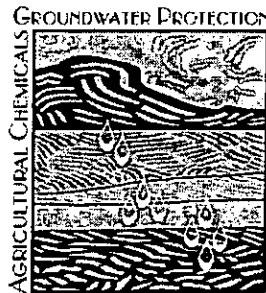


# ANNUAL REPORT FOR 2005

## STATUS OF IMPLEMENTATION OF SENATE BILL 90-126 THE AGRICULTURAL CHEMICALS AND GROUND WATER PROTECTION ACT

Colorado Department of Agriculture  
Colorado State University Cooperative Extension  
Colorado Department of Public Health and Environment



[www.ag.state.co.us/CSD/GroundWater/Waterhome.html](http://www.ag.state.co.us/CSD/GroundWater/Waterhome.html)



*Colorado Department of Agriculture  
Colorado State University Cooperative Extension  
Colorado Department of Public Health and Environment*

## **Executive Summary**

### **Status of Implementation of Senate Bill 90-126 The Agricultural Chemicals and Ground Water Protection Act**

In the annual report for 2004, several goals for 2005 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 2006 between the Colorado Department of Agriculture and: 1) Colorado State University Cooperative Extension, and 2) the Colorado Department of Public Health and Environment.

#### **Colorado Department of Agriculture**

##### **Storage Rules**

Section 25-8-205.5 (3)(b) of the Agricultural Chemicals and Ground Water Protection Act requires the Commissioner of Agriculture to develop rules where pesticides and fertilizers are stored or handled in quantities that exceed the established thresholds. Pesticide and fertilizer facility inspections continued in 2005.

##### **Pesticide Management Plan**

EPA is developing a program that would require states to produce management plans for pesticides thought to be significant hazards to ground water. If a state wants to allow continued use of any of the

pesticides identified, it must produce an EPA-approved management plan specific to that pesticide. EPA concurred on Colorado's Generic Pesticide Management Plan (PMP) in March of 2000. This generic plan will be used as a model to produce the pesticide specific plans.

#### **Federal Regulations for Pesticide Containmentment**

The Program continues to work with and monitor EPA's progress toward proposed Federal *Standards for Pesticide Containers and Containmentment*. EPA proposed these standards in 1994 and has taken public comment twice, in 1994 and 1999. They once again opened the comment period in 2004 and hope to have these standards finalized by the end of 2006.

#### **Waste Pesticide Disposal**

MSE Environmental Inc., a private contractor, conducted another "Chemsweep" program in 2005.

#### **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 V). The committee met once during 2005.

#### **Legislation**

Senate Bill 176 was passed during the 2005 Legislative Session. A portion of this Bill changed the fee setting authority for the Ground Water Program from the General Assembly to the Agricultural Commission. In September of 2005, the Agricultural Commission was asked to approve a \$10 per product fee adjustment for the Ground Water Program; this request was approved. However, in approving this request, the overall pesticide registration fee of \$95 was not changed; only the amount of that \$95 dollars the Ground Water Program collects was changed - from \$20 to \$30. This \$10 adjustment will provide the Program with approximately \$100,000 of additional revenue per year.

#### **Conservation Services Division**

In 2005, the Ground Water Program was moved from the CDA's *Division of Plant Industries* to a newly created division, the *Conservation Services Division*. This division of CDA also houses the Noxious Weed Program, Insectary, and Soil Conservation Board. The Department is hoping to see cooperative work efforts among the programs that will enhance each program's efforts and the Division and Department as a whole.

### **Ground Water Monitoring**

In 2005, the Program completed the eleventh year of a long-term monitoring effort initiated in the South Platte alluvial aquifer from Brighton to Greeley. From June through August 2005, 71 wells in the long-term network were sampled. Nitrogen analysis indicated that 78% of the monitoring wells and 72% of the irrigation wells exceeded the nitrate drinking water standard of 10 mg/L. Pesticide results for the monitoring well portion of the network revealed three pesticides, Atrazine, Metolachlor, and 2,4-D present in the samples. The breakdown product of Atrazine, Deethyl Atrazine, was also detected. Atrazine was present in six wells and Deethyl Atrazine was present in ten wells. Six wells contained both triazine compounds. Metolachlor was detected in three wells and 2,4-D in one. The total number of wells with a pesticide detection was thirteen of the eighteen sampled (72%). No pesticide was detected at a level that exceeds the applicable standard.

The Arkansas Valley monitoring well network network was first sampled in 2004, shortly after installation. In 2005, the Colorado Department of Public Health and Environment (CDPHE) gave CDA \$5,000 to conduct sampling for selenium in the wells. The Program was also able to collect another round of pesticide and nitrate samples while helping CDPHE collect data on selenium.

Nitrogen analysis indicated that only one of the twenty wells sampled (5%) showed a nitrate level in excess (13.7 mg/L) of the EPA standard for drinking water (10 mg/L). Three wells tested below the laboratory detection limit of 0.1 mg/L. The remaining sixteen (16) wells (80%) tested positive for nitrate but were below the EPA standard.

Pesticide data revealed one pesticide, the herbicide Metolachlor, in one well sample. The breakdown product of Atrazine, Deethyl Atrazine, was also present in one well. Deethyl Atrazine is a breakdown product of Atrazine and when found indicates that Atrazine was present at an earlier time in this area. In sum total, there were two wells containing two pesticide detections. No pesticide concentration exceeded an applicable water quality standard.

The Program also selected and sampled 40 urban monitoring wells in 2005; four in Greeley, one in Windsor, and the remaining located in the Denver metro area.

The majority of the wells sampled in 2005 had some nitrate and five went over the drinking water standard of 10 mg/L. Eight urban monitoring wells were non-detect for nitrate.

Only one pesticide was detected, MCPP which is similar to 2,4-D. MCPP was detected in 3 wells at levels ranging from 0.040 to 0.043 ug/l or ppb. The three wells detecting MCPP were located along the west side of the South Platte River.

The Gilpin County extension agent was interested in testing water quality in this area and contacted our program in 2004. The program was able to collect twenty-seven domestic well samples.

No well samples exceeded the nitrate standard for drinking water (10 mg/L). Nine of the samples were non-detect and fifteen contained nitrate, but were less than 5.0 mg/L. No pesticides were detected in the Gilpin County samples.

### **Colorado State University**

#### **Education and Communication**

Communication is a vital component of the Program. Numerous methods are used to provide information to individuals and organizations using agricultural chemicals. We continue to provide written fact sheets and publications with information on the Program and distribute at meetings, conferences, and trade shows. Also, a display board is being utilized at conferences and trade shows to provide information on the Program. Information on ground water protection is continually being presented to the public through publications, newsletter articles, press releases, and presentations at meetings throughout the state. Presentations on how the Program works, past and present water quality projects, and plans for future projects with request for local input are made at every opportunity. In 2005, presentations were made at several major meetings and small local groups throughout the state. We consider this type of outreach an important part of the customer service component of the Program.

#### **Ongoing BMP Development and Education**

Colorado State University Cooperative Extension (CSUCE) has worked with the Colorado Department of Agriculture to develop Best Management Practices (BMPs) for Colorado farmers, landowners, and commercial agricultural chemical applicators. Because of the site-specific nature of ground water protection, the chemical user must ultimately determine the BMPs adopted for use at the local level. The local perspective is also needed to evaluate the feasibility and economic impact of these practices. The Program Advisory Committee has recommended that a significant level of input be received at the local level prior to adoption of recommended BMPs.

### **Demonstration Sites and Field Days**

The Ground Water Program at CSUCE works with crop producers, their advisors, fertilizer dealers, USDA NRCS, commodity groups, and local County Extension faculty, to demonstrate and evaluate new and existing production tools that may improve producer profitability and help protect ground water. Field demonstration work in 2005 focused on helping growers improve water and nutrient management. CSUCE loaned atmometers (ETgages) to county agents, consultants, and individual farmers in Weld, Phillips, Alamosa, and Yuma Counties in 2005. ETgages are useful for simple and effective irrigation scheduling. A third year of a center pivot nozzle height (above and below canopy) replicated demonstration was conducted in cooperation with the NE Regional Water Specialist. Nozzle placement can impact water runoff and therefore irrigation uniformity, soil moisture storage and ultimately yield. Results suggested that placing nozzles at a height just above the canopy reduced runoff, improved soil moisture storage, but did not significantly impact yield as compared to nozzles located within the canopy at 14 inches above the ground. Results were published in the Proceedings for the Center Plains Irrigation Conference and Exposition (Appendix IV).

### **Colorado Department of Public Health and Environment**

During 2005, the Colorado Department of Public Health and Environment (CDPHE) continued to be actively involved with the Agricultural Chemicals and Ground Water Protection Program. The CDPHE continues to review the Program's monitoring data on an annual basis, and provide input on the results. Other activities that the Department has assisted the Program with include final permitting on the new monitoring wells along the Arkansas River, and attending meetings on an as needed basis.

### **Objectives for 2006 Determined**

The following objectives for 2006 have been established:

- Complete production of a report on ground water quality status in Colorado, educational efforts to address water quality problems, and the history of the Program;
- Continue study plots to demonstrate improved nitrogen and irrigation management to farmers;
- Coordinate with other agencies and non-governmental organizations to deal with water quality issues throughout the state;

- Continue BMP education work in vulnerable ground water areas of Colorado;
- Continue to develop and update educational resource materials for ground water education;
- Distribute and display on the web, urban BMPs to encourage improved agricultural chemical and water management in urban areas;
- Continue to hold in-service training for CSU and NRCS agency personnel in irrigation water management;
- Participate in the Certified Crop Advisor program;
- Continue performing inspections of facilities requiring compliance with the bulk storage and mixing/loading rules;
- Continue to provide information on and enforcement of the bulk storage and mixing/loading rules;
- Continue collection and analysis of ground water samples for pesticides and nitrate on a regional scale;
- Continue the long-term monitoring program in Weld County by collecting and analyzing ground water samples for pesticides and nitrate;
- Complete statistical trend analysis on Weld County long-term monitoring data;
- Distribute 2001-2002 BMP survey;
- Continue disseminating information on the Act and ground water protection to special interest groups in Colorado;
- Continue revising, publishing, and distributing fact sheets relevant to the Program;
- Improve, update, and continue using the display board to provide information on the Program at trade shows and professional meetings;

- Revise bulletin on pesticide fate and transport;
- Participate in USDA PDP program;
- Complete work on producing a web-based pesticide and ground water quality information tool;
- Revise and reprint the *Pesticide Record Keeping Book*;
- Distribute revised bulletin for private wellhead protection; and
- Continue establishing and sampling an urban monitoring well network.



# **APPENDICES**

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**Appendix V..... Advisory Committee**

**APPENDIX I**

## 2005 Annual Report Colorado Department of Agriculture

### Rules for Agricultural Chemical Bulk Storage Facilities and Mixing and Loading Areas

Section 25-8-205.5 (3)(b) of the Agricultural Chemicals and Ground Water Protection Act requires the Commissioner of Agriculture to develop rules where pesticides and fertilizers are stored or handled in quantities that exceed the established thresholds. These rules were adopted in July 1994 and became effective September 30, 1994. The law mandated at least a three-year phase-in period for the rules. As a result of comments prior to and at the public hearings, a graduated phase-in schedule was adopted. Regulation of pesticide secondary containment/storage facilities and mixing and loading areas began on September 30, 1997. Regulation of fertilizer secondary containment/storage facilities and mixing and loading areas began on September 30, 1999.

