REPORT TO THE GENERAL ASSEMBLY OF THE STATE OF COLORADO

STATUS OF IMPLEMENTATION OF SENATE BILL 90-126, THE AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT

Submitted by Steven W. Horn,
Commissioner

Colorado Department of Agriculture

December 31, 1991

Report to the General Assembly of the State of Colorado

Status of Implementation of Senate Bill 90-126, the Agricultural Chemicals and Groundwater Protection Act

In accordance with Title 25 Article 8 Section 205.5 (9), C.R.S. (1990 Supp.), the following report of the progress made in implementing the provisions of the Agricultural Chemicals and Groundwater Protection Act ("Act") is hereby provided. This report reflects progress made since the last report, dated December 31, 1990.

In the report to the Legislature, dated December 31, 1990, several goals for 1991 were identified by the cooperating agencies. The progress made toward each of the goals is detailed in the following pages. An update of activities from Cooperative Extension and the Colorado Department of Health are contained in Appendices I and II respectively.

Memoranda of Understanding

Memoranda of Understanding as provided in Section 25-8-205.5 (3)(f) and (g) of the Act have been signed for fiscal year 1991/92 between the Colorado Department of Agriculture and 1) Colorado State University Cooperative Extension (Appendix III) 2) the Colorado Department of Health (Appendix IV).

Education and Communication

A conference was held in Fort Collins on March 11, 1991, to discuss groundwater and agricultural chemical issues. This conference was held in connection with Dr. Sandra Davis' pilot project for Region VIII of E.P.A. A short video is being produced to inform the general public on groundwater quality, agricultural chemicals and the Act. This video should be available for distribution in early 1992. Information on the Act is continually being presented to the public through presentations at meetings throughout the state. A newsletter/fact sheet will be published several times throughout the year to keep the public informed. These publications will be sent to numerous interested organizations for distribution to their respective memberships.

Best Management Practices

The procedure for development of best management practices (BMPs) has been established. The BMPs will be developed at the user level through extensive local input. Priority areas in the state for BMP development have been designated with the first being the South Platte River basin from metro Denver to the Nebraska state line (Appendix V). Sites are being selected and prepared on farms in several counties along the South Platte River to demonstrate nitrogen related BMPs in irrigated corn.

Groundwater Monitoring

The first priority identified for groundwater monitoring is the South Platte River basin. This coincides with the priorities for BMP development. Locations for 100 groundwater samples in the South Platte River alluvial aquifer have been proposed. The sampling program is being closely coordinated with extension agents, conservancy districts, and local and county officials in the area. The samples will be taken by the Colorado Department of Health Agricultural Chemicals Program during the current fiscal year. These samples will be from shallow domestic wells and will be analyzed for pesticides used in the area and for fertilizers, including nitrate. Details of this sampling program can be found in Appendix VI.

Several other groundwater monitoring projects analyzing for at least one agricultural chemical, usually nitrate, are being performed by other agencies. A summary of the these projects can be found in Appendix VII.

Groundwater Data Management System

The collection, evaluation and entering of existing groundwater quality data into the groundwater quality database have been postponed by the hiring freeze imposed by the Governor on August 9, 1991. Therefore, we have been unable to meet our goal in this area. We view this as a temporary problem.

Personnel

A specialist for each of three cooperating agencies was hired and began work in mid 1991. They are:

- Reagan Waskom
  Colorado State University Cooperative Extension
  C 09 Plant Science Building
  Colorado State University
  Ft. Collins, CO 80523
  (303) 491-6103
- Brad Austin
  Water Quality Control Division
  Colorado Department of Health
  4210 East 11th Ave.
  Denver, CO 80220
  (303) 331-4552
- Mitchell Yergert
  Division of Plant Industry
  Colorado Department of Agriculture
  700 Kipling Suite 4000
  Lakewood, CO 80215-5894
  (303) 239-4140

Advisory Committee

The Colorado Agricultural Commission appointed an advisory committee of 17 individuals from the general public, producers, green industry, agricultural chemical suppliers, commercial applicators and the Water Quality Control Commission (Appendix VIII). Members are appointed for a three year term with one-third of the terms expiring each year. The committee met four times in 1991. In order to exploit the diversity of the committee, members have given presentations about their particular industry and area so the committee can become acquainted with all aspects of agricultural chemical use in Colorado. The committee identified as their first priority the need to focus program efforts along the South Platte River basin, including the development of BMPs and groundwater monitoring. They have also agreed upon a procedure for the BMP development. This committee will help devise a groundwater protection program that will be effective and responsive to the needs of the agricultural industry and advise the department on numerous policy questions that will arise. A newsletter/fact sheet will be published and sent to the advisory committee as a vehicle to provide them information as well as to keep them informed of the program's progress.

Storage Regulations

Proposed federal regulations for bulk storage of agricultural chemicals were not released in 1991 as originally anticipated. It appears these regulations are still several years away. In order to continue the pro-active posture and achieve the goal of the Act (to protect groundwater and the environment from impairment or degradation) a subcommittee of the advisory committee has been formed to begin drafting regulations for bulk storage facilities and mixing and loading areas as required in section 25-8-205.5 (3) (b) of the Act. We feel we have sufficient information on the proposed federal regulations to assure our regulations will conform to what will eventually be proposed at the federal level. By proceeding with state storage regulations Colorado will wield more influence on federal regulations. The subcommittee will put together regulations that will be submitted to the advisory committee for review and revision. The proposals for the regulations will then be presented at professional organization and industry meetings to solicit local input. The proposals will then be revised, and it is expected the formal rule making process will begin in 1993. This approach will provide two opportunities for public input into the process.

