Groundwater Quality Regulation In Colorado

By Thomas J. Looft

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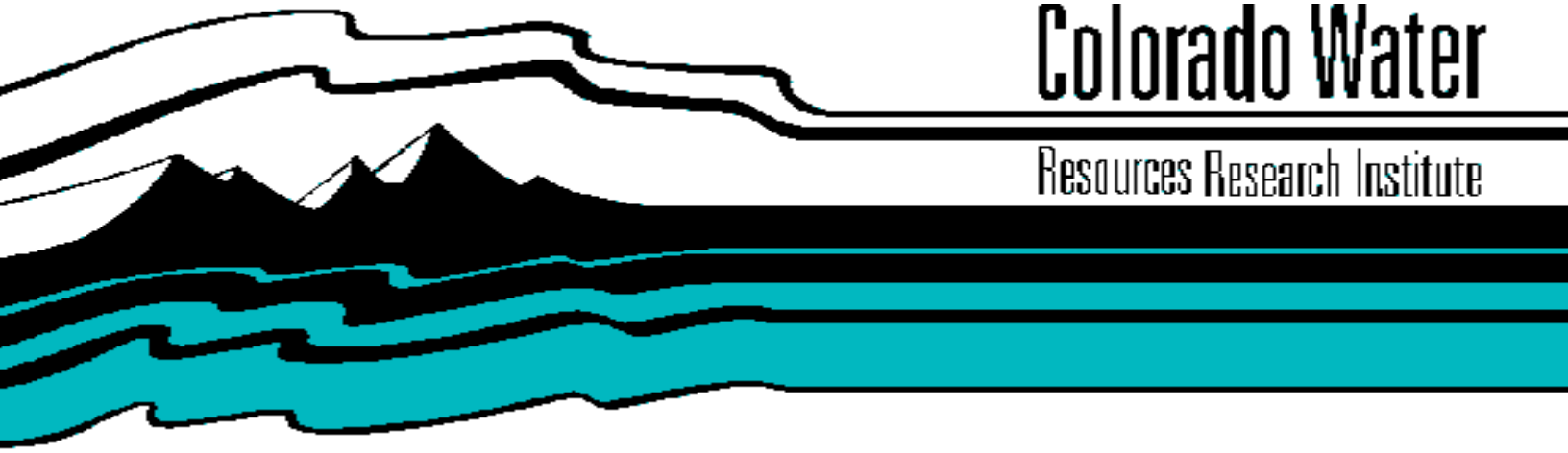

Colorado State University

GROUNDWATER QUALITY REGULATION IN COLORADO

Miscellaneous Report

By

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This report was prepared as a Masters thesis under the direction of Professor Henry P. Caulfield, Jr.

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INTRODUCTION

Groundwater may be defined as subsurface water that occurs beneath a water table in soils, rocks or in geologic formations that are fully saturated. Aquifers, the subsurface permeable rock formations which contain groundwater, underlie most of the nation. Groundwater is stored in aquifers by formations of impermeable rock, and thus reaches the surface only when the aquifer is exposed (natural springs), or tapped (drilled wells). The amount of ground water stored in an aquifer is dependent upon its permeability and porosity.[1]

A vast natural resource, this saturated subsurface zone, or phreatic zone, contains the largest source of unfrozen fresh water in the world. It constitutes twenty-one percent of all the world's fresh water and ninety-seven percent of all the unfrozen fresh water on earth.[2] Today, nearly twenty-five percent of all the water withdrawn in the nation comes from under the ground, and roughly one half of the population depends on groundwater as its principal source of drinking water.[3]

It is generally argued that, up to now, the quality of our groundwater resources has been taken largely for granted. This is primarily a result of the fact that

groundwater has always been viewed as a pristine resource. In fact, early air and water pollution control laws generally encouraged the land disposal of wastes; the very solution that put groundwater supplies in jeopardy. The infiltration of contaminants into groundwater bodies was not thoroughly accounted for by early legislation.

Today, many pollution sources are threatening groundwater. Contamination from such sources as landfills, underground injection, hazardous waste disposal and storage, mine drainage and non-point agricultural sources have reduced groundwater quality. These contaminants include a variety of materials; however, organic and inorganic chemicals, many of them carcinogenic, have been found to be the most notable.[4]

The groundwaters of the State of Colorado are utilized for a variety of purposes, with the greatest uses being made for agricultural and domestic purposes. Nearly eighty percent of public water systems in Colorado depend on groundwater for all, or a portion of their raw drinking water supply.[5] However, a very substantial proportion of water utilized for drinking purposes in the State derives from surface water supplies.

Surface and subsurface disposal of solid, liquid, and hazardous wastes has increased in the State in recent years.[6] Unregulated and improper waste disposal practices often means that contamination will migrate offsite, such as the cases of the Rocky Mountain Arsenal and the Lowry

Landfill. As Colorado's population increases and new sources of water are needed to meet projected demands, the likelihood increases that public drinking water supplies and other beneficial uses of groundwater will be adversely impacted if groundwater quality is not properly regulated. The following examples of groundwater quality problems in Colorado indicate the State's need for a comprehensive and coordinated groundwater quality management program.

The underground injection of fluids has become an increasingly popular method of waste disposal in recent years. Contamination problems can occur in a number of ways including: poorly designed injection wells which leak into aquifers; injection of wastes into incompatible formations and; excessive injection pressure causing disposal fluids to migrate into unintended formations. Contamination problems resulting from underground injection have occurred in the past in Colorado at the Grover in-situ uranium project, where ammonia was injected into the ore body for leaching purposes. Such problems can be expected to grow as energy development in the State increases.[7]

Groundwater contamination from mill and mine tailing ponds and piles is common in Colorado. Tailings are the end waste product of ore extraction. The tailings are often deposited as slurry in settling ponds, which usually are unlined. These tailings often contain high amounts of radioactivity, heavy metals, and substances used for ore

extraction such as cyanide. Contamination problems associated with tailings may be severe or slight, depending upon the composition of the tailings, geologic conditions, and proximity to groundwater bodies.[8]

Such problems have been documented near Telluride at the Idarado Mining Company mill. Hexavalent chromium has been found to be leaching out of tailings into the valley aquifer contaminating groundwater intended to be used as a future domestic water supply by Telluride.[9]

Similar problems are known or suspected at the Cotter Corporation site in Canon City, at Union Carbide's Rifle facility, at Standard Metal's Mayflower mill near Silverton, and at New Jersey Zinc's mill near Minturn.[10]

The burial of solid and hazardous wastes has the potential for groundwater contamination. Problems occur when the design and construction is inadequate and when the landfill is located poorly. Such is the case at the Rocky Mountain Arsenal located north of Denver's Stapelton Airport and the Lowry Landfill located east of Aurora.

Rocky Mountain Arsenal, since its inception, has produced toxic chemicals and chemical filled munitions. In 1946, a large portion of the facility was leased to Shell Chemical Company for the production of pesticides and herbicides. In the past, wastes from the manufacturing of these products were disposed of in unlined basins. In 1980, DBCP (dibromochloropropane), a pesticide manufactured at the Arsenal, was detected in the Town of Irondale's

drinking water supply. DBCP has also been discovered in private wells in the Irondale area. Crops in the area that were irrigated with the contaminated water have also been damaged.[11]

Lowry Landfill is owned and operated by the City of Denver and was used for the disposal of toxic chemicals and other hazardous wastes. The landfill was closed in July, 1982, after the Colorado Supreme Court ruled that Chemical Waste Management Company had not obtained a hazardous waste permit from Arapahoe County. But, after the landfill closed, state health officials detected an underground plume of contamination, consisting of the chemical 1.1 trichloroethane, moving northeast, west, and south of the site. The chemical is an industrial cleaner, and in high doses it is suspected of causing reproductive problems.[12]

Finally, there is the problem of illegal dumping, the extent of which is unknown in Colorado. Most documented cases involve saline brine disposal associated with oil and gas production, however, the dumping of chemical wastes is also expected to be fairly common. In one documented case, sodium cyanide was discovered at a solid waste disposal site near Empire.[13]

In order to gain a national perspective on the extent and severity of drinking water contamination due to groundwater contaminants, the Council on Environmental Quality (CEQ) collected data during 1980 from the Environmental Protection Agency (EPA) Office of Drinking Water, the ten

EPA regions and several states. CEQ received detailed information on drinking water contamination in thirty-four states. At least one state in each of the ten EPA regions reported significant problems. The data also showed that almost all states east of the Mississippi have major problems with contamination, as do the relatively non-industrial, more sparsely populated western states.[14]

Prior to five years ago, legislation explicitly prescribing groundwater pollution control programs was virtually non-existent. The low priority given groundwater can be attributed to the national focus on surface water quality which came to the forefront of public attention during the environmental movement of the sixties and early seventies. Surface water contamination could frequently be seen with the naked eye and was therefore easily recognized. Hence, legislation, primarily federal with state enforcement provisions, was enacted to preserve the quality of our nation's surface waters. Much of this legislation overlooked or only referred to groundwater incidentally. Groundwater quality was taken for granted primarily because it lacked visibility and was not otherwise known to be substantially contaminated.

Once groundwater contamination problems became apparent, government officials and experts in the field were dismayed to discover the weak regulatory system available for protecting the quality of this resource. Responses to the emerging groundwater contamination problem

consisted of ad-hoc legislation which was directed at pieces of the problem, such as hazardous waste disposal. These piecemeal legislative responses represented an effort of expediency on the part of the federal government, and as a consequence, the current federal legal framework for groundwater quality protection consists of a patchwork of several different laws that are not primarily concerned with groundwater. This framework is further muddled by the fact that some of these laws provide for direct federal regulation, while others delegate administrative responsibility to the states.

As with federal law, there are a large number of Colorado laws and regulations that bear upon aspects of the groundwater pollution problem. These laws may address groundwater specifically or refer somewhat ambiguously to, "the waters of the state." However, Colorado has not addressed groundwater contamination in a comprehensive way. The state programs like the federal laws are generally directed towards pieces of the problem.

Since the authority for groundwater quality regulation is divided between the federal government and the states, it is essential that federal law as well as Colorado law be accounted for in order to comprehensively address Colorado's groundwater quality management system. However, as public officials and citizens consider the legal, institutional, and political complexities of protecting groundwater quality, it is imperative that a few physical, chemical and biological facts be kept in mind:

1). Many groundwater contaminants are removed from percolating water through filtration and absorption; but soil and strata do not eliminate most toxic chemicals. Moreover, once water reaches a saturated region, very little, if any further cleansing takes place in an abiotic, cool and dark aquifer. Finally, once contaminated, ground water may remain so for hundreds or thousands of years, if not for geologic time.

2). The degree to which contamination is a threat to groundwater is dependent upon the types of materials underlying a surface site and the particular geologic and hydrologic conditions. For instance, contaminants may be discharged into a relatively dry, or impermeable geologic formation, in which case they may not reach any water for an extended period of time, if at all. On the other hand, discharges into highly permeable and porous soil and rock strata overlying an aquifer can often result in severe degradation of the groundwater body in a relatively short period of time.

3). Groundwater moves slowly, depending upon the hydraulic gradient and permeability of the aquifer. Given enough time, however, contaminants within groundwater can travel great distances. It is possible that groundwater may be heavily contaminated in one place, while only a few hundred feet away it may remain pristine. There may also be long delays and distances between the time and place of contamination and its detection. It may take decades

before groundwater polluted in one place appears in a water supply elsewhere.

4). Testing for and monitoring of contaminants is expensive.

5). The qualities and quantities of ground and surface water are often interdependent, due to hydrologic connections. Some aquifers are confined and do not connect with surface waters, however, depending upon the geology and hydrology of an area, contamination in a wetland or other surface water may pollute an aquifer.[15]

This paper will discuss the current regulatory framework for groundwater quality control in Colorado.