During 2005, facilities were visited to provide information and answer specific questions regarding the rules for bulk storage and mixing/loading facilities. This educational process aids individuals in determining first, whether or not compliance with the rules is required and second, what specifically must be accomplished to meet the requirements.

Pesticide and fertilizer facility inspections continued in 2005. A total of 29 pesticide secondary containment structures and 57 pesticide mixing/loading areas were inspected. A total of 51 fertilizer secondary containment structures and 51 fertilizer mixing/loading areas were also inspected. A total of 48 follow-up inspections were also conducted to ensure that problems noted on previous facility inspections were corrected. In addition, one Cease and Desist Order and one Violation Notice were issued during 2005. Finally, 44 follow-up inspection orders were issued for problems at facilities that were not serious enough at this time to warrant a Cease and Desist Order or Violation Notice. Inspection of pesticide and fertilizer facilities will be ongoing during 2006.

One requirement of the rules is that the facility design be signed and sealed by an engineer registered in the state of Colorado; or the design be from a source approved by the Commissioner and available for public use. The Colorado Department of Agriculture (CDA) in conjunction with Dr. Lloyd Walker, former extension agricultural engineer with Colorado State University Cooperative Extension, produced a set of plans that meet the second criteria. The document is entitled, *Agricultural Chemical Bulk Storage and Mix/Load Facility Plans for Small to Medium-Sized Facilities*. The plans are available from CDA or Colorado State University free of charge.

Copies of the complete rules and a summary sheet that contains a checklist to allow individuals to determine if the rules apply to their operation are also available from CDA, CSU, or via the Internet at [www.ag.state.co.us/CSD/GroundWater/Waterhome.html](http://www.ag.state.co.us/CSD/GroundWater/Waterhome.html)

Finally, the Rules for the storage and mixing/loading of agricultural chemicals will be slightly altered in 2006. Since publication in 1994, the Rules have never been formally reviewed.

During the eight years since formal facility inspections have begun, some errors and omissions have been discovered in the Rules. The Ground Water Program's manager and CDA Attorney have thoroughly reviewed the Rules and made some minor changes. These changes have been approved by the Program's Advisory Committee and will be presented to the Agricultural Commission in March of 2006 for final approval.

### **Pesticide Registration and Ground Water Protection**

The Program continues to review products for registration in Colorado, which have ground water label advisories and advise the Department's registration program on the merits of registering these products.

### **Pesticide Management Plan**

In October of 1991, the EPA released their *Pesticides and Ground Water Strategy*. The document describes the policies, management programs, and regulatory approaches that the EPA will use to protect the nation's ground water resources from risk of contamination by pesticides. It emphasizes prevention over remedial treatment. The centerpiece of the Strategy is the development and implementation of Pesticide Management Plans (PMPs) for pesticides that pose a significant risk to ground water resources.

The EPA will require a PMP for a specific pesticide if: (1) the Agency concludes from the evidence of a chemical's contamination potential that the pesticide "may cause unreasonable adverse effects to human health or the environment in the absence of effective local management measures;" and (2) the Agency determines that, although labeling and restricted use classification measures are insufficient to ensure adequate protection of ground water resources, national cancellation would not be necessary if the State assumes the management of the pesticide in sensitive areas to effectively address the contamination risk. If the EPA invokes the PMP approach for a pesticide, its legal sale and use would be restricted to states with an EPA-approved PMP.

EPA published the proposed rule for PMP's on June 26, 1996. Comments on the proposed rule were submitted under the signature of the Commissioner of Agriculture, Director of Colorado State University Cooperative Extension, and the Executive Director of the Colorado Department of Public Health and Environment. These comments were printed in the 1996 report. To date, EPA has not published the final rule. It is uncertain when or if the document will be completed and what will be included based on the comments submitted. However, EPA is still requiring states to produce generic PMPs and is encouraging states to continue with ground water protection programs as outlined in each state's PMP.

In 1996, a complete draft of Colorado's generic PMP was finished and provided to EPA for their informal review. A redrafted plan based on EPA's comments on previous versions was submitted in January 1998. Comments on this version were received from EPA in April 1998, and Colorado then submitted a document final in August 1998 for formal review and concurrence. Two subsequent documents were submitted to EPA based on comments received, the last being in January of 2000. EPA concurred on Colorado's Generic PMP in March of 2000.

One of the more significant issues regarding the PMP involves EPA's demand for a sensitivity analysis/vulnerability assessment map of the state in a Geographic Information System (GIS) format, by which to determine where to focus education and monitoring activities. In late 1995, a small EPA grant was obtained to perform a sensitivity analysis pilot project for the northeastern part of the state. This work was completed in 1996 and provided to EPA. EPA reacted favorably to the project and provided funding for a statewide sensitivity analysis, which was completed in 1998. This information has been published in an eight-page fact sheet titled *Relative Sensitivity of Colorado Ground Water to Pesticide Impact*. This publication assesses aquifer sensitivity based on four primary factors: conductivity of exposed aquifers; depth to water table; permeability of materials overlaying aquifers; and availability of recharge for the transport of contaminants. These factors were selected because they incorporate the best data currently available for the entire state and incorporate important aspects of Colorado's unique climate and geology.

In 1999, the Ground Water Program was given spending authority to begin an aquifer vulnerability project to compliment and improve the existing aquifer sensitivity map. Work on one project on aquifer vulnerability to pesticides was completed June 30, 2001 with the Colorado School of Mines. Another related project titled *Probability of Detecting Atrazine/Desethyl-atrazine and Elevated Concentrations of Nitrate in Ground Water in Colorado*, done in conjunction with the United States Geological Survey (USGS) was completed in 2002. The Program is continuing its work in this area and future projects are currently being planned based upon funding availability.

### **Federal Regulations for Pesticide Containment**

The Program continues to work with and monitor EPA's progress toward proposed Federal *Standards for Pesticide Containers and Containment*. EPA proposed these standards in 1994 and has taken public comment twice, in 1994 and 1999. They once again opened the comment period in 2004 and hope to have these standards finalized by the end of 2006.

### **Waste Pesticide Disposal**

In 1995, CSU Cooperative Extension operated a pilot waste pesticide collection program in Adams, Larimer, Boulder, and Weld counties. The purpose of this type of program is to provide pesticide users an opportunity to dispose of banned, canceled, or unwanted pesticides in an economical and environmentally sound manner. Part of the funding for the program was provided by an EPA Nonpoint Source 319 grant. Approximately 17,000 lbs. of waste pesticides from 67 participants was collected and safely disposed.

Based on the success of this pilot program, CDA was asked to continue a program that could collect and dispose of waste pesticides in other areas of the state. However, CDA currently has no statutory authority or funding to operate such a program. In light of this, two alternatives were discussed as a way for a waste pesticide collection program to continue. The first was for CDA to seek statutory authority and funding from the Legislature to operate a state-run program. The second was to determine if a private program, operated by a hazardous waste handling company, was possible.

The EPA and the Colorado Department of Public Health and Environment made the possibility of continuing a waste pesticide disposal program significantly easier by passing the Universal Waste Rule (UWR) in late 1995. The UWR was developed to encourage disposal of products identified as universal wastes by relaxing the regulations in the Resource Conservation and Recovery Act (RCRA) and therefore making it easier to properly dispose of these products. Waste pesticides were defined in the rule as a universal waste.

CDA spoke to hazardous waste contractors to determine if they would be interested in attempting to collect and dispose of waste pesticides as a private program. One company, MSE Environmental Inc., stated they would be interested. Discussions were initiated with the company and it appeared it would be possible for MSE to operate a private program at a reasonable cost to the participants. The collection and disposal costs for participants would be between \$2.25 and \$2.65 a pound.

Based on this information, it was determined that the private program option would be pursued since the possibility of getting legislation passed was slim. Furthermore, the time required for legislation to be passed would considerably delay the operation of a program.

After numerous issues were addressed, MSE targeted two areas of the state to initiate the program, the San Luis Valley and six counties in northeastern Colorado. Registration for participants was set to begin in early 1997, with a scheduled collection of pesticides set for mid-March 1997. This program was very successful. Over 10,500 lbs. of waste pesticides were collected from 33 participants. The cost to participants was \$2.65 per pound.

Based on the success of this program, MSE conducted a statewide collection program in November 1997. Over 23,000 lbs. of waste pesticides were collected from 75 participants. Again the cost was \$2.65 per pound. Subsequent programs are as follows:

<u>Year</u>	<u>Pesticides Collected (lbs.)</u>	<u>Number of Participants</u>
1998	0	0
1999	19,792	47
2000	0	0
2001	13,486	34
2002	8,762	33
2003	2,254	7
2004	8,520	10
2005	5,023	11

## Legislation

The Program personnel have proposed the need for legislation addressing the Program's fee structure. Due to the effects of both drought and the economy, Program revenues have declined over the last several years. This has necessitated cuts in both personnel and operating expenses that are adversely affecting the way the Program is operated. After 14 years at the current funding levels, a fee increase is necessary in order to effectively implement this Program.

The first step in this process is asking the Colorado General Assembly to remove the Program fees from statute and allow the Colorado Agricultural Commission to set the fees. Currently, fees for the Department's other pesticide programs are approved by the Agricultural Commission. This includes the pesticide manufacturer's state registration fee of \$95 per product, from which the Ground Water Program currently receives \$20. Having the Ground Water Program's fee setting structure similar to other related programs is desirable and will give this program more flexibility to deal with future budget issues.

Senate Bill 176 was passed during the 2005 Legislative Session. A portion of this Bill addressed the above issues for the Program and changed the fee setting authority from the General Assembly to the Agricultural Commission. In September of 2005, the Agricultural Commission was asked to approve a \$10 per product fee adjustment for the Ground Water Program; this request was approved. However, in approving this request, the overall pesticide registration fee of \$95 was not changed; only the amount of that \$95 dollars the Ground Water Program collects was changed - from \$20 to \$30. This \$10 adjustment will provide the Program with approximately \$100,000 of additional revenue per year.

## Conservation Services Division

In 2005, the Ground Water Program was moved from the CDA's *Division of Plant Industries* to a newly created division, the *Conservation Services Division*. This division of CDA also houses the Noxious Weed Program, Insectary, and Soil Conservation Board. The Department is hoping to see cooperative work efforts among the programs that will enhance each program's efforts and the Division and Department as a whole.

