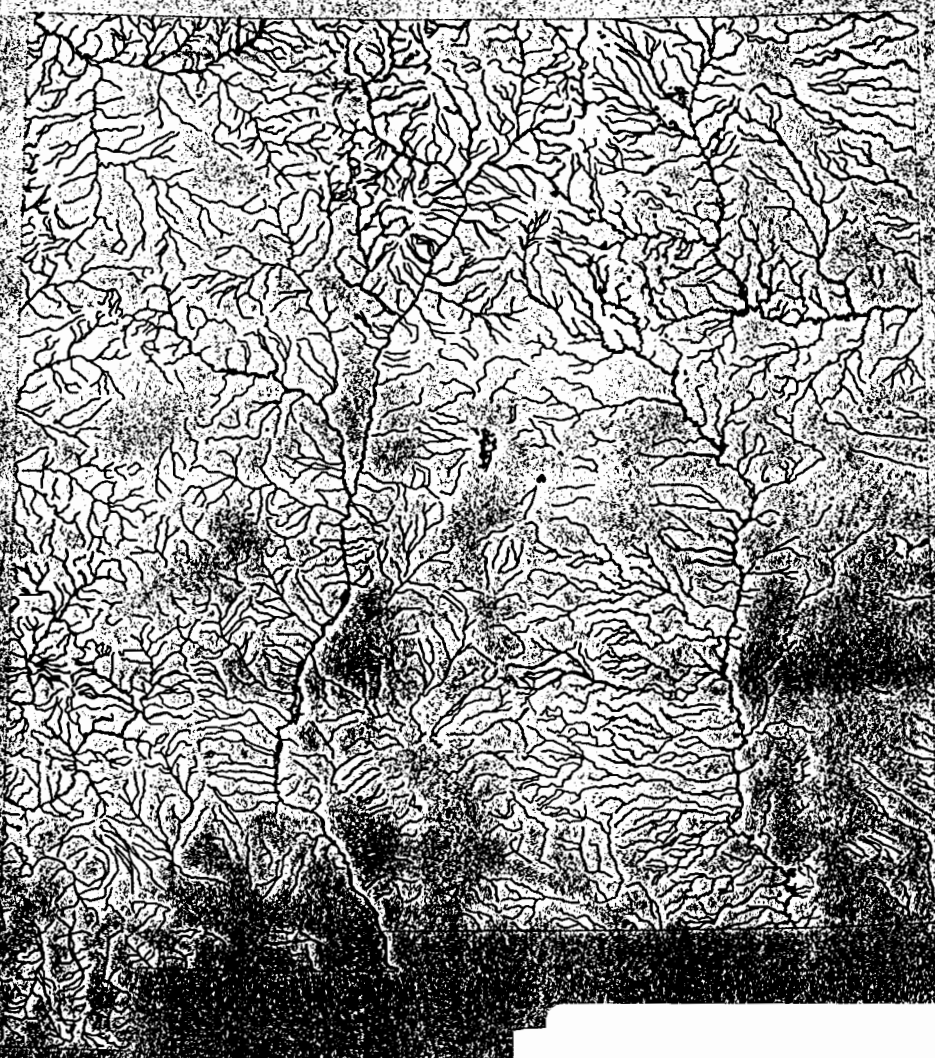
LIBRARY COPY

STATE OF NEW MEXICO

WATER QUALITY CONTROL COMMISSION

WATER QUALITY AND WATER POLLUTION CONTROL IN NEW MEXICO 2000



13326

FEDERAL CLEAN WATER ACT ~ SECTION 305:

[*Codified into Public Law at U.S. Code, Title 33, Chapter 26, Subchapter III, Section 1315*]

WATER QUALITY INVENTORY

[*State reports on water quality; transmittal to Congress*]

Sec. 305. (a) [*Omitted*] The Administrator, in cooperation with the States and with the assistance of appropriate Federal agencies shall prepare a report to be submitted to the Congress on or before January 1, 1974, which shall—

(1) describe the specific quality, during 1973, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, of all navigable waters and the waters of the contiguous zone;

(2) include an inventory of all point sources of discharge (based on qualitative and quantitative analysis of discharges) of pollutants, into all navigable waters and the waters of the contiguous zone; and

(3) identify specifically those navigable waters, the quality of which—

(A) is adequate to provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allow recreational activities in and on the water;

(B) can reasonably be expected to attain such level by 1977 or 1983; and

(C) can reasonably be expected to attain such level by any later date.

(b) (1) Each State shall prepare and submit to the Administrator by April 1, 1975, and shall bring up to date by April 1, 1976, and biennially thereafter, a report which shall include—

(A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this Act [*chapter*] (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act [*1314(a) of this Title*]) and the water quality described in subparagraph (B) of this paragraph;

(B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;

(C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved bye the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what waters such additional action is necessary;

(D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and

(E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs.

(2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and October 1, 1976, and biennially thereafter.

NMED/SWQ-00/1

WATER QUALITY AND TER POLLUTION CONTROL IN NEW MEXICO

2000

Report Prepared for Submission to the
Congress of the United States
by the
State of New Mexico
Pursuant to Section 305(b) of the
Federal Clean Water Act

New Mexico Water Quality Control Commission

Peter Maggiore, Secretary
Designee: Paul Ritzma
Environment Department

Thomas C. Turney, State Engineer
Office of the State Engineer and
Interstate Stream Commission

Lori Wrotenbery, Chairman
Oil Conservation Commission
Designee: William C. Olson

Thomas Trujillo, Director
State Parks Division
Designee: David Johnson

Frank A. Dubois, Secretary
Department of Agriculture
Designee: Ricardo Chavez Rel

Jerry Maracchini, Director
Department of Game & Fish
Designee: Jack Kelly

Dusty Hunt, Chairman
Soil & Water Conservation Commission
Designee: Howard Hutchinson

Peter Scholle, Director
Bureau of Mines & Mineral Resources
Designee: Lynn Brandvold

Irene Juliana Lee, Member-at-Large

Alberto Gutierrez, Member-at-Large

Paul Gutierrez, Member-at-Large

~ A C K N O W L E D G E M E N T S ~

The New Mexico Environment Department prepares this report, as part of its delegated responsibilities, for review and approval by the New Mexico Water Quality Control Commission. Preparation of this edition involved many people both inside and outside of the Department. The editor would like to extend his gratitude for valuable assistance in reviewing and writing the report to Keith Melton and Jennifer Wellman of the Drinking Water Bureau, Dale Doremus, Maura Hanning, Marcy Leavitt, Dennis McQuillan and Jennifer Parker in the Ground Water Quality Bureau, Rusty Rodke and Butch Tongate in the Solid Waste Bureau, Steve Baumgarn, Jim Davis, Don Ditmore, Maxine Goad, Pat Hanson, Dave Hogge, Lorenci Kaniatobi, Steve Pierce, and Elizabeth Reed, in the Surface Water Quality Bureau, Anna Richards at the Underground Storage Tank Bureau, as well as Erik Galloway, Special Assistant to the Director, Water and Waste Management Division.

Several WQCC Commissioners or their designees were instrumental in building this document. Special thanks are extended to Lynn Brandvolt at the Bureau of Mines and Mineral Resources, Paul Gutierrez, Member-At-Large, Bill Olson in EMNRD's Oil Conservation Division, Richardo Rel at the New Mexico Department of Agriculture, Bruce Thompson of the Civil Engineering Department at the University of New Mexico, Tom Turney, the State Engineer, and Paul Ritzma, Deputy Secretary at NMED. Several others beyond those mentioned have also contributed to the report as word processors, linguists and final-content reviewers; their patient assistance is kindly remembered and gratefully appreciated.

In closing, the editor would like to extend his humble gratitude to all the fine State employees at the State Printing Offices in Santa Fe who helped make this effort a reality.

Cordially,

Gary King
Editor

TABLE OF CONTENTS

Citation: Federal Clean Water Act ~ Section 305(b) ..... frontispiece
New Mexico Water Quality Control Commission iii
List of Figures viii
List of Tables viii
List of Acronyms ix
List of Appendices xi
Preface xv
Index xix

PART I: EXECUTIVE SUMMARY AND RECOMMENDATIONS

Executive Summary/Overview 1
Recommendations for Ground and Surface Water Quality Management
Recommendations to the Congress of the United States 4
Recommendations to the U.S. Environmental Protection Agency 8

PART II: SURFACE AND GROUND WATER QUALITY

Chapter 1 New Mexico: A Geographical Description 11
References 16
Chapter 2 New Mexico's Surface Water Basins
The Rio Grande Basin 19
Upper Rio Grande 19
Middle Rio Grande 20
Lower Rio Grande 20
Surface Water Quality Concerns in the Rio Grande Basin 21
Ground Water Quality Concerns in the Rio Grande Basin 21
The Arkansas/White/Red Rivers Basin 23
Surface Water Quality Concerns in the Arkansas/White/Red Rivers Basin 24
Ground Water Quality Concerns in the Arkansas/White/Red Rivers Basin 24
The Central Closed Basins 25
Surface Water Quality Concerns in the Central Closed Basins 26
Ground Water Quality Concerns in the Central Closed Basins 26
The Lower Colorado River Basin 26
Surface Water Quality Concerns in the Lower Colorado River Basin 27
Ground Water Quality Concerns in the Lower Colorado River Basin 28
The Pecos River Basin 28
Surface Water Quality Concerns in the Pecos River Basin 29
Ground Water Quality Concerns in the Pecos River Basin 29
The San Juan River Basin 30
Surface Water Quality Concerns in the San Juan River Basin 31
Ground Water Quality Concerns in the San Juan River Basin 32
The Southern High Plains Basin 32
Surface Water Quality Concerns in the Southern High Plains Basin 33
Ground Water Quality Concerns in the Southern High Plains Basin 33
Southwestern Closed Basins 33
Surface Water Quality Concerns in the Southwestern Closed Basins 34
Ground Water Quality Concerns in the Southwestern Closed Basins 34
The Western Closed Basins 35
Ground Water Quality Concerns in the Western Basins 35
References 36

PART III: WATER QUALITY MANAGEMENT

Chapter 3 The State Role in Water Quality Management
Overview 41
Responsibilities of the Water Quality Control Commission 41
Other Programs Relevant to Water Pollution Control 44
References 46
Chapter 4 Surface Water Quality in New Mexico
Water Quality in Assessed Surface Waters 47
Methodology 47
Assessment Strategy 47
Stream Water Quality 50
Aquatic Life Use Support in the State's Streams 50
Individual Use Support in the State's Streams 50
Lake Water Quality 53
Attainment of Designated Uses and Clean Water Act Goals 53
Trophic Status 56
Lake Acidification 56
Control Methods 56
Causes and Sources of Water Quality Impairment 56
Streams 56
Lakes 62
Public Health/Aquatic Life Impacts 62
Other Water Quality Assessment Measures for Streams and Lakes 62
Water Quality Limited Segments 62
Water Quality Trends 63
Status of New Mexico Wetlands 63
Future Direction 63
Middle Rio Grande Ecosystem: Bosque Biological Management Plan 63
Programs for Surface Water Pollution Control 64
The State Role in the NPDES Program 64
Federal NPDES Permits 65
State Certification of NPDES Permits 66
State Administrative Assistance 68
Pretreatment 68
Present and Emerging Concerns 69
Sewage Sludge 69
Storm Water 69
Discharge of Toxic Pollutants 69
Contaminated Aquifer Remediation 70
Community Wastewater Facility Construction Grants/Loans 70
Dredge-and-Fill Program 70
State Water Quality Protection Regulations 74
Utility Operator Certification and Facility Operation 74
Certification 74
Training Activities 74
Facility Operations 74
Enforcement 75
Future Directions and Needs 75
State Revolving Loan Program 75
New Directions 75
Colonias Wastewater Construction Grant Program 75
State Enforcement 76
Present and Emerging Concerns 76
Nonpoint Source Water Pollution Management Program 77
Best Management Practices 77
Nonpoint Source Management Program Activities 77

Statewide Efforts 77
Agriculture 77
Rangeland Agriculture 78
Silviculture 78
Resource Extraction 79
Hydromodification 79
Recreation 79
Road Construction and Maintenance 79
On-Site Liquid Waste Disposal 79
Consistancy Reviews 80
Education and Outreach 80
Watching Our Waters 80
Watershed Efforts 80
Invasive Plant Control 81
Federal Programs - Environmental Oversight at Department of Energy Facilities 81
Water Quality Improvements 82
Surface Water Quality Assessments 82
Surface Water Quality Monitoring 83
Lake and Reservoir Monitoring 83
NMED Special Studies 83
Future Directions 84
Program Evaluation 85
Costs of Surface Water Quality Programs 85
References 88

Chapter 5 Ground Water Quality in New Mexico

The Importance of Ground Water in New Mexico 91
Sources of Ground Water Contamination 91
Nonpoint Sources of Contamination 91
Point Sources of Contamination 94
Programs for Ground Water Pollution Control 96
State Regulation for Ground Water Quality 96
New Mexico Water Quality Act and Water Quality Control Commission Regulations 96
Subpart I – Notification of Discharge/Removal 96
Subpart III – Permitting and Ground Water Standards 96
Subpart V - Underground Injection Control 98
Enforcement of Water Quality Control Commission Regulations 98
Effectiveness 99
New Mexico Oil and Gas Act 99
New Mexico Hazardous Waste Act 100
Hazardous Waste Management Regulations 100
Underground Storage Tank Program 102
Ground Water Protection Act 103
Emergency Management Act 103
New Mexico Environmental Improvement Act 103
Liquid Waste Program Regulations 103
Public Drinking Water Supply Programs 105
Water Supply Regulations 106
Source Water Protection: Wellhead Protection Programs 107
New Mexico Solid Waste Act 107
Other State Programs 108
Office of the State Engineer 108
State Land Office 109
Public Involvement 109
Federal Programs Related to Ground Water Quality 110
Superfund 111
Other Federal Programs 111
County and Municipal Authorities 112
References 117

LIST OF FIGURES

Figure		Page
1.	Map of New Mexico	15
2.	Water Quality Basins in New Mexico	16
3.	Vulnerability of New Mexico Aquifers to Contamination from Surface Discharges	17
4.	Composition of the New Mexico Water Quality Control Commission	42
5.	Sources of Impairment to New Mexico's Streams	57
6.	Major Nonpoint Sources of Pollution in New Mexico Streams	57
7.	Number of NPDES Permits in New Mexico by Year	65
8.	Distribution of NPDES Facilities by Activity	65
9.	Distribution of NPDES Facilities in New Mexico by Size and Type	66
10.	New Mexico Environment Department NPDES Permit Certificate Process	67
11.	Number of Major Municipal NPDES Permittees in New Mexico Achieving Secondary Treatment by Year	86
12.	Distribution of Administrative Penalty Orders Issued by the EPA by Amount of Penalty	87
13.	All Discharge Permits with Monitoring Requirements	87
14.	Point Sources of Ground Water Contamination in New Mexico	90
15.	Contaminated Water Supply Wells in New Mexico (Public & Private)	91
16.	Ground Water Clean-ups in New Mexico	92
17.	Contaminated Public and Private Water Supply Wells By Source-Type in New Mexico	93
18.	Point Sources of Ground Water Contamination in New Mexico by Source-Type	93
19.	Point Source Ground Water Contamination Cases in Relation to Cleanup Efforts by Regulatory Authority	97
20.	Location of Stream Monitoring Stations in New Mexico Sampled Regularly by the United States Geological Survey	D4

LIST OF TABLES

Table		Page
1.	County and Number of Reported Spills Currently Recorded In The Rio Grande Basin	25
2.	Criteria for Determination of Designated and Aquatic Life Use Support	48
3.	New Mexico Fishing Use Protection Numeric Water Quality Standards for Toxicants	49
4.	Aquatic Life Use Support in Assessed Rivers (Units in Miles)	51
5.	Individual Use Support Summary for New Mexico Rivers (Units in Miles)	52
6.	Aquatic Life Use Support in Assessed Lakes (Units in Acres)	54
7.	Individual Use Support in New Mexico Lakes (Units in Acres)	55
8.	Total River Miles not Fully Supporting Designated or Attainable Uses by Cause Category	58
9.	Total River Miles not Fully Supporting Designated or Attainable Uses by Source Category	59
10.	Total Lake and Playa Acres not Fully Supporting Designated or Attainable Uses by Cause Category	60
11.	Total Lake and Playa Acres not Fully Supporting Designated or Attainable Uses by Source Category	61
12.	Current NPDES Permits in New Mexico	71 - 73
13.	Special Stream Surveys, 1998-1999	84
14.	Playa Lake Surveys, 1999	84
15.	Assessed Stream Reaches with Threatened, Partially or Non-Supported Designated Uses	B3-B33
16.	Assessed Lakes Not Fully Supporting Designated or Attainable Uses	B35-B47
17.	Codes for Designated Uses and Nonpoint Sources of Pollution	B49
18a.	Publicly Owned or Operated Lakes In New Mexico	B51-63
18b.	Publicly Owned or Operated *Playa* Lakes in New Mexico	B64-B66
19.	Fish Consumption Guidelines Due to Mercury Contamination	C5-11
20.	Location of Current U.S. Geological Survey Stream Quality Monitoring Stations funded by N.M. Environment Department	D5
21.	Parameters and STORET codes for organic chemicals analyzed during the special water quality surveys conducted in 1996 and 1997.	D6
22.	Sample Types, Parameters, and STORET Codes for Environmental Measures Performed during Special Surveys Conducted by the New Mexico Environment Department	D7
23.	Toxics Monitored in Selected Point Source Discharges, 1998.	D8

LIST OF ACRONYMS

ADB	*Access*® Database
AIP	Agreement-In-Principle
AST	Above-ground storage tank
BLM	United States Bureau of Land Management
BMMR	New Mexico Bureau of Mines and Mineral Resources
BMP	Best management practice
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CWL	Chemical Waste Landfill
COA	City of Albuquerque
COC	Constituents of Concern
CPB	Construction Programs Bureau, New Mexico Environment Department
CWA	Clean Water Act
DA	New Mexico Department of Agriculture
DGF	New Mexico Department of Game and Fish
DLG	Digital Line Graph database, an information system of the United States Geological Survey
DOD	United States Department of Defense
DOE	United States Department of Energy
DOI	United States Department of Interior
DRASTIC	*D*epth to water; (net aquifer) *R*echarge; *A*quifer media; *S*oil media; *T*opography; *I*mpact on the vadose zone media; and *C*onductivity database of the United States Environmental Protection Agency
DWB	Drinking Water Bureau, New Mexico Environment Department
EID	Environmental Improvement Division, precursor to the New Mexico Environment Department
EMNRD	New Mexico Energy, Minerals and Natural Resources Department
EPA	United States Environmental Protection Agency
ER	Environmental restoration
ET	Evapotranspiration
FU	Field unit
GIS	Geographic Information System
GWPRB	Ground Water Protection and Remediation Bureau, New Mexico Environment Department
IRP	Installation Restoration Project
ITRI	Inhalation Toxicology Research Institute
ISC	New Mexico Interstate Stream Commission
KAFB	Kirtland Air Force Base
LAAO	Los Alamos Area Office, United States Department of Energy
LANL	Los Alamos National Laboratories
LRRI	Lovelace Respiratory Research Institute
LUST	Leaking underground storage tank
LWDR	Liquid Waste Disposal Regulations
LWDS	Liquid Waste Disposal System
MEK	Methyl ethyl ketone
MMRD	Mining and Minerals Division
MOA	Memoranda of agreement
MODFLOW	Modular three-dimensional finite-difference ground water model software developed by the USGS
MWPP	Municipal Water Pollution Prevention Program
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFA	No Further Action
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Nonpoint source
NRCS	Natural Resource Conservation Service, United States Department of Agriculture
NRCC	Natural Resource Conservation Commission
OCC	New Mexico Oil Conservation Commission
OCD	Oil Conservation Division, New Mexico Energy, Minerals and Natural Resources Department

List of Acronyms, continued.

OSE	Office of the State Engineer
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PNM	Public Service Company of New Mexico
PPP	Pollution Prevention Plans
PRS	Potential Release Site
PSR	Point Source Regulation Section, Surface Water Quality Bureau of the New Mexico Environment Department
QA/QC	Quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation work plan
RHWMB	Radioactive and Hazardous Waste Material Bureau, New Mexico Environment Department
RN	Radionuclide
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SER	Sandia Engineering Reactor
SHTD	New Mexico State Highway and Transportation Department
SIC	Standard Industrial Classification
SNL	Sandia National Laboratories
SPD	State Parks Division; New Mexico Energy, Minerals and Natural Resources Department
STORET	STOrage and RETrieval database of the United States Environmental Protection Agency
SVOC	Semi-volatile organic compound
SWA	Solid Waste Act
SWCC	Soil and Water Conservation Commission
SWCS	Soil and Water Conservation Service
SWHCP	Site-Wide Hydrogeologic Characterization Project
SWQB	Surface Water Quality Bureau, New Mexico Environment Department
SWMU	Solid Waste Management Unit
TA-	Technical Area (-integer), Los Alamos National Laboratories
TDS	Total dissolved solids
TMDL	Total maximum daily load
TSDF	Treatment, storage or disposal facilities for hazardous waste
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground storage tank
USTB	Underground Storage Tank Bureau, New Mexico Environment Department
VCM	Voluntary Corrective Measures
VOC	Volatile organic compound
WIPP	Waste Isolation Pilot Project
WHPP	Wellhead Protection Program, a function of NMED's Drinking Water Bureau
WQCC	New Mexico Water Quality Control Commission

LIST OF APPENDICES

Appendix A **Background Information on Surface Waters**
New Mexico Geographic Information Summary A3

Appendix B **Waterbodies With Designated Uses Partially or Not Fully Supported or Fully Supported but with Threatened Designated or Attainable Uses**
Table 16: Assessed Stream Reaches with Fully Supporting ~ Impacts Observed, Partial or Non-Supported Designated Uses B3-37
Table 17: Assessed Lakes not Fully Supporting Designated or Attainable Uses B39-51
Table 18: Codes for Designated Uses and Nonpoint Sources of Pollution B53
Table 19a: Publicly Owned or Operated Lakes in New Mexico B55-67
Table 19b: Publicly Owned or Operated *Playa* Lakes in New Mexico B68-70

Appendix C **Fish Consumption Guidelines** C3
Table 20: Fish Consumption Guidelines Due to Mercury Contamination C5-C11

Appendix D **Surface Water Monitoring Systems Information** D3
Figure 20: Location of Stream Monitoring Stations in New Mexico Sampled Regularly by the United States Geological Survey D4
Table 21: Location of Current United States Geological Survey Stream Quality Monitoring Stations funded by the New Mexico Environment Department D5
Table 22: Parameters and STORET Codes for Organic Chemicals Analyzed During the Special Water Quality Surveys Conducted in 1996 and 1997 ..... D6
Table 23: Sample Types, Parameters, and STORET Codes for Environmental Measurements Performed during Special Surveys Conducted by the New Mexico Environment Department D7
Table 24: Toxics Monitored in Selected Point Source Discharges, 1998 ..... D8

Appendix E **Summary of New Mexico State and Local Government Authorities to Control Pollution of Ground and Surface Waters** E3

INDEX xix

Preface

PREFACE

This report is designed to satisfy the statutory requirements of § 305(b) of the federal Water Pollution Control Act [33 U.S.C. 1288], commonly known as the Clean Water Act (CWA). It also serves as a source of basic information on water quality and water pollution control programs in New Mexico. Accordingly, the intended audience includes the general public, interest groups, consultants, state legislators, governmental agencies at State, local, and federal levels, as well as universities and other educational entities.

State and federal agencies, statutes, regulations, and programs are distinctly identified within the various aspects of water pollution control management as required by the context.

Legal Requirements

CWA § 305(b) (1) requires that each State submit a biennial report to the United States Congress through the United States Environmental Protection Agency (USEPA). The report is to include the following:

- an assessment of water quality;
- an analysis of the extent to which surface waters provide for protection and propagation of fish, shellfish, and wildlife and recreation in and on the water;
- an overview of progress in water pollution control and recommendations for further action;
- an estimate of the environmental, social, and economic impacts of restoring and maintaining the chemical, physical, and biological integrity of waters within the State; and
- a description of the nature of nonpoint source pollution and of programs for nonpoint source pollution control.

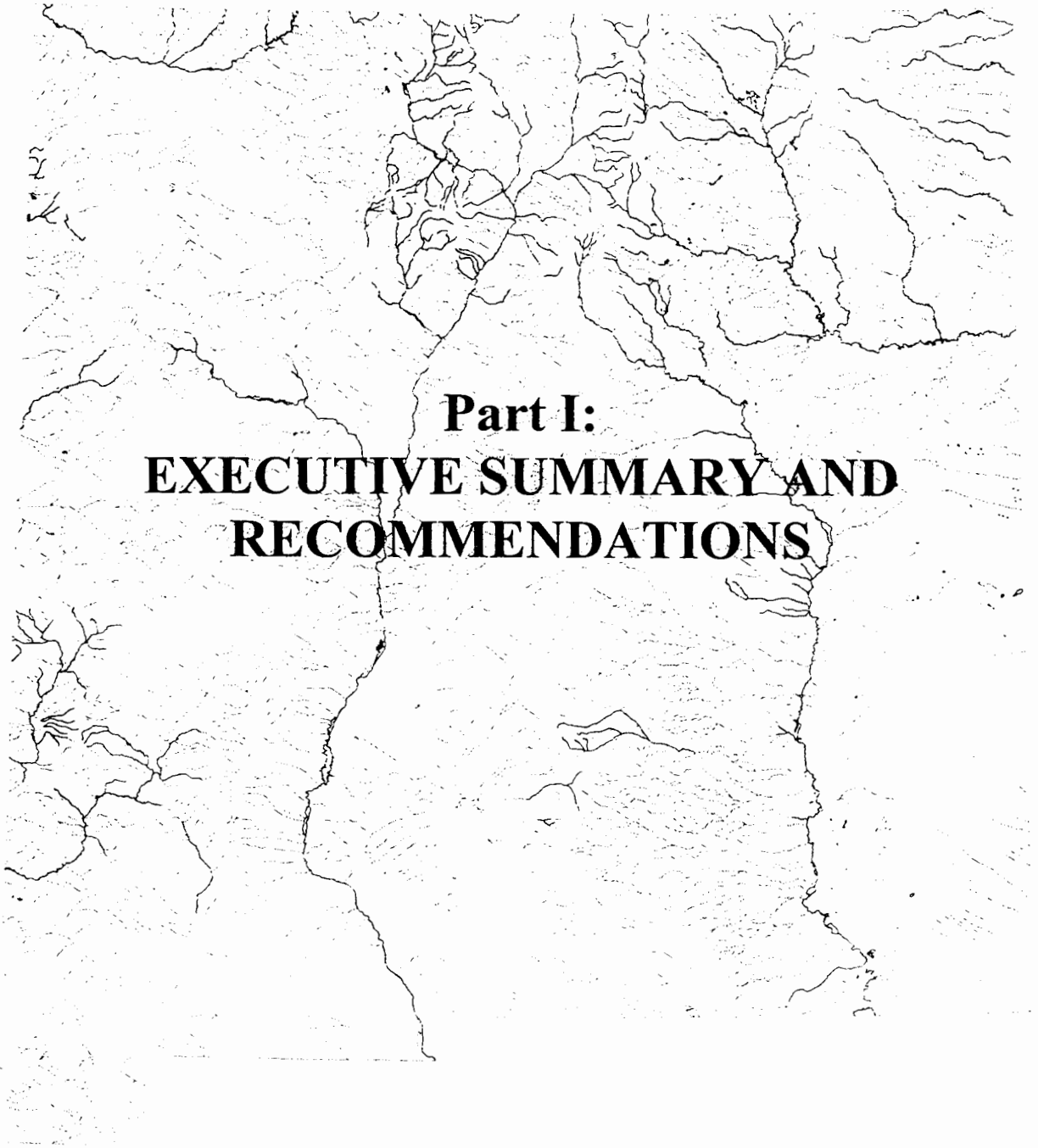
This report contains three parts. Part I contains the *Executive Summary* and *Recommendations*. The executive summary focuses on water quality and water pollution control management results, highlighting major points made in the report. The recommendations from the Water Quality Control Commission are addressed to both the United States Congress and the USEPA.

Part II, *Surface and Ground Water Quality*, provides a basin-by-basin narrative on current pollution problem areas and efforts to remediate them. This part of the report also outlines the State's assessments of both its ground and surface water resources.

The final part of this report, *Water Quality Management*, details the work of many agencies within the State entrusted with protecting New Mexico's water resources.

Information Used

This report generally deals with the period from January 1999 through December 1999.



Part I:
EXECUTIVE SUMMARY AND RECOMMENDATIONS

EXECUTIVE SUMMARY

PART I: SURFACE AND GROUND WATER QUALITY

SURFACE WATER QUALITY

Information about surface water quality throughout New Mexico is based on the results of the New Mexico Environment Department's (NMED) intensive surveys, water quality monitoring of projects under the State's Nonpoint Source Pollution Management Program, Total Maximum Daily Load surveys and studies, preliminary statewide studies of mercury in fish tissues, water quality monitoring conducted under the National Pollutant Discharge Elimination (NPDES) System program and review of physical and chemical data entered by various agencies into the United States Environmental Protection Agency's (EPA) database.

Conclusions concerning attainment of fishery uses is based on water quality analyses; where available, biological data were used to verify these results.

From a total of over 5,875 perennial stream miles, almost 3,080 assessed miles, or 52%, have some level of threatened or impaired designated or attainable uses while 124,140 out of a total of 148,883 lake acres, or 83%, do not fully support designated uses. Of the river miles that are impaired, designated uses in 1,247.45 river miles were partially supported; in 1,427.7 river miles, pollution was such that one or more designated uses were not supported.

Of the lake acres impaired, designated uses were not supported in 1,960 acres. The remaining impaired acres still provided partial support for designated uses.

Reported sources of water quality impairment in New Mexico are diverse and include agriculture, recreation, hydromodification and resource extraction. Causes of impairment include toxic metals, temperature, plant nutrients, bottom deposits and other causes. Over 91% of all water quality impairment identified in New Mexico's rivers is due to nonpoint sources of water pollution. All of the known lake water quality impairment is due to nonpoint source water pollution.

In 1994-1995, the State of New Mexico issued fish consumption advisories for 23 lakes and reservoirs and one river due to elevated mercury concentrations in fish. Twenty five lakes were added to the 1998 CWA §303(d) list fish consumption advisories for mercury, even though the water quality standard for mercury was not exceeded in these lakes.

Estimates by the United States Forest Service (USFS) based on comparing the extent of hydric soils in the State to the extent of present wetlands show that New Mexico's wetlands, which currently total approximately 481,900 acres, have been reduced over 33% since the 1780s. Due to these historical trends, point and nonpoint pollution and drainage, all wetlands are considered threatened in New Mexico.

GROUND WATER QUALITY

Approximately 90% of the population of New Mexico depends on ground water for its drinking water. The water quality for the 81% of the population utilizing ground water sources from public water supplies is monitored routinely. Nearly one half of the total water used for all purposes in New Mexico is ground water. In many locations, ground water is the only available supply.

Ground Water Contamination Inventories

NMED maintains an ongoing inventory of known ground water contamination cases in the State. At least 1,235 cases have been identified from 1927 through December 1999, with 188 public and 1,907 private water-supply wells impacted. Ground water contamination most frequently occurs in vulnerable aquifer areas where the water table is shallow.

Causes and Sources of Ground Water Contamination

Approximately 13% of ground water contamination in the State has been caused by nonpoint sources, predominantly small household septic tanks or cesspools. Nonpoint source contamination may be caused by diffuse sources such as large numbers of small septic tanks spread over a subdivision, residual minerals from evapotransporation, animal feedlot operations, areas disturbed by mineral exploration and/or storage of wast products, urban runoff or application of agricultural chemicals.

Point sources are discharges at specific identified locations such as surface impoundments, landfills, and injection wells. Accidental spills and leaking underground storage tanks account for almost half of all point source contamination.

Public Drinking Water Systems

The 1996 reauthorization of the federal Safe Drinking Water Act (SDWA) mandates that EPA set new or revised standards for two constituents which are naturally occurring in New Mexico ground water: radon and arsenic.

EPA must promulgate a standard for radon by December 2000, with a proposal by August 1999. There is at present no drinking water standard for radon. Radon is an important issue for this state. Present sampling data suggest that radon could possibly be evident in 84% of New Mexico's water supply wells. Annual treatment costs to remove radon could be substantial, depending on the level at which EPA sets the standard.

EPA promulgation of a revised regulation for arsenic has been mandated for no later than January 1, 2001. Like radon, the costs to remove arsenic could be substantial depending on the level at which EPA sets the standard.

PART 2: WATER QUALITY MANAGEMENT

THE STATE ROLE IN WATER QUALITY MANAGEMENT

Water quality management in New Mexico has both state and federal aspects. The State establishes standards for state and interstate waterbodies and for ground water, assesses the quality of surface and ground waters, adopts regulations, and takes actions to protect and maintain surface and ground water quality. The State also coordinates with EPA in implementing the federal Clean Water Act (CWA) [33 U.S.C. 1288] and other federal acts which contain water quality protection provisions.

At the state level, the New Mexico Water Quality Control Commission (WQCC), under the authority of the New Mexico Water Quality Act, has adopted the basic framework for water quality management. Major components of this framework include surface and ground water quality standards, regulations, and the State's Nonpoint Source Management Program.

Programs for Surface Water Pollution Control

New Mexico uses a variety of mechanisms including State, federal, and/or local components to protect its surface waters from becoming polluted. The principal mechanism used to protect waters from municipal and non-municipal point source discharges is the federal NPDES program. While NPDES permits for discharges in New Mexico are issued and enforced by EPA, the State plays a significant role in this permit program, by providing water quality certification for these permits as well as inspecting the facilities for compliance with their permit. NMED administers and enforces Surface Water Protection and Utility Operator Certification regulations for the WQCC.

Nonpoint source surface water pollution is addressed by the State Nonpoint Source Water Pollution Management Program. NMED is the lead agency for this program which utilizes a variety of State, local and federal agency programs to achieve implementation of Best Management Practices to prevent and abate nonpoint source pollution. As part of this program, the State assures that water quality standards are maintained and wetlands are protected through the water quality certification process for CWA § 404 dredge-and-fill permits issued by the United States Army Corps of Engineers.

Programs for Ground Water Pollution Control

Programs established under the New Mexico Water Quality Act, Oil and Gas Act, Hazardous Waste Act, Ground Water Protection Act, Solid Waste Act, Emergency Management Act, Voluntary Remediation Act and Environmental Improvement Act are designed to maintain ground water quality.

Water Quality Act programs include a ground water discharge permit program that protects ground water quality through the issuance of ground water pollution prevention permits; an abatement program that includes requirements for the assessment and abatement of releases that cause or threaten to cause exceedances of ground water quality standards; and a spill response program that includes provisions for the reporting and cleanup of spills that impact ground water quality.

Regulations under the Oil and Gas Act "regulate the disposition of water produced or used in connection with the drilling for or producing of oil and gas....". The Oil and Gas Act also regulates disposition of non-domestic and non-hazardous solid waste produced by the oil and gas industry. Hazardous Waste Act regulations include requirements for preventing and cleaning up releases of hazardous waste and releases from underground storage tanks. The Ground Water Protection Act provides a state cleanup fund for corrective action at sites contaminated by leaking underground storage tanks. The Emergency Management Act provides for the Hazardous Materials Emergency Response Plan which gives NMED the responsibility for providing necessary information to first responders at hazardous materials and radiological incidents. Under the authority of the Environmental Improvement Act, regulations have been adopted that cover liquid waste disposal, septage and public water supply. The goal of the Voluntary Remediation Act is to facilitate the expeditious, voluntary cleanup of contaminated properties, thereby promoting their redevelopment and productive use.

Several federal programs contribute to ground water quality protection in New Mexico. The federal Superfund program also impacts the state, and NMED's Superfund Oversight Section identifies, investigates, and oversees remediation of abandoned hazardous waste sites under a Superfund Memorandum of Agreement with EPA.

The New Mexico State Legislature has given extensive authority to counties and municipalities for land use and protection of public health and safety, areas with substantial implications for ground water quality protection. Most have not taken full advantage of this authority. The present zoning authority of the counties can be coupled with a wellhead protection program to effectively protect ground water drinking water sources in partnership with the State Environment Department and EPA. Many small systems, which rely on surface water for their drinking water, may establish a watershed protection program for their surface water sources.

PROGRAMS FOR WATER QUALITY ASSESSMENT

Surface Water Quality Assessments

The State uses a wide variety of methods for assessment of its water quality. Second-party data including discharger's reports, published literature, data stored in EPA's database as well as data generated by the United States Geological Survey (USGS) are routinely reviewed. NMED generates large amounts of data through intensive surveys, assessment of citizen complaints, special studies aimed at areas of special concern (e.g., mercury concentration in fish), volunteer monitoring programs, short and longterm nonpoint source pollution monitoring and effluent monitoring.

Ground Water Monitoring and Data Management

Ground water quality monitoring is carried out under many of the State ground water quality protection and remediation programs and by the USGS. The scope and variety of ground water quality investigations in New Mexico has created the need for computerized data management. NMED is committed to agency-wide improvements in information management in order to reduce the burden on staff, the regulated community and other stakeholders. Through a *OneStop* grant from EPA, the initial steps of this process have been made to centralize environmental data. NMED is beginning the process that will result in the purchase and modification of an integrated environmental database system. Incorporating groundwater monitoring data as well as the other core needs of NMED, this system will result in improvements in the way that the public obtains environmental data from the agency.

PROGRAM EVALUATION

Surface Water

Various qualitative and quantitative measures have been used by EPA, the states and others to measure the effectiveness of water quality management programs. The cost of administering these programs continues to grow at a steady rate. The primary function of these programs is to maintain suitable water quality necessary to protect existing, designated or attainable uses. New Mexico was one of the first states to have all of its municipalities achieve secondary treatment capability. In general, "major" dischargers normally do a good job of meeting permit requirements while "minor" dischargers continue to have noncompliance problems which are not being completely addressed due to EPA enforcement policies.

Nonpoint source water pollution in New Mexico is receiving ever more attention. Significant efforts have been initiated by the United States Forest Service (USFS) in cooperation with NMED in a large number of different settings, to reduce and eliminate such pollution in a number of the State's highest quality waters. These efforts have led in several cases to the elimination of longstanding nonpoint source problems.

Ground Water

Measures of ground water protection programs effectiveness are documented through site-specific monitoring at permitted facilities and facilities that are abating ground water contamination. Although there is no overall index to determine the rate at which ground waters are polluted or remediated, state and federal programs that ensure the quality of the state's ground water have been successful in both ground water quality protection and clean-up efforts.

RECOMMENDATIONS FOR SURFACE WATER AND GROUND WATER QUALITY MANAGEMENT

The following recommendations are divided into two groups: first, recommendations are made to the United States Congress on desirable legislation and necessary funding of water quality management; and secondly, recommendations are made to the EPA on administration of the CWA and other federal acts which contain water quality protection provisions.

RECOMMENDATIONS TO THE CONGRESS OF THE UNITED STATES

Nonpoint Source Controls

1. New Mexico's Nonpoint Source Control Program was first fully-approved by EPA in September of 1989. Consequently, the State has been implementing the program for only 10 years. We believe that it cannot yet be determined to what extent the State's largely voluntary approach is having in controlling nonpoint source pollution.

The states should have an adequate period of time to fully determine the efficacy of their existing nonpoint source control programs. Only after such time should federal mandates be developed and then only for those elements of a state's program that are not making adequate progress toward meeting a state's water quality standards.

2. Language in some proposed federal legislation calls for the states to adequately treat all of their nonpoint source concerns such that runoff from these areas would meet state water quality standards in some arbitrary period of time. Due to vast differences in the types of nonpoint source problems faced by individual states, any such artificial deadline may be adequate for one state yet impossible to meet for its neighbor. Secondly, in the west, where the majority of the nonpoint source concerns identified to date are associated with runoff from vast areas of mountains, rangelands, irrigated farmlands, extensive road networks et cetera, the sheer magnitude of the problem will preclude attainment of standards unless exorbitant commitments of limited financial resources are dedicated to these problems. Finally, even the expenditure of such vast resources may not have immediate benefit in the arid portions of the west because establishment and/or reestablishment of adequate groundcover to prevent overland flows of sediment-laden waters is dependent upon adequate precipitation, which is never assured.

In every instance in which a deadline is established requiring the attainment of water quality standards by nonpoint sources of pollution, remove the deadline and substitute the following phrase:

..."as rapidly as possible based on the ecological potential of the area as determined by the state."

3. Over one-third of New Mexico's lands are owned by the federal government where most nonpoint source pollution in the State occurs. The majority of New Mexico's Category I watersheds as determined in the Clean Water Action Plan (CWAP) Unified Watershed Assessment (UWA) are located within federal land boundaries. These are the watersheds where new CWA § 319 monies under the CWAP will be directed. Most of New Mexico's high quality coldwater fisheries are contained within these federal lands. The USFS and the Bureau of Land Management have been designated by the WQCC as management agencies for water quality protection within the context of the New Mexico Water Quality Management Plan and the State's Nonpoint Source Management Program. It is difficult, however, for these federal agencies to apply for § 319 funding due to the EPA requirement for a 40% <u>non-federal</u> match for any § 319 funds. This situation discourages the federal agencies from applying for § 319 grant funds for important water quality improvement projects.

The EPA language requiring a "non-federal" match of 40% for all CWA § 319 grant awards should be changed so as to allow for the utilization of federal match dollars.

Indian Tribes

The funding set-asides for Indian tribes in the CWA puts tribes in direct competition with the states for the limited available federal funds. The funding provided to tribes is inadequate to develop or implement effective water quality programs.

The United States Congress should provide sufficient dedicated funds to Indian tribes so that they can develop and implement an effective water quality management program. These funds should be in addition to, not in place of, monies allocated to the states.

Funding

1. Technical information in many areas is essential to any state water pollution control program. These areas include sampling and monitoring technology, containment and remediation technology, risk assessment, and standards development. Such information is of wide applicability and would be useful to all states. It is more desirable for federal agencies to assemble and disseminate this information than for states to utilize their limited resources on such projects.

The United States Congress should provide adequate funding to federal and state agencies including universities and other publicly-funded institutes to foster and support basic ecological, hydrologic, medical, public health, and other research efforts relevant to water quality protection and to support technical assistance and technology transfer to the states.

2. The CWA requires all municipal wastewater treatment plants to meet secondary treatment standards as defined by federal regulations. Over the past two decades, an enormous investment of public funds has been made by federal, state and local governments to construct a national wastewater treatment infrastructure that would meet this goal. However, once constructed, the effectiveness and longevity of this wastewater infrastructure is heavily dependent upon the skill and competence of the operators who maintain it. In fact, the absence of effective operation and maintenance programs has been implicated as the primary cause of most NPDES permit noncompliance nationwide as well as in New Mexico. Thus, the lack of good operation and maintenance at treatment facilities both jeopardizes the attainment of secondary treatment and reduces the benefit of the huge expenditure of public funds made to achieve this goal.

