultural contamination in Colorado, a group of wells has been selected for sampling this summer in the San Luis Valley, south-central Colorado. This program is a continuation of last summer's successful groundwater sampling in the Northern High Plains, specifically Yuma County.

In a cooperative project with Colorado State University, CDH will sample 35-40 irrigation wells, most of which are located in the northwestern part of the valley. This region is characterized by intense irrigation agriculture; it contains an extremely high concentration of center-pivot systems tapping a relatively shallow alluvial aquifer.

Sampling of each well selected will occur twice in the summer of 1990. The first sampling will take place in late May/early June, and the second is scheduled for mid August. Much of the preliminary planning has been done by Dr. James Loftis of CSU who has coordinated closely with extension agents, local and county officials in the area. Agro Engineering, Inc., a crop production and management company centered in Alamosa, has been very helpful in the well selection and planning of this project. Sampling will be performed by Scott Davies of CDH with the assistance of two graduate students from CSU. These two individuals will be running computerized soil models based on soil measurements and surface applications in an attempt to predict groundwater contamination at each site. The simulation output will be compared with analytical results obtained. Well sampling will follow the protocols under development by the Groundwater Workgroup where available.

Laboratory analysis will be performed for a wide variety of parameters for each sample collected as shown in Figure 1. Concentrations of all major, including nitrate, plus selenium and TDS, will be determined. The inorganic analysis will again be performed by the laboratory at CSU with a number of samples split with the CDH laboratory for QA/QC evaluation. Last summer's QA/QC evaluation showed fairly consistent results between the two laboratories.

In addition to inorganic parameters, pesticide analysis will be performed on all samples. Figure 2 lists 26 pesticides that will be analyzed for in some or all of the groundwater samples collected this summer. Each of these substances has been, or is currently being utilized in the San Luis Valley according to agricultural officials there. Negotiations have begun with the Organics Laboratory at CDH to reach the lowest cost per sample achievable. Last year's suite of pesticides covers only six of the substances on this list.

The results from last summer's Yuma County sampling has been incorporated into the CDH Groundwater Quality Data System recently developed at CDH. All analytical results from the San Luis Valley sampling will likewise be incorporated into this system. A detailed report describing the area sampled, the protocol for sampling and analysis, and the results of the analysis will be provided. The report will also describe the implications that the data suggests for nonpoint reductions from agriculture in the San Luis Valley.

A map of the study area is provided in Figure 3, and a schedule of activities in Figure 4.

Commonly Used Pesticides in the San Luis Valley

Trade Name	Common Name	EPA Method #	No. Samples
<u>Herbicides :</u>			
Sencor	Metribuzin	507	
Treflan	Trifluralin	508	
Eptam/Genep/Drexel	EPTC	507	
Lorox	Linuron	NPS4	
Prowl	Pendimethalin	507	
Dual	Metolachlor	507	
Rhomene	MCPA	515	
Weedone	2,4-D	515	
Kerb	Pronamide	NPS4	
Lasso	Alachlor	507	
Oust	DCPA	515	
Dinoseb	DNBP	515	
<u>Insecticides :</u>			
Thoidan	Endosulfan	508	
Furadan	Carbofuran	NPS4	
Pydrin	Fenvalerate	508	
Asana	Esfenvalerate	508	
Monitor	Methamidophos	507	
Ambush/Pounce	Permethrin	508	
Di-Syston	Disulfoton	507	
Lorsban	Chlorpyrifos	507	
Temik	Aldicarb	NPS4	
Methyl Parathion	Paraoxon	507	
<u>Fungicides</u>			
Bravo	Chlorothalonil	508	
Dithane	EBDC	NPS4	
Manzate			
Mancozeb			
<u>Other Uses</u>			
Diquat	Diquat	549	

Figure 2 - Pesticides to be Analyzed in SLV Samples

SAN LUIS VALLEY GROUNDWATER SAMPLING PROJECT - SUMMER 1990
SUMMARY STATEMENT
October 18, 1990

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Introduction

At the October 18, 1990 meeting of the San Luis Valley Potato Administrative Committee, the results of a groundwater sampling program conducted by Colorado Department of Health (CDH) and Colorado State University (CSU) were presented. The primary study area for this project was the most intensely irrigated region in the San Luis Valley bounded as follows: north of Hwy. 374 between Alamosa and Monte Vista, south of a point approximately half way between Center and Saguache, east of the boundary between the basin and the San Juan Mts., and west of Hwy. 17 between Alamosa and Moffat. A total of 30 wells were sampled in this region. In addition, two wells were sampled near Blanca, and two near Antonito.

This study was designed to show any variation in water chemistry between the early and latter phases of the growing season. The first inorganic sampling of each well was performed between May 22, and May 31, 1990, the first pesticides sampling between June 19 and July 7, 1990, and the second sampling for each analysis was performed between July 30 and August 17, 1990.