## **Ground Water Monitoring**

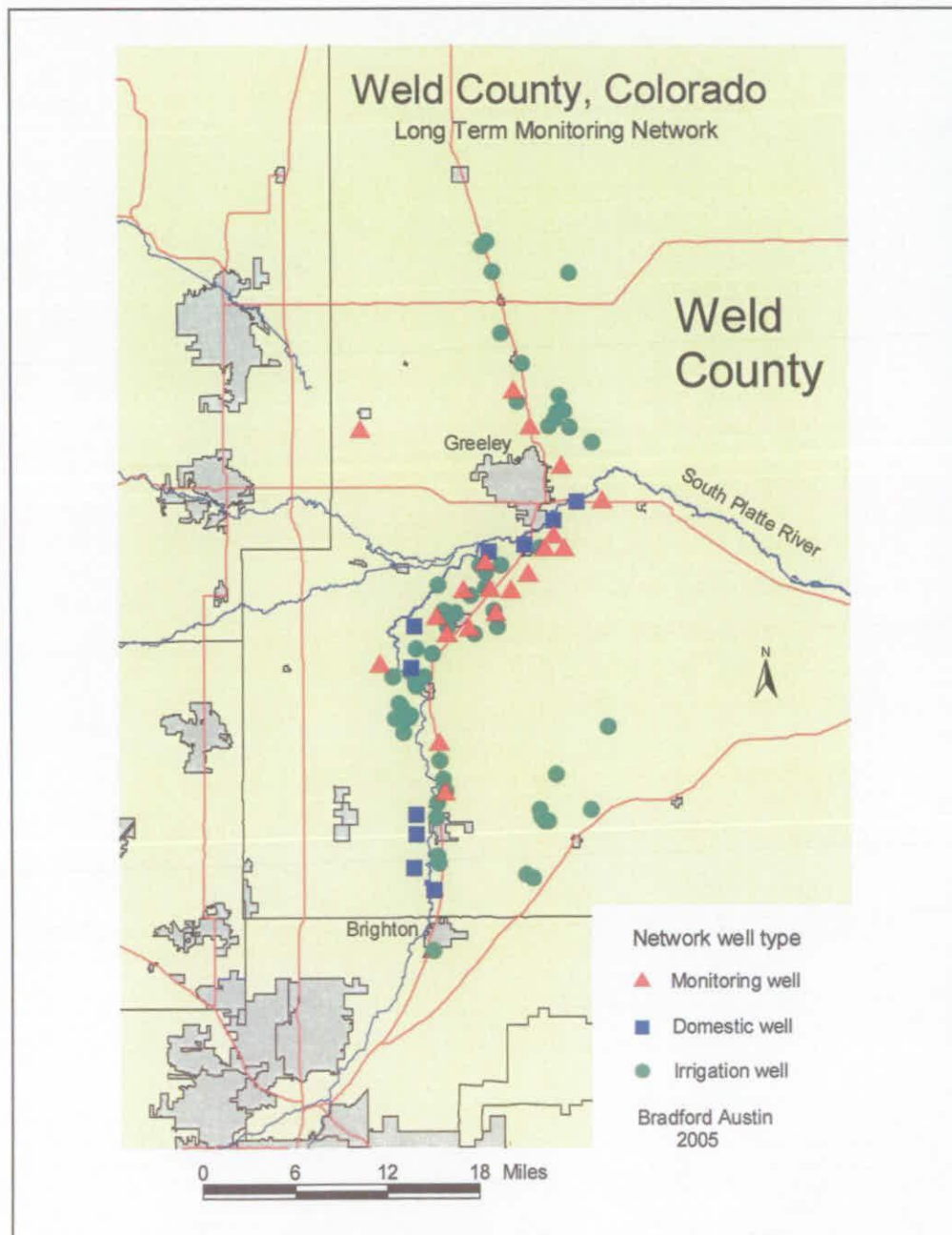
### Summary of Accomplishments:

- ◆ Continued the long term monitoring project in the Weld County portion of the South Platte River Basin, a high priority watershed for SB 90-126 efforts. This sampling year (2005) the program sampled eighteen monitoring wells and fifty-three irrigation wells.
- ◆ Mailed out 2004 sampling results for the Weld County long term network and used the opportunity to seek sampling permission in advance of field work in order to avoid this time consuming task.
- ◆ Edited the monitoring portion of the comprehensive program report, a 12-year summary report on all program work to date.
- ◆ Sampled the network of dedicated monitoring wells installed in the Arkansas Valley in 2004.
- ◆ Established and sampled an urban monitoring well network along the Front Range urban corridor utilizing existing monitoring wells.
- ◆ Continued development of a long term monitoring plan as a guide to program sampling efforts for the next five years.
- ◆ Completed the monitoring portion of the program's 2005 annual report.
- ◆ Assisted in the refinement of a database for the program's ground water monitoring data. Assisted in the design for a GIS interactive database.
- ◆ Collaborated with the Department of Agriculture Standards Laboratory to revise and refine the laboratory analysis used on all ground water samples. Evaluated the pesticide survey data to extract information needed to improve laboratory analysis.
- ◆ Addressed groups on SB 90-126 and issues related to agricultural chemicals and ground water quality. Groups addressed include chemical dealers, ground water management districts, crop and livestock producers, and agency personnel.
- ◆ Distributed fact sheets and reports on Colorado ground water quality to interested parties and fielded questions by phone and e-mail to Colorado citizens.
- ◆ Cooperated with county Extension agents on disseminating information about Colorado ground water quality.
- ◆ Worked to coordinate efforts of the Agricultural Chemicals and Ground Water Protection program with other state and federal programs in Colorado.



## Weld County Long Term Monitoring

In 2005, the program completed the eleventh year of a long term monitoring effort in the South Platte alluvial aquifer from Brighton to Greeley. The long-term monitoring network was established in 1995 and is a combination of three types of wells designed to sample a complete cross-section of the aquifer (Figure 1). The network well types are: a) Twenty dedicated monitoring wells permitted by the Central Colorado Water Conservancy District; b) Fifty-five irrigation wells that have been sampled continuously since 1994; and c) Ten domestic wells first sampled in 1992. The monitoring and irrigation wells are sampled each year, the domestic wells every three years.



From June through August 2005, seventy-one wells in the long-term network were sampled. All wells were analyzed for nitrate-nitrite as nitrogen. The eighteen monitoring wells were analyzed for the complete suite of forty-seven pesticides listed in Table 4. The pesticide analysis performed on the irrigation wells since 1995, an immuno assay screen for the triazine herbicides, had to be discontinued due to a change in the kits by the manufacturer.

FIGURE 1 - Location and type of well comprising the Weld County, Colorado long term monitoring network.

Nitrogen analysis indicated that 78% of the monitoring wells and 72% of the irrigation wells exceeded the nitrate drinking water standard of 10 mg/L. In the monitoring wells, nitrate levels varied over a broader range, with the highest median value. The monitoring wells sample the upper most zone (ten feet) of the aquifer. The irrigation wells recorded a narrower range in nitrate levels with a smaller median value. The differences are expected due to the different zones of the aquifer sampled by each well set, as the irrigation wells sample the entire saturated zone of the aquifer. Table 1, lists the summary statistics for each set of wells.

**TABLE 1 - Summary statistics for the Weld County nitrate monitoring results, 2005.**

Weld County Nitrate Monitoring			
	Monitoring wells		Irrigation wells
Mean	26.1		15.4
Median	21.4		13.0
Standard Deviation	25.6		9.4
Minimum	3.4		0.24
Maximum	99		38.7
# Wells sampled	18		53
Note: all values are Nitrate as N (mg/L), except # wells			

Pesticide results for the monitoring well portion of the network revealed three pesticides, Atrazine, Metolachlor, and 2,4-D present in the Weld County monitoring well samples. The breakdown product of Atrazine, Deethyl Atrazine, was also detected. Atrazine was present in six wells and Deethyl Atrazine was present in ten of the wells. Six wells contained both triazine compounds. Metolachlor was detected in three wells and 2,4-D in one. The total number of wells with a pesticide detection was thirteen of the eighteen sampled (72%). Levels detected ranged from 0.02 for 2,4-D, to 1.4 ug/L (ppb) for DEA. No pesticide was detected at a level that exceeds the applicable standard.

The triazine herbicide screen used on the irrigation wells from 1995 to 2004, had to be discontinued due to a change in the kit detection level by the manufacturer. Fortunately, the program had obtained sufficient data to show a statistically significant decline in pesticide detections in the irrigation wells for that period.

Brad Austin of CDA sampled the monitoring wells in Weld County during June 2005, and the irrigation wells July through August 2005. Field sampling procedures followed the protocol developed by the ground water quality monitoring working group of the Colorado nonpoint task force.

## Arkansas River Monitoring Well Network

In 2004, a network of permanent, dedicated monitoring wells was installed in the Arkansas River valley alluvial aquifer. This work was made possible by a grant from the EPA. Well locations were determined by analysis of existing monitoring data, agricultural chemical use, and aquifer sensitivity and vulnerability models developed by the program. The Arkansas River alluvial aquifer was lacking in monitoring well coverage before this project and continues to rank highly in our areas of concern.

The Arkansas network was first sampled in 2004, shortly after installation. In 2005, the Colorado Department of Public Health and Environment (CDPHE) gave CDA \$5,000 to conduct sampling for selenium in the Arkansas valley monitoring wells. The Program was also able to collect another round of pesticide and nitrate samples while helping CDPHE collect data on selenium. Figure 2 shows the Arkansas River alluvial aquifer monitoring well network as installed in 2004.

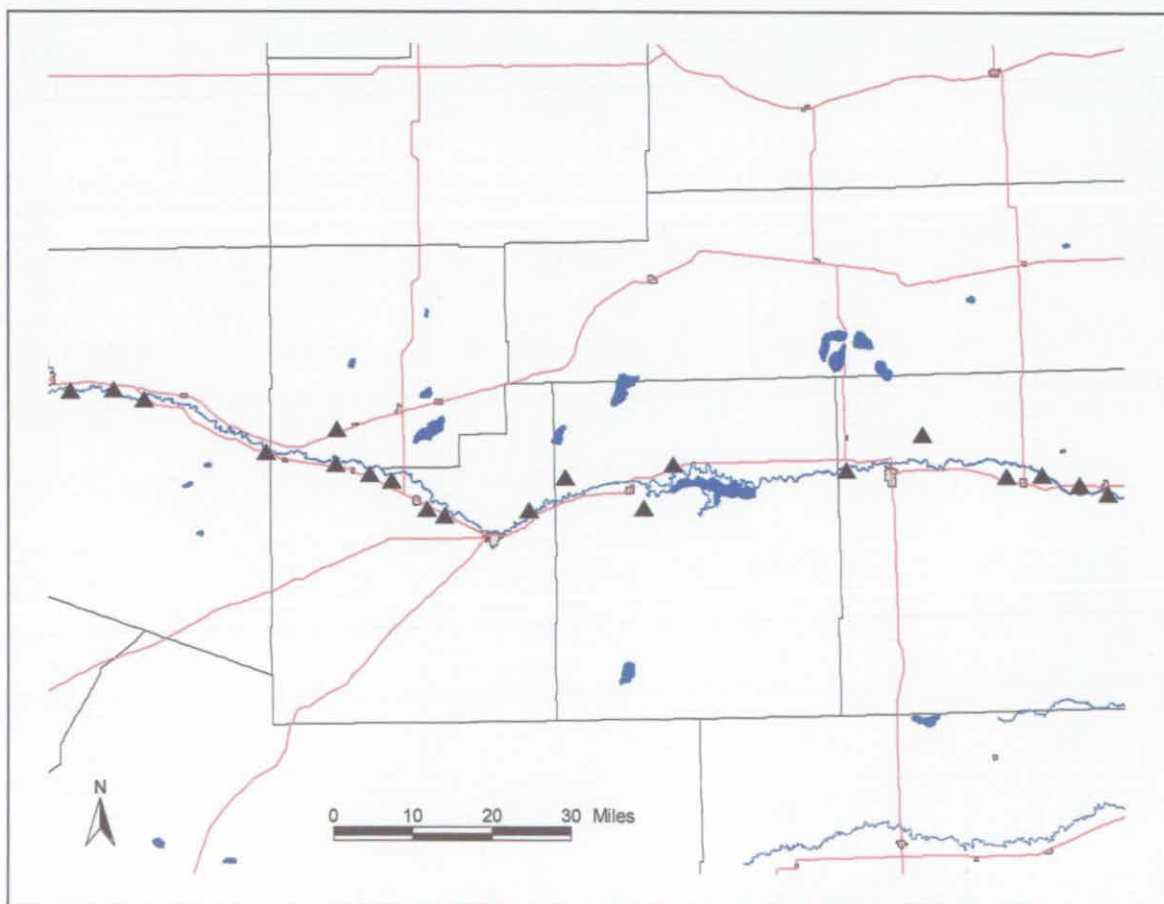


FIGURE 2 – Monitoring well locations in the Arkansas River alluvial aquifer.



