

**REPORT TO THE
GENERAL ASSEMBLY
STATE OF COLORADO**

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

**Submitted by Robert G. McLavey
Acting Commissioner
Colorado Department of Agriculture
December 31, 1993**

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, 1992.

In the report to the Legislature dated December 31, 1992, several goals for 1993 were identified by the cooperating agencies. The progress made toward each of the goals is detailed in the following pages.

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 1993/94 between the Colorado Department of Agriculture and: 1) Colorado State University Cooperative Extension (Appendix I); and 2) the Colorado Department of Health (Appendix II).

Education and Communication

A short video entitled Protecting Colorado's Groundwater is available to inform the general public on groundwater quality, agricultural chemicals and the Act. This video may be borrowed from the Department of Agriculture or copies may be purchased from the CSU bulletin room. In order to keep the advisory committee and interested organizations informed of activities concerning the program a newsletter was developed. The newsletter is published several times a year to present current information on the program. Also, fact sheets are prepared to provide informa-

tion on the program and are being distributed at meetings, conferences and trade shows (Appendix III). A display board was developed and is being utilized at conferences and trade shows to provide information on the program. Information on the program is continually being presented to the public through radio shows, mass media, press releases and at presentations at meetings throughout the state.

Best Management Practices

The procedure for the development of best management practices (BMPs) has been established. The BMPs are being developed at the user level through extensive local input. The San Luis Valley and the South Platte River Basin from Denver to the Nebraska state line are the first two priorities for BMP development. A general BMP notebook for Colorado Agriculture is being published to guide the local work groups. The localized BMPs for the San Luis Valley will be published this year in cooperation with the USDA Water Quality Project and the Soil Conservation Service. The localized BMPs for the Front Range/South Platte area are in process (Appendix IV).

Demonstration Sites and Field Days

Seven (7) fields in the South Platte River Valley were selected and used to demonstrate improved nitrogen management techniques in irrigated corn. Field days were held at three of the sites to demonstrate BMPs. Demonstration plots and field days will be continued in the South Platte River Basin in 1994 (Appendix IV).

Groundwater Monitoring

In 1992, 96 shallow private domestic use wells in the South Platte River alluvial aquifer were sampled. The wells were located from Denver to Julesburg. The samples were analyzed for pesticides used in the area and for commercial fertilizers, including nitrate. The sampling indicated nitrate concentrations exceeded the drinking water standard (10 mg/l) in 34% of the wells. The majority of the wells that exceeded the drinking water standard were located in three regions centered around Gilcrest, Wiggins and Ovid. Follow-up sampling was performed in 1993 in western Morgan and Sedgwick Counties. Because of the extensive monitoring in the Gilcrest area being conducted by other agencies this area was not resampled. The resampling confirmed the results from 1992 that these areas have groundwater with nitrate in excess of the drinking water standard and also indicated there

has been little or no change in nitrate concentrations during the past year.

Of the 96 wells sampled only one well was found to exceed the drinking water standard for a pesticide, however in 27% of the wells the herbicide atrazine was detected (Appendix V).

In 1993, 93 shallow private domestic use wells in the San Luis Valley were sampled for pesticides and nitrates. The complete results will not be available until late winter, but preliminary data indicate pesticide contamination to be minimal. (Appendix V).

All of the sampling is closely coordinated with extension agents, water conservancy districts, and local and county officials in the area. Many of these agencies have groundwater monitoring projects analyzing for at least one agricultural chemical, usually nitrate (Appendix VI).

The aquifer vulnerability model developed by CSU to assess groundwater vulnerability to agricultural chemicals will be field tested in the San Luis Valley in 1994. If proven effective, the model will be used to assist in prioritizing areas for groundwater monitoring and BMP development (Appendix V).

Groundwater Data Management System

The collection, evaluation and entering of existing groundwater quality data from all available sources is ongoing. The data that is currently available has been or is in the process of being entered into the groundwater quality database at the Department of Health. Other data has been generated however it remains unavailable due to concerns about privacy and future use of the data (Appendix V).

Advisory Committee

The advisory committee continues to be an integral part of the implementation of this program by providing input from the many facets of the agricultural community and the general public that they represent (Appendix VII). The committee met four times during 1993. Two of these meetings were two days in length. The majority of the meeting time was spent reviewing and revising the statewide BMP chapters for nitrogen, manure and irrigation. The committee provided extensive input into the wording of the amendment to the law which changed the thresholds for determining compliance with the proposed rules and regulations for bulk

storage facilities and mixing and loading areas as well as numerous other issues.

Coordination

Coordination with other projects and programs relating to agricultural chemicals and groundwater is an essential part of the implementation of the Act. All three agencies work continually to keep abreast of other programs both governmental and private so information can be incorporated into the implementation of the Act as well this programs information passed on to other agencies and organizations. Input is sought in all phases of the implementation of this program to avoid duplication of efforts, costs and to insure decisions are made with the most complete knowledge available.

Storage Regulations

The drafted rules and regulations required in section 25-8-205.5 (3)(b) of the Act were presented at 13 meetings throughout the state to receive input. The majority of the comments centered around the wording in the law which established the thresholds for compliance and the difficulty it presented in determining whether compliance was necessary. As was stated in previous reports to the legislature, the wording was the major issue because it was inconsistent with the manner in which the terms are commonly used in industry. The public comments reflected this inconsistency. During the 1993 legislative session, the law was amended to clarify the wording to make it consistent with industry usage. This clarification has allowed progress to continue on developing the regulations. Comments on other issues in the drafted regulations were evaluated and changes were made as necessary. The formal hearings will now be held in February 1994. The program continues to stay abreast of information concerning the development of federal regulations in order to prevent a conflict with regulations that will eventually be enacted at the national level.(Appendix VIII).

Major Issues

Of the two major issues identified in the past reports to the legislature, one has been addressed by the amendment to the law mentioned above affecting the storage regulations. The second issue of the unwillingness among many agencies both public and private to share groundwater quality data already developed due to concerns about privacy and future use of the data has not presented any major problems this year.

Goals for 1994 Determined

The following goals for 1994 have been established:

- Continue the development of localized BMPs for irrigated crops in the South Platte River Basin;
- Complete development of the localized BMPs in the San Luis Valley for the major crop rotation patterns;
- Complete the production of a general BMP notebook for Colorado Agriculture;
- Coordinate an interagency field day to deal with water quality issues in the South Platte River Basin.
- Continue demonstration plots in the South Platte River area for displaying improved nitrogen and water management to farmers;
- Continue developing educational resource materials for groundwater education particularly for urban uses to encourage improved agricultural chemical and water management;
- Continue to hold in-service training for chemical applicators, agency personnel, etc.;
- Complete the analysis and report of the 93 groundwater samples taken in the San Luis Valley;
- Perform follow up sampling at sites in the South Platte River Basin and in the San Luis Valley where agricultural chemicals were found above a level of concern;
- Begin field assessment of the aquifer vulnerability model in the San Luis Valley;
- Obtain and input results of other groundwater monitoring for agricultural chemicals into the Agricultural Chemicals and Groundwater database;
- Begin the implementaion of the long term sampling plan;
- Integrate results of other projects to achieve goals in the Act;

- Hold the formal hearings on the proposed rules and regulations for bulk storage sites and mixing and loading areas;
- Evaluate input from the formal hearings and revise the proposed rules and regulations for bulk storage sites and mixing and loading areas as necessary;
- Propose adoption of the rules and regulations for bulk storage sites and mixing and loading areas;
- Continue disseminating information on the Act and groundwater protection to special interest groups in Colorado;
- Continue publishing and distributing the newsletter and fact sheets;
- Continue using the display board to provide information on the program at trade shows and professional meetings.

APPENDICES

TABLE OF CONTENTS

- Appendix I CSU Cooperative Extension Memorandum
of Understanding
- Appendix II CDH Water Quality Control Division
Memorandum of Understanding
- Appendix III Education and Communication Materials
- Appendix IV CSU Cooperative Extension Activities
Report
- Appendix V CDH Water Quality Control Division
Activities
- Appendix VI Colorado Ground Water Sampling
Programs
- Appendix VII Advisory Committee
- Appendix VIII Rule and Regulation Development for
Bulk Storage Facilities and Mixing and
Loading Areas

APPENDIX I

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

Agency Code: BAA
Contract Routing Number:
Contract Control Number:
Fund: 254 Appropriation Code: F01
Organization Unit: 1620
Program: 8032 Object Code: 1920

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 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 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) Continue the compilation of general best management practices (BMPs) for the State of Colorado for both rural and urban areas. The resulting BMPs will be compiled in a notebook. Copies of the notebook will be distributed to Cooperative Extension Service offices, Soil Conservation Service offices, consultants, agricultural chemical applicators and dealers and cooperating agencies.