Pilot State Project

Dr. Sandra Davis of Colorado State University has completed her pilot project for the U.S. Environmental Protection Agency. Based on her work with the State of Colorado and on conversations with other states, she has developed a model on how to implement an agricultural chemicals and groundwater protection program. Dr. Davis' survey work throughout the state has given us insight on how to proceed to solicit local input as well as

identifying numerous agencies and individuals concerned with water quality in Colorado. This information has been, and will continue to be, used by the implementing agencies. Dr. Davis' report is lengthy and although not included in the appendices, it is available and can be provided upon request.

Major Issues

The major problem encountered this year is the statutory language in the Act dealing with rules and regulations for bulk storage sites and mixing and loading areas. The language in the Act is not consistent with the manner in which the terms are commonly used in the industry. This is causing difficulty in developing cohesive rules and regulations. The language has no similarity to language used in other states having similar laws. We anticipate difficulties when it becomes necessary to incorporate the federal regulations when they are completed. A continuing problem is the unwillingness among many agencies at all levels of government to share data already developed concerning groundwater quality.

Goals for 1992 Determined

The following goals for 1992 have been established:

- Develop localized BMPs for irrigated corn producers;
- Develop a general list of BMPs for Colorado agricultural chemical users in cooperation with U.S. Soil Conservation Service;
- Continue disseminating information on the Act and groundwater protection to special interest groups in Colorado;
- Develop educational resource materials for groundwater education particularly a slide set focusing on urban uses of agricultural chemicals;
- Set up demonstration plots in the South Platte River area for displaying improved nitrogen and water management to farmers;
- Set up demonstration sites in the front range to encourage improved agricultural chemical and water management to homeowners and urban applicators;
- Hold in-service training for chemical applicators, agency personnel, etc.;
- Meet with local groups to develop localized BMPs;
- Complete video and slide sets and make available to general public;
- Complete the analysis and report of the 100 samples taken in the South Platte River alluvium;
- Follow up sampling sites on the South Platte River where agricultural chemicals were found above the maximum contaminant level.
- Begin identifying sampling sites on the Arkansas River;
- Assess vulnerability models to identify one most appropriate to Colorado;
- Integrate results of other projects to achieve goals in the Act;
- Have rules and regulations for bulk storage sites and mixing and loading areas approved by the advisory committee and presented at public meetings; and
- Begin publishing and distributing the newsletter and fact sheet.

APPENDICES

TABLE OF CONTENTS

SB 126 ANNUAL REPORT
Cooperative Extension

Accomplishments:

1. Gave presentations of SB 126 and groundwater quality to various audiences throughout the state including: commodity groups, licensed applicators, agricultural producers, urban chemical users.

2. Began production of an educational video tape on water quality and SB 126. This tape is slated for completion in December 1991.

3. Prepared radio and newspaper releases describing the Act for distribution statewide through the CSU Public Relations Department media contacts.

4. Participated as member of the SB 126 Implementation Task Force. Through regular meetings, activities were planned and coordinated.

5. Hired Reagan Waskom as a full-time Water Quality Specialist to coordinate Extension's education and training activities.

6. Prepared a slide set to be used as visual aid in presenting SB 126 information to audiences.

7. Initiated a demonstration project in the South Platte River Basin to educate farmers on proper use of nitrogen fertilizer and irrigation as related to water quality.

8. Conducted in-service training for Cooperative Extension agents and other agency personnel on water quality issue and SB 126.

9. Dick Tinsley researched and prepared a written report on Best Management Practices in Colorado. Dick was on contract to Extension to investigate this topic and left for an international assignment when a full-time specialist was hired. Dick's research suggested a method of developing BMPs at the local level with significant local input into the outcome. These reports are excerpted in the appendix.

10. Monthly newsletter articles on water quality, SB 126, and BMPs were produced for the Agronomy Department Extension Newsletter and the Ag Engineering Extension Newsletter. These reports are distributed throughout Colorado to extension agents and their clientele.

11. Lloyd Walker represents Cooperative Extension on the Bulk Storage and Handling Subgroups to provide technical expertise and engineering guidelines for the development of rules and regulations.

Attachments: Excerpt of Dick Tinsley's BMP Report
BMP Development Plan

EXCERPTS FROM DR. R.L. TINSLEY'S

STATUS REPORT ON THE DEVELOPMENT OF BMPs FOR COLORADO

Under the provisions of SB 90-126, agricultural chemicals are considered to be both fertilizers and pesticides. The latter includes insecticides, herbicides, fungicides, etc. At present, there are few reports of Colorado aquifers with pesticide contamination, probably in part due to limited analysis for these chemicals. The most serious presently known hazard is that of sporadically occurring high nitrate levels in Colorado groundwater. The aquifers that are presently considered the highest priority problem are the enclosed aquifer in the northern San Luis Valley and the alluvial aquifers of the South Platte and Arkansas Rivers.

Movement of Agricultural Chemicals

Before agricultural chemicals can become a groundwater hazard, they must move from the soil surface to the watertable. Most of the wetting fronts moving chemicals into the groundwater are a result of climatic events, irrigation applications, or some combinations of the two. Once an aquifer is contaminated by agricultural chemicals, it is extremely difficult to restore.