All twenty monitoring wells were sampled in September 2005. The wells were analyzed for nitrate-nitrite as nitrogen and the complete suite of 47 pesticides currently established by the Program and listed in Table 4, as well as basic ions, dissolved metals, and selenium.

Nitrogen analysis indicated that only one of the twenty wells sampled (5%) showed a nitrate level in excess (13.7 mg/l) of the EPA standard for drinking water (10 mg/L). Three wells tested below the laboratory detection limit of 0.1 mg/L. The remaining sixteen wells (80%) tested positive for nitrate but were below the EPA standard.

Figure 3 is a map of the area locating each of the wells and showing their corresponding nitrate result. Wells on the map have been color coded according to the nitrate level measured in the well. The wells in blue have nitrate levels below the laboratory detection level of 0.1 mg/L. The wells in green have nitrate levels above the laboratory detection level of 0.1 mg/L up to one half the drinking water standard (4.9 mg/L). Wells in yellow indicate nitrate present in the sample at or greater than one half the standard (5.0 mg/L) but less than 10 mg/L. Wells presented in red indicate nitrate levels exceeding the EPA drinking water standard (10 mg/L).

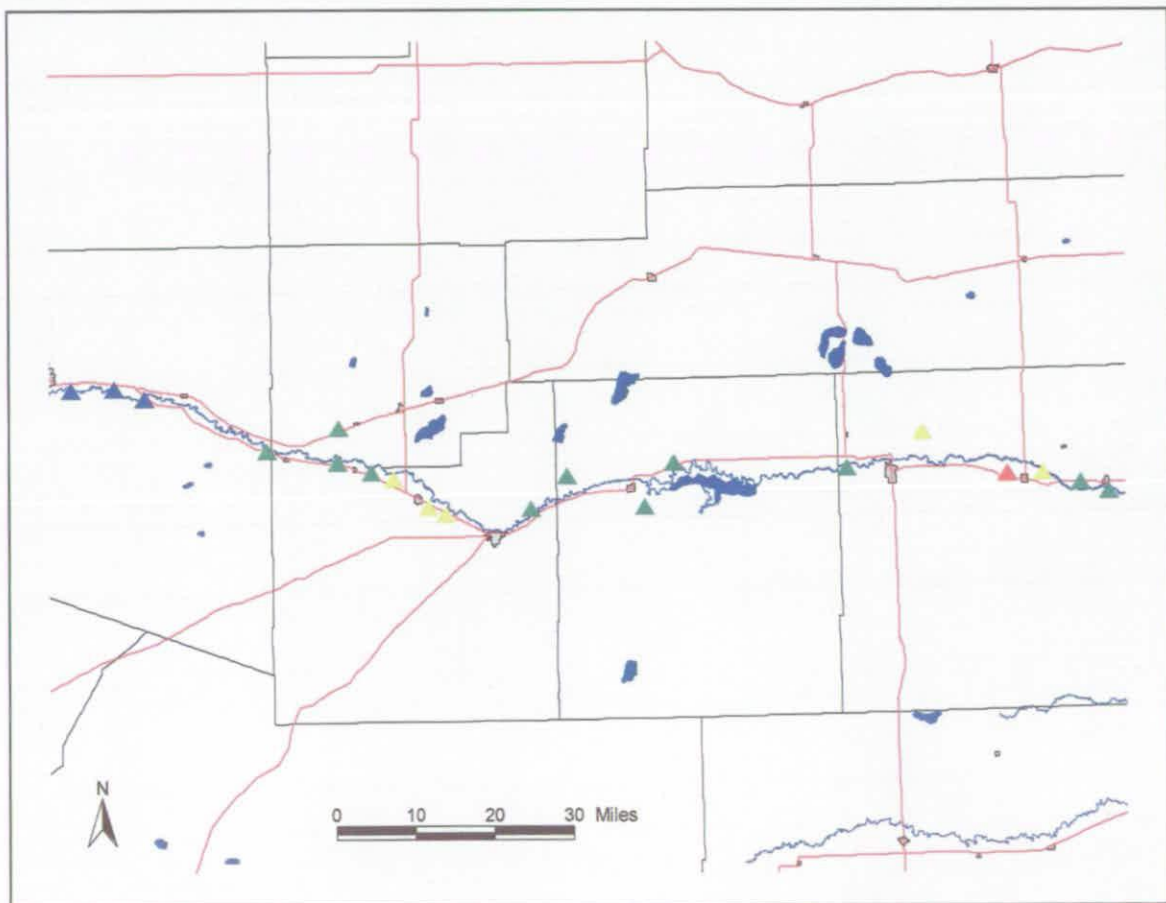
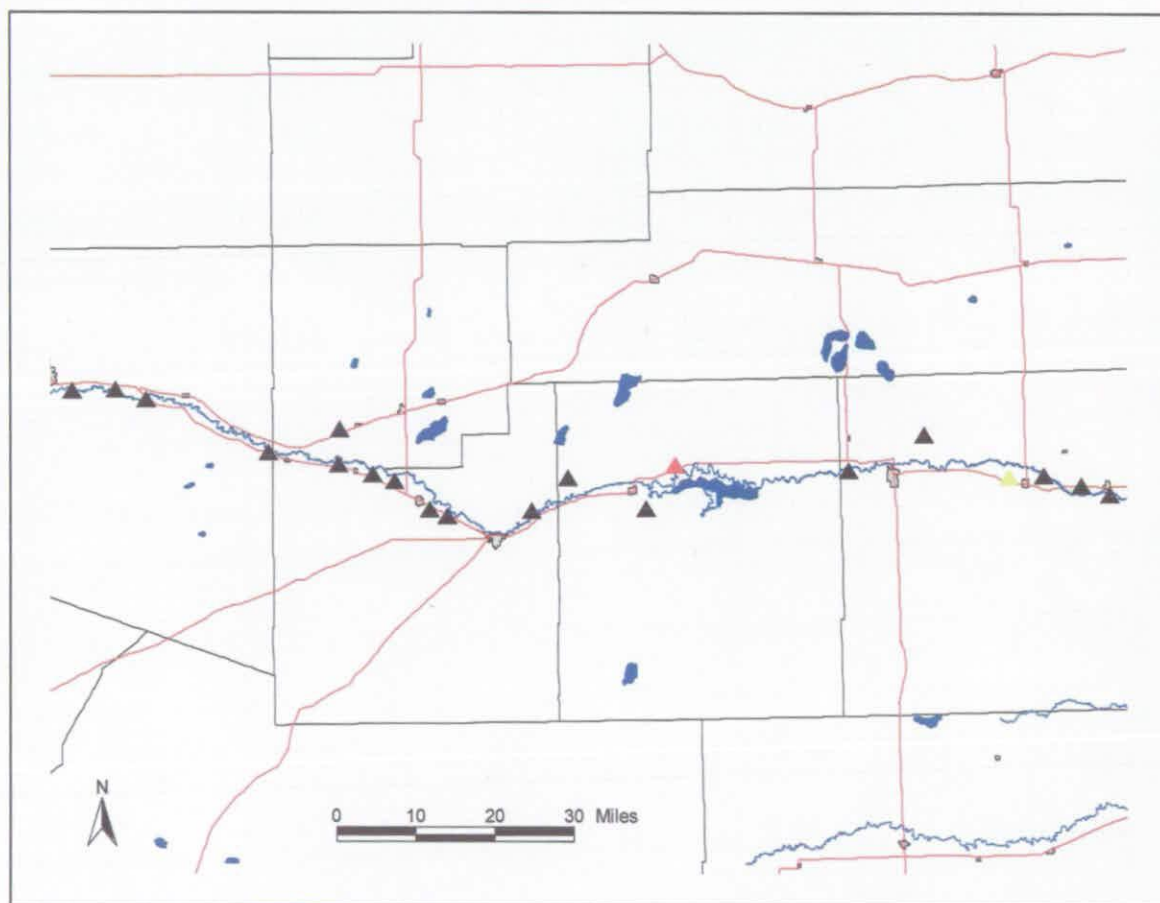


FIGURE 3 – Map showing nitrate levels in Arkansas monitoring wells, 2005.

Pesticide data revealed one pesticide, the herbicide Metolachlor in one well sample. The breakdown product of Atrazine, Deethyl Atrazine, was also present in one well. Deethyl Atrazine is a breakdown product of Atrazine and when found indicates that Atrazine was present at an earlier time in this area. In sum total, there were two wells containing two pesticide detections. No pesticide concentration exceeded an applicable water quality standard.

In one of the twenty wells sampled the herbicide Metolachlor was detected at a level of 0.59 ug/L. Deethyl Atrazine was detected in one well at a level of 0.79 ug/L. The detection limit of the laboratory analysis is 0.04 ug/L (ppb) for DEA and 0.03 for Metolachlor.

The locations of the pesticide detections are mapped in Figure 4. The well shown in red contained Deethyl Atrazine. The well shown in yellow tested positive for Metolachlor.



**FIGURE 4** – Map showing locations of pesticide detections in Arkansas Valley monitoring wells, 2005.

## Front Range Urban Corridor Monitoring Well Network

The Front Range urban corridor is an area the Program intends to continue monitoring for agricultural chemicals. The development density of this area creates special considerations and challenges for monitoring. The current project is to build a monitoring network from existing monitoring wells. There are hundreds of dedicated monitoring wells installed throughout the metropolitan area, but a majority of these wells were installed for site investigations of leaking underground storage tanks and are unusable for investigations related to agricultural chemicals. To avoid the expense of installing a monitoring well, we have contacted numerous monitoring well owners in this area to enlist their cooperation in our sampling effort.

In 2005, the program had contacted and received the cooperation of a sufficient number of well owners in the Denver metro area to launch the sampling program. The effort will be expanded in 2006 to the surrounding metropolitan areas of the Front Range including Fort Collins, Colorado Springs, and Pueblo.

The Program selected and sampled forty urban monitoring wells in 2005; four in Greeley, one in Windsor, and the remaining located in the Denver metro area. The locations are plotted in Figure 5.