The United States Congress should provide additional dedicated funding to state-operated programs which address the operation and maintenance of wastewater treatment facilities in order to prevent water pollution and National Pollutant Discharge Elimination System permit noncompliance.

3. Section 402 of the CWA states NPDES permits "..are for fixed terms not exceeding five years." Title 40 Section 122.6 of the *Code of Federal Regulations* allows for the administrative continuance of expired permits beyond five years under specified conditions including but not limited to timely reapplication by the permittee. Permits are often continued due to lack of resources to prepare renewed permits. Currently, approximately 90% of the individual NPDES permits in New Mexico are five or more years old. Outdated permits may not be protective of current water quality standards adopted by the State and revised once every three years in accordance with Section 303 of the CWA.

The United States Congress should provide adequate funding to the federal and state agencies charged with administering the NPDES permit program so that the enormous backlog of out-of-date NPDES permits might be promptly reduced and then in the future all permits may be renewed on a timely basis.

Hazardous and Radiological Waste

CWA § 303(c) and its implementing regulations at 40 CFR 131 require states to develop and implement water quality standards with sufficient criteria to protect designated uses. Among the pollutants of ecological and human health concern are natural and manmade or concentrated radioactive compounds. CWA § 502(6) currently recognizes 'radioactive materials' as a 'pollutant'; yet the Atomic Energy Act (42 U.S.C. 2011 et seq.) exempts certain of these compounds. Consequently, pollutants such as plutonium and enriched uranium are not yet regulated under the NPDES system.

The Atomic Energy Act should be amended to require the NPDES permit to be the sole regulatory vehicle for any point source discharge of any pollutant to "waters of the United States."

Federal Facilities

1. Federal agencies have an obligation to protect water quality at their facilities and in their projects and to remediate pollution which occurs. There are known instances of surface and ground water contamination, sometimes of a very serious nature, caused by federal facilities in New Mexico and elsewhere.

Federal installations and projects should not only be required to comply with all pertinent federal and state laws and regulations but should also be expected to lead in the area of environmental protection by prevention of adverse impacts during construction and operation and by cleanup or reclamation upon discovery of a problem.

2. Federal laws, such as the Comprehensive Environmental Response, Compensation and Liability Act, commonly known as Superfund, place responsibility on federal agencies for investigating and remediating old hazardous waste sites on federal lands. The Department of Defense (DoD) has responded positively to this mandate by initiating and continuing work at active defense installations in New Mexico and nationwide. DoD/state Memoranda of Agreement provide funds to states to participate in investigation and cleanup work. Left out of these efforts, however, are formerly used defense sites which are not presently the property of DoD. Several such sites in New Mexico are known or suspected to be contributing to ground water pollution and other environmental problems.

The United States Congress should encourage the Department of Defense to aggressively investigate and remediate formerly-used defense sites, to include states as partners, and to use existing mechanisms such as DoD/state Memoranda of Agreement to provide monies to states for required site-specific tasks such as review of work for compliance with state environmental laws.

Ground Water Quality Management

1. Prevention of ground water pollution is always more protective of public health and environmental quality as well as being more cost-effective than trying to cleanup an aquifer once it has become contaminated. Cleanup is always expensive, often costing hundreds of thousands or even millions of dollars, and often taking decades to accomplish. Cleanup to natural background levels is often impossible at any price. In addition, the health effects of chronic exposure to even low level contamination are poorly quantified but may be significant. Therefore, it is a more prudent use of public funds to prevent exposure of the nation's citizens to contaminated water supplies than to restore the ground water to its original condition.

The primary focus of federal ground water pollution prevention efforts should be to support state pollution control programs and initiatives.

2. Ground water protection is, and should remain, actively managed and implemented at the state and local levels. New Mexico and other states are taking the lead in developing and implementing ground water monitoring, protection, remediation and management programs suited to their particular needs. Some of these programs have been in existence for decades and should be used as models for other states that are developing new ground water protection programs.

Any federal legislation dedicated to ground water protection should include a statement of a general national goal and then explicitly recognize the primary role of the states and local governments in all facets of ground water protection.

Delegation of Superfund to States

New Mexico currently does not have a State Superfund program and relies on the federal Superfund law to address abandoned or uncontrolled hazardous waste sites in the state. In the Superfund reauthorization debates taking place in Congress, New Mexico supports the delegation of the federal Superfund program to the states. However, delegation should allow states to retain all state rights, especially state applicable standards, and to have the flexibility to apply the Superfund program in a manner that meets specific needs of the state. This is especially critical in arid western states where policies and procedures developed for eastern states are not applicable. Additionally, inhabitants of sparsely populated areas of western states deserve equal protection from potential health or environmental problems. Yet, the federal Hazard Ranking System assigns lower priority to these factors and makes Superfund difficult to apply to sites in western states like New Mexico.

The United States Congress should provide a mechanism whereby administration of Superfund is delegated to states to better address state and local water quality problems associated with abandoned or uncontrolled hazardous waste sites.

Drinking Water Standards

The EPA is considering drafting new national drinking water standards based on preliminary arsenic studies without sufficient scientific warranty to base those standards on. More stringent drinking water standards would be extremely costly to the Citizens of New Mexico. Capital costs will likely range from $250 million to over $500 million, depending on where the standards are set. Annual operating costs could range between 2 – 5% of capital costs. It is likely that there will be no measurable benefits (as opposed to calculable benefits such as reduced risk) associated with a lower standard. There is no conclusive evidence, and no evidence whatsoever in the United States, to show that arsenic at the current maximum contaminant level (MCL) poses a risk to human health of greater than 10^{-4}, the value which has been accepted by EPA as providing adequate safety to consumers.

The United States Congress should delay the Safe Drinking Water Act requirement for a new arsenic drinking water standard until EPA can demonstrate a need for a new standard based on epidemiological evidence collected in the United States.

RECOMMENDATIONS TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System Permit Program

1. EPA largely focuses NPDES enforcement and permitting on discharges categorized as "major." In New Mexico and elsewhere most NPDES majors have good compliance with secondary or Best Available Technology treatment limits and have current NPDES permits. Many "minors," however, are not consistently meeting their NPDES permit requirements (e.g., reporting, effluent limits, or operation and maintenance), and many have outdated permits. EPA permit-issuance strategies also differentiate between majors and minors with regard to reviewing and addressing the potential for toxic pollutants. Majors are carefully addressed while minors are given little or no attention. Despite the lesser flow of the minors, these discharges may create significant water pollution or public health problems. Although EPA Region VI has stepped up enforcement against minors, and has made some effort to expand its review of minors in the permitting process, they continue to receive a low priority from the EPA.

EPA should change the focus of its National Pollutant Discharge Elimination System program so that priorities are not focused as intensely on permit classification. EPA should conduct its enforcement and permitting activities on the basis of factors in addition to discharge volume including compliance records, designated stream uses, water quality standard violations, and potential risk to the environment or public health.

2. The CWA clearly states that "*it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited.*" EPA relies heavily on biomonitoring tests performed on the effluent from wastewater treatment plants to determine attainment of that policy. The fish species which is normally tested, *Pimephales promelas* (Fathead minnow), is a warmwater species. Because coldwater species are generally more sensitive to pollutants, biomonitoring tests based only on a warmwater species may not be protective of coldwater ecosystems.

Coldwater species should be developed for biomonitoring dicharges to coldwater fisheries with the same degree of accuracy as those currently performed with the Fathead minnow. Rainbow trout (Oncorhynchus mykiss) is readily available and culture techniques for it have been well developed. Although non-native, it is widespread and may prove to be a suitable surrogate for coldwater species, including native fishes. Rainbow trout are currently readily available from six state hatcheries for biomonitor-reporting purposes. Other widespread species, such as the Longnose Dace (northern part of the state) and the Speckled Dace (southern part of the state) (Rhinichthys cataractae and R. osculus, respectively) should also be considered. Coldwater species should be used for biomonitoring tests when discharges are to an aquatic system with an existing coldwater fisheries use.

Pretreatment

With the above-stated national policy of the CWA in mind, EPA has implemented its pretreatment program through the NPDES permit program. There are two ways that EPA implements the pretreatment program: 1) through regulations requiring certain municipalities to administer and enforce their own EPA-approved pretreatment programs; and 2) through EPA enforcement against industrial dischargers which discharge into publicly owned treatment works that are not regulated under approved pretreatment programs.

In New Mexico, five municipalities are currently required to fully develop pretreatment programs. The EPA has conducted a detailed pretreatment inspection of all pretreatment program municipalities in New Mexico once each year. Some local governments remain reluctant to enforce pretreatment requirements effectively in cases where industrial sites are available in other cities without pretreatment programs. Other industries settle or relocate in areas served by private wastewater treatment plants not subject to the pretreatment regulations, since the treatment plants are not "Publicly Owned Treatment Plants."

EPA should continue to place greater emphasis on its pretreatment program, to ensure pretreatment programs are required where necessary regardless of the size or ownership of the plant, and to take adequate enforcement action to meet the federal Clean Water Act's policy of no discharge of toxic substances in toxic amounts into the environment. The Agency should apply its regulations evenly so that no municipality is granted an unintended economic advantage over another municipality with a pretreatment program.

Sludge Management

Beginning in 1987, EPA has incorporated by reference the sludge regulation requirements of 40 CFR 257 or, as appropriate, 40 CFR 503 into NPDES permits issued in New Mexico. These regulations broadly cover areas such as pathogen control, safety, ground water protection, endangered species, floodplains, and surface water. New Mexico has had an effective ground water protection regulatory program in place since 1977. Because the State ground water regulations do not address certain areas such as pathogen control, the federal and State ground water protection programs are not completely equivalent. Thus, compliance with one program does not ensure compliance with the other. EPA's advance into the area of ground water protection has resulted in a duality of regulations for sludge disposal with regard to ground water protection.

EPA should ensure that federal sludge regulations and the administration of federal sludge programs do not result in dual regulation or undermine existing state programs. This can be achieved by federal regulations which provide that a state ground water program which satisfies national minimum requirements becomes the basis for cleanup or control under any and all federal programs relating to ground water protection in that state. The regulations developed should focus primarily on public health protection and on surface and ground water protection.

Indian Tribes

The 1987 Amendments to the CWA and the 1986 Amendments to the SDWA allows EPA to treat Indian tribes as states. The tribes have indicated a great interest in receiving technical assistance from EPA, especially for water quality standards development and implementation. In some cases, for example arsenic in the Middle Rio Grande Basin of New Mexico, tribal water quality standards have been adopted that are far more stringent than existing background conditions, by three orders of magnitude, and are thus unattainable.

The CWA also provides that EPA shall provide a "*...mechanism for the resolution of any unreasonable consequences that may arise as a result of differing water quality standards that may be set by States and Indian Tribes located on common bodies of water.*" The CWA provides that relevant factors include the effects of differing water quality permit requirements on upstream and downstream dischargers and economic impacts.

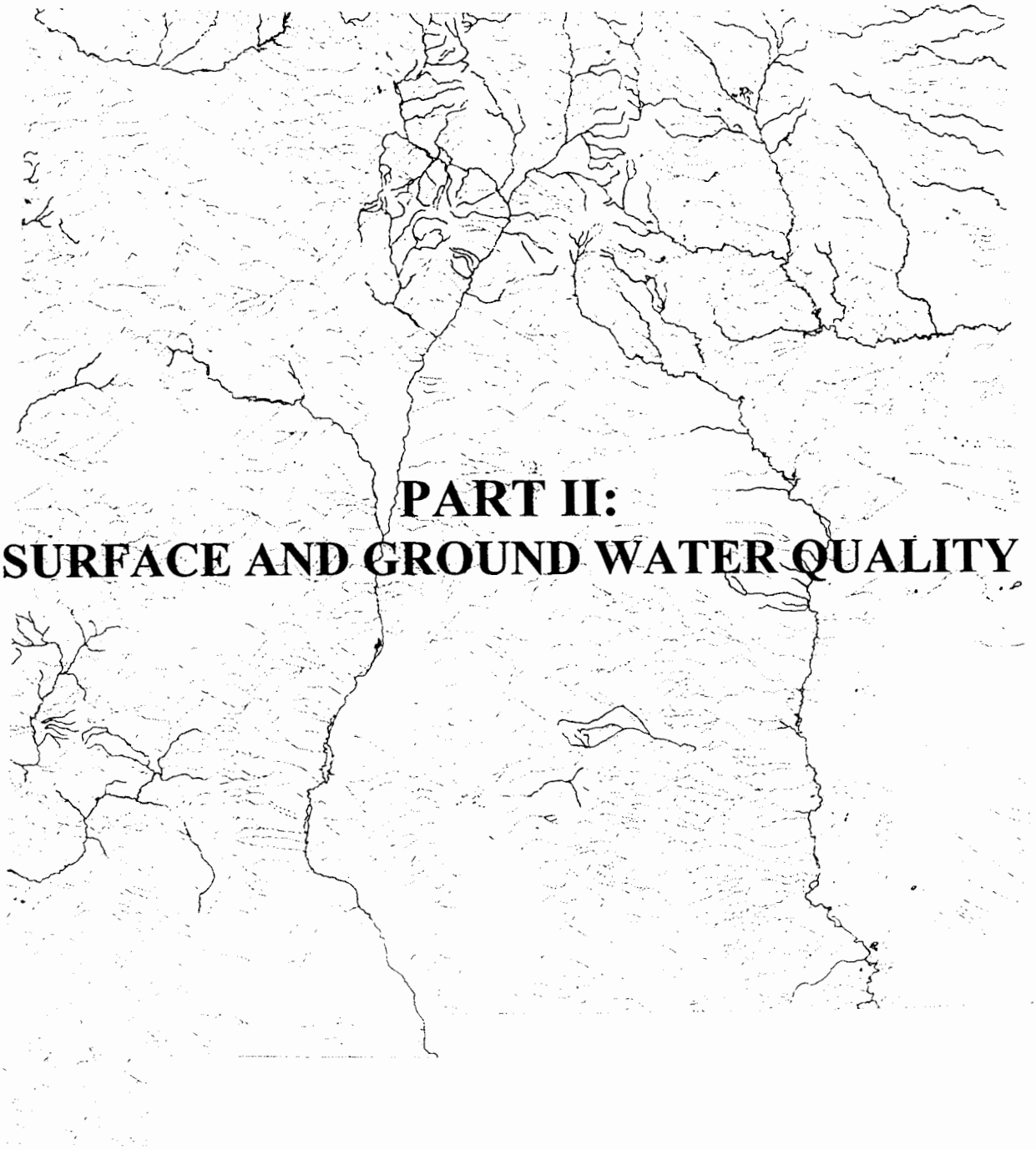
EPA should, in keeping with its trust responsibility to tribes, work with the tribes to ensure that water quality standards and programs adopted by the tribes are scientifically defensible and technically achievable.

Reporting Criteria

Salt cedar invasion and infestation is one of the significant contributors water quality impairment in New Mexico. Yet, no water quality impairment code for sources exist except *hydromodification*, and *removal of riparian vegetation* to classify this threat to the native riparian biome and its associated water quality. Exotic vegetation invasion and displacement of native riparian vegetation poses a significant threat to maintenance of New Mexico's water quality.

EPA should review and amend the Codes of Designated Uses and Nonpoint Sources of Pollution to:

1. ***Include source codes for*** **Improper Functioning Watersheds, Wildlife Management** ***and*** **Fish Hatchery Operations;**
2. ***Break out*** **Natural Sources** ***from general heading code*** **Other** ***and make it a general heading code with appropriate subcodes;***
3. ***Exotic noxious weeds should be placed under the general heading*** **Other;** ***and***
4. ***Disclose omission sources.***



PART II:
SURFACE AND GROUND WATER QUALITY

CHAPTER ONE NEW MEXICO: A Geographical Description

New Mexico is characterized by high mountains, extensive plains and plateaus, river gorges and broad valleys. Figure 1 locates New Mexico with reference to her neighbors and shows the principal towns, drainage systems, and road networks. The climate of the State is arid to semiarid. Average annual precipitation ranges from less than eight inches in desert valleys to over 30 inches in the mountains. About half the annual precipitation is received during brief but intense summer storms. Much of the winter precipitation falls as snow in the high mountains and as snow or rain at lower elevations. Statewide, the annual average precipitation is much less than evaporation from open water surfaces (**1**). Land surface elevations in New Mexico vary from just over 13,000 feet in the northern mountains to just under 3,000 feet at the Texas border in the southeast.

New Mexico is the fifth largest of the fifty states, with a total area of almost 122,000 square miles. Of this total, 34.2 % are federal lands, 11.8% are State lands, 9.4% are Native American lands, and 44.6% is privately owned. In 1982, about 84 % of all land in New Mexico was used for grazing (**2**). Just over 80% of non-federal New Mexico land was used for pasture and rangeland in 1982, while urban and built-up land constituted about 1.25% of the State's non-federal land area (**3**). In 1992, pasture and rangeland occupied about 82% of all land (**4**). Cropland uses about 3.3% of all land of which about 56% of that amount was used for irrigated agriculture (**18**).

From a count of just over 1.3 million in 1980, the population increased 2.75 % due to migration from out-of-State, and 13.5% from in-State natural increase (births minus deaths) to a 1990 total of just over 1.5 million people (**5**). 1998 population projections have reached 1,736,931 (**6**). The population is expected to reach about two million within the next ten years (**7**). Despite a rapid rate of increase compared to the nation, the State remains sparsely settled overall.

Population centers are associated with available surface and ground water. While some communities are located over large underground aquifers, the environmentally sensitive river valleys and flood plains, which often contain shallow aquifers, are foci for population density (**3**). Albuquerque, on the Rio Grande near the center of the State, is by far the largest city. Containing one-third of the total State population within its metropolitan area, it is currently estimated to be more than five times larger than either of the next two cities in size, Las Cruces near the Texas border to the south and Santa Fe to the north.

New Mexico has a small and relatively poor regional economy. In 1997 for instance, New Mexico had a per capita personal income of $19,298. This rating ranked 49th out of the entire United States (**8**). Services and government-affiliated jobs are the leading non-agricultural employment sectors, followed by wholesale/retail trade. Manufacturing is fourth, providing just over six % of jobs. New Mexico also has a diversified natural resource extraction industry (**9, 10, 17**). The federal government provides over 4.5% of the State's employment and has a large defense and research presence in the State. Some researchers argue that the federal presence is actually much larger than figures originating with the New Mexico Department of Labor presented above might suggest. These researchers reason that active duty service personnel, defense plant employees, and workers at the two national laboratories should be included in the federal sector. At present many of these workers are either not included in the statistics, or are classified in other sectors. Using multipliers to estimate indirect impacts as well, one researcher estimates the federal presence between 30 and 35 % of employment (**7**).

In New Mexico, the State estimates that there are approximately 6,000 miles of perennial rivers and streams. EPA has issued a preliminary estimate of 110,741 miles of rivers, streams, ditches and canals for New Mexico. Of these, 8,682 are classified perennial, 99,332 miles as intermittent, and 2,727 as ditches or canals (**11**). New Mexico estimated the length of its perennial streams by the use of a map wheel on a full set of United States Geological Survey's (USGS) 1:24000-scale topographic maps. Only the cartographic symbols for perennial stream were used; no intermittent or ephemeral streams, ditches or canals were included. EPA relied on its *Reach File 3* (RF3) database, created from the USGS's Digital Line Graph (DLG) database. This dataset was in-turn developed from 1:100000-scale maps. The difference in map scales may account for much of the difference in total perennial stream lengths. Additionally, since the two agencies may have used maps which were updated from satellite or aerial photos taken at different times, potentially at different times of the year, there is further reason to believe the estimates might differ (**11**).

The State has identified approximately 175 freshwater, publicly accessible lakes and reservoirs, approximately fifty of which are over 200 acres in area. According to EPA's preliminary estimate, New Mexico has 1,256 lakes (**11**).

Figure 2 shows the State's eleven water quality basins. New Mexico's surface waters include headwater portions of three of the nation's principal drainage systems: the San Juan River Basin and Lower Colorado River Basin contributes to the Colorado River; drainage from the Arkansas-White-Red River Basin contributes to the Mississippi River; and the three Rio Grande basins and the Pecos River Basin contribute discharge to the Gulf of Mexico. Other streams in the State are in topographically closed basins and drain internally (**12**).

Total annual stream flow averages over 5.7 million acre-feet, of which precipitation falling within the State boundaries contributes 3.3 million acre-feet. Other states, principally Colorado via the Rio Grande and the San Juan River, contribute the rest. Downstream states receive 3.6 million acre-feet from New Mexico (**1**).

The quality of surface water varies

from place to place. Generally, water originating in the high mountains is of excellent quality. At lower elevations, water is usually of lesser quality. High quality water is subjected to degradation as it flows downstream due to evapotranspiration, evaporation, anthropogenic pollutant loading, and its application to beneficial uses. Background information on surface waters is provided in **Appendix A**.

New Mexico's hydrogeology is highly variable and complex, and the quality and availability of ground water also varies from place to place. Sedimentary deposits (mainly sandstone, limestone, or unconsolidated sand and gravel) are the most productive aquifers. Valley-fill aquifers of major importance occur along the Rio Grande, the Rio Chama, the San Juan and Pecos Rivers. These aquifers are typically less than 200 feet thick and commonly provide water containing less than 1,000 milligrams per liter of total dissolved solids. A major basin-fill aquifer occurs in the Rio Grande Valley where basin-fill deposits attain thicknesses of up to 20,000 feet. This aquifer provides the source of water for Albuquerque and a partial source for Santa Fe. The High Plains basin-fill aquifer (primarily Ogallala formation) is a major water source along the eastern border of New Mexico. The Ogallala formation, the boundaries of which are roughly from Nebraska to New Mexico, is an example of a shared water source where states need to coordinate their efforts in terms of ground water pollution. Major sandstone aquifers are located in the San Juan Basin in the northwestern part of the State, and limestone aquifers are of importance in the southeastern part and locally in the central and western parts.

Many aquifers are highly vulnerable to contamination from surface discharges. Maintenance of surface water quality is necessary to protect the State's ground water quality. The key risk factor for aquifer contamination is a shallow water table combined with a significant point or nonpoint source of pollution. In the urban areas of our state, abandoned, unplugged domestic wells (such as in Las Cruces and the South Valley in Bernalillo County) also add to the vulnerability to contamination. Other factors affecting ground water vulnerability include preferential flow pathways, clay and organic matter content of soils, and oxidation-reduction potential. The location and relative vulnerability of New Mexico aquifers are shown in Figure 3 (**13**).

The magnitude of ground water supplies in the State is estimated to be 20 billion acre-feet. Of this amount, an estimated three billion acre-feet of fresh water and 1.4 billion acre-feet of slightly saline water are recoverable. In some areas with significant ground water use, ground water levels have declined due to withdrawals in excess of recharge (**1**).

The State's surface water supply is almost fully applied to beneficial uses under existing rights or reserved for specified beneficial uses under water rights filings. In order to protect existing ground water rights from impairment, 32 underground water basins, have been 'declared' by the State Engineer (**14, 15**).

Water uses depend on both surface and ground water supplies. In 1990, total surface and ground water withdrawals totaled 4.2 million acre-feet and depletions (that portion of withdrawals permanently removed from the water supply) amounted to almost 2.6 million acre-feet. Of these totals, agriculture, excluding reservoir and stock pond evaporation, accounted for 3.4 million acre-feet (80%) of withdrawn water and just under two million acre-feet (75%) of the depletion. Public and private water supply wells extracted approximately 0.3 million acre-feet in 1990, and so accounted for only eight percent of total withdrawals. Ground water comprised 89% of the public and private water withdrawals and of agricultural withdrawals. The relative distribution of water uses can be expected to change in future years, as the growing sectors of the economy and an increasing population exert continued demands on this limited resource (**16**).

Figure 1. Map of New Mexico

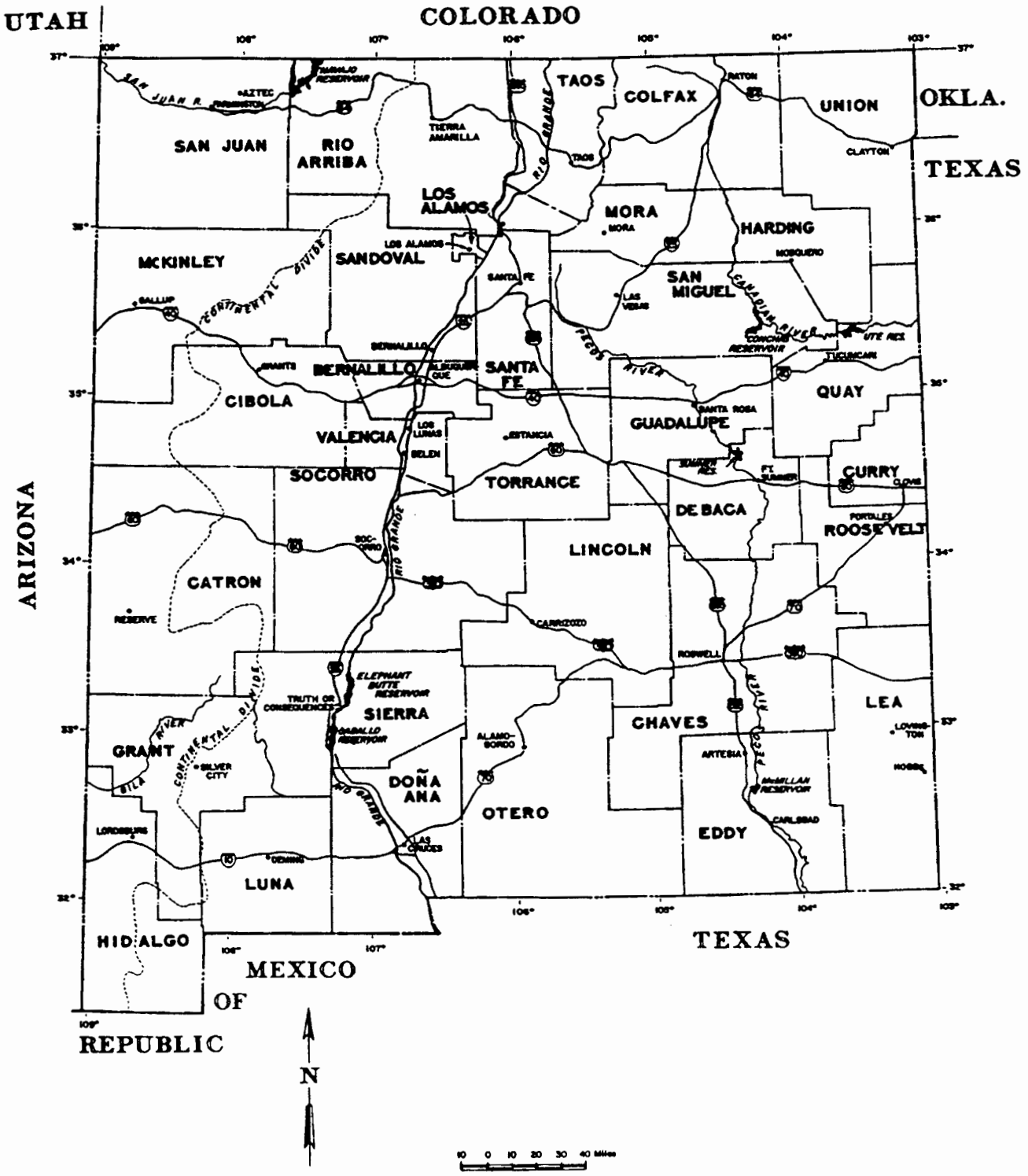


Figure 2. Water Quality Basins in New Mexico

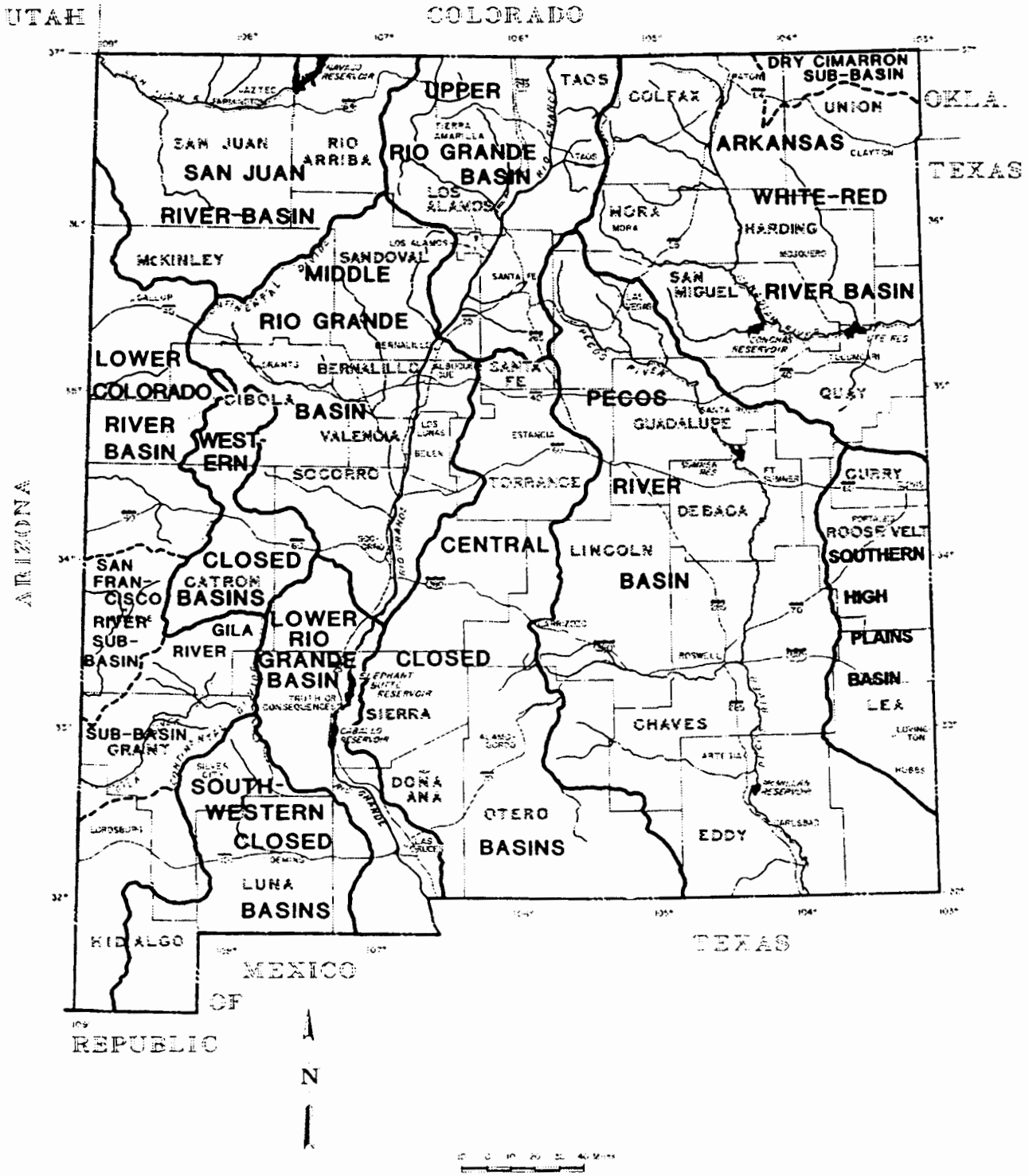
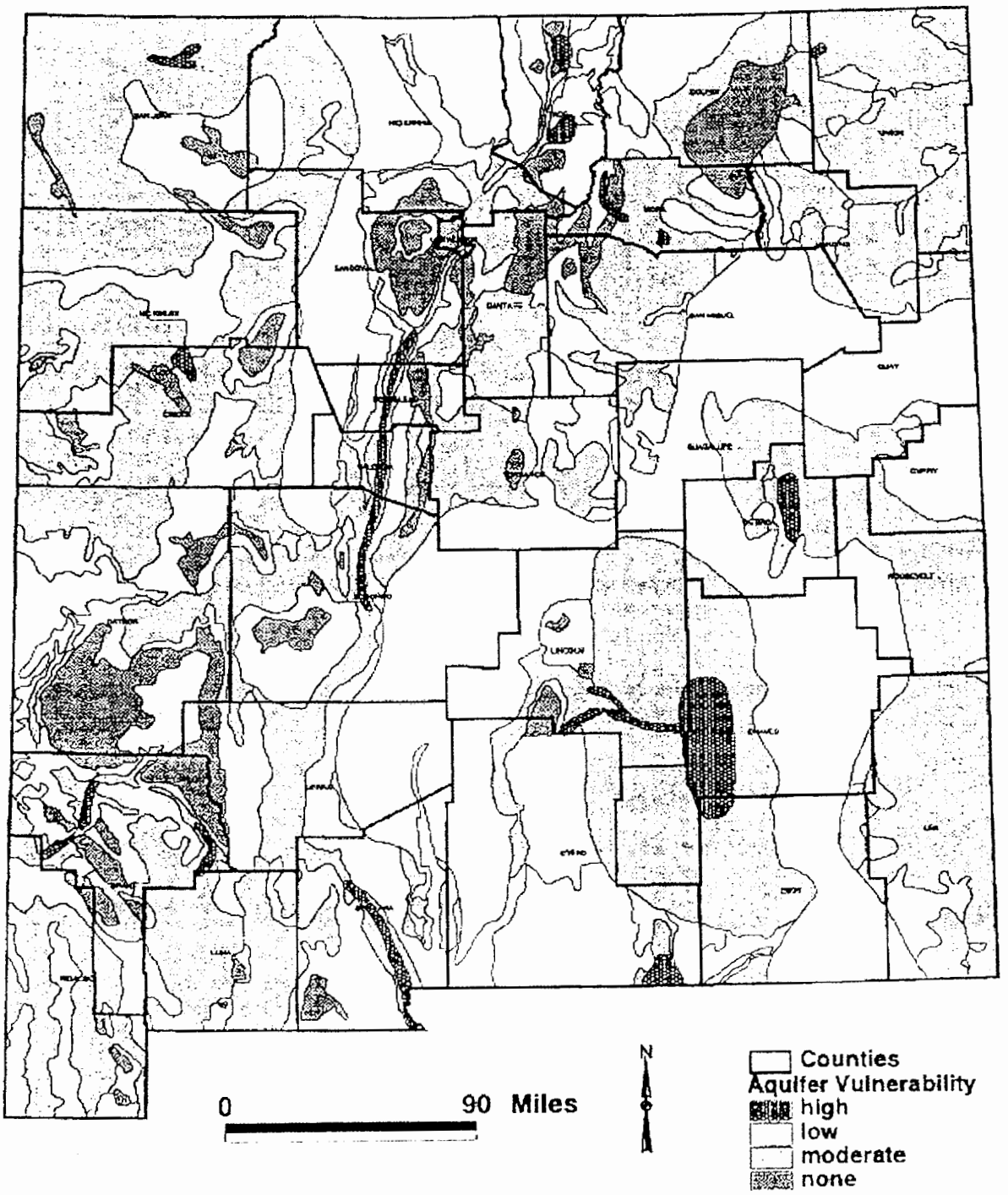


Figure 3.

Aquifer Vulnerability in New Mexico



United States Department of the Interior

1) 1976 Bureau of Reclamation in cooperation with the State of New Mexico. *New Mexico State resources assessment for planning purposes*. 218 pages.

2) 1986 New Mexico Soil and Water Conservation Division. *New Mexico soil and water conservation plan*. Santa Fe, New Mexico. 22 pages.

Jerry L. Williams

3) 1986 *New Mexico in Maps*. Second Edition. University of New Mexico Press. Albuquerque, New Mexico. 177 pages.

United States Department of Agriculture

4) 1992 New Mexico Agricultural Statistics Service. *New Mexico Agricultural Statistics, 1992*. Las Cruces, New Mexico. 72 pages.

University of New Mexico

5) 1991 Alcantara, Adelamar. *New Mexico's Population in the 1990's. Continuing an era of slow growth*. Bureau of Business & Economic Research. Albuquerque, New Mexico. 31 pages.

6) 1999 Bureau of Business & Economic Research. Demographic Analysis and Projection Service. *New Mexico Counties Population Estimates, 1990-1998*. Albuquerque, New Mexico. Data released March 12, 1999 by the U.S. Dept. of Commerce, Bureau of the Census. Available via the Internet at http://www.unm.edu/~bber/demo/nmco9095.htm.

7) 1998 Bureau of Business & Economic Research. Demographic Analysis and Projection Service. *Population and employment projections for New Mexico Counties 1990-2010*. Albuquerque, New Mexico. Available via the Internet at http://www.unm.edu/~bber/demo/poproj.htm.

8) 1993 Bureau of Business & Economic Research. *New Mexico Business; Current Economic Report*. Vol. 14, No. 10. November, 1993. Albuquerque, New Mexico. 10 p.

9) 1998 Bureau of Business & Economic Research. *BEARFACTS*, available via the Internet at: http://www.unm.edu/~bber/reis95/35000-bf.htm

10) 1989 McDonald, Brian. *New Mexico economy: Review and outlook*. Bureau of Business and Economic Research. Albuquerque, New Mexico. 17 pages.

United States Environmental Protection Agency

11) 1993 Office of Water. *Total Waters Estimates for United States Lakes and Streams*. Monitoring Branch. Assessment and Watershed Protection Division Office of Wetlands, Oceans and Watersheds.

New Mexico Water Quality Control Commission

12) 1974 *Basin Plans*. Series of publications for each of the eleven WQCC-designated stream -1976 basins in New Mexico. Santa Fe, New Mexico. {See References for Chapter Two for individual document citations.}

Lee Wilson & Associates

13) 1979 *Program for the statewide monitoring of ground water quality in New Mexico: File report for the NM Environment Improvement Division.* Albuquerque, New Mexico. 180 pages.

New Mexico State Engineer Office

14) 1995 *Annual report of the New Mexico State Engineer Office.* Fiscal year 1995, July 1, 1994 to June 30, 1995. Santa Fe, New Mexico. 97 pages.

15) 1989 *Special order No. 142 declaring the Curry County underground water basin in Curry County.* Santa Fe, New Mexico. 2 pages.

16) 1992 Wilson, Brian. *Water Use by Categories in New Mexico Counties and River Basins and Irrigated Acreage in 1990.* Technical Report 47, July, 1992. Santa Fe, New Mexico. 141 pages.

New Mexico Economic Development Department

17) 1993 *New Mexico USA Fact Book.* Santa Fe, New Mexico. 162 pages.

New Mexico State University

18) 1992 Lanceford, Robert. *Sources of Irrigation Water and Irrigated and Dry Cropland in New Mexico by County 1990 - 1992.* Agricultural Experiment Station, Cooperative Extension Service, College of Agriculture and Home Economics. Technical Report 16. Las Cruces, New Mexico.

CHAPTER TWO NEW MEXICO'S SURFACE WATER BASINS:

Their Physical Descriptions, Current Contamination Problems, and Ongoing Remediation Efforts

The New Mexico Water Quality Control Commission (WQCC), through this document, continues a comprehensive geographic approach to protect all the State's water resources. New Mexico has performed a great deal of such planning since the adoption of the WQCC's Basin Plans in 1974 under the federal mandate of §208 of the Clean Water Act (CWA) [33 U.S.C. 1288].

The WQCC recognizes eleven distinct basins within the State, which are identified mainly by surface hydrology. In one case, however, (the Rio Grande Basin with its Upper, Middle and Lower segments) convenient landmarks serve to divide the basin into regions based on types of water use, availability and socioeconomic differences. This chapter summarizes New Mexico's individual surface water basins as currently recognized by the WQCC with descriptive narratives on physical features and boundaries, typical climatic conditions, and some of each basin's topical environmental concerns. Remediation efforts by State and federal agencies are briefly discussed in those areas of current concern.

THE RIO GRANDE BASIN

The Rio Grande flows approximately 1,900 miles from its headwaters in Colorado to the Gulf of Mexico, virtually splitting the State down the middle for over 400 miles. For water quality management purposes, the Rio Grande in New Mexico has been divided into three sections: the Upper Rio Grande, which extends along the Rio Grande from the Colorado/New Mexico State Line to the Angostura Diversion Works; the Middle Rio Grande, which includes the reach from the Angostura Diversion Works to the headwaters of Elephant Butte Reservoir; and the Lower Rio Grande, which runs from the headwaters of Elephant Butte Reservoir to the International Boundary and Water Commission sampling station above American Dam.

The Upper Rio Grande

The Upper Rio Grande watershed covers approximately 7,500 square miles in North-Central New Mexico (1) and extends over portions of seven counties including Rio Arriba, Taos, Santa Fe, Los Alamos, Sandoval, Mora and San Miguel. It is bounded on the north by the Colorado/New Mexico State Line, and extends south to the Angostura Diversion Works just above the confluence of the Rio Grande and Jemez River. The eastern boundary of the section runs along the major ridge line of the Sangre de Cristo Mountains, while the western boundary follows the Continental Divide through Rio Arriba County, then travels southeast through Sandoval County to the San Felipe Pueblo boundary line.

The Rio Grande bisects the northcentral portion of the State from north to south for a distance of about 143 miles. The river is fed by several tributaries including the Rio Chama with its main tributaries, the Rio Tusas, Vallecitos Creek, Rio Ojo Caliente, El Rito, Abiquiu Creek, and Rio del Oso, as well as Santa Clara Creek and the Rito de los Frijoles which drain the areas located west of the Rio Grande. The Red River, Rio Hondo, Rio Pueblo de Taos, Embudo Creek, Rio Medio, Santa Cruz River, Rio Frijoles, Pojoaque River, Santa Fe River, Galisteo Creek and Las Huertas Creek carry drainage from the east. Not all of these tributaries sustain perennial surface flow throughout their entire lengths. It should be noted, however, that almost all of the perennial tributaries to the Rio Grande in New Mexico can be found within the Upper Rio Grande.

The topography of the area is characterized by mountains interspersed by river valleys and sparsely vegetated foothills. Elevations range from 5,100 feet south of the City of Santa Fe up to 13,161 feet at the summit of Wheeler Peak. Several other mountain peaks in the region rise to elevations of well over 12,000 feet.

For its first fifty miles inside New Mexico, the Rio Grande winds through a deep basalt-lined gorge. At some points this canyon is as much as 1,200 feet from the riverbed to the rim, with sheer walls on either side. The Rio Grande gorge has been designated a Wild and Scenic River by the United States Congress, as has the four-mile segment of the Red River where it forms the Red River Canyon above its confluence with the Rio Grande. This designation indicates these river segments are free-flowing, of high water quality, and of significant aesthetic value.

The Rio Grande travels through the Rio Grande Gorge and into the Española Valley where it is intersected by the Rio Chama, its largest tributary. Just below Otowi Bridge, the Rio Grande enters a 16-mile stretch through White Rock Canyon before it is again intersected, this time by the Santa Fe River, in the Santo Domingo Valley above Cochiti Dam. Below Cochiti Dam, the river continues into the San Felipe Pueblo, which defines the southern boundary of the Upper Rio Grande at the Angostura Diversion Works.