Analysis

The Soil Testing Lab at CSU performed a 'Basic Water' and 'Basic Metals' analysis on each inorganic sample collected. Filtration (0.45 um) of the 'Basic Metals' samples before acidification was performed on half of the samples collected during the initial screening, and all collected in the resampling, in order to show any variation. All samples collected in this study were kept on ice from the time they were sampled until delivery to the laboratory. In addition to the basic inorganic analysis run at CSU, a sample was collected at each site and analyzed for Alkalinity, Total Dissolved Solids, and Hardness (A/T/H) at the Inorganics Lab at CDH. Each of these three parameters was covered in the basic inorganic analysis performed by the CSU Lab - additional data was justified because of the importance of these parameters and the value of data comparison between the two labs.

In order to further compare the data generated by the two inorganic labs, 'split' samples were collected at five of 34 sites during the initial sampling period, and six of 34 during the resampling. These samples were submitted to the inorganics lab at CDH for complete inorganic analysis. These samples were analyzed for every parameter covered in the CSU basic inorganic analysis as well as a few additional analytes.

Pesticide analysis was performed by the CDH Organics Lab and featured a screen for 16 pesticides, all previously and/or currently utilized in the San Luis Valley. Levels of detection varied from 0.025 ug/l to 0.8 ug/l.

In addition, leaching potential of the 16 pesticides was evaluated, and solute tracking models were used to predict at what time and how much pesticide could reach the water table under current conditions. The results of this analysis will be published through the Colorado Water Resources Inst. at CSU.

SAN LUIS VALLEY GROUND WATER SAMPLING PROJECT - SUMMER 1990 - page 2
Results

The following is a summary of results for some of the inorganic analysis:

<u>Analyte</u>	<u>Number of Samples</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>High</u>	<u>Low</u>	<u>Units</u>
Total Alkalinity	160	128.5	30.5	240	44	mg/l
Bicarbonate	75	153.7	39.3	271	54	mg/l
Calcium as Ca	75	54.8	22.8	129	12	mg/l
Nitrate as N	75	10.0	14.8	24	0.1	mg/l
Chloride	86	11.9	12.7	52	1.1	mg/l
Total Hardness	154	177.8	72.2	406	38	mg/l
Potassium	86	5.8	2.7	12	0.5	mg/l
Sodium	86	25.7	15.6	84	0.7	mg/l
Conductivity	86	465.3	176.4	974	175	uohms/cm
Sulfate	86	61.8	54.5	250	1.4	mg/l
Total Diss. Solids	149	345.0	135.0	740	83	mg/l

The following is a summary of results of pesticide analysis:
 Total number of samples for each analyte is 68 (34 x 2).

<u>Analyte</u>	<u>Minimum Det. Limit</u>		<u>Number Positive Sams.</u>
Alachlor (Lasso)	0.38	ug/l	0
Chlorothalonil (Bravo)	0.025	ug/l	6 (6X Trace)
Chlorpyrifos (Lorsban)	0.03	ug/l	0
2,4-D	0.2	ug/l	1 (Trace)
DCPA (Dacthal)	0.025	ug/l	0
Disulfoton (Di-Syston)	0.3	ug/l	0
Endosulfan I (Thiodan)	0.015	ug/l	0
EPTC (Eptam)	0.25	ug/l	3 (2X Trace, 1X 7.0 ug/l)
Fenvalerate (Pydrin)	0.5	ug/l	0
Methyl Parathion	0.5	ug/l	0
Metolachlor (Dual)	0.75	ug/l	0
Metribuzin (Sencor)	0.15	ug/l	6 (4X Trace, 1X 1.5, 1X 2.8 ug/l)
Pendimethalin (Prowl)	0.8	ug/l	0
Permethrin (Ambush)	0.5	ug/l	0
Pronamide (Kerb)	0.76	ug/l	0
Trifluralin (Treflan)	0.025	ug/l	0

A 'trace' is defined as a quantity greater than the Minimum Detection Limit (MDL) and less than the Practical Quantification Limit (PQL), or 10 X the MDL.

Positive Sample Summary

First Sampling: 4 x Metribuzin, 1 x EPTC, 0 x 2,4-D, 0 x Chlorothalonil
 Second Sampling: 2 x Metribuzin, 2 x EPTC, 1 x 2,4-D, 6 x Chlorothalonil

A small percentage of water samples taken contained low levels of various pesticides. The levels detected are not of immediate concern. Leaching potential does exist, however, as indicated by elevated nitrate levels. There is justification for continued monitoring of groundwater chemistry to determine if contamination will be a future problem.