Trends in Agricultural Chemical Usage

As I review the current trends in agricultural chemical usage, I am impressed with what is happening. There have been some major changes in both the amount of chemicals being applied and the formulation of those chemicals. Changes in pesticide chemistry has resulted in more pest-specific compounds that can be applied at much lower rates. All of this has been in a direction that is more protective of the environment and the groundwater.

In addition to the reduction in the amount of chemicals being applied, there have been some major changes in the handling of chemicals and containers. There are now several methods available to reduce chemical exposure to the environment. These would include the use of solu-paks, lock & load, and recycling of used chemical containers.

Trends in Water Management

The trends in water management in Colorado that would reduce the movement of agricultural chemicals are not as dramatic as the

trends in chemical applications. There is a very limited movement in the surface irrigation toward the use of surge irrigation. This is mostly in the Grand Junction area. Surge is accepted to a lesser extent on the Eastern Slope, even though the Northern Colorado Water Conservancy District is actively promoting its use.

There are also trends in the center pivots towards lower pressure nozzles that are underslung from the main pipe. These allow a more uniform application closer to the ground or crop canopy. They reduce drift and evaporation, assuring higher efficiency applications. There is also more use of irrigation scheduling with center pivots in which growers are effectively working with consultants.

Developing Best Management Practices for Colorado

With Colorado's diverse agriculture sector that needs to be preserved, it is necessary that the practices identified and promoted under SB 90-126 be economically feasible and accepted within the area they are being encouraged. Instead of a top-down presentation of best management practices, I propose a facilitated discussion format with different user groups. This format is intended to provide a high level of local input into how to protect the groundwater, and provide the local users with a sense of ownership in the outcome. While the process tends to endorse the best of current management practices, it does avoid promoting practices that are not acceptable in the area. After the discussions are completed, the session can be summarized and distributed to the participants and other concerned persons via the normal Extension Service distribution system. Since implementation of BMPs is presently voluntary, I think this procedure has the best prospects of being accepted by the users.

Approach to Best Management Practices

There are two general approaches to developing and promoting BMPs that I can conceive. The one I would encourage is to identify key practices that should be either encouraged or discouraged and concentrate on these practices.

The other alternative would be to develop a complete series of fact sheets specifying definitive practices for all user conditions in the state. In Colorado this could rapidly become overwhelming, as separate fact sheets would be required for every crop under all possible soil types and each water management system. This would result in a lot of fact sheets, but may not actually be necessary.

Management Practices for Encouragement:

-Nitrogen Budgeting
-Nitrification Inhibitors
-Ridge Banding of Chemicals
-Split Applications
-Irrigation Scheduling
-Irrigation Efficiency
 lower pressure sprinkler systems
 surge irrigation systems
-Use of Consultants

Practices for Discouragement:

-Metering Nitrogen into Ditchwater
-Excessive Nitrogen fertilization

SUMMARY

The Colorado Agricultural Chemical and Groundwater Protection Act is a preventive effort to assure Colorado's groundwater remains safe for future generations. The bill is being implemented in a background of generally environmentally aware users, including both rural and urban sectors. Few agricultural chemical users would willfully or knowingly endanger the environment. However, most producers are operating on a small margin of return and are cautious about having management practices imposed that may reduce their profit margins.

Over the last several years the trends in chemical usage have been toward more efficient use of chemicals, resulting in a reduction in the amount of chemicals being applied, as well as better timing and placement of those that are applied. All these trends will help reduce the risk of agricultural chemicals contaminating the groundwater.

The trends in the water management of center pivot and other sprinkler systems has also been toward more efficient resource use. However, improvement in surface irrigation has not been as dramatic. It is probably in surface irrigated areas that the most severe groundwater quality problems will occur that will need to be addressed under SB 90-126. As this will be associated with water rights, it will also be the most difficult to address. Water rights are a very sensitive issue that have previously been considered without much result. I think the use of surface water will eventually have to be addressed and resolved in a manner that protects the interests of all concerned.

Finally, I suggest that the development of BMPs be driven by an interactive process which includes Colorado applicators and farmers. My recommendation would be to concentrate on selected practices that should be either encouraged or discouraged, rather than making an exhaustive set of BMP fact sheets.

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Division
Ag Chemicals Program

Introduction

The Agricultural Chemicals Program provides the ground water monitoring and aquifer vulnerability analysis required by the Agricultural Chemicals and Ground Water Protection Act. Prior to passage of this Act, a lack of ground water quality data had prevented an accurate assessment of impacts to ground water quality from agricultural operations. This program will provide current, high quality ground water quality data that will assist the Commissioner of Agriculture in determining if agricultural operations are impacting ground water quality. The program also assists the Commissioner in identifying those aquifers that are vulnerable to contamination. Steps can then be taken to prevent ground water contamination before it occurs. This approach has always proven to be more cost effective than clean-up or water treatment before use. The philosophy adopted is to protect ground water and the environment from impairment or degradation due to the improper use of agricultural chemicals while allowing for their proper and correct use.

Staffing

In mid 1991, Brad Austin took over responsibility for the functions assigned to the Water Quality Control Division by the Agricultural Chemicals and Ground Water Protection Act (SB 90-126).
Brad holds Master of Science degrees in Geology (Hydrogeology) and Civil Engineering (Water Resources). Brad has worked with Colorado ground water for the past three years, both in the Hazardous Materials and Water Quality Divisions of the Department of Health.