In Part I, the federal government's role will be addressed. The various federal laws which have an impact on groundwater quality will be summarized. It will be demonstrated that some of these laws provide for direct federal regulation, while others delegate primary administrative responsibility to the states. This summary will further illustrate the inadequacies of the existing framework which is composed of a patchwork of policies. The federal government attempted to resolve this problem through its Groundwater Quality Management Program (WQM); however, the Reagan Administration embraced policy priorities which did not include groundwater management. Therefore, progress on WQM appears to have been slowed to a standstill.

Part II of this paper will discuss Colorado laws which impact groundwater quality. Some of these laws

explicitly provide for groundwater quality protection, while others refer to it only incidentally. Colorado, like the federal government, attempted to alleviate its groundwater quality regulatory problems by developing a groundwater quality management program. The Colorado Groundwater Quality Task Force was created by the Colorado Water Quality Control Commission in 1978 for the purpose of developing a coordinated groundwater quality management approach for the State in lieu of the administrative problems associated with the State's current regulatory system.

Finally, some observations regarding problem areas in Colorado's groundwater quality management system will be presented.

NOTES

[1]R. Alan Freeze and John A. Cherry, Groundwater (Englewood Cliffs, New Jersey: Prentice Hall Inc., 1979), p. 2.

[2]Thomas Dunne and Luna B. Leopold, Water in Environmental Planning (San Francisco, California: W. H. Freeman and Company, 1978), p. 192.

[3]"EPA Groundwater Policy Process," Groundwater News (Denver, Colorado: Colorado Water Congress, September 7, 1982), p. 1.

[4]David E. Burmaster, "The New Pollution: Groundwater Contamination," Environment, (March 1982), p. 8.

[5]F. N. Repplier, F. C. Healy, D. B. Collins, and P. A. Longmire, Atlas of Groundwater Quality (Colorado Geological Survey, 1981), map series 16, plate 1.

[6]Colorado Department of Health, "Preliminary Draft: Administrative review of Groundwater Quality and Groundwater Contamination Problems," (August 1982), p. 3.

[7]Ibid., p. 4.

[8]Ibid.

[9]Ibid.

[10]Ibid., p. 5.

[11]Ibid., p. 5-6.

[12]Burt Hubbard, "Chemicals Taint South Groundwater," Rocky Mountain News, (September 17, 1982), p. 7.

[13]Health Department Review, p. 7.

[14]Burmaster, Environment, p. 11.

[15]Ibid., p. 9.

PART ONE

FEDERAL REGULATION

CHAPTER 1

FEDERAL STATUTES AFFECTING GROUNDWATER QUALITY

Recognition of the groundwater problem has raised questions as to whether our existing legal system is adequate. The system consists of a patchwork of federal and state legislation resulting in indefinite, confusing and possibly conflicting policies. There is currently no federal statute, nor single federal agency that comprehensively addresses groundwater from every form of contamination or mismanagement. At the same time, a number of sections in nine federal laws granting regulatory authority to three federal agencies, the Environmental Protection Agency (EPA), the Department of Interior (DOI) and the Nuclear Regulatory Commission, are related to or can impact groundwater quality. They are as follows:

1. Clean Water Act (CWA)
2. Safe Drinking Water Act (SWDA)
3. Resource Conservation and Recovery Act (RCRA)
4. Toxic Substances Control Act (TSCA)
5. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
6. Surface Mining Control and Reclamation Act (SMCRA)
7. Uranium Mill Tailings Radiation Control Act (UMTRCA)
8. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
9. National Environmental Policy Act (NEPA)

These laws variously authorize the control of water pollution generally; drinking water; specific hazardous or toxic substances, certain actions, such as the manufacture or transport of toxic or hazardous materials and certain facilities, such as injection wells or open dumps. The significant requirements in the aforementioned federal statutes that bear directly on the protection of groundwater will now be discussed.

Clean Water Act (CWA)

The Federal Water Pollution Control Act (FWPCA) of 1972 was designed to set the course for a sustained water quality improvement program with "no pollution" as its ultimate goal. The basic approach of the FWPCA was maintained when it was amended and renamed the Clean Water Act in 1977.[1] The provisions of the CWA are directed to water quality in general, however, its primary thrust is geared towards the protection of surface water quality with the exception of only a few specific references to groundwater.

The primary thrust of the CWA is stated in section 102(a) which addresses EPA's responsibility for developing comprehensive programs for water pollution control;

> "The Administrator shall . . . in cooperation with other Federal agencies, State water pollution control agencies, interstate agencies and the municipalities and industries involved, prepare or develop comprehensive programs for preventing, reducing or eliminating the pollution of navigable waters and groundwaters and improving the sanitary condition of surface and underground waters."[7] (emphasis added)

The principal provisions in the CWA which are specifically directed towards groundwater quality are section 208 (Areawide Waste Treatment Management), section 302 (National Pollutant Discharge Elimination System--NPDES), section 303 (Water Quality Standards) and section 106 (Pollution Control Grants).

Section 208, as established by the general directives set forth in section 102(a), required the EPA Administrator to publish guidelines for the identification of areas having substantial water quality control problems. Within sixty days after the publication of those guidelines, the Governor of each state had the responsibility to determine the boundaries of those areas and designate a single policy body capable of developing effective areawide waste treatment management plans for the area involved. These plans were to contain alternatives for waste treatment management and be applicable to all wastes generated in such an area.

Specifically, these plans were required to include; (1) provisions dealing with waste treatment works, such as the identification of needed facilities, financial arrangements, construction priorities and regulatory programs and; (2) a process to identify non-point sources of pollution and procedures to control them. Section 208(b)(2)(f-k) explicitly addresses groundwater quality problems caused by non-point sources.

Finally, section 208 authorized Federal funding to

the states in order to aid them in the developing of their own management programs.

The National Pollutant Discharge System (NPDES) established by section 302 of the CWA requires that all point sources of pollution receive permits from EPA or from federally approved state programs. The system sets up a step by step schedule that requires sources to reduce pollutants to acceptable levels over a specified period of time. Sources must also monitor and report their discharges on a continuing basis. Violations of the compliance or of any permit requirement may result in fines or court action.

Conflicting judicial decisions have clouded EPA's authority to issue NPDES permits to control point source discharges into groundwater. Two district courts denied EPA the authority under NPDES to regulate deep well injection of waste.[2] However, in U. S. Steel Corp. v. Train,[3] the Seventh Circuit decided that, at least in conjunction with the regulation of a permittee's discharge into surface water, EPA does have the authority to regulate discharges into deep wells.

Under section 303 (Water Quality Standards), EPA clearly has the authority to require states to promulgate groundwater quality standards for cases showing a clear hydrologic nexus between ground and surface waters. This analysis of section 303 was litigated and upheld in Kentucky ex rel. Hancock v. Train.[4] However, EPA has construed

this authority to apply to groundwater only in unique and narrow circumstances, and accordingly has not developed a program of national groundwater quality standards.[5]

Section 106 of the CWA provides grants to states and interstate agencies to assist them in administering programs for the prevention, reduction and elimination of pollution. A wide variety of water pollution control activities, including the planning and implementation of groundwater controls are eligible for 106 funding.

EPA's specified scope of authority under the CWA is somewhat ambiguous and has been further confused by judicial decisions. In addition, the agency has been reluctant to exercise its CWA authorities as they pertain to groundwater protection, interpreting them narrowly and failing to push for their implementation. During the Carter administration, EPA was somewhat more aggressive, however, now much of that progress has been lost.[6]

Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act of 1974[7] was designed to upgrade drinking water supplies by establishing minimum national standards for public water supplies and regulating underground injection of wastes. The SDWA has three primary provisions of significance to groundwater protection; the Underground Injection Control Program, the Sole-Source Aquifer Protection Program and the authority for EPA to establish national standards (maximum contaminant levels)

and treatment technologies for public drinking water.

Section 1421 (Underground Injection Control) authorized EPA to promulgate minimum requirements for state programs to control the design and operation of injection wells that might endanger existing or future sources of drinking water and regulate them by permit or rule. The EPA regulations were to specify the procedural and technical requirements for such programs. If a state did not establish and enforce an adequate program consistent with EPA guidelines, the job was forfeited to EPA. The only limitation to the Underground Injection Control Program is that it deals only with drinking water sources, thereby neglecting groundwater supplies valuable for other purposes.

The Sole-Source Aquifer Protection Program established under section 1424(e) of the SDWA is designed to protect the recharge zone of an aquifer that is the sole or principal source of drinking water for an area. EPA has the authority to designate sole-source aquifers and prohibit any federally assisted project that may contaminate such an aquifer so as to create a significant threat to public health. The weakness of this program is that it has no effect on non-federally funded projects. As of July 1980, seven sole-source aquifers had been designated and petitions for eight other designations were pending.[8]

The final provision of the SDWA which pertains to groundwater is contained in section 1412(b), which grants EPA the authority to establish maximum contaminant levels for

pollutants in public drinking water supplies, including those drawn from groundwater. EPA may also prescribe specific treatment technologies to be used.

To date, EPA has established interim final maximum contaminant levels for heavy metals, six pesticides and trihalomethanes; however, it has not proposed them for most compounds, including toxic organics, that frequently contaminate well water. It has instead, prepared "suggested no adverse response levels" which can be used by state and municipal governments in regulating such materials. Under the Carter administration, EPA was planning to replace its "suggested no adverse response levels" with maximum contaminant levels for several chlorinated organic compounds, however, this has yet to be accomplished.[9]

Primary enforcement responsibilities under the SDWA are placed upon the states. However, the failure of a state to administer its enforcement program properly, permits EPA to bring a civil action against any violator, or a criminal action where the violation is willful.

A bill now before Congress, (S 1866)[10] proposes to alter several key provisions of the SDWA. This bill will be discussed in further detail later in the paper.

Resource Conservation and Recovery Act (RCRA)

The broad regulatory program established by the Resource Conservation and Recovery Act of 1976[11] is the primary source of authority for EPA's Solid Wastes Program.

The Act deals with the location, design and operation of landfills as well as hazardous waste generation, treatment, storage and disposal, all of which are potentially dangerous to groundwater sources.

EPA was required under the RCRA to publish criteria for identifying hazardous wastes along with minimum standards governing them. The Act authorized federal funding for those states wishing to operate hazardous waste management programs. In states which did not establish such programs, EPA had the responsibility to issue permits for them, as the Act required permits for all facilities involved in the treatment, storage or disposal of hazardous wastes.

The control mechanism under the RCRA is undertaken through a system of identifying hazardous wastes as they are generated and tracking them as they move through the environment. This includes ensuring that hazardous wastes are packaged and transported properly and includes regulating the treatment, storage and disposal of them. Regulations pertaining to generators of hazardous wastes include requirements for record-keeping, labeling, and the use of a manifest system to ensure that all such wastes are designated only for authorized treatment, storage or disposal facilities.

Another major objective of the RCRA was the development of solid waste management plans by the states, interstate urban areas and municipalities. Each plan was

to include provisions for prohibiting open dumping and upgrading them to sanitary landfills in order to protect the quality of surface and groundwater from leaching and surface runoff contamination.

EPA began promulgating hazardous waste management regulations early in 1980. They required hazardous waste managers to monitor the upper-most aquifer underlying a hazardous waste facility for compliance with the national interim primary drinking water standards and to determine groundwater quality and contaminant levels. Monitoring data must be reported to EPA at specified intervals, and, in the case of landfills, monitoring must continue after such facilities have been closed.[12]

The RCRA also provides for primary enforcement delegation to the states.

Toxic Substances Control Act (TSCA) and Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Although both the Toxic Substances Control Act of 1976 and the Federal Insecticide, Fungicide and Rodenticide Act of 1947 make no specific references to groundwater quality, they have the clear potential in certain circumstances to restrict the use of or ban substances which are of particular danger to human health or the environment; groundwater included.

The TSCA[13] was designed to provide better information about the potential hazards of chemical substances, to

prevent toxic problems through pre-market screening of new chemicals and to limit the manufacture and use of potentially harmful chemicals. EPA's regulatory responsibilities under the Act are triggered by risk of harm rather than by actual damage.