The Middle Rio Grande

The Middle Rio Grande watershed (2) covers approximately 11,884 square miles of land in parts of nine counties including Rio Arriba, Sandoval, McKinley, Valencia, Santa Fe, Bernalillo, Torrance, Catron and Socorro. It is located along the main floodplain of the Rio Grande Valley. Principal tributaries are the Jemez River, the Rio Puerco/Rio San Jose and the Rio Salado.

The topography of the Middle Rio Grande varies from mountains to relatively flat, broad plains. The eastern portion extends from the ridges of the Sandia and Manzano mountains, down along the Los Piños and Fra Cristobal mountain ranges to the northwestern side of the Jornada del Muerto. The boundary then cuts across the Rio Grande at the headwaters of Elephant Butte Reservoir, returns northwest along the San Mateo Mountains, follows the eastern side of the Plains of San Agustin and the Northern Plains, and joins the Continental Divide south of Bluewater to just north of Cuba, marking the western and northern boundaries of the section. The boundary line then proceeds eastward, taking in a part of the Jemez Mountains and finally crossing the Rio Grande at the Angostura Diversion Works.The Rio Grande Valley follows a chain of sub-basins in the middle of the Rio Grande rift. These sub-basins have been down-faulted thousands of feet; the rift is bounded on both sides by major fault zones. On the east side of the rift, uplifting of mountain highlands has occurred; volcanoes and igneous intrusions mark the west side of the rift. Sands, gravels, silts and clays carried in tributaries or in runoff from adjacent highlands have filled the sub-basins in some places to an estimated depth of 10,000 feet. The Rio Grande trough is 25 to 30 miles wide and about 85 miles long in the Albuquerque and Belen Sub-basins. The valleys are bounded on each side by mesas which rise abruptly to heights of 300-500 feet above the valley floor and then slope gently upward to the foothills. Socorro Valley, which begins at the San Acacia constriction and ends at the San Marcial constriction is about 38 miles long. The incised river portion is much narrower than the floodplain, which is about eight to twelve miles wide, bordered by mountains to the west and highlands on the east.

Most of the surface water in the Middle Rio Grande is supplied by runoff and stream flow from the Upper Rio Grande. Exceptions are perennial tributaries in the Jemez Mountains which contribute to the Jemez River and its principal tributary, the Guadalupe River, as well as the upper reaches of the Rio Puerco and its principal tributary, the Rio San Jose. Large amounts of ground water are held in storage in the alluvial materials of the Rio Grande trough. Most water uses, primarily municipal and industrial, in the Rio Grande Basin are met with ground water supplies; an exception is irrigated agriculture which relies primarily upon surface water.

Wetland habitats within the Middle Rio Grande are either intermittent or perennial. Intermittent wetland areas receive water during spring runoff as floods withdraw, leaving ponded backwaters which dry up with the hot summer sun. Perennial wetland areas include the Rio Grande riverside drains, low-flow conveyance channels and wetlands in the Belen, Bernardo, Casa Colorada, and La Joya State Waterfowl areas, and in the Sevilleta and Bosque del Apache National Wildlife areas. Oxbow lakes formed from cut-off channels of the Rio Grande also provide wetlands habitats.

The Lower Rio Grande

The Lower Rio Grande watershed (3) encompasses an area of approximately 5,000 square miles in parts of four counties including Catron, Socorro, Sierra and Doña Ana. The sub-basin is bound on the northwest by Socorro County's San Mateo Mountains with a peak elevation of 10,410 feet. The Mimbres Mountains extend north and south to the west of the Rio Grande in Sierra and Catron counties where the Continental Divide creates the western boundary. As these mountains recede, the boundary cuts east into Doña Ana County's Sierra de las Uvas near the Rio Grande and then south to the Mexican Border. It is near here where the basin's lowest elevation of approximately 3,800 feet is recorded. The eastern boundary of the Lower Rio Grande runs roughly parallel to the Rio Grande along the spine of the Organ and San Andres mountain ranges, about five to ten miles east of the river. The Lower Rio Grande is bordered on the east and west by vast expanses of desert and topographically closed basins, on the north by the Middle Rio Grande section, and on the south by the Republic of Mexico and Texas.

The Rio Grande bisects this section of the State from the headwaters of Elephant Butte Reservoir at the USGS gaging station near the old town of San Marcial to the point where it flows out of the State at the International Boundary and Water Commission sampling station above American Dam.

The Lower Rio Grande Sub-basin is dominated in the north by two large reservoirs, Elephant Butte and Caballo. These man-made reservoirs control and store the entire surface flow in this section of the Rio Grande Basin, thus providing two narrow fertile valleys, the Rincon and the Mesilla, with water for irrigation. Nearly all of the irrigated agricultural land in this watershed, about 100,000 acres, is to be found in these valleys along the river. The watercourse is tightly controlled and regulated southward as the Rio Grande is essentially channeled from Caballo Dam to the Texas/New Mexico State Line. It is confined to the pilot channel, with contiguous high water flood plains on either side of the channel, all contained between levees. The floodplain of the Rio Grande varies from less than one mile to five miles in width; and although there are numerous ephemeral tributaries running from the west down to the Rio Grande, there are no perennial streams or rivers

within this section except the Rio Grande itself.

The climate of the entire area is essentially dry, with potential evapotransporation far exceeding precipitation levels annually. Yet, the Lower Rio Grande Valley consists of a narrow strip of green land with arid desert and semi-arid mountainous regions on both sides.

The channelled riverbed extends in a generally south and southeasterly direction through lands characterized by arid, gently sloping plains which are broken by barren mountain ranges and isolated mountain peaks. Approximately 80% of the Lower Rio Grande is between 4,000 and 6,000 feet in elevation and belongs in the lower Sonoran life zone. Except within the irrigated valleys, this entire area is characterized by creosote, tar bush and mesquite. The surrounding slopes of the San Mateo and Mimbres mountain ranges exhibit grasslands characteristic of the upper Sonoran. Woodland areas of the Transition zone denoted by areas of piñon, juniper, oak and mountain mahogany are found further up their slopes. Located highest of all are small pockets of northern coniferous forest, which is comprised of a spruce and fir biome.

Amounts of precipitation are sparse, but correspond closely to altitudes. Snowfall is generally light throughout the Lower Rio Grande. The dry seasons in this portion of the State occur in Fall, Winter and Spring mainly because of a rain shadow effect, a condition where moisture circulating eastward from the Pacific Ocean is removed as air masses pass over and rain on mountains west of the State. Summer in this portion of New Mexico is the rainy season, when southeasterly circulating moisture-laden air from the Gulf of Mexico enters the southern parts of the State and strong surface heating, aided by uplifting air flow, brings brief and often heavy showers. Average annual precipitation along this section of the Rio Grande Valley ranges from six to eight inches, while the high mountains to the west receive up to sixteen. Rainfall is highly variable, however, with annual local totals as low as three inches or as high as 19 inches, even at lower elevations.

Aquifers in the Lower Rio Grande may be generally separated into two groups, valley fill and bedrock. Ground water, primarily from the valley fill, is used for municipal, industrial, agricultural, rural domestic and livestock purposes. The Rio Grande, by means of the reservoir system, furnishes the primary supply of water for irrigation.

Surface Water Quality Concerns In The Rio Grande Basin

The Rio Grande Basin has a total of 1,011 State-jurisdictional miles of assessed river reaches that only partially or do not support their designated or attainable uses. The specific pollutant or threat in this lack of support are turbidity, streambottom deposits, metals, pH, total ammonia and total residual chlorine near the major municipal dischargers, temperature, total organic carbon, pathogens, plant nutrients, total phosphorus, nuisance algae, flow alteration and overall watershed condition. The probable sources of this non- or partial-support are agriculture, recreation, hydromodification, road and highway maintenance, silviculture, resource extraction, municipal and domestic point sources, land disposal, road runoff, and natural and unknown sources. The most commonly found toxins in acute concentrations are aluminum, copper and zinc and the most commonly found toxins in chronic concentrations are aluminum, arsenic, cadmium, lead, mercury, nickel, selenium, and zinc.

The Rio Grande Basin currently has at least 61,747 assessed lake acres that only partially or do not support their designated or attainable uses. The specific pollutant or threat in this lack of support are excessive nutrients, pH imbalance, lack of dissolved oxygen, presence of mercury in fish tissues, nuisance algae, turbidity, excessive temperature extremes, conductivity and the presence of metals in solution. The probable sources of these causes include agriculture, land disposal, off-road vehicle use, natural and unknown conditions, spills, silviculture, and recreationally-associated problems such as road /parking lot runoff, roadway maintenance, and refuse disposal /littering.

Ground Water Quality Concerns In The Rio Grande Basin

Approximately 90% of the population of New Mexico depends on ground water for its domestic water supply. In New Mexico, at least 1,235 ground water contamination plumes emanating from point sources and numerous areas of widespread contamination from nonpoint sources have been identified from data acquired between 1927 and December 1999. This contamination has impacted at least 188 public and 1,719 private water-supply wells.

Over half of all cases of ground water contamination in New Mexico have been shown to be caused by nonpoint sources, predominantly household septic tanks and cesspools which together create the single largest known source of ground water contamination in the State. It is estimated that there are over 170,000 household septic tanks or cesspools in the State discharging roughly 51 million gallons of wastewater every day. Other nonpoint sources which may impact ground water include residual minerals from evapotranspiration, pesticides and fertilizers from agricultural and urban sources, discharges from mine water and urban runoff.

Nonpoint Sources of Contamination

The following nonpoint contaminants have been found to contribute to ground water pollution in the Rio Grande Basin:

Iron, Manganese and Sulfides

Anoxic contamination is a condition in which dissolved oxygen in ground water

has been depleted. Iron, manganese and sulfides are typical ground water contaminants in areas exhibiting this condition. It can be caused by septic tank discharges or by naturally occurring geologic deposits such as humus or peat. Anoxic conditions are typically seen in shallow ground water in highly populated areas that use septic tanks or cesspools to treat their sewage. Anoxic contamination has been reported throughout New Mexico with cases reported within the Rio Grande Basin occurring in Española, Pojoaque, Corrales, both the North and South Valleys of Albuquerque, Los Lunas, a large area in Bosque Farms, Belen, and Las Cruces that has affected at least 102 wells.

Nitrates

Nitrate contamination of ground water is also found in areas where there is heavy loading by septic tanks and cesspools, but unlike areas with anoxic contamination, the vadose zone is sufficiently thick and aerobic for ammonia nitrification to occur. Nitrates typically do not cause aesthetic problems like anoxic conditions, but can be shown to cause various health problems, such as methemoglobinemia or "blue baby syndrome", a potentially serious and sometimes fatal disease affecting infants and their ability to pickup and release oxygen with their blood.

Nitrate contamination is prevalent in areas with high densities of septic tanks and cesspools. Nitrate contamination also can occur from point-sources such as meat packing and processing plants, sewage treatment plants, dairies feedlots, landfills, uranium mills, and explosives manufacturing or disposal facilities. Nitrate contamination has been reported in Questa, Taos, Española, Tesuque, Santa Fe, Grants, Bernalillo, Corrales, Albuquerque, Bosque Farms, Los Lunas, Belen, Anthony, Las Cruces and Mesquite.

Albuquerque's South Valley Mountainview contains a serious case of nitrate contamination caused by over-fertilization at a former vegetable farm. NMED, the University of New Mexico, the Bernalillo County Environmental Health Department, and the New Mexico Waste-management Education and Research Consortium (WERC), in a partnership, are developing a technology for *in-situ* bio-denitrification using Mountainview as the prototype project site.

Pesticides

Pesticides such as insecticides, herbicides & fungicides have been used in New Mexico. Only 4 detections of pesticides in shallow agricultural and urban use aquifers were discovered out of an overall pool of 110 statewide sampling sites. All detections were well below established Health Advisory levels. Ongoing efforts by NMED and the New Mexico Department of Agriculture to monitor the use of such chemicals and their occurrence in ground water as a means of identifying and preventing future ground water contamination problems were recently concluded.

Total Dissolved Solids (TDS)

Residual minerals left behind by evapotranspiration (ET) can increase the levels of TDS in ground water and form alkali deposits in the soil. ET has degraded the quality of shallow ground water in vast areas of the Rio Grande Valley (4).

Point Sources of Contamination

Point source contamination in the Rio Grande Basin is predominantly industrial in nature, involving refined petroleum in approximately half of the cases. Non-industrial point sources include centralized sewage-treatment works and landfills. Most of New Mexico's point source cases have resulted from either poor historical disposal practices, or accidental, permitted or unpermitted discharges. The following point sources have been found to contribute to ground water pollution in the Rio Grande Valley:

Leaking Underground Storage Tanks and Refined Petroleum Products

In the Rio Grande Basin there are approximately 1,269 sites as of November 1999 where leaking underground storage tanks have been reported. The majority of these reported ground water contamination cases are due to gasoline, jet fuel, diesel, gasoline additives, petroleum constituents such as benzene, toluene, ethyl benzene, and xylene. The bulk of these sites are concentrated around the major industrialized areas such as Albuquerque, Santa Fe and Las Cruces in areas typically associated with service stations, liquid petroleum storage and distribution centers and pipelines, and government facilities (4).

Landfills

Many landfills in New Mexico have received large amounts of liquid and/or industrial wastes. Ground water contamination has been detected in three landfills in the Rio Grande Valley. These landfills are located in Albuquerque, Albuquerque's South Valley, and in Doña Ana County. Contaminants include chlorinated solvents and basic-, neutral and acid-extractable compounds.

Radionuclides (RN)

Six cases of anthropogenic RN ground water contamination have been reported in and around the Department of Energy's Los Alamos National Laboratory facility.

Halogenated Aliphatic Compounds

There are also ground water contamination sites located in the Rio Grande Basin that involve halogenated aliphatic compounds, primarily solvents. Trichloroethylene (TCE) and other halogenated aliphatics have caused ground water contamination in Arroyo Hondo, Española, Santa Fe, San Rafael near Grants, Bernalillo, Albuquerque proper, Albuquerque's South Valley, Tijeras, Carnuel, Sedillo, Laguna Pueblo, Los Lunas, Belen, Socorro, Mesita, Organ and Las Cruces. Halogenated aliphatic compounds are used in various manufacturing processes, the dry cleaning industry, degreasing metals, and as fumigants (5).

Polychlorinated Biphenyls (PCB's)

Formerly used as hydraulic fluids, plasticizers, adhesives and fire retardants, PCB's were used in electrical transformers and capacitors, vacuum pumps and gas-transmission turbines. Ground water contamination sites involving PCB presence are in Belen, Las Cruces and on Laguna Pueblo.

Total Dissolved Solids

Point source ground water contamination due to elevated levels of TDS is found near many of the mining and milling sites in New Mexico. Seboyeta, Milan, Bluewater and Grants were found to have high TDS in ground water due to uranium mining activities, Cuba from copper mining, and Questa from molybdenum activities. TDS

also results from natural limestone deposits in these areas.

Metals

Metals such as aluminum, cadmium, cobalt, iron, lead (other than those associated with gasoline spills and LUSTS), manganese, selenium and zinc have been found to be the cause of several cases of ground water contamination throughout New Mexico. These cases, from both nonpoint and point pollution sources, are found in Medenales, Santa Fe, Golden, Corrales, Sedillo, Grants, Milan, Albuquerque, and Cuba.

Spills

A total of 499 spill cases are currently recorded on NMED's spill report databas with 323 of the total (65%) located withi the twelve counties that make up the Ri Grande Basin (Table 1). While many o these cases are not known to currentl impact ground water, in some cases the may cause serious damage.

TABLE 1 **Number of reported spills currently recorded in the Rio Grande Basin**

Rio Arriba	1
Taos	
Los Alamos	3
Sandoval	3
Santa Fe	3
McKinley	
Cibola	
Bernalillo	9
Valencia	
Socorro	
Sierra	
Doña Ana	8

THE ARKANSAS/WHITE/RED RIVERS BASIN

The New Mexico portion of the Arkansas/White/Red Rivers Basin (6) is located in the northeast corner of the State. The area within the basin encompasses Union, Harding and Colfax counties, most of Mora and Quay counties, and part of San Miguel County. Also included are small parts of Curry and Guadalupe counties. The Arkansas/White/Red Rivers Basin in New Mexico is bounded on the north by the State of Colorado, on the east by the States of Oklahoma and Texas, on the south by the Pecos River Basin and portions of the High Plains, and on the west by the Rio Grande Basin. The entire area covers approximately 17,066 square miles, or about 14% of the State's total geographical area.

The Arkansas/White/Red Rivers Basin exhibits diverse topographical characteristics. It is composed of grassy plains and arid valleys in the eastern section where elevations range from 3,600 feet in the south to 7,350 foot high Emory Peak in the north. The entire western side of the basin is bounded by the Sangre de Cristo Mountain Range with elevations as high as 13,161 feet.

The Arkansas/White/Red Rivers Basin in New Mexico is mostly drained by the Canadian River and its tributaries. The Canadian River flows southward from its headwaters near the Colorado/New Mexico State Line west of Raton, into southern San Miguel County, then eastward into Texas and its confluence with the Arkansas River. The Purgatoire River drains northeastward into the Arkansas River of Colorado. The other drainages flow eastward and southeastward into Oklahoma and Texas. Of the six sub-basins draining the area, only three, the Canadian River, the Dry Cimarron and Corrumpa Creek, are perennial. The Canadian River is now perennial throughout its entire length in New Mexico, in part due to discharges from Conchas and Ute reservoirs. Both the Dry Cimarron and Corrumpa Creek have perennial reaches near their headwaters but may, in dry years, show little or no surface flows throughout the majority of their drainages.

The major streams in the Canadian River Sub-basin are the Vermejo River, Mora River, Cimarron Creek (which drains from Eagle Nest Lake), Canadian River, Conchas River, and Ute Creek. The Canadian River flows 163 miles from its headwaters in the mountains west of Raton to Conchas Dam, 77 miles from Conchas Dam to Ute Reservoir, and about fift miles from Ute Reservoir to the State Lin with Texas. The Mora River, Cimarro Creek and the Vermejo River drain th eastern slopes of the Sangre de Crist Mountains and are the Canadian River major tributaries. Three significa reservoirs, Eagle Nest, Conchas, and Ut are located within the basin.

The climate in the basin ranges fro semi-arid in the lower elevations subhumid in the timbered mountainou regions. Normally, the summers are h and the winters are mild. Low humidi and clear skies prevail most of the yea There are large seasonal and diurn fluctuations in temperatures which a typical of the higher elevations in t continental areas. Strong winds blo throughout this region especially durin the spring and fall months. With fe exceptions, more than fifty percent of t precipitation occurs between the months May to September with the greate amount occurring during July and Augu Warm, moist air rising from the Gulf Mexico provides most of this precipitati in the form of intense but brief afterno thunderstorms throughout this late-summ period.

Surface Water Quality Concerns in the Arkansas/White/Red Rivers Basin

Surface water quality concerns in this Basin are largely limited to nonpoint source impacts. Among the most prevalent are the effects of historical grazing practices and, more recently, recreational impacts. A few point source concerns have been identified in the basin within the last few years.

The Arkansas/White/Red Rivers Basin has 421 State-jurisdictional miles of assessed river reaches that do not fully support their designated or attainable uses. The specific pollutant or threat in this lack of support are turbidity, stream bottom deposits, nutrients, habitat alteration, metals, pathogens, total phosphorous, temperature extremes, problems with pH, total ammonia and overall watershed condition.

The most probable sources for these causes are agriculture, resource extraction, recreation, hydromodification, road runoff, silvicultural activities, road construction and municipal point sources and domestic point sources for the total ammonia, pathogens and nutrients. The most prevalent toxins, all of which are found in chronic levels are aluminum, copper, lead, mercury, and selenium.

The Arkansas/White/Red Rivers Basin has approximately 24,850 assessed lake acres that do not fully support their designated or attainable uses. The most specific pollutant or threat in this lack of support are metals, nutrients, nuisance algae, pH, lack of dissolved oxygen, temperature extremes, and mercury presence in fish tissue. Probable sources of these causes are mainly recreation and agriculture.

Ground Water Quality Concerns in the Arkansas/White/Red Rivers Basin

Most ground water availability problems presently encountered in the Arkansas/White/Red Rivers Basin are associated with agricultural demands. On the east side of the basin, near the Texas border, large amounts of ground water are used for irrigation. Lands irrigated by ground water are in Union and Harding counties and in Quay County north of Logan. Ground water is presently used by most communities for domestic uses and is also utilized by a few industries. However, urban or rural domestic, self-supplied industrial and recreational uses deplete only a small fraction of the basin's present annual water use.

Currently, three significant sources of ground water contamination are from leaking underground storage tanks, septic systems, and halogenated aliphatic compounds in the Arkansas /White/Red Rivers Basin.

Leaking Underground Storage Tanks and Refined Petroleum Products

As of November 1999, about 126 leaking underground storage tank sites were reported in the Arkansas/White/Red Rivers Basin. The majority of these reported ground water contamination cases are due to oil, gasoline, jet fuel, diesel, gasoline additives, petroleum constituents such as benzene, toluene, ethyl benzene, and xylene, and solvents such as chlorinated methane, ethanes, propanes and ethylenes. The bulk of these sites are concentrated around the municipal and industrialized areas such as Raton, Springer, Angel Fire and Maxwell in Colfax County, and Tucumcari in Quay County. These areas are typically associated with service stations, liquid petroleum storage and distribution centers and pipelines, or other extractive activities.

Nitrates

Nitrate contamination is prevalent in areas in the Arkansas/White/Red Rivers Basin where there are high densities of septic tanks and cesspools. Nitrate contamination also occurs from meat packing and processing plants, sewage treatment plants, dairies and feedlots. Nitrate contamination has been reported in Maxwell, Angel Fire, Wagon Mound, Solano, Tucumcari, Logan, and San Jon.

Halogenated Aliphatic Compounds

Halogenated aliphatic compounds have been detected in ground water in Tucumcari and in Texico. Grain fumigants and degreasing solvents are the suspected sources.

THE CENTRAL CLOSED BASINS

The Central Closed Basins (7) are a cluster of four drainage systems in the south-central part of New Mexico. These basins total 14,605 square miles and include portions of eleven counties: Santa Fe, San Miguel, Bernalillo, Torrance, Socorro, Lincoln, Sierra, Otero, Doña Ana, Chavez and Eddy. Each basin completely contains all the surface flows within its boundaries. Little of this flow is perennial; the names of two of the basins give an indication of the lack of surface water within their boundaries: Jornada del Muerto (Journey of the Dead Man) and the Salt Sub-basin. While the other two basins, the Tularosa and the Estancia, likewise exhibit limited surface water, they support the bulk of the region's population with substantial ground water resources.

Because of the geologic history of the Central Closed Basins, the quantity and quality of the ground waters vary tremendously. Ancient lakes and streams deposited waterbearing fill over older bedrock. Cracks and fissures in the bedrock of Permian and Pennsylvanian ages yield small quantities of relatively good quality water. However, the yield of the Yeso Formation is highly saline. The overlying valley alluvium generally consists of unconsolidated gravels, sands, and clays capable in some areas of yields up to 2,000 gallons a minute. Potable water is mostly found from wells near the edges of the basins with more saline water toward the basin centers.

One geologic formation deserving special mention is the Madera Limestone of the Manzano Mountains. This

Pennsylvanian Age aquifer is important despite its small yield (ten gallons a minute), as it is the only source of potable water in the area. Thus, despite its proximity to Albuquerque, the Manzano Mountains may experience only limited development because of such a low yield unless regional water supplies are developed.

The largest water withdrawal in the Central Closed Basins is in the Estancia Sub-basin, where the water is primarily used for irrigated agriculture. The economy of the basin depends to a great extent on irrigated agriculture. Usage of these ground water resources in the 1930s enabled agriculture to expand rapidly in the area. Most of the irrigation is in the lower, more frost-free parts of the Estancia and Salt sub-basins and is dependent on ground water, although the Rio Tularosa and a few other perennial streams in higher altitudes provide water for about ten percent of the irrigated acres in the two basins.

The Estancia Sub-basin has no perennial streams, although playa lakes such as the Laguna del Perro often contain some water. The major source of domestic water supplies in this area is the alluvium; but the Madera Limestone in the west, the Glorieta Sandstone in the north, and the Yeso formation in the southern and northeastern parts of the valley also yield considerable water.

The Tularosa Sub-basin exhibits the next largest water use in the Central Closed Basins, with water use in the Jornada del Muerto and Salt sub-basins being considerably smaller. The upper reaches of Three Rivers and of the Sacramento River are perennial in the Tularosa Sub-basin. However, water used for domestic supplies generally comes from the ground waters; the largest exception is that portion of Alamogordo's water supplied from Lake Bonito (which is in the Pecos River Basin). Ground water in the Tularosa Sub-basin is located in a large alluvial deposit with very little fresh water. There are a few scattered locations around the edges of the basin where fresh water is available, but only two of these are principal water sources. One consists of a long narrow area around Tularosa and Alamogordo; the other more productive area is in the southwestern part of the basin.

There are only ephemeral surface streams in the Jornada del Muerto Sub-basin. Ground water exists in sufficient quantity throughout the basin at depths ranging from 30 to about 400 feet for watering of livestock. Most of this ground water is slightly saline and therefore contains concentrations of dissolved solids that are higher than recommended levels for human consumption. In rare locations, sufficient water for irrigation has been developed from the Dakota Sandstone deposits and its underlying San Andres formation, but this water is slightly brackish. The few known sources of fresh water in the Jorñada del Muerto are found around the edges of the basin in alluvial fan deposits.

The only perennial flow of consequence in the Salt Sub-basin is in the upper reaches of the Sacramento River at the northern end of the basin. The Bolson alluvium produces about 840 of water a minute. Ground water in large quantities suitable for irrigation is obtained west of the alkali flat that occupies the central part of the basin. The Bone Spring Limestone formation is a prolific bedrock aquifer penetrated by many irrigation wells, and has yields measured as high as 3,620 gallons per minute with only ten feet of head pressure. However, rough estimates suggest a fresh water storage of only about a half-million acre-feet in the Salt Sub-basin as a whole.

The climate of the Central Closed Basins, like most of New Mexico, varies with elevation. The lower areas of each basin are warm and dry, being around 4,000 feet in elevation. Potential evapotranspiration in these areas significantly exceeds annual precipitation. The mountainous rims of the four basins, in contrast, have a cooler and more humid climate, often with fewer than one hundred frost-free days and more than twenty-five inches of rainfall in an average year. The edges of these basins are generally at least 6,500 feet high while Sierra Blanca, on the rim of the Tularosa Sub-basin, is over 12,000 feet in elevation. Wind patterns in the lowlands combine with sparse vegetation in these areas to cause localized cyclones, or "dust devils", with heights up to 12,000 feet.

The varieties of climates and topographies have fostered an equally disparate economic base. Although parts of the Central Closed Basins have been continuously inhabited for thousands of years, the lack of perennial surface water flow in most areas inhibited settlement until recently. Sparse population and large open areas attracted the United States Department of Defense to acquire about one-third of the basins' total land for weapons and rocket experimentation. White Sands Missile Range, Holloman Air Force Base, and Fort Bliss Military Reservation cover most of the southwestern part of the Tularosa Sub-basin. The mountainous areas east of Alamogordo along with the Manzano and Sandia mountains east of Albuquerque are experiencing considerable tourist, second home, and recreational development, while the area in and around Cloudcroft has been one of the faster growing areas in the State. The overall limiting factor to growth and development in the Central Closed Basins, besides the absolute availability of useable water, is the high rates of evaporation which limit the use of existing supplies for agriculture. There are areas throughout these sub-basins with suitable soils for irrigated agriculture yet are not under cultivation because of the lack of adequate, high quality water.

Surface Water Quality Concerns in the Central Closed Basin

The Central Closed Basin has 17.7 State-jurisdictional assessed river miles that are listed as only partially supporting their designated uses. The specific pollutants or threats in this lack of support are metals (for chronically toxic levels of mercury on one reach), streambottom deposits, temperature, and conductivity. The recognized probable sources of this lack of support are traditional rangeland practices, removal of riparian vegeta streambank modification/destabiliza and other unknowns as well as ov watershed condition.

Ground Water Quality Concerns in the Central Closed Basin

In the Central Closed Basin the greatest sources of ground water contamination are from leaking underground storage tanks and septage systems.

Leaking Underground Storage Tanks and Refined Petroleum Products

As of November 1999, there were approximately 126 leaking underground storage tank sites reported in the Central Closed Basin. The majority of these reported ground water contamination cases were due to gasoline, jet fuel, diesel and gasoline additives. The bulk of these sites are concentrated around the municipal and industrialized areas such as Alamogordo in Otero County and Moriarty, Encino and Estancia in Torrance County. These areas are typically associated with service stations, liquid petroleum storage and distribution centers, pipelines, and the military installations at Fort B Holloman AFB and the White S Missile Range.

Nitrates

The incidences of nitrate contamin are found mostly in the Central Cl Basins Estancia Valley and in and ar the City of Alamogordo. This proble mostly due to high densities of septic t and cesspools found in the populated a

THE LOWER COLORADO RIVER BASIN

The Lower Colorado River Basin (**8**) in New Mexico consists of a number of tributary drainages that start in or near New Mexico and continue into Arizona. Included in this basin are portions of McKinley, Cibola, Catron, Sierra, Grant, Luna and Hidalgo counties. While several streams rise in New Mexico and join larger tributaries of the Colorado River in Arizona, only one stream, the Gila River, originates in New Mexico and directly joins the Colorado itself.

Included in the discussion of the Lower Colorado River Basin boundaries is the Animas Closed Sub-basin of New Mexico. The Animas Sub-basin, approximately 2,400 square miles in area, is one distinct hydrologic unit, and just one of several closed basins to the south and east of the Lower Colorado Basin.

The following is a description of the five sub-basins within the Lower Colorado of New Mexico, starting from the furthest north.

The Little Colorado River Sub-basin in New Mexico has an area of some 5,150 square miles, which includes three principal streams systems: the Puerco River (Rio Puerco of the West), the Zuni River and Carrizo Creek. The sub-basin also includes several minor drainage systems. Only the Zuni is a perennial stream, and then only in its upper reaches. It is formed by the junction of the Rio Nutria and Rio Pescado, both of which rise on the forested western slopes of the Zuni Mountains. Much of the sub-basin is subject to severe sheet erosion and head-cutting.

This sub-basin is primarily within the Navajo Section of the Colorado Plateaus physiographic province. The Navajo section is considered young plateau country characterized by relatively low relief. Elevations generally range from about 6,000 to 7,500 feet above mean sea level, but in places reach 9,000 feet. The drainages are not deeply entrenched, and canyons more than a few hundred feet deep are uncommon. Although the relief is not great, the topography is rough. Wide flat-bottomed washes bordered by cliffs of sandstone from 10 to 200 feet high rise step-like to flat-topped table lands and are the most conspicuous features of much of the region. Dissection of the broad Zuni uplift east and southeast of Gallup has produced a locally mountainous terrain. Young lava flows that fill some of the wide shallow valleys mark the transition zone between the Navajo section and the Datil section to the south.

The next sub-basin includes the San Francisco River drainage which arises in Arizona, enters New Mexico west of I and returns to Arizona southwes Glenwood, New Mexico, where it join Gila River near Clifton, Arizona. Th Francisco Sub-basin in New Mexico h area of 1,900 square miles. The Francisco River is perennial throug most of its course in New Mexico, bu channel is sometimes dry in the immediately above Glenwood. In area, the valley is wide, the channe relatively thick, and water disappear the gravel only to reappear downstr The river receives the flow of se perennial tributaries that rise in Mogollon and Tularosa mountains o east side of the basin, and in the Francisco Mountains and Blue Ran the west. The main perennial tribu are Tularosa River, Negrito C Whitewater Creek, Apache Creek Saliz Creek. Jenkins Creek, Pueblo C and Mule Creek drain a large are have perennial flow in the upper p their courses; they may cont appreciable underflow to the San Fra River through channel gravels in reaches.

The Gila River originates in a wild area between the Mogollon Mountai the Black Range, then flows southwesterly direction for about 10

before entering Arizona near Virden. Elevations vary from 10,800-foot Mogollon Peak to 4,000 feet near Virden. In general, this sub-basin is mountainous with streams enclosed in long narrow valleys. The Gila Sub-basin of New Mexico has an area of 3,500 square miles. The river normally is perennial from its source in the Gila Wilderness to the New Mexico/Arizona State Line, but diversions for irrigation result in stretches of the river being dry at times. The Gila receives water from numerous small perennial creeks in the high country, the principal ones being Willow, Beaver, Taylor, and Sapillo creeks. The Mogollon, Bear, Duck, Mangas, and Blue creeks typically discharge their waters into the Gila by underflow through channel gravels.

Most of the Gila Sub-basin lies within the Colorado Plateaus physiographic province. However, the southernmost New Mexico reaches of the river are entrenched in the aggraded desert plains of the Mexican Highlands. This section is typified by generally low relief. However, the Gila has cut sharply 300 to 500 feet into the plains and has developed a flat-bottomed inner valley up to a mile wide in the vicinity of Virden and Red Rock. Tributaries to the south have also cut well-defined channels for a few miles.

San Simon Creek Sub-basin has an area of 220 square miles in New Mexico. San Simon Creek, which joins the Gila River in Arizona is not perennial and has no tributaries of consequence in New Mexico. Flood flow from the western slopes of the Peloncillo Mountains in New Mexico occasionally may reach the main channel. Tributaries, principally Cave Creek, which rise in the Chiricahua Mountains in Arizona, may contribute some underflow to the San Simon Valley. Characteristics of the basin resemble those of the adjacent topographically closed basins to the east, such as the Animas, more closely than those of the rest of the Lower Colorado Basin.

In the Animas Closed Basin, runoff collects in the upper valley of Animas Creek and spreads northward across the lower valley in a wide indistinct channel which terminates in broad playas at the north end of the basin. Areas around Lordsburg in particular are irrigated with ground water.

Surface Water Quality Concerns in the Lower Colorado River Basin

The Lower Colorado Basin has 539 State-jurisdictional assessed river miles that are listed as only partially or not supporting their designated uses. The Basin also has approximately 166 assessed lake acres that are listed as only partially or not supporting their designated uses.

Water quality management of the Lower Colorado Basin has gone through significant and important changes in the past few decades, as increasing knowledge of environmental pollution factors has grown. Although water quality problems remain relatively few when compared to more populated regions of the State, the basin can exhibit some of the same controversial and complicated contamination situations typically found elsewhere. The following is a recent example.

NMED has begun the process of developing comprehensive watershed condition assessments throughout New Mexico. One pollution category of high concern within the Lower Colorado Basin is metal loading, primarily from mineral extraction sites in the Gila/San Francisco Watershed (9).

In the Gila/San Francisco system the most common mode of metal transport is associated with the suspended component. The less common, but biologically more damaging mode of transport, are those releases in which the metals are in the dissolved phase. This occurs in areas where mining wastes are high in sulfides. The common pH range in such situations is from 2.0 to 5.0 with metal loading varying from small traces to extremely high values.

Additional water quality concerns seen throughout the sub-basins are the historical degradation of the riparian community, habitat alteration, and the resulting destabilization of streambanks caused by overgrazing, and resource management such as fire suppression. Other concerns include the presence of pathogens, sediment-laden runoff from forest roads and recreational impacts caused by off road vehicles, camping and streamside trails, hydromodification and silviculture projects as well as nutrient-enriched waters. The specific pollutant or threat of partial or nonsupport of lake acres in the Lower Colorado River Basin include excessive nutrients, nuisance algae, reduction of riparian vegetation, bank destabilization, siltation, and pH imbalance. Probable sources of these causes include silviculture, recreation, road maintenance, agriculture and overall watershed condition.

Ground Water Concerns in the Lower Colorado River Basin

The majority of the ground water concerns in the Lower Colorado River Basin are from leaking underground storage tanks and refineries, nitrates from septic tanks, cesspools and public and privately owned sewage treatment plants, cyanide, metals and total dissolved solids from mineral leaching operations, and total dissolved solids, metals and sulfates from past uranium milling operations.

Leaking Underground Storage Tanks and Refined Petroleum Products

In the Lower Colorado River Basin there were approximately 133 sites where leaking underground storage tanks had been reported as of November 1999. The majority of these reported ground water contamination cases were due to gas, oil, diesel and gasoline additives. These areas are typically associated with service stations, liquid petroleum storage and distribution centers and the bulk of these sites are concentrated around municipal, industrialized centers, and mining operations in and around the City of Gallup in McKinley County and Apache Creek, Reserve, and Quemado in Catron

County.

Nitrates

Nitrate contamination areas in the Lower Colorado Basin are mostly found around Lordsburg in Hidalgo County and are mostly associated with high densities of septic tanks and cesspools and publicly owned sewage treatment plants.

Salinity

Salinity problems in the Lower Colorado River Basin have been addressed by the New Mexico Interstate Stream Commission. New Mexico particip with other western states in establishing Yuma Desalting Project which was cre to remove salinity from the basin w that are eventually used by Mexico (1

THE PECOS RIVER BASIN

Originating high in the Sangre de Cristo Mountains in northcentral New Mexico where it is fed by snowmelt and rainfall, the Pecos River (11) flows southward through New Mexico for 435 miles and enters Texas south of Malaga. The Pecos River Basin of New Mexico encompasses an area of 25,992 square miles in fourteen counties, including Mora, San Miguel, Santa Fe, Guadalupe, Torrance, Quay, Curry, De Baca, Roosevelt, Chavez, Lincoln, Otero, Eddy, and Lea.

Major tributaries in the upper basin are Cow Creek, the Gallinas River, Tecolote Creek, Canyon Blanco, Pintada Arroyo, and Alamogordo Creek. Between Sumner Lake and Carlsbad, the most important tributaries arise from the Sacramento Mountains in southcentral New Mexico. These streams include Rio Hondo, Rio Felix, Rio Peñasco, and Seven Rivers. In the Carlsbad area of Eddy County the principal drainage courses are Dark Canyon, Black River, and the Delaware River.

The geology of the basin is highly variable with rock outcroppings ranging in age from Precambrian to Recent. Sedimentary rocks underlie most of the basin with igneous rocks appearing most numerous in the western part of the basin. The igneous rocks of the mountains are not, as a rule, waterbearing. Most of the waterbearing rock formations in the Pecos River Basin are sedimentary and found in the plains areas. The largest of these is the San Andres Formation, containing the Roswell-Artesian aquifer, which also supplies by seepage a considerable proportion of the water in the shallow alluvium aquifer above it.

Variation of flow in places along the Pecos River is partially controlled by the geology of the basin. For example, near the village of Colonias, about fifteen miles upstream of Santa Rosa, the Pecos River channel is often completely dry; the flow remaining in the river below irrigation diversions seeps into the permeable San Andres Formation.

The Pecos River and Rio Hondo are regulated by Sumner Lake, Two Rivers, and McMillan Reservoirs. These were built primarily for flood control, irrigation purposes, recreation, and sediment retention. There are other smaller reservoirs in the basin which are used to control sediment and runoff.

Because the principal determining factor is the gradual downgrade of the land from the northwest to the southeast, the climate in the Pecos River Basin is moderate in temperature and relatively sub-humid to semi-arid. The northern portions of the basin have greater rainfall and lower evapotranspiration rates and are cooler. Rapid diurnal temperature fluctuat occur because of the predominantly cl and dry atmospheric conditions. Usu November and February are the dr months of the year, whereas July August are the wettest. The basi precipitation varies from approximately inches in the southern portions to 35 inc in the northern mountain areas. average growing season in the upper ba (above Pecos, New Mexico) is less than hundred days while in the lower basin it over 200 days.

Water quality management in the Pec River Basin has long been recognized a necessary and significant contribution insuring sustainable human activity with this area of the Southwest. As early 1942, the National Resources Plann Board stated

> *"...For its size, the basin of the Pecos River probably presents a greater aggregation of problems associated with land and water use than any other irrigated basin in the Western U.S."*

Some modern-day problems can st trace their origins even further back time. The following subsection describe such a situation in the upper reaches of th Pecos River, not far from its headwaters

Surface Water Quality Concerns in the Pecos River Basin

Willow Creek originates in the Pecos Wilderness west of Elk Mountain. This first-order tributary of the Pecos River remains healthy and highly productive for most of its length. However, less than a half-mile from its mouth on the Pecos River, this stream encounters the abandoned Pecos Mine, also known as the Terrero Mine.

Records show the site yielded 2,223,552 tons of raw ore, mostly made up of zinc and lead sulfides. The discarded sulfide wastes were disposed of in such a way that surface runoff from above the site infiltrates into the 19-acre wasterock pile and emerges at the base of the dump as an acidic metal-loaded drainage. It is suspected that runoff from the mine site contributed to periodic fish kills at the Lisboa Springs Hatchery, and potentially affected fish populations in the intervenin reach of the Pecos River.

Mine waste was used throughout th upper Pecos River Canyon for fill materi and road surfacing. Interim actions hav been implemented at the mine site while remedial investigation was conducte This investigation will provide the bas for developing a longterm remedial actio for the mine. The State Recreation U

Areas consists of campgrounds, day use areas and river access points managed by the New Mexico Department of Game and Fish (DGF). Remediation of this operable unit was completed in 1994. Remediation consisted of removing mine waste-contaminated soils with lead levels greater than 500 ppm and transporting them to a disposal cell at the mine site. A background report has been prepared for the Lisboa Springs Fish Hatchery , which includes Monastery Lake, that summarizes existing data and indicates areas needing additional investigation. A remedial investigation will be conducted to gather additional data, which will be used to formulate a longterm remedial solution .

The Pecos River Basin has 500 river miles that are listed as partially supportive or nonsupportive of their designated use. The specific pollutant or threat in this lack of support include metals, turbidity, grazing, habitat alteration, nutrients, pathogens, dissolved oxygen and total ammonia from municipal point sources, total dissolved solids, salinity, temperature, flow alterations, and total phosphorus. The probable sources of these pollutants are road maintenance, construction, recreation, land disposal, resource extraction, agriculture, hydromodification, point sources, silviculture, unauthorized spills, road runoff, land disposal, and unknown and natural sources. Elevated TDS also results from natural limestone deposits in this area. The toxic contaminants cadmium, copper and zinc have been found at acute levels. The toxic contaminants aluminum, mercury, and lead have been found at chronic levels.

The Pecos River Basin has 9,356 assessed lake acres that are listed as partially or not supporting their designated uses. The specific pollutant or threat in this lack of support include excessive nutrients, nuisance algae, siltation, reduction of riparian vegetation, bank destabilization, fish tissue mercury, dissolved oxygen, pH imbalance and turbidity. Probable sources of these causes include recreation, agriculture, silviculture, hydromodification, construction, and overall watershed condtion.

Ground Water Quality Concerns in the Pecos River Basin

The main sources of ground water contamination in the Pecos River Valley are from leaking underground and above-ground storage tanks, mining and milling operations, manufacturing facilities, dairies, private and public sewage treatment plants, septic tanks and cesspools, as well as oil and gas production and refining operations.