(b) Continue to coordinate educational activities and programs related to BMPs throughout the state with emphasis for this activity to be placed on the South Platte River Basin and the San Luis Valley.

(c) Conduct meetings with agricultural chemical users to continue developing localized BMPs using the materials and information developed in 1(a) and (b) as well as utilizing local input.

(d) To establish 5 demonstration/research plots to develop and test best management practices and conduct field days in conjunction with the demonstration plots to provide information to agricultural chemical users.

(e) Assist the C.D.A. in beginning to develop a generic State Management Plan (SMP) for agricultural chemicals to meet federal guidelines. Assist in the development of a pesticide specific SMP as needed.

(f) Continue to work in conjunction with the C.D.A. and the Colorado Department of Health to identify the agencies involved in groundwater protection; provide input and expertise into the development of rules and regulations for bulk storage facilities and mixing and loading areas and disseminate information on any agricultural management areas that may be defined.

(g) Items 1(a), (b), (c), (d), (e) and (f) will be completed by June 30, 1994.

(h) 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), (d), (e), and (f) no later than November 1, 1993.

(i) 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), (e) and (f).


(c) Time of Performance: The project contemplated shall commence July 1, 1993 and shall be terminated on June 30, 1994.

(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 seventy-five thousand six hundred dollars (\$75,600). No indirect costs shall be allowed. Payments shall be made upon receipt by the C.D.A. of quarterly billings. C.S.U. shall retain the documentation to support the billings.

(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 available for a period of three years following the termination of this agreement for audit in compliance with State Fiscal Rules.

COLORADO STATE UNIVERSITY

COLORADO DEPARTMENT OF AGRICULTURE


James F. Brown
Assistant V.P. for Research

for 
Steven W. Horn
Commissioner

DATE

6/18/93

DATE

6/24/93


State Controller Approval

CLIFFORD W. HALL

APPENDIX II

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

Agency Code: BAA
Contract Routing Number: 94-0008
Contract Control Number: N/A
Fund: 254 Appropriation Code: F01
Organization Unit: 1620
Program: 8032 Object Code: 1920
Encumbrance Number:

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) and provide a written report to the C.D.A on November 1, 1993 and May 1, 1994 of the information entered.
 - (c) Maintain the ACGWQDB and make the data available to interested parties.
 - (d) Select wells and collect at least 150 groundwater samples from previously identified vulnerable areas and the Arkansas River basin for analysis of agricultural chemicals. If needed, monitoring wells may be installed. Depending upon the analytical results from the initial round of sampling, funds may be used to expand the number and kinds of analytical determinations on a contingency basis to explore initial results.
 - (e) Report the results of the analyses from 1(d) to the Commissioner and input the data into the ACGWQDB.
 - (f) Continue the development of a long term sampling plan.
 - (g) Begin to field test the vulnerability analysis model at at least one site.
 - (h) Assist the C.D.A. in beginning to develop a generic State Management Plan (SMP) for agricultural chemicals to meet federal guidelines. Assist in the development of a pesticide specific SMP if needed.
 - (i) 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; and assist in defining agricultural management areas as needed.

(j) Items 1(a), (b), (c), (d), (e), (f), (g), (h), and (i) shall be completed by December 31, 1994.

(k) Provide a written report detailing progress toward implementation of the Agricultural Chemicals and Groundwater Protection Act (SB 90-126), including, but not limited to, items 1(a), (b), (c), (d), (e), (f), (g), (h), and (i) no later than November 1, 1993.

(l) Indirect costs shall not exceed \$11,336.

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), (f), (g), (h) and (i).

(c) Time of Performance: The project contemplated shall commence on August 1, 1993 and shall be terminated December 31, 1994.

(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 eighteen thousand two hundred seventy-four dollars (\$118,274), one hundred six thousand nine hundred thirty-eight dollars (\$106,938) of which are direct program costs, and eleven-thousand three hundred thirty-six dollars (\$11,336) are indirect costs. Payments shall be made upon receipt by the C.D.A. of quarterly billings accompanied by supporting documentation.

(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.

(f) Availability of funds for payment after June 30, 1994: Funds for services provided in accordance with this agreement have been appropriated and made available pursuant to SB 93-234. Payment for services provided in accordance with this contract, and rendered after June 30, 1994, is contingent upon the State Controller's approval of a roll forward of funds encumbered but not expensed during the state fiscal year 1994 under this agreement.

COLORADO DEPARTMENT OF HEALTH

COLORADO DEPARTMENT OF AGRICULTURE

Patricia A. Nolan, MD, MPH
Patricia A. Nolan, MD, MPH
Executive Director

Steven W. Horn
Steven W. Horn
Commissioner

7-14-93
DATE

7-30-93
DATE

State Controller Approval

CLIFFORD W. HALL

APPENDIX III



AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION

BEST MANAGEMENT PRACTICES FOR WATER QUALITY

Public concern regarding drinking water quality and the environment has increased the need for urban and rural agricultural chemical applicators to modify some common practices. Preventing groundwater contamination is particularly important because, once contaminated, it is very difficult and expensive to clean up. The Colorado legislature addressed this concern by passing the Agricultural Chemicals and Groundwater Protection Act (SB 90-126) which 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."

Rather than legislate overly restrictive measures on farmers and related industries, Colorado has elected to encourage the voluntary adoption of Best Management Practices (BMPs) which suit the agricultural chemical user's specific managerial constraints, while still meeting environmental quality goals. The BMPs will be determined by the Colorado Department of Agriculture and CSU Cooperative Extension with significant input from local producers and chemical applicators. Voluntary adoption of these measures by agricultural chemical users will help prevent contamination of water resources, improve public perception of the industry, and perhaps eliminate the need for further regulation and mandatory controls.

Best Management Practices

Best Management Practices are recommended methods, structures, or practices designed to prevent or reduce water pollution. Implicit within the BMP concept is a voluntary, site specific approach

to water quality problems. Many of these methods are already standard practices, known to be both environmentally and economically beneficial.

The actual BMPs selected for use at the local level must ultimately be determined by agricultural chemical applicators because of the site specific nature of groundwater protection. Site characteristics such as depth to water table, soil type and water holding capacity, and the climate affect groundwater vulnerability.

Select the BMPs that help you achieve the goals of your operation.

Consider:

- potential leaching hazard of the application site
- overall costs and benefits
- short-term and long-term effects on water quality
- most suitable practices for your site and your farm management plan

Examples of BMPs for Groundwater Protection May Include:

Wellhead Protection

- Implement minimum setbacks (at least 100' from wellhead) for mixing, loading, and storage of agricultural chemicals.
- Monitor well water quality periodically and know site-specific variables affecting aquifer vulnerability.

What can Homeowners Do?

Homeowners and urban chemical applicators can also help protect our environment and minimize groundwater problems by adopting Best Management Practices. Various publications are available at your local Cooperative Extension office outlining proper lawn and garden management techniques. The local Master Gardeners program can also help you determine how to properly fertilize and control pests.

Best Management Practices for Lawn Care

- Apply all chemicals at the lowest effective labelled rate.
- Time chemical application for optimum effectiveness. Do not apply immediately prior to rain or irrigation.
- Apply only enough irrigation water to satisfy plant needs. Do not leach soils after any chemical application.
- Store all chemicals in a safe, dry place with labels intact.
- Check with your county Department of Natural Resources prior to disposing of any lawn care chemical.

Irrigation Management

- Schedule irrigation according to crop needs and soil water depletion.
- Upgrade irrigation equipment to improve application efficiency.

Nutrient management

- Sample soil to a minimum depth of 2 ft. to determine residual N.
- Establish crop yield goals for each field based upon a documented 5 year average plus no more than 5%.
- Credit all sources of residual N toward crop N requirements, including: organic matter, previous crop residues, irrigation water nitrate, subsoil nitrate, and manure.
- Split N fertilizer into as many applications as economically and agronomically feasible.
- Avoid fall application of nitrogen on sandy soils and over vulnerable aquifers.
- Avoid manure application on frozen or saturated soils and always incorporate any surface applied nutrients after application.
- Employ grass filter strips around erosive crop fields to catch and filter nutrients in surface runoff.

Pest Management

- Monitor pest and predator populations to determine economic thresholds for any pest control measures.

- Select crops and varieties which are resistant to pests.
- Employ beneficial insects and other non-toxic controls.
- Time planting and harvest dates to minimize pest damage.
- Spot treat or band herbicides instead of using broadcast treatments.
- Use the lowest effective labelled rate.