In 1980, CEQ argued that the TSCA, "clearly gives EPA the authority to control the disposal of most, if not all, of the toxic chemicals now found in groundwater supplies."[14]

EPA has enforcement authority under the TSCA and may seek injunctive restraints and criminal and civil penalties in district court against any person who violates the Act or the regulations under it.

The Federal Insecticide, Fungicide and Rodenticide Act, amended the Federal Pesticide Act of 1978,[15] provides the basis for EPA's Pesticides Control Program. The Act authorized a comprehensive program to regulate the manufacture, distribution and use of pesticides as well as major research efforts into the effects of pesticides on living organisms.

The 1978 amendment shifted the primary enforcement responsibilities of the Act from EPA to the states. The use of pesticides in a manner inconsistent with labeling directions, which are approved by EPA at the time of pesticide registration, is prohibited and subject to civil or criminal penalties.

Surface Mining Control and Reclamation Act (SMCRA)

The Surface Mining Control and Reclamation Act of 1977, under the direction of the Department of the Interior, for the first time set national performance standards to protect the environment from surface mine pollution.[16] Groundwater protection is explicitly provided for as stated in section 515(b) (10) and 515(b) (14) of the Act which require that surface mine operations:

> "(10) minimize the disturbances to the prevailing hydrologic balance at the mine site and in associated off-site areas and to the quality and quantity of water in surface and groundwater systems both during and after surface coal mining operations and during reclamation."
>
> "(14) insure that all debris, acid forming materials, toxic materials, or materials constituting a fire hazard are treated or buried and compacted or otherwise disposed of in a manner designed to prevent contamination of ground or surface waters and that contingency plans are developed to prevent sustained combustion."

The SMCRA established an Office of Surface Mining (OSM) in the Department of the Interior. Its duties included the implementation of the Act's regulatory programs and providing technical assistance to state governments. The failure of a state to submit a fully approvable regulatory program triggers the preparation and implementation of a federal program for the control of surface mining within that state. Permits are required eight months after the approval of a regulatory program in order to commence or continue mining and must conform to national performance standards.

The primary enforcement responsibility under the SMCRA resides in the states under federal supervision.[17]

Uranium Mill Tailings Radiation Control Act (UMTRCA)

The Uranium Mill Tailings Control Act of 1978[18] gives the Nuclear Regulatory Commission (NRC), in cooperation with EPA, the authority to develop standards for the safe disposal of wastes from uranium processing mills:

> ". . . in order to prevent or minimize radon diffusion into the environment and to prevent or minimize other environmental hazards from such tailings."[19]

The provisions under the UMTRCA, which effect groundwater quality indirectly, gives the states the right to participate fully in the selection and implementation of procedures to clean up wastes. The Act also required that waste disposal sites be turned over to the states or the federal government unless the NRC determined that such a turnover was unnecessary.[20]

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("Superfund")[21] gives the federal government, through EPA, the authority to immediately clean up any chemicals that are released into the environment. The Act defines environment as including groundwater and drinking water supplies. It established a $1.6 billion fund to be used by the government for cleaning

up hazardous spills and gives the President the authority to order any emergency clean up by either the government or those parties responsible in order to protect the public health and welfare or the environment.

The Act provides that the "fund" could pay for the following losses resulting from hazardous chemical releases: 1) ninety percent of the operation and maintenance costs of any remedial action taken at a release site (the state pays the remaining ten percent); 2) the loss of natural resources (including groundwater) and costs up to fifty million dollars and; 3) the costs of health studies and diagnostic exams for victims' health problems, but not for other medical expenses.

National Environmental Policy Act (NEPA)

The National Environmental Policy Act of 1969 was very broad in scope in that it mandated all federal agencies to consider the effects of any federal action on all aspects of environmental quality. The Act required the drafting of Environmental Impact Statements (EIS) by responsible officials which were to include:

> "(I) The environmental impact of the proposed action,
> (II) Any adverse environmental effects which cannot be avoided should the proposals be implemented,
> (III) Alternatives to the proposed action,
> (IV) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity,

> (V) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."[22]

The Acts summarized in this section (see Figure I) demonstrate the fragmented and uncoordinated nature of federal groundwater protection regulations. Several of the Acts provide for explicit, well-defined regulatory approaches for the protection of groundwater quality while others refer to it only incidentally or not at all.

EPA was well aware of this institutional problem and proposed to solve it by developing a comprehensive and integrated groundwater strategy. This strategy is the topic of the next section.

FIGURE I

MAJOR SOURCES OF GROUND WATER CONTAMINATION AND CURRENT APPROACHES TO CONTROL

Sources of Contamination	Primary Basis of Current Control Efforts
Waste Disposal Sources	
Landfills, Dumps, and Surface Impoundments	Federal regulations and state delegation under RCRA.
Mining Wastes	Previously BMPs for active mines and little for abandoned mines, 1977 Surface Mining Act initiated permit and reclamation programs.
On-lot Waste Water Disposal Systems	Generally local or county control under state health regulations, with evaluation of alternatives under 208 funding.
Radioactive Wastes	NRC authority, sometimes delegated to states.
Sludge Management via Land Spreading	BMPs developed at federal level
Underground Injection Wells	New UIC program of federal standards and state enforcement under the Safe Drinking Water Act
Land Treatment of Municipal Waste Water	Step 1 for new POTW construction
Non-Disposal Sources	
Abandoned Wells	Limited state programs, some expansion of program under UIC and SWDA emergency actions
Accidental Spills	Federal advice available, sometimes assistance; SDWA; RCRA and Superfund (if enacted) will extend authorities and funding
Agriculture Practices	Primarily recommended BMPs, with selected regulations under FIFRA and CWA
Artificial Recharge	BMPs under development by EPA and selected cities
Highway De-Icing Compounds	BMPs at state levels
Petroleum Exploration and Development	State programs in past, now UIC and RCRA add federal standards for injection wells and lagoons.
Underground Storage Tanks and Pipelines	Some local or state standards for construction, few inspection programs
Depletion	
Increased Salinity	State and local efforts
Salt Water Encroachment	State and local efforts

Source: Planning Workshops to Develop Recommendations for a Ground Water Protection Strategy, Table II-1.

NOTES

[1]33 U. S. C. 1251-1378 (1978).

[2]See U. S. v. GAF Corp., 389 F. Supp. 1379, 5 ELR 581 (S. D. Tex. 1975), and Exxon Corp. v. Train, 554 F. 2d 1310, 7 ELR 20594 (5th Cir. 1977).

[3]556 F. 2d 822, 7 ELR 20419 (4th Cir. 1977).

[4]6 ELR 20689 (E. D. Ky. 1976).

[5]"Proceedings of the Fourth National Groundwater Quality Symposium," EPA, August 1979, p. III-11.

[6]Amy Horne, "Groundwater Policy: A Patchwork of Protection," Environment, April 1982, p. 7.

[7]42 U. S. C. 300f-300j-10 (1974).

[8]Horne, Environment, p. 8.

[9]Ibid.

[10]42 U. S. C. 300j-8 (1974).

[11]42 U. S. C. 6901-6987 (1976).

[12]Michael S. Hamilton under the direction of Norman Wengert, Summaries of Selected Federal Statutes Affecting Environmental Quality, Cooperative Extension Service, Colorado State University, March 1980, p. 2.

[13]15 U. S. C. 2601-2629; Pub. L. 94-469, October 11, 1976, 90 Stat. 2003.

[14]CEQ Annual Report, Environmental Quality - 1980, U. S. GPO, Washington D. C., December 1980. p. 99.

[15]7 U. S. C. 135-136y (1979).

[16]30 U. S. C. 1201-1328; Pub. L. 95-87, August 3, 1977, 91 Stat. 445.

[17]30 U. S. C. 1271 (1977).

[18]42 U. S. C. 7901-7942 (1978).

[19]Ibid., 7901-a.

[20]Ibid., 7913.

[21]42 U. S. C. 9601-9657 (1980).

[22]42 U. S. C. 4321-4347 (1970).

CHAPTER 2

FEDERAL GROUNDWATER QUALITY MANAGEMENT PROGRAM (WQM)

In 1979, EPA began studying the feasibility of developing a comprehensive national groundwater protection program. The Agency's goal was to marshall its authorities under existing Federal legislation containing groundwater quality provisions and develop them in a coherent fashion that reduced confusion and burdensome overlaps on one hand and minimized major gaps in coverage on the other.[1]

Guiding Principles

In order to aid in the creation of the proposed program, EPA developed four basic principles to guide it in its efforts. These principles included; 1) the administration of the related programs would be a cooperative effort involving Federal, State, and Local governments; 2) the program's focus would concentrate on the prevention of contamination, rather than on its treatment at the point of withdrawal; 3) applicable standards would be based on available technology rather than ambient groundwater quality considerations and; 4) there would be a need to balance

environmental protection, energy development and continued economic prosperity objectives so that the resulting program would fully protect health while being realistically implementable.

With regard to the first principle, the majority of Federal legislation pertaining to groundwater either provided exclusively for State programs or for primary State responsibility in the administration and enforcement of programs. EPA preferred that the States retain the lead in managing groundwater and therefore perceived its role as being one of establishing minimum quality and program standards, providing technical and financial assistance and reviewing State progress and performance.[2]

The second principle which stressed the reliance on preventing contamination rather than on its abatement, was based on the difficult and often impractical nature of remedial action. The physical characteristics of groundwater make it nearly impossible to cleanse once contaminated and the treatment of contaminated groundwater after withdrawal is often too costly to be practical.[3]

The third principle's reliance on technology based rather than ambient water quality standards was established due to the fact that the effects of discharges on ambient quality are complex, difficult to predict and of long duration. EPA felt that it would be more practical to utilize sound engineering practices in the siting, construction, operation, closure and abandonment of facilities

that had the potential for adversely affecting groundwater quality.[4]

Finally, EPA was of the opinion that groundwater protection should be geared towards a multiple-use concept. This was based on the argument that not all groundwater sources would be needed for drinking water and that certain industrial and other activities might be of higher priority than groundwater protection in some areas. EPA felt that many practices serving other purposes could be carried on with little adverse inpact on groundwater quality if they were located, designed, constructed and operated according to known ecological and engineering practices.[5]

National Strategy

In 1980, EPA established a National Groundwater Quality Task Force which was directed to formulate a national groundwater policy consistent with the aforementioned principles. The Task Force was comprised of members representing the EPA Offices of Water Planning and Standards, Drinking Water, Solid Waste Management, Research and Development, Planning and Management and Regional representatives.[6]

The strategy proposed by the National Task Force for the Water Quality Management Program (WQM) provided a framework for: developing cost effective solutions to groundwater problems through a national prototype technology transfer program, developing EPA Regional groundwater

strategies and State programs and funding WQM groundwater projects. The strategy discussed the selection and use of national prototype projects as an approach to developing cost effective solutions and Best Management Practices (BMP's) for significant and characteristic groundwater problems. A major factor in the selection of such projects was that their results be potentially transferrable to other areas of the country experiencing similar problems. The strategy also provided direction to the States and area wide agencies on the development of other groundwater projects and provided directions to the EPA Regions for evaluating projects for funding.[7]

All WQM groundwater projects were required to satisfy basic criteria for EPA funding. EPA Regional Offices used a two-phased procedure in reviewing groundwater work plans. In the first phase, proposals were screened for their conformity with a set of fundamental criteria. The applicant agencies were required to: 1) identify and address a problem of groundwater pollution; 2) show what appropriate support had been approved or was being requested; 3) explain how the products of the work plan were expected to aid or spur the undertaking of action to protect groundwater quality and; 4) present a well organized and technically sound work program.[8]

If the applicants met the first set of requirements they qualified for the second stage of review in which more detailed criteria were applied to rank the proposals in

order of relative merit and priority. These include, in order of importance: 1) the significance of the problem to be addressed; 2) emphasis on implementation; 3) transferability of results to other locations and contexts; 4) advancement in state-of-the-art groundwater management; 5) diversity; 6) leverage to secure multi-purpose advantages and; 7) comprehensiveness of the project.[9]