Discussion of Results

There are several potential explanations for the detection of pesticides that do not reflect the quality of the groundwater in this aquifer.

1. The contamination of a water sample, either during field sampling or at the lab, is always a possibility. Five out of six positive Metribuzin samples had to be taken past the injection point. In two of three positive EPTC samples, and in four of six positive Chlorothalonil samples, field contamination is probable.

2. Deficiencies in well casing construction, were noted at 7 of 34 wells. A pool of water collecting at the base of the wellhead, and/or holes in the casing itself, could lead to direct contamination of the groundwater being sampled. One sample containing Chlorothalonil, and two samples containing Metribuzin were taken at wells with wellhead construction problems.

With potential contamination of samples in mind, there are still serious questions that need to be addressed:

1. Not all positive pesticide analysis results could be explained by obvious well bore or sampling problems. Additional information is needed to determine the implications of these results.

2. The water samples were taken from small taps in irrigation lines. Water sampled at many sites was taken as it exited from the lines at high velocities which tend to volatilize pesticide residues. Even though the pesticides screened in this study are considered semi-volatile, this could lead to false negative results for volatile pesticides.

Considerations for Future Programs

The procedures used for this study followed established EPA sampling protocol. Most sampling programs are designed to evaluate water chemistry at the drinking water tap. The funding for this program, however, requires that these samples be taken from irrigation wells. In the San Luis Valley in addition to the question "Is the shallow aquifer contaminated?" another question should be asked: "How much potential is there for future aquifer contamination if current agricultural practices are maintained?"

To address this second question, a modified sampling program is recommended for the San Luis Valley. This would include installation and periodic sampling of shallow monitoring wells, and the use of predictive computer models. This study would represent an effort to evaluate agricultural practices in light of their potential to cause groundwater contamination. Samples would be taken at the water table as opposed to the deeper intake points characteristic of many irrigation wells. In addition, water samples from monitoring wells would not be subject to wellhead contamination or post-injection point contamination problems. The monitoring wells would be initially useful to determine if, in fact, any of the non-negative pesticide results represent regional scale rather than very localized groundwater contamination. The monitoring wells could be utilized for long-term groundwater monitoring in the San Luis Valley.

Revised May, 1990

COLORADO DEPARTMENT OF HEALTH
WATER QUALITY CONTROL DIVISION
GROUNDWATER UNIT

PROPOSED GROUNDWATER QUALITY ASSESSMENT PROGRAM
WESTERN SLOPE - ORCHARD REGION

Phase III
Summer 1991

Introduction

The Colorado Water Quality Control Division (WCQD) is proposing a groundwater monitoring project for FY 91 nonpoint source funding. The Colorado Nonpoint Assessment Report (January 1990) notes that a lack of groundwater data has prevented an accurate assessment of nonpoint source impacts to groundwater quality. This project is consistent with the overall intent of the NPS Management Program, and will be specifically identified as a priority project when the Management Program is updated later in 1990.

As with Phase I and II of this program, the proposed project will provide for groundwater monitoring in one of Colorado's major agricultural regions. The proposed project will provide the WCQD with the funds necessary to conduct such a project; state match shall be provided through state funding of personnel in the WCQD Groundwater Program. The project will include sample collection, laboratory analysis, and data analysis and storage. This project will provide the basis for determining groundwater quality, and any necessary nonpoint source control efforts in these regions.

Project Proposal

In an effort to further establish the extent and magnitude of agricultural contamination in Colorado's groundwater, a group of 45 wells will be selected for sampling in the summer of 1991. The region selected for Phase III is an orchard crop region of western Colorado along the Uncompahgre River and the North Fork of the Gunnison River. The proposed study area includes the towns of Paonia, Hotchkiss, Orchard City, Cedaridge, Delta, Montrose and Ridgeway. This program is a continuation of the program initiated in 1989 in Yuma County (Northern High Plains), and this year's sampling in the San Luis Valley which will begin May 21, 1990.

Sampling of each of the 45 wells selected will occur twice in the summer of 1991. The first sampling will take place early in the growing season (May/June), and the second late in the summer (mid-August). Well selection will be done with the help of extension agents, local and county officials in the area. Sampling will be performed by Scott Davies of CDH. Well sampling will follow the protocols under development by the Groundwater Workgroup where available.

Laboratory analysis will be performed for a wide variety of parameters for each sample collected as shown in Figure 1. Concentrations of all major ions, including nitrate, plus selenium and TDS, will be determined. The inorganic analysis will again be performed by the laboratory at CSU with a number of samples split with the CDH laboratory for QA/QC evaluation. Results from Phase I sampling in 1989 showed fairly consistent results between the two laboratories. An expanded QA/QC program will be carried out in Phase II (San Luis Valley) this year.