In September, 1991, John Colbert joined the Ag Chemical Program as a Physical Science Technical Assistant. John holds a Bachelor of Science in Physics with a minor in Geology. John has previous experience with the Laboratory at the Department of Health.

Update on collecting existing Ground Water Quality Data

In the FY 91 Memorandum of Understanding, the Water Quality Control Division agreed to pursue collecting, evaluating, and entering into a water quality database, all existing ground water

planned to be performed by hiring a 6-month temporary, but the state hiring freeze prevented filling the position. The Ag Chemical Program is now perusing completion of this agreement through an outside contract.

Update on action by the Water Quality Control Commission

Another factor affecting the collection of existing ground water quality data from outside sources is the recent action by the Water Quality Control Commission. At the May, 1991 hearing, five geographic areas were proposed for the establishment of ground water classification and standards. They are the South Platte River valley aquifer, the Arkansas River valley aquifer, the Denver Basin aquifers, the High Plains (Ogallala) aquifer, and the San Luis Valley aquifers.

The Water Quality Control Commission established an "Interim Narrative Standard" for these five areas effective October 30, 1991. This narrative standard requires ground water quality to be maintained at the less restrictive of (1) the existing ambient quality as of 10/30/91 or (2) the drinking water and agricultural criteria in "The Basic Standards for Ground Water".

Parties may present their data to the appropriate implementing agency for evaluation and determination of the existing ambient water quality. The Commission intends that agencies with authority to implement this standard will exercise their best professional judgment as to what constitutes adequate information to determine or estimate existing ambient quality. Data generated after 10/30/91 may be used for establishing the standard if no new or increased sources of contamination have been introduced to the area. If available information is not adequate to set the standards, the ground water quality is assumed to meet the criteria in "The Basic Standards for Ground Water". It is hoped that this action will encourage those parties holding ground water quality data to submit it for review. The applicable standard will revert to the generally more restrictive numerical limits in the Basic Standards, if available information is not adequate to determine existing ambient water quality.

Adoption of the "Interim Narrative Standard" provides assurance that agricultural operations will not find themselves in violation of standards as a result of past practices.

The "Interim Narrative Standard" is not expected to have a significant impact on SB-126 implemention, which focuses on preventing or mitigating the pollution of ground water.

Ground Water Monitoring Program

The FY-92 monitoring program will provide for groundwater quality monitoring in one of Colorado's major agricultural regions, the South Platte River Valley. The monitoring program will include sample collection, laboratory analysis, and data analysis and storage. This sampling program will provide the basis for determining a groundwater quality baseline for this region.

The Ag Chemicals Program of the Water Quality Control Division will sample 100 domestic wells from 80th Avenue in Commerce City to Julesburg. The sampling will help to establish the possible impacts and magnitude of agricultural chemical contamination. This region is characterized by intense irrigation agriculture; it contains both surface water diversions and center-pivot systems tapping a relatively shallow alluvial aquifer.

Sampling of each well selected will occur once in the spring of 1992. The sampling will take place in late May or early June. Wells are being selected for sampling based on the following factors: permitted for domestic or household use, located within the valley fill aquifer of the South Platte River or one of its major tributaries, and a well depth of less than 150 feet. Much of the preliminary planning has been done by Brad Austin of CDH who has coordinated closely with extension agents, Conservancy Districts, and local officials in the area. Sampling will be performed by Brad Austin and John Colbert of CDH. Well sampling will follow the protocols under development by the ground water workgroup of the nonpoint source task force.

Well samples will be analyzed for basic inorganics and selected pesticides. Concentrations of all basic inorganic parameters, including nitrate, plus selenium and TDS, will be determined. The inorganic analysis will be performed by the laboratory at CSU with a number of samples split with the CDH laboratory for QA/QC evaluation. Past work by the division has shown fairly consistent results between the two laboratories.

In addition to inorganic parameters, pesticides will be analyzed for in some or all of the groundwater samples collected this spring. The final list of pesticides to be analyzed for has yet to be determined. Selection will be based on those substances that have been, or are currently being utilized in the South Platte Valley according to agricultural officials there. Negotiations have begun with the Organics Laboratory at CDH to reach the lowest cost per sample achievable. It is anticipated that due to the magnitude of this sampling event an outside laboratory will also have to be utilized.

The results from this sampling program will be entered into the CDH Groundwater Quality Data System recently developed at CDH. 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 concerning potential impacts to ground water quality from agriculture in the South Platte Valley.

A map of the study area is provided in Figure 1, and a schedule of activities in Figure 2.