Leaking Underground Storage Tanks and Refined Petroleum Products

The Pecos River Basin contains approximately 290 sites where leaking underground storage sites had been reported as of November 1999. The majority of these reported ground water contamination cases were due to gasoline, waste oil, diesel, gasoline additives, petroleum constituents such as benzene, toluene, ethyl benzene, and xylene and solvents such as chlorinated methane, ethanes, propanes and ethylenes. The bulk of these sites are concentrated around the major industrialized areas such as Santa Rosa in Guadalupe County, Fort Sumner in De Baca County, Roswell in Chavez County, Atresia and Carlsbad in Eddy County, and Ruidoso, Alto and Carrizozo in Lincoln County. These contamination sites are typically associated with service stations, liquid petroleum storage and distribution centers, pipelines, and oil extraction operations.

Total Dissolved Solids

Point source ground water contamination due to TDS is found near many of the mining and milling sites of copper, potash, and silver in the Pecos River Basin.

Nitrates

Nitrate contamination is prevalent in areas where there are high densities of septic tanks and cesspools. High nitrate concentrations can also be seen around meatpacking and processing plants, sewage treatment plants or dairy operations where large amounts of wastes saturate the ground. Nitrate contamination in the Pecos River Basin has been reported in Las Vegas, Los Montoyas, Ribera, Ruidoso, Hondo, Roswell, Dexter, Hagerman, and Carlsbad.

Halogenated Aliphatic Compounds

There are also ground water contamination sites located in the Pecos River Basin that involve solvent contamination. TCE and other types of solvents caused ground water contamination cases have been reported in Roswell and Carrizozo. Halogenated aliphatic compounds are used in some manufacturing processes, the dry cleaning industry and for degreasing metals (5).

THE SAN JUAN RIVER BASIN

The San Juan River (12) is a major tributary of the Colorado River. Arising on the western slope of the Continental Divide in southwestern Colorado, the San Juan River flows from the San Juan Mountains north of Pagosa Springs, Colorado, and enters the extreme northwestern section of New Mexico via Navajo Reservoir in Rio Arriba County to the west of the Jicarilla Apache Reservation and the Carson National Forest. The course of the San Juan River in New Mexico turns westward for some 140 miles before the river turns back north and re-enters Colorado just a few miles to the east of the cartographic landmark known as "Four Corners." The San Juan River then resumes its westerly direction across Southern Utah towards its confluence with the Colorado River.

The San Juan River Basin in New Mexico includes lands from four counties. It encompasses all of San Juan County, most of the northern half of McKinley and western half of Rio Arriba counties, while taking up a relatively small corner of Sandoval County. Parts of the Navajo, Ute Mountain and Jicarilla Apache reservations are in the basin.

The San Juan River portion of the Upper

Colorado Basin in New Mexico covers approximately 9,725 square miles, or 25%, of the total Upper Colorado drainage and consists of two sub-basins, those of the San Juan River and Navajo River. Water used in the basin largely comes from surface water sources. Ground water is used for domestic purposes and livestock watering. Irrigated agriculture predominately uses surface water withdrawals. Losses from power production and reservoir evaporation also affect the surface water supply.

A number of tributaries arise in southern Colorado to flow south toward their confluences with the San Juan River in New Mexico. These major tributaries are the Los Piños, Animas, La Plata, and Mancos rivers. The Navajo River also begins in southern Colorado, enters New Mexico and drains an area of 245 square miles, then turns north near Dulce where it is joined by the Amargo River, and re-enters Colorado, discharging into the San Juan River near Juanita. The length of the Navajo River in New Mexico is less than fifteen miles, with only the eastern portion within State jurisdiction (the remainder is within the Jicarilla Apache Reservation). Several tributaries of the San Juan River originate in New Mexico including La Jara Creek, Gobernador Canyon, Canyon Largo, and Chaco Wash, of which all are ephemeral watercourses.

The Colorado Plateau physiographic region extends into the northwestern section of the State of New Mexico, and this plateau region comprises the major portion of the San Juan River Basin of New Mexico. The area is generally one of horizontal sedimentary rocks carved into a gentle relief of broad mesas and valleys, buttes, plateaus, and canyons. The area is termed the Navajo and Canyon Lands section of the Colorado Plateau province.

The New Mexico portion of the San Juan River Basin is delineated on the north by the New Mexico/Colorado State Line and on the west as the New Mexico/Arizona state line. The southwestern edge of the basin is delineated by the peaks of the Chuska Mountains, which gradually rise to the Continental Divide at the southernmost tip of the basin. The Divide also gives the basin its eastern limits as it extends northward into Colorado.

The basin gradient extends generally westward from the point where the San Juan River flows from Colorado into New Mexico at an elevation of about 6,600 feet. The elevation of the river at Farmington is about 5,500 feet and at the point near Four Corners where the river leaves New Mexico and returns to Colorado the elevation is about 4,800 feet. The botanical species within the basin correspond to changes in elevation. The floor of the San Juan River Valley was originally populated by grasses, but these have mostly been replaced with irrigated croplands. The intermediate broad mesas are now predominately vegetated by grasses, sagebrush, pygmy piñon and junipers. Ultimately, the higher elevations are populated by stands of pine, fir and spruce.

The major portion of the San Juan River Basin consists of broad expanses of grassland and piñon-juniper stands, with an average mild continental climate which lacks extremes in hot or cold conditions. With precipitation under ten inches per year, this zone is principally arid, although rainfall is sufficient for some grasses, but not for dryland farming. The zone can be subdivided into an upper region of piñon/juniper forest where rainfall generally increases with increasing elevation. The lower, more open and arid valley bottoms constitute an area marked by a paucity of trees except along streams and by the scattered grasses, cacti, yuccas, and low desert shrubs.

The lower zone includes an extensive area drained by the San Juan River and its tributaries. This area is characteristically a great open plain with narrow bordering patches of piñon/juniper and scrub oak along the margins of surrounding foothills. This extensive valley bottom is also a region of deep erosion, comprised of many canyons, dry washes, picturesque badlands, rich coal fields, and plentiful fossil beds.

The Chuska Mountains rise along the southwest corner of the basin to between 8,000 and 9,000 feet, and are actually a long mesa or plateau. Most of this table land is of sandstone, with abrupt rim rock margins and ridges of lava and basalt in the northernmost sections.

The summits of the Chuska Mountains are surrounded by forests and shallow lakes, usually without outlets. Many springs and short creeks rise in the canyons below the rim, flowing for short distances down steep slopes or in a few instances out into the nearby valleys. Water is abundant for stock but little is available for irrigation purposes. The vegetation ranges from open forests of ponderosa pine with grasses and shrubs to the colder, upper slopes covered with aspens, firs and spruces. Precipitation in this area progresses from 12 to 16 inches annually with increases in elevation. The eastern reaches of the basin beyond the vast expanses of grasslands, which constitutes the majority of the basin, consists of large stands of piñon/juniper forest gradually changing with increasing elevation into pine forests. Precipitation along the eastern reaches of the basin increases with altitude, from 10 to 18 inches on the average, annually.

The major portion of the San Juan River Basin of New Mexico receives 10 inches or less of average precipitation annually and is therefore classified as arid. The areas of the basin where rainfall ranges from 10 to 16 inches is classified as semi-arid, although this classification should not be rigidly fixed where stands of piñon/juniper dominate. As the elevation increases towards the periphery of the basin, precipitation increases concomitantly so that above 5,900 and up to 7,200 feet the semi-arid zone is usually prevalent beyond which the climate becomes more humid and cooler. Below 6,900 feet precipitation is generally too sparse for the maturing of crops, while in the moist zone of the higher elevations the growing season is too short.

The San Juan River Basin is geologically a structural as well as topographic and hydrologic basin. Deposition of sediments of marine and continental origins, which commenced in early Paleozoic time, has continued in the basin with just a few intermittent interruptions. Sedimentary rocks in the central basin are at least 15,000 feet deep.

The San Juan structural basin extends into southwestern Colorado some 25 miles

and slightly into Arizona. The structural basin boundaries on the east are delineated by the Nacimiento and southern San Juan mountains, on the south by the Zuni Mountains, on the west by the Defiance uplift and the Chuska and Carrizo mountains, and on the north by the Ute, La Playa, and northern San Juan Mountains.

Alluvium of recent age is found in and along channels of the principal streams and their tributaries and consist primarily of stream deposits and terrace gravel, both largely floodwash residuals. The San Juan River and other major streams of the basin are actively downcutting their channels, which are kept relatively free of thick accumulations of sediment through the action of flood flow and normal streamflow.

Three soil types predominate in the New Mexico portion of the San Juan Basin. Most of the area south of the San Juan River consists of a medium-textured, moderately deep to shallow soil that mantles gently rolling topography. Along the San Juan River and its northern tributaries, a medium- to heavily-textured deep soil is found which is suitable for agriculture. In the mountainous terrain of the northeastern part of the basin, shallow to moderately-deep soils with light- to medium-textures dominate.

The San Juan River Basin has been associated with energy production and its concomitant environmental pollution problems for the better part of this century. The first oil-and-gas well was drilled near Farmington in 1900. The coal mining industry was started in 1911. Commercial petroleum fuel production was first organized in the 1920s. It was not until the 1950s that the fuel industry boom became a major force in the growth and development of the basin's economy, however, it remains a major economic factor in the Four Corners region today.

Surface Water Quality Concerns in the San Juan River Basin

The New Mexico Oil Conservation Division (OCD) and the United States Bureau of Land Management (BLM) are involved with energy development and associated environmental issues within the San Juan Basin (**13**). One emerging water quality concern affecting threatened and endangered fish in the region is their vulnerability to Polycyclic Aromatic Hydrocarbons (PAH). BLM, in consultation the State's OCD and NMED as well as other United States Department of the Interior agencies including the Fish and Wildlife Service, Bureau of Reclamation, Bureau of Indian Affairs and USGS, has developed a monitoring plan for the basin aimed at verifying alleged PAH contamination from the oil and gas industry. The monitoring project attempts to identify any possible PAH contamination sources. The plan is part of the BLM's Riparian Program, and was implemented in 1994.

Another aspect of the Riparian Program is weed control. The use of herbicides in the oil fields is closely monitored using criteria developed through the use of *DRASTIC* indexing. *DRASTIC* is a risk assessment modeling program for evaluating potential ground water pollution which features a numerical rating system developed by EPA. The acronym stands for *D*epth to water; (net aquifer) *R*echarge; *A*quifer media; *S*oil media; *T*opography; *I*mpact on the vadose zone media; and *C*onductivity. Applicators are limited to sixteen herbicides, and are limited to their area of use by *DRASTIC*'s parameters.

BLM's Riparian Program has also created a demonstration project of its implementation efforts in the Pump Canyon watershed. This relatively large block of public land is drained by an ephemeral tributary to the San Juan River. Their confluence is located approximately eight miles downstream from Navajo Reservoir Dam. The watershed is part of the Fruitland Coal Seam Development Area which has sustained heavy industrialized changes in the recent past including considerable road, pipeline, and facility construction. One goal of the project includes improving water quality and vegetative diversity through development and implementation of best management practices on existing uses. Accomplishments in the watershed have included initiation of surface water monitoring, several dozen acres of salt cedar treatment, riparian plantings, creating riparian fencing, implementing a moratorium on livestock grazing, developing 150-acre upland vegetative treatment project, and overseeing gas development mitigation efforts.

In the San Juan River Basin there are 129.4 assessed river miles that are listed as non- or partially-supporting their designated uses. The specific pollutant or threat in this lack of support include metals, turbidity, nutrients, pathogens, dissolved oxygen and total ammonia, dissolved solids, salinity, temperature, total phosphorus, habitat alteration, grazing and flow alteration. Among the probable sources for these causes are resource extraction, hydromodification, agriculture and overall watershed condition. There are no toxins listed at acute levels in the San Juan River Basin. Chronic levels of toxins have been listed for aluminum, mercury and selenium. A potentially viable salinity control project at the Hammond Diversion near Bloomfield has been identified by the U.S. Bureau of Reclamation (**14**). The San Juan River downstream of the Hammond Diversion is the only stream in New Mexico currently listed in the State's **Fish Consumption Guidelines** (Appendix C) due to elevated mercury levels in fish.

The San Juan River Basin has 15,198 assessed lake acres that are listed as only partially supporting their designated uses. The specific pollutant or threat in this lack of support are attributed to fish tissue mercury and metals. The probable source of these causes is currently unknown. However, aluminum and selenium occur naturally in the sediment in this area. Mercury levels in fish tissue are thought to be due to atmospheric deposition.

Ground Water Quality Concerns in the San Juan River Basin

The majority of ground water concerns in the San Juan River Basin are releases from leaking underground and above ground storage tanks, and from oil and gas production, pipelines, storage, distribution and refining sites. There are two reported cases of ground water contamination from landfills in the San Juan River Basin near Farmington.

Leaking Underground/Above-Ground Storage Tanks and Refined Petroleum Products

As of November 1999, the San Juan River Basin had approximately 174 incidences where leaking underground storage tank sites and one above-ground storage tank site were reported. The majority of these reported ground water contamination cases were due to gas, oil, diesel, gasoline additives, petroleum constituents such as benzene, toluene, ethyl benzene, and xylene and solvents such as chlorinated methane, ethanes, propanes and ethylenes. The bulk of these sites are concentrated around the major industrialized areas such as Farmington, Aztec and Bloomfield in San Juan County and Dulce in Rio Arriba County. These areas typically associated with service stations, liquid petroleum storage and distribution centers, pipelines and oil extraction operations.

Total Dissolved Solids

Point source ground water contamination due to TDS is found near many of the uranium mining and milling in the San Juan River Basin near Crownpoint. TDS also results from natural limestone deposits in this area.

Landfills

Many landfills in New Mexico have received large amounts of liquid and/or industrial wastes. Ground water contamination has been detected in two landfills in the San Juan River Basin. These landfills are located near Farmington in San Juan County. Contaminants include chlorinated solvents and basic-, neutral- and acid-extractable compounds and crude oil.

THE SOUTHERN HIGH PLAINS BASIN

The Southern High Plains (**15**) in New Mexico is on the western edge of the Great Plains of the United States and encompasses 5,487 square miles in New Mexico's Curry, Roosevelt, Chavez and Lea counties. There are no perennial streams in this area. The Ogallala formation, a large water-bearing aquifer, supplies practically all the water needs for this part of New Mexico. This vast resource underlies parts of eight states.

During Francisco Vásquez de Coronado's journey into the Southwest in 1598 and 1599, the Southern High Plains were referred to as "*Llano Estacado*," or the *staked plain*. Their sharp rise from the surrounding area forms an escarpment which marks the southern and western boundaries of the basin. There are no perennial streams in the Southern High Plains, although the relatively flat topography can have occasional water-filled shallow depressions called playa lakes. Also, there are several draws from which ephemeral streams appear during periods of heavy or prolonged precipitation.

The climate is generally warm and sunny during the day, becoming much cooler at night. The average temperature ranges from 57.7° Fahrenheit (°F) in Portales to 61.2°F in Hobbs. An additional indicator of the mild climate are the annual number of frost-free days. These range from 182 days near Portales to 218 near Hobbs (one of the longest frost-free periods in the State). There is an average rainfall of about 16 inches a year with most of this precipitation occurring during the summer months. There is often about five times as much precipitation during the months of May through October as there is in the other half of the year.

There are four geologic ages which deposited fresh water-bearing rock formations in the Southern High Plains: the Triassic, Cretaceous, Tertiary, and Quaternary. Although the Dockum Group, Tucumcari Shale and the alluvium do produce some usable fresh water, the Ogallala formation of the Tertiary Age produces by far the greatest amount of water and is the most important. This formation was eroded away in the Portales Valley, which was then filled with water-bearing alluvium during the Quaternary Age. Practically all water used in the basin comes from these aquifers. The waters of the Ogallala, although hard, are of generally good quality. Playa lakes constitute the only significant recharge to the Ogallala aquifer in New Mexico. Recharge, however, is probably less than a half-inch a year and is expected to be far less than withdrawals.

Surface Water Quality Concerns in the Southern High Plains Basin

The only significant surface waters in the Southern High Plains occur in the aforementioned playa lakes. Like all wetlands throughout New Mexico, these ephemeral, endorheic (internally draining) areas are considered threatened by a variety of human activities. Common problems are caused by contamination with municipal sewage effluents, stormwater runoff, hypersaline brines discharged by potash refining, petroleum industry waste-products, as well as high levels of agricultural chemicals, stockyard wastes and overall watershed condition. Traditional rangeland practices where BMPs have not been applied threaten these fragile and critical wildlife habitats with terrain alterations which can either obliterate playa completely or expose it to increased levels of pluvial and eolian sedimentation, vegetative growth, and anaerobic conditions.

Ground Water Quality Concerns in the Southern High Plains Basin

The ground water contamination concerns seen in the Southern High Plains Basin include leaking underground storage tanks, nitrates from agricultural activities, dairy operations, septic tanks and public and private sewage treatment plants. There also are cases of petroleum, methane and TDS contamination from oil and gas field operations.

Leaking Underground/Above Ground Storage Tanks and Petroleum Products

In the Southern High Plains Basin there were approximately 153 sites as of November 1999, where leaking underground storage sites had been reported and one above-ground storage tank site. The majority of these reported ground water contamination cases are due to gas, oil, diesel, gasoline additives, and petroleum by-products. The bulk of these sites are concentrated around the major industrialized areas such as Hobbs, Tatum, Lovington in Lea County and Clovis in Curry County. These areas are typically associated with service stations, liquid petroleum storage and distribution centers and pipelines and oil extraction operations and military installations.

Total Dissolved Solids

At least one hundred thirty cases of point source ground water contamination due to oil field discharges are found near many of the oil and gas operation sites in the Southern High Plains Basin. Most are due to past practices of oil field brine disposal with its resultant contamination of ground water with crude oil, TDS, methanes and chlorides.

Nitrates

Nitrate contamination is prevalent in areas where there are high densities of septic tanks and cesspools. High nitrate concentrations can also be seen around meat packing and processing plants, sewage treatment plants or dairy operations, and explosive manufacturing plants. Nitrate contamination in the Southern High Plains Basin has been reported in Lovington, Hobbs and Clovis.

Halogenated Aliphatic Compounds

Halogenated aliphatic compounds have been detected in ground water in Clovis. Degreasing solvents are the suspected source.

THE SOUTHWESTERN CLOSED BASINS

The Southwestern Closed Basins (**16**) are located in the far southwestern "bootheel" area of New Mexico. They consist of three drainage areas comprising a total of 5,990 square miles, or about five percent, of the State's land area. The individual basins and their respective areas are the Mimbres with 4,410 square miles, the Playas and its 1,410 square miles, and the Wamel at 170 square miles. The Animas Closed Subbasin has been included in discussion of the Lower Colorado Basin Plan as it falls on the western side of the Continental Divide. The overall area encompasses virtually all of Luna County, the southeast corners of Grant and Hidalgo counties, the western edge of Doña Ana County and a relatively small southwestern piece of Sierra County. The Southwestern Closed Basins' southern boundary coincides with the International Border with the Republic of Mexico, while its western edge is created by the Continental Divide and the northern and eastern limits as defined by the Rio Grande Basin.

The Southwestern Closed Basins are topographically closed basins and make no surface water contributions to any of the surrounding basins. In the upper stretches of the Mimbres River there is perennial flow. Water from the Mimbres River is diverted for irrigation purposes and a reservoir has been constructed by the New Mexico Department of Game and Fish in Bear Canyon, a tributary of the Mimbres, for conservation and recreation purposes. There are no perennial flows in the Playas or Wamel Sub-basins.

The northern part of the Basins are high mountainous wooded areas with elevations ranging from 6,500 to 10,000 feet. Much of the land is characterized by rough and broken topography, including steep mountain slopes and canyons. Intermingled with the steeper areas are gently to strongly sloping narrow valley bottoms and gently sloping and rolling uplands and ridgetops.

The southern parts of the Basins consists of broad, virtually level to gently sloping semi-desert and desert plains from which rise relatively narrow but steep and rugged mountain ridges, isolated peaks, and foothill ranges. Elevations along these parts of the basins range from 5,000 feet in the north to 4,000 feet along the south borders. The mountains and hills in these areas rise from 1,000 to 2,000 feet above the floors of the plains.

Climate ranges from arid in the southern portion of the basins to sub-humid in the northern mountains, with a narrow, semi-arid belt running through the middle. The climate of the basins is essentially dry with only the higher elevations of the Piños Altos and Mimbres mountains having a climate where perennial streams are possible.

The essential feature of the basins' climate is that evaporation exceeds precipitation. The two commonly recognized subdivisions of arid climates, desert and steppe, are present within the basins. Valley floors and lowlands are deserts; the transitional belts between the lowlands and the humid mountain areas are steppes. Average annual precipitation varies from eight to ten inches a year for most of the lowland areas, while up to 25 inches in the higher elevations of the mountains on the northern border of the basins have been recorded. Over half of the annual precipitation falls in July, August and September each year, and usually occurs as brief high-intensity afternoon thundershowers.

Average annual temperatures range from 60° F in the lower southern elevations to around 55° in the Bayard-Silver City areas. Mountain areas average less than 50° annually. Normal winter sunshine occurs over seventy percent of the time while summer sunshine occurs over eighty percent of the time.

Frost-free seasons average over 220

days in the southern part of the basins, decreasing to 140 in the north with some mountain areas having less than 120 days annually. Frost in the lower elevations of the basins can be expected from early November until late March. Earlier fall frost and later spring frost will occur in the northern mountain areas with increasing elevation.

Factors that control the hydrology of the Southwestern Closed Basins are integrally associated to the climatology of the region. The source of all water in the basins is the precipitation that falls within the drainage area. No ground waters are known to enter the basins from outside areas.

In the Southwestern Closed Basins, the Mimbres River is the principal perennial stream. This flow in normal years is limited to the upper stretches of the river. Water that is not used for irrigation or contained in the Bear Canyon Reservoir infiltrates into the ground upon leaving the mountains and enters the floor of the basin near the Grant-Luna counties line. Flow beyond this point is infrequent and usually reaches only to the Florida Mountains. The channel across the lower half of the basins is ill-defined, although runoffs from unusually large storms may reach the Mexican Border.

Bear Canyon Reservoir is located near the confluence of the Mimbres River and Bear Canyon. The reservoir is capable of impounding 700 acre-feet of water for conservation storage and recreation. Surface water for irrigation is practical only in the area of the perennial flow of the Mimbres River, although it is used for stock watering purposes in other areas.

There are four declared underground water basins wholly or partly within the Southwestern Closed surface drainage Basins. These include the Mimbres, Animas, Playas and Nutt-Hockett underground water basins. The Mimbres aquifer underlies 4,279 square miles of surface area within portions of Luna, Grant, Sierra, and Doña Ana counties. The Animas Valley aquifer lies beneath 426 square miles of surface area with approximately 30 square miles in the Southwestern Closed Basins. The Playas Valley aquifer underlies 515 square miles of surface area in Hidalgo County, while the Nutt-Hockett aquifer lies under 13 square miles of surface area within portions of Luna, Sierra, and Doña Ana counties.

The principal aquifers in the Mimbres Subbasin are the alluvium, Bolson fill, and Gila conglommerate. It is the Gila conglomerate which provides the principal source of water for the towns and villages in the northern mountainous portion of the basins. The alluvium in the channels and under the flood plains of the creeks and washes may locally contain appreciable amounts of water at shallow depth, but generally will not sustain large yields for prolonged periods. Great thicknesses of Bolson deposits appear in most of the large valleys and constitute ground water reservoirs of significant capacity.

Surface Water Quality Concerns in the Southwestern Closed Basin

There are 57.1 assessed river miles in the Southwestern Closed Basins that are listed as partially or not supporting their designated uses. All these assessed river reaches are located on the Mimbres River. The specific pollutant or threat in this lack of support are temperature, turbidity, pH, total ammonia, total phosphorous, habitat alteration, pathogens and metals. The probable sources of these pollutants are hydromodification, agriculture, grazing, resource extraction, and natural and unknown causes. There are no toxins currently known to be at levels of concern within this basin.

The Southwestern Closed Basins have 22 assessed lake acres at the Bear Canyon Reservoir that are listed as only partially supporting their designated uses. The specific pollutant or threat in this nonsupport include a lack of dissolved oxygen, and nutrient overload. The probable sources of these causes are agriculture and overall watershed condition.

Ground Water Quality Concerns in the Southwestern Closed Basins

The majority of the ground water quality concerns in the Southwestern Closed Basin are from approximately 69 leaking underground storage tanks , mining and milling operations, nitrates from septic tanks and cesspools in Deming, and chlorinated solvents in Deming.

Total Dissolved Solids

The majority of the ground water problems found in the Southwestern Closed Basin are from sulfates, metals and TDS. The source of these problems are from heap-leach operations, copper milling operations and lead milling operations. Many of these sites also have acidity problems associated with them.

Halogenated Aliphatic Compounds

Halogenated aliphatic compounds have been detected in ground water in Deming. Degreasing solvents are the suspected source.

THE WESTERN CLOSED BASINS

The Western Closed Basins (17) in west-central New Mexico consist of two major drainage areas: the North Plains Subbasin, which is mostly in Cibola County but extends southward into Catron County, and the San Augustin Plains Subbasin, which is mostly in Catron County, yet extends eastward into Socorro County. There are no distinct communities in the North Plains Subbasin. Communities in the San Augustin Plains Subbasin are Datil and Horse Springs. The Western Closed

Basins lie immediately east of the Continental Divide, which forms their western and southern borders, while the Rio Grande Basin bounds the eastern extremities.

The North Plains encompass an area of approximately a thousand square miles. It is bounded on the east by Cebolleta Mesa, and on the south and southeast by the sedimentary and volcanic rocks of the Datil Mountains. Sedimentary outcrops northeast of the Zuni Mountains loosely define the northern boundary of the basin. The North Plains derives its name from a broad area of low relief that occupies the central and western parts of the basin. This area is mostly a grassy plain underlain at very shallow depths by basaltic lava flows. At low elevations in the north and eastern parts of the basin lava beds cover the surface. It is not definitely established that the North Plains Subbasin is truly closed at its north end; the basin here is covered by a lava flow, and it is possible that some water escapes northward from the basin through, or under, the lava beds toward Rio San Jose.

The San Augustin Plains, an area of approximately 1,965 square miles, is bounded on the east and north by the San Mateo, Gallinas and Datil mountains, on the south by the Tularosa, O-Bar-O, and Pelona mountains, and on the west by the Mangas Mountains. The San Augustin Plains are featureless grass-covered lands at the center of the San Augustin Plains Subbasin. This area in earlier geological times was occupied by pluvial Lake San Augustin which covered a maximum area of 255 square miles. The San Augustin Plains Sub-basin is topographically closed, having superficial internal drainage around its perimeter.

The Western Closed Basins have no perennial streams and none of the intermittent streams are named. Generally, waterways are dry and poorly defined. Ephemeral streams that originate in the bordering mountains occasionally carry flood waters into the basins. The flood flows spread out over the gravelly soil and soon disappear into the ground or evaporate. During periods of heavy precipitation, water is contained in several natural lakes in the western part of the North Plains and in a few small playas in the northeastern part of the San Augustin Plains. At the west end of the San Augustin Plains a large playa which covers approximately 35 square miles occasionally contains water.

Precipitation averages about fifteen inches annually in both basins. Within the center of the basins, annual precipitation is fourteen inches or less; in the surrounding highlands sixteen inches or more are received annually.

The principle aquifer in the North Plains is composed of thick basalt of Quaternary age that underlies the North Plains and extends over half of the total area of the basin. Sandstones of Jurassic and Cretaceous ages, which are usually dependable aquifers, are in adjacent areas. In the northern part of the basin the San Andres Limestone and Glorieta Sandstone, both of Permian age, are known to contain water.

The principal aquifer in the San Augustin Plains is formed by the bolson deposits of Quaternary age that underlie the middle of the basin. Volcanic rocks of the Datil Formation of Tertiary age which surrounds the basin may contain small quantities of water in some localities. Some water may be present in the small patches of Gila Conglomerate Quaternary alluvium which are widely scattered within the basin. It also seems possible that some water may be present in the basalt and andesite flows of Quaternary age which cover large areas on the south and west edges of the basin.

Much of the area of the North Plains is underlain by slightly saline water, and saline water is known to be present within the San Augustin Plains. Water analyses are available for a few wells in the northeastern part of the North Plains and the southwestern part of the San Augustin Plains. Limited data is available for other localities within the Western Closed Basins. The community of Magdalena's water system, just east of the basin, is tested annually. Records show this water is of high quality. The depth-to-water in wells within the North Plains and the San Augustin Plains ranges from less than fifty feet to about 200 feet. The depth to water increases away from the middle of the basins and is 500 feet or more in the higher elevations of the mountainous areas around the basins.

Ground Water Quality Concerns in the Western Basins

The majority of the ground water quality concerns in the Western Closed Basins are from 5 leaking underground storage tanks.

REFERENCES: NEW MEXICO'S BASINS

New Mexico Water Quality Control Commission

1) 1976 *Upper Rio Grande Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 150 pages.

2) 1976 *Middle Rio Grande Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico. 166 pages.

3) 1975 *Lower Rio Grande Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 144 pages.

New Mexico Water Quality Control Commission

4) 1992 *Water Quality and Water Pollution Control in New Mexico, 1992*, P.O. Box 26110, Santa Fe, New Mex 87502. Page 70.

Merck & Co.

5) 1989 *The Merck Index*, Merck & Co., Inc., Eleventh Edition.

New Mexico Water Quality Control Commission

6) 1975 *Arkansas River Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 122 pages.

7) 1975 *Central Closed Basins Plan.* P. O. Box 2348, Santa Fe, New Mexico, 87503. 106 pages.

8) 1974 *Lower Colorado River Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 168 pages.

New Mexico Environment Department

9) 1994 Salter, R., Unpublished summary of field conditions in the Gila/San Francisco Watershed. Nonpoint Sou Section, Surface Water Quality Bureau. January, 1994.

New Mexico State Engineer Office

10) 1995 *Annual Report*, November 1995, Pages 62-63.

New Mexico Water Quality Control Commission

11) 1976 *Pecos River Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 134 pages.

New Mexico Water Quality Control Commission

12) 1976 *San Juan River Basin Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 120 pages.

United States Department of the Interior

13) 1993 New Mexico Bureau of Land Management *Nonpoint Source Annual Report*, unpublished paper and accompanying Memorandum 7240 (93413). Bureau of Land Management, New Mexico State Office, 1474 Rodeo Road, P.O. Box 27115, Santa Fe, New Mexico, 87502-0115.

New Mexico State Engineer Office

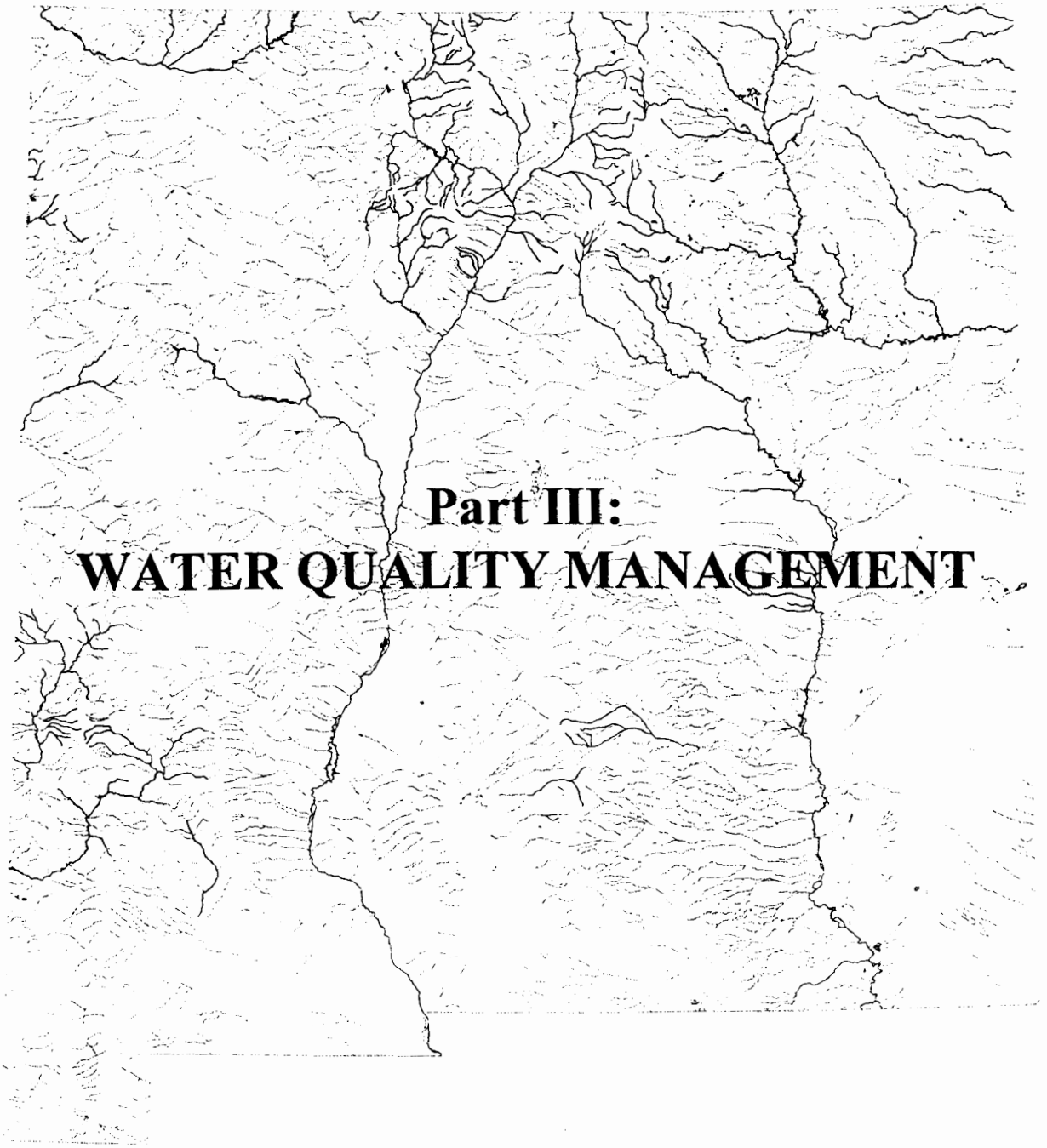
14) 1995 *Annual Report*, November 1995, page 64.

New Mexico Water Quality Control Commission

15) 1976 *Southern High Plains Water Quality Management Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 9 pages.

16) 1975 *Southwestern Closed Basins Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 112 pages.

17) 1974 *Western Closed Basins Plan.* P.O. Box 2348, Santa Fe, New Mexico, 87503. 40 pages.



Part III:
WATER QUALITY MANAGEMENT

OVERVIEW

Relation of State and Federal Laws to State Water Quality Management

The major law dealing with water quality management at the State level is the New Mexico Water Quality Act.

Because so many activities may affect water quality, other State laws besides the Water Quality Act are involved in water quality protection. Among these laws are the Utility Operators Certification Act, the Wastewater Facility Construction Loan Act, the Oil and Gas Act, the Environmental Improvement Act, the Ground Water Storage and Recovery Act, the Solid Waste Act, the Hazardous Waste Act, the Mining Act, the Voluntary Remediation Act and several laws giving authority to local governments.

New Mexico has received delegated authority from the United States Environmental Protection Agency (EPA) to implement, at the State level:

- the wastewater revolving loan program of the federal Clean Water Act (CWA);
- the underground injection control and public water supply programs of the federal Safe Drinking Water Act (SDWA);
- the hazardous waste management and the State underground storage tank programs of the federal Resource Conservation and Recovery Act (RCRA);
- the State underground storage tank program of RCRA; and
- the State solid waste management program.

While New Mexico assists EPA with the administration of the National Pollutant Discharge Elimination System (NPDES) permit program of the CWA, EPA is responsible for issuance and enforcement of NPDES permits.

Both the State and the federal government play significant roles in water quality management in New Mexico. This chapter describes the various programs and mechanisms for water quality management in New Mexico with emphasis on the State role.

Ground water quality management has both State and federal aspects. New Mexico's ground water protection program was well-established before most of the federal legislation and regulations addressing ground water quality were adopted. State regulations controlling the disposal of oil field brines necessary to protect ground water quality have been in effect since 1969. A comprehensive ground water quality program applicable to most other types of discharges was in effect by 1977 in the form of regulations adopted by the New Mexico Water Quality Control Commission (WQCC). There are also various other State laws and regulations affecting ground water quality management.

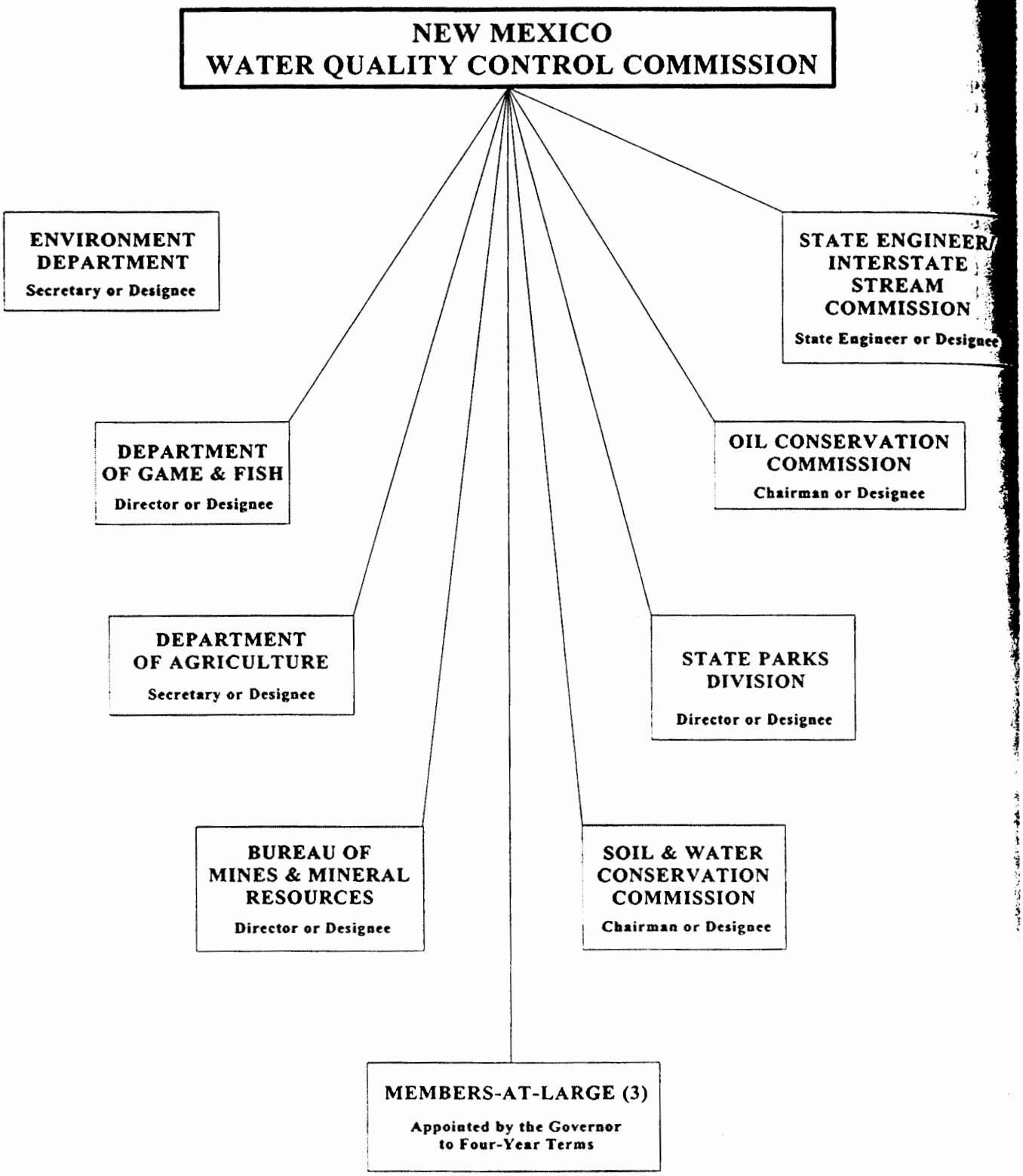
The challenge to New Mexico has been to incorporate in its programs beneficial aspects of federal programs without disruption of State programs already in place. The State has sought and obtained primary enforcement authority over the underground injection control program established by the SDWA and the hazardous and solid waste management programs established by RCRA. The State receives limited funding from the EPA under four laws, namely, SDWA, RCRA, CWA, and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund.

Surface water quality management in New Mexico also has State and federal aspects. The State establishes standards for intrastate and interstate waterbodies, assesses the quality of surface waters, adopts regulations, and develops programs and takes actions to protect and maintain surface water quality. The State also coordinates with EPA in implementing the CWA, the nation's primary legislation for controlling surface water quality. Under this act, Congress provides partial funding for State water quality planning and management activities, for State contractual assistance in the administration of the NPDES permit program, and for loans for planning, design, and construction of wastewater treatment facilities by communities. EPA administers the NPDES permit program and performs administrative responsibilities pursuant to the CWA.

RESPONSIBILITIES OF THE WATER QUALITY CONTROL COMMISSION

The basic authority for water quality management in New Mexico is provided through the New Mexico Water Quality Act (Sections 74-6-1 et seq., NMSA 1978). This law establishes the WQCC and specifies its duties and powers. These include adoption of a comprehensive water quality management program, the development of a continuing planning process, the administration of loans and grants from the federal government, the adoption of water quality standards, and the adoption of regulations 'to prevent or abate water pollution in the state or in any specific geographic area or watershed of the state...or for any class of waters.' Under this act, water is defined as 'all water, including water situated wholly or partly within or bordering upon the state, whether surface or subsurface, public or private, except private waters that do not combine with other surface or subsurface water.' The WQCC is the State water pollution control agency for all purposes of the federal CWA and may take all necessary actions to secure the benefits of the Act. The composition of the WQCC is shown below in Figure 4.

Figure 4. Composition of the New Mexico Water Quality Control Commission



Under the authority of the Water Quality Act, the WQCC had adopted the basic framework for water quality management in New Mexico. Major components of this framework include the continuing planning process, the State water quality management plan, ground and surface water quality standards, ground water protection regulations, underground injection control regulations, regulations for discharge to surface waters, a regulation on disposal of refuse, a spill cleanup regulation, ground water pollution abatement regulations, utility operator certification, and wastewater facility construction loan regulations. In addition, the WQCC approved a nonpoint source management program in 1989 which was updated and submitted to the EPA in December 1999.

These major components are reviewed briefly below. Where more detailed discussion of certain components is found elsewhere, cross-references are made to the appropriate sections. As the WQCC has no technical staff of its own, responsibilities for water quality management activities are delegated to constituent agencies, generally the New Mexico Environment Department (NMED) or the Oil Conservation Division (OCD) of the New Mexico Energy, Minerals and Natural Resources Department (EMNRD).