In addition to inorganic parameters, pesticide analysis will be performed on all samples. A list of the most commonly used pesticides in the region will be developed and the CDH Organics Lab will be consulted on the feasibility of analyzing groundwater for these substances. The Organics Lab at CDH invested great effort in their ability to analyze groundwater for specific pesticides at reasonable cost since the onset of this program. We feel it is very beneficial to encourage the CDH Organics Lab to continue this expansion of the services they can offer to anyone in the State.

The results from last summer's Yuma County sampling has been incorporated into the CDH Groundwater Quality Data System recently developed at CDH. All analytical results from the San Luis Valley and Western Slope sampling will likewise be incorporated into this system. A detailed report describing the area sampled, the protocol for sampling and analysis, and the results of the analysis will be provided. The report will also describe the implications that the data suggests for nonpoint reductions from agriculture in the western Colorado orchard region. A presentation of findings will be made to the NPS Task Force.

A map of the proposed study area is provided in Figure 2, and a proposed budget and schedule of activities in Figure 3.

Proposed Budget - Phase III
1991 Western Slope - Orchard Region Groundwater Sampling

Personal Services: State Match - Groundwater Program \$60,000.

EPA Grant

Analytical Budget: Western Slope Orchard Region Sampling

Pesticide

CDH: 90 samples @ \$500.00 per \$45,000.

Inorganic

CSU: 90 samples @ \$ 55.50 per \$ 4,995.

CSU: 15 blank samples at \$55.50 per \$ 833.

CDH: 20 split samples @ \$173.25 per \$ 3,465.

CDH: 90 samples, additional analytes, @ \$53.50 per \$ 4,815.

Total Analytical Budget : \$54,113.

Additional Expenses (based on 8 week sampling period, 40 days)

Laboratory Supplies (0.45 um filters, syringes, etc) \$ 1,000.

Contractual: Data Entry (based on \$10.00/hour for 100 hours) \$ 1,000.

Contractual: Field Assistant (based on 3 months at \$1,300/mo.) \$ 3,900.

Computer Equipment (output devices for map generation -
including printer, plotter, software) \$ 6,567.

Travel (Lodging, Food, Transportation) \$ 6,500.

Total Additional Expenses : \$18,967.

Indirect Cost (18.8%) : \$16,920.

_____ Total EPA Grant : \$90,000.

Total Budget, WS-OR 1991 Sampling: \$150,000.

Schedule of Activities

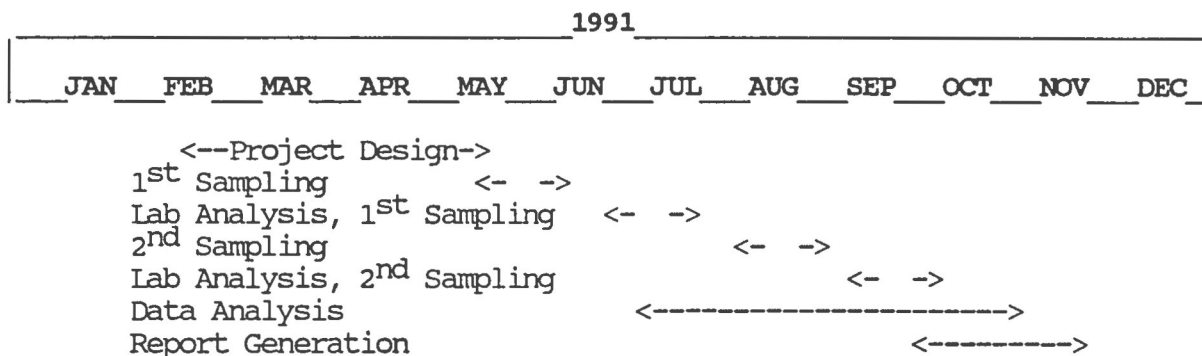


Figure 3 - Time Frame and Budget for Completion of Phase III

Table B (cont.)

GROUND WATER
NON-CARCINOGENIC ORGANIC CHEMICALS (3)

Parameter	CAS No.	Standard (ug/l)	Detection Levels (ug/l)	
			GC	GC/MS
Pentachlorophenol	87-86-5	200 (L)		50
Tetrachlorobenzene 1,2,4,5	95-94-3	2 (L)		10
Tetrachloroethylene	127-18-4	10 (L)		5
Toluene	108-88-3	2,420 (L)		5
Trichloroethane 1,1,1	71-55-6	200 (M)		5
Trichloroethane 1,1,2	79-00-5	28 (I)		5
Trichlorophenol 2,4,5	95-95-5	700 (I)		10
Trichlorophenoxypropionic Acid (2,4,5-TP)	93-72-1	10 (M)	0.05	

- (1) PQL is based on Colorado Department of Health Laboratory's best professional judgment
- (2) HPLC High Pressure Liquid Chromatography PQL (EPA Method 531.1)
- (3) Organic chemicals not on this partial list are covered under section 3.11.5 (C) (1).
- (M) Based on MCL for drinking water.
- (L) Based on EPA life time drinking water health advisory.
- (I) Based on reference dose from EPA Integrated Risk Information System (IRIS).