Based upon the project selection criteria, EPA's Water Planning Division was to select twenty-two prototype projects (twelve starting in FY80 and ten in FY81) from among the qualifying proposals sent by the Regions. These projects, which were to be managed by the Regional Offices, would represent various types of pollution problems. With the assistance of the Regions, the Water Planning Division was then responsible to transfer groundwater technologies and information developed as a result of the projects throughout the nation (see Figure II).[10]

FIGURE II

WQM PROGRAM

OBJECTIVES MATRIX--GROUNDWATER

OVERALL OBJECTIVE: (1) TO DEVELOP AN EPA AND WQM GROUNDWATER POLICY AND STRATEGY AND (2) TO CONTINUE TO DEVELOP TECHNOLOGICAL AND FINANCIAL BASES FOR CONTROLS THROUGH PROTOTYPE PROJECTS

UNIT	FY 80	FY 81	FY 82	FY 83	FY 84-85
Headquarters	by contract, analyze ground water issues across the country	develop national policy on ground water protection for guidance to States	manage prototype projects with the Regions, including FMAP+assistance	continue to transfer BMP's from prototype projects to other areas	prepare national report on controls, BMP's for ground water quality problems
	with Regions, States, areawides select sites for ground water prototype and Category II ground water projects	provide tech/financial mgt. assist. on ground water prototypes thru FMAP+(thru 82)	initiate transfer of BMP's to other Federal, State, areawide agencies (thru 83)	provide assistance with consultants to Regions, States and areawide agencies to initiate evaluation of prototype (thru 84)	Implementation of report recommendations
	develop and implement EPA ground water policy (thru 83)	with other HQ offices, Regions, and contractors, help manage prototypes (thru 82)			
	develop framework for integrated State ground water programs with ODW, OSW (thru 84)				continue tech transfer and public info programs
	identify target groups and develop system for info transfer; develop public info materials (thru 83)	select additional prototype projects; provide tech, mgt. assistance to these			
EPA Regions	provide technical assist., evaluation, funding for ground water prototype projects (thru 82)	help select sites for additional prototype projects, provide tech. assist, eval., funding for projects	select and manage Category II ground water projects; continue management of prototypes	initiate evaluation of prototype projects (thru 84)	assist in preparation and implementation of national report
	help select sites for ground water prototype projects and ground water Category II projects	use FMAP+ to provide financial mgt. assist. to prototype projects (thru 82)			
State and areawide agencies	help select sites for ground water prototype projects and propose Category II ground water projects	inform and involve public in imple. of ground water poll. controls (thru 84)	selected State or areawide agencies complete work on ground water prototype projects	initiate evaluation of prototype projects (thru 84)	manage State ground water protection programs
	selected State and/or areawide agencies receive funds to initiate ground water prototype projects and Category II ground water projects (thru 82)		Implement cost-effective BMP's (thru 85)		

+ FMAP--Financial Management Assistance Project

NOTES

[1]Victor J. Kimm, "The Federal Groundwater Protection Program: A Review," EPA, August 1979, pp. 75-79.

[2]Ibid., p. 76.

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]"Groundwater Strategy for the Water Quality Management Program: Draft," EPA Water Planning Division, April 1980, pp. 1-18.

[7]Ibid., p. 1.

[8]Ibid., p. 6-9.

[9]Ibid., pp. 10-11.

[10]Ibid., p. 12.

CHAPTER 3

BUDGET CUTS AT EPA AND THE DEMISE OF WOM

Since the Presidential election of 1980, it appears that there has been a sudden and dramatic reversal in the direction that characterized the environmental efforts of the last decade. By means of budgetary and personnel actions designed to reduce the size and power of EPA, the Reagan administration, through its new EPA administrator, Anne Gorsuch, may be moving toward what may amount to a defacto repeal of many of our environmental laws without a single vote in Congress directly affecting those laws.

EPA's budget[1] for fiscal year 1981 was approximately $1.4 billion, which was considered inadequate by many knowledgeable observers given EPA's extensive pollution control responsibilities. However, early in 1981, the Administration proposed a twelve percent cut in the EPA budget for fiscal year 1982, which was accepted by Congress in its first budget resolution. Thus, EPA was left with a budget of $1.2 billion for the current fiscal year.

Gorsuch's budget proposal for fiscal year 1983, which begins October 1, called for a further twenty percent reduction in EPA's operating budget and staff, to a level

of $980 million. The Office of Management and Budget (OMB) porposed further cuts to a level of $760 million, however, Reagan supported Gorsuch and as of now EPA has been left with a budget of $916 million, which is only two-thirds of that in the last year of the Carter administration.

There has also been speculation in the press and among environmentalists that the Reagan administration plans to cut EPA's budget to $700 million by fiscal year 1984.

The policy direction taken by the Reagan administration has also created problems in EPA with respect to personnel.[2]

Since its inception, EPA has had the reputation of being a non-partisan, professional agency. But through a combination of mistrust among holdover employees, insulated and highly politicized decision making and proposals for extensive transfers and dismissals, the Gorsuch administration has so demoralized agency staff that the attrition rate among professionals is three times higher than at any time in the history of EPA. The agency's Office of Enforcement has been abolished, and only ten enforcement cases have been referred to the Justice Department since Gorsuch became administrator, compared to more than one-hundred-fifty referrals in 1980.[3]

In addition, rumors have been circulating at EPA and in the press about further reorganization that may result in the dismissal of as many as one thousand more employees in the spring. The signs indicate that by fiscal year

1984, EPA may have only one-half the number of employees it had in fiscal year 1981.[4]

A discussion of further cutbacks and statutory modifications scheduled for fiscal year 1983 will help illustrate the sobering effects that the policy direction pursued by the Reagan administration will have on groundwater quality.

First of all, EPA's Safe Drinking Water Program is to be cut in excess of fifteen percent, which will effectively curtail the agency's efforts to set standards for many of the toxic chemicals that have been detected with increasing frequency in drinking water supplies nation wide.[5]

A bill now before Congress (S 1866)[6] seeking to amend the Safe Drinking Water Act, would also have a diminishing effect on EPA's ability to regulate toxic contaminants of drinking water. This bill would subject national primary drinking water regulations to a determination that compliance costs are justified by the benefits and would eliminate EPA's authority to prescribe treatment techniques for meeting maximum contaminant levels.

Furthermore, the bill would change the Safe Drinking Water Act's basic requirement from one applying to contaminants which, "may have any adverse effect on the health of persons," to one applying to contaminants which, "pose an unreasonable risk to the health of persons."[7]

The Toxic Substances Control Program will be cut by more than one-third, which means that EPA's efforts to regulate existing chemicals and screen new chemicals (major responsibilities under the TSCA) will be curtailed. It is likely that the severe reductions of staff and funds will prevent EPA from effectively meeting its statutory responsibility to protect the public against harm from toxic chemicals. The Toxic Substances Control Program has no statutory state component and cannot therefore be easily delegated to the states.[8]

Proposed changes to the Federal Insecticide, Fungicide and Rodenticide Act would drastically reduce public access to health and safety data supporting pesticide registrations.[9]

Perceiving the need to provide the public with full information about the safety of pesticides, Congress in 1978 enacted liberal disclosure provisions in FIFRA. The 1978 disclosure provision was never implemented, however, because legal challenges by the agricultural chemicals industry resulted in the issuance of injunctions against disclosure. More recently, representatives of the pesticides chemical industry, primarily the National Agricultural Chemicals Association, have lobbied Congress to repeal the 1978 amendment and to substitute a restrictive disclosure provision that would drastically reduce public access to, or ability to utilize the health and safety data. Strong opposition by environmental groups, labor organizations,

farm workers, and other members of the public has produced a series of compromise proposals, all of which nevertheless, severely limit public access to, and use of health and safety data. None of the proposals permits studies to be copied in their entirety, and all limit subsequent use of data. Finally, if the National Agricultural Chemicals Association should succeed in persuading Congress to enact drastic restrictions on the disclosure of pesticide health and safety data, it could only be a matter of time before attempts were made to similarly amend the disclosure provisions of the Toxic Substances Control Act.[10]

The Comprehensive Environmental Response, Compensation and Liability Act, "Superfund," has not been given any real priority at EPA, despite Congresses' clear recognition that the improper disposal of hazardous waste is today's most serious unresolved environmental problem. Cutbacks in EPA budget and personnel have already dramatically slowed progress in the cleanup of one-hundred-fifty priority hazardous waste sites around the country identified by EPA. In spite of the fact that more than five thousand hazardous waste disposal sites have been identified as potential problems, and that over $200 million has been collected from industry in accordance with the law, not one site has been cleaned up since the passage of Superfund.[11]

Finally, more than one-half of EPA's research budget will be cut, resulting in significant reductions in research

on the health effects of toxic chemicals and on technologies for pollution cleanup.[12]

Demise of WQM

EPA's WQM program was an initial ambitious scheme designed to solve what was perceived as a tremendously significant problem. However, with the confirmation of Anne Gorsuch as EPA Administrator in May 1981, the Reagan administration seems to have quietly blocked all further development of the proposed strategy.

In September 1981, Representative Toby Moffett (D-Connecticut), Chairman of the Environment, Energy and Natural Resources Sub-committee of the House Committee on Government Operations, wrote Gorsuch seeking her early attention to completion of WQM. She made little or no response.[13]

WQM was a comprehensive integration of EPA's programs and policies designed to address a growing health menace. However, the budgetary constraints and the new leadership imposed on EPA by the Reagan administration have all but forced the program out of existence.

The new administration views water management as a state function, not a federal responsibility. Although WQM was never fully implemented, it provided the foundation for the states to follow in developing their own initial groundwater quality management programs.

Federal policy de-emphasis on environmental protection, the cutback of EPA's funds and personnel, and the

demise of WQM will effect Colorado's groundwater regulatory programs. Federal de-emphasis on environmental programs will take the pressure off the Colorado legislature in its consideration of this issue. Cutbacks of EPA funds transferable to Colorado will possibly curtail the State's programs. Also, EPA's direct regulatory impact on Colorado's groundwater problems will be slowed. Finally, the benefits to Colorado that might have derived from EPA's WQM program will not occur.

NOTES

[1]Charles S. Warren, "Budget Cutbacks and Environmental Legislation," Environment, March 1982, pp. 2-4.

[2]Ibid., p. 3.

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]Environmental Reporter (BNA), August 1, 1980, p. 477; May 30, 1980, p. 149.

[7]Jaquelin M. Warren, "Environmental Statutes Under Attack," Environment, April 1982, pp. 3-4.

[8]Charles S. Warren, Environment, p. 4.

[9]Jaquelin M. Warren, Environment, p. 3.

[10]Ibid., pp. 3-4.

[11]Charles S. Warren, Environment, p. 4.

[12]Ibid.

[13]David E. Burmaster, "The New Pollution: Groundwater Contamination," Environment, March 1982, p. 36.

PART TWO

COLORADO REGULATION

CHAPTER 4

COLORADO'S GROUNDWATER QUALITY REGULATION SYSTEM

The authority for regulating groundwater quality in Colorado is dispersed among several state agencies, primarily the Department of Health, the Oil and Gas Conservation Commission, the Mined Land Reclamation Board, and the State Engineers Office. A discussion of these state agencies and their statutory responsibilities for protecting groundwater quality will help illustrate the confusing and conflicting nature of groundwater quality management in Colorado.

Colorado Department of Health

The Colorado Department of Health was created by the State Legislature in 1947 in order to provide the State with an institution capable of protecting public health and safety.[1] In order to accomplish its legislative directives, the Department was granted broad regulatory authority over a variety of areas, which necessarily included water quality control.