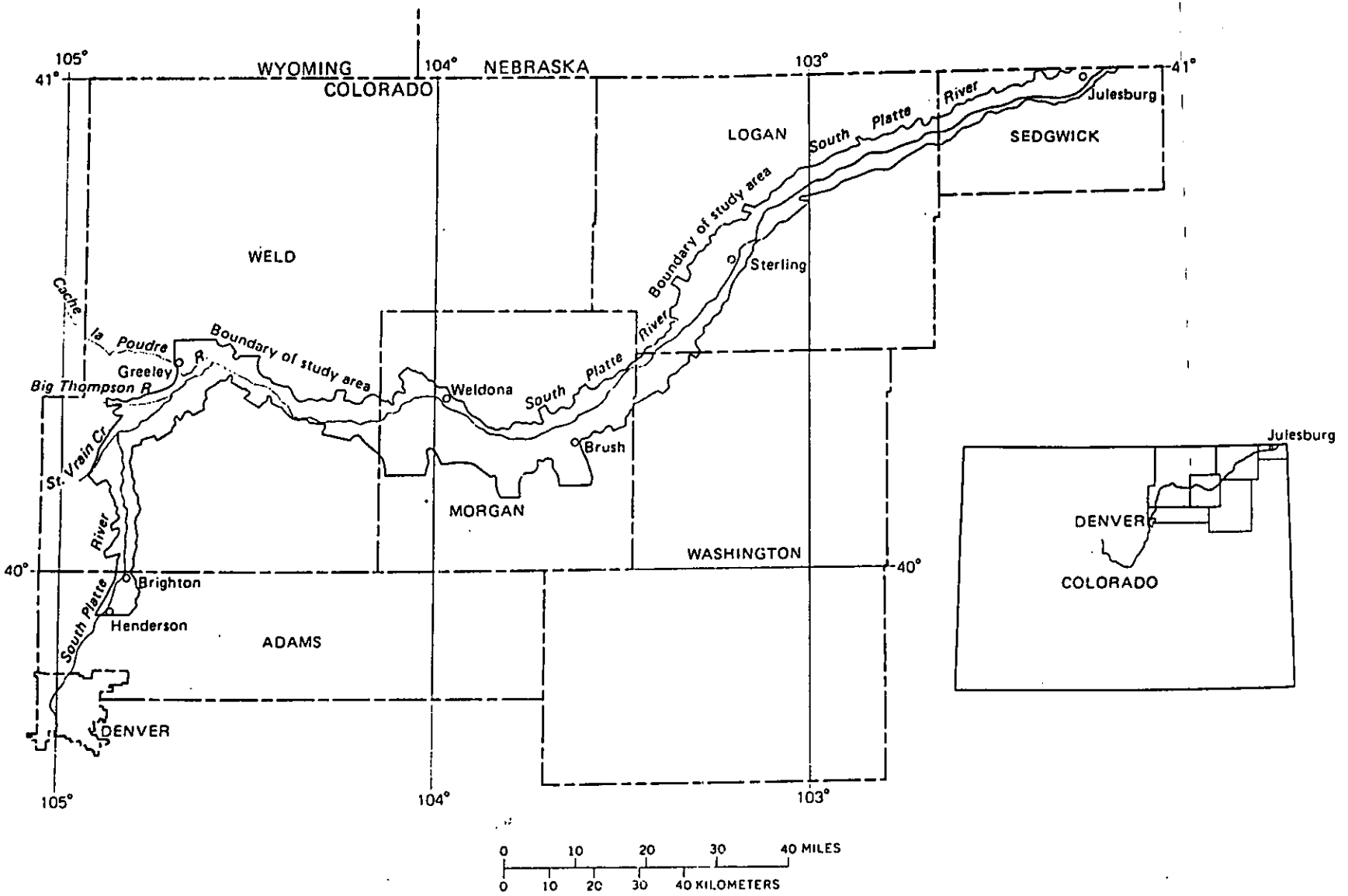

Figure 1. – Index map showing location of study area.

Schedule of Activities FY-92 Monitoring Program

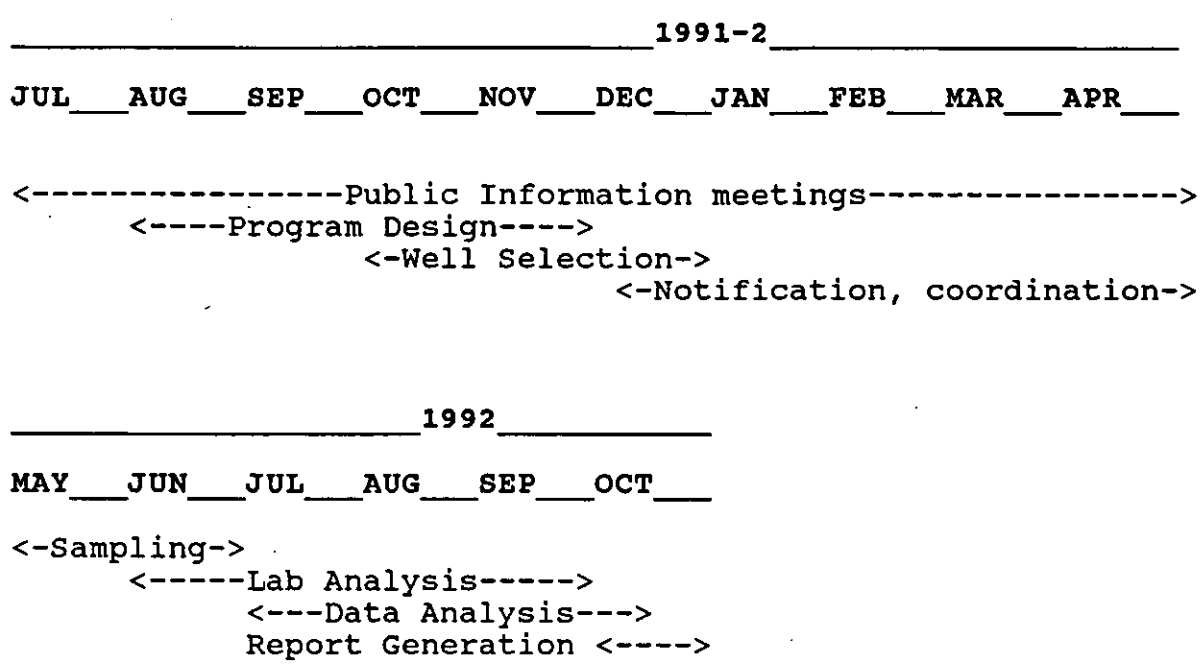

Figure 2 - Schedule of activities FY-92 monitoring program

92-8811

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

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, 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 groundwater 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 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 and produce a 10 to 20 minute educational videotape on the basics of groundwater, the water quality problem and alternative approaches and practices to minimize the effect of agricultural chemicals on groundwater.