Continuing Planning Process

The continuing planning process required by the CWA provides a framework for water pollution control activities in the State by describing program components and interrelationships. The present continuing planning process was adopted by the WQCC in 1998 (1).

Water Quality Management Plan

The State water quality management plan helps set direction for further study of water pollution, options to be considered in development of water pollution control mechanisms such as the "Total Maximum Daily Load" allocation process, and most importantly, strategies to be implemented by State, local, and federal agencies to maintain and, as necessary, improve water quality in New Mexico. The WQCC adopted the plan in November 1978 and May 1979 **(4)** and has delegated responsibility for development of most elements of the plan to NMED. The plan has been updated many times.

Ground Water Quality Standards

Water quality standards for 47 contaminants or classes of contaminants are included in the ground water protection regulations (**2**, §3103), discussed below.

Surface Water Quality Standards

Under the Water Quality Act, the WQCC is required to promulgate surface water quality standards. These standards include: (1) general standards applicable at all times to all surface waters of the State, unless otherwise specified in the site-specific criteria of Part 2; and (2) site-specific standards for each of 66 segments set out in Subpart II of the standards, including their designated uses, for which the water quality is to be maintained, and numeric and narrative standards to sustain the uses; and (3) use-specific numeric water quality standards set out in Subpart III, § 3101 for existing, attainable and designated uses. The standards are subject to triennial review and appropriate revision pursuant to § 303(c) of the federal CWA. Amendments may be proposed at any time by NMED or others, as the Water Quality Act specifies that any person may propose amendments to the standards (§ 74-6-6. B). Proposed amendments are presented at public hearings before consideration and adoption by the WQCC. The latest triennial review hearing concluded on October 1, 1998 followed by WQCC approval on January 11, 2000.

Underground Injection Control Regulations

Underground injection wells, other than those associated with oil and gas production, are regulated under the general ground water protection requirements of Subpart III of the WQCC regulations and under the underground injection control regulations, Subpart V of the WQCC regulations (**2**). All types of underground injection wells except those associated with oil and gas production are subject to Subpart III and must meet all applicable provisions of these regulations. The Subpart V underground injection control regulations impose technical requirements on injection wells used for effluent disposal and *in situ* mineral extraction.

Ground Water Protection Regulations

Both Subpart III and Subpart V of the WQCC regulations (**2**) are designed to protect all ground water with total dissolved solids concentrations of 10,000 mg/L or less for present and potential use as domestic and agricultural water supply.

Regulations for Discharge to Surface Waters

State regulations for this purpose, §§ 2100 to 2102 of the WQCC regulations (**2**), are administered by NMED and OCD. As the WQCC has, to date, determined that the federal NPDES permit program should be the primary mechanism for controlling point source discharges to surface water in the State, the WQCC has incorporated a mechanism into the regulations to ensure NPDES permittees normally are not simultaneously subject to federal and State regulations. The WQCC recognizes that NMED has the responsibility to coordinate, under contract, with EPA in administering the NPDES permit program.

Regulation of Disposal of Refuse

Section 2201 of the WQCC regulations (**2**) prohibits the disposal of refuse in a natural watercourse or in a location or manner where there is a reasonable probability that refuse will be moved into a natural water course. "Refuse" is broadly defined (**2**, § 1101.00) and includes, among other things, all substances from the preparation, cooking, and consumption of food and from the handling, storage, and sale of food products, junked parts of automobiles and other machinery, paper and paper products, oil, ashes, tailings, and all unwholesome materials. NMED has used this regulation as a legal basis to stop discharge of sludge from domestic

wastewater treatment plants into watercourses.

Cleanup Regulation

Section 1203 of the WQCC regulations is a major tool for controlling ground and surface water pollution. First, this regulation requires most leaks, spills, and other unregulated discharges that enter, or have the potential to enter surface or ground water, to be reported to NMED without delay. The only exceptions are those discharges where laws, rules, regulations, or orders require notification to OCD. WQCC regulation § 1203.A requires that, "the owner/operator of the facility shall take such corrective actions as are necessary or appropriate to contain and remove or mitigate the damage caused by the discharge," of a water contaminant. This non-specific regulation, adopted in 1974 and modified in 1987, has been used to compel actions ranging from simple soil removal to longterm ground water remediation.

However, most longer term cleanups are now handled under Subpart IV of the WQCC Regulations, also know as the Abatement Regulations. An abatement plan includes Stage 1 (investigation) and Stage 2 (alternative selection, design and implementation) components. Abatement standards exist for the vadose zone, ground water and surface water. Subpart IV also includes provisions for public notice, public meetings in cases where there is significant public interest, technical infeasibility demonstrations, risk-based variances allowing cleanup to "alternative abatement standards", dispute resolution, and appeals.

Utility Operator Certification Regulations

20 NMAC 7.4 regulations help support compliance with NPDES permit limitations and State regulations in two ways: (1) by requiring utility operators to demonstrate knowledge of wastewater treatment through testing and to further their knowledge through continuing training; and, (2) by requiring that wastewater utilities be adequately staffed with certified operators. The regulations are administered and enforced by NMED.

Wastewater Facility Construction Loan Regulations

Regulations pursuant to the Wastewater Facility Construction Loan Act (Part 5, 20 NMAC 7.5) were amended by the WQCC in 1993. These regulations are used by NMED in the administration of the State revolving loan program. Part 5 defines eligibility for local authorities to borrow State and federal monies from a revolving loan fund for wastewater facility construction. The regulations also address eligible and ineligible construction items, the priority system and priority lists (project ranking), application procedures, and administration of the loan program and fund. The last topic includes criteria for zero and three percent interest rates which are available under certain conditions. The FY 1998 interest rate is four percent.

Nonpoint Source Pollution Management Program

The WQCC has approved a nonpoint source pollution management program **(4)** mandated by the United States Congress in the 1987 Amendments to the CWA. This program was recently updated and approved by EPA in December 1999.

Clean Water Action Plan

In order to help meet the goals of the Clean Water Act, states were requested, in 1998, through the Clean Water Action Plan (CWAP) to identify and prioritize watersheds with water quality problems. New Mexico used a cooperative approach to develop the Unified Watershed Assessment (UWA) that identified the following categories of watersheds (utilizing the USGS 8-digit system of watershed delineation): Category I.- Watersheds in Need of Restoration; Category II.- Watersheds Meeting Goals; Category III.- Watersheds with Pristine/Sensitive Aquatic System Conditions; and Category IV.- Watersheds with Insufficient Data to make an Assessment. Category I watersheds fall within several of New Mexico's basins and will have additional monies through the CWAP process directed to nonpoint source pollution projects within these watersheds in the near future. These funds will focus on watersheds prioritized within the Category I watersheds.

Other Responsibilities

Besides responsibilities for components of the basic framework reviewed above, the New Mexico Water Quality Act has assigned or the WQCC has delegated other water quality management responsibilities to NMED or OCD. These responsibilities include the following:

- State certification of licenses to construct and operate power dam facilities issued by the Federal Energy Regulatory Commission;
- investigations of existing water quality;
- lead agency for all nonpoint source pollution control activities;
- determination of the extent and causes of water pollution; and
- State certification of permits issued under CWA §§404 (Dredge-and-Fill permits) and 402 (NPDES permits).

OTHER PROGRAMS RELEVANT TO WATER POLLUTION CONTROL

Not all programs and mechanisms for water pollution control in New Mexico fall under the jurisdiction of the WQCC. This is especially true for ground water quality management. Among the major responsibilities are those of the OCD for protection of fresh water, and management of non-domestic and non-hazardous solid waste from oil and natural gas production facilities under the New Mexico Oil and Gas Act, EMNRD's Mining and Minerals Division (MMD) for reclamation of mining sites to mitigate impacts associated with hard rock mining under the New Mexico Mining Act, and those of the New Mexico Environmental Improvement Board for hazardous waste management, underground storage tanks, liquid waste disposal, solid waste management, and emergency response under several State

laws. In addition, NMED coordinates with the federal government in the implementation of Superfund. The Office of the State Engineer regulates ground water withdrawals in order to prevent saline water encroachment into fresh water.

Changes in the Underground Storage Tank Program

The Ground Water Protection Act provides a State Corrective Action Fund for NMED to use in taking corrective action at sites contaminated by the contents of leaking underground storage tanks and to allow for the reimbursement of tank owners and operators for the costs of corrective action. In 1995 the Act was amended to: 1) limit reimbursement for corrective action done by geotechnical companies affiliated with petroleum tank owners and operators ("affiliates"), 2) require qualification of firms conducting corrective action in order for the work to be eligible for reimbursement, and 3) require that all corrective action be competitively bid in order to qualify for reimbursement. In 1996, the Petroleum Products Loading Fee Act was modified again, this time to triple the amount of money going into the Fund from $40 to $120 per load and to set out conditions for reducing or increasing the loading fee based on the unobligated balance in the Fund. In 1998 the Secretary of the Environment Department certified a fund balance of greater than $12 million dollars, resulting in a decrease of the loading fee back to $40 per load.

REFERENCES: THE STATE ROLE IN WATER QUALITY MANAGEMENT

New Mexico Water Quality Control Commission

(1) 1987 State of New Mexico Continuing Planning Process. Santa Fe. 48 Pages.

(2) 1996 New Mexico Water Quality Control Commission regulations as amended through November 15, 1996. Santa Fe. 83 pages.

(3) 1995 Water Quality Standards for Interstate and Intrastate Streams in New Mexico. Santa Fe. 51 Pages.

(4) 1979 New Mexico Statewide Water Quality Management Plan. Santa Fe. 107 Pages.

CHAPTER FOUR SURFACE WATER QUALITY IN NEW MEXICO

WATER QUALITY IN ASSESSED SURFACE WATERS

Methodology

Information about surface water quality throughout New Mexico is based on the results of the New Mexico Environment Department's (NMED) intensive surveys, project-by-project monitoring of selected nonpoint source control efforts, preliminary results of a statewide ultra-clean study to determine low-level mercury contamination in stream waters and sediments, and the development of Total Maximum Daily Loads (TMDLs). Water quality information is also obtained from data collected by NMED staff during inspections of wastewater treatment facilities, review of Discharge Monitoring Reports submitted by individual wastewater dischargers, the State's voluntary monitoring project "Watching Our Waters," and a review of physical, chemical and biological data entered by all agencies into STORET, the United States Environmental Protection Agency's computerized database. Additional water quality information was included from results of historical water quality surveys, investigations resulting from information provided by concerned citizens, and fisheries data where available .

Assessment Strategy: Assessed waters are those waterbodies for which the State can determine levels of support for designated uses established in the State's assessment protocol as well as for the goals of the federal Clean Water Act (CWA). Designations are established by the New Mexico Water Quality Control Commission (WQCC) for most perennial surface waters in New Mexico. These include fisheries, recreational and domestic uses, municipal and industrial water supplies, irrigation and livestock watering and wildlife habitat. Numeric and narrative water quality standards are established by the WQCC to protect designated, existing and attainable uses. These standards are consistent with the CWA goals which provide for the protection and propagation of fish, shellfish and wildlife, as well as providing for recreation in and on the waters.

The categories of assessment are 'monitored' and 'evaluated':

- "Monitored waters" are those waterbodies for which current (1998-1999), site-specific physical/chemical water quality data are sufficient to make a use support decision. These data are compared to numeric and narrative criteria in the State's water quality standards. Where available, biological data are also used to determine whether designated uses are supported;
- "Evaluated waters" are those waterbodies where insufficient current data exist to consider the waterbody "monitored," but where other information permits an evaluation of the use support status. New Mexico's evaluated assessments are based on data older than five years, data not fully meeting Quality Assurance/ Quality Control standards, citizens' monitoring or reports of impairment, or on professional evaluations by NMED or water resource professionals from other state or federal agencies.

Levels of support for designated uses are determined for individual waterbodies as follows:

- Fully supporting: all uses are fully supported;
- Fully supporting, impacts observed: all uses are fully supported; however, it is reasonably expected to exceed water quality criteria before the next two-year list submission deadline;
- Partially supporting: one or more uses are adversely affected, but not precluded, by pollution and the remaining uses are fully supported; and
- Not supporting: one or more uses are at least temporarily precluded by man-made or man-induced pollution.

The State's assessment protocol of monitored waters depends primarily on ambient physical/chemical, biological, and other types of available data. It also uses fish tissue data from a study begun in 1991. Data from biological surveys and biomonitoring tests are becoming available and are incorporated into the State's assessment protocol where available.

Criteria used for determining designated and overall use support are summarized in Table 2. These criteria are largely comparable to those recommended by EPA in guidelines (**1**) for this document but have been modified to meet the special needs and circumstances of New Mexico.

For this report, New Mexico has chosen to designate uses as "partially supported" when waters show exceedances of chronic criteria for toxicants unless exceedances of other criteria indicate that impairment is serious enough to warrant the designation of "not supported." In waters where more than one toxicant exceeds acute criteria at significant levels, we have stated that a use is "not supported."

Water quality criteria necessary to protect aquatic biota from toxic pollutants which have been adopted in New Mexico's water quality standards are listed in Table 3. As part of the 1998 triennial review of stream standards, New Mexico adopted in early 2000 these chronic and acute numeric water quality standards. In addition, numeric criteria for toxicants for the uses of irrigation, domestic water supply, livestock watering and wildlife habitat were developed. The majority of these standards are for the dissolved fraction of the metals, and are largely based on criteria in EPA's Quality Criteria for Water 1986 (**2**) or on updates to this document.

New Mexico's chronic standards are applied to the arithmetic mean of four samples collected on four consecutive days. Significant data do not yet exist to evaluate chronic toxicity based on the four-day average of total or dissolved metals. Therefore, many of New Mexico's evaluations were based on grab samples for total or dissolved metals. Grab samples are single water samples taken on a single day, therefore these results are appropriately compared with acute water quality standards.

Table 2. Criteria for Determination of Designated and Aquatic Life Use Support.

		Support of Designated Uses[a]			
Assessment Basis	**Assessment Description**	**Fully Supporting**	**Fully Supporting, Impacts Observed**	**Partially Supporting**	**Not Supporting**
Evaluated	Available data more than 5 but less than 10 years old OR if no site specific data, assessment based on land use, location of sources and on-site professional evaluation.	Available historical data indicate criteria are met AND no point or nonpoint sources are known to be present which could interfere with the uses.		Available historical data indicate criteria are violated OR sources are present which affect uses OR no known sources exist but water quality complaints are on record OR evaluation by professional indicates use impairments.	Available historical data indicate criteria often or significantly violated OR the multitude or magnitude of sources indicate uses are not supported. Documented non-compliance of narrative surface water standards. Waters with fishing, swimming or drinking water advisories in effect.
Monitored (Biological)	Available data no more than 5 years old. Site visited by qualified biologist. Recognized bioassessment protocols used. Benthic macroinvertebrate taxonomic identifications made to at least the family level using protocol comparable to EPA's "*Rapid Bioassessment Protocols for Use in Streams and Rivers.*"	No evidence of modification to indigenous or established community. Comparable to best situation expected within ecosystem (watershed reference site). Balanced trophic structure. Optimum community structure (composition & dominance) for stream size and habitat quality.	Community structure less than expected. Composition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.	Some modification of community noted OR biomonitoring demonstrates behavioral modification or decreased fecundity. Fewer species due to loss of most intolerant forms. Reduction in EPT index[b].	'Use clearly not supported, definite modification of community noted. Biomonitoring demonstrates significant lethality. Few species noted. If high densities of organisms, then dominated by one or two taxa.
Monitored (Chemical /Physical)	Available data no more than 5 years old. Fixed-station sampling, intensive surveys, or rigorous reconnaissance surveys. Chemical analysis of water, sediment or biota.	For chemical/physical parameters[c], criteria exceeded in ≤ 7% of measurements within a 5-year period. If criteria are exceeded in 7 to 15% of the measurements within a 5-year period, the water body is listed as *Fully Supporting, Impacts Observed.*	For chemical/physical parameters[c], criteria exceeded in ≥ 7% but ≤ 15% of the measurements within a 5-year period.	Within a 5-year period, criterion for any parameter[c] is exceeded in a 15-25% range of measurements OR one toxic pollutant exceeds EPA acute criteria by ≥ 1.5 times but ≤ 2 times the acute standard.	Criteria for the grouped parameters[c] exceeded in ≥ 25% of measurements within a 5-year period. Criteria for any two or more toxic pollutants exceed (≥ 2 times) the EPA's acute water quality standard.
Monitored (CWA § 307(a)[d] Toxics including ammonia and cholorine)	Available data no more than 5 years old. Fixed-station sampling, intensive surveys, or reconnaissance surveys. Only acute values currently used for toxicology determinations.	No measured toxic pollutants[d] exceed EPA acute criteria. For any toxic parameter, one exceedance ≥ 1.5 times thechronicstandard within a 5-year period constitutes listing the waterbody as *Fully Supporting ,Impacts Observed.*	For any one parameter[d], one exceedance of the acute or chronic criteria or chronic screening level within a 5-year period.	For any one parameter[d], more than one exceedence of the acute or chronic criteria or chronic screening level within a 5-year period and in < 25% of samples.	For any one parameter[d], more than one exceedence greater than the acute or chronic criteria within a 5-year or 3-year period respectively and in ≥ 25% of the samples.
Monitored (Using Stream Morphology[e])	Available data no more than 5 years old. Recognized stream morphology protocols used.	Data indicate only slight modification of stream morphology using a quantifiable tool. Stream is stable.	Data shows moderate alterations which are localized and do not show impacts outside of a reasonable recovery area.	Modification to stream morphology significant and with broad scale. Quantifiable assessments of stream morphology show vertical and/or horizontal instability.	Stream morphology severely altered. Severe bank failure and/or hydrological changes. Accelerated upland erosion.

a *Fully Supporting* = All designated uses fully supported; *Fully Supported, Impacts Observed* = All designated uses fully supported but is reasonably expected to exceed criteria for at least one designated use in the next two-year reporting period; *Partially Supporting* = One or more designated uses partially supported and all other designated uses fully supported; and *Not Supported* = One or more designated uses not supported.

b EPT index is the total number of distinct taxa within the orders *Ephemeroptera*, *Plecoptera*, and *Trichoptera*. This value summarizes taxa richness within the insect orders that are generally considered to be sensitive to pollution.

c Conventional pollutants to be grouped for the determination of aquatic life use support are temperature, turbidity, pH, dissolved oxygen and total phosphorus.

d Refers to priority pollutants identified in CWA § 307(a). Toxicants include metals, pesticides, organics, ammonia, cyanide and chlorine (See Table 3, page). Currently, insufficient data are collected to use chronic toxicity values to determine use support decisions based on New Mexico Water Quality Standards.

e These assessments will be made using assessment tools currently being developed by the Nonpoint Source Pollution Section of the Surface Water Quality Bureau in the New Mexico Environment Department. Further modifications to this table will be necessary as the tool is modified and tested.

Table 3. New Mexico Fishery Use Protection Numeric Water Quality Standards For Toxicants

Chronic Criteria [a]

Dissolved aluminum	87.0	ug/l
Dissolved beryllium	5.3	ug/l
Total mercury	0.012	ug/l
Total recoverable selenium	2.0	ug/l
Cyanide, amenable to chlorination	5.2	ug/l
Total chlordane	0.0043	ug/l
Dissolved cadmium[c]	e(0.7852[ln(hardness)]-3.49)	ug/l
Dissolved chromium[d]	e(0.819[ln(hardness)]+1.561)	ug/l
Dissolved copper	e(0.8545[ln(hardness)]-1.465)	ug/l
Dissolved lead	e(1.273[ln(hardness)]-4.705)	ug/l
Dissolved nickel	e(0.846[ln(hardness)]+1.1645)	ug/l
Dissolved zinc	e(0.8473[ln(hardness)]+0.7614)	ug/l
Total chlorine residual	11	ug/l

Acute Criteria [b]

Dissolved aluminum	750	ug/l
Dissolved beryllium	130	ug/l
Total mercury	2.4	ug/l
Total recoverable selenium	20.0	ug/l
Dissolved silver	e(1.72[ln(hardness)]-6.52)	ug/l
Cyanide, amenable to chlorination	22.0	ug/l
Total chlordane	2.4	ug/l
Dissolved cadmium[c]	e(1.128[ln(hardness)]-3.828)	ug/l
Dissolved chromium[d]	e(0.819[ln(hardness)]+3.688)	ug/l
Dissolved copper	e(0.9422[ln(hardness)]-1.464)	ug/l
Dissolved lead	e(1.273[ln(hardness)]-1.46)	ug/l
Dissolved nickel	e(0.8460[ln(hardness)] +3.3612)	ug/l
Dissolved zinc	e(0.8473[ln(hardness)]+0.8604)	ug/l
Total chlorine residual	19	ug/l

[a] The chronic criteria shall be applied to the arithmetic mean of four samples collected on each of four consecutive days. Chronic criteria shall not be exceeded more than once every three years.

[b] The acute criteria shall be applied to any single grab sample. Acute criteria shall not be exceeded.

[c] For numeric standards dependent on hardness, hardness (as mg $CaCO_3$/L) shall be determined as needed from available verifiable data sources including, but not limited to, the United States Environmental Protection Agency's STORET water quality database. The hardness-dependant formulæ for metals are only valid for hardness values of 0-400 mg/L. For for values above 400 mg/L, 400 will be used.

[d] The criteria for chromium shall be applied to an analysis which measures both the trivalent and hexavalent ions.

As data are collected during new surveys, samples will be collected for metals on four consecutive days. All future changes to the listings for chronic standards violations should be based on four-day averages. Until adequate data exist for evaluating use support based on four-day averages, the number of miles of impairment due to chronic violations should be assumed to be artificially high. Significant data for such studies is currently being collected.

It should be noted that many of New Mexico's streams and lakes have not been sampled by any agency within the last five water years (October 1994-September 1999). Data limitations reported in the State's last reports to the United States Congress still exist (**3, 4, 5, 6**).

During the current CWA §305(b) reporting cycle, special three-season intensive water quality surveys were completed on ten watersheds or lakes. These special surveys are listed in Table 13 below.

Also during the current biennial reporting period (1998-2000), geographic and water quality assessment data for the majority of New Mexico's perennial rivers and streams have been entered into the latest Microsoft® application (version 1.0.3) of EPA's Access® Database (ADB) software. The ADB allows for more detailed reporting of the overall health of a waterbody, the number of miles affected by various pollutants, and the extent of designated use support. The information in the database was used to provide many of the tabulations in this report. Because of more detailed tracking, the miles of streams with impaired uses may vary from previous reports.

Stream Water Quality

Table 15 of Appendix B summarizes, on a segment-by-segment basis, those rivers and streams with designated uses which are either fully supported-impacts observed, partially supported or which are not supported due to man-made or man-induced point or nonpoint source pollution. In the case of several waters not currently assigned designated uses in the State's water quality standards, attainable uses which are impaired are identified. Table 15 of Appendix B also identifies the impaired reach of the stream or river and the probable causes and sources of use nonattainment. Table 17 of Appendix B identifies the codes for sources of nonsupport.

Approximately 2,675 assessed river miles have impaired designated or attainable uses and 405 miles out of a total of 5,875 State-recognized perennial river miles are threatened with impairment. Many of the identified reaches have more than a single threatened or impaired use. Use impairment is frequently due to several causal agents from several sources. One hundred and seventy-nine streams and 223 impaired reaches of these streams are distributed among 43 of the 56 segments described in the State's water quality standards. Stream reaches with impaired uses have been identified in all of New Mexico's water quality basins. This compares with the 2,936 impaired river miles in 180 rivers or streams composed of 164 reaches in the last report to Congress.

Aquatic Life Use Support in the State's Streams

Table 4 summarizes the aquatic life level of use support in those streams which have been assessed. Over 1,247 stream miles were found to have been adversely affected to the extent that designated or attainable uses were only partially supported. Seventy-nine streams with approximately 1,428 stream miles were found to be affected to the extent that designated uses were not supported.

Almost 1,204 miles of New Mexico's waters have been assessed and determined to fully support all designated uses. The majority of these waters are in wilderness areas or in watersheds protected from anthropogenic impacts. As evaluation of water quality continues, additional waters may be identified which fully support designated uses; these will be tabulated in future reports.

Individual Use Support in the State's Streams

Table 5 is a summary of individual designated use support. The Clean Water Act goal of "fishable" is now reported under the fish consumption and aquatic life support uses, and the "swimmable" goal is reported under the swimmable and secondary contact uses. EPA developed this method through a consensus approach to reduce inconsistencies in states' reports. Table 5 was generated by using the ADB database.

Overall, 12 of the State's 15 designated uses have been impaired by point or nonpoint sources of pollutants. All subcategories of both the coldwater and warmwater fishery uses, as well as the irrigation and irrigation storage, primary and secondary contact, domestic water supply, fish culture, and livestock watering and wildlife habitat uses have been impaired.

The majority of assessed river miles at least partially meets the fish consumption and aquatic life support goal of the Clean Water Act; a little over 93 miles only partially meet the fishable goal.

Approximately 396 miles of stream reaches were added to the impaired status list from *fully supporting* designated uses. From these, almost 333 miles of stream reaches were changed directly to *not supporting* status while just over 50 miles of *fully supporting – impacts observed* reaches were reclassified as *partially supporting* their designated uses. Incidentally, almost 50 miles of reaches previously designated as *not supporting* have improved to *partially supported* status. Nearly 34 miles previously listed as not supporting their designated uses were restored to *fully supported* status and removed altogether from the list. The changes in status were the result of improved monitoring techniques associated with the new TMDL Program.

Table 4. Aquatic Life Use Support in Assessed Streams

(Size unit in miles)

	Assessment Basis		
Degree of Use Support	**Evaluated**	**Monitored**	**Total Assessed**
Fully Supporting	711.6	491.9	1,203.5
Fully Supporting, Impacts Observed	176.1	229.2	378.3
Partially Supporting	507.0	740.45	1,247.45
Not Supporting	316.8	1,110.9	1,427.7
Not Attainable	0.0	0.0	0.0
Total Size Assessed	**1,711.5**	**2,572.45**	**4,283.95**

Table 5. Individual Use Support Summary for New Mexico Streams

(Size unit in miles)

Use	Fully Supporting	Fully Supporting Impacts Observed	Partially Supporting	Not Supporting	Not Attainable	Not Assessed
OVERALL USE SUPPORT	1,203.5	405.3	1,247.45	1,427.7	0.0	1,591.05
FISH CONSUMPTION	0.0	0.0	93.4	0.0	0.0	0.0
AQUATIC LIFE SUPPORT	751.5	376.9	1,304.0	1,562.8	0.0	1,018.3
SWIMMABLE	4,087.6	15.3	16.0	15.0	0.0	1,501.1
High Quality Cold Fishery	236.9	166.6	541.25	535.8	0.0	852.0
Coldwater Fishery	74.3	31.0	318.5	176.0	0.0	131.5
Marginal Coldwater Fishery	88.1	42.2	386.1	245.6	0.0	50.4
Warmwater Fishery	29.7	12.9	345.0	198.2	0.0	176.7
Limited Warmwater Fishery	68.1	132.3	284.2	38.6	0.0	148.7
Primary Contact	294.1	0.0	4.7	53.6	0.0	93.4
Secondary Contact	3,613.4	0.0	42.3	6.2	0.0	1,406.0
Domestic Water Supply	1,396.0	0.0	4.6	0.5	0.0	991.1
Fish Culture	1,128.5	0.0	4.6	0.5	0.0	751.9
Irrigation	4,400.8	80.6	109.3	116.3	0.0	1,168.0
Livestock Watering	4,819.0	26.9	19.6	74.3	0.0	935.2
Wildlife Habitat	110.8	0.0	4.6	0.5	0.0	54.3

Lake Water Quality

The State has identified 175 publicly owned, freshwater lakes totaling 148,883 acres. These waterbodies consist of large mainstem reservoirs, mountain cirque lakes and small fishing impoundments ranging in size from less than one acre to a 40,000-acre reservoir (Elephant Butte at maximum storage pool). Regardless of size, all lakes are used extensively in water-scarce New Mexico. Even the smaller lakes provide drinking water for livestock watering and habitat for wildlife, are used by migratory waterfowl or provide important recreational opportunities for boating, swimming, fishing and aesthetic pleasure in municipal, rural, and wilderness settings (Appendix B, Table 18).

Although all publicly owned waterbodies are considered important, NMED has prioritized lakes and reservoirs over twenty acres as "significant," due to their many uses. In addition, publicly owned high mountain cirque lakes, regardless of size, are also considered "significant" since they serve as sensitive indicators of potential acidic precipitation as well as nonpoint sources of pollution.

Attainment of Designated Uses and Clean Water Act Goals

Assessed lakes, playas and reservoirs cover approximately 136,972 acres, or about 92%, of the estimated 148,883 publicly-owned lake acres. The State water quality standards apply to lakes and reservoirs as well as to streams. During 1998-1999, NMED conducted lake monitoring to collect and update data for playas. Where available, data collected during the past five years (1994-1999), were used to determine use attainment in lakes and reservoirs determined to be "significant" in New Mexico; this number includes a few additional lakes smaller than twenty acres where fish kills or pollutants have threatened designated use attainment. The remainder of the "significant" lakes were evaluated based on historical data or best professional judgment. Monitoring data were used to assess 47,241 lake acres (31% of assessed lake acres) while 107,545 acres (69%) were evaluated.

Table 16 of Appendix B summarizes the State's assessment of the "significant" lakes with less than full support for designated or attainable uses. The table also identifies lakes whose status of support is unknown due to paucity or age of data. This table identifies:

- thirty-five lakes and playas which currently fully support designated uses but whose uses are fully supporting yet with impacts observed which could adversely affect favorable status conditions should current trends continue;
- thirty-one lakes and playas which partially support designated uses;
- nine lakes and playas where use support is unknown due to the paucity of recent monitoring data or other information which would permit an updated evaluation; and
- seven lakes and playas in which at least one designated use is not supported.

A total of 124,140 lake and playa acres do not fully support designated uses; this is a slight decrease in the number of lake acres identified as impaired in 1998 (**6**).

Table 6 summarizes the overall level of use support in assessed lakes. Almost all impaired lake acreage falls under the categories of partially supported or fully supported/impacts observed. Based on recent water quality data and/or observation of persistent conditions, 1,960 lake and playas acres are assessed as not supporting one or more designated use. Causes of nonsupport include nutrients, siltation, reduction of riparian vegetation, and bank destabilization resulting primarily from agriculture and recreation.

Table 7 summarizes the status of support for designated uses and for the so-called fishable/swimmable goals of the federal Clean Water Act. The uses listed in this table are a combination of uses which EPA has requested the states use to report CWA goal attainment and the state's designated uses identified in its water quality standards.

The fishable goal of the CWA is defined as protection and propagation of fish, shellfish, and wildlife. Support for this use is reported under the fish consumption and aquatic life support uses in Table 7. Lake acreage where fish tissue sampling has been conducted was used to assess the degree of support for fish consumption. Most of the assessed lake acres only partially support the fish consumption use due to the levels of mercury in fish tissue; this issue is discussed below under ***Public Health/Aquatic Life Impacts***. The aquatic life use assessment is based on the fishery uses assessment contained in Table 16 of Appendix B. Since all classified lakes, playas and reservoirs in the State are designated for one or more fishery uses, the total lake acres in the Aquatic Life/Fish Consumption category are equal to the total classified lake acreage. All classified lake and playa acreages are also designated for wildlife habitat and livestock watering uses. Because lake data have not yet been included in the ADB database, total lake acres for the other uses listed in Table 7 cannot be identified at this time.

The swimmable goal is defined as providing for recreation in and on the water. Support for this goal is reported under the primary and secondary contact uses. Support for the swimmable use is based on swimming area closures. No closures have been issued at the state level and NMED does not have records of any local closures.

Support assessment for all of the State's designated uses are based on Table 16 of Appendix B. Impaired lake acreage is due solely to nonpoint sources of pollution. Table 7 shows that six designated uses in New Mexico's lakes have been adversely affected by these sources. All three subcategories of coldwater fisheries and one of the two subcategories of warmwater fisheries are partially impaired or fully supporting but with impacts observed. Rooted macrophytes, algal growth and turbidity have adversely affected secondary contact recreation, and irrigation storage has been impaired by siltation.

Table 6. **Aquatic Life Use Support in Assessed Lakes**

(Size units in acres)

Degree of Use Support	Assessment Basis: Evaluated		Assessment Basis: Monitored		Total Assessed
Size fully supporting	85	(2%)	4,573	(98%)	4,658
Size fully supporting, impacts observed	11,666	(45%)	14,086	(55%)	25,752
Size partially supporting	95,593	(78%)	26,587	(22%)	122,180
Size not supporting	5	(<1%)	1,955	(>99%)	1,960
Unknown	196	(83%)	40	(17%)	236
TOTAL	**107,545**	**(69%)**	**47,241**	**(31%)**	**136,986**

Table 7. Individual Use Support in New Mexico Lakes
(Size units in acres)

Use	Assessed						Nonassessed
	Supporting	Supporting Impacts Observed	Partially Supporting	Not Supporting	Not Attainable	Unknown	Unknown
Clean Water Act Goals							
Fish Consumption	-	410	109,499	-	-	-	-
Aquatic Life Support	674	13,019	111,116	18	0	142	7,366
Swimming	-	-	-	-	-	-	-
Secondary Contact Recreation	-	201	127	13	0	0	-
Drinking Water Supply	-	-	-	-	-	-	-
Agriculture	-	0	0	0	0	0	-
New Mexico Designated Uses							
High quality coldwater fishery	-	4,568	6,064	5	-	40	-
Coldwater fishery	-	7,535	19,970	13	0	0	-
Marginal coldwater fishery	-	740	0	0	0	20	-
Warmwater fishery	-	8,150	101,332	0	0	196	-
Limited warmwater fishery	-	0	0	0	0	0	-
Primary contact recreation	-	0	0	0	0	0	-
Secondary contact recreation	-	301	137	13	0	0	-
Domestic water supply	-	0	0	0	0	0	-
Fish culture	-	0	0	0	0	0	-
Livestock watering	-	12,863	12,110	1,942	0	0	-
Wildlife Habitat	-	12,863	12,110	1,942	0	0	-
Irrigation	-	130	0	0	0	0	-

Trophic Status

Trophic state is established as part of lake water quality monitoring efforts. Although trophic state is not used in New Mexico in use attainment determination, it is an important tool which helps relate the relative condition of a lake to its designated use support, and also leads to a better understanding of what probable cause or causes may be contributing to water quality problems within a lake.

Trophic states were evaluated using the Carlson trophic state indices (TSIs). The lakes were categorized using a continuum from oligotrophy to eutrophy. The univariate Carlson index used to assess trophic state is based on Secchi disk depth, chlorophyll *a* and total phosphorus concentrations. It is an absolute index whereby a ten-unit increase on a scale of zero to 100 corresponds to a doubling in epilimnetic algal biomass. Thus, small differences in data values result in a larger change in TSI for lake trophic evaluation. Each of the Carlson TSI values for a given lake has been separately evaluated with preferential consideration given to chlorophyll concentrations. Trophic state boundaries are consistent with the EPA index: i.e., trophic state values exceeding 47 indicate a eutrophic lake and values less than 42 indicate oligotrophic lakes (**7, 8**). These trophic state indices were evaluated for their applicability in comparisons between the various playa lakes under investigation throughout New Mexico. The investigators concluded that these indices have little to no applicability or usefulness in comparisons between hypersaline lakes. Furthermore, since these trophic state indices were developed using data from temperate freshwater lakes, their applicability in most playa lake environments may be limited.

Classification systems simplify the dynamic concept of trophic state. Among the assumptions of the classification indices are that algae are the most important primary producers and nutrient loading is responsible for the productivity within the lake (**8, 9**). The Carlson index is of limited applicability for lakes with significant non-algal turbidity or nitrogen limitation, where aquatic macrophytes are the dominant primary producers, or where zooplankton grazing controls algal abundance. The biological data and total nitrogen/total phosphorus ratios for each lake are also used to help evaluate the utility of the trophic index for classifying lakes in New Mexico.

The total number of evaluated lakes in each trophic class is:

Eutrophic	33
Oligomesotrophic	8
Mesoeutrophic	7
Oligotrophic	0
Mesotrophic	12
Dystrophic	1

Trophic state for evaluated lakes and general morphometric data for most of the publicly owned lakes in New Mexico are summarized in Table 18, Appendix B.

Lake Acidification

No lakes in New Mexico are known to consistently have pH values less than 5.0 standard units; therefore, there is no current need to develop methods to neutralize or restore buffering capacity. Lakes most likely to be susceptible to acid precipitation are characterized by alkalinities less than 100-200 eq/L (less than 5-10 mg $CaCO_3$/L), have small watersheds, and are located on granitic bedrock at high elevations. Data from 14 such publicly-owned lakes were collected by Lynch *et al.* (**10**). Results of this study indicated that, based on the characteristics listed above, the Truchas Lakes and Santa Fe Lake are potentially the most susceptible of those reviewed to acidification due to low buffering capacity. Further data for these and other alpine lakes are needed to establish acidification trends in any high-elevation lake in New Mexico.

The high-elevation cirque lakes in New Mexico are all contained within National Forests boundaries. The United States Forest Service (USFS) has developed a monitoring plan to perform tracer studies to identify the sources of possible acid precipitation falling in the State's major high-mountain areas.

Control Methods

Programs and measures to control potential pollution sources to New Mexico's lakes include the federal National Pollutant Discharge Elimination System (NPDES) program for point source discharges and the State certification process for permits issued under this program; State certification of federal dredge-and-fill permits; discharge plans required under the State ground water regulations; State review of federal actions under the consistency provisions of the federal Clean Water Act; and agreements between NMED and other State and federal agencies to implement nonpoint source pollution control measures.

CAUSES AND SOURCES OF WATER QUALITY IMPAIRMENT

Streams

Table 8 presents an analysis of those causal agents which have seriously affected the State's streams. A cause was judged to make a major impact if it was the predominant reason for use impairment. A moderate/minor impact is one where multiple causes are responsible for impairment but none predominate. Heavy metal contamination, stream bottom deposits, temperature, total phosphorus and turbidity are the major causes of impairment of designated or attainable uses.

Point source discharges now play a quantitatively minor role in the impairment of the State's streams (Figure 5). Over 91% of all water quality impairment identified in New Mexico's streams is due to nonpoint sources of water pollution.

While poorly operated or maintained treatment plants may have severe adverse localized effects on water quality, the available data indicate the State, working with EPA and permitees, has been largely

successful in reducing point source impacts on the State's surface waters.

Approximately 288 stream miles are impaired largely due to discharges from wastewater treatment plants (Table 9). The majority of the remaining stream miles are impaired by nonpoint sources of pollution. Figure 6 identifies the major nonpoint sources of impairment in the State's streams. The chart shows that water quality impairment due to agriculture and range land grazing affects about 27% of the State's streams. Although no "hard" data exist, wildlife grazing may also contribute to localized water quality problems.

Hydromodification impairments affecting over 43% of New Mexico streams occur from dam reconstruction activities, stream channelization, or flow diversion for irrigation.

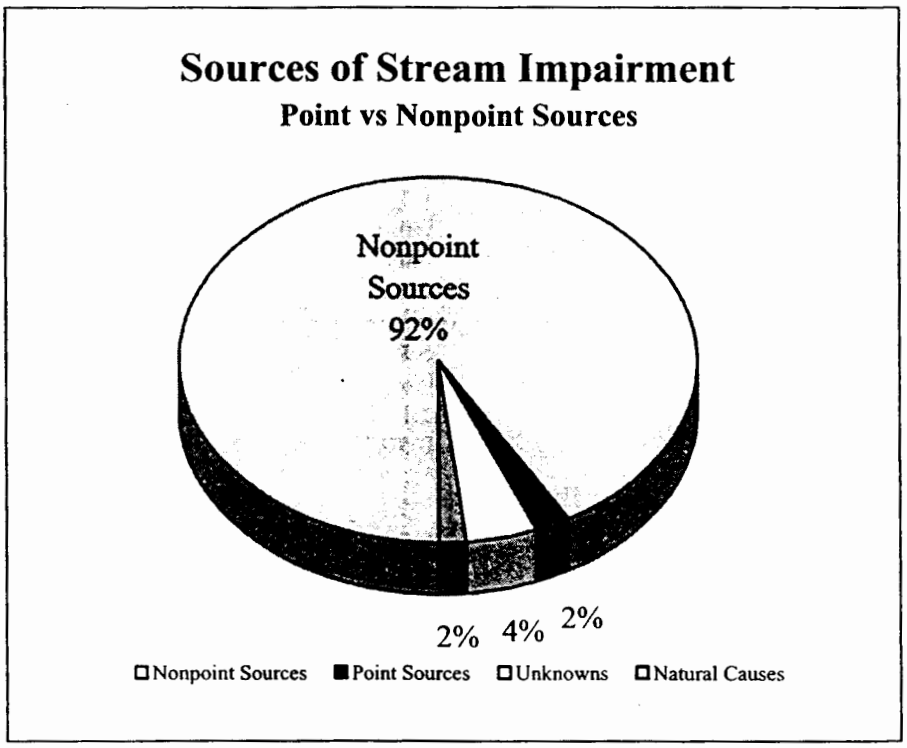


Figure 5. Sources of Impairment to New Mexico's Streams.

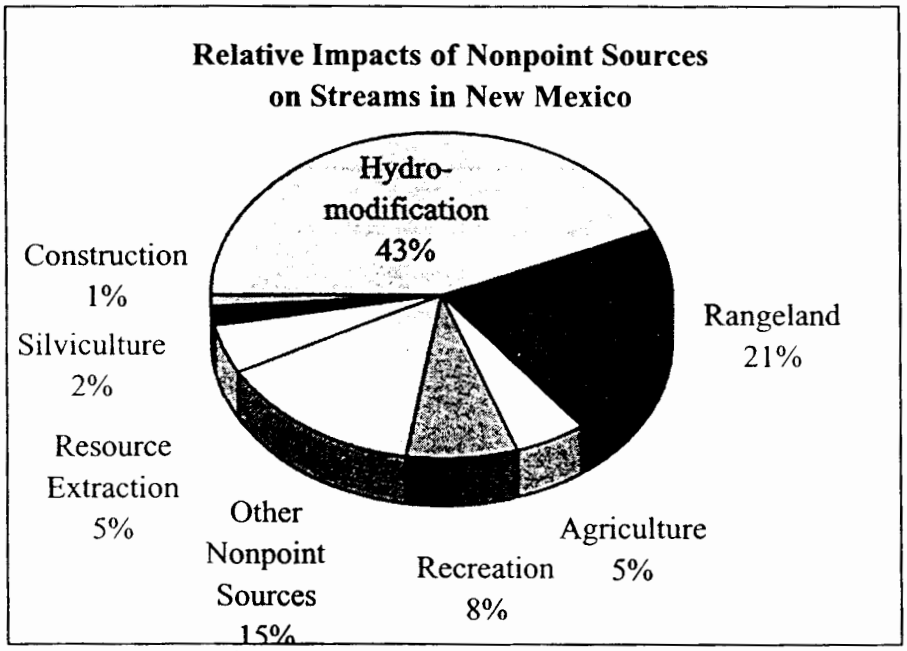


Figure 6. Major Nonpoint Sources of Pollution in New Mexico's Streams.