Pesticide Management

- All agricultural chemical applicators should receive thorough training and certification prior to any unsupervised use.
- Application equipment should be inspected, calibrated, and maintained on a regular basis.
- Records of all pesticides and fertilizers applied should be maintained by business operators.
- Store and dispose of all pesticides and empty containers according to state and local guidelines.

For more in-depth information or specific inquiries about BMPs, contact CSU Cooperative Extension or the Colorado Department of Agriculture. They have publications, programs, and specialists that can help you prevent water pollution.



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AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION

June 1993

Turf BMP Fact Sheet

Best Management Practices for Turfgrass Production

Public concern about groundwater quality has prompted closer scrutiny of the use of pesticides and fertilizers in turfgrass cultivation. The Colorado Legislature enacted the Agricultural Chemicals and Groundwater Protection Act (SB 90-126) to address activities which could result in agricultural chemicals contaminating our groundwater. This Act emphasizes preventive measures and a voluntary approach, but also gives the Commissioner of Agriculture authority to regulate the use of agricultural chemicals by all applicators, including the turfgrass industry and homeowners.

Research has indicated that well established turfgrass may actually deter chemical runoff and leaching. The thatch layer of turf acts to filter pesticides from water moving through the soil profile. In fact, filter strips of grass are an encouraged practice around agricultural fields that are subject to runoff and overland movement of agricultural chemicals. However, these research findings do not indicate that turfgrass prevents leaching; only that it is more effective than the bare soil conditions often found in crop production. Studies have shown that transport of pesticide applied to grass can be a problem on sandy soils when rain storms or heavy irrigations occur in the first few days after application. The turfgrass industry also has the same problems associated with mixing, loading, storing, and dis-

posal of pesticides and fertilizers as other chemical applicators.

Best management practices (BMPs) are methods designed to reduce water contamination which may occur during routine operations. The BMP approach addresses pollution problems in a voluntary manner compatible with conventional practices. The objective of BMPs for turfgrass production is to achieve an attractive landscape in an environmentally and economically sound manner.

Best management practices are usually compatible with current operating procedures, but may entail a slightly higher level of management. Turfgrass BMPs include site specific management of pests, fertility, and water. The following list of BMPs is not exhaustive, but rather some key practices which can help you protect water quality.

Site Characteristics

- Determine the major site characteristics such as soil type, aquifer depth and vulnerability, and runoff potential.
- Promote optimum turf vigor and health (dense turf allows less runoff and leaching, and is more competitive against many pests).

- Select turf species such as buffalograss, blue grama, or fescue which require less fertilizer and water.
- Maintain a buffer zone of at least 50 ft. around wells or surface water where pesticides and fertilizers are not applied.

Pesticide Selection and Use

- Utilize an Integrated Pest Management (IPM) approach, incorporating careful scouting and monitoring, rather than the use of preventive sprays. Pesticides should be considered a last resort when other cultural, mechanical, and biological methods fail to control pests.
- Select pesticides best suited to the characteristics of the target site. Pesticide half-life, solubility, and adsorption should be compared to site characteristics to determine the safest chemical. Choose least toxic and less persistent sprays whenever possible.
- Do not apply pesticides during high temperatures or windy conditions.
- Employ application techniques which increase efficiency and allow the lowest effective application rate. Carefully calibrate application equipment and follow all label instructions.
- Consider spot treatments of pests rather than treating the entire area.
- Keep concentrated products away from wells and surface water. Dispose of containers, rinsate, and waste properly. Contact your county Department of Natural Resources prior to disposing of any pesticide.
- Keep precise pest and pesticide records.

Nitrogen Fertilizer Practices

- Base fertilizer rates upon soil analysis. Use conservative rates on sandy soils or over shallow groundwater.

- Utilize split applications of slow release forms such as IBDU, sulfur-coated urea, and natural organic based fertilizers.
- Allow grass clippings to remain on the site to recycle nutrients.
- Do not apply late season N applications on sandy soils over shallow groundwater.

Water Management

- Avoid application of any pesticide or fertilizer immediately prior to heavy rainfall or irrigation.
- Apply only enough irrigation to replace water loss by evapotranspiration. Match irrigation application to soil type and root depth. Avoid applying more water than can be contained in the root zone.
- Control surface water applications to minimize runoff.
- Maintain a minimum mowing height of at least 2 inches to increase drought tolerance and pest resistance, and reduce surface runoff.

The water quality hazards associated with good turfgrass management have been shown to be significantly less than other land uses. However, turfgrass managers can avoid negative environmental impacts and demonstrate a progressive response to public concerns by implementing best management practices for proper chemical use.

For more in-depth information or specific inquiries about BMPs, contact CSU Cooperative Extension or the Colorado Department of Agriculture. They have publications, programs, and specialist that can help you prevent water pollution.



AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION

August 1993

Legislative Action Changes Rules and Regulation Thresholds in SB 90-126

In 1993 the Colorado Legislature amended the Agricultural Chemicals and Groundwater Protection Act, SB 90-126. The new law substantially changes the thresholds that determine whether a mixing and loading pad is required or whether secondary containment of bulk agricultural chemicals is needed. Commercial fertilizers and pesticides are now governed by separate thresholds rather than one cumulative threshold. Also, field mixing and loading is exempted from regulation.

"The citizens advisory committee to SB 126 had significant input into the change in the law," stated Mike Mitchell, committee chairman and San Luis Valley farmer. "The current language makes it much easier to determine if compliance with the proposed regulations is necessary. Also, separate thresholds are given for pesticides and fertilizers and are stated in terms familiar to ag chemical users." The exemption of field mixing and loading will allow the law to be much more workable and promote a sound ag chemical management practice.

Attached is a summary sheet that gives a complete view of the thresholds as well as a synopsis of the proposed regulations. Questions may be directed to:

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AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION

REVISED SUMMARY OF DRAFT RULES AND REGULATIONS FOR BULK STORAGE FACILITIES AND MIXING AND LOADING AREAS FOR FERTILIZERS AND PESTICIDES

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

This summary is meant to highlight the draft rules and regulations developed to fulfill requirements of Senate Bill 90-126. The 1993 Colorado Legislature amended Senate Bill 90-126 with regard to the scope of these rules and regulations. The section below presents this amended scope. This summary sheet covers only key points of the rules and is meant to convey a general overview. For a complete copy of the draft rules and regulations, contact Mitch Yergert, Colorado Department of Agriculture.

SCOPE OF RULES AND REGULATIONS

Senate Bill 90-126 addresses two key elements in agricultural chemical handling: secondary containment of storage containers, and mixing and loading pads. These two elements are further divided by the product handled, i.e., pesticides or fertilizers, and whether the product is in liquid or dry form, as follows:

Pesticides

Secondary Containment: Required of any bulk storage facility, liquid or dry. Bulk storage facilities are those handling containers with capacities of greater than 55 gallons liquid or 100 pounds dry. However, facilities handling only approved mini bulk containers up to 660 gallons are exempt from secondary containment requirements.

Mixing and Loading Pads: Required where at least 500 gallons of liquid formulated product or 3000 pounds of dry formulated product are handled annually; also required where 1500 pounds of active ingredient of a combination of liquid and dry product

is handled annually. Additionally, any bulk pesticide storage facility required to have secondary containment must also have a mixing and loading pad.

Fertilizers

Secondary Containment: Required of liquid storage facilities where any container or series of interconnected containers has a capacity of greater than 5000 gallons, and dry storage facilities where at least 55,000 pounds of bulk fertilizer are stored.

Mixing and Loading Pads: Fertilizer storage facilities required to have secondary containment must also have a mixing and loading pad.

It should be noted that field mixing and loading of agricultural chemicals are exempt from these rules and regulations.

SECONDARY CONTAINMENT FOR THE STORAGE OF LIQUID AGRICULTURAL CHEMICALS

All liquid agricultural chemical containers must be stored in an impervious secondary containment structure (SCS) capable of containing a discharge. Capacity of SCS is up to 125 percent of the volume of the largest container in the structure. Walls shall be of such a height as to allow easy inspection and egress. Floor of the SCS shall be designed to drain to a shallow sump. Discharges or precipitation accumulations in an SCS shall be promptly recovered by an operator controlled pump. SCS must be maintained as impervious over its service life. Special requirements apply to very large (over 100,000 gallons) fertilizer storage containers.