GC Gas Chromatography (Pesticides EPA-Method 508/608)
(Herbicides AWWA-Method 509—EPA-Method 515.1)

GC/MS Gas Chromatography / Mass Spectrometry (Methods 624 and 625)

CAS No. Chemical Abstracts Service identification number.

Table B

GROUND WATER
NON-CARCINOGENIC ORGANIC CHEMICALS (3)

Parameter	CAS No.	Standard (ug/l)	Detection Levels (ug/l)	
			GC	GC/MS
Aldicarb	116-06-3	10 (L)	10 (2) (1)	
Carbofuran	1563-66-2	36 (L)		10
Chlorobenzene	108-90-7	300 (L)		10
Dichlorobenzene 1,2	95-50-1	620 (L)		10
Dichlorobenzene 1,3	541-73-1	620 (L)		10
Dichlorobenzene 1,4	106-46-7	75 (M)		10
Dichloroethylene 1,1	75-35-4	7 (M)		5
Dichloroethylene 1,2-Cis	156-59-2	70 (L)		5
Dichloroethylene 1,2-Trans	156-60-5	70 (L)		5
Dichlorophenol 2,4	120-83-2	21 (L)		10
Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	100 (M)	0.1	
Endrin	72-20-8	0.2 (M)	0.1	
Ethylbenzene	100-41-4	680 (L)		5
Ethylene Glycol	107-21-1	7,000 (L)	5,000 (1)	
Hexachlorobutadiene	87-68-3	14 (I)		10
Hexachlorocyclopentadiene	77-47-4	49 (I)		10
Isophorone	78-59-1	1,050 (I)		10
Methoxychlor	72-43-5	100 (M)	0.1	
Nitrobenzene	98-95-3	3.5 (I)		10
Pentachlorobenzene	608-93-5	6 (I)		10

Table A (cont.)

GROUND WATER
CARCINOGENIC ORGANIC CHEMICALS (4)

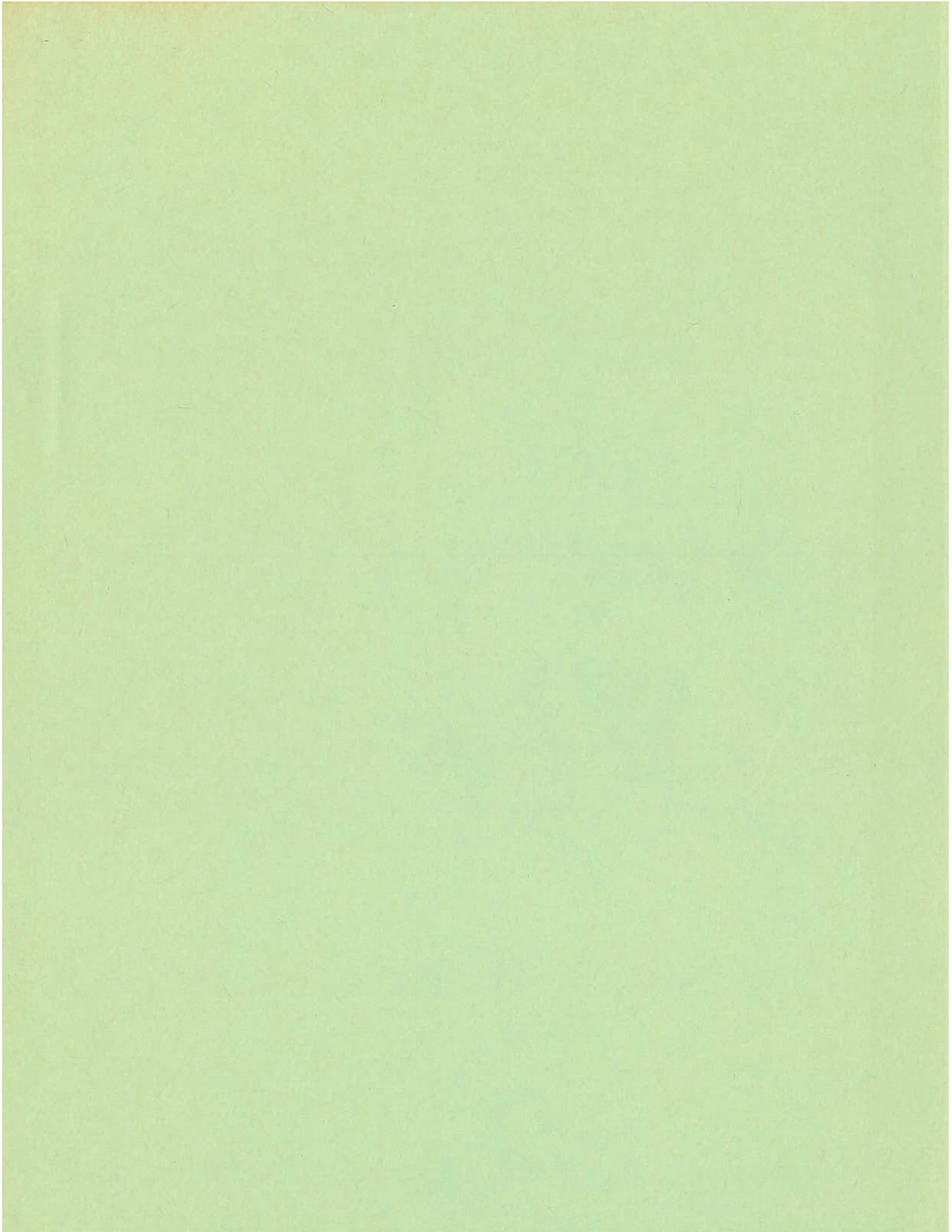
Parameter	CAS No.	Standard (1) (ug/l)	Detection Levels (ug/l)	
			GC	GC/MS
Polychlorinated Biphenyls (PCBs)	1336-36-3	0.005 (I)	0.5	
Toxaphene	8001-35-2	5	1.0	
Trichloroethylene	79-01-6	5		5
Trichlorophenol 2,4,6	88-06-2	2.0 (I)		10
Trihalomethanes (total) (2)		100		5
Vinyl Chloride	75-01-4	2		2