Responsibility for groundwater quality protection is currently dispersed among five agencies within the Department of Health. These include: the State Board of Health;

the Water Quality Control Commission; the Water Quality Control Division; the Waste Management Division; and the Radiation Control Division. The State Board of Health and the Water Quality Control Commission are primarily policy bodies which have the responsibility of promulgating rules and regulations pertaining to water quality protection. The three Divisions represent the administrative arm of the Department. They have the responsibility of administering and enforcing the rules and regulations established by the State Board of Health and the Water Quality Control Commission.

State Board of Health

The State Board of Health was created pursuant to the Act creating the Department of Health in 1947.[2] The Board consists of nine members who are appointed by the Governor with the consent of the Senate. The composition of the Board must include one member from each Congressional District in the State; the remaining three are selected from the State at large. It is the responsibility of the Senate to assure that no business or professional group constitutes a majority of the Board.

As mentioned previously, the Board of Health is primarily a policy body which has broad authority regarding public health and safety. Section 25-1-108 of the Act grants the Board the following powers:

> "(1)(a) To determine general policies to be followed . . . in administering and enforcing the public health laws and the orders, standards, rules and regulations of the board;
> (b) To act in an advisory capacity to the executive director of the department on all matters pertaining to public health."

Since groundwater contamination poses a risk to public health, the Board has the authority to indirectly protect groundwater quality.

Colorado Water Quality Control Commission

The Colorado Water Quality Control Act of 1973 as amended,[3] is similar to the Federal Clean Water Act to the extent that both contain provisions which are directed to water quality in general. The primary thrust of both acts is geared towards the protection of surface water quality with the exception of only a few specific references to groundwater.

The Act created the Colorado Water Quality Control Commission as part of the Department of Health.[4] The Commission consists of nine members who are appointed by the Governor with the consent of the Senate. Appointments are made in such a manner so as to achieve geographic representation and to reflect the various water interests in the State.

The Commission was granted the authority to develop and maintain a comprehensive and effective program for the prevention, control and abatement of water pollution in

the State. "State waters" as defined by section 25-8-103 (19) of the Act include:

> ". . . any and all surface and subsurface waters which are contained in or flow in or through this state . . ." (emphasis added).

The Act required the Commission to set up a classification system for all state waters. The type of classification was dependent upon several relevant characteristics including; the existing or maximum extent of water pollution to be tolerated, whether or not the pollution arises from natural sources, the present or expected beneficial uses of the water, and the type and character of the water (i.e., surface or subsurface).

The Commission was also given the responsibility of promulgating water quality control standards and regulations which were to be used as an aid in developing and enforcing the State's water classification system. The surface waters of the State have been classified in accordance with the provisions of the Act, however, groundwater classifications have yet to be established.

The Commission also has the authority to promulgate permit regulations for the discharge of pollutants into State waters. These regulations require the discharger to: specify the location, quantity, and quality characteristics of the discharge; monitor and maintain records regarding discharges and; abide by the water quality standards and regulations promulgated by the Commission.

Finally, the Federal Safe Drinking Water Act requires the states to develop programs for underground injection control.[5] If a state fails to implement a fully approvable program the job is forfeited to EPA. The Water Quality Control Commission currently has the requisite statutory authority for the establishment of most of the key elements of an underground injection control program. There are some areas according to Tom Smith of the State Attorney General's Office, however, in which current statutory authority may not be broad enough to authorize regulations required to implement a program which will receive federal approval. First, in order to implement an approved program, the Commission must have authority to proscribe all underground injections which are not authorized by permit or rule. This requirement could be dealt with pursuant to the Health Department's statutory authority to prohibit all discharges of pollutants into State waters from a point source without a permit. However, this authority may not apply to situations where a well discharges pollutants into a relatively dry geological formation, where the pollutants may not reach any water for an extended period of time. In such cases, it is not clear whether the well may be said to have discharged into State waters, and thus it is unclear whether the Department would have the authority to regulate such discharges. Secondly, in order to establish a federally approved program, the Health Department must be in a position to prohibit not only injections, but even the

construction of an underground injection well. The Department does not appear to have the statutory authority to enforce such a prohibition. Finally, the Department has established both legal and political precedents by asking the State Legislature for additional statutory authority during each of the last two legislative sessions. Both times the legislature denied the Department the additional authority requested. In so doing, the Department has at least tacitly admitted that it lacks the requisite statutory authority to implement an underground injection control program.[6]

Water Quality Control Division

The Water Quality Control Division within the Department of Health is responsible for administering and enforcing the water quality control standards and regulations promulgated by the Water Quality Control Commission. Section 25-8-301 of the Colorado Water Quality Control Act provides the Division with the responsibilities of: carrying out enforcement provisions; administering the permit system; monitoring waste discharges; monitoring State waters; inspecting premises and records; and taking such action as necessary to prevent, abate, and control pollution in accordance with the rules and regulations promulgated by the Water Quality Control Commission.

Prior to recent revisions, section 25-8-505 of the Water Quality Control Act granted the Water Quality Control

division rather broad regulatory authority regarding underground waste disposal activities. However, House Bill #1468[7] amended this section so that now it pertains solely to underground disposal of radioactive waste. Section 25-8-505 of the Act was revised and replaced by section 25-8-506 which states:

> "(1) It is unlawful for any person to discharge, deposit, generate, or dispose of any radioactive waste underground in liquid, solid, or explosive form unless the division, upon application of the person desiring to undertake such activity and after investigation and hearing, has first found based upon a preponderance of the evidence, that there will be no significant pollution resulting therefrom or that the pollution, if any, will be limited to waters in a specified limited area from which there is no risk or significant migration."

The Bill also contains provisions relating to the federal Uranium Mill Tailings Radiation Control Act as section 25-8-506(3) maintains that:

> "No permit for the discharge, deposit, or disposal of nuclear or radioactive waste underground shall be required in any case where groundwater quality regulation is conducted . . . under the Uranium Mill Tailings Radiation Control Act of 1978 or a successor statute, where such regulation is determined by the division to comply with the standards set forth in subsection (1) of this section."

Sections 25-8-604 through 609 of the Water Quality Control Act provide the Division with the authority to impose penalties for permit violations. The Division has the power to suspend, modify, or revoke permits; issue cease and desist orders, clean-up orders, and restraining

orders and injunctions. If, in the event violators do not comply with the aforementioned orders, the Division has the authority to initiate civil or criminal proceedings against said violator.

Finally, section 25-1-107(x) of the Act creating the Department of Health, empowers the Department with the authority to adopt and enforce minimum public drinking water standards pursuant to the federal Safe Drinking Water Act.[8] The Water Quality Control Division has the authority under this section to: review new waterworks facilities and modifications to existing facilities; require facilities to maintain records; and grant exemptions from minimum standards. The Division also has the authority to bring a civil action against anyone who willfully violates the minimum public drinking water standards instituted under this section.

Waste Management Division

The Colorado Management and Disposition of Solid and Hazardous Waste Act as amended by Senate Bill #519,[9] authorizes the State of Colorado to undertake the responsibility of implementing a hazardous waste management program effective July 1, 1983. The Bill was enacted pursuant to the federal Resource Conservation and Recovery Act, and provides the Health Department, through its Waste Management Division, with the authority to regulate hazardous waste generation, treatment, storage, and disposal, all of which

are potentially dangerous to groundwater quality. Section 25-15-301 of the Act specifies the responsibilities of the Division:

> "(2)(a) Issue permits for treatment, storage, and disposal facilities, provide for the inspection of such operations, and enforce the limitations and conditions of such permits, including any conditions and schedules established to correct non-compliance; and (b) Assure that all generators, transporters, storers, treaters and disposers of hazardous waste have received appropriate identification by the department, use a manifest system, and provide periodic reports on waste manifested."

The Act prohibits hazardous waste disposal except at hazardous waste disposal sites. All such sites are required to have a "certificate of designation" which is obtainable from the Board of County Commissioners. The certificates identify the general types of waste which may be accepted or rejected for a specific site.

The State Board of Health is authorized under section 25-15-208 of the Act to promulgate rules and regulations establishing the design and operation of hazardous waste disposal sites. These rules and regulations are required to include:

> ". . . Protection of surface and subsurface waters, suitable soil characteristics, distance from waste generation centers, access routes, distance from water wells, on-site traffic control patterns, insect and rodent control, methods of waste disposal fill, confinement of wind blown debris, fire prevention and final closure of the compacted fill."

The Act also created the Committee on Hazardous Waste. The Committee is composed of nine members. One member must be the Director of the Colorado Geological Survey or his designee and the other eight members are appointed by the Governor as follows: three members representing commercial enterprises involved in activities pertaining to hazardous waste management in the State, including one person with appropriate scientific or technical training or experience; two members representing local government; and three members who represent the public at large. No more than five of the appointed members may be from the same political party.

The Committee was authorized by the Act to formulate rules and regulations protecting public health and the environment from the effects of hazardous waste. These rules and regulations, as stipulated by section 25-15-302, are to include: characteristics for establishing and listing hazardous wastes; regulations concerning wastes which may not be stored together; regulations for a manifest system; record keeping requirements; and classification of sites suitable for hazardous waste disposal. The rules and regulations formulated by the Committee are forwarded to the Board of Health for final approval and may not be any more stringent than those promulgated by EPA pursuant to the federal Resource Conservation and Recovery Act.

Finally, any site that is found to be abandoned, or that is operated or maintained in such a manner so as to

violate any provision of the Act, or any rule or regulation adopted pursuant to the Act, is to be treated as a public nuisance. Such violations are subject to criminal and civil penalties.

Radiation Control Division

The Colorado Radiation Control Act of 1979 as amended,[10] provides the Department of Health, through its Radiation Control Division, with exclusive authority over the regulation of radioactive materials. The Act does not contain specific provisions for the protection of groundwater quality, however, it serves to protect environmental quality and public health and safety in general and therefore deals with groundwater indirectly. Sections 25-11-103 (2 and 3) of the Act explain the powers and duties of the Radiation Control Division:

> "(2) Pursuant to rules and regulations adopted as provided in section 25-11-104, the department shall issue licences pertaining to radioactive materials, prescribe and collect fees for such licences, and require registration of other sources of ionizing radiation. No other agency or branch of this state shall have such power or authority.
> (3) The department shall develop and conduct programs for evaluation and control of hazards associated with the use of any and all radioactive materials and other sources of ionizing radiation, including criteria for disposal of radioactive wastes and materials to be considered in approving facilities and sites pursuant to part 2 of this article."

The State Board of Health is authorized under section 25-11-104 to promulgate rules and regulations pertaining to radioactive waste disposal. These regulations were required under this section to conform to those proposed by the Council of State Governments entitled, "Suggested State Regulations for Radiation Control." Any facility in which sources of ionizing radiation are believed to be located is required to obtain a licence from the Radiation Control Division. The licence holder is required to conform to the rules and regulations prescribed by the Board of Health and any violations may result in criminal or civil penalties.

Part 3 of the Act, which was added in 1979, provides the Division with the authority to protect the public from hazards associated with uranium mill tailings. This section was enacted in order to provide the State of Colorado with the authority to participate in the implementation of the federal Uranium Mill Tailings Radiation Control Act. Section 25-11-303 states the general provisions of the amendment:

> "(1) The general assembly hereby authorizes the department of health to participate in federal implementation of the "Uranium Mill Tailings Radiation Control Act of 1978," and for such purposes the department has the authority to:
> (a) Enter into cooperative agreements with the secretary of energy to perform remedial actions at processing sites designated by the secretary;
> (b) Provide reimbursement for the actual cost of any remedial action in accordance with the terms of Public Law 95-604;

> (c) Aquire and dispose of any designated processing site, including any interest in such site, and any site to be used for the permanent disposition and stabilization of residual radioactive materials;
> (e) Participate in the selection and performance of remedial actions in which the state pays a portion of the cost."

Section 25-11-202 of the Act, prohibits the disposal of any radioactive waste which originates, or has been used outside the State. The only exception to this provision are those sites which are approved under the preceding amendment.