MIXING AND LOADING AREAS FOR LIQUID AGRICULTURAL CHEMICALS

All mixing and loading operations must take place on an impervious mixing and loading pad (MLP). Pads need only be large enough so that the tank and appurtenances are over the pad provided no flushing of the boom system occur. Capacity of MLP is up to 125 percent of the volume of the largest container (up to 1200 gallons) using the pad. MLP serving containers holding more than 1200 gallons need only be designed to the 1200 gallon container standard. If the primary use of the MLP is to service chemical application equipment and bulk transport vehicles only use the pad for occasional deliveries, then the pad size is determined by the container size of the application equipment. However, the bulk transport must conduct its operations with appurtenances over the MLP. MLP shall be designed to drain to a shallow sump. Discharges or precipitation accumulations in an MLP shall be promptly recovered by an operator-controlled pump. MLP must be maintained as impervious over its service life.

OPERATIONS OF LIQUID AGRICULTURAL CHEMICAL PRIMARY AND SECONDARY CONTAINMENT FACILITIES AND MIXING AND LOADING AREAS

Storage containers and appurtenances shall be designed and constructed of materials which are resistant to corrosion, puncture or cracking and can handle operating stresses. Storage containers shall be secured to prevent flotation or instability. Storage container connections, except safety relief connections, shall be equipped with a shut-off valve. Plumbing shall be adequately supported and a flexible connection is required between plumbing and storage containers. Every storage container shall have a device or method for measuring liquid level. Pesticide storage containers shall be properly labeled and equipped with a pressure regulated vent. Abandoned storage containers shall be thoroughly cleaned.

DRY BULK AGRICULTURAL CHEMICALS

Dry bulk agricultural chemicals (DBAC) shall be stored inside a sound structure. Floor of the structure shall be constructed of a material to prevent downward movement of DBAC and moisture through the floor. All handling of DBAC shall be done on a

mixing and loading pad designed and constructed of material so as to form a barrier between the DBAC handling area and the surrounding earth, facilitate easy cleanup of spills and handle wheel loads of vehicles served. The pad must be maintained as a barrier for the life of the structure.

OPERATIONS-ALL FACILITIES

All agricultural chemicals in the facilities shall be secured against access by unauthorized persons. Valves on storage containers shall be locked except when persons responsible for facility security are on site. A device or method to prevent back flow in the water supply line shall be installed. Regular inspection and maintenance of the facility shall be performed. If operations at a facility are discontinued, Colorado Department of Agriculture must be notified, all agricultural chemical product removed and storage containers cleaned.

SITE PLAN DESIGN AND CONSTRUCTION

Design of bulk storage facilities and mixing and loading areas must be signed and sealed by a Colorado registered professional engineer.

CHEMIGATION SYSTEMS

Storage containers for liquid fertilizer at a chemigation site will be covered by secondary containment regulations if the container's capacity is more than 5000 gallons.

COMPLIANCE SCHEDULE

Upon adoption of these rules, compliance shall be within:

Three years for liquid pesticide secondary containment and mixing and loading areas, and leak detection system installation for very large fertilizer storage containers.

Five years for liquid fertilizer secondary containment and mixing and loading areas.

Seven years for dry agricultural chemical storage and mixing and loading areas,

Ten years for secondary containment of very large fertilizer storage containers.

Colorado Department of Agriculture



Mitch Yergert
Colorado Department of Agriculture
(303) 239-4140



Brad Austin
Colorado Department of Health
(303) 692-3572



Reagan Waskom
Colorado State University
(303) 491-6103



**AGRICULTURAL
CHEMICALS
AND
GROUNDWATER
PROTECTION**

FEEDBACK ON PROPOSED RULES AND REGULATIONS

Thank you for your interest in the process of developing rules and regulations for agricultural chemical bulk storage facilities and mixing and loading areas as mandated by Senate Bill 90-126. In this phase of the process, your comments on the proposed rules and regulations are being sought. Please list your comments under the appropriate section head.

SCOPE OF RULES AND REGULATIONS

SECONDARY CONTAINMENT FOR THE STORAGE OF LIQUID AGRICULTURAL CHEMICALS

MIXING AND LOADING AREAS FOR LIQUID AGRICULTURAL CHEMICALS

**OPERATIONS OF LIQUID AGRICULTURAL CHEMICAL PRIMARY AND
SECONDARY CONTAINMENT FACILITIES AND MIXING AND LOADING AREAS**

DRY BULK AGRICULTURAL CHEMICALS

OPERATIONS - ALL FACILITIES

SITE PLAN DESIGN AND CONSTRUCTION

CHEMIGATION SYSTEMS

COMPLIANCE SCHEDULE

Please return this feedback sheet to:

Mitch Yergert
Colorado Department of Agriculture
Division of Plant Industry
700 Kipling Street, Suite 4000
Lakewood, Colorado 80215-5894



Mitch Yergert
Colorado Department of Agriculture
(303) 239-4140



Brad Austin
Colorado Department of Health
(303) 692-3572



Reagan Waskom
Colorado State University
(303) 491-6103

Will The Proposed Rules and Regulations on Agricultural Chemical Bulk Storage and Mixing and Loading Sites of SB 90-126 Apply To You?

Pursuant to SB 90-126, the Agricultural Chemicals and Groundwater Protection program, the Commissioner of Agriculture is required to develop rules and regulations for bulk storage facilities and mixing and loading sites where threshold amounts of pesticides and commercial fertilizers are handled. Below is a checklist to determine if the proposed regulations will affect your operation.

PESTICIDES

YES NO

Secondary Containment:

- | | | |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1) Do you store pesticides in containers larger than 55 gallons for liquid pesticides or 100 pounds for dry pesticides? | <input type="checkbox"/> | <input type="checkbox"/> |
| * If you answered no to question 1, secondary containment is not required, skip questions 2 and 3. | | |
| 2) Do you store pesticides in containers larger than 55 gallons that are not U.S. Department of Transportation approved? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3) Do you store pesticides in containers larger than 660 gallons? | <input type="checkbox"/> | <input type="checkbox"/> |
| * If you answered yes to either question 2 or 3 secondary containment of pesticides stored in this manner is required. | | |

Mixing and Loading Pads:

- | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1) Do you mix and load at one site annually (any site within 300 feet of another site is considered one site for these regulations) more than: | | |
| a) 500 gallons of liquid formulated product (concentrate as it comes from the supplier), OR | | |
| b) 3000 pounds of dry formulated product, OR | | |
| c) 1500 pounds of active ingredient of a combination of liquid and dry product, | <input type="checkbox"/> | <input type="checkbox"/> |
| * If yes, a mixing and loading pad for pesticides is required. | | |
| * If secondary containment is required a mixing and loading pad is also required. | | |

FERTILIZERS

- | | | |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1) Do you store liquid fertilizer in a container or series of interconnected containers with a capacity of greater than 5,000 gallons? | <input type="checkbox"/> | <input type="checkbox"/> |
| * If yes, secondary containment is required. | | |
| 2) Do you store bulk (containers larger than 100 pounds) dry fertilizer in quantities of 55,000 pounds or more? | <input type="checkbox"/> | <input type="checkbox"/> |
| * If yes, containment is required. | | |
| * A mixing and loading pad for fertilizer is required only if you answered yes to either of the above questions. | | |

Field mixing & loading of either pesticides or fertilizers is exempt from these regulations.

Any questions or comments should be directed to:

Mitch Yergert
 Colorado Department of Agriculture
 700 Kipling St., Suite 4000
 Lakewood, CO 80215-5894
 (303) 239-4140



AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION

November 1993

Hearing Dates Set for Proposed Regulations for Bulk Storage Facilities and Mixing and Loading Areas

Proposed regulations have been developed for agricultural chemical bulk storage facilities and mixing and loading areas. The purpose of these regulations is to implement the provisions of SB 90-126 by adopting minimum performance standards and requirements for: 1) secondary containment of bulk pesticides, 2) mixing and loading pads where threshold amounts of pesticides are handled, 3) secondary containment of bulk commercial fertilizers stored in threshold amounts, 4) Mixing and loading pads where secondary containment is required for commercial fertilizers, and 5) management of these facilities.

These rules will help achieve the overall purpose of SB 90-126, which is "to provide for the management of agricultural chemicals to prevent, minimize, and mitigate their presence in groundwater", by intercepting spills or leaks that may occur during the storage or handling of agricultural chemicals.

Hearings will be held at 9:30 a.m. each day at the following locations:

- | | | |
|---------------------|----------------|-------------------------------|
| • January 31, 1994 | Lamar | Lamar Community College |
| • February 2, 1994 | Alamosa | Adams State College |
| • February 8, 1994 | Grand Junction | Mesa State College |
| • February 23, 1994 | Sterling | Northeastern Jr. College |
| • February 28, 1994 | Lakewood | Colorado Dept. of Agriculture |

Any interested party may file with the Commissioner of Agriculture or present at the hearings, written data, views or arguments with respect to the proposed rules and regulations and may present the same orally unless the Commissioner deems it unnecessary.