- (1) Standards are based on the MCL for drinking water unless otherwise noted.
- (2) Total trihalomethanes are considered the sum of the concentrations of bromodichloromethane (CAS NO. 75-27-4), dibromochloromethane (CAS NO. 124-48-1), tribromomethane (bromoform, CAS NO. 75-25-2) and trichloromethane (chloroform, CAS NO. 67-66-3).
- (3) For permit issuance and compliance purposes use Test Methods for Evaluating Solid Wastes, Vol. 1B, EPA, November 1986, Method 8280.
- (4) Organic chemicals not on this partial list are covered under section 3.11.5 (C) (1).
- (5) For routine surveillance and screening using EPA Method 625
- (I) Based on 10^{-6} Cancer risk from EPA Integrated Risk Information System.
- (L) Based on EPA life time drinking water health advisory.

GC Gas Chromatography (Pesticides EPA-Method 508/608)
 GC/MS Gas Chromatography / Mass Spectrometry (Methods 624 and 625)
 CAS No. Chemical Abstracts Service identification number.

TABLE A
GROUND WATER
CARCINOGENIC ORGANIC CHEMICALS (4)

Parameter	CAS No.	Standard (1) ug/l)	Detection Levels (ug/l)	
			GC	GC/MS
Aldrin	309-00-2	0.002(I)	0.1	
Benzene	71-43-2	5		5
Benzidine	92-87-5	0.0002(I)		50
Carbon Tetrachloride	56-23-5	5		5
Chlordane	57-74-9	0.03(I)	0.1	
Chloroethyl Ether (BIS-2)	111-44-4	0.03(I)		10
DDT	50-29-3	0.1(I)	0.1	
Dichloroethane 1,2	107-06-2	5		5
Dichloropropane 1,2	78-87-5	0.56(L)		6
Dieldrin	60-57-1	0.002(I)	0.1	
Dioxin (2,3,7,8-TCDD)	1746-01-6	2.2 X 10 ⁻⁷ (L)		0.01 ⁽³⁾ 3 ⁽⁵⁾
Diphenylhydrazine 1,2	122-66-7	0.05(I)		20
Ethylene Dibromide	106-93-4	0.0004(L)		10
Heptachlor	76-44-8	0.008(L)	0.1	
Heptachlor Epoxide	1024-57-3	0.004(L)	0.1	
Hexachlorobenzene	118-74-1	0.02(L)		10
Hexachlorocyclohexane (Lindane)	58-89-9	4	0.10	



STATE OF COLORADO

DEPARTMENT OF AGRICULTURE

700 Kipling Street
Suite 4000
Lakewood, Colorado 80215-5894
(303) 239-4100
(303) 239-4125 FAX



Roy Romer
Governor
Steven W. Horn
Commissioner
Robert G. McLavey
Deputy Commissioner

December 7 1990

Dear Organization Leader:

As the Colorado Department of Agriculture begins the process of developing a mechanism to implement the Colorado Agricultural Chemicals and Groundwater Protection Act, Senate Bill 90-126, there are numerous policy questions that must be addressed.