Table 8. Total Stream Miles Not Fully Supporting Designated or Attainable Uses [a]

~ By Cause Category ~

Causal Category	Major Impact (miles [b])	Moderate/Minor (miles [b])
Biological impairment	0.0	10
Biological criteria	30.8	0.0
Cause unknown	11.0	98.6
Unknown toxicity	0.0	62
Pesticides	0.0	2.8
Metals	242.5	580.9
Total ammonia	146.5	22.3
Chlorine	6.1	4.1
pH	150.8	204.1
Turbidity	601.1	356.6
Siltation	0.5	0.0
Dissolved oxygen deficiencies	71.7	241.9
Salinity/TDS/chlorides	73.4	241.9
Temperature	476.4	553.7
Stream bottom deposits	314.9	1,180.95
Fecal coliform	101.5	414.4
Total phosphorus	34.0	19.6
Total organic carbon	84.2	147.3
Conductivity	91.1	161.0
Plant Nutrients	25.4	254.3

[a] This information was generated using the USEPA's *ADB* software.

[b] In most instances, more than one causal agent contributed to water quality impairment. Where waterbodies have more than one cause of impairment, the appropriate waterbody length was entered in each category.

Table 9. Total Stream Miles Not Fully Supporting Designated or Attainable Uses [a]

~ By Source Category ~

Causal Category	Major Impact (miles [b])	Moderate/Minor Impact (miles [b])
Point Sources		
Municipal (0200)	109.9	152.9
Domestic (0201)	27.0	13.8
Nonpoint Sources		
Agriculture (total)	1,388.7	1,776.85
Irrigated crop production (1200)	254.9	185.1
Irrigated return flows (1201)	110.3	22.8
Pastureland (1400)	7.0	0.0
Rangeland (1500)	974.9	1,556.95
Riparian grazing (1510)	0.0	12.0
Aquaculture (1700)	0.0	0.0
Animal holding/management areas (1800)	41.6	0.0
Silviculture (total)	104.6	91.4
Harvesting, restoration, residue mgt. (2100)	36.2	26.6
Forest management (2200)	0.0	32.3
Road construction maintenance (2300)	68.4	32.5
Construction (total)	73.8	86.3
Highway/road/bridge (3100)	4.8	29.8
Land development (3200)	69.0	56.5
Urban runoff\storm sewers (4000)	26.0	71.1
Resource extraction (total)	224.8	371.4
Surface mining (5100)	48.6	57.5
Subsurface mining (5200)	13.6	2.5
Placer mining (5300)	0.0	14.1
Dredge mining (5400)	11.6	0.0
Petroleum activities (5500)	37.1	117.5
Mill tailings (5600)	28.2	23.0
Mine tailings (5700)	44.8	36.2
Road construction/maintenance (5800)	7.1	12.5
Spills (5900)	33.8	108.1
Land disposal (total)	80.6	68.8
Landfills (6300)	0.0	2.8
Onsite wastewater system (6500)	80.6	55.6
Hazardous waste (6600)	0.0	10.4
Hydromodification (total)	1,807.4	2,760.2
Hydromodification (7000)	0.0	5.5
Channelization (7100)	171.8	59.9
Dredging (7200)	26.0	9.4
Dam construction / repair (7300)	0.0	39.8
Flow regulation/modification (7400)	103.5	204.9
Bridge construction (7500)	0.0	12.0
Removal of riparian vegetation (7600)	808.1	1,295.25
Streambank modification/destabilization (7700)	698.0	1,133.45
Other nonpoint source pollution (total)	1,166.2	1,422.85
Highway maintenance/runoff (8300)	271.4	235.24
Spills (8400)	0.0	0.0
Natural (8600)	258.6	164.1
Recreational activities (8700)	163.0	399.65
Road/parking lot runoff (8701)	75.1	143.5
Off-road vehicles (8702)	0.0	38.7
Refuse disposal/littering (8703)	26.4	76.4
Ski slope runoff (8705)	0.0	21.7
Upstream impoundment (8800)	5	25.5
Unknown	366.7	318.1

a This information is generated using the USEPA's *ADB* software.

b In most instances, more than a single source contributed to water quality impairment. Where waterbodies have more than one source of impairment, the appropriate waterbody length is entered in each category.

Table 10. Total Lake and Playa Acres Not Fully Supporting Designated or Attainable Uses

~ By Cause Category ~

Causal Category	Major Impact (acres [a])	Moderate/Minor Impact (acres [a])
Unknown	0	0
Unknown toxicity	0	0
Priority organics	0	0
Nonpriority organics	0	0
Pesticides	0	1,240
Metals	0	63,200
Un-ionized ammonia	0	0
Chlorine	0	0
Other inorganics	0	0
Nutrients	23,098	11,953
Total phosphorus	27	0
pH	0	107
Turbidity	0	34
Siltation	73,594	9,777
Dissolved oxygen deficiencies	32	84
Salinity/TDS/Chlorides	6,177	0
Thermal modification	0	0
Flow alteration	0	0
Other habitat alterations		
Reduction of riparian habitat	18,195	14,242
Bank destabilization	17,060	15,365
Pathogens	0	0
Radiation	0	2,880
Oil and grease	10	4
Mine waste	600	0
Noxious aquatic plants/nuisance algae	300	9,404
Filling and draining	0	0
Fish tissue mercury	0	109,499

[a] In most instances, more than one causal agent contributed to water quality impairment. All agents contributing to the impairment are identified in the table.

Table 11. Total Lake and Playa Acres Not Fully Supporting Designated or Attainable Uses

~ By Source Category ~

Source Category	Major Impact (acres [a])	Moderate/Minor Impact(acre [a])
Point Sources		
Industrial	0	0
Municipal	0	0
Domestic	0	0
Combined sewer overflow	0	0
Nonpoint Sources		
Agriculture	90,509	2,325
Silviculture	0	215
Construction	0	0
Urban runoff	14	0
Resource extraction	1,342	0
Land disposal	327	13
Hydro/habitat modification	0	35
Recreation	63	85,746
Road maintenance/runoff	0	60
Road/parking lot runoff	0	25
Dredging	0	0
Salt storage	350	0
Storm Sewers	0	4
Mine and mill tailing	950	0
Natural	10,907	450
Unknown	0	109,011

[a] In most instances, more than one causal agent contributed to water quality impairment. All agents contributing to the impairment are identified in the table.

Lakes

Table 10 presents an analysis of the causal agents adversely affecting the State's lakes. Heavy metals, siltation, nutrients and habitat destruction are the major casual agents of use impairment. Agriculture and recreation are the predominant sources of lake water quality impairment (Table 11). Point sources are not a factor in attainment of designated uses in the State's lakes.

PUBLIC HEALTH/AQUATIC LIFE IMPACTS

Measures evaluated in determining the public health and aquatic life impacts of waterborne toxic and non-toxic contamination include:

- fishing guidelines in effect;
- fishing bans in effect;
- pollution-related fish abnormalities observed;
- pollution-caused fish kills observed;
- surface drinking water supplies closed;
- bathing areas closed; and
- waterborne disease incidents.

In January 1991, the United States Fish and Wildlife Service (USFWS) presented NMED with information which indicated that at least two species of fish in Santa Rosa Reservoir were contaminated with mercury at levels which could affect human health. The United States Army Corps of Engineers also provided NMED with copies of data which also indicated that there could be significant mercury contamination of fish in the State.

The discovery of elevated levels of mercury in some reservoir fish prompted NMED, in cooperation with the New Mexico Department of Health and the New Mexico Department of Game and Fish, to issue *Fish Consumption Guidelines Due to Mercury Contamination*, which are periodically updated as new information is received. The latest guidelines are contained in Appendix C.

Until the current CWA § 305(b) reporting cycle, water and sediment samples collected from lakes, reservoirs and streams did not yield detectable levels of mercury. In September 1994 a new effort was initiated to sample the stream waters and sediments in the State using experimental ultra-clean sampling and analytical methods. The ultra-clean sampling protocol was developed in conjunction with the Cincinnati EPA National Exposure Research Laboratory, which conducted the low-level mercury analyses gratis in order to fully develop the sampling and analytical methods using "real-world" samples. The Laboratory is able to reproducibly analyze levels to 0.7 ng/L (parts per trillion). The ongoing study is revealing that low levels of mercury in surface waters are common throughout New Mexico and that higher levels are found in isolated locations and in some stream sediments. The elevated levels that have been found in fish are due to a process called biomagnification. This process starts with the methylation of the elemental mercury by microorganisms present in the organic layers found at the bottom of large bodies of water. These low concentrations of the organic methylated form of mercury are then passed through the trophic web progressively from smaller to larger and larger fish until the result is elevated levels in the larger fish. These elevated mercury levels are especially evident in the top predatory fish such as walleye, bass and perch, as well as some of the bottomfeeders such as catfish. Because of the low concentrations of mercury in waters, all other designated or attainable uses including primary and/or secondary recreation, livestock watering and wildlife habitat, and irrigation are not currently affected by this pollutant.

To date, only one fishing ban has been issued in New Mexico. The single instance of a fishing ban issued in 1989 and still in effect, was initially due to the suspected presence of polychlorinated biphenyls (PCBs) in trout in the Rito Cañon de Frijoles located wholly within Bandelier National Monument. Additional surveys conducted by the National Park Service and NMED did not confirm the high levels of PCBs in fish or sediment but did identify relatively high concentrations of DDT (1,1,1-trichlor-2,2-*bis*-(p-chloro-phenyl) ethane) and its decomposition products. The National Park Service has conducted an intensive survey of the area to try to identify and pinpoint the sources of the contamination, and is currently preparing preliminary remediation efforts.

No surface drinking water supplies were closed due to public health concerns during 1999. There were, however, reported cases of giardiasis in the State. In 1999 alone, 265 cases were reported, of which 134 were related to water supply. 20 cases were attributed to contact with infected surface waters. Even so, there have been no "bathing" closures issued in New Mexico during the 1999 reporting cycle.

OTHER WATER QUALITY ASSESSMENT MEASURES FOR STREAMS AND LAKES

NMED also uses the following measures to assess the water quality status of New Mexico's streams and lakes and to direct programmatic activity:

Water Quality Limited Segments

Section 303(d) of the federal Clean Water Act requires states to designate "water quality limited" stream segments where applicable water quality standards are not being met, or are not expected to be met even after the application of technology-based effluent limitations. Identification of a segment as "water quality limited' requires the state to:

- Calculate a total maximum daily load (TMDL), which considers seasonal variations and margins of safety, for the segment. The TMDL is the water segment's capacity to accept point and nonpoint pollution loadings, as well as natural background levels, while

maintaining parameter levels which assure protection and propagation of indigenous populations of fish, shellfish, and other wildlife, while maintaining the State's water quality standards;

- Develop more stringent effluent limitations, if necessary, for point sources; and
- Develop best management practices, where appropriate, to mitigate nonpoint source pollution.

New Mexico has previously identified three stream reaches as water quality-limited, and has developed waste load allocations for the Town of Red River on the Red River, Twining Ski Valley on the Rio Hondo, and the City of Grants on the Rio San Jose. The current State list for streams requiring TMDL work is analogous with Table 15 in Appendix B.

Water Quality Trends

No water quality trend information based on ambient data has been developed for New Mexico. The United States Geological Survey is the only source in the State of longterm water quality data at fixed stations. Overall, it is difficult to compare the use assessment discussed above to earlier use assessments due to lack of historic data, increase in the number of stream reaches and lakes assessed, changes in the use attainment protocol, and the adoption of standards for additional contaminants or changes in standards, as the need for these are identified. It should be noted, that most of the statistical techniques designed to evaluate trends have significant data requirements and greater mathematical assumptions.

STATUS OF NEW MEXICO WETLANDS

The USFWS has mapped wetlands in New Mexico using the Cowardin system. The USFWS estimates that there are approximately 481,900 remnant acres of wetlands in New Mexico. The USFWS further estimates that there were 720,000 acres of wetlands in New Mexico in the 1780s based on the existing distribution of hydric soils. Hence, there has been a 33% reduction in the State's wetlands in historical times.

Individual wetlands have not yet been classified in the State water quality standards, thus do not have designated uses, but do have at least the attainable use of livestock watering and wildlife habitat. Wetlands, however, were defined in the State's water quality standards as "waters of the State" during the 1990-1991 triennial standards review. As waters of the State, wetlands are protected under the general standards, the antidegradation policy, and any attainable use under §3101 of the State water quality standards. The overall status of wetlands in New Mexico with respect to attainment of CWA objectives is not known, but due to historical trends, point and nonpoint source discharges and drainage practices, all wetlands are considered threatened in New Mexico.

Future Direction

Wetlands and riparian areas, threatened in New Mexico, are of great importance for maintaining water quality and quantity, stabilizing stream banks, providing flood control, as well as providing habitat for fish and other wildlife. NMED in conjunction with EPA has entered into a five-year project with the University of New Mexico, New Mexico Heritage Program to develop a basic description of the diversity of riparian vegetation types in relation to soils and the hydrology and other environments in which they occur, their successional relationships, and management strategies. This work is especially important in light of the New Mexico definition of wetlands, "*which are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions in New Mexico,*" (Section 3100.VV. of the "New Mexico Standards for Interstate and Intrastate Streams in New Mexico").

This project will provide an essential component of the New Mexico Wetlands Conservation Plan, which is currently in the process of being developed, by identifying important riparian/wetland areas in New Mexico and their particular management opportunities. Information produced by this project will enable the State to more precisely identify goals for the protection, enhancement and restoration of riparian/wetland areas throughout New Mexico. The products of this study will include a preliminary hierarchical classification system describing the general physiographic, edaphic and floristic features for riparian/wetland community types as well as dichotomous keys, descriptions and management information.

A five-year study has been completed on the Pecos, Upper and Lower Rio Grande, Gila, San Francisco, San Juan, Little Colorado and Mimbres watersheds. The fifth year's study included performing a classification study of the Arkansas-White-Red Rivers Watersheds and testing the Wetlands Assessment Manual in preparation for the production and printing of the Statewide Wetlands/ Riparian Assessment classification system.

Middle Rio Grande Ecosystem: Bosque Biological Management Plan

The Bosque Biological Management Plan was created to mitigate the stress in the Middle Rio Grande Valley from Cochiti Dam to San Marcial and to develop a new approach to sustain and enhance the biological quality and ecosystem integrity of the middle Rio Grande bosque, together with the river and floodplain that it integrates. The plan was proposed by the Rio Grande Bosque Task Force, a citizen's group formed by United States Senator Pete Domenici to examine the bosque's problems, to solicit public involvement and to recommend the means for its protection and the continuation of its benefits to human society. An interagency team of biologists from the USFWS, the United States Army Corps of Engineers, the United States Bureau of Reclamation and the University of New

Mexico was appointed to develop the plan in consultation with scientists, historians and other experts on the Middle Rio Grande Valley.

The plan's goals are as follows: (1) synthesize past and present available information about the ecosystem; (2) identify key species, communities and ecological processes essential to sustaining the ecosystem's biological quality and integrity; (3) recommend procedures for monitoring, conducting research and managing the ecosystem; and (4) identify procedures for incorporating new information and recommendations into the management plan.

New Mexico's use assessment protocol is based primarily on ambient physical/chemical and biological water quality data. NMED recognizes the value of other relevant data produced through the growing emphasis on biological and toxicological testing and is incorporating these types of data into the special water quality surveys being conducted.

Use attainment methodology will be in a state of flux over the next ten years as it adapts to meet the changing face of surface water concerns, such as the development of standards for lakes and reservoirs, playa lakes and wetlands, and as strategies are developed to protect them.

PROGRAMS FOR SURFACE WATER POLLUTION CONTROL

New Mexico uses a variety of mechanisms including State, federal, and/or local components to protect its surface waters from becoming polluted by point source discharges from municipal and non-municipal (i.e., industrial, state, and federal) sources. The principal mechanism is the federal National Pollutant Discharge Elimination System (NPDES) permit program. Under this program, a permit specifies the total amount and concentrations of contaminants that a permittee may discharge to a watercourse.

Pretreatment of industrial wastes that enter municipal wastewater treatment plants helps ensure that receiving waters are not polluted, that treatment processes are not disrupted, that NPDES permit limitations are not exceeded, and that toxic pollutants do not excessively contaminate sludge. While five cities in New Mexico are required to have federally approved pretreatment programs as part of their NPDES permits, the establishment and enforcement of an industrial waste ordinance by a municipality is basically a local responsibility.

Between 1972 and 1989, the federal wastewater construction grants program provided grants to local communities for planning, design, and construction of wastewater treatment plants. These plants were designed to prevent and abate water pollution, promote public health and meet enforceable requirements of the federal Clean Water Act (CWA). Since 1988 the federal grant program has been replaced with the State revolving loan program administered by the New Mexico Environment Department (NMED) under the New Mexico Water Quality Control Commission (WQCC) regulations.

Pursuant to CWA § 404, the United States Army Corps of Engineers regulates dredge-and-fill operations in surface waters and wetlands of the State. NMED is statutorily (§ 74-6-4.E. NMSA 1978) charged to review each permit for conformance with State and federal law, regulations and water quality standards.

In addition to these federal programs, the State has developed several other mechanisms under WQCC regulations to protect surface water quality (**11**). Subpart I of these regulations contains a section which requires spill reporting and cleanup. Subpart II provides the basis for management of discharges to surface waters as well as for enforcement action against dischargers in violation of State or federal regulations.

The State operator certification and training program under 20 NMAC 7.4 improves operator expertise regarding treatment processes and treatment plant operation. This part also ensures that treatment plants are adequately staffed by operators with the requisite training. These requirements help to ensure that NPDES permit limitations or approved ground water discharge plan requirements are met by treatment plant discharges to surface watercourses or ground water, respectively.

20 NMAC 7.5 regulations are used in administration of a State revolving loan fund. This fund provides low-interest monies for local authorities such as cities, counties, sanitation districts and Indian tribes for wastewater treatment plant construction.

In addition to regulatory measures, the WQCC has also approved a nonpoint source management program. This program is largely based on the voluntary implementation of Best Management Practices (BMPs).

This chapter discusses the uses of the mechanisms mentioned above for surface water pollution control in New Mexico.

THE STATE ROLE IN THE NPDES PROGRAM

While NPDES permits for discharges in New Mexico are issued and enforced by the United States Environmental Protection Agency's (EPA) Region VI office located in Dallas, Texas, the State plays a significant role in this permit program[1]. NMED is statutorily (§ 74-6-4.E. NMSA 1978) charged with responsibility for certification of NPDES permits pursuant to CWA §401. NMED also receives a grant from the EPA to assist with the administration of the NPDES permit program.

Currently, there are 137 individual NPDES permits issued to dischargers in New Mexico (Figure 7). The number of NPDES permits increased moderately between 1984 and 1990 but stabilized in recent years. However, the number of permits is expected to increase dramatically upon implementation of the new NPDES sludge permitting program and when EPA begins permitting discharges into playa lakes.

[1] In 1991, EPA Region VI Offices in Dallas, Texas transferred their administrative responsibilities for NPDES permit program on the Navajo Reservation within New Mexico to EPA Region IX Offices in San Francisco, California.

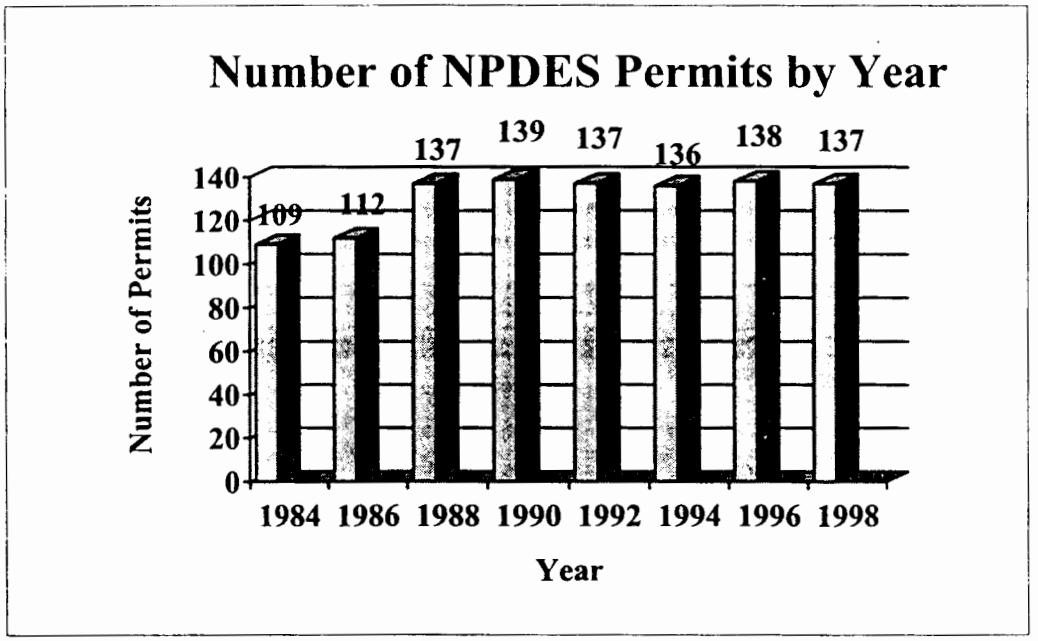


Figure 7. Number of NPDES Permits in New Mexico by Year.

Since 1992 EPA has issued 6 NPDES "general" permits in New Mexico. These permits are for: (1) onshore oil and gas extraction, (2) storm water (baseline construction activities), (3) storm water (baseline non-construction-industrial activities), (4) storm water (multi-sector industrial activities), (5) concentrated animal feeding operations and (6) underground storage tank (UST) remediation. EPA Region VIII (Denver) has issued a general permit on the Southern Ute Indian Reservation adjoining New Mexico's northern border for activities associated with coal bed methane gas development on the Reservation.

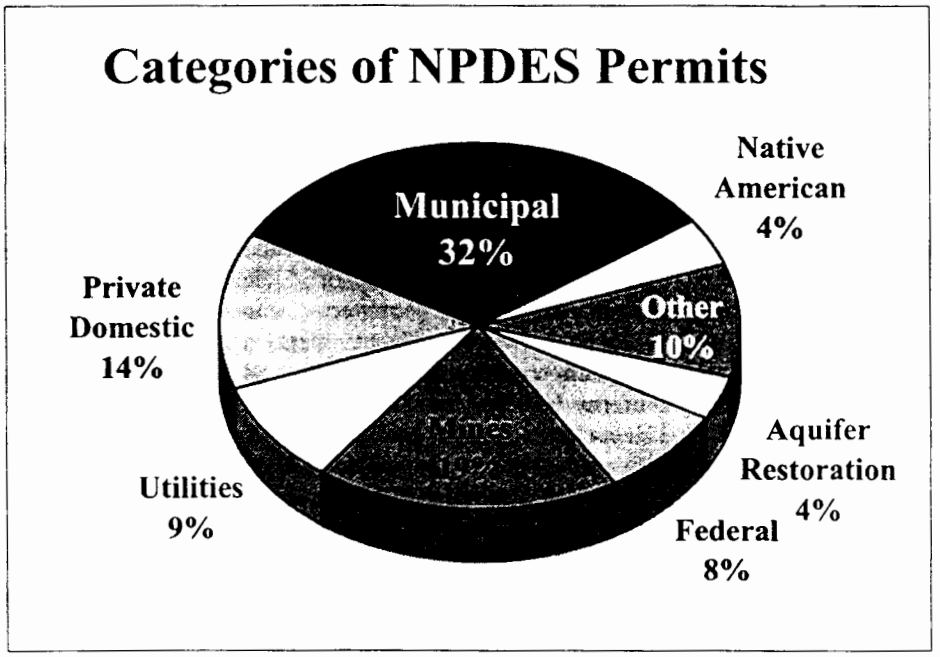


Figure 8. Distribution of NPDES Facilities by Activity.

Federal NPDES Permits

EPA categorizes NPDES permits as either "municipal" or "non-municipal." Municipal permits are issued for publicly-funded community wastewater treatment plants. Other discharges are classified as non-municipal. New Mexico is unique in that many of the non-municipal sources, often referred to as

"industrials," are small private domestic wastewater discharges (privately-owned sewage treatment plants) or mines rather than the types of discharges commonly assumed when the word "industrials" is used (Figure 8).

NPDES permittees are further categorized by EPA as either "major" or "minor" dischargers. Major municipal permittees are classified as such if they have a one million gallons a day or greater design flow capacity or, in a few instances, where design flow is less than a million gallons, they have other concerns such as water quality based effluent limits. Industrial permittees are classified based upon a number of factors which include, but are not limited to type of industry, chemical constituents in the discharge, or use designation of the receiving stream. There are currently [illegible] major municipal and nine major industrial permittees in New Mexico (Figure 9).

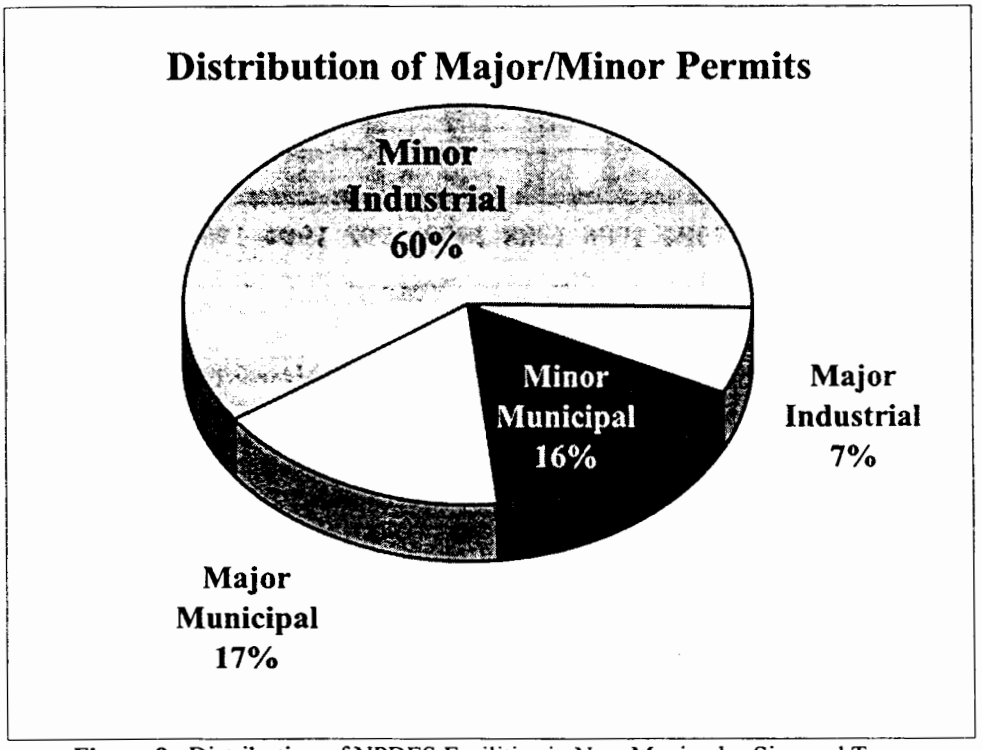


Figure 9. Distribution of NPDES Facilities in New Mexico by Size and Type.

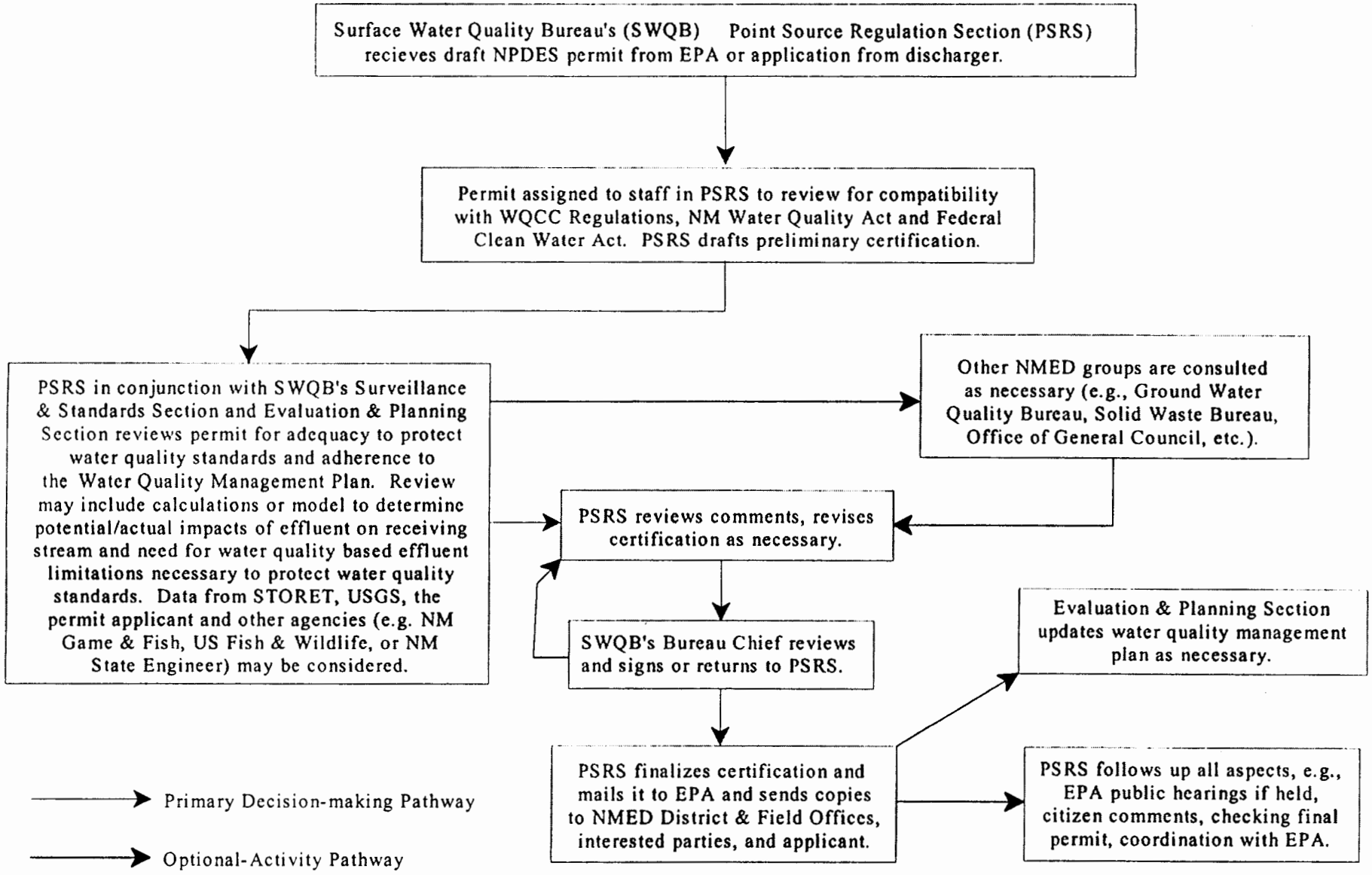
State Certification of NPDES Permits

Prior to issuing any NPDES permit in final form, EPA must first obtain from the State a certification that the proposed NPDES permit is consistent with State and federal requirements. NMED performs this task as a statutory responsibility. Through certification, NMED verifies that the conditions of the NPDES permit meet applicable provisions of the federal Clean Water Act as well as applicable State requirements such as water quality standards, and the water quality management plan (Figure 10).

One example of the importance of State certification relates to the State's concern that public health, irrigation waters, and livestock and wildlife be protected from the pathogens present in domestic sewage. The State water quality management plan consequently requires, as a condition of State certification, that permittees who discharge sewage effluent meet a maximum concentration of 500 fecal coliform bacteria per 100 milliliters effluent limit. A second example relates to permits issued in the San Juan River Basin which is part of the Colorado River Basin. For these permits, New Mexico requires the inclusion, as required by water quality standards, of certain conditions necessary to implement State surface water quality standards adopted to support the program and policy of the Colorado River Basin Salinity Control Forum. NMED also reviews proposed NPDES permits to ensure that "no toxics in toxic amounts" are in the effluent. This review is in response to the long-standing Congressional mandate that toxic pollutants be controlled. To this end, NMED has required a number of permittees to control chlorine in their final discharges. Some permittees have also received water quality-based effluent limitations to control specific metals (e.g., Las Cruces has a copper limit and Silver City a vanadium limit). These controls are necessary to implement the State's water quality standards.

Between October 1995 and September 1998, 4 major municipal, 1 non-municipal, five general NPDES permits and two sludge-only permits were reviewed for State certification.

Figure 10. **New Mexico Environment Department NPDES Permit Certification Process.**



State Administrative Assistance

NMED assists EPA in administering the NPDES permit program by reviewing self-monitoring data submitted by all NPDES permittees, providing program information and training to the public and permittees, and conducting inspections of permittees. NMED also assists EPA NPDES permit writers by providing technical information necessary to draft the permit. Information provided includes: data on critical low-flow of the receiving waters, water quality data for the receiving stream, water quality standards applicable to the receiving stream, and other site specific information. Information provided by the NMED helps expedite the permit issuance process. NMED prepared an interim guidance document for implementation of water quality standards through NPDES permits. That document assists NPDES permit writers with developing water quality based effluent limits. It also provides the NMED with a "yardstick" for certifying NPDES permits in a consistent manner.

As required by EPA policy, all active permitted facilities classified as major, whether municipal or non-municipal, should be inspected annually by either EPA or NMED. This effort is coordinated by the two agencies at the beginning of each year to minimize overlap. Since neither agency has resources to inspect every minor discharge each year, NMED uses a priority list to direct inspection efforts among these facilities. The priority list is based upon the date of last inspection; those facilities that have gone the longest without inspection receive higher priority.

NMED conducts four types of compliance inspections at permitted facilities as part of its contractual assistance to EPA:

- **Compliance Evaluation Inspection:** Designed to verify NPDES permittee compliance with self-monitoring requirements and compliance schedules, the compliance evaluation inspection is based on record reviews and a visual examination of treatment facilities, effluent, and receiving waters.
- **Compliance Sampling Inspection:** In addition to the tasks and objectives summarized above, a compliance sampling inspection includes analysis of effluent quality. Effluent samples are collected and flow measurements are verified by NMED. Data from an inspection may be used to verify accuracy of the self-monitoring report or as evidence in enforcement proceedings. Samples of the receiving stream above and below the outfall are also collected in most instances in order to evaluate the actual chemical impact of the effluent on the stream thus insuring the environmental efficacy of the NPDES permit.
- **Performance Audit Inspection:** A performance audit inspection is conducted primarily to evaluate the NPDES permittee's sampling and laboratory procedures. In addition to verifying the permittee's reported data and permit compliance through a check of the records, NMED staff actually observe the permittee going through the steps of the self-monitoring process from collecting samples and measuring flow through laboratory analysis, data processing, equipment calibration, and report preparation.
- **Reconnaissance Inspection:** A reconnaissance inspection is an abbreviated inspection often used to determine the general status of a facility or to focus on only one aspect (e.g., effluent quality) of compliance without performing a complete review. In the last biennial, the NMED developed two additional subcategories of reconnaissance inspections. These new categories are for facilities operating under the EPA general permits for storm water and for "sludge only" facilities [2].

Between October 1995 and September 1998 NMED conducted 54 compliance evaluation inspections, 26 compliance sampling inspections, 8 reconnaissance inspections of individual NPDES permittees, 124 reconnaissance inspections of facilities discharging under a storm water general permit, and 1 reconnaissance inspections of confined animal feeding operations for EPA. In the same period EPA also conducted 46 compliance evaluation inspections. NMED also assisted EPA with follow-up to these inspections by providing requested information and participating in enforcement meetings between EPA and permittees.

Pretreatment

'Pretreatment' refers to treatment of waste before it enters a wastewater treatment plant in order to remove, or make less harmful, certain components of that waste. A municipality is responsible for regulating what comes into its wastewater treatment plant and ensuring that: (1) the effluent limits specified in its NPDES permit are met; (2) its sludge does not become contaminated; and (3) its treatment processes are not upset by incoming waste.

While most municipalities have adopted some industrial waste ordinance, certain larger communities or communities with specific industrial users connected to their sewer systems are further required to adopt an EPA-approved pretreatment program. In general, industrial or sewer- use ordinances, unless incorporated into a formal pretreatment program under the NPDES permit program, are poorly enforced by the municipality. Pretreatment programs under the NPDES permit tend to be better enforced because the municipality has proper operation of the program as a requirement in its NPDES permit. Moreover, the pretreatment program itself is subject to EPA inspections and is, therefore, subject to EPA enforcement if it is not administered correctly.

Currently, five New Mexico communities - Albuquerque, Santa Fe, Las Cruces, Farmington, and Roswell - have EPA-approved pretreatment programs in their NPDES permits.

[2] The term *sludge-only facilities* refers to treatment works treating domestic sewage that are not otherwise required to obtain an NPDES permit for discharges of effluent into a "*waters of the United States*". Sludge-only facilities are required to meet federal regulations adopted under CWA § 405 that are published in the Code of Federal Regulations (40 CFR 503). Examples of sludge-only facilities in New Mexico are Clovis and Hobbs.

Present and Emerging Concerns

Sewage Sludge

On February 19, 1993, the EPA published a new rule for sludge disposal, codified at 40 CFR 503. The new regulations are comprehensive in their approach to environmental protection. They increase the responsibilities of sludge generators in regard to the disposition of their sludge. The regulations are also designed to encourage beneficial reuse of the sludge. Coordination of the federal regulation with state ground water protection regulation is ongoing.

The New Mexico Solid Waste Management Regulations (12) also govern sludge disposal at landfills. Sludge disposal is allowed in landfills provided it meets certain criteria. These criteria should ensure environmentally safe disposal of sludge at landfills.

A demonstration project by the US Forest Service and the City of Albuquerque won an EPA award. The project demonstrated the value of land applying treated sludge or "biosolids" in rangeland reclamation. Improved vegetative cover as well as increases in desirable plant species and decreases in undesirable species was demonstrated. A separate but similar demonstration project showed essentially no runoff from sloped lands that had been treated with biosolids. Control of runoff reduces soil erosion which may adversely impact future land use and prevents sedimentation of nearby streams.

Overall, in 1998, 25% of the biosolids generated by New Mexico's wastewater treatment facilities was beneficially reused, mainly due to the aforementioned demonstration projects. Several smaller cities are beneficially reusing 100% of their biosolids. Increased compliance with sludge regulations and improvements in sludge treatment encouraged by the regulations is providing communities greater opportunities to dispose of their biosolids in beneficial ways rather than in a landfill. Increasing the beneficial reuse of biosolids remains an important aspect of the State's wastewater program.

Storm Water

The federal Water Quality Act (WQA) of 1987 added § 402(p) to the CWA. Section 402(p) of the CWA requires the EPA to establish phased and tiered requirements for storm water discharges under the NPDES program. In 1990, EPA promulgated regulations which established permitting requirements, including deadlines, for certain storm water discharges associated with industrial activity, and discharges from municipal separated storm sewer systems (MS4s) serving a population of 100,000 or more. These are commonly known as phase I facilities. Most other dischargers of pollutants in storm water to navigable waters from point sources (phase II facilities which include commercial, retail and institutional facilities, construction activities under five acres, and MS4s serving populations of less than 100,000), have until August 7, 2001 to submit NPDES permit applications.

To this end, EPA originally developed a four-tier approach to permitting storm water discharges. The following is a summary of EPA's risk-based permitting strategy:

Tier I: Minimum baseline general permit for most discharges;

Tier II: Watershed permitting - target facilities within adversely impacted watershed for individual or watershed-specific permits;

Tier III: Industry specific permitting - industrial categories will be targeted for individual or industry-specific general permits; and

Tier IV: Facility-specific permitting - target individual facilities causing particularly severe impacts for individual permits.

This approach has resulted in the issuance (by EPA) of a very limited number of individual permits, two baseline general permits (one for five or more acre construction activities, one for all other phase I industrial facilities) in 1992, and one industry specific multi-sector permit which covers 29 industrial groups, in 1995. The construction general permit expired in 1997 and was re-issued in 1998. The baseline industrial general permit expired in 1997 and has been replaced with the multi-sector general permit which was modified extensively in 1998 and now covers 30 industrial groups. EPA has yet to issue a pending MS4 permit to the City of Albuquerque, which is the only New Mexico community that currently meets the phase I criteria.

This program has significantly increased the burden on state, and to some extent, local government agencies, especially in the area of public outreach regarding permitting, implementation of appropriate storm water runoff control practices, and other requirements of this program. In addition, MS4 operators are required to establish a comprehensive storm water management program to control pollutants from the MS4 which includes controls on the quality of storm water discharges from industrial (including construction) sites, identification and prohibition of illicit discharges to the MS4, and controls of spills, dumping and disposal of materials other than storm water into the MS4.

However, it is anticipated that the reduction of pollutant loads in storm water runoff from facilities regulated under this NPDES program, in combination with efforts to reduce other diffuse sources of water pollution, such as through State Nonpoint Source Control Programs developed under § 319 of the CWA, should ultimately help alleviate a significant cause of water quality impairment in New Mexico.

Discharge of Toxic Pollutants

The United States Congress, in its 1972 adoption of the Clean Water Act, stated "... it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited" [CWA §101(a)(3)]. The Congress in 1987

amended CWA § 303(c) requiring that each state adopt standards for any of a specific list of toxic pollutants, "...the discharge or presence of which in surface waters can reasonably be expected to interfere with the designated uses adopted by the state." These standards must be numeric criteria if such criteria have been published pursuant to CWA § 304(a). If no criteria have been published, standards must be based on biological monitoring or assessment methods. The State completed its adoption of water quality standards to meet the CWA § 303(c) requirements in 1991 and these standards were subsequently approved by EPA.

Adoption of numeric standards for toxic pollutants led to greater emphasis at both the state and federal levels on "water quality-based permitting." Water quality-based permitting, simply stated, is the development of NPDES permit limits necessary to assure that the water quality standards of a receiving stream are protected. Table 12 lists all current individual NPDES permits in New Mexico including the pollutants that are regulated in each permit and the basis of the effluent limitation. The table demonstrates the increase in water quality-based effluent limits in permits issued since the 1987 amendments to the CWA. In particular, after 1987 the number of permits with chlorine, a toxicant to fish, increases dramatically. Subsequent to the adoption of the 1991 water quality standards, the number of water quality-based limits addressing other pollutants in NPDES permits has greatly increased.

As a result of this "water quality-based" permitting strategy, the workload on both EPA and the State in proposing and certifying NPDES permits has increased dramatically. This increase is primarily due to the increased modeling of the effects of a permittee's discharge on the receiving stream (i.e., determination of potential to cause a water quality standard violation) and appeals by permittees suddenly faced with more stringent effluent limits in their renewed permits. It is expected that water quality-based permitting will continue to be controversial.