(b) Begin the compilation of best management practices (BMP's) for the South Platte River basin for both rural and urban areas. The resulting BMP's will be written up in fact sheets for local distribution.

(c) Begin devising a work plan and locating sites to establish demonstration plots and other educational programs to exhibit BMP's for the South Platte River basin.

(d) Conduct meetings with agricultural chemical users on BMP's using the materials developed in 1(a) of this M.O.U. and in 1b 1(c) of the amendment to the Memorandum of Understanding between Colorado Department of Agriculture and Colorado State University dated June 28th, 1991.

(e) Items 1(a), (b), (c) and (d) will be completed by June 30, 1992. The agreement may be renewed annually contingent upon funding from the general assembly.

(f) 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 the Agricultural Chemicals and Groundwater Protection Act, including, but not limited to, items 1(a), (b), (c) and (d) no later than November 1, 1991.

(g) 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: C.S.U. agrees that the C.D.A. has the right to conduct periodic evaluations of the development of materials in item 1(a), (b), (c), (d) and (f).

(c) Time of Performance: The project contemplated shall commence upon the execution of this memorandum of understanding and shall be terminated on June 30, 1992.

(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. C.S.U. shall retain the documentation to support the billing.

(e) Maintenance of Records: C.S.U. shall maintain all records, documents, communications, and other materials which pertain to the operation of programs 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 a available for a period of three years following the termination of this agreement for audit in compliance with State Fiscal Rules.

Colorado State Board of Agriculture
by and through
COLORADO STATE UNIVERSITY

James F. Brown
Assistant V.P. for Research

8/15/91
DATE

COLORADO DEPARTMENT OF AGRICULTURE

Steven W. Horn
Commissioner

8/22/91
DATE

APPROVALS:
STATE CONTROLLER
CLIFFORD W. HALL
BY Christine A. Trujillo

92-0010

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) 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 State Engineer's Office, U. S. Geological Survey, Colorado Geological Survey, Colorado State University, the U. S. Environmental Protection Agency, water conservancy districts, the Soil Conservation Service, et. al.

(b) Input applicable data from 1(a) into the Agricultural Chemicals Groundwater Quality Data Base (ACGWQDB).

(c) Collect and analyze 100 groundwater samples from the South Platte River basin and the Arkansas Valley River basin for agricultural chemicals. If needed, monitoring wells may be installed.

(d) Report the results of the analyses from 1(c) to the Commissioner and input the data into the ACGWQDB.

(e) Begin development of the Colorado Aquifer Vulnerability Model by: evaluating models developed by other states; reviewing research at Colorado State University and other states; acquiring copies of those models when available; determining data needs and availability; evaluating suitability for the Colorado environment. Begin identifying the state's groundwaters most vulnerable to the potential contamination from agricultural chemicals.

(f) Maintain the ACGWQDB and make the data available to interested parties.

(g) Items 1(a), (b), (c), (d), (e), (f) shall be completed by June 30, 1992.

(h) Continue to work in conjunction with the C.D.A. and C.S.U. Cooperative Extension to identify the agencies involved in groundwater

protection; consult on the development and refinement of best management practices; assist in defining agricultural management areas as needed; and provide a written report detailing progress toward implementation of the Agricultural Chemicals and Groundwater Protection Act (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), (d), (e) and (f) no later than November 1, 1991.

(i) Indirect costs shall not exceed $12,782. The indirect costs cannont be used in the division of Water Quality Control as annotated in SB 91-227 (the long bill) pages 49 and 50, but shall go to the Administration and Support in the Department of Health.

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 progress made toward completion of items 1(a), (b), (c), (d), (e) and (f).

(c) Time of Performance: The project contemplated shall commence upon the execution of this memorandum of understanding and shall be terminated on June 30, 1992. 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 one hundred fifty-six thousand five hundred twenty-four dollars ($156,524), one hundred forty-three thousand seven hundred forty-two dollars ($143,742) of which is direct program costs, and twelve thousand seven hundred eighty-two dollars ($12,782) in indirect costs which shall be used as outlined in 1(i). Payments shall be made upon receipt by the C.D.A. of billings. C.D.H. shall retain documentation to support the billing.