In order to develop a groundwater protection program that will be effective and responsive to the needs of the agricultural industry, I have been asked by the Colorado Agricultural Commission to solicit names of individuals who can represent agriculture on an advisory committee dealing exclusively with the implementation of SB 126.

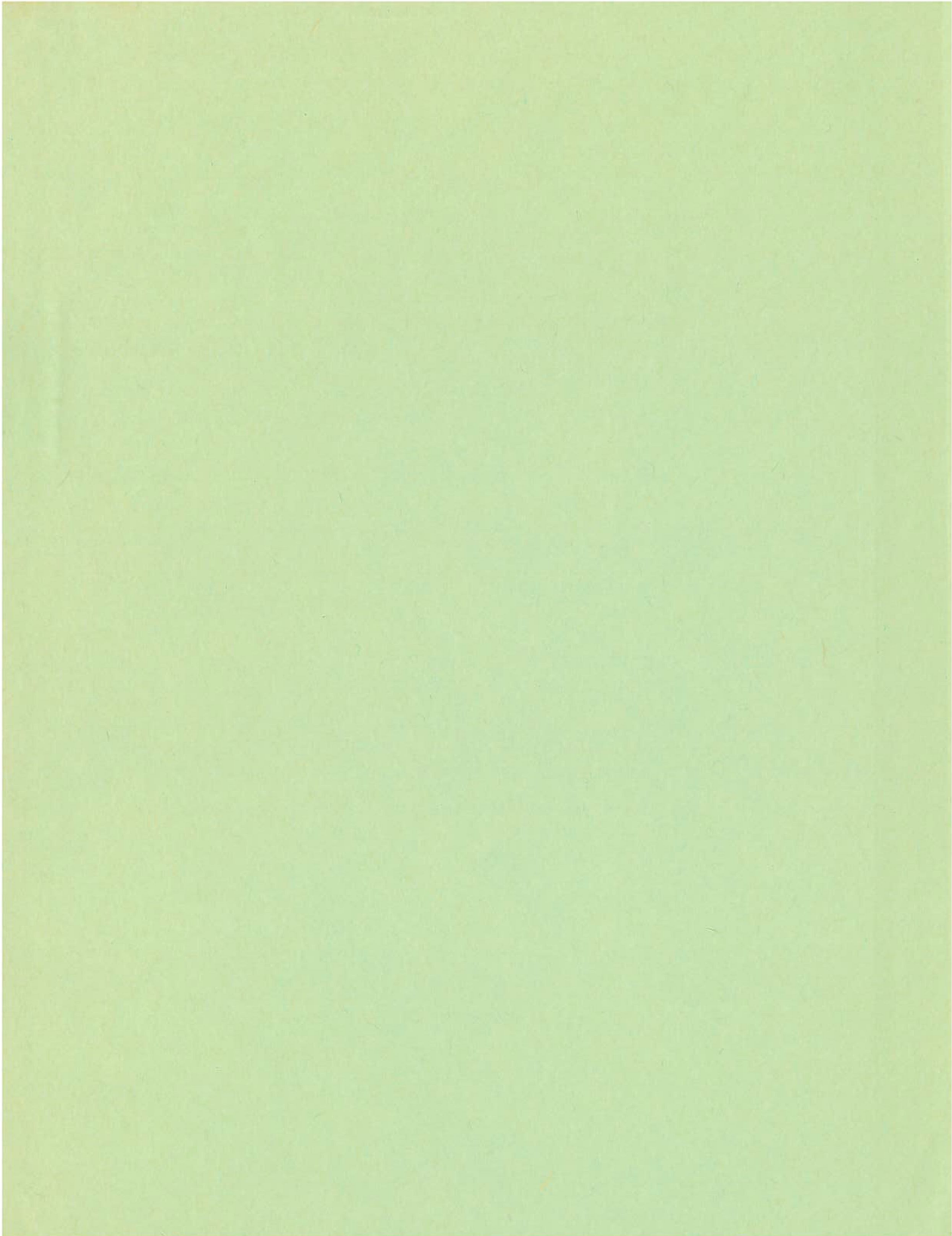
The Commission will appoint the advisory committee to be comprised of representation as follows:

- Six agricultural producers (including one chemigator);
- Two representatives from the green industry (turf farms, greenhouses, nurseries, etc.);
- Two representatives from the general public;
- One supplier of agricultural chemicals;
- One commercial applicator regulated under Section 35-10, Colorado Revised Statutes; and
- One member from the Colorado Water Quality Control Commission.