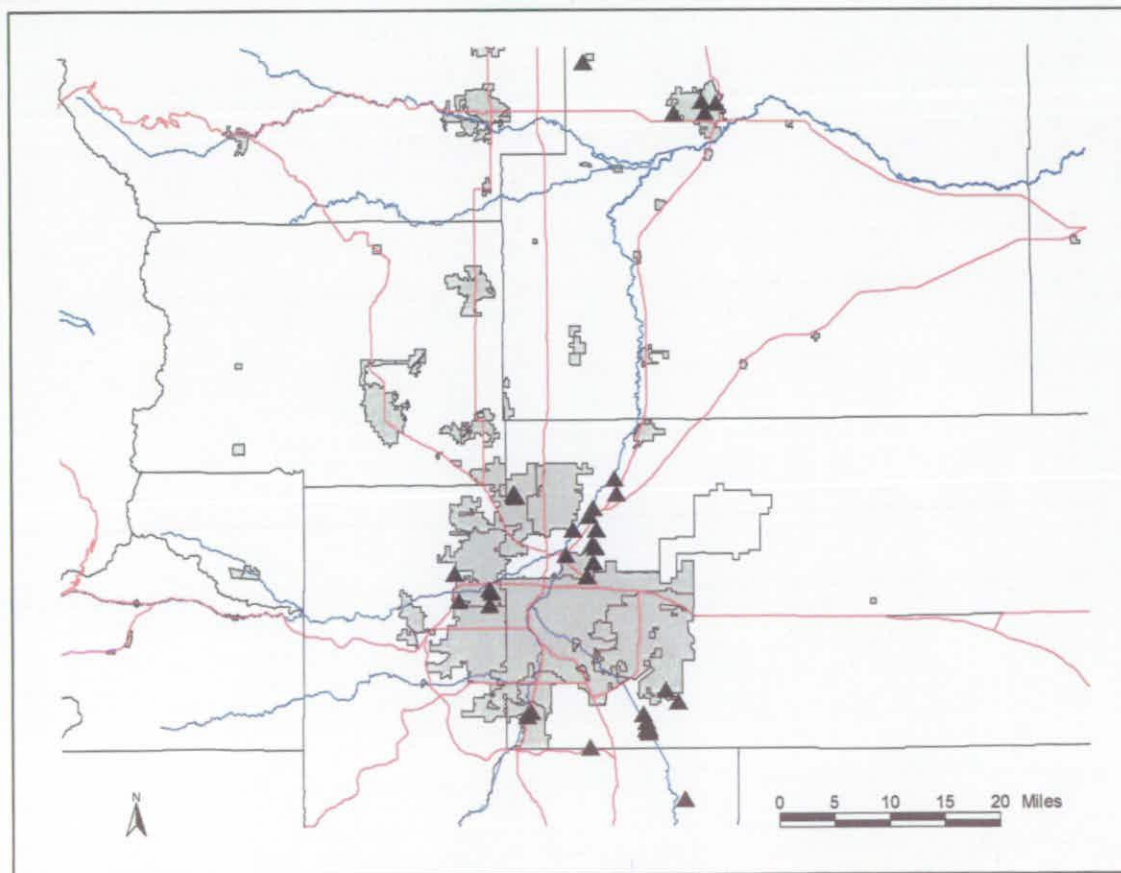
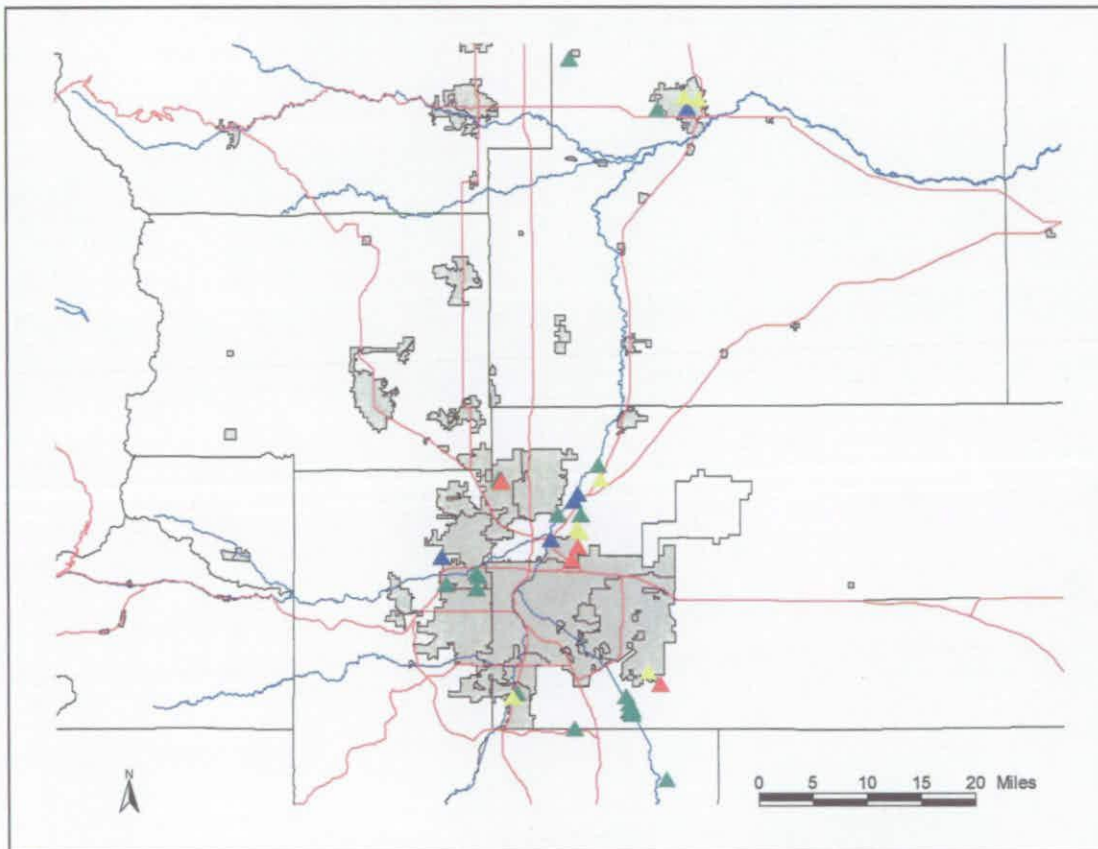


FIGURE 5 – Monitoring well locations in the Front Range urban corridor.



The majority of the wells sampled in 2005 had some nitrate and five went over the drinking water standard of 10 mg/L. Eight wells were non-detect for nitrate.

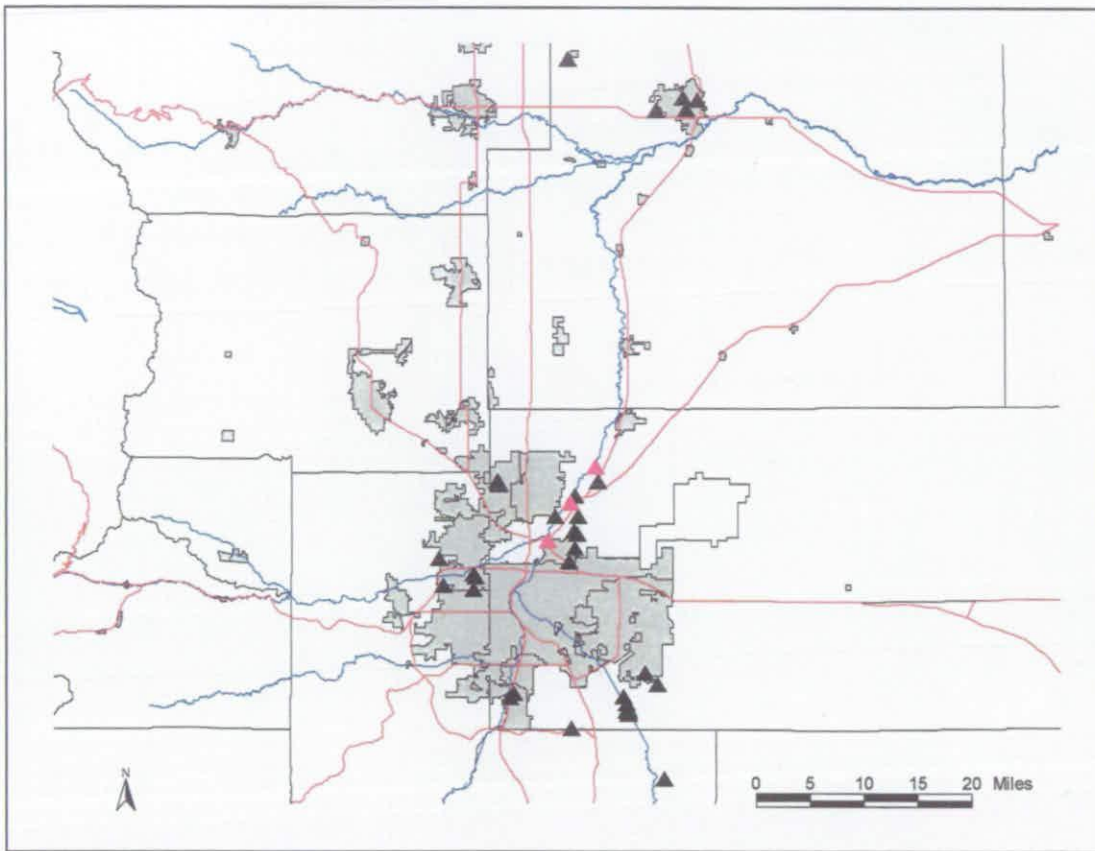
Figure 6 is a map of the area locating each of the wells and showing their corresponding nitrate result. Wells on the map have been color coded according to the nitrate level measured in the well. The wells in blue have nitrate levels below the laboratory detection level of 0.1 mg/L. The wells in green have nitrate levels above the laboratory detection level of 0.1 mg/L up to one half the drinking water standard (4.9 mg/L). Wells in yellow indicate nitrate present in the sample at or greater than one half the standard (5.0 mg/L) but less than 10 mg/L. Wells presented in red indicate nitrate levels exceeding the EPA drinking water standard (10 mg/L).



**FIGURE 6** – Map showing nitrate levels in urban monitoring wells, 2005.

Only one pesticide was detected, MCPP which is similar to 2,4-D. MCPP was detected in 3 wells at levels ranging from 0.040 to 0.043 ug/L (ppb). The detection limit of the laboratory analysis for MCPP is 0.03 ug/L (ppb). The three wells detecting MCPP were located along the west side of the South Platte River.

The location of the pesticide detections are mapped in Figure 7. The wells plotted in magenta contained the herbicide MCPP.