On May 3, 1982, Governor Lamm signed the Rocky Mountain Low-Level Waste Compact for the purpose of restricting the importation of low-level radioactive wastes from states outside the Rocky Mountain Region. Other states besides Colorado eligible to join in the compact are Arizona, Nevada, New Mexico, Utah and Wyoming.[11]

Colorado, as the state responsible for producing over eighty percent of all low-level radioactive waste in the Rocky Mountain region, took the lead in approval of the compact. Under the compact, facility sites would be recommended by counties with the guidance of the Department of Health, the Rocky Mountain Low-Level Waste Board and the Colorado Low-Level Waste Advisory Committee. The proposed facility sites would then be assessed by the Health Department, whose suggestions would be finally approved or disapproved by the Regional Board based on economic feasibility and capacity requirements. At this time no action

has been taken on the part of the other eligible states, due to the extremely short or non-existent legislative budget sessions in those states last year.[12]

Colorado Department of Natural Resources

Within the Department of Natural Resources, the primary agencies responsible for groundwater quality protection are the Oil and Gas Conservation Commission and the Mined Land Reclamation Board. The principal concern of both agencies is promoting the efficient development of Colorado's mineral resources. Mining efficiency includes, but is not limited to, the unwasteful extraction of mineral resources. Another important tenet of mining efficiency is environmental protection, in the form of minimizing disturbances to the land and water resources surrounding the mining area, both during and after the mining process. Thus, both agencies have the statutory and regulatory authority to promulgate environmental standards, including those pertaining to groundwater quality protection, which must be adhered to during and after any mining operation.

Colorado Oil and Gas Conservation Commission

The Colorado Oil and Gas Conservation Act of 1963,[13] created the Colorado Oil and Gas Conservation Commission and granted it the authority to regulate oil and gas drilling operations. The Commission consists of six members; one from each Congressional District in the State. Appointments

are made by the Governor with the consent of the Senate.

The primary purpose of the Act was to encourage and promote the development, production, and utilization of oil and gas natural resources in the State of Colorado. However, the Act also contains provisions for the protection of groundwater quality, due to contamination problems which may occur as a result of faulty drilling procedures.

Waste, as defined by the Act, is primarily associated with the inefficient extraction of oil and natural gas. However, it may also be construed to have a meaning associated with contamination, as section 34-60-106(1)(c) gives the Oil and Gas Conservation Commission the power to require:

> "The drilling, casing, operation and plugging of seismic holes or exploratory wells in such manner as to prevent . . . the intrusion of water into oil or gas stratum, the pollution of fresh water supplies by oil, gas, saltwater, or brackish water . . ."

Fresh water, as mentioned in the Act, pertains to both surface and subsurface fresh water supplies.

Persons wishing to drill for oil or gas must first give notice of intent to drill by obtaining a permit, which is subject to all the rules and regulations prescribed by the Commission. The Commission is required to examine each oil and gas well in the State at least once every calender year to determine that permit conditions are being met.

The Oil and Gas Conservation Commission has the power to bring suit in the name of the State, through the

Office of the Attorney General, against any person who violates any provision under the Act, or any rule, regulation, or order made by the Commission under the Act.

Senate Bill #10,[14] amended the Oil and Gas Conservation Act by adding a subsection which gave the Oil and Gas Conservation Commission the authority to assume control over a portion of the underground injection control program as provided under the federal Safe Drinking Water Act. The Bill states:

> "34-60-106. Additional powers of the Commission
> (9) Notwithstanding the provisions of section 34-60-120 or any other provision of law, the commission, as to class II injection wells defined in the regulations associated with any production of oil, gas, oil shale, or any other energy source, shall also have the power to perform all acts for the purpose of protecting underground sources of drinking water in accordance with state programs authorized by 42 U. S. C. section 300f. et. seq. and regulations thereunder in effect or as may be amended."

Finally, the Colorado Geothermal Resources Act of 1974,[15] was enacted for the purpose of ensuring that wells for the discovery and production of geothermal resources be drilled, operated, maintained and abandoned in such a manner as to safeguard public health and welfare and the environment.

The Oil and Gas Conservation Commission has the same powers relating to geothermal resources as it has pertaining to oil and natural gas. This includes permit requirements

for protective measures in order to avoid groundwater contamination.

In addition, the Colorado Geological Survey is required to advise the Oil and Gas Conservation Commission in the promulgation of rules and regulations pertaining to geothermal resources, and to provide other governmental agencies with the technical assistance regarding geothermal resources as needed.[16]

Colorado Mined Land Reclamation Board

The Colorado Mined Land Reclamation Act of 1973,[17] created the Colorado Mined Land Reclamation Board as part of the Division of Mines in the Department of Natural Resources. The Board consists of five members including: the Executive Director of the Department of Natural Resources who is the Chairman of the Board; the Deputy Commissioner of Mines; the Chief Inspector of Coal Mines; the State Geologist; and a member of the State Soil Conservation Board.

The powers of the Board include the authority to carry on a review of the problems of open mining and land reclamation in the State, and to develop and promulgate standards for the protection of the State's land and water resources during and after mining processes.

The primary purpose of the Act, as set forth by section 34-32-102, is to provide:

> ". . . during the mining process and after mining operations have been completed, for the reclamation of land subjected to surface disturbances by open mining and thereby conserve natural resources, aid in the protection of wildlife and aquatic resources . . . and to protect and promote the health, safety and general welfare of the people of this state."

Section 34-32-116(1)(h) of the Act specifically addresses groundwater quality. It states that mining operations shall be allowed to commence if certain requirements are met including:

> "Disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quality and quantity of water in surface and groundwater systems both during and after the mining operation and during reclamation shall be minimized."

Any person may engage in an open mining activity after first obtaining a permit from the Mined Land Reclamation Board. The mine operator is required under the Act to file a bond in such an amount as deemed necessary by the Board, payable to the State of Colorado, to ensure that permit conditions are met. Permit violations may result in the forfeiture of the operators bond upon the Board's request.

An amendment to the Mined Land Reclamation Act, Colorado House Bill #1195, was approved in June 1980. The amendment contains provisions regarding the regulation of prospecting drill holes abandonment in order to prevent groundwater contamination.[18]

The Colorado Surface Coal Mining Reclamation Act of 1979,[19] was enacted pursuant to the federal Surface Mining Control and Reclamation Act, which required the states to develop and implement fully approvable regulatory programs for surface coal mining operations. The Mined Land Reclamation Board is also the regulatory authority under this Act.

The primary purpose of the Act, as set forth by section 34-33-102, is to provide:

> ". . . a balance among the protection of the environment, agricultural productivity, and the need for coal as an essential source of energy . . . It is further the intent of the general assembly . . . to protect society and the environment from the adverse affects of surface coal mining operations . . . to promote the reclamation of mined areas left without adequate reclamation prior to the enactment of this article and which continue, in their unreclaimed condition, to substantially degrade the quality of the environment, prevent or damage the beneficial use of land or water resources, or endanger the health or safety of the public, to aid in the protection of wildlife and aquatic resources, and to protect and promote the health, safety, and general welfare of the people of this state."

Any person wishing to engage in a surface coal mining operation is required to obtain a permit from the Mined Land Reclamation Board. Permit applications are required under the Act to contain extensive and very specific provisions regarding environmental protection. The Act's treatment of groundwater quality protection is exceptionally thorough. Section 34-33-110(2)(1) stipulates that every permit application is required to include:

> "A determination of the probable hydrologic consequences of the surface coal mining and reclamation operations, both on and off site, with respect to the hydrologic regime and the quantity and quality of water in surface and groundwater systems, including the dissolved and suspended solids under seasonal flow conditions and the collection of sufficient data for the mine site and surrounding areas, so that an assessment can be made by the division of the probable cumulative impacts of all anticipated mining in the area upon the hydrology of the area . . ."

In addition, section 34-33-110(2)(o), requires that every permit application include:

> "Cross sections, maps or plans of the land to be affected, including . . . the location of subsurface water and its quality . . . the location of aquifers; the estimated elevation of the water table; the location of all impoundments for waste . . . the location of any settling or water treatment facility."

Section 34-33-120 requires mine operators to engage in specific mining practices in order to meet the environmental protection performance standards stipulated under the Act. Required practices regarding groundwater quality protection include:

> "(2)(j)(I) Avoiding acid or other toxic mine drainage by such measures as, but not limited to:
> (A) Preventing or removing water from contact with toxic producing deposits . . .;
> (B) Casing, sealing, or otherwise managing boreholes, shafts, and wells to keep acid or other toxic drainage from entering groundwaters and surface waters:"

and

> "(2)(n) Ensure that all debris, acid-forming materials, or materials constituting a fire hazard are treated or buried and compacted

> or otherwise disposed of in a manner designed to prevent contamination of groundwaters or surface waters and that contingency plans are developed to prevent sustained combustion."

For purposes of administering and enforcing any permit, the Mined Land Reclamation Board, under section 34-33-122, requires the permittees to establish and maintain records containing information relative to their mining operations. With regards to mining operations which affect or potentially affect surface and subsurface water, the Board has the authority to require the permittee to:

> "(2)(a) Establish monitoring sites to record the effect of the operations on the level and amount of such water;
> (b) Maintain records of well logs and borehole data;"

The Mined Land Reclamation Board is required to inspect surface coal mining operations for compliance to permit conditions at least once every calender year. Any violations may be remedied through civil or criminal actions upon the Board's request.

Finally, the Mined Land Reclamation Board has the authority to designate areas unsuitable for surface coal mining. Lands included in this category are those where surface coal mining would adversely affect aquifers or aquifer recharge zones.

Office of the State Engineer

The Colorado Division of Water Resources located in the Office of the State Engineer, is primarily responsible for the administration of water rights in Colorado, and as such, its authority over groundwater quality regulations is limited.

Bruce Debrine, of the Groundwater Section in the Division of Water Resources, summed up his agency's role concerning groundwater quality:

> "The Division provides the staff and support resources for the Board of Examiners of Water Well and Pump Installation Contractors, who are charged by law in Article 37-91, CRS 1973, as amended, to protect the public health by its regulation and licensing of persons engaged in the business of constructing water wells or installing pumps or pumping equipment in water wells. Rules and regulations have been promulgated by the Board of Examiners to ensure proper location, construction, repair, and abandonment of water wells and the proper installation and repair of pumps and pumping equipment so that adequate protection is provided to both the users of groundwater and the aquifers themselves."[20]

In addition, the Division's investigative section provides data and groundwater expertise to other state agencies who are actively engaged, and are charged with groundwater quality regulation. This support is provided at the request of the regulating agency, however, and is limited by fiscal and manpower constraints.[21]

NOTES

[1]CRS 1973 25-1-102 et. seq.

[2]Ibid.

[3]CRS 1973 25-8-101 et. seq.

[4]Colorado Senate Bill #10, June 12, 1981.

[5]Outline of speech presented by Paul D. Frohardt, Attorney, "Groundwater Quality Control," October 28, 1981.

[6]Memo from Tom Smith, Assistant Attorney General-Natural Resources Section to Tom Looby, Environmental Program Administrator--Office of Health Protection. "Groundwater Quality Protection," September 23, 1982, pp. 1-2.

[7]Colorado House Bill #1468, June 19, 1981.

[8]CRS 1973 24-1-107 et. seq.

[9]CRS 1973 25-1-101 et. seq. as amended by Senate Bill #510, June 19, 1981.

[10]CRS 1973 25-11-101 et. seq.

[11]Colorado House Bill #1246, May 3, 1982.

[12]Pam Duncan, "Interstate Low-Level Radioactive Waste Compact Restricts Importation," Rural Reporter, June 1982, p. 4.

[13]CRS 1973 34-60-101 et. seq.

[14]Colorado Senate Bill #10 June 12, 1982.

[15]CRS 34-70-101 et. seq.

[16]CRS 1973 34-1-103.

[17]CRS 1973 34-32-101 et. seq.