(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 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

J. David Holm
Director

5/22/91
DATE

COLORADO DEPARTMENT OF AGRICULTURE

Steven W. Horn
Commissioner

DATE

APPROVALS:
STATE CONTROLLER
CLIFFORD W. HALL
BY Christine A. Trujillo

DEVELOPMENT PLAN - COLORADO BEST MANAGEMENT PRACTICES

1. Prioritize efforts to begin with most serious problems first. High priority areas would include:

   - South Platte River Basin including Denver Metro area
   - San Luis Valley (Being addressed by SLV WQ Demo Project)
   - Arkansas River Basin (Being addressed by Patterson Hollow HUA)
   - Ogallala aquifer / Center pivot areas
   - Front Range Urban Area
   - Front Range Rural Areas

2. Develop BMPs for nutrient and pesticide use in localized situations. Best Management Practices will be identified by:

   A. Working with other agencies in Colorado to develop a coordinated set of BMPs.

   B. Meeting with local Ag chemical users to develop localized BMPs.

3. Disseminate general and local guidelines for proper use of Ag chemicals in agricultural and urban settings.

   A. Demonstrate use and feasibility of BMPs on Colorado farms and urban lands.

   B. Promote BMPs on local and statewide basis though mass media, publications, and extension networks.

Ground Water Monitoring Program

The FY-92 monitoring program will provide for groundwater quality monitoring in one of Colorado's major agricultural regions, the South Platte River Valley. The monitoring program will include sample collection, laboratory analysis, and data analysis and storage. This sampling program will provide the basis for determining a groundwater quality baseline for this region.

The Ag Chemicals Program of the Water Quality Control Division will sample 100 domestic wells from 80th Avenue in Commerce City to Julesburg. The sampling will help to establish the possible impacts and magnitude of agricultural chemical contamination. This region is characterized by intense irrigation agriculture; it contains both surface water diversions and center-pivot systems tapping a relatively shallow alluvial aquifer.

Sampling of each well selected will occur once in the spring of 1992. The sampling will take place in late May or early June. Wells are being selected for sampling based on the following factors: permitted for domestic or household use, located within the valley fill aquifer of the South Platte River or one of its major tributaries, and a well depth of less than 150 feet. Much of the preliminary planning has been done by Brad Austin of CDH who has coordinated closely with extension agents, Conservancy Districts, and local officials in the area. Sampling will be performed by Brad Austin and John Colbert of CDH. Well sampling will follow the protocols under development by the ground water workgroup of the nonpoint source task force.

Well samples will be analyzed for basic inorganics and selected pesticides. Concentrations of all basic inorganic parameters, including nitrate, plus selenium and TDS, will be determined. The inorganic analysis will be performed by the laboratory at CSU with a number of samples split with the CDH laboratory for QA/QC evaluation. Past work by the division has shown fairly consistent results between the two laboratories.

In addition to inorganic parameters, pesticides will be analyzed for in some or all of the groundwater samples collected this spring. The final list of pesticides to be analyzed for has yet to be determined. Selection will be based on those substances that have been, or are currently being utilized in the South Platte Valley according to agricultural officials there. Negotiations have begun with the Organics Laboratory at CDH to reach the lowest cost per sample achievable. It is anticipated that due to the magnitude of this sampling event an outside laboratory will also have to be utilized.

The results from this sampling program will be entered into the CDH Groundwater Quality Data System recently developed at CDH. 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 concerning potential impacts to ground water quality from agriculture in the South Platte Valley.

A map of the study area is provided in Figure 1, and a schedule of activities in Figure 2.