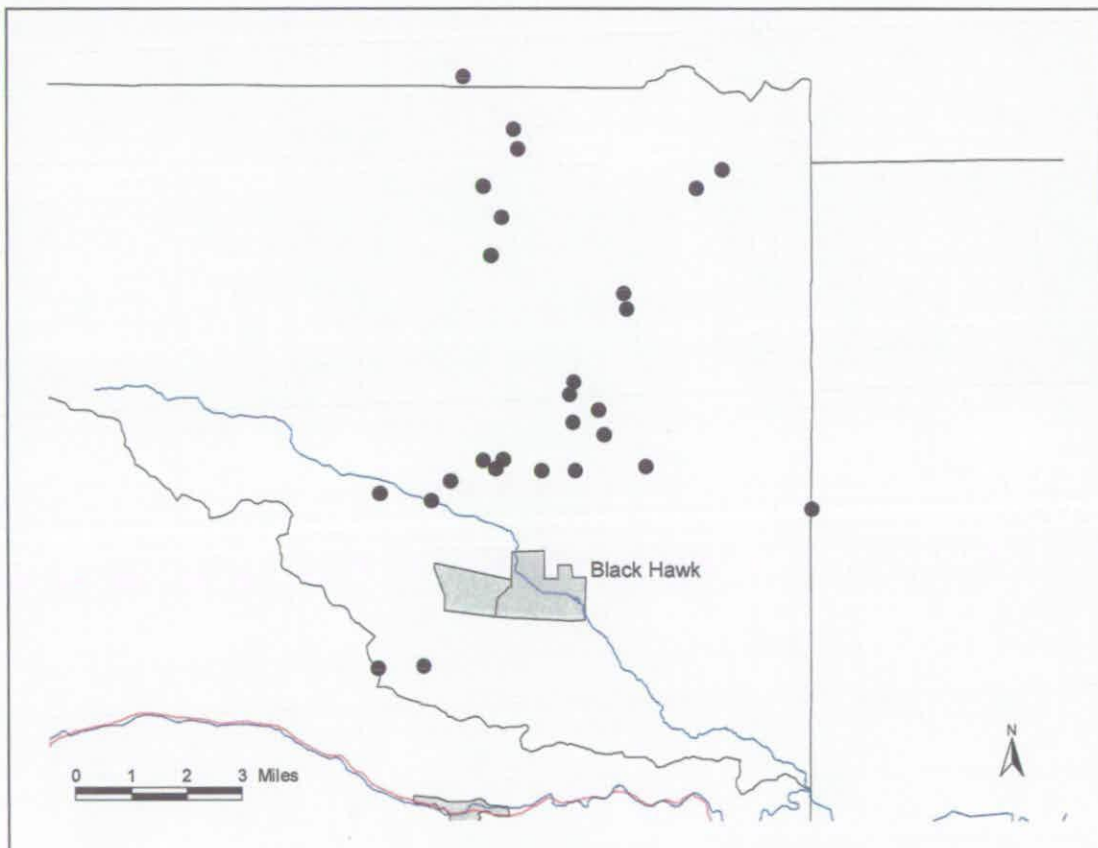


**FIGURE 7** – Map showing locations of pesticide detections in urban monitoring wells, 2005.



## Gilpin County

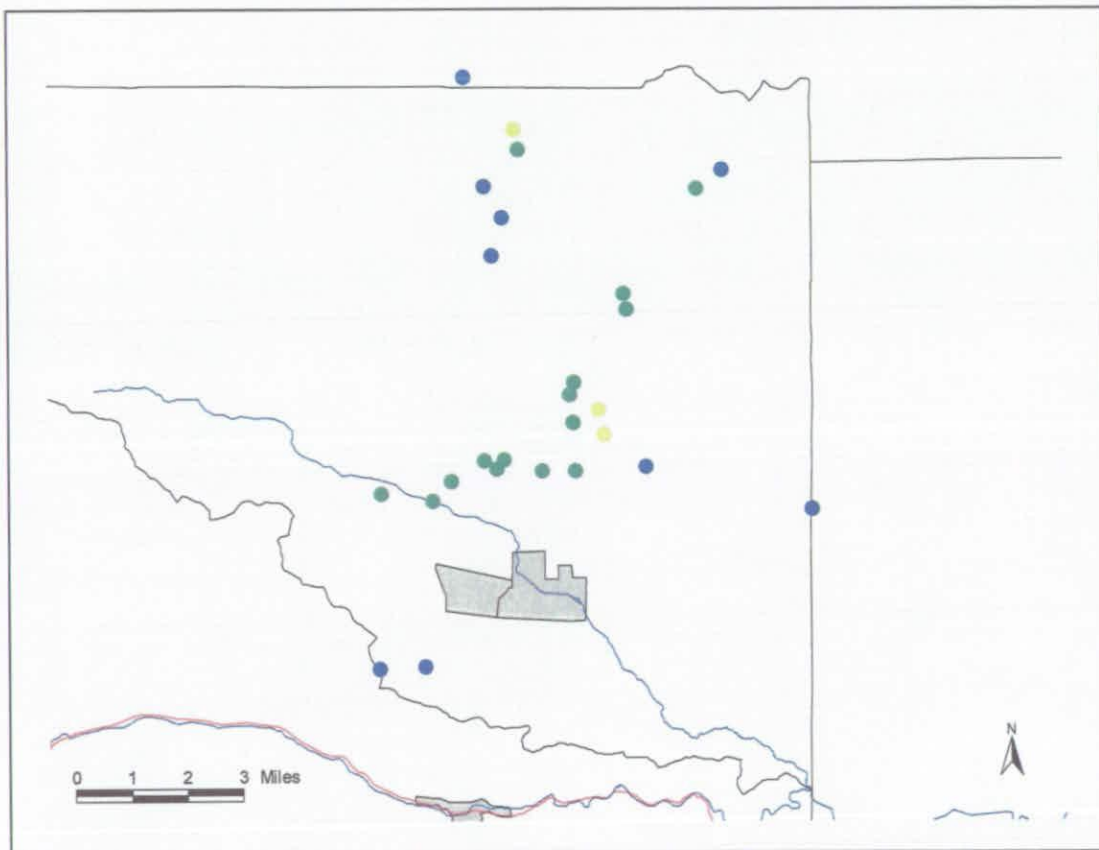
The Gilpin County extension agent was interested in testing water quality in this area and contacted our program in 2004. Gilpin County is located in the Front Range of the Rocky Mountains and the majority of ground water occurs in a fractured granite system. Almost all development, outside of the towns of Black Hawk and Central City, is mountain subdivisions. Twenty-seven residents had contacted the county agent and expressed an interest in water quality sampling and the program was able to accommodate all well owners. The locations sampled are shown in Figure 8.



**FIGURE 8** – Domestic well locations sampled in the Gilpin County.

No well samples exceeded the nitrate standard for drinking water (10 mg/L). Nine of the samples were non-detect and fifteen contained nitrate, but were less than 5.0 mg/L. No pesticides were detected in the Gilpin County samples.

Figure 9 is a map of the area locating each of the wells and showing their corresponding nitrate result. Wells on the map have been color coded according to the nitrate level measured in the well. The wells in blue have nitrate levels below the laboratory detection level of 0.1 mg/L. The wells in green have nitrate levels above the laboratory detection level of 0.1 mg/L up to one half the drinking water standard (4.9 mg/L). Wells in yellow indicate nitrate present in the sample at or greater than one half the standard (5.0 mg/L) but less than 10 mg/L.



**FIGURE 9** – Map showing nitrate levels in Gilpin County domestic wells, 2005.

**TABLE 4 - Laboratory Methods and Detection Levels, 2005****Colorado Department of Agriculture Standards Laboratory****PESTICIDE ANALYSIS**

<b>Pesticide Trade Name</b>	<b>Pesticide Common Name</b>	<b>Pesticide Use</b>	<b>Chemical Type</b>	<b>EPA Method</b>	<b>MDL (ug/L)</b>
Harness	Acetachlor	Herb	acetoalimide	525.1	0.1
Lasso	Alachlor	Herb	OrganoCL	525.1	0.1
AAtrex	Atrazine	Herb	Triazine	525.1	0.06
	Deethyl Atrazine		Triazine	525.1	0.04
	Deisopropyl Atrazine		Triazine	525.1	0.6
Balan	Benfluralin	Herb	OrganoFL	525.1	0.06
Hyvar	Bromacil	Herb	uracil	525.1	0.2
Captane	Captan	Fungi	carboximide	525.1	0.2
Lorsban	Chlorpyrifos	Insect	OrganoPH	525.1	0.1
Bladex	Cyanazine	Herb	Triazine	525.1	0.6
Dacthal	DCPA	Herb	phthalic acid	525.1	0.06
Dazzel	Diazinon	Insect	OrganoPH	525.1	0.1
Barrier	Dichlobenil	Herb	nitrile	525.1	0.07
	Dimethoate	Insect	OrganoPH	525.1	0.2
	p,p-DDT	Insect	OrganoCL	525.1	0.08
	Endrin	Insect	OrganoCL	525.1	0.3
	Heptachlor	Insect	OrganoCL	525.1	0.1
	Heptachlor epoxide	Insect	OrganoCL	525.1	0.4
	Velpar	Hexazinone	Herb	Triazine	525.1
Gamma-mean	Lindane	Insect	OrganoCL	525.1	0.6
Malathion	Malathion	Insect	OrganoPH	525.1	0.08
Ridomil	Metalaxyl	Fungi	acylalanine	525.1	0.1
Marlate	Methoxychlor	Insect	OrganoCL	525.1	0.04
Dual	Metolachlor	Herb	acetamide	525.1	0.03
Sencor	Metribuzin	Herb	Triazine	525.1	0.07
Prowl	Pendimethalin	Herb	dinitroaniline	525.1	0.09
Primatol	Prometon	Herb	triazine	525.1	0.2
Princep	Simazine	Herb	triazine	525.1	0.1
Treflan	Trifluralin	Herb	OrganoFL	525.1	0.1
Weed B Gone	2,4-D	Herb	PhenoxyAcid	515.2	0.02
Stinger	Clopyralid	Herb	PicolinicAcid	515.2	0.2
Banvel	Dicamba	Herb	BenzoicAcid	515.2	0.3
Kilprop	MCPP	Herb	PhenoxyAcid	515.2	0.03
Agritox	MCPA	Herb	PhenoxyAcid	515.2	0.05
Tordon	Picloram	Herb	PicolinicAcid	515.2	0.4
Turflon	Triclopyr	Herb	PicolinicAcid	515.2	0.07

**TABLE 4, continued - Laboratory Methods and Detection Levels, 2005****Colorado Department of Agriculture Standards Laboratory****PESTICIDE ANALYSIS**

<b>Pesticide Trade Name</b>	<b>Pesticide Common Name</b>	<b>Pesticide Use</b>	<b>Chemical Type</b>	<b>EPA Method</b>	<b>MDL (ug/L)</b>
Temik	Aldicarb	Insect	Carbamate	531.1	0.4
	Aldicarb sulfone		Carbamate	531.1	0.2
	Aldicarb sulfoxide		Carbamate	531.1	0.3
Sevin	Carbaryl	Insect	Carbamate	531.1	0.2
Furadan	Carbofuran	Insect	Carbamate	531.1	0.3
	3-Hydroxycarbofuran		Carbamate	531.1	0.3
	Methiocarb		Insect	Carbamate	531.1
Lannate	Methomyl	Insect	Carbamate	531.1	0.3
	1-Naphthol		Carbamate	531.1	0.7
DPX	Oxamyl	Insect	Carbamate	531.1	0.3
Baygon	Propoxur	Insect	Carbamate	531.1	0.3

**INORGANIC ANALYSIS**

	<b>EPA Method</b>	<b>MDL (mg/L)</b>
Nitrate as N	300	0.1
Nitrite as N	300	0.6

**TABLE 4, continued - Laboratory Methods and Detection Levels, 2005****Colorado State University Soils Laboratory****MINERALS AND DISSOLVED METALS ANALYSIS**