[18]Colorado House Bill #1195, June 5, 1980.

[19]CRS 1983 34-33-101 et. seq.

[20]Personal letter from Bruce Debrine, Groundwater Section of the Colorado Division of Water Resources--State Engineers Office to Tom Looft, July 28, 1982.

[21]Ibid.

CHAPTER 5

COLORADO GROUNDWATER QUALITY TASK FORCE

The Colorado Water Quality Control Commission recognized the importance of a coordinated groundwater quality management approach for the State in lieu of the administrative problems associated with the current regulatory situation. Therefore, in early 1978, the Commission created the Colorado Groundwater Quality Task Force for the purpose of preparing recommendations for a State Groundwater Quality Management Strategy. In order to accommodate representation of the various views on groundwater quality management in the State, the membership of the Task Force included a cross-section of groundwater quality control interests (see Figure III). Given the diversity of the Task Force membership and the complexity of its mission, consensus was not possible on all issues. Although the strategy does represent a majority position, it should be viewed as the considered judgement of a limited number of individuals and therefore represents only the first step in a process which will require additional development by qualified technical, legal, and concerned interests.[1]

Figure III

GROUNDWATER QUALITY STRATEGY TASK FORCE
Water Quality Control Commission

Norman A. Evans, Chairman
Colorado Water Resources
Research Institute, CSU

James Blakey
U.S. Geological Survey

Robert Brennan
U.S. Geological Survey

Bruce DeBrine
Colorado Division of
Water Resources

Ralph Curtis
Rio Grande Water
Conservancy District

Luke Danielson
National Wildlife Federation

*Noel Hobbs
Rocky Mountain Consultants

David Holm
Colorado Division of
Mined Land Reclamation

*Marcia Hughes
Colorado Attorney
General's Office

*Neil Jaquet
Adolph Coors Company

Donald Klusman
Dept. of Chemistry and
Geochemistry, CSM

*Tom Larsen
AMAX Environmental
Services, Inc.

Michael Liuzzi
Colorado Water Quality
Control Division

Gary Mast
Denver Regional Council
of Governments

James McKee
Colorado Oil and
Gas Commission

Hester McNulty
League of Women Voters

*Sharon Metcalf
Colorado Attorney
General's Office

Larry Mugler
208 Coordinator
Denver Regional Council
of Governments

*Tom Norton
Consulting Engineer

*Jack Odor
Groundwater Appropriators
of the South Platte

Paul Osborne
U.S. Environmental
Protection Agency

Richard Pearl
Colorado Geological
Survey

Robert Pomeroy
Holland and Hart

*Karen Rasmussen
Gulf Mineral Resource
Company

*Chuck Roberts
Colorado Water Quality
Control Division

Ben Saunders
Frenchman Groundwater
Management District

Dan Sunada
Civil Engineering Dept.,
Colorado State University

*Erich Tiepel
Wyoming Mineral Corporation

Terry Trembly
208 Coordinator
Larimer-Weld Regional
Council of Governments

*Donald Turk
Tri-County Health Department

Kenneth Waesche
Colorado Department of Health

*Arden Wallum
Colorado Water Quality
Control Division

*Kenneth Webb
Colorado Water Quality
Control Division

*Toni Worcester
League of Women Voters

Technical Secretary
Gregg Cawley
Colorado Water Resources
Research Institute, CSU

Ex-Officio Members
Robert Owen
Colorado Water Quality
Control Division

Bruce Zander
U.S. Environmental
Protection Agency

*Past Members

The function of the Task Force is purely advisory, and as such, the acceptance and implementation of any of its recommendations must be made pursuant to the statutory authority of the Water Quality Control Commission. With this in mind, the Task Force prepared a strategy consisting of recommendations which require little, if any, legislative action. They are intended to provide the State of Colorado with a comprehensive and coordinated groundwater quality management program by marshalling the State's existing federal and state legislation in a coherent fashion. The recommendations prepared by the Task Force include requirements for: a groundwater use classification system; groundwater quality guidelines; a groundwater monitoring plan and; standards for permitting pollutant discharges into groundwater.[2] All of these recommendations are consistent with the authority granted to the Water Quality Control Commission as provided by the Colorado Water Quality Control Act.

Classification System

The Colorado Water Quality Control Act gave the Water Quality Control Commission the responsibility to develop a classification system for all the waters of the State based on quality and use characteristics. Surface water classifications have been established. The groundwaters of the State have yet to be classified due to difficulties encountered as a result of the physical character of the resource itself.

The Task Force recommended that subsurface water classification be done on the basis of groundwater bodies rather than aquifers due to the fact that the physical boundaries of aquifers often contain many subsurface water bodies with different quality and use characteristics. For example, an aquifer may contain intrusions of impervious materials which subdivide it into independent zones in which water quality may be greatly different. Or, pressure distributions in the water of an aquifer can effectively separate volumes which behave almost independently and which should therefore be classified individually.[3]

Another important component of the classification process would be the development of a centralized groundwater quality data bank managed by a team of geology and groundwater hydrology specialists. This team would have the responsibility for building the data base by: collecting existing data; receiving and analyzing data furnished by permit applicants and; establishing the boundaries of groundwater bodies and their quality and use classification for each permit application. Groundwater bodies for which adequate data already exists would be classified also. There is much groundwater quality data already collected, however, it is dispersed in the records of the various state agencies charged with groundwater quality regulation. Therefore, an extensive inventory of the existing data and the establishment of a central archive would be important first steps in creating a centralized data bank for the classification process.[4]

The Task Force was of the opinion that groundwater sources not being used for drinking water purposes should not be protected as such. The feeling was that such stringent quality parameters would place an undue burden on dischargers. Therefore, the Task Force recommended that groundwater bodies be classified according to their current and expected future uses with corresponding effluent limitations.[5] The Classification scheme proposed by the Task Force consists of:

Class I: Individual Domestic

Class II: Public Water Supply

Class III: Industrial

Class IV: Irrigation

Class V: Livestock Drinking Supply[6]

This classification system was not intended to imply a hierarchy among uses. Rather it represents potential uses of groundwater in Colorado which may require different quality parameters.

Quality Guidelines

Numeric groundwater quality guidelines are an integral component of the classification system. However, the identification of, and justification for quality parameters and limits for various uses of water is controversial since there is not yet inclusive factual information on which to base them. Thus, the Task Force recommended that groundwater quality guidelines be consistent with the

State's surface water quality guidelines and primary drinking water standards (see Figures IV and V).[7]

Figure IV

Water Quality Standards: Colorado Water Quality Control Commission, July 10, 1979

Inorganic Parameters mg/l	Drinking Water	Agriculture
Ammonia (as N)	0.5	--
Cyanide (free)	0.2	0.2
Sulfide (as H2S)	0.05	--
Nitrate (as N)	10.0	100.0
Nitrate (as N)	1.0	10.0
Boron	--	0.75
Chloride	250	--
Sulfate	250	--
Metal Parameters		
Arsenic	0.05	0.1
Barium	1.0	--
Beryllium	--	0.1
Cadmium	0.01	0.01
Chromium		
trivalent	0.05	0.1
Hexivalent	0.05	0.1
Copper	1.0	0.2

Figure IV (continued)

Metal Parameters (cont)	Drinking Water	Agriculture
Iron	0.3 (sol.)	--
Lead	0.05	0.1
Manganesse	0.05	0.2
Mercury	0.002	--
Nickel	--	0.2
Selenium	0.01	0.02
Silver	0.05	--
Zinc	5.0	2.0
Organic Parameters		
Endrin	0.0002	--
Lindane	0.004	--
Methoxychlor	0.1	--
Toxaphene	0.0005	--
2,4D	0.1	--
Chlorophenol	0.001	--
Monohydric phenol	0.001	--
Benzidine	0.0001	--

Figure V

Mandatory Parameters of Drinking Water Colorado Department of Health

Inorganic Parameters (mg/l)	
Nitrate (as N)	10.0
Nitrite (as N)	10.0
Metal Parameters	
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	
trivalent	0.05
hexivalent	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Organic Parameters	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4D	0.1
2,4,5-TP	0.01

Figure V (cont.)

Radioactivity	
Gross Alpha	15pCi/L
Gross Beta	50pCi/L
Radium, 226-228	5pCi/L

The Task Force qualified this recommendation by stating that groundwater quality should not be degraded beyond the specified levels unless the Water Quality Control Commission determines that such degradation is justified by reason of economic and social development. Further, the recommended numerical guidelines were not intended as maximum concentrations allowable for use and they should not be construed as limiting the withdrawal of groundwaters containing higher concentrations for any use.[8]

Monitoring Plan

The Task Force recommended that a statewide monitoring network he established for the purpose of assessing the extent to which pollutants have entered groundwater bodies. It was advised that the design and operation of this monitoring network be the responsibility of the same team of geology and groundwater hydrology specialists charged with managing the centralized groundwater quality data bank.

Monitoring would take place semi-annually in the following areas: where little groundwater quality data is available; where degradation could be expected and; in each major groundwater body of the State.[9]

Monitoring would be accomplished by comparing upgradient with downgradient water quality samples. The upgradient samples establish background quality since they would not be affected by the entry of pollutants. The downgradient sampling points establish a network to detect the presence of pollutants which may have been introduced into the groundwater body. A statistical comparison of samples would enable a determination to be made as to the extent of contamination existent in the groundwater body.[10]

Discharge Permits

The Task Force's primary intent was to recommend a strategy for those activities which actually, or potentially, deposit pollutants into groundwater. Therefore, the permit system recommended by the Task Force accounted for three different groups of activities including: those attributed to causing the most serious groundwater problems in the State; those which have the potential for groundwater quality degradation, but were not considered to be significant threats to groundwater quality at present and; activities which could be exempted from regulation because they do not generally pose a threat to groundwater quality.

The Task Force concluded that the most serious threats to groundwater quality in the State could be attributed to four activities: solid waste disposal, which includes hazardous waste; on-lot sewage treatment, such as septic tanks and leach fields; mineral development, including exploratory drill holes and in-situ mining processes and; surface impoundments of liquid waste.[11] The Task Force sought to regulate these activities in the most comprehensive way possible. Therefore, it devised a uniform permit system which would avoid confusion and burdensome overlaps on the one hand and minimize major gaps in coverage on the other.

The Task Force recommended that no person should be allowed to discharge effluents or leachate into groundwater unless such discharges were in compliance with a permit issued either by the Water Quality Control Division or any other authorized agency of the State. Dischargers would be required to file an application for a discharge permit with the Water Quality Control Division. The issuance of such a permit would depend on the contents of the application which would require the discharger to set forth in detail the methods or techniques he intends to employ, including natural processes if appropriate.[12] The application contents would also be required to include a factual determination of the existing hydrological conditions at and surrounding the discharge site including:

"(1) existing groundwater quality in the vicinity of the proposed discharge site;
(2) a map or maps of the site and surrounding area, drawn to scale, showing distances to:
(a) existing wells and exploratory holes;
(b) existing lakes or ponds, canals, streams, springs, and swamps;
(c) direction of surface drainage and direction of groundwater movement in the site area;
(d) location of borings, observation wells, exploratory borings and other subsurface data used in the determination.
(3) Analyses based upon the hydrogeological data which provided a basis for determination of the acceptability of the site to receive effluent such as (but not limited to):
(a) evaluate the impact of the effluent on the quality of groundwater;
(b) establish the direction and rate of groundwater flow and changes expected, including groundwater mounding, as a result of the proposed effluent discharge;
(c) define the physical boundaries of the receiving groundwater body.
(4) Analyses may be included which:
(a) define the thickness, area, extent, and relevant physical and chemical characteristics of earth materials through which the effluent will pass and evaluate their capacity to remove pollutants from the effluent by physical, chemical or biological processes;
(b) establish feasibility of engineering modifications to the site that may make the proposed discharge of effluent acceptable."[13]

The Task Force advised that each holder of a discharge permit be required to monitor its discharges. Monitoring would include the collection of data on: fluid pressure distribution; hydraulic or pressure gradients; and mineral, biological and chemical water quality parameters. Permit holders would also be required to establish patterns

showing fluid flow gradients in the groundwater body as well as concentrations of pollutants.[14]

In order to provide coordination among the various state agencies having statutory authority over groundwater quality regulation, the Task Force recommended that no additional effluent discharge permits be required for activities regulated under existing federal and state statutes.[15] These include:

1. Solid Waste Disposal and Facilities Act, 30-20-101 C.R.S.
2. Radiation Control Act, 25-11-101 C.R.S.
3. Oil and Gas Conservation Act, 34-60-101 C.R.S.
4. Mined Land Reclamation Act, 34-32-101 C.R.S.
5. Surface Coal Mining Reclamation Act, 34-33-101 C.R.S.
6. Management and Disposition of Solid and Hazardous Waste Act, 25-15-101 C.R.S. as amended by Senate Bill #519, 1981.
7. A state or federal program created pursuant to the federal Safe Drinking Water Act (Underground Injection Control) Subtitle C, 42 USC 300h et. seq.
8. A state program created pursuant to House Bill #1468, section 505, 1981.