Contaminated Aquifer Remediation

The NMED underground storage tank program has identified a number of leaking underground storage tanks that have contaminated ground water several of which have also threatened surface waters. Rapid containment is often used at high-priority sites to reduce spreading of the contaminant plume, thereby protecting water supply wells, sewer collection lines, surface watercourses, homes and other structures from contamination. Containment and some remediation technologies include pumping, treating, and disposing of treated ground water. Disposal options are varied and site-specific, but may include reinfiltration, discharge to a sanitary sewer, or direct discharge to a watercourse. Recommended remediation strategies emphasize cleanup of the source area and include a variety of technologies mentioned in an earlier section of this report, many of which are *in situ* technologies.

Discharge to a sanitary sewer must be made with permission of the sewer authority which has the right to control or prohibit such discharge. The sewer authority, upon acceptance of the wastewater, becomes responsible for any effect that it might have on their system and any pollutants which 'pass through' their facility and effect the receiving stream. Some communities have elected to accept this kind of discharge conditionally, while others have expressly prohibited it.

In order to legally discharge directly to a watercourse, an NPDES permit must be secured prior to initiation of the discharge. Frequently, hydrologic containment procedures and pump tests must be initiated sooner than an individual permit can be issued. In an attempt to resolve this problem EPA issued a general NPDES permit for this category in 1998 to allow discharge more expeditiously.

COMMUNITY WASTEWATER FACILITY CONSTRUCTION GRANTS/LOANS

The wastewater construction grants program has been phased out and grants have not been offered since December 31, 1988. Prior to this date, the State and federal governments provided grants to communities for planning, design, and construction of wastewater treatment facilities to reduce and prevent water pollution and meet enforceable requirements of the federal Clean Water Act. NMED administered this program under delegation from EPA. In conformance with EPA regulations governing federal funding for treatment plant construction, NMED prioritized construction of treatment works which more directly reduced or prevented water pollution over construction of interceptors and collection systems. NMED also administered State matching funds for the federal construction grants program as well as special State appropriations for wastewater treatment. The wastewater construction program has been replaced by the **State Revolving Loan Program**, discussed later in this chapter.

DREDGE-AND-FILL PROGRAM

Dredge-and-fill activities, such as channelization, diversion and levee building, are regulated through permit by the United States Army Corps of Engineers. A discussion of how New Mexico utilizes this program in water pollution control is presented below under the **State Nonpoint Source Water Pollution Management Program.**

Table 12. NPDES Permits in New Mexico

Facility Name	NPDES Permit #	Year Issue	BOD	TSS	pH	COD	Chlorine	Fec Col	O&G	NH_3	NO_3	TKN	P	Salt	Al	As	Ag	B	Se	CN	Co	Cd	Cr	Cu	Fe	H-3	Hg	Mn	Mo	Ni	Pb	Ra	Se	U	V	Zn	WET	BIO-MON.	D.O.	Chlordane	Gross alpha	Temp	Sett Sols	Other
Albuquerque	NM0022250	1994	■	■	■		●	♦		●	●				●	●	●			●																	●		●					
Alto de las Flores	NM0028819	1985	■	■	■			♦																																				
Anthony	NM0029629	1987	■	■	■			♦																																				
Artesia	NM0022268	1995	■	■	■		●	♦							●					●				●			●						●					○						
Aztec	NM0020168	1999	■	■	■		●	♦						○																								○						
Belen	NM0020150	1997	■	■	■		●	♦																														○						
Bernalillo	NM0023485	1988	■	■	■			♦																																				
Bloomfield	NM0020770	1995	■	■	■		●	♦						○																								○						
Bosque Farms	NM0030279	2000	■	■	■		●	♦		○																											●							○
Carlsbad	NM0026395	1995	■	■	■		●	♦																			●										●							
Chama	NM0027731	1989	■	■	■		●	♦																																				
Cloudcroft	NM0023370	1988	■	■	■			♦																																				
Cuba	NM0024848	1989	■	■	■			♦																																				
Espanola	NM0029351	1990	■	■	■		●	♦																														○						
Farmington	NM0020583	1999	■	■	■		●	♦						○	●																							○						
Fort Sumner	NM0023477	1989	■	■	■		●	♦																																				
Gallup	NM0020672	1995	■	■	■		●	♦						○																														
Hatch	NM0020010	1989	■	■	■		●	♦																																				
Jemez Springs	NM0028011	1985	■	■	■			♦																																				
Las Cruces	NM0023311	1995	■	■	■		●	♦							●									●									○				●							○
Las Vegas	NM0028827	1988	■	■	■		●	♦																																				
LA Co White Rock	NM0020133	1989	■	■	■		●	♦																																				
LA Co Bayo	NM0020141	1995	■	■	■		●	♦									○																					○						
LA Co Westgate	NM0028991	1985	■	■	■			♦																																				
Los Lunas	NM0020303	1988	■	■	■			♦																																				
Maxwell	NM0029149	1989	■	■	■		●	♦																																				
Mora	NM0024996	1988	■	■	■		●	♦		●																																		
Pecos	NM0029041	1988	■	■	■		○	♦																																				
Ramah	NM0023396	1986	■	■	■			♦																																				
Raton	NM0020273	1997	■	■	■		●	♦																														○						
Red River	NM0024899	1995	■	■	■		●	♦							●												●											○						
Reserve	NM0024183	1989	■	■	■		●	♦																																				
Rio Rancho #2	NM0027987	1990	■	■	■		●	♦		■					○	○	○	○	○	○	○	○	○	○			○				○	○	○		○	○		○	○	○				○
Rio Rancho #3	NM0029602	1988	■	■	■			♦																																				
Roswell	NM0020311	1989	■	■	■		●	♦																																				
Ruidoso	NM0029185	1994	■	■	■		●	♦												●							●				●								○						
San Miguel Co.	NM0028363	1985	■	■	■			♦																																				
Santa Fe	NM0022292	1988	■	■	■			♦			●	○																																
Santa Rosa	NM0024988	1985	■	■	■			♦																																				
Silver City	NM0020109	1993	■	■	■			♦																											●									
Socorro	NM0028835	1994	■	■	■		●	♦									●		●	●											●							○						
Sunland Park	NM0029483	1987	■	■	■			♦																																				
Taos	NM0024066	1995	■	■	■		●	♦																									●					○						
T or C	NM0020681	1995	■	■	■		●	♦							○																							○						
Tucumcari	NM0020711	1989	■	■	■		●	♦																																				
Twining	NM0022101	1995	■	■	■		●	♦		●			●																									○						

● = Indicates a numeric water quality based NPDES effluent limitation.
○ = Indicates an NPDES requirement to monitor & report the concentration but for which there is no effluent limitation. All monitoring requirements may not be shown.
■ = Indicates a technology based effluent limitation (BPT/BAT or BPJ)
♦ = Indicates an effluent limit based upon the NM Water Quality Management Plan
BOD = Means either Biochemical Oxygen Demand (5 day) or Carbonaceous Biochemical Oxygen Demand (5 day).
COD = Chemical Oxygen Demand
Chlorine - Note most water quality based effluent limits are "total residual chlorine." Some technology based limits are "free available chlorine."
O & G = Oil and Grease
WET = Whole Effluent Toxicity Limitation
Salt = Per policies established by the Colorado River Basin Salinity Control Forum.
Ra = generally means Ra 226 + 228 but some permits require only Ra 226
Other = this category covers uncommon parameters (e.g., sulfite that occurred in only one permit or as in some cases requirements to analyze a number of organic pollutants).

Effluent limitations are listed if they occur anywhere in a permit. In permits where there are multiple outfalls, all limits may not apply at all outfalls. In some cases the effluent limitation may not be in effect if a permittee has been allowed a schedule of compliance or has seasonal limits as provided under sections 1106.D and 1105.B. (respectively) of the New Mexico *Standards for Interstate and Intrastate Streams*. It should also be noted that for some facilities not all water quality based limitations are applicable at all times. For example, Chino Mines' permit generally prohibits any discharge except in certain defined instances involving storm events; when discharges are allowed the water quality based effluent limits are applicable.

Table 12.

NPDES Permits in New Mexico, Continued.

Facility Name	NPDES Permit #	Year Issue	BOD	TSS	pH	COD	Chlorine	Fec Col	O&G	NH_3	NO_2	TKN	P	Salt	Al	As	Ag	B	Be	CN	Co	Cd	Cr	Cu	Fe	H-3	Hg	Mn	Mo	Ni	Pb	Ra	Se	U	V	Zn	WET	BIO-MON.	D.O.	Chlordane	Gross alpha	Temp	Sett Sols	Other
Arco	NM0027995	1978		■	■																																							
Ariz. Pub. Serv.	NM0000019	1988		■	■		■		■					○										■	■													○				■		■
Armendaris RV	NM0029777	1990	■	■	■		●	♦																																				
Arroyo Hondo	NM0029823	1989			■	■																			■						■													■
ATSF	NM0000078	1986		■	■				■																																			■
Bloomfield Sch.	NM0028142	1986	■	■	■			♦																																				
Cent. Cons. Sch.	NM0029319	1986	■	■	■			♦																																				
Cent. NM Correction	NM0028851	1987	■	■	■			♦																																				
Cervantes	NM0030261	1990	■	■	■	■		♦																																				
Chino Mines	NM0020435	1993	■		■										●	●		●				●	●	●			●				●	●	●		●	●								
Cloud 9, Ltd.	NM0028061	1976	■	■	■			♦																																				
Cobiss Person	NM0030376	2000			■		●			○													■													■								■
Consol. Coal	NM0028584	1986		■	■									○											■																		■	
Delta Env. - Duke	NM0029807	1989			■	■	○				○				■	○	○	○	○		○	○	○	○	■		○	○	○	○	■		○		○	○					○		■
Delta Env. - Sham.	NM0029688	1989	■		■	■	○			●	●				○	○	○	○	○		○	○	○	○	■		○	■	○	○	■		○		○	○					○		■
El Paso Electric	NM0000108	1987	■	■	■		■		■																																■		■
Farm. Anim. Stm.	NM0000043	2000		■	■				■					○																											■		
Farmington S&G	NM0028258	2000		■	♦									○																													B
Gadsden School	NM0028487	1978	■	■	■			♦																																				
General Electric	NM0000159	1988				○			■																																			○
Glorieta Con. Cen.	NM0028088	1985	■	■	■			♦	■																																			
Harper Valley	NM0029025	1985	■	■	■			♦						○																														
Holloman AFB	NM0029971	2000	■	■	■		●	♦																														○						
Rio Grande Cement	NM0000116	2000		■	■				■						●			●						●			●		●							●						■		B
Jemez Val. School	NM0028479	1985	■	■	■			♦																																				
Lee Ranch Coal	NM0029581	1986		■	■																				■			■														■		
Los Alamos Nat.	NM0029637	1987		■	■		●																																					
DOE/UC - LANL	NM0028355	1993	■	■	■	■	●	♦	■	○	○		■		●	●	■	●				●	●	●	■	●	●				●	●	●		●	●								■
Los Ranchos	NM0029378	1986																																										
Marquez Develop.	NM0028215	1993													●	●		●				●	●	●			●				●		●		●									
Medite Corp.	NM0029718	1988	■	■	■	■			■			■																																
Molycorp	NM0022306	1993		■		■	●								●	■	●		○	●	○	●		●	■		●	■	■		●					■		○		●				■
Nat. Amer. Prep.	NM0029289	1986	■	■	■			♦																																				
NMGFD Parkview	NM0030139	1994		■	■					○	○	○	○																												○	■	
NMGFD Glen.	NM0030163	1994		■	■					●	○	○	○																												○	■	
NMGFD Rock	NM0030155	1994		■	■					○																															○	■	
NMGFD Sav. Spr	NM0030112	1994		■	■					○	○	○	○																												○	■	
NMGFD Lisboa	NM0030121	1994		■	■					○	○	○	○																												○	■	
NMGFD Red Riv.	NM0030147	1994		■	■					○																															○	■	
NMPRD E. Butte	NM0024937	1985	■	■	■			♦																																				
Pegasus Gold	NM0028711	1987			■																							○																○
P&M Ancho	NM0030180	1995		■	■		●			○					●	●		●			●	●	●	●	■	●	●				●	●	●		●	●				●		■	
P&M York Canyon	NM0000205	1985		■	■				○																■						○												■	○
P&M Cimarron	NM0029459	1986		■	■																				■																		■	
Plains Electric	NM0000132	1987			■		■																																		■		
Pojoaque Terr.	NM0028436	1987	■	■	■			♦																																				
PNM Sangre	NM0000191	1974		■	■										■										■			■																
PNM Reeves	NM0000124	1990		■	■		■		■																																■		
PNM San Juan	NM0028606	1994		○	○		○		○		○		○		○	○	○	○	○	○	○	○	○	○	○		○	○	○		○		○			○	No discharge is allowed (see footnote)							○
Quivira	NM0020532	2000		■	■	■																										■	●	■	●	■								
Rancho Ruidoso	NM0029238	1989	■	■	■		●	♦																																				
Raton Pub. Serv.	NM0026522	1988		■	■		■		■															■	■																			
Rio de Arenas	NM0027375	1990	■	■	■		●	♦																																				
Rio Grande Res.	NM0028100	2000	■	■	■	■		♦							●			●			●	●	●	●			●		●		●	■	●	■	●	■				●				
Rio Grande Utils.	NM0027782	1987	■	■	■			♦																																				
Rio Pecos Villa	NM0028134	1976	■	■	■			♦																																				
Ruidoso WTP #1	NM0029335	1986		■	■		●																																					
Ruid. WTP Alto	NM0028533	1986		■	■																																							
San Juan Coal	NM0028746	1987		■		■		♦	■					●											■																			
San Juan Coal	NM0029505	1986		■	■									○																												■		
San Juan Con.	NM0000027	1974		■	■																																							
Sandia Peak	NM0027863	1987	■	■	■			♦																																				
St. Cloud Mining	NM0029050	1987		■	■																			■			■				■													
Siemens	NM0029394	1991		■					■																																			
Southwest. Pub.	NM0029131	1983					■																																		■			
Santa Teresa	NM0030201	1995	■	■	■		●	♦																			●											○						
United Nuclear	NM0020401	1986		■	■	■								○														○	○			■	○	■	○	■					○		○
Uranium King	NM0028169	1993	■	■	■	■		♦																							■	■		■	●	■								
Utah International	NM0028193	1993		■	■									○											■			■															■	
Valle Vista	NM0028614	1985	■	■	■			♦																																				
Village Supermkt.	NM0029785	1989			■	■														●		●			■						■													■
Tim Watson	NM0029487	1986	■	■	■	■		♦																																		■		
Yampa Gateway	NM0029475	1986			■									○																														
Yampa De Na Zin	NM0029432	1987			■									○																														

Facility Name	NPDES Permit #	Year Issue	BOD	TSS	pH	COD	Chlorine	Fec Col	O&G	NH_3	NO_3	TKN	P	Salt	Al	As	Ag	B	Be	CN	Co	Cd	Cr	Cu	Fe	H-3	Hg	Mn	Mo	Ni	Pb	Ra	Se	U	V	Zn	WET	BIO-MON.	D.O.	Chlordane	Grease alpha	Temp	Salt Sols	Other
BIA Crystal Sch.	NM0020869	1974	■	■	■			♦																																			○	
BIA Ft. Wingate	NM0020958	1986	■	■	■			♦						○																														
BIA Jicarilla	NM0028751	1989	■	■	■		●	♦						○																														
BIA Lake Valley	NM0021016	1986	■	■	■			♦						○																														
BIA Nenahnezad	NM0020600	1986	■	■	■			♦						○																														
BIA Pueb. Pintado	NM0020991	1986	■	■	■			♦						○																														
BIA Stand. Rock	NM0020982	1986	■	■	■			♦						○																														
BIA Torreon Day	NM0020974	1986	■	■	■			♦																																				
NTUA Navajo	NM0020613	1975	■	■	■			♦																																			○	
NTUA Shiprock	NM0020621	1993	■	■	■		●	♦						○																								●						
NTUA Crownpoint	NM0020630	1985	■	■	■			♦						○																														
USDI Mescal. Fish	NM0021997	1987		■	■			♦																																			■	
Cochiti Pueblo	NM0029831	1989	■	■	■		●	♦																																				

● = Indicates a numeric water quality based NPDES effluent limitation.
○ = Indicates an NPDES requirement to monitor & report the concentration but for which there is no effluent limitation. All monitoring requirements may not be shown.
■ = Indicates a technology based effluent limitation (BPT/BAT or BPJ)
♦ = Indicates an effluent limit based upon the NM Water Quality Management Plan
BOD = Means either Biochemical Oxygen Demand (5 day) or Carbonaceous Biochemical Oxygen Demand (5 day).
COD = Chemical Oxygen Demand
Chlorine - Note most water quality based effluent limits are "total residual chlorine." Some technology based limits are "free available chlorine."
O & G = Oil and Grease
WET = Whole Effluent Toxicity Limitation
Salt = Per policies established by the Colorado River Basin Salinity Control Forum.
Ra = generally means Ra 226 + 228 but some permits require only Ra 226
Other = this category covers uncommon parameters (e.g., sulfite that occurred in only one permit or as in some cases requirements to analyze a number of organic pollutants). A "B" indicates BMP requirements.
PNM San Juan (NM0028606) This permit requires "no discharge allowed" however it also provides that if there is an unexpected discharge it must be monitored.

Effluent limitations are listed if they occur anywhere in a permit. In permits where there are multiple outfalls, all limits may not apply at all outfalls. In some cases the effluent limitation may not be in effect if a permittee has been allowed a schedule of compliance or has seasonal limits as provided under sections 1106.D and 1105.B. (respectively) of the New Mexico *Standards for Interstate and Intrastate Streams*. It should also be noted that for some facilities not all water quality based limitations are applicable at all times. For example, Chino Mines' permit generally prohibits any discharge except in certain defined instances involving storm events; when discharges are allowed the water quality based effluent limits are applicable.

STATE WATER QUALITY PROTECTION REGULATIONS

Spill Cleanup

The State spill cleanup regulation, §1203 of the WQCC Regulations, requires prompt notification to NMED or, as appropriate, the New Mexico Energy, Minerals and Natural Resources Department's Oil Conservation Division (OCD) of any unpermitted discharge or spill potentially affecting ground or surface water. This regulation also requires the discharger to take corrective action to remediate the problem. Section 1203 is routinely employed to effect cleanup of spills to surface water, often in conjunction with § 2201 of the regulations, which prohibits disposal of refuse in a watercourse.

Discharges to Surface Waters

State regulations for discharge to surface waters (Subpart II) are another mechanism for surface water pollution control. These regulations set discharge limits for biochemical oxygen demand, chemical oxygen demand, settleable solids, fecal coliform bacteria, and pH. The WQCC has, to date, determined that the federal NPDES permit program will be the primary mechanism for regulating point source discharges to surface waters in New Mexico. The WQCC has historically opposed the 'dual regulation' that would occur if the State were to have a separate State discharge permit. Accordingly, the WQCC regulations apply to discharges with an NPDES permit only if the discharger has not corrected violations of NPDES permit limitations within thirty days after receipt of written notification of such violations from EPA. The State regulations are also the means for regulating dischargers who have applied for but have not yet been issued NPDES permits and dischargers with expired NPDES permits who have not yet applied for renewal.

A general permit was issued by the EPA in 1993 which controls discharges from concentrated animal feeding operations in New Mexico. Under the federal permit, no discharges are allowed except during certain major rainfall events. This permit requires the retention and proper disposal of wastewater and contaminated runoff from large cattle and dairy feeding operations, as well as horse, swine, and poultry feeding operations and other large concentrated animal feeding operations. Currently there are approximately fifty facilities permitted under the EPA's general permit.

Utility Operator Certification and Facility Operations

Regulations for classification of utility systems and certification of utility operators (20 NMAC 7.4) were adopted by the WQCC in 1974 and subsequently amended in 1993 in response to the requirements of the New Mexico Utility Operators Certification Act (§§ 61-30-1 et seq., NMSA 1978). The regulations classify public water and wastewater utility systems according to the population served and technical complexity of the utility system. These regulations require that operators be certified at appropriate levels of proficiency, depending upon system classification. The WQCC has assigned responsibility for implementing the Certification Act to NMED. The program receives general guidance from the New Mexico Utility Operators Certification Advisory Board.

Certification

Over 2,100 water and wastewater operators were certified by NMED in 1999. Because many operators hold both water and wastewater certificates, over 2,800 certificates are in effect today. Over 1,000 examinations for certification and recertification given on an annual basis in 1998 and 1999. Approximately 1,800 public water and wastewater utilities are required to have certified operators. Working with the Utility Operators Certification Advisory Board and panels of operators, supervisors and trainers from around the State in 1999 and 2000, NMED is updating the criteria documents used to guide operator training and validate examinations for all levels of utility operator certification.

Training Activities

Through funding under the federal Safe Drinking Water Act, the CWA, and the State Water Conservation Fund Act, statewide training activities have increased in the past few years. NMED assists the various training providers in the State in planning efforts to improve operator training availability and quality. NMED has also continued to fund the New Mexico State University Water Utilities Technical Assistance Program. This program conducts specialized workshops in the various geographic regions of the State and provides technical assistance to operators' "short schools" sponsored by the New Mexico Water and Wastewater Association. The program also provides essential on-site technical outreach assistance and consultation for the resolution of municipal water and wastewater facility problems related to operations. In 1998 and 1999, NMED continued its productive coordination with this training program in both the performance of diagnostic inspections and the provision of technical assistance.

NMED reviews and approves training toward operator certification requirements, based on criteria adopted by the Advisory Board. Slightly more than 40,000 trainee contact hours were reported to NMED during 1999. NMED staff also participate in and conduct several training sessions offered throughout the year.

Facility Operations

NMED reviews the operations and maintenance manuals prepared for new wastewater projects funded through the federal and State programs administered by the NMED Construction Programs Bureau. These reviews help ensure that the project's consulting engineer has provided necessary training for facility personnel, that each community will be informed of applicable State and federal water pollution control laws and its responsibility as a grant recipient to

comply with these laws, and that staffing plans will be adequate for the size and complexity of the facility.

NMED has participated in several operations and management evaluations in conjunction with EPA since 1986. These inspections are conducted to evaluate NPDES permit compliance as well as the operations, maintenance and financing of wastewater facilities built with federal and State funds. In recent years, NMED has taken a lead role in these evaluations in an effort to address the inadequate operations and maintenance of wastewater treatment facilities. Such inadequacies are often a major factor in permit noncompliance.

Enforcement

In 1998 and 1999, compliance surveys were conducted on 350 public water and wastewater facilities. Of these, a majority were found to be in compliance with the Utility Operator Certification Regulations. About half the cases of non-compliance and marginal compliance are temporary, and are caused by the movement of certified operators from one facility to another.

Facilities found to be below necessary staffing are allowed to operate under negotiated compliance schedules designed to bring them into total compliance by specified dates. NMED is currently monitoring voluntary compliance schedules with several communities found to be noncompliant in surveys conducted in 1999. These systems include municipal, privately owned, as well as State and federal facilities.

EPA has included operational and staffing deficiencies as items which must be rectified under its administrative orders issued against noncompliant NPDES permittees. This has allowed compliance with State certification requirements to be incorporated directly into enforcement actions designed to address instances of poor permit performance resulting from unsatisfactory facility operations.

Future Directions and Needs

Some modifications in the State's utility operator certification program will be required to bring it fully in line with national standards contained in the *Guidelines for the Certification and Recertification of the Operators of Community and Nontransient Noncommunity Public Water Systems*, as adopted by EPA in 1999. These changes will include minor alterations to the regulations, and complete documentation of policies and procedures. Additional improvements to operator training quality and availability are needed to assure public water and wastewater utility operators are well qualified.

State Revolving Loan Program

Through enactment of the Wastewater Facility Construction Loan Act (§§ 74-6A-1 et seq., NMSA 1978), which was signed into law in 1986, the New Mexico Legislature created a revolving loan fund. The purpose of the Loan Act "is to provide local authorities in New Mexico with low-cost financial assistance in the construction of necessary wastewater facilities through the creation of a self-sustaining revolving loan program so as to improve and protect water quality and public health." Regulations (20 NMAC 7.5) pursuant to the State Loan Act have been adopted by the WQCC. In addition, the State has developed policy, procedures, guidelines, and a priority ranking system for use in administration of the State loan program.

The revolving loan fund is administered by NMED. State money appropriated to the Department to carry out the provisions of the Loan Act (i.e., loans to local authorities) may be used to match federal funds allocated to New Mexico pursuant to the CWA. Federal capitalization grants and loan principal and interest repayments are deposited into the fund. Proposed construction projects are prioritized and then funded based on the availability of federal and State funds. In 1993 the WQCC lowered the base interest rate for new loans to 4%, and included provisions for 3% interest and 0% interest loans for hardship communities which meet certain criteria. The base interest rate for Fiscal Year 1998 remains four percent.

New Directions: Loans under this program are now available to assist local governments and other sub-state entities which implement BMPs to protect water quality from nonpoint source impacts. NMED is developing procedures to include nonpoint source and Brownfields type projects, along with point source projects, on an integrated priority list for loan funding.

Colonias Wastewater Construction Grant Program

One of the more serious environmental concerns facing New Mexico is along its southern border with the Republic of Mexico. Rapid industrial growth driven by unprecedented trade opportunities, along with burgeoning concentrations of people in the neighboring large cities of Ciudad Juárez, Mexico and El Paso, Texas, have created serious conditions in nearby New Mexico. Congestion, uncontrolled urban development, and lack of basic environmental health and sanitation facilities have become significant problems in many communities on both sides of the border.

In the United States, many unincorporated communities or settlements, called colonias, have sprung up adjacent to established towns and cities along the border. Colonias are home to several hundred-thousand people in Texas and at least 40,000 in New Mexico. They are characterized by substandard housing, inadequate roads and drainage, and inadequate or non-existent environmental infrastructure systems such as potable water supplies or regulated wastewater treatment facilities. Currently less than seven percent of New Mexico's colonias are served by licensed

and monitored wastewater treatment systems. The rest of the colonias are served by on-site cesspools, septic tanks with leach fields or outhouses. Approximately 20% of the colonias in New Mexico have no water supply systems.

Many of the colonias were originally settled over 200 years ago and represented established and stable communities. However, the rapid growth and development in the border area over the last two decades has brought significant change to the population dynamics of the region. The majority of current colonia inhabitants are first and second-generation low-income migratory families of Mexican descent. Parts of six New Mexico counties are within the 100 kilometer (62-mile) designated border area. This includes Otero, Doña Ana, Sierra, Luna, Grant and Hidalgo counties. Many colonias, with their concentrations of people and concurrent health and environmental concerns, occur along the 44 mile stretch of the Rio Grande Valley from Las Cruces to the El Paso/Ciudad Juárez metropolitan area. Another cluster of colonias is around Hatch. North Hurley, near Silver City, also qualifies as a colonia.

The State of New Mexico through NMED is addressing part of the complex colonias issue with the administration of two federal grant programs provided through the EPA. The Colonias Wastewater Treatment Construction Grant Program brings up to $10-million into the border region for planning, construction or improving facilities which serve New Mexico's colonias. The program is eligible to any identifiable unincorporated community, or a county, municipality, district or other political subdivision of the State acting on the behalf of a colonia. To be eligible, a community must be situated within a hundred kilometers of the United States-Mexico border, be designated by the State or county in which it is located as a colonia on the basis of objective criteria, including lack of an adequate potable water supply, lack of adequate sewage systems and lack of decent, safe and sanitary housing, and be able to prove that it was in existence before November 28, 1990.

STATE ENFORCEMENT

In recent years the State has taken fewer surface water enforcement actions against larger NPDES permittees than in the past for two principal reasons. First, fewer facilities require enforcement, as the construction grants program and State special appropriations have funded new wastewater treatment plants or major modification for most of the communities in New Mexico. While the grant program has been phased out and replaced by a revolving loan program, the program was very successful in correcting many of the problems which led to noncompliance. Secondly, EPA has improved enforcement of its NPDES permit program. Consequently, rather than duplicate effort, NMED now places more emphasis on assisting EPA with its enforcement program.

State enforcement may be an administrative or a judicial action. Administrative enforcement may be through an 'assurance of discontinuance' negotiated between the State and the discharger who is in violation of WQCC regulations. An assurance typically sets forth actions a discharger must take and a timetable for achieving compliance with the regulations. An assurance may also contain interim effluent limitations covering a specified time period. An assurance of discontinuance must be formally approved by the WQCC. In 1993 the New Mexico Legislature amended the New Mexico Water Quality Act. Among the many amendments, enforcement powers were increased by establishing administrative penalty provisions, higher maximum financial penalties and criminal provisions.

Judicial action involves court proceedings. The judicial means commonly used are 'stipulated judgments' and 'judgments by consent' whereby the terms of the judgment are negotiated between NMED, on behalf of the WQCC, and the discharger as approved by the State District Court. NMED has also negotiated out-of-court settlement agreements. The State could also file a Citizen's Suit pursuant to CWA § 505 to enforce an NPDES permit.

Present and Emerging Concerns

In recent years the State's surface water enforcement problems have been primarily in the area of illegal disposal of refuse in a watercourse. This includes the deposition of trash, septage disposal, and solid waste.

Septage disposal and disposal of other wastes hauled by vacuum trucks continue to be a problem statewide. The 1989 New Mexico Solid Waste Management Regulations **(12)** banned disposal of liquids in solid waste landfills. Illegal disposal in watercourses of materials commonly carried by septage disposal companies continues to be a concern. Another problem regarding septage disposal in New Mexico may result from EPA's recent technical sludge management regulations. EPA's new technical regulations consider land application of septage to be a form of disposal only, and require treatment in addition to land application. Strict implementation of EPA's proposed technical regulations further compounds the problem of illegal septage disposal by adding the new dimension of federal requirements.

The discharge of raw sewage from sewer collection lines that break or overflow due to poor maintenance or location continues to be of great concern. NMED frequently receives reports that raw sewage entered a stream when a sewage collection line broke. These breaks often could have been prevented by better siting or through a maintenance program which would have identified the potential problems. In recent years, some communities have made considerable progress in minimizing the number and severity of their overflows. For example, the City of Farmington, in response to NMED's increased attention to spills, installed high water alarms with telemetry

capabilities at critical places in the collection system. These preventative devices and the increased sewer line maintenance were a direct response to regulatory attention.

The amendments to the spill reporting requirements of WQCC regulations (§ 1203), effective in December 1987, have resulted in increased awareness and reporting of spills. Due to these amendments, NMED is now better able to address spills because it can include a prevention program as part of the required corrective action report. Thus, corrective action may not only include an immediate fix but a longterm plan to correct underlying causes of failure such as maintenance or location.

THE STATE NONPOINT SOURCE WATER POLLUTION MANAGEMENT PROGRAM

The New Mexico Nonpoint Source Management Program was first adopted by the WQCC and approved by the Governor prior to submittal to EPA on September 12, 1989. The program was subsequently approved by EPA on September 26, 1989. The revised and updated program was recently approved by EPA in December 1999 (**13**).

Since first approval of the program, as the lead nonpoint source (NPS) management agency for New Mexico, NMED has coordinated largely voluntary efforts and activities within the State through the Surface Water Quality Bureau (SWQB), and has made significant progress in reducing known NPS pollution concerns while promoting pollution prevention on a broad scale.

The Nonpoint Source Management Program contains a series of implementation milestones which were designed to establish goals while providing a method to measure progress and success of the program. Implementation itself consists of extensive coordination of efforts among NPS management agencies, promotion and implementation of best management practices, coordination of demonstration projects and watershed projects, inspection and enforcement activities, consistency reviews and education and outreach activities.

Best Management Practices

Nonpoint source controls are typically established through the implementation of management practices which can be either structural or nonstructural in nature. Structural practices can be represented by diversions, sediment basins, animal waste lagoons, fencing for the management of livestock, terraces, rock check dams or other constructed means of reducing impairments to surface and ground waters. Nonstructural practices are thought of as conservation practices related to the way in which we manage our resources. These nonstructural practices can be represented by the timing and rate of fertilizer and pesticide application, conservation tillage methods, and rotation of cattle on grazing areas, riparian plantings and other strategies. Best management practices should realistically represent the best combination of structural and/or nonstructural management practices working together to reduce impairments to water quality. These BMPs should be developed based on the site-specific conditions where the practices are to be constructed and/or implemented, and should be selected based on the economics and goals associated with the specific problem to be addressed. As BMPs are selected for a specific application, many sources of technical information are available to assist in the selection, design and implementation.

Under ideal situations, the process provides for the protection of water quality. As with any form of pollution control measure, the benefits gained are directly associated with the degree of thought, analysis and care given to the process of selection, design, implementation, maintenance, and management.

Nonpoint Source Management Program Activities

The New Mexico NPS Program contains elements which are both statewide and watershed oriented. Since many NPS issues within the State are of such widespread concern, a number of efforts and activities must be coordinated on a statewide basis. Likewise, many issues which are of critical concern are extremely localized within specific watersheds, and therefore are addressed on a watershed-by-watershed basis.

Statewide Efforts

Nonpoint source pollution is directly related to land use practices on a broad geographical scale. In New Mexico, the principal sources of NPS pollution include agriculture, ranching, silviculture, resource extraction, hydromodification, recreation, road construction and maintenance, and on-site liquid waste disposal. Reduction in pollutant delivery from these sources is controlled or prevented through the implementation of BMPs by the responsible party. New Mexico encourages the use of BMPs for the control of NPS pollutants through a combination of efforts including incentive programs, education and outreach activities. Statewide efforts to control or reduce the degree of water quality impairments utilizes a combination of these techniques and are discussed below in the appropriate NPS category.

Agriculture

New Mexico's crop production includes irrigated and nonirrigated activities. The impact on water quality from each of these agricultural sources varies regionally across the State. These variations are mainly due to widespread differences in suitability for each type of production. Current statewide efforts focus on providing enhanced protection of water quality with these differences in mind.

Irrigated agriculture can affect water quality through the diversion of water from natural systems as well as through the discharge of return flows. Diversion from streams is known to completely dry up reaches of streams in several areas in New Mexico resulting in the destruction of the aquatic biota. In addition, both irrigated and nonirrigated crop production can adversely affect water

quality through the discharge of storm water following precipitation events.

Primary programs for control of NPS impairment from agriculture are coordinated through the United States Department of Agriculture. The majority of those efforts represent incentive programs which provide information, technical assistance and financial assistance to agricultural producers within the State. These sources include the Natural Resources Conservation Service, formerly known as the Soil Conservation Service, which provides technical assistance related to the design and planning of practices and structures, and the Farm Service Agency, which provides financial assistance for the implementation of BMPs. Additionally, the New Mexico Soil and Water Conservation Commission provides recommendations to the Secretary of Agriculture for projects and programs through the Soil & Water Conservation Districts for producers to implement BMP's. Additional sources of funding and assistance for implementation of BMP's come from the Soil & Water Conservation Districts through mil levy referendums; distribution of county funding from the Farm & Range Improvement funds; administering federal, state, local and private foundation grants; low-interest loan programs for irrigation improvements from the Interstate Stream Commission; and providing equipment and tools. CWA § 319 appropriations are now funding many of these programs throughout the State.

The New Mexico Cooperative Extension Service also provides significant assistance to agricultural producers through its education and outreach programs. Many of the programs provided through the Extension Service are now oriented toward the protection and improvement of water quality. One such program, FARM*A*SYST, is designed to provide producers with a tool to make assessments of environmental concerns on the farmstead and provide alternative methods of management designed to benefit water quality.

Rangeland Agriculture

In New Mexico rangeland NPS pollution in the form of turbidity and siltation is often the product of natural conditions associated with arid land climates. Most of New Mexico receives 15 inches or less of annual precipitation on highly erodible soils. This precipitation typically arrives in July and August in the form of torrential downpours following two to three months of little to no rainfall. Scarce vegetation in the form of grasses and forbs allows overland flows to strip soils from the surface.

Progress continues to be made in the area of grazing management as ranchers and State/federal allotment permittees become increasingly aware of the ecological importance of riparian areas. Although many operators continue to feel threatened by the plethora of regulation surrounding water quality and riparian related species, many now recognize that what is good for riparian areas is also good for production. Grazing management trends point to multiple-pasture rest rotation grazing systems which often include special protection for riparian areas. This type of active management, whereby cattle are frequently moved from pasture to pasture, has proven to be a reliable path to success. Riparian and upland watershed conditions often exhibit rapid improvements under this type of system.

Another issue facing the ranching community is the ever-shrinking size of suitable grazing land due to an accelerated encroachment by woody species (piñon and juniper). This phenomenon is generally thought to be a direct result of the interrupted natural fire cycle which used to occur in the southwest United States. Some progressive ranchers have begun to reverse this trend by removing woody species and reintroducing fire into the ecosystem, the results of which have proven to be positive to both water quality and quantity. Most within the ranching community recognize that the longterm sustainability of the ranching in New Mexico depends on an environmentally sensitive and active management approach. In fact, many bear witness to the fact that their ranches are thriving under these types of systems. In the words of one such rancher, "...this environmentalism is making me money."

Efforts to reduce rangeland NPS pollution have focused on grazing practices instead of vegetation management. Years of livestock numbers reductions and implementation of grazing BMPs have had little to no effect on grazing lands NPS pollution. The recognition that a 90% reduction in livestock numbers has brought little to no improvement has prompted a reevaluation of the source of NPS pollution on grazing lands.

Fire suppression allowing woody plant species invasion is the primary cause of surface erosion in the woodland and lower elevation grasslands[x]. In the ponderosa pine forests, fire suppression has fostered an increase in tree densities from 19 to 50 trees per acre to highs of 3000 trees per acre resulting in an average of 30% reduction of surface flows and restriction of infiltration to ground waters.

In the early 1980's, the Soil and Water Conservation Division promulgated BMPs designed to address the issues of woody invasion, diminishing grasses and forbs, reduction of surface flows and groundwater recharge. Federal and State land management agencies have not successfully implemented many of these BMPs.

The Soil and Water Conservation Commission and Districts have identified watershed restoration as the number one priority for New Mexico.

Silviculture

Larger-scale commercial timber harvesting on USFS-managed lands has been effectively halted due to continuing litigation. The only silvicultural activities presently occurring are primarily associated with personal use (fuelwood and fenceposts), habitat/watershed improvements (thinning), fire salvage logging, and urban interface/fire protection.

The New Mexico Forestry and Resource Conservation Division of the Energy, Minerals and Natural Resources

Department continues to operate voluntary and regulatory programs which are directed toward the use of BMPs for silvicultural activities on State and private lands.

Areas on Forest Service Lands identified by the USFS as suitable for timber harvesting occupy roughly 10% of the forested lands. Pre-1990 harvesting activities were disturbing about one half of one percent of those lands. BMPs were modified at that time to reduce impacts to water quality. Fire suppression on all Forest Service lands over the last 100 years has created conditions that favor large scale catastrophic wild fires and an average 30% reduction of high quality water delivery.

These reductions of water delivery from the watersheds has also contributed to exceedence of water quality standards in the lower reaches of New Mexico's rivers. As the flows of higher quality water is reduced, numeric concentrations of point and non point source pollutants increase. Soil and Water Conservation Districts (SWCD) serving areas of forested lands have engaged in extensive public outreach and education about these conditions and the need of reintroduction of fire into the ecosystem. SWCD are also soliciting partnerships with the USFS, BLM and permittees to reduce fuel loading and tree densities in an effort to restore stream flows, enhance riparian regeneration and reduce non point source pollution.

Resource Extraction

Historical resource extraction issues have been difficult to address in New Mexico due to the nature of regulatory requirements that have been in existence. Many of the inactive and abandoned sites were not subject to much scrutiny by NMED or other State regulatory agencies prior to the development of the Nonpoint Source Program. In addition, the New Mexico Mining Act (NMMA) rules which went into effect in July of 1994 require the reclamation of all land disturbing activities at mines which operated for at least two years after 1970. This should contribute to the mitigation of the impacts of mining activities on water quality.

Hydromodification

The SWQB issues the CWA § 401 Water Quality Certifications for CWA §404 Dredge-and-Fill activities throughout the State. Individual, Regional and Nationwide permit activities are reviewed for consistency with the NPS program and for the protection of water quality standards. SWQB staff review dredge-and-fill applications to ensure that applicants are using BMPs to protect water quality. This review process includes providing comments to agencies and individuals during planning of the projects to ensure proper water quality concerns are taken into account early in the process. Following a review process, SWQB issues unconditional certification, conditional certification, or denies certification as appropriate. SWQB rarely issues unconditional certification. Unconditional certificates are issued for nationwide permits in ephemeral systems, hazardous waste cleanup and oil spill cleanup. For the majority of all nationwide permits, individual certification must be obtained. Conditions are added to the certifications to ensure maintenance of water quality standards. This change has greatly enhanced the capability to protect water quality by requiring specific practices for those activities. In those cases where BMPs have not been implemented and water quality standards violations have occurred, the State takes steps to ensure that mitigation efforts are initiated. Enforcement activities are undertaken only as a last resort to ensure compliance with State water quality standards.

Recreation

Recreation in New Mexico is an important industry which serves both residents and visitors from throughout the United States as well as from other nations. Hiking, picnicking, camping, fishing, hunting, biking, outdoor photography, off-road vehicle use, whitewater boating, and skiing attract many people to both developed and undeveloped recreational areas throughout the State. Many of the recreational areas exist on public lands administered by the BLM, BOR, USFS and the New Mexico State Parks (NMSP).

As the population increases, recreational land uses and associated impacts also increase. Nonpoint source problems associated with recreation include erosion, loss of riparian vegetation, streambank destabilization, runoff from roads, parking lots, trails and other developed areas, and on-site waste disposal. The USFS, BLM and NMSP have taken steps to reduce NPS impacts from many of their developed recreation areas through the relocation of use areas away from waterbodies, riparian plantings, the repair and maintenance or closing of roads, and the control of erosion.

The SWQB continues to address NPS impacts from recreation through federal consistency review and several CWA § 319 projects.

Road Construction And Maintenance

NMED continues to cooperate with the New Mexico State Highway and Transportation Department (NMSHTD) to provide for the increased awareness of water quality concerns related to road construction and maintenance and to provide for the increased utilization of BMPs. As a result of training provided by the SWQB and the signing of a Memorandum of Understanding in 1995 between NMED and NMSHTD, an expanded program of sound BMP implementation at road construction and maintenance sites has developed.

The SWQB participates in the planning phases of Federal Highway Administration road projects that have the potential to impact surface waters. This participation can result in changes to road alignment and design that are protective of surface water quality.

The USFS and BLM's continuing efforts to close, relocate, or rehabilitate roads has as improved watershed conditions and helped reduce the transport of sediment into surface waters.

On-Site Liquid Waste Disposal

New Mexico has expressed significant concern regarding the impairment of surface and ground water from on-site liquid waste disposal systems. In

response to this concern, NMED, through State funding, operates a statewide liquid waste regulatory program designed to address concerns through inspection and enforcement activities. Details of this effort are described elsewhere in this chapter.