Requests for copies or questions regarding the proposed regulations should be directed to:

Mitch Yergert
Colorado Department of Agriculture
700 Kipling St., Suite 4000
Lakewood, CO 80215
(303) 239-4140

FUNDING

Funding for the program is provided by a twenty dollar fee assessed to the manufacturer or formulator of each pesticide product registered in the state each year and a fee of fifty cents on each ton of commercial fertilizer sold in the state of Colorado.

FYI

Further information can be obtained by contacting the following:

Lead Agency/Rules and Regulations

Mitchell Yergert

Colorado Department of Agriculture
(303) 239-4140

Education and Training

Reagan Waskom
CSU Cooperative Extension
(303) 491-6103

Groundwater Monitoring

Brad Austin
Colorado Department of Health
(303) 692-3572



COLORADO DEPARTMENT OF AGRICULTURE

Division of Plant Industry

700 Kipling St., Suite 4000 - Lakewood, CO 80215-5894

(303) 239-4140

GOAL...

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...

Taken from SB 90-126

Steven W. Horn, Commissioner

Roy Romer, Governor

This fact sheet was prepared by the
Colorado Department of Agriculture
Division of Plant Industry
700 Kipling St., Suite 4000
Lakewood, CO 80215-5894
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THE COLORADO LEGISLATURE

During the 1990 legislative session the Colorado Legislature passed Senate Bill 90-126, the Agricultural Chemicals and Groundwater Protection Act. In this Amendment to the Colorado Water Quality Control Act, the general assembly declared that the public policy of this state 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 emphasis is to improve the management of agricultural chemicals to prevent, minimize, and mitigate their presence in groundwater.

The Act emphasizes a voluntary approach, using education and training, to achieve the goal. Should voluntary efforts fail to address groundwater contamination from agricultural chemicals, the law sets forth a series of actions first by the Commissioner of Agriculture and then finally by the Water Quality Control Commission.

The Act defines agricultural chemicals as all pesticides and commercial fertilizers used in both urban and rural settings. The Colorado Department of Agriculture, the lead agency, the Colorado Department of Health, and Colorado State University Cooperative Extension are cooperating agencies in the implementation of this program.

ADVISORY COMMITTEE

The Colorado Agricultural Commission appointed an advisory committee to assist in the implementation of this program. The committee consists of seventeen individuals from the public, producers, green industry, agricultural chemical suppliers, commercial applicators and the Water Quality Control Commission. Members are appointed for a three year term with one-third of the terms expiring each year.

EDUCATION AND TRAINING

Education and training of agricultural chemical applicators to insure proper and correct use of pesticides and fertilizers is the key to the program. The program is geared to all users of pesticides and fertilizers including commercial applicators, urban homeowners, farmers, golf course superintendents and the general public. Colorado State University Cooperative Extension provides the education and training component. A variety of educational methods are used to reach these groups with information on agricultural chemical use and groundwater protection.

One major component of the program is the development of best management practices (BMPs) for agricultural chemical use. Research based guidance principles and BMPs are being developed by CSU in cooperation with the Soil Conservation Service and other agricultural groups. Localized BMPs will be developed at the user level with extensive local input.

GROUNDWATER MONITORING

The Colorado Department of Health is conducting a groundwater monitoring program to determine the presence of agricultural chemicals in the groundwater. The water sampling is performed by the Department of Health's Water Quality Control Division in close coordination with extension agents, water conservancy districts, and local officials.

Wells sampled are analyzed for selected pesticides and basic inorganic parameters including nitrate. The pesticides are selected based on the frequency of use in the area and the physical properties of the pesticide. The groundwater monitoring program provides a basis for determining a groundwater quality baseline upon which to gauge trends in groundwater quality. The results are entered in the CDH groundwater quality data base.

RULES AND REGULATIONS FOR BULK STORAGE AND MIXING AND LOADING AREAS

The Commissioner of Agriculture is required to promulgate rules for storage facilities and mixing an loading areas for pesticides and commercial fertilizers where they are stored or handled in quantities that exceed the established threshold. A three-year phase-in period is required on any rules developed. The purpose of these rules is to prevent spill and leaks that may occur during the storage and mixing/loading of agricultural chemicals from contaminating groundwater. The rules will establish performance standards for the construction and operation of: secondary containment of bulk liquid pesticide and fertilizer storage facilities; pesticide and fertilizer mixing/loading areas; and bulk dry pesticide and fertilizer storage.

The process for the development of the rules and regulations provides for extensive public input. A subcommittee including members of the advisory committee develops a draft of potential rules and regulations. The advisory committee reviews and revises the subcommittee's draft. With the advisory committee's approval this draft is presented at public meetings of professional organizations, industry groups, and interested parties throughout the state to receive input.

Following this presentation of the rules, the draft is revised, as necessary, and formal hearings held in preparation of adoption of the rules and regulations. This process allows two opportunities, the public meetings and the formal hearings, for the public to affect the content of these regulations. It is anticipated adoption of the regulations occurs in early 1994.

APPENDIX IV

1993 Annual Report
Colorado State University Cooperative Extension

Accomplishments:

1. Gave presentations on SB 90-126 and groundwater quality to various audiences throughout the state including: commodity groups, licensed applicators, agricultural producers, urban chemical users.
2. Compiled BMPs from other states and agencies to be used in Colorado's BMP program as appropriate.
3. Initiated two local BMP development groups to begin process of localizing BMPs. One group began work in the San Luis Valley, and one in the South Platte River Basin.
4. Worked to coordinate all aspects of development of the BMPs for Colorado with the Soil Conservation Service, water conservancy districts, and soil conservation districts.
5. Worked on the production of a BMP notebook for Colorado to be utilized by all agricultural chemical users. Completed four chapters to date: Overview of BMPs, N Fertilizer Management, Organic N Source Management, and Irrigation Management.
6. Prepared radio and newspaper releases describing SB 90-126 for distribution statewide through the CSU Public Relations Department media contacts.
7. Participated as a member of the SB 90-126 Implementation Task Force. Through regular meetings, activities were planned and coordinated.
8. Prepared audio visual information to be used in presenting SB 90-126 information to audiences.
9. Conducted demonstration projects and held a field day in the South Platte River Basin on proper use of nitrogen fertilizer and irrigation relative to water quality.
10. Conducted in-service training for Cooperative Extension agents and other agency personnel on water quality issues and SB 90-126.
11. Produced monthly newsletter articles on water quality, SB 90-126, and BMPs for the Agronomy Department Extension Newsletter and the Ag Engineering Extension Newsletter. These reports are distributed throughout Colorado to extension agents and their clientele.

12. Represented Cooperative Extension on the Bulk Storage and Mixing and Loading Regulation subcommittee to provide technical expertise and engineering guidelines for the development of rules and regulations. Produced a summary sheet of the drafted regulations to be handed out as well as a form to receive feed back on the drafted regulations. Gave presentations on the drafted regulations to several groups.

BMP DEVELOPMENT PROCESS

Colorado State University Cooperative Extension is working with the Colorado Department of Agriculture to develop Best Management Practices for Colorado farmers, land owners, and commercial chemical applicators. In order to achieve voluntary adoption of BMPs, CSU CE has recognized that local input is essential to develop feasible BMPs for the various cropping areas of the state that farmers will willingly accept. CSU CE is working with local producers, applicators, and the Soil Conservation Service to localize BMPs. The goal of this approach is to meld producer knowledge and experience with research data to develop improved BMPs. Our objective is to avoid a top-down, agency driven approach to the development of the required BMPs. Rather, development of BMPs in Colorado is being accomplished largely at the local level by producers, chemical applicators, and other experts within the affected watershed.

Two high priority watersheds have been selected to initiate the development of localized BMPs: the South Platte River basin and the San Luis Valley. These watersheds are extremely important to Colorado's agricultural economy but have also been identified as having two of the most vulnerable aquifers in the State. Small work groups of 10 to 15 agricultural chemical users have been formed in each of these watersheds. Producers asked to serve on the group were either nominated by local organizations, such as Soil Conservation Districts, or were selected based upon agricultural expertise in a critical area. Representation was also sought from local irrigation districts, consultant groups, the agricultural chemical industry, and the USDA Soil Conservation Service. County extension agents serve to facilitate discussions and reconcile outside reviews. One producer is elected by the group to serve as chairperson/moderator. The final product developed by these groups is a working draft of recommended practices to be reviewed and endorsed by local agricultural groups. Area Extension personnel will publish the materials and use them for workshops and other training opportunities.