<b>Basic Water Quality Parameters</b>	<b>Method</b>	<b>Reporting Limit (mg/L)</b>
Boron	EPA 200.0	0.01
Bicarbonate	APHA 2320B	0.1
Calcium	EPA 200.0	0.1
Carbonate	APHA 2320B	0.1
Chloride	EPA 300.0	0.1
Magnesium	EPA 200.0	0.1
Nitrate	EPA 300.0	0.1
pH	EPA 150.1	0.1 pH unit
Sodium	EPA 200.0	0.1
Specific conductance (TDS)	EPA 120.1	1.0 uS/cm
Sulfate	EPA 300.0	0.1
Potassium	EPA 200.0	0.1
Alkalinity, total	Titration	1.0
Solids, Total Dissolved	Gravimetric	10.0
Hardness, total as CaCO <sub>3</sub>	Calculation	1.0
<b>Dissolved Metals</b>		
Aluminum	EPA 200.0	0.1
Barium	EPA 200.0	0.01
Cadmium	EPA 200.0	0.01
Chromium	EPA 200.0	0.01
Copper	EPA 200.0	0.01
Iron	EPA 200.0	0.01
Manganese	EPA 200.0	0.01
Nickel	EPA 200.0	0.01
Molybdenum	EPA 200.0	0.01
Phosphorous, total	EPA 200.0	0.1
Zinc	EPA 200.0	0.01

## **APPENDIX II**

## 2005 Annual Report Colorado State University Cooperative Extension

### Summary of Accomplishments:

- ◆ Conducted educational programs throughout Colorado on SB 90-126 and issues related to agricultural chemicals and ground water quality. Groups addressed include crop and livestock producers, commercial applicators, chemical dealers, weed districts, crop consultants, crop and livestock producers, agency personnel, homeowners, real estate professionals, and urban chemical users.
- ◆ Conducted training related to the Colorado Best Management Practices Manual. Distributed publications to Colorado citizens covering nutrient, pesticide, irrigation, manure, corn, pesticide record keeping, and private water well management.
- ◆ Published *Protecting Your Private Well*, Colorado State University Cooperative Extension Bulletin – XCM 179 to replace *Best Management Practices for Private Well Protection*, which was out-dated and out of print. The new publication contains the basics of well components, testing, and protection; water quality interpretation and treatment; and septic system components and maintenance.
- ◆ Published a technical bulletin, *Survey of Irrigation, Nutrient, and Pesticide Management Practices in Colorado*, Colo. Ag. Expt. Station Technical Report – TR05-07 (Appendix IV), which presents summarized data from returned surveys from a statewide Irrigated Crop Production Survey to assess the current level of BMP adoption by Colorado producers.
- ◆ Partnered with the Colorado Environmental Pesticide Education Program to produce a *Pesticide Record Book for Private Greenhouse Applicators*.
- ◆ Cooperated with field Extension staff to conduct irrigation management demonstrations on farmer fields throughout Colorado. Demonstrations included: using ET from atmometers, weather stations data, and WaterMark<sup>®</sup> soil moistures for improved irrigation scheduling; the affect of sprinkler nozzle height on corn yield, runoff and soil moisture under center pivot irrigation (third year).
- ◆ Conducted an applied research study/demonstration on irrigation-water-nitrate crediting in Weld County.
- ◆ Conducted an applied research study/demonstration on pre-sidedress soil nitrate testing (PSNT) for corn when applied with poultry manure in cooperation with Parker Ag Services company.

- ◆ Cooperated with the Colorado Climate Center to promote and improve the crop water use (ET) reports provided by the Colorado Agricultural Meteorological Network (CoAgMet). See [www.CoAgMet.com](http://www.CoAgMet.com).
- ◆ Served on the Colorado board for the Certified Crop Advisors Program as Exam Chair responsible for conducting the state exam.
- ◆ Maintained a CSU Extension Water Quality Website to disseminate BMP information via the Internet ([www.csuwater.info](http://www.csuwater.info)).
- ◆ Distributed revised series of four fact sheets on the web to educate Colorado homeowners on BMPs for urban pesticide and fertilizer use. These fact sheets are entitled:
  - Homeowner's Guide to Protecting Water Quality and the Environment XCM-223*
  - Homeowner's Guide to Pesticide Use Around the Home and Garden XCM-220*
  - Homeowner's Guide: Alternative Pest Management for the Lawn & Garden XCM-221*
  - Homeowner's Guide to Fertilizing Your Lawn and Garden XCM-222*
- ◆ Distributed the revised *Pesticide Record books for Private Applicators*.
- ◆ Worked to coordinate efforts of the Agricultural Chemicals and Ground Water Protection program with other state and federal programs in Colorado.
- ◆ Coordinated the incorporation of the Program's ground water quality data to develop a web-interactive database utilizing the Integrated Decision Support (IDS) Group at CSU.
- ◆ Served on the planning committee for the 2005 South Platte Forum. The SP Forum is an interdisciplinary conference that brings together diverse interests in water to communicate and get the latest on water quantity and quality science and policy in the basin.

### **Ongoing BMP Development and Education**

Colorado State University Cooperative Extension (CSUCE) has worked with the Colorado Department of Agriculture to develop Best Management Practices for Colorado farmers, landowners, and commercial agricultural chemical applicators. Because of the site-specific nature of ground water protection, the chemical user must ultimately determine the BMPs adopted for use at the local level. The local perspective is also needed to evaluate the feasibility and economic impact of these practices. The SB 90-126 Advisory Committee has recommended that a significant level of input be received at the local level prior to adoption of recommended BMPs.

Colorado State University Cooperative Extension has compiled a broad set of BMPs encompassing nutrient, pest, and water management that has been used as a template for local committees. These documents were published in a notebook form in 1995 that are



updated as needed (manure was revised in 1999) and expanded to include additional guidelines. Revisions to one chapter in that notebook, Best Management Practices for Private Well Protection, were finished in 2005 and resulted in a new, more comprehensive publication entitled *Protecting Your Private Well*.

Cooperative Extension piloted the local BMP development process in the San Luis Valley and in the Front Range area of the South Platte Basin. The local working committees consist of a small group of producers, consultants, and chemical applicators. Both of these groups have produced BMPs for nutrient and irrigation management - the most serious problem in their respective areas. In 1995, the Shavano SCD worked with local Extension agents and producers to develop a set of practices appropriate for the West Slope entitled "Best Management Practices for the Lower Gunnison Basin." During 1996, a fourth local BMP work group was initiated in the lower South Platte Basin. They published their findings in a bulletin entitled "Best Management Practices for the Lower South Platte River Basin." Although most of these work groups have not been active since finishing their local BMP publications, these guides continue to be distributed at the local and state level. Building on these efforts, a crop specific BMP, Best Management Practices for Colorado Corn was published in 2003 with support from the Colorado Corn Growers.

### **Evaluation of BMP Adoption**

A mailed crop production survey was conducted during the last week of November, 2001 to measure the progress of our educational efforts related to SB 90-126. The primary objective of this survey was to learn the adoption rate of nutrient, pesticide, and irrigation BMPs among Colorado producers. This survey was mailed to 3,260 irrigating crop producers. These results will be used to focus the ground water program on the geographical and topical areas that need higher adoption rates to protect water quality. Because we conducted a similar survey in 1997, we can use the 2001 survey to measure progress in our educational efforts since that time. Approximately 40% of the producers mailed responded with 37% of the responses being usable. Results from returned surveys were entered into a database in 2002 and 2003 and were analyzed and summarized in 2004. The results of this survey have been summarized in a technical report, *Survey of Irrigation, Nutrient, and Pesticide Management Practices in Colorado, Colo. Ag. Expt. Station Technical Report – TR05-07* was published in 2005.

### **Field Demonstration and Research**

Field demonstration work in 2005 focused on helping growers improve water and nutrient management. CSUCE loaned atmometers (ETgages) to county agents, consultants, and individual farmers in Weld, Phillips, Alamosa, and Yuma Counties in 2005. ETgages are useful for simple and effective irrigation scheduling. A third year of a center pivot nozzle height (above and below canopy) replicated demonstration was conducted in cooperation with the NE Regional Water Specialist. Nozzle placement can impact water runoff and therefore irrigation uniformity, soil moisture storage and ultimately yield. Results suggested that placing nozzles at a height just above the canopy reduced runoff and improved soil moisture storage, but did not significantly impact yield as compared to nozzles located within the canopy at 14 inches above the ground. Results

were published in the Proceedings for the Center Plains Irrigation Conference and Exposition (Appendix IV).

Additionally, we continue to improve the awareness and usability of crop ET information provided by the CoAgMet weather network. Cooperating with field CSUCE faculty and Nolan Doesken in the Colorado Climate Center, we upgraded the usability and output of ET reports from weather stations in the CoAgMet network. Specifically, users now have the ability to choose specific crops, weather stations, and planting dates to customize their reports (see "New ET Reports" link at [www.CoAgMet.com](http://www.CoAgMet.com)). In addition, the Program cooperated to add a weather station to this network in 2005. The station was installed in the southern part of the San Luis Valley, near the town of LaJara.

Applied research on nutrient management included a continuing study/demonstration of irrigation water  $\text{NO}_3\text{-N}$  was continued in Weld County in 2005. The results of these demonstrations are useful in convincing growers to adopt this BMP when using nitrate enriched ground water. We also partnered with an agronomist with Parker Ag Services to conduct research plots and demonstrate the pre-sidedress soil nitrate test (PSNT) for corn in fields amended with poultry manure. The PSNT has been used successfully in non-manured fields in Colorado, but has not been extensively tested when manure has been applied and no work has been done on fields receiving poultry manure.

### **Education and Communication**

Communication is a vital component of the program. Numerous methods are used to provide information to individuals and organizations using agricultural chemicals as well as the general public. We continue to provide written fact sheets and publications with information on the program and distribute at meetings, conferences, and trade shows. Also, a display booth is being utilized at conferences and trade shows to provide information on the program. Information on ground water protection is continually being presented to the public through publications, newsletter articles mass media, press releases, and presentations at meetings throughout the state. Presentations on how the program works, past and present water quality projects, and plans for future projects with request for local input are made at every opportunity. In 2005, presentations were made at several major meetings and small local groups throughout the state. Audiences ranged from licensed commercial applicators and Certified Crop Advisors to private well owners and urban homeowners.

Training professionals that advise farmers is critical to making sure growers are provided with sound environmental and agronomic advice. A significant collaboration with USDA/NRCS in 2005 was the 2005 Irrigation Water Management Workshop conducted at CSU research farm (ARDEC) in July. This weeklong workshop trained 25 NRCS and CSUCE field staff using a comprehensive curriculum that included topics from soil-plant-water relationships to water quality to irrigation scheduling.

We continue to provide information available over the Internet. Several locations including the CSU Cooperative Extension web site (<http://www.ext.colostate.edu>), the CSU Cooperative Extension Water Quality web site (<http://www.csuwater.info>), and the

Agricultural Chemicals and Ground Water Protection Program web site (<http://www.ag.state.co.us/CSD/GroundWater/Waterhome.html>), provide information on BMPs.

Educational efforts aimed at youth are also conducted. We developed a set of Colorado specific curriculum to accompany four ground water models purchased from the Soil and Water Conservation Society at Iowa State University using non-point source pollution grant funds. Four of the models are distributed to off-campus Cooperative Extension faculty to utilize in educational efforts in ground water. The four curriculum models are: Aquifer Properties, Ground Water Basics, Ground Water Quality and Septic Systems. Although the curriculum was largely developed for a youth audience, it can be used for all ages with some adjustment.