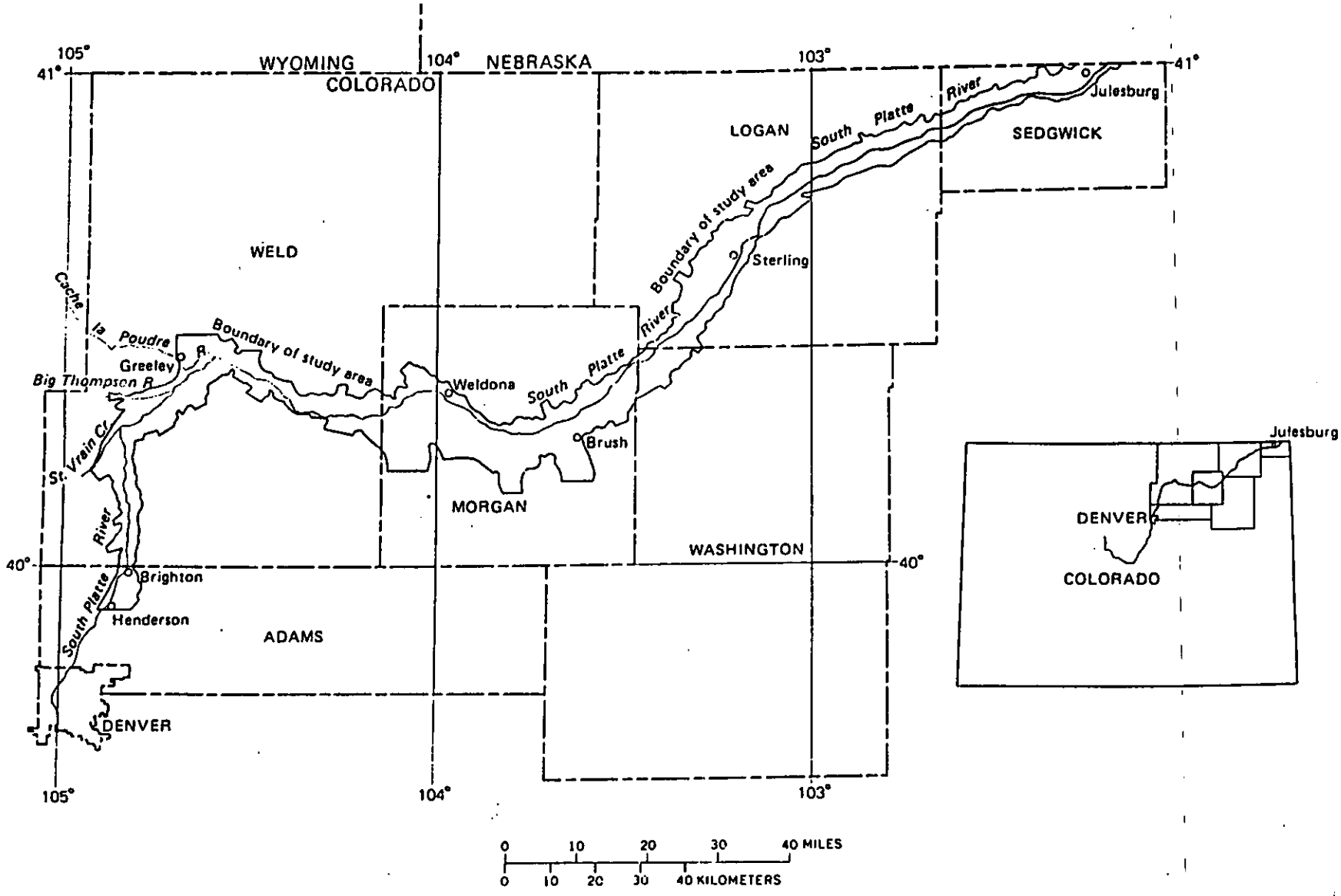

Figure 1. – Index map showing location of study area.

Schedule of Activities FY-92 Monitoring Program

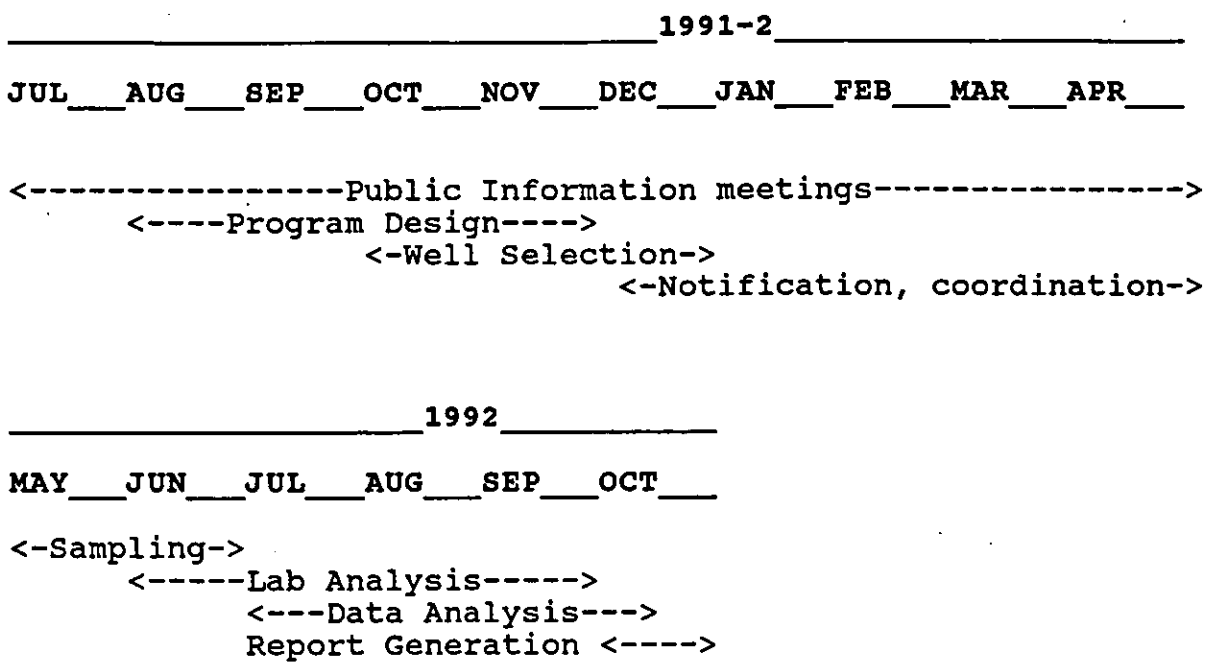

Figure 2 - Schedule of activities FY-92 monitoring program

COLORADO GROUND WATER SAMPLING PROGRAMS

Agency	Area	Date	Analysis	No. Wells
Colo. Dept. Health Ag-Chem Program	South Platte R.	Spring 92	Inorg/Pest	100
State Engineers Office	West Slope	Summer 92	Nitrate, Methane	60
US Geo. Survey Nat. Water Quality Assessment	South Platte R. Rio Grande R.	Summer 92	Inorg, Org, Trace, Pest	?
Central Colo. Water Conservancy Dist.	District	Summer 91	Nitrates, Imuno Assay	50
North Front Range Water Quality Assoc.	Weld County	Summer 91	Nitrates,Inorg	110
CSU	San Luis Valley	Summer 91	Pest, Inorg	?
Oil & Gas Conservation Commission	LaPlata County	Summer 91	Methane, Inorg Nitrates	?
Colo. Dept. Health Drinking Water	Public drinking water supplies	Spring 93	Pest	?
Colo. Dept. Health Non-Point Source	West Slope	Summer 92	Inorg, Pest	45
Lowr S. Platte Water Conservancy Dist.	Lower S. Platte Morgan, Logan, Sedgwick Co.	Summer 92	Nitrates, Inorg	50

Inorg - Inorganic chemicals (calcium, chloride, sodium, etc.)
Pest - Pesticides
Org - Organic chemicals (industrial solvents)
Trace - Trace minerals

AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT ADVISORY COMMITTEE

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