The producers participating in the work groups are the essential link to foster grass-roots support for the voluntary approach. They are asked to be the first to adopt the local BMPs and to demonstrate the successful use of BMPs to their neighbors.

Colorado State University Cooperative Extension is currently working to compile a broad set of BMPs encompassing nutrient, pest, and water management which will be used as a template for local committees. This document will receive input and review from CSU agricultural scientists and extension personnel, the Soil Conservation Service, local water districts and the SB 126 Advisory Committee. It will be published in a notebook form that can be updated as needed and expanded to include additional guidelines.

Cooperative Extension has been working on the local BMP development process in the San Luis Valley in conjunction with the USDA San Luis Valley Water Quality Demonstration Project. This group will use their resources to help facilitate the development and demonstration of BMPs specific to this area. Once this group has reached a consensus on appropriate BMPs, a series of public meetings will be held in the area to receive comment and input. During the 1994 crop season, BMPs will be implemented in field demonstrations.

Field Demonstrations

Colorado State University Cooperative Extension established field research and educational plots to demonstrate improved nitrogen management techniques in the South Platte Region. New production tools which may improve producer profitability and protect groundwater are being evaluated and demonstrated to farmers.

Field trials were held on 6 farms in the basin during 1993. An educational field day was held to acquaint interested parties with SB 126 and the need for groundwater protection.

A new technology known as in-season nitrate testing was demonstrated to farmers at the field days. This tool may help farmers improve N recommendation accuracy and minimize the use of "insurance" N fertilizer. By complementing preplant soil testing with in-season testing, it may be possible to improve N fertilizer requirement prediction accuracy, resulting in reduced leaching of NO_3 to groundwater. Quick soil test kits for NO_3 have been developed that allow "field testing", thereby alleviating the problem of slow turn-around time in commercial soil testing laboratories. The development of these quick test kits has made the in-season nitrate test a viable soil testing procedure for assessing the N fertility status of crops at any growth stage. It is expected that this will result in the joint use of preplant deep soil NO_3 testing and in-season testing which will increase the accuracy of N fertilizer recommendations. Another production tool evaluated and demonstrated at these test sites is the use of a portable chlorophyll meter to assess N status of growing plants. These tools may help producers to avoid the application of excess N fertilizer without negatively affecting crop yields.

Project cooperators include Colorado State University Cooperative Extension and Department of Agronomy, Northern Colorado Water Conservancy District, and the Soil Conservation Service. Farmer Cooperators included Dennis Hoshiko, Weld Co., Sam Rasmussen, Weld Co., Bill Haselbush, Boulder Co., Mike Laber, Boulder Co., Bob Zadel & Stan Linker, Morgan Co, Bob & Francie Graham of Weld Co., and Bob Schnieder of Weld Co.

APPENDIX V

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Division
Ag Chemicals Program

Executive Summary

The Water Quality Control Division (WQCD) of the Colorado Department of Health (CDH) has responsibility under the Agricultural Chemicals and Ground Water Protection Program (SB 90-126) to conduct monitoring for the presence of commercial fertilizers and pesticides in ground water. This data assists the Commissioner of Agriculture in determining whether agricultural operations are impacting ground water quality. This past year the program monitored groundwater quality in one of Colorado's major agricultural regions, the San Luis Valley. The program sampled ninety three (93) domestic wells throughout the valley (Figure 1). Each well was sampled once between June and August, 1993. Well samples were analyzed for basic constituents, dissolved metals, and selected pesticides. The laboratory results and field data from the survey have been entered into the CDH Ground Water Quality Data System. Preliminary analysis of the laboratory reports indicates that ground water in some areas of the valley has been impacted by various agricultural chemicals. The major inorganic contaminant of concern is nitrate. Thirteen out of ninety three (14%) of the domestic wells sampled showed nitrate levels in excess of the EPA standard for drinking water (10 mg/L). The majority of the wells that exceeded the drinking water standard were located in an area to the east of Center, Colorado. Three different pesticides were detected, but only one well contained a pesticide at a level higher than the EPA drinking water standard. This pesticide, Lindane, was detected at a level of 0.29 ug/L; the MCL for lindane is 0.2 ug/L. No single pesticide was detected in more than one well.

After analysis of the 1992 South Platte survey data it was decided to do a follow-up sampling for nitrate in Morgan and Sedgwick Counties. Because of the extensive monitoring in the Brighton/Greeley area being conducted by other agencies, this area was not resampled. In Morgan County, the seventeen (17) original wells sampled in 1992 were resampled and seventeen (17) new wells were added. In Sedgwick County, the eight (8) wells sampled in 1992 were resampled and five (5) new wells were added. The resampling indicated little or no change in nitrate levels from one year to the next. The results also confirmed that nitrate levels exceeded the drinking water standard in both areas.

In addition to monitoring ground water for the presence of agricultural chemicals, the Ag Chemicals Program is required to determine the likelihood that an agricultural chemical will enter the ground water. This type of determination has been described as a vulnerability analysis. As the first step in this process, the Program funded researchers at Colorado State University to develop a model suitable for use in the Colorado environment. The final report from CSU was received in November 1992. After review and consultation with other agencies working on similar research, a limited field test to evaluate the model in the San Luis Valley in 1994 has been initiated.

Introduction

The Water Quality Control Division (WQCD) of the Colorado Department of Health (CDH) has responsibility under the Agricultural Chemicals and Ground Water Protection Program (SB 90-126) to conduct monitoring for the presence of commercial fertilizers and pesticides in ground water. The Agricultural Chemicals Program has been established to provide current, scientifically valid, ground water quality data to the Commissioner of Agriculture. Prior to passage of SB 90-126, a lack of data had prevented an accurate assessment of impacts to groundwater quality from agricultural operations. This program will assist the Commissioner of Agriculture in determining to what extent agricultural operations are impacting ground water quality. The program also assists the Commissioner in identifying those aquifers that are vulnerable to contamination. 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.

This report has been prepared for the Colorado General Assembly to provide a summary of the monitoring work completed in 1993. The monitoring program involves the collection and laboratory analysis of ground water samples. This monitoring program was planned to meet the objectives necessary for a preliminary determination of the existence of agricultural chemicals in the ground water in a safe, cost effective, and timely manner.

The ground water quality sampling program is intended to fulfill the following objectives:

1. Determine if agricultural chemicals are present in the ground water.
2. Provide data to assist the Commissioner of Agriculture in the identification of potential agricultural management areas.

The factors considered in selecting an area for monitoring are:

1. Agricultural chemicals are used in the area.
2. The ground water in the area is shallow in depth or vulnerable.
3. The majority of the agricultural production in the area is irrigated.
4. The soil types are conducive to leaching.
5. The alluvial and /or shallow bedrock aquifers are utilized for domestic water supplies.

Before an area is selected for monitoring, CDH will contact interested parties to inform them of the sampling program and SB 90-126, and how we envision its implementation. CDH will coordinate closely with federal agencies, county extension agents, conservancy districts, and local health officials in the project area.

Ground Water Monitoring Program

The 1993 monitoring program focused on groundwater quality monitoring in one of Colorado's major agricultural regions, the San Luis Valley. A map of the study area is provided in Figure 1. In addition, a project to resample selected areas from the 1992 South Platte study was undertaken. The monitoring program included sample collection, laboratory analysis, and data analysis and storage. Upon completion of the full analysis, which will include integration with previous and current studies by other agencies, 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 sampled ninety three (93) domestic wells throughout the San Luis Valley and forty seven (47) wells in Morgan and Sedgwick Counties. The San Luis Valley sampling program was the first effort to screen the entire shallow aquifer to establish the possible impacts and magnitude of agricultural chemical contamination. The San Luis Valley is characterized by intense irrigation agriculture encompassing both surface water diversions and large capacity irrigation wells for irrigation water supplies. The wells supply surface and center-pivot irrigation systems from the shallow unconfined aquifer. This shallow aquifer is also a major source for domestic water supplies throughout the valley.

All wells were sampled once between June and August, 1993. Wells were selected for sampling based on the following factors: permitted for domestic or household use, located within the unconfined valley fill aquifer, and cooperation of the well owner. All field sampling was performed by Brad Austin and John Colbert of CDH. Field sampling procedures followed the protocol developed by the Ground Water Quality Monitoring Working Group of the Colorado Nonpoint Task Force.

Well samples were analyzed for basic constituents, dissolved metals, and selected pesticides. A list of analytes is presented in Table 1. The basic and metals analysis was performed by the laboratory at CSU with all samples split with the CDH inorganic laboratory for nitrate and ammonia for quality control evaluation.