Finally, we also partnered with the USDA-Cooperative State Research, Education, and Extension Service (CSREES) Water Quality Program (<http://www.usawaterquality.org/>) to offer \$2,000 mini-grant opportunities to CE field and campus faculty. These grants encourage educational programs and extend research information on topics related to water and water quality. Seven programs were successfully accomplished by CSUCE county agents with the following themes:

- < Biological control of field bindweed using the *Aceria malharbae* mite – Boulder County
- < Educating the public about drinking water and human health through the use of water testing – Custer County
- < Mountain Water Symposium – Gilpin County
- < Sprinkler nozzle placement for water conservation – Kit Carson County
- < Adding a weather station to the San Luis Valley ET network – Conejos County
- < Precision management strategies to optimize nitrogen loadings into soil and minimize water quality degradation for sustainable agricultural production – Larimer and Weld Counties
- < Private applicator record book for greenhouses in Colorado - Statewide

**APPENDIX III**

## **2005 Annual Report**

### **Colorado Department of Public Health and Environment**

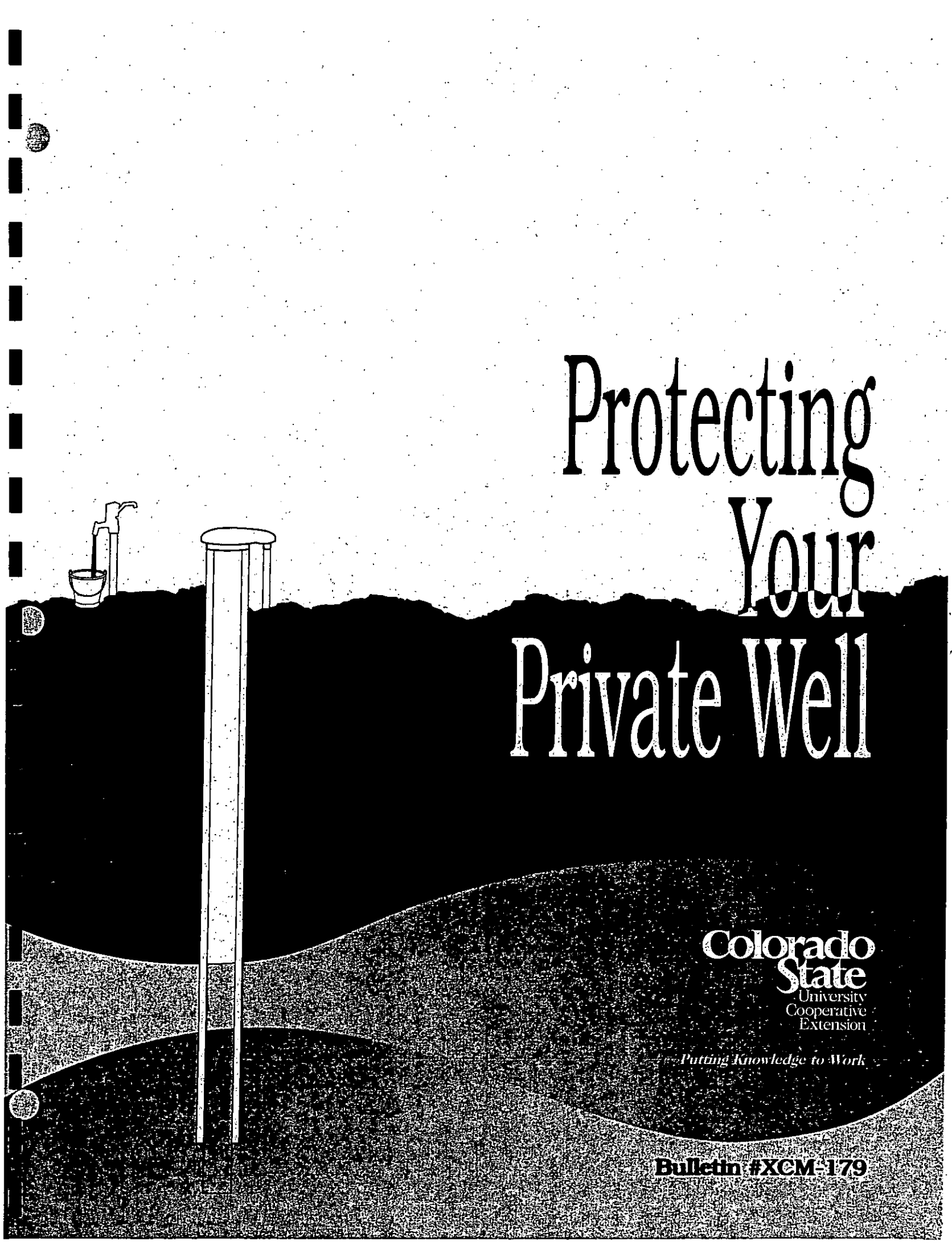
The Colorado Department of Public Health and Environment (CDPHE) has been actively involved with the Agricultural Chemicals and Ground Water Protection Program.

CDPHE continues to review the monitoring data on an annual basis, and provide input on the results. In 2005, CDPHE observed field sampling during the annual Weld County monitoring, and helped with the interpretation of baseline water quality monitoring from Gilpin County. Other activities include assisting with the development of the Program's long-range monitoring plan, and attending meetings on an as needed basis.

CDPHE continues to be involved in the Program's development of a Web-based pesticide and ground water information tool. Activities related to this effort included assisting with layout and design, compilation of chemical specific data with associated water quality standards and health based limits, and associated quality control testing of the various functions.

CDPHE also supports the Program by promoting the Program's activities to outside parties. These activities include communicating the objectives of the Program to other State and Federal agencies, interested parties, and Colorado citizens. Reports, educational materials, and other correspondence have been distributed in an effort to develop an awareness of the importance of the Program to the State's efforts in ground water protection.

**APPENDIX IV**



# Protecting Your Private Well

Colorado  
State  
University  
Cooperative  
Extension

*Putting Knowledge to Work*

**Bulletin #XCM-179**

Technical Report

TR05-07 November 2005

Colorado  
State  
University

*Knowledge to Go Places*

# *Agricultural Experiment Station*

College of  
Agricultural Sciences

Department of  
Soil and Crop Sciences

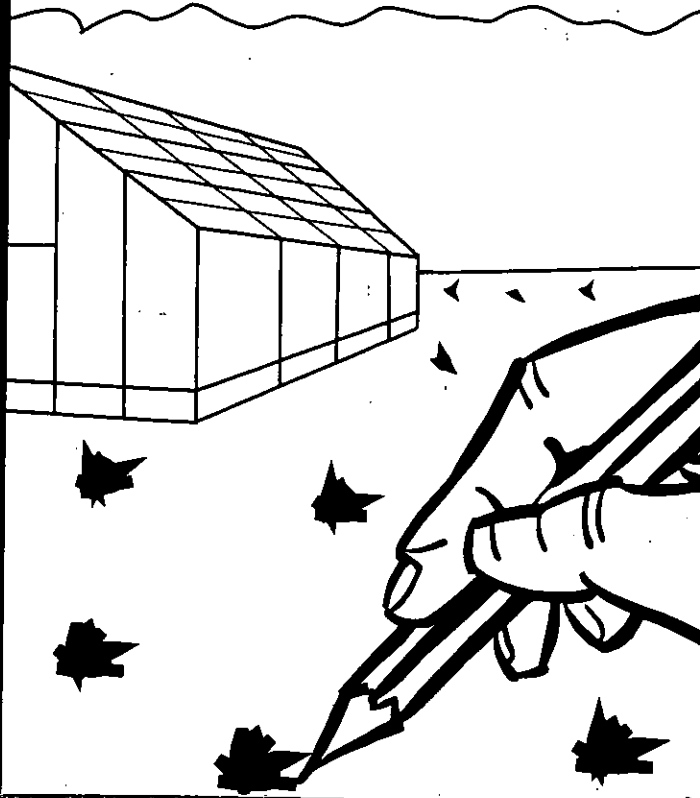
Cooperative  
Extension

## **Survey of Irrigation, Nutrient and Pesticide Management Practices in Colorado**



# Pesticide Record Book

for Private Greenhouse  
Applicators



**APPENDIX V**

**AGRICULTURAL CHEMICALS AND GROUNDWATER PROTECTION ACT  
ADVISORY COMMITTEE  
(Revised 2/06)**

**Water Quality Control  
Commission**

Mr. Robert Sakata  
662 Rose Dr.  
Brighton, CO 80601  
(303) 659-8675  
rtsakata@aol.com  
Original Appointment: 1991

**General Public**

Ms. Barbara Fillmore  
18150 North Elbert Road  
Elbert, CO 80106  
(H) (303) 648-9972  
(W) (303) 648-9897  
bjfillmore@aol.com  
Original Appointment: 1997

Mr. John Stout  
8782 Troon Village Pl.  
Lone Tree, CO 80124  
(303) 708-1841  
jstout@aol.com  
Original Appointment: 1998

**Commercial Applicators**

Mr. Steven D. Geist  
Swingle Tree Co.  
8585 East Warren Avenue  
Denver, CO 80231  
(303) 337-6200  
sdgeist@swingletree.com  
Original Appointment: 1994

Mr. Darrel Mertens  
Aero Applicators, Inc.  
P.O. Box 535  
Sterling, CO 80741  
(970) 522-1941  
aero@aeroapplicators.com  
Original Appointment: 2003

**Green Industry**

Mr. Eugene Pielin  
GMK Horticulture  
2768 Crestview Ct.  
Loveland, CO 80538  
(970) 669-0248  
GMKHort@aol.com  
Original Appointment: 1999

Mr. Mark Krick  
The Homestead Golf Course  
13414 W. Morison  
Lakewood, CO 80228  
(720) 963-5163  
mskrick@aol.com  
Original Appointment: 2006

**Ag Chemical Suppliers**

Mr. Anthony Duran  
American Pride Coop  
653 Rose Dr.  
Brighton, CO 80601  
(303) 659-3643  
aduran@americanpridecoop.com  
Original Appointment: 1998

Mr. Wayne Gustafson  
Agland, Inc.  
155 Oak Drive  
Eaton, CO 80615  
(970) 454-4038  
Wgustafson@aglandinc.com  
Original Appointment: 1991

**Producers**

Mr. Lanny Denham  
2070 57.25 Road  
Olathe, CO 81425  
(970) 323-5461  
pdenham@sisna.com  
Original Appointment: 1996

Mr. Steven Eckhardt  
19487 County Rd. 29  
Platteville, CO 80651-8710  
(970) 539-0443  
fsdefi@msn.com  
Original Appointment: 1997

Mr. John Hardwick  
24700 County Road 19  
Vernon, CO 80755  
(970) 332-4211  
meh@plains.net  
Original Appointment: 1991

Mr. Dave Latta  
38002 Co. Rd. N  
Yuma, CO 80759  
(970) 848-5861 x 222  
dlatta@conagrabeef.com  
Original Appointment: 2001

Mr. Mike Mitchell  
1588 E. Rd. 6 N.  
Monte Vista, CO 81144  
(719) 852-3060  
mitch6@amigo.net  
Original Appointment: 1991

Mr. Don Rutledge  
10639 County Road 30  
Yuma, CO 80759  
(970) 848-2549  
djrutledge@hotmail.com  
Original Appointment: 1995

Mr. Max Smith  
48940 County Road X  
Walsh, CO 81090  
(719) 324-5743  
cmsmith@rural-com.com  
Original Appointment: 1994

Mr. Leon Zimbelman, Jr.  
0949 WCR G7  
Keenesburg, CO 80643  
(303) 732-4662  
pufarms@concentric.net  
Original Appointment: 1993