The Task Force qualified this recommendation, however, by proposing that the technical criteria for permits and the review process used by the issuing agency be reviewed and approved by a memorandum of agreement between the issuing agency and the Water Quality Control Division. It was advised that this memoranda of agreement include: criteria for application; determination of application completeness; review time frames; public notice and hearing procedures and monitoring and enforcement responsibilities.[16]

The Task Force also recommended that any agency proposing to issue permits in areas of cumulative impacts which affect groundwater quality, should execute a memorandum of agreement with the Water Quality Division.[17]

A second group of activities were identified by the Task Force which have the potential for degradation of groundwater quality, but which were not considered to be significant threats to groundwater quality at present. The Task Force recommended that a general permit be issued for such activities. Such a permit would provide minimal regulation at present, but it would not preclude more stringent regulation in the future should any such activities be determined to present a significant threat to groundwater quality.[18] Activities suggested to be regulated under general permit include: Effluent or leachate which conforms to all numerical guidelines for a classified use and does not contain any pollutants in toxic concentrations; effluent resulting from flood control systems; controlled application of street de-icing chemicals; recycling of heat pump water having a temperature less than 10°F warmer than ambient groundwater temperature and; underground mine backfilling which is authorized by the State of Colorado.[19]

The Task Force suggested that State 208 agencies could possibly be given administrative responsibility for issuing general groundwater quality permits within their respective jurisdictions.[20]

Finally, the Task Force identified a group of activities which could be exempted from regulation since they do not generally pose a threat to groundwater quality. The Water Quality Control Division may require permits for such activities in the event that they become injurious to groundwater quality. These activities include:

> "(1) Water applied to land for irrigation of agricultural crops, watering of lawns, trees, gardens or shrubs provided that the source of the water is a classified body of water.
> (2) Effluents which are normal seepage from conveyance structures and storage reservoirs used to transport or store water which is used for irrigation, livestock, individual domestic, public domestic consumption, industry, or recreation as a raw water supply.
> (3) Effluent subject to a NPDES permit which is discharged to a perennial watercourse. Discharges to dry channels and ephemeral streams should not be exempt from the discharge permit requirement.
> (4) Controlled application of dust suppressant chemicals, including water.
> (5) Controlled chemical applications on public roads right-of-way for weed control, domestic pest control purposes, and agricultural or silvacultural pest control."[21]

Current Status of Task Force Recommendations

The recommendations concerning a groundwater quality management strategy for the State of Colorado, prepared by the Colorado Groundwater Quality Task Force, are currently being reviewed by the Colorado Water Quality Control Commission. As of September 28, 1982 the

Commission had taken no action on the proposals prepared by the Task Force.[22] However, the Colorado Department of Health is currently in the process of analyzing the adequacy of its groundwater quality protection programs and is formulating suggestions for the future direction this program should take.[23]

NOTES

[1]Groundwater Quality Task Force, "Recommendations for a State Groundwater Quality Management Strategy Prepared for the Colorado Water Quality Control Commission," September 17, 1981, p. 1.

[2]Ibid., p. 19.

[3]Ibid., p. 3-4.

[4]Ibid., p. 5.

[5]Ibid., p. 6.

[6]Ibid., p. 21.

[7]Ibid., p. 6.

[8]Ibid., pp. 21-22.

[9]Ibid., p. 22.

[10]Ibid., p. 11.

[11]Ibid., p. 13.

[12]Ibid., pp. 22-23.

[13]Ibid., pp. 23-24.

[14]Ibid., p. 25.

[15]Ibid., p. 12.

[16]Ibid., p. 26.

[17]Ibid., pp. 26-27.

[18]Ibid., p. 27.

[19]Ibid., p. 13.

[20]Ibid., pp. 27-28.

[21]Ibid., pp. 28-29.

[22]Personnal Interview with Dr. Norman Evans, Chairman of the Colorado Groundwater Quality Task Force, September 28, 1982.

[23]Memo from Robert A. Arnott, Assistant Director of the Colorado Department of Health to Persons interested in groundwater quality, October 7, 1982.

CHAPTER 6

OBSERVATIONS

Groundwater is a vitally important renewable resource that has been taken for granted and given little protection. Only in the last decade has the general public become aware of the potential for groundwater contamination in Colorado. For many years it was believed that groundwater was an essentially pure and uncontaminated resource, capable of naturally cleansing itself of introduced contaminants. This misconception and lack of foresight has produced a problem which is quickly becoming one of Colorado's most pressing environmental problems. According to former EPA official Eckardt Beck, the contamination of groundwater is, "the environmental horror story of the 1980's."[1]

This "horror story" has been accentuated by the uncoordinated and fragmented legal framework available for protecting this resource. It has been demonstrated that the existing system is composed of a patchwork of state and federal laws. Further, the authority for administering these laws is dispersed among several state and federal agencies, which inevitably causes problems

associated with inter-agency coordination. Most important, the relationships that exist between these agencies are often informal and subject to the traditional forces of program prerogative, personalities and the competition for available resources. The informal lines of communication which exist, and the competition which develops among these agencies, serves to compound the problem of effectively protecting groundwater quality.

The complexity of groundwater contamination problems and the multiplicity of pollution sources make necessary an organized comprehensive approach. Unfortunately, such an approach is not evidenced in existing federal and state programs. The federal Groundwater Quality Management Program (WQM), which contained provisions for federal financial and planning assistance to states wishing to develop groundwater quality management programs, was an attempt to comprehensively address the problem. However, the Reagan administration did not view groundwater quality management as a policy priority. Hence, progress on WQM has been slowed to a standstill. The Colorado Groundwater Quality Task Force completed its mission of preparing recommendations regarding a comprehensive groundwater quality management program for the State in October 1981. However, as of September 28, 1982 the Colorado Water Quality Control Commission had taken no action regarding those proposals.

As a result of the stagnated status of the proposed comprehensive groundwater quality management programs, action on groundwater contamination in Colorado will remain fragmented and frustrating. Unless many steps are taken to provide the State of Colorado with a comprehensive and coordinated groundwater quality management system, the groundwater contamination "horror story" may continue for many years.

NOTES

[1]Eckardt Beck quoted in Sharon Begley, "How Safe Is Your Water?" Newsweek, November 1, 1982, p. 89.

REFERENCES

Begley, Sharon. "How Safe is Your Water?" Newsweek. November 1, 1982.

Burmaster, David E. "The New Pollution: Groundwater Contamination," Environment. March 1982.

CEQ Annual Report. Environmental Quality - 1980. U. S. GPO, Washington, D. C., December 1980.

Colorado Groundwater Quality Task Force. "Recommendations for a State Groundwater Quality Management Strategy," September 15, 1980.

Colorado House Bill #1195.

Colorado House Bill #1246.

Colorado House Bill #1468.

Colorado Senate Bill #10.

Colorado Senate Bill #519.

Colorado Department of Health, "Preliminary Draft: Administrative Review of Groundwater Quality and Groundwater Contamination Problems," August 1982.

Congressional Quarterly Almanac. "Congress Clears 'Superfund' Legislation," Vol. XXXVI, 1980.

Conservation Foundation Newsletter. "Groundwater Supplies: Are They Imperiled," Conservation Foundation, Washington, D. C., June 1980.

CRS 1973 25-1-102 et. seq.

CRS 1973 25-8-101 et. seq.

CRS 1973 25-11-101 et. seq.

CRS 1973 34-1-103 et. seq.

CRS 1973 34-32-101 et. seq.

CRS 1973 34-33-101 et. seq.

CRS 1973 34-60-101 et. seq.

CRS 1973 34-70-101 et. seq.

Duncan, Pamela. "Interstate Low-Level Radioactive Waste Compact Restricts Importation," Rural Reporter, Colorado Rural Council, June 1982.

Dunn, Thomas and Leopold, Luna B. Water in Environmental Planning. W. H. Freeman and Company, San Francisco, California, 1978.

Environmental Law Reporter: Regulations. Vol. XI, December 1976.

Environmental Law Reporter: Statutes. Vol. XI, December 1981.

EPA. "Draft Water Quality Management Needs Assessment," September 1980.

EPA. "Planning Workshops to Develop Recommendations for a Groundwater Protection Strategy," June 1980.

EPA. "Proceedings of the Fourth National Groundwater Quality Symposium," August 1979.

EPA. "Profile of Environmental Quality," October 1978.

EPA. "Water Quality Management Five-Year Strategy FY80-Baseline," August 1979.

EPA Water Planning Division. "Groundwater Strategy for the Water Quality Management Program: Draft," April 1980.

Freeze, Alan R. and Cherry, John A. Groundwater. Prentice Hall Inc., Englewood Cliffs, New Jersey, 1979.

Frohardt, Paul D. "Groundwater Quality Control," Outline of Speech, October 28, 1981.

Groundwater News. "EPA Groundwater Policy Process," Colorado Water Congress, Denver, Colorado, September 7, 1982.

Groundwater Quality Task Force, "Recommendations for a State Groundwater Quality Management Strategy Prepared for the Colorado Water Quality Control Commission," September 17, 1981.

Hamilton, Michael S. Under the direction of Norman Wengert. Summaries of Selected Federal Statutes Affecting Environmental Quality. Colorado Extension Service, Colorado State University, March 1980.

Horne, Amy. "Groundwater Policy: A Patchwork of Protection," Environment. April 1982.

Hubbard, Burt. "Chemicals Taint South Groundwater," Rocky Mountain News. September 17, 1982.

Interview with Dr. Gregg Cawley, University assistant professor and former Technical Secretary of the Colorado Groundwater Quality Task Force. April 14, 1982.

Kimm, Victor J. "The Federal Groundwater Protection Program: A Review," EPA. August 1979.

Memo from Tom Smith, Assistant Attorney General-Natural Resources Section to Tom Looby, Environmental Program Administrator--Office of Health Protection. "Groundwater Quality Protection," September 23, 1982.

Muskie, Senator Edmund S. "The Meaning of the Clean Water Act," EPA Journal. July-August 1979.

Personal Interview with Dr. Norman Evans, Chairman of the Colorado Groundwater Quality Task Force, September 28, 1982.

Personal Letter from Bruce Debrine, Groundwater Section of the Colorado Division of Water Resources--State Engineers Office to Tom Looft, July 28, 1982.

Repplier, F. N., Healy, F. C., Collins, D. B., and Longmire, P. A. Atlas of Groundwater Quality, Colorado Geological Survey, 1981.

Tripp, James T. B. and Jaffe, Adam B. "Preventing Groundwater Pollution: Towards a Coordinated Strategy to Protect Critical Recharge Zones," Harvard Law Review, Vol. 3:1, 1979.

Warren, Charles S. "Budget Cutbacks and Environmental Legislation," Environment. March 1982.

Warren, Jaquelin M. "Environmental Statutes Under Attack," Environment. April 1982.