In addition to the inorganic parameters, all of the groundwater samples collected were analyzed for selected pesticides. The pesticide analysis was performed by the CDH and Colorado Department of Agriculture laboratories. A listing of pesticides was compiled for analysis based on those substances that have recently been, or are currently being utilized in the San Luis Valley according to agricultural officials there. Budget restrictions would not allow testing for all pesticides used in the study area. To reduce the analysis cost, each pesticide was weighted according to its chemical properties of persistence and mobility in the environment, amount of active ingredient used per acre, and the amount of acreage within the study area that pesticide was used on. Pesticides were then selected according to their final score and the ability of the laboratory to detect their presence.

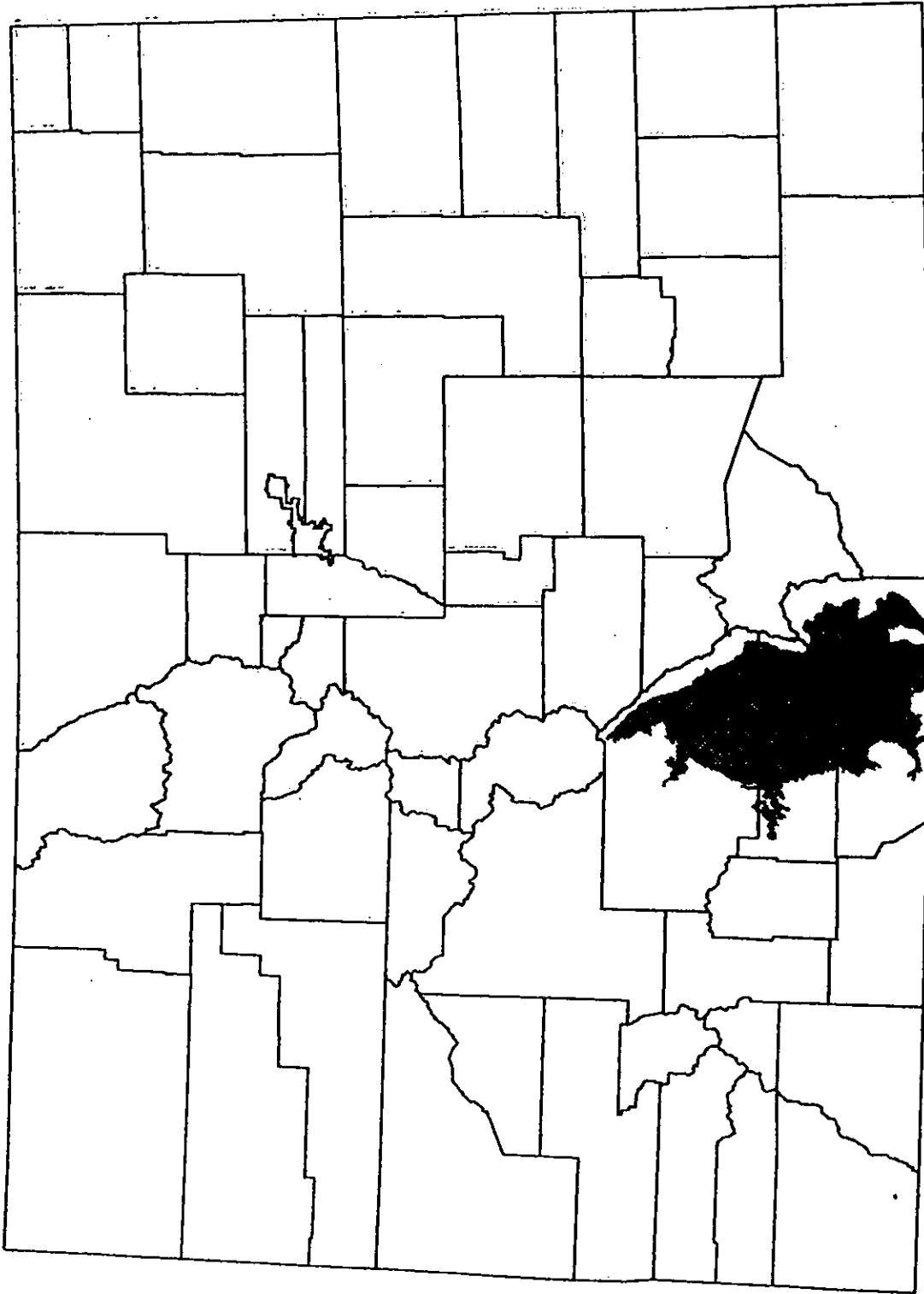


FIGURE 1 - Study area for San Luis Valley unconfined aquifer monitoring program.

TABLE - 1

**San Luis Valley Unconfined Aquifer
List of Analytes**

**BASIC WATER QUALITY
CONSTITUENTS**

Boron
 Bicarbonate
 Calcium
 Carbonate
 Chloride
 Magnesium
 Nitrate
 pH
 Sodium
 Specific Conductance (TDS)
 Sulfate
 Potassium
 Alkalinity, total
 Solids, Total Dissolved
 Hardness, total

DISSOLVED METALS

Aluminum
 Barium
 Cadmium
 Chromium
 Copper
 Iron
 Lead
 Manganese
 Nickel
 Molybdenum
 Phosphorous, total
 Zinc

PESTICIDE COMPOUNDS

Trade Name	Use	Trade Name	Use
Atrazine	Herb	Ambush/Pounce	Insect
Balan	Herb	Diazinon	Insect
Bladex	Herb	Furadan	Insect
Dacthal	Herb	Lannate	Insect
Eptam	Herb	Lorsban	Insect
Evik	Herb	Malathion	Insect
IPC	Herb	Parathion	Insect
Lasso	Herb	Penncap-M	Insect
Lexone/Sencor	Herb	Sevin	Insect
Ro-Neet	Herb	Bayleton	Fungi
Sinbar	Herb	Bravo	Fungi
Sonnalan	Herb	Temik	Nematode
Treflan	Herb		
Velpar	Herb		
2,4-D	Herb		

The results from this sampling program have been 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 to the Commissioner of Agriculture in 1994.

At the time of this report, a complete analysis of all laboratory results for the San Luis Valley has not been completed. Preliminary analysis of nitrate and some of the pesticide data indicates that ground water in parts of the study area has been impacted by various agricultural chemicals. The major inorganic contaminant of concern is nitrate. Thirteen of the ninety three (14%) domestic wells sampled showed nitrate levels in excess of the EPA standard for drinking water (10 mg/L). Three different pesticides were detected, but only one well contained a pesticide at a level higher than the EPA drinking water standard. This pesticide, Lindane, was detected at a level of 0.29 ug/L; the MCL for lindane is 0.2 ug/L. No single pesticide was detected in more than one well.

A follow-up sampling program was conducted in May, 1993, to resample a portion of the 1992 South Platte study area. Analysis of the nitrate data had indicated three areas where nitrate levels exceeded the drinking water standard of 10.0 mg/L. These three areas were the Brighton to Greeley reach of the aquifer, an area in western Morgan County around Wiggins, and Sedgwick County. The Platteville-Gilcrest-Greeley area has been monitored in recent years by two other agencies, the North Front Range Water Quality Authority (NFRWQA), and the Central Colorado Water Conservancy District (CCWCD). The U. S. Geological Survey (USGS) is currently monitoring the area under the National Water Quality Assessment (NAWQA) program. Since these other studies will eventually be incorporated into the final analysis, it was determined best to spend our limited resources on the other two areas where less work had been done. The follow-up sampling program consisted of resampling a majority of the original wells in Morgan and Sedgwick Counties, plus adding additional wells to improve the sampling density. In all, forty seven (47) wells were sampled for nitrate. The resampling program was designed to determine if the contamination originally detected was a widespread non-point source occurrence or only a coincidence of randomly selecting a few wells with high nitrate levels. The 1993 results confirmed that nitrate levels exceeded the drinking water standard in both counties. In Morgan County, thirteen of thirty four (38%) of the wells had nitrate levels in excess of the EPA drinking water standard of 10 mg/L, with only two wells (5%) showing no nitrate. In Sedgwick County, five of thirteen (38%) of the wells had nitrate levels in excess of the EPA drinking water standard of 10 mg/L. All Sedgwick County wells had some level of nitrate present. The resampling also indicated little or no change in nitrate levels from one year to the next in those wells that had been sampled both years.