I would appreciate your suggestions of names of individuals to submit to the Commission for consideration at their next meeting on January 11, 1991. Please submit your recommendations by January 7 to Ms. Linda Coulter, Chief, Pesticides Section, Colorado Department of Agriculture, 700 Kipling Street, Suite 4000, Lakewood, Colorado 80215-5894. Thank you in advance for your assistance.

Sincerely,

Steven W. Horn
Commissioner



Vacancy Announcement

Vacancy no. 23-90 Deadline date 9/21/90

POSITION: Water Quality Extension Specialist
Colorado State University
Fort Collins, CO

This is a 12-month general faculty (non-tenure track) position with 100% Cooperative Extension responsibilities. Annual funding is provided through the newly adopted Colorado Ground Water Protection Act. The appointee will be affiliated with an appropriate academic department including agricultural and chemical engineering, agronomy, entomology or plant pathology and weed science.

The Colorado State University campus is located in the city of Fort Collins, the county seat of Larimer county. Fort Collins is a progressive community of approximately 82,000 situated 65 miles north of Denver on Interstate 25. Located at an elevation of 5,000 feet, Fort Collins has a clear dry atmosphere and generally pleasant temperature throughout the year.

DEADLINE: New position. Applications (organization application form required) and transcripts of college course work must be received or postmarked no later than September 21, 1990.

PURPOSE OF POSITION: To implement the educational provisions of the Colorado Ground Water Protection Act.

RESPONSIBILITIES AND RELATIONSHIPS: The individual in this position will work as a member of a team of professionals, under the supervision of the respective department head and the Cooperative Extension assistant director, agriculture and natural resources. Primary duties include, but are not limited to:

- training agricultural chemical users on current regulations and best management practices for chemical use including non-chemical alternatives designed to protect water quality;
- training agency personnel and the general public as described above;
- developing and distributing a compilation of best management practices, both hard copy and audio/visual;
- cooperating and interacting with other Extension personnel and agencies including the Colorado Department of Agriculture, Colorado Department of Health, Soil Conservation Service, Colorado Association of Soil Conservation Districts and Environmental Protection Agency;
- interacting with Colorado State University researchers and federal researchers including the Agricultural Research Service and U.S. Geological Survey;
- maintaining effective communication with all interested parties; and
- providing leadership and assistance with other activities as assigned.

SALARY: Commensurate with educational level and prior experience.

Appendix X

**TRAINING AND EXPERIENCE
REQUIRED**

- Completed masters degree; Ph.D. is preferred. Degree(s) may have been awarded in a number of different disciplines but course work and/or professional experience must be in an agriculturally related field with emphasis on water/environmental quality.
- Relevant areas of course work and/or experience will include soil physics, soil chemistry, plant pathology, weed science, entomology, integrated pest management, agricultural chemical transport and application technology, irrigation management, and microcomputer applications.
- Skill in working with people as individuals, groups and staff (teamwork) to accomplish individual and/or group goals as indicated by experience and references.
- Evidence of drive and initiative as demonstrated by personal experiences and previous employment (must be self-starter).
- Leadership ability as demonstrated by elected and appointed positions of responsibility.
- Ability to communicate (oral, written and listening skills) as demonstrated by formal training, experience and application materials.

DESIRABLE

- Experience in Cooperative Extension, university research and teaching, or business/industry.
- An agricultural background with knowledge of United States plant and animal production systems.
- Professional experience, knowledge and familiarity with Cooperative Extension and the land grant university system.
- Experience and familiarity with the mass media (TV, radio, newspapers, etc.)
- Familiarity with different socio-economic and ethnic groups.

BENEFITS Twenty-four working days vacation each year, 15 days sick leave. Enrollment in group health, life and accident insurance available. Public Employees Retirement Association retirement (or federal retirement may be continued), work injury benefits, and disability insurance (after first year of employment) available..

Available personal transportation required, travel allowance provided. Colorado State University provides an allowance for moving new employees.

Colorado State University is an equal opportunity/affirmative action institution and complied with all federal and Colorado State laws, regulations, and executive orders regarding affirmative action requirements in all programs. The Office of Equal Opportunity is located in Room 314, Student Services Building. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves.

Colorado State University Cooperative Extension operates in compliance with the same laws and executive orders as the University as administered by the U.S. Department of Agriculture regulations. As a part of the USDA regulations, the Cooperative Extension Equal Employment Opportunity representative is: Gail Shellberg, Extension Affirmative Action Coordinator, 1 Administration Building, Colorado State University.

Application forms and additional information may be obtained by writing to:

Milan A. Rewerts

Milan A. Rewerts
Personnel Director
Cooperative Extension
137 Aylesworth Hall, N.W.
Colorado State University
Fort Collins, CO 80523
(303) 491-6421

#23-90 9/21/90