Aquifer Vulnerability Study Summary

In addition to monitoring ground water for the presence of agricultural chemicals, the Ag Chemicals Program is required to determine the likelihood that an agricultural chemical will enter the ground water. This determination is based upon the chemical properties of the chemical in question, the behavior of a particular chemical in the soil types of the region under study, the depth to ground water, the farming practices in use, and other factors. This type of determination has been described as a vulnerability analysis. As the first step in this process, a study was funded by the program to researchers at Colorado State University to develop a model suitable for use in the Colorado environment. The model establishes three levels of vulnerability assessment: a quick-look assessment; an intermediate level assessment; and a detailed assessment. The quick-look is modified from the Soil Conservation Service's (SCS) soil-pesticide interaction rating scheme. The intermediate level uses that same scheme with much greater detail in its input parameters. The detailed assessment adds the screening models Chemical Movement in Layered Soils (CMLS) for pesticides and Nitrate Leaching and Economic Analysis Package (NLEAP) for nitrates.

The Program has reviewed the model and consulted with other agencies working on similar research. A limited field test to evaluate the model is currently planned in the San Luis Valley in 1994. Upon successful evaluation, the program will then use this model to determine those areas of the state where ground water is vulnerable to contamination from agricultural chemicals. The monitoring program can then target resources to those areas where attention is most needed.

Update on collecting existing Ground Water Quality Data

In the FY-93 Memorandum of Understanding, the Ag Chemicals Program agreed to pursue collecting, evaluating, and entering into a database all existing ground water quality data available. Several studies of ground water quality in various regions of the state have recently become available. These include: North Front Range Water Quality Planning Association (over 300 wells in Weld County over a three year period 1989-1991); State Engineers Office (60 wells in southwestern Colorado in 1992); Colorado Department of Health (45 wells in the Delta-Montrose area in 1992, 30 wells in the San Luis Valley in 1990 and 26 wells in the High Plains in 1989). All data from these studies has been collected and entered into a database specifically designed for this purpose. In addition, historical data from the U. S. Geological Survey and U. S. EPA is currently being entered.

The U. S. Geological Survey (USGS) is currently monitoring the South Platte and the San Luis Valley areas under the National Water Quality Assessment (NAWQA) program. As this data becomes available it will be incorporated into the final analysis for both areas. Several water conservancy districts are also actively engaged in collecting ground water quality data. Unfortunately, this data continues to remain unavailable due to concerns about

privacy and future use of the data. The program hopes that as the monitoring effort continues and the agricultural community grows comfortable with our goals and intent, this valuable source of data will become available and enhance our understanding of the overall ground water quality of the state.

Other Activity

A long range sampling plan has been developed for the monitoring program. The plan covers three major types of ground water monitoring. The first type of monitoring is the initial screening surveys to be conducted on all major aquifers subject to contamination from agricultural chemicals. The screening surveys for the South Platte alluvial aquifer and the San Luis Valley unconfined aquifer are complete. The second type of monitoring is a follow-up sampling program to resample, for confirmation, all wells in which any contaminant was detected at a level of concern. Surrounding wells may also be sampled, if available, to determine if the contamination is widespread or only a localized problem. The third type of monitoring is the specialized sampling needed for evaluation of Best Management Practices or Agricultural Management Areas when established. The procedures for this type of monitoring are currently under development.

The program intends to include in its analysis of the study areas all available ground water quality data. Results from previous and on-going studies in the South Platte and San Luis Valley will be integrated into the final analysis.

Before an area is selected for monitoring, CDH will contact interested parties to inform them of the sampling program and SB 90-126, and how we envision its implementation. CDH will coordinate closely with federal agencies, county extension agents, conservancy districts, and local health officials in the project area.

APPENDIX VI

COLORADO GROUNDWATER SAMPLING PROGRAMS

Agency	Area
Colo. Dept. Health Ag-Chem Program	S. Platte River San Luis Valley
US Geological Survey Nat. Water Quality Assess.	S. Platte River Rio Grande River
Central Colo. Water Conservancy District	District
North Front Range Water Quality Assoc.	Weld County
San Luis Valley Water Quality Demonstration Project	San Luis Valley
CSU	San Luis Valley
Colo. Dept. of Health Drinking Water	Public drinking water supplies
Lower S. Platte River Conservancy District	District
USDA/Agricultural Research Service	S. Platte River San Luis Valley
N. Colorado Water Conservancy District	District
SCS/CSU	Patterson Hollow/ Arkansas Valley

APPENDIX VII

AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT
ADVISORY COMMITTEE 1993

Water Quality Control Commission

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APPENDIX VIII

Rule and Regulation Development for Agricultural Chemical Bulk Storage Facilities and Mixing and Loading Areas

Section 25-8-205.5 (3) (b) of SB 90-126, the Agricultural Chemicals and Groundwater Protection Act, requires the Commissioner of Agriculture to develop regulations where pesticides and fertilizers are stored or handled in quantities that exceed the established thresholds. To accomplish this task, the Advisory Committee requested that a workgroup consisting of members of the advisory committee and other individuals be established to begin drafting the regulations. This process began in the fall of 1991.

Early in the regulation drafting process it was discovered that the language in the Act requiring the regulations and establishing the thresholds for compliance was not consistent with the manner in which the terms are commonly used in industry. This terminology caused problems with developing a workable set of regulations where it could easily be determined if compliance was necessary. Also, it was determined this may make integrating our regulations with similar federal regulations that are being drafted problematic. However, since the law was new, it was decided that work should continue on the draft regulations and to work with the rest of the Act to determine if any other sections might need to be changed. This issue was presented in previous reports to the Legislature.

The workgroup completed a draft of the regulations through a series of meetings during the winter of 1991-92. This draft was presented to the full advisory committee for further review and revision. Following these revisions, the advisory committee requested that the drafted regulations be presented at meetings throughout the state to obtain widespread local input prior to the public hearing process. This process would allow more input into the drafted regulations by not only providing an additional opportunity for comment, but would provide an informal setting that would facilitate discussion. Also, presentations could be made in more locations around the state than will be possible with the formal hearings.

During the winter of 1992-93 the drafted regulations were presented at 13 meetings throughout the state to various groups. The presentations were given by Mitchell Yergert of the Colorado Department of Agriculture and Dr. Lloyd Walker, agricultural engineer with CSU Cooperative Extension. The presentations consisted of an overview of the scope of the regulations and then a more detailed discussion of each component. Verbal comments were recorded for later discussion and evaluation. Written comments were also solicited by providing a feedback sheet that contained an outline of the regulations.

The vast majority of the comments received centered around the language in the Act that is mentioned above. Individuals could not readily determine if compliance was necessary with the drafted regulations since the terms were not consistent with the way they are used in industry. Based on these comments, it was determined that in order to proceed with the development of the regulations, a change in the statutory language was needed.

The 1993 Colorado General Assembly addressed this issue by passing an amendment (SB 93-114) to the Act changing the language that established the compliance thresholds. The new language is consistent with terms used commonly in industry. This change has allowed progress to continue on development of the regulations.

Comments received on other components of the drafted regulations were evaluated by the subcommittee and advisory committee and revisions were made. The regulations were then prepared for the formal hearing process which will occur in early 1994.

The U.S. Environmental Protection Agency failed to release proposed federal regulations for bulk storage of pesticides in 1993. However, they should be released early in 1994. The program continues to stay abreast of information concerning these regulations to facilitate easy integration with what will eventually be enacted at the federal level.

**Public Meetings Concerning the Drafted Rules and Regulations
for Bulk Storage Sites and Mixing and Loading Areas
under SB 90-126**

Presentations of the drafted rules and regulations for bulk storage facilities and mixing and loading areas were made to the following organizations/conferences during 1992-93.

- | | |
|-------------------------------------------------------|---------|
| ▶ Crop Protection Institute | Nov. 12 |
| ▶ Colorado Agricultural Aviation Association | Nov. 1 |
| ▶ Colorado Weed Management Association | Dec. 8 |
| ▶ Central Colo. Water Conservancy Dist. Board of Dir. | Dec. 15 |
| ▶ Rocky Mtn. Plant Food and Ag Chem Assn | Jan. 7 |
| ▶ Weld County Farm Bureau | Jan. 12 |
| ▶ Colorado Greenhouse Growers Assn. | Jan. 21 |
| ▶ Western Colo. Horticulture Conference | Jan. 21 |
| ▶ Yuma County Pesticide Applicator Workshop | Feb. 8 |
| ▶ San Luis Valley Potato/Grain Conference | Feb. 10 |
| ▶ Rocky Mtn Golf Course Superintendents | Feb. 16 |
| ▶ S. High Plains Water Mgmt Dist. Winter Workshop | Feb. 25 |
| ▶ Lower South Platte Water Cons. Dist. Board of Dir. | March 2 |

Agricultural Chemicals and Groundwater Protection Act

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