Consistency Reviews

The NMED Nonpoint Source Section coordinates consistency reviews of federal, State and local projects. Environmental impact statements, environmental assessments, and various notices of intent are reviewed by NMED staff to determine consistency with the State's NPS program and appropriate comments are directed to the agencies. This insures that water quality concerns are analyzed early in the process so as to positively influence agency activities for the protection of water quality.

Cooperation between NMED and the five USFS systems within New Mexico continues. The USFS, recognizing that many forest activities have the potential to impact water quality, continues to develop and implement BMP's designed to mitigate impacts and reduce NPS pollution. NMED's involvement in the planning and development phases of forest activities has increased. In January 1996, NMED opened a NPS Section office in Silver City, which is located in the southern part of the State. This office, among other duties. handles consistency review for the Lincoln and Gila National Forests.

Examples of projects evaluated include ski area activities, timber sales, CWA §§401/404 Dredge-and-Fill permits, grazing permit renewals, recreational development or management, wildfire rehabilitation, watershed improvements, and fish habitat improvements.

Under Work Element 13 of the New Mexico Statewide Water Quality Management Plan, Federal, State and Local Government Agencies have been designated management responsibilities for lands and water quality standards compliance within their jurisdictions. With each designation, constituent agencies of the Water Quality Control Commission are assigned as recipients of reports designed to communicate information and data on BMP implementation. Designated agencies have agreed to coordinate with the assigned constituent agencies in the development and implementation of BMPs.

Work Element 13 has been amended in 1999 to include the City of Rio Rancho as a Designated Management Agency. The entire management plan is now in the process of being reviewed and preparations are being made to have the amended plan before the WQCC in the calendar year 2000.

Education And Outreach

The Nonpoint Source Pollution Section conducts education and outreach activities related to nonpoint source pollution and its control. Through development and distribution of brochures relating to nonpoint source pollution, set up of displays, presentations, water camps, water quality sampling training and field trips, the Outreach Program has been able to reach a wide audience with information about NPS pollution and the use of best management practices (BMPs). The Outreach Program has developed slide presentations, several brochures, and three 3-dimensional models for use in outreach activities. In addition, *Clearing the Waters*, NMED's NPS pollution newsletter is published quarterly.

Watching Our Waters

The *Watching Our Waters* (WOW) program forms and coordinates volunteer surface-water monitoring throughout New Mexico. This program is intended for concerned citizens with a genuine interest in streams, but not necessarily with a formal education or professional training. These citizens learn more about our water resources and how they can help prevent pollution at the grassroots level. The program encourages local stakeholders to engage in joint fact-finding, perhaps leading to consensus-bulding. Additionally, the program generates data useful to technical staff charged with evaluating stream resources. SWQB staff review these data for evidence of stream standard violations and other findings. The WOW is administered within SWQB and is conducted under an EPA-approved Quality Assurance Project Plan.

Watershed Efforts

As part of New Mexico's Nonpoint Source Management Plan, addressing NPS impacts within specific watersheds continues to be a primary focus. Such watershed efforts are currently active for the following rivers: Ruidoso, Gila/San Francisco, Mimbres, Gallinas, Rio Puerco, Red River, and Rio Embudo. In addition, watershed organizational workshops and citizen monitoring groups have been established with the CWA § 104(b)(3) "*Watching Our Waters*" program cited above.

In order to help meet the goals of the Clean Water Act, states were directed, in 1998, through the Clean Water Action Plan (CWAP) to identify and prioritize watersheds with water quality problems. The SWQB and Natural Resources and Conservation Service (NRCS) developed a cooperative approach to initiate this effort by inviting federal agencies, state agencies, local governments, tribes and pueblos, soil and water conservation groups, industry representatives, environmental groups, etc. to participate in the development of the Unified Watershed Assessment (UWA) for New Mexico. Utilizing the USGS 8-digit system of watershed delineation, the UWA identifies the following four categories of watersheds:

Category I

Watersheds in Need of Restoration ~ watersheds do not now meet, or face imminent threat of not meeting, clean water and other natural resource goals;

Category II

Watersheds Meeting Goals, Including Those Needing Action to Sustain Water Quality ~ watersheds meet clean water and other natural resource goals and standards and support healthy aquatic systems. All such watersheds need the continuing implementation of core clean water and natural resource programs to maintain water quality and conserve natural resources;

Category III

Watersheds with Pristine/Sensitive Aquatic System Conditions on Lands Administered by Federal, State, or Tribal Governments ~

watersheds with exceptionally pristine water quality, other sensitive aquatic system conditions, and drinking water sources that are located on lands administered by federal, state, or tribal governments; and

Category IV

Watersheds with Insufficient Data to Make an Assessment ~

watersheds lack significant information, critical data elements, or the data density needed to make a reasonable assessment at this time.

The participants of this process provided data and input as to how watersheds in New Mexico would be ranked within these four categories. Watersheds within the Category I classification were further prioritized for restoration and protection efforts.

Invasive Plant Control

Salt cedar invasion into New Mexico stream systems has emerged as a significant non-point sources of pollution. Originally imported to the state to stabilize stream banks, salt cedar occupies the lower reaches of all of the states major water ways.

A phreatophyte with no biological controls, salt cedar consumes high volumes of water through evapotranspiration. Transpired water forms a gentle mist of salt laden vapor that eventually renders the habitat useless for all other riparian vegetation. Salt cedar increases the salinity of surface flows and significantly reduces those flows.

SWCD are actively engaged in salt cedar eradication and native riparian plant restoration demonstration projects that have proven successful in the last three years and are in the process of seeking funding and partners to expand efforts in the other infested stream segments in the state.

While less problems are faced with other noxious weeds, SWCD are involved with control programs to insure retention of native vegetation best suited to control nonpoint sources of pollution.

FEDERAL PROGRAMS

Department of Energy Environmental Oversight and Monitoring Program

On June 27, 1989, the Secretary of Energy announced a 10-point initiative that addressed the need for the DOE to improve its accountability concerning public health, safety and environmental protection by allowing states hosting the DOE facilities direct access to those facilities and by financially underwriting the costs of State oversight of DOE environmental monitoring programs. As a result of this initiative, the DOE entered several agreements, collectively known as the Agreements-In-Principle (AIP) with various states including New Mexico. The New Mexico agreement is comprehensive in scope and establishes many actions that are to be performed either jointly or separately by DOE and State agencies and organizations. The New Mexico Environment Department (NMED) is the state's designated lead agency for the agreement.

The four DOE facilities in New Mexico are Sandia National Laboratories (SNL) and the Lovelace Respiratory Research Institute (LRRI), formerly the Inhalation Toxicology Research Institute (ITRI) in Albuquerque, the Los Alamos National Laboratory (LANL) in Los Alamos and the Waste Isolation Pilot Plant (WIPP) in Carlsbad. The New Mexico Agreement-in-Principle is designed to help assure that activities at DOE facilities are protective of the public health and safety and the environment. To accomplish the goals of the agreement, an oversight program was developed with four primary objectives:

- To assess the DOE's compliance with existing laws including regulations, rules, and standards;
- Prioritize cleanup and compliance activities;
- Develop and implement a vigorous program of independent monitoring and oversight; and
- To communicate with the public so as to increase public knowledge of environmental matters about the facilities, including coordination with local and tribal governments.

The DOE Oversight Bureau carries out the oversight and monitoring activities of the program. Although the Oversight Bureau has no regulatory status, it facilitates compliance with applicable environmental regulations by reporting water quality concerns and infractions to DOE and the appropriate regulatory NMED Bureaus (i.e., Surface Water Quality, Ground Water Quality, and Hazardous & Radioactive Materials). DOE Oversight Bureau staff communicate routinely with the public to increase public knowledge of oversight, monitoring, and environmental issues involving the facilities. The Oversight Bureau issues quarterly and annual implementation reports to the DOE describing the scope of work, objectives, accomplishments and significant issues that occurred during each period. Results of oversight and monitoring activities are also available to the public along with numerous documents transmitting technical comments and concerns relative to specific program areas. These reports and documents are a source of reliable technical information for the writers of facility proposals and decision makers at regulatory agencies.

Surface Water Protection at DOE Facilities

In its efforts to protect the waters of the State, the DOE Oversight Bureau monitors and assesses DOE compliance with WQCC regulations, all water quality stream standards and NPDES permitting under the federal CWA.

The DOE Oversight Bureau reviews all activities at DOE facilities for their impacts on New Mexico's surface waters. These reviews include both point source and nonpoint source control efforts. DOE Oversight Bureau's activities with water quality monitoring programs

include, but are not limited to, inspections, document verification/ validation and field monitoring. The DOE Oversight Bureau also responds to and investigates spills or releases that enter or have the potential of entering a watercourse.

The DOE Oversight Bureau has collected samples of aquatic benthic macroinvertebrates from streams and springs located in DOE facilities, including neighboring Pueblos, to determine the biological condition of surface waters in and around DOE facilities. Data from initial sampling will provide baseline information on surface water biological communities [illegible] reference conditions for the comparis[illegible] of neighboring watersheds. An extensi[illegible] database of habitat assessment [illegible] associated macroinvertebrate commun[illegible] metrics will aid in these assessment [illegible] future changes in the biologic[illegible] communities.

WATER QUALITY IMPROVEMENTS

Since many of the State's high quality waters exist in areas managed by USFS, management changes and BMP implementation in many of these areas results in a rapid benefit even though the State does not always have the necessary data to establish statistical correlation between the implementation of BMPs and an improvement in water quality. In many instances, changes in management practices will not be immediately evident, due to slow vegetative growth rates and other ecological factors. Actual improvements within the water column may not be noticeable for years, and possibly even decades. Due to this "ecological lag time," NMED is exploring the use of other indicators of improvement. NMED has begun to develop protocols for assessing sedimentation through the use of biological and geomorphological methodologies. NMED also recognizes the need for and plans to develop protocols for assessing riparian areas and how they influence water quality.

PROGRAMS FOR WATER QUALITY ASSESSMENT

Water quality assessment is an integral part of water quality management in New Mexico. Information on water quality serves as a basis for various program decisions. Moreover, statewide assessments of surface and groundwater quality are an important component of this federally-required report. Monitoring activities and programs used by New Mexico to assess ground and surface water quality are described below.

Surface Water Quality Assessments

The State uses a wide variety of methods for assessment of its water quality. Second-party data including discharger's reports, published literature, data stored in the United States Environmental Protection Agency's (EPA's) database, as well as data generated by the United States Geological Survey (USGS) are routinely reviewed. The New Mexico Environment Department (NMED) generates large amounts of data through intensive surveys, assessment of citizen complaints, special studies aimed at areas of special concern (e.g., mercury concentration in water, sediments and fish), short- and long-term nonpoint source pollution monitoring, and effluent monitoring.

Surface Water Quality Monitoring

Water quality monitoring and other surveillance activities provide water quality data needed to (1) revise water quality standards, (2) establish waterbody monitoring/management priorities, (3) develop water quality-based effluent limitations, (4) develop total maximum daily loads (TMDL), (5) assess the efficacy of point source water pollution controls through the National Pollutant Discharge Elimination System (NPDES), (6) identify new areas of concern such as the statewide fisheries mercury study, and (7) evaluate the efficacy of best management practices (BMPs) developed to mitigate the impact of nonpoint sources.

Water quality data are acquired by four basic forms of monitoring: (1) ambient, fixed station monitoring performed by the USGS; (2) special water quality surveys of priority waterbodies by NMED; (3) effluent monitoring; and (4) NMED special studies.

Stream Monitoring

Ambient Monitoring

In addition to intensive and special water quality surveys, the Surface Water Quality Bureau has for many years relied on water quality data collected by the United States Geological Survey from a

series of long-term fixed stations. Through 1995 the USGS maintained a network of 49 long-term fixed stations, located in almost every watershed in the State. The primary objective of this fixed station network has been to provide long-term measurements of water quality variables at representative points on the State's major streams to determine spatial and temporal water quality trends. These data are also used for determining TMDLs for these watersheds as required. Prior to 1996 the funding for this sampling effort was provided by an appropriation from the Legislature to the State Engineer Office, along with an equal match from USGS. In June 1996 the State Engineer Office withdrew all future funding for water quality data collection and concentrated on funding the stream flow studies. The Surface Water Quality Bureau reviewed the fixed-station network of stations compared to the upcoming TMDL commitments and recommended a modified work plan involving 13 stations. Funding is provided by the New Mexico Legislature on a year-to-year basis and the future of fixed-station monitoring in New Mexico is in doubt.

In addition to the 15 fixed-station water quality stations maintained by USGS there are two additional stations yielding valuable water quality data for the State. These stations are part of the National Stream-Quality Accounting Network (NASQAN) and are located on the Rio Grande in Colorado and Texas just outside the New Mexico state boundaries. Locations of the fixed water quality network in the State, parameters sampled, frequency of sampling and other related information are presented in Figure 20 and Table 20 in Appendix D.

Special Stream Surveys

Special water quality surveys involve three or four seasonal sampling trips consisting of three to four sampling runs each. During each seasonal trip water quality samples are collected and measurements are made of physical parameters at representative points along a stream reach over a relatively short period of time (four to five days). The purpose of these investigations is to determine water quality characteristics under specific conditions, and to determine where possible, cause and effect relationships of water quality.

Special surveys are usually timed to coincide with annual periods of stress for the fish and macroinvertebrates of the waterbody, such as periods of annual low streamflow or highest ambient temperatures. Stream surveys conducted during 1998 and 1999 are listed in Table 13. Benthic macroinvertebrate assessments to evaluate the integrity of aquatic communities were conducted in association with most of these stream surveys. Parameters sampled during special surveys are listed in Table 21 of Appendix D.

The Surface Water Quality Bureau is currently attempting to conduct water quality sampling efforts in each of the State's watersheds every five years.

Lake and Reservoir Monitoring

Lake and reservoir monitoring in New Mexico is conducted to (1) collect information for standards development and to determine the trophic status for all publicly-owned or operated lakes where little or no physical, chemical, or biological information exits; and (2) update information with regard to trophic status of previously studied publicly-owned lakes. Lake water quality status, control measures, restoration efforts, and the status of mercury in lakes and reservoirs are discussed under Chapter Three, *Water Quality in Assessed Surface Waters*.

Lakes sampled during 1998 and 1999 are listed in Table 13. These special lake surveys consisted of three-season sampling efforts from one or two stations. Summer surveys were also conducted on additional lakes. The surveys for these small lakes were conducted during the period of maximum stress to the aquatic ecosystem.

Effluent Monitoring

Receiving streams are sampled in conjunction with effluent samples collected during Compliance Sampling Inspections at NPDES permitted discharge facilities. Inspectors collect samples from the discharge pipe as well as an upstream sample and a downstream sample. This group of samples provides information on the impact, if any, of the discharge on the chemical quality of the receiving stream. The information is stored in the EPA's STORET computer database and can be used to determine if water quality standards are being violated as the result of a point-source discharge. The data also provide information necessary for the preparation of NPDES water quality based permit effluent limitations.

NMED Special Studies

Nonpoint Source Monitoring

Under the Nonpoint Source Management Program, NMED conducts extensive water quality monitoring around the State to determine the effectiveness of BMPs used to control nonpoint source (NPS) pollution. Monitoring is also conducted in conjunction with targeted watershed demonstration projects. Intensive implementation of BMPs is ongoing in these watersheds to improve water quality. On a statewide basis, NMED monitors selected projects in priority waterbodies such as timber harvests, road construction and dredge-and-fill activities to determine the effectiveness of BMPs used to protect water quality in these projects.

NPS monitoring typically includes determinations of whether BMPs are being implemented as planned, and water quality sampling upstream and downstream of actual or potential NPS problem areas. In the case of short-term projects such as a utility line crossing of a river, monitoring may be done only once or twice during the project. In these projects, turbidity monitoring is often used as an indicator of erosion control effectiveness on the project. If turbidity standards are violated, additional water quality parameters may also be checked.

In the case of monitoring watershed improvement projects, samples are collected seasonally over a multi-year period. Water quality is monitored upstream and downstream of all major NPS problems and control BMPs implemented in the watershed. Sampling repeatedly over a multi-year period will allow the State to document the effectiveness and feasibility of watershed restoration projects in improving water quality. As discussed previously, other indicators of improvement are being developed and implemented.

Future Directions: Monitoring and Evaluation of Nonpoint Source Controls

Since 1988, New Mexico has been increasingly active in addressing nonpoint source pollution. Several agencies, such as the Soil & Water Conservation Districts (SWCD), State Land Office (SLO), State Parks Division (SPD), the State Highway & Transportation Department, the Natural Resources Conservation Service (NRCS), the United States Forest Service (USFS), and the Bureau of Land Management (BLM) are routinely including water quality BMPs to control nonpoint source pollution in their activities due to these efforts. The SWCD, NRCS, and USFS in conjunction with NMED have also initiated several major watershed restoration projects specifically aimed at NPS pollution abatement.

Additional programs initiated by the SLO include a riparian improvement program (RIP) whose purpose is to identify, prioritize, and implement restoration projects in riparian areas and associated watersheds located on state trust lands in cooperation with lessees, adjoining land owners, and land management agencies. The SLO has also initiated a program to identify and control noxious weeds found on state trust lands. The program relies on cooperative efforts with land management agencies, county governments, and other interests to prevent to the extent possible the spread of noxious weeds and the consequent loss of productive agricultural lands.

The USFS has also initiated several major watershed restoration projects specifically aimed at NPS pollution. Since NPS pollution often occurs in discrete episodes related to precipitation events, it is difficult to assess the effectiveness of these controls using only traditional chemical water quality parameters. Simply stated, it is rare that staff would be in the right place at the right time to be able to sample the runoff from these precipitation events. Therefore, NMED is developing physical and biological indicators of water quality in order to monitor and evaluate nonpoint source control activities. Ultimately, the State will have measurable physical and biological water quality standards.

Table 13. Special Stream Surveys, 1998-1999.

Rio Chama Watershed
Cimarron River Watershed
Santa Fe River
Red River Watershed
Jemez River Watershed
San Francisco Watershed
Middle Rio Grande (Isleta to San Felipe pueblos)

Special three-season intensive water quality lake surveys

El Vado Lake
Eagle Nest Lake
Abiquiu Lake

Single-season intensive water quality surveys were conducted on the following three lakes:

Fenton Lake
Bottomless Lakes
Hopewell Lake

Table 14. Playa Lake Surveys, 1999.

MO02BO.Playa 1	Mora County
MO03BP.Playa 2	Mora County
CO01BQ.Playa 3	Colfax County
CO02BR.Playa 4	Colfax County
HA02BS.Playa 5	Harding County
HA03BT.Playa 6	Harding County
CO03BU.Playa 7	Colfax County
HA04BV.Playa 8	Harding County
HA05BW.Playa 9	Harding County
HA06BX.Playa 10	Harding County
CO04BY.Playa 11	Colfax County
HA01AJ.CHICOSAL	Colfax County

PROGRAM EVALUATION

Various qualitative and quantitative measures have been used by the United States Environmental Protection Agency (EPA), the states, and others to measure the effectiveness and accomplishments of water quality management programs. This section discusses measures that provide an evaluation of the overall effectiveness of programs for ground and surface water quality management.

Costs of Surface Water Quality Programs

The costs of administering surface water quality programs in New Mexico reached almost $3.3 million in combined federal and State funds in the State fiscal year (July 1996-June 1997). The State's responsibilities in several areas of concern have significantly grown as a result of documentation of problems by the New Mexico Environment Department (NMED), increased public perceptions of water quality problems, and federal mandates, especially nonpoint source control efforts.

The major expenditure under these programs in 1996-1997 has been for the construction of municipal wastewater treatment facilities under the State revolving loan program. Established in 1986, this program to date has provided loans worth over $66 million in combined federal and State funds to local governments. In addition, approximately $17 million in potential loans are currently under negotiation. About $18 million remains in the fund for future loans. Other projects worth over $150 million have been placed on the priority list.

Despite the large amount of money spent on wastewater treatment facilities construction over the last 20 years, recent surveys of wastewater needs and an increased emphasis on water quality impacts from other pollution categories show that many additional needs remain.

Value of Designated Uses

The primary function of surface water quality management programs is maintenance of suitable water quality to protect existing, designated or attainable uses. These uses produce important economic and social benefits to many disparate groups. Protection of the domestic water supply use produces important direct public health benefits to riverside residents, hikers, and campers. Protection of the municipal water supply use prevents additional treatment costs to municipalities. Irrigated agriculture and grazing provide the economic and social bases for many small communities in New Mexico; thus, the irrigation and livestock grazing uses produce economic benefits not only for farmers and ranchers, but also spin off additional economic benefits to farm service establishments. The recreational use of streams and lakes in New Mexico produces economic and social benefits for both New Mexicans and residents of nearby states. While many of these uses generate direct economic benefit, it is important to note that the fishing use, which is the most dependent of all uses on clean water, generates over $232 million annually in such direct economic benefits **(14)**.

Reduction of Waste in Municipal Discharges to Surface Waters

Biochemical oxygen demand (BOD_5) is a measure of the oxygen demand exerted by wastewater over a five-day period at a constant 20° C. The presence of high concentrations of pollutants in effluents results in excessive oxygen demand as they decompose in the water column which can result in significant depletion of instream dissolved oxygen downstream of a wastewater discharge. Consequently, reduction of oxygen demanding compounds in wastewater is a major goal of wastewater treatment. Treatment processes used to reduce oxygen demand also result in reduction of other pollutants, such as suspended solids, nutrients, trace elements, and organic compounds in discharged wastewater.

NPDES Permit Compliance

Since passage of the federal Clean Water Act (CWA) in 1972, municipal compliance in New Mexico has increased dramatically (Figure 11). Under its National Municipal Policy, EPA set a compliance deadline of July 1, 1988 for municipalities to achieve secondary treatment capability or to be on an enforceable schedule toward this goal. The State of New Mexico, in terms of the National Municipal Policy, was one of eight states in the nation, and the only state in EPA Region VI, to attain a 100 % compliance by the 1988 deadline. However, this does not mean that there are no compliance problems. Improper operation and maintenance of treatment works and, in some cases, effluent quality violations still exist. In 1987, Congress authorized EPA to assess administrative penalties for violations of the CWA. Since that time, EPA has assessed administrative penalties totaling $699,500. EPA continues to issue Administrative Penalty Orders.

Since 1987 two facilities, one major municipal and one private domestic utility paid an administrative penalty of $125,000 each, which is the maximum currently allowable under the administrative penalty authority. Figure 12 shows the distribution of EPA's administrative penalty orders by the penalty amount. The above administrative penalties are in addition to numerous EPA Administrative Orders which also address permit violations of lesser magnitude. Between 1995 and 1998, EPA issued 66 administrative orders and 10 administrative penalty orders in New Mexico. Thirty-nine administrative orders went to unpermitted facilities.

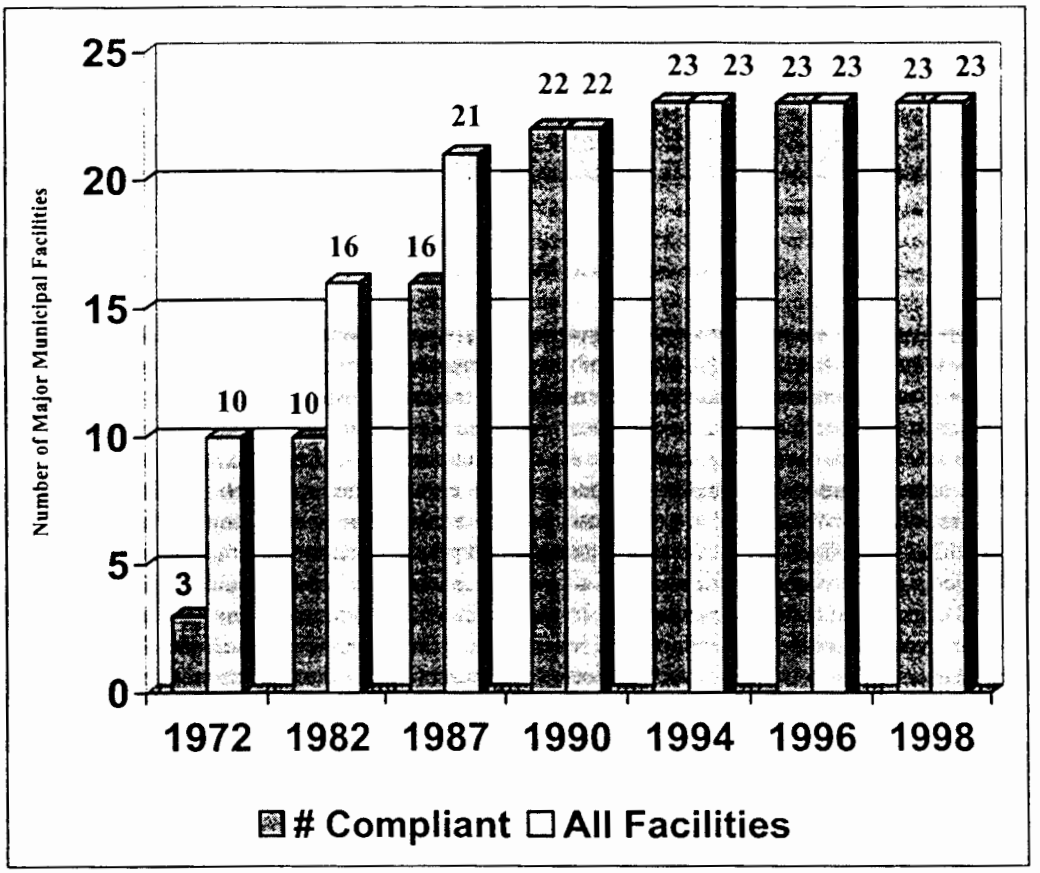


Figure 11. Number of Major Municipal NPDES Permitees in New Mexico Achieving Secondary Treatment by Year.

EPA prioritizes its enforcement efforts to emphasize facilities classified as '*major*.' Consequently, compliance information regarding '*minor*' facility compliance is not as clear nor as measurable as that for '*major*' facilities.

In the past, EPA has been reluctant to initiate enforcement against any minor facility. However, in recent years,Region VI of EPA has begun taking more action against '*minors*' violating NPDES conditions. The State's experience in performing NPDES compliance inspections for EPA indicates that '*minor*' facilities commonly have non-compliance problems which need to be addressed.

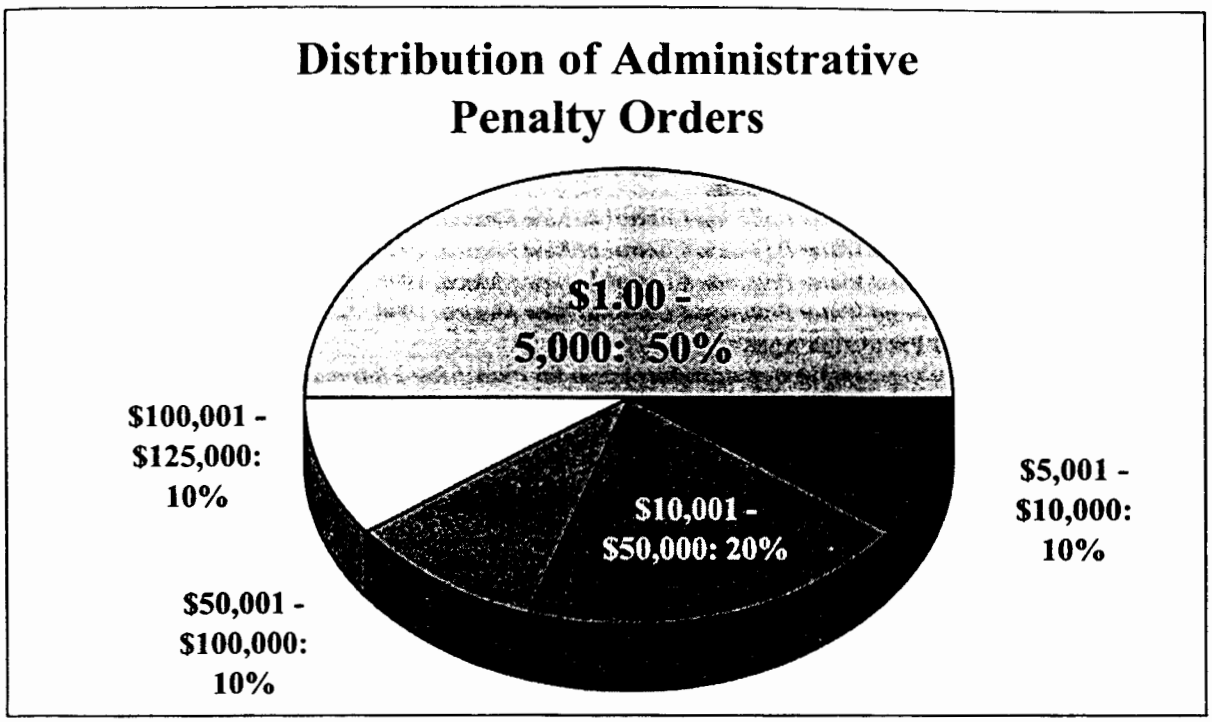


Figure 12. Distribution of Administrative Penalty Orders Issued by the EPA by Amount of Penalty.

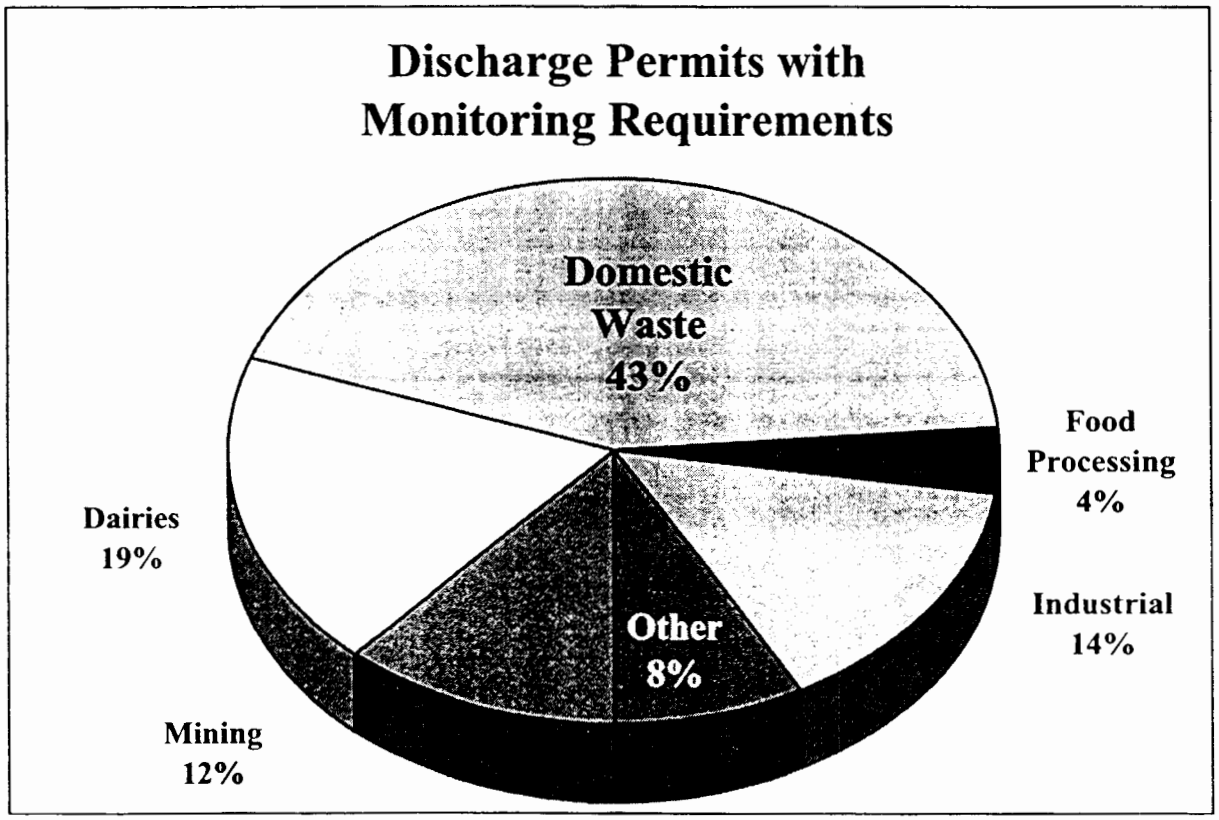


Figure 13. All Discharge Permits with Monitoring Requirements.

REFERENCES: WATER QUALITY IN ASSESSED SURFACE WATERS

United States Environmental Protection Agency

1) 1995 *Guidelines for the Preparation of the **2000** State Water Quality Assessments* (CWA § 305(b) reports).

2) 1986 *Quality Criteria for Water.* Washington, D.C.

New Mexico Water Quality Control Commission

3) 1990 *Water Quality and Water Pollution Control in New Mexico*, 1990. Santa Fe. 289 pages.

4) 1994 *Water Quality and Water Pollution Control in New Mexico*, 1994. Santa Fe. 435 pages.

5) 1996 *Water Quality and Water Pollution Control in New Mexico*, 1996. Santa Fe.

6) 1998 *Water Quality and Water Pollution Control in New Mexico*, 1998. Santa Fe.

United States Environmental Protection Agency

7) 1974 *An approach to a relative trophic index system for classifying lakes and reservoirs.* Working Paper No. 24. Pacific Northwest Environmental Research Laboratory. Corvallis, Oregon.

8) 1979 *Lake and Reservoir Classification Systems.* Maloney, T.E., editor. EPA-600/3-79-074.

Carlson, R.E.

9) 1989 More complications in the chlorophyll-Secchi disk relationship. *Limnology and Oceanography* 25: pages 380-382.

New Mexico Water Resources Research Institute

10) 1988 Lynch, T.R., C.J. Popp, G.Z. Jacobi, and J. Robertson. *Assessing the Sensitivity of High Altitude New Mexican Wilderness Lakes to Acidic Precipitation and Trace Metal Contamination.* WRRI 1423697. Las Cruces, New Mexico. 177 pages.

New Mexico Water Quality Control Commission

11) 1995 New Mexico Water Quality Control Commission Regulations as amended through November 15, 1995. Santa Fe, New Mexico. 129 pages.

New Mexico Environmental Improvement Board

12) 1989 New Mexico Solid Waste Management Regulations. Santa Fe, New Mexico. 21 pages.

New Mexico Water Quality Control Commission

13) 1999 New Mexico Nonpoint Source Pollution Management Program, December 1999. Santa Fe, New Mexico. 100 pages.

Southwick Associates, Inc.

14) 1994 Total Economic Impact of Wildlife-Related Recreation in New Mexico. Analysis prepared from 1991 National Survey of Fishing, Hunting and Wildlife-Associated Recreation conducted by the United States Fish and Wildlife Service and the United States Bureau of the Census for the New Mexico Department of Game & Fish. 5 pages.

CHAPTER FIVE GROUND WATER QUALITY IN NEW MEXICO

The Importance of Ground Water In New Mexico

New Mexico's ground water resources are of vital importance in sustaining life, and must be preserved for both present and futures generations. Approximately 90% of the total population of the State depends on ground water for drinking water. Seventy-eight percent (78%) of the population are served by public systems with water derived from ground water sources. Approximately 150,000 people, or 10% of the State population, depend on private wells for drinking water. Nearly half of the total water annually withdrawn for all uses in New Mexico, including agriculture and industry, is ground water, the only practicable source of water in many areas of the State.

About 4.4 billion acre-feet of recoverable fresh and slightly saline water are estimated to be present in underground storage in New Mexico. Overall, the quality of these waters is assumed to be good, although there are significant pollution problems known to affect certain areas throughout the State. A comprehensive survey of the State's ground water quality has not been done, so a quantitative statement concerning ground water quality cannot be made.

Sources of Ground Water Contamination

In the late 1970s, the New Mexico Environment Department (NMED) began evaluating existing information on vulnerable aquifers and major known and potential contamination sources. Evaluation of existing information by NMED has become an ongoing process as focus has shifted from identification of major potential sources of contamination to specific questions about known or suspected ground water problems. An initial inventory of known or suspected cases of groundwater contamination resulting from surface impoundments and other facilities was concluded in 1980 (1). An update, expansion and computerization of this inventory of ground water contamination incidents of all types from all sources during the years 1927 through early 1999 is currently in progress.

In general, groundwater contamination most frequently occurs in vulnerable aquifer areas where the water table is shallow although other factors including precipitation, soil type and preferential flow pathways also affect vulnerability. Vulnerability maps, based on aquifer depth, were prepared in 1989 for all counties in the State. These county maps are available for inspection at the appropriate NMED field offices and at the NMED Underground Storage Tank Bureau office in Santa Fe. The New Mexico Energy, Minerals and Natural Resources Department's developed vulnerability maps for the San Juan Basin in northwestern New Mexico in 1985 and 1992, which are available for inspection at their office in Santa Fe.

At least 1,235 ground water contamination plumes emanating from point sources, and numerous areas of widespread contamination from nonpoint sources, have been identified in the State from 1927 through November 1999 (Figure 15). This contamination has impacted 188 public and 1,719 private water-supply wells (Figures 14 and 16). To date, 363 cases have received or will soon receive some degree of remediation (Figure 17). For the purpose of this report, remediation is defined as either removal of polluted ground water for beneficial use or recycling, removal of floating hydrocarbons or purification of polluted ground water followed by reinjection or discharge to surface waters. Remedial actions include removal of floating non-aqueous-phase liquids, vapor ventilation, air sparging, bioremediation, monitored natural attenuation, and a variety of pump-and-treat, pump-and-waste, or pump-and-use methods. The above remediation activities have occurred in the past, are occurring now or are expected to occur in the near future.

Ground water contamination is known to have occurred at a small percentage of facilities operating under a Ground Water Discharge Permit approved by NMED or OCD since the regulations became effective in 1977. Prevention of ground water contamination is clearly more cost effective and technically achievable than remediation. Approximately 13% of ground water contamination in the State have been caused by nonpoint sources, predominantly household septic tanks or cesspools. Nonpoint source contamination may be caused by diffuse sources such as large numbers of small septic tanks spread over a subdivision, residual minerals from evapotranspiration, animal feedlot operations, areas disturbed by mineral exploration and/or storage of waste products, urban runoff or application of agricultural chemicals. Point source categories are shown in Figure 18. These sources are include publicly and privately owned sewage treatment plants with flows over 2,000 gallons a day, dairies, mines, food processing operations, industrial discharges, landfills and accidental spills or leaks.

Nonpoint Sources of Contamination: Household Septic Tanks and Cesspools

It is estimated that there are over 208,000 household septic tanks or cesspools in the State discharging roughly 78 million gallons per day of wastewater to the subsurface. In shallow water table areas, the effluent percolates rapidly to underlying aquifers. These systems can pollute ground water with the following contaminants:

- total dissolved solids (TDS);
- iron, manganese and sulfides (anoxic contamination);
- nitrate;
- potentially toxic organic chemicals; and
- bacteria, viruses and parasites (microbiological contamination).

TDS contamination occurs largely from 'mineral pickup,' the increase of minerals during domestic use.

Anoxic contamination is a chemical condition in which the water is deficient in oxygen. It can be caused by septic

Figure 14.

Point Sources of Ground Water Contamination in New Mexico.

1,235 Cases, Distributed County-by-County.

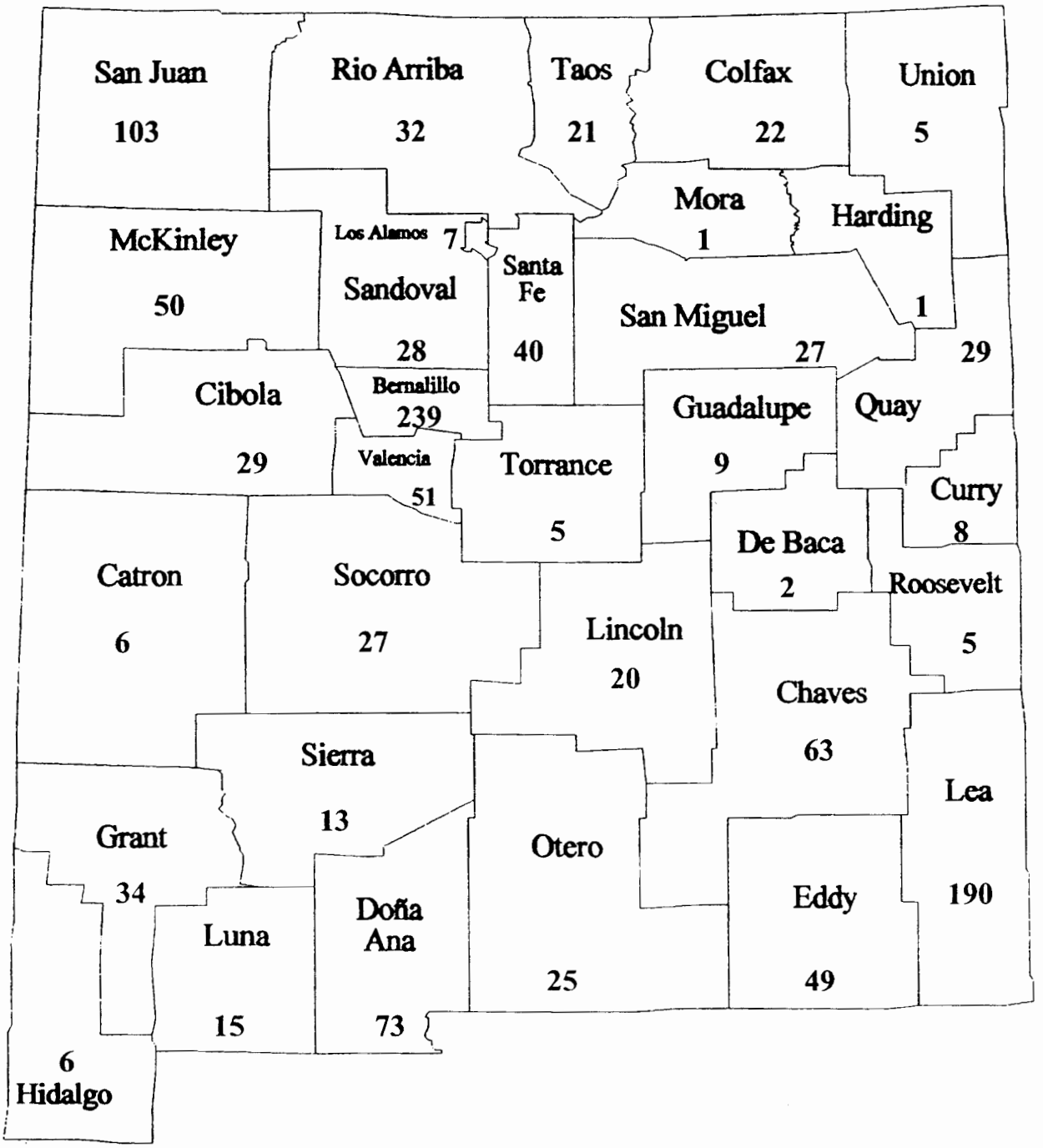


Figure 15.

Contaminated Water Supply Wells in New Mexico.

(Public and Private)

1,907 Sites, Distributed County-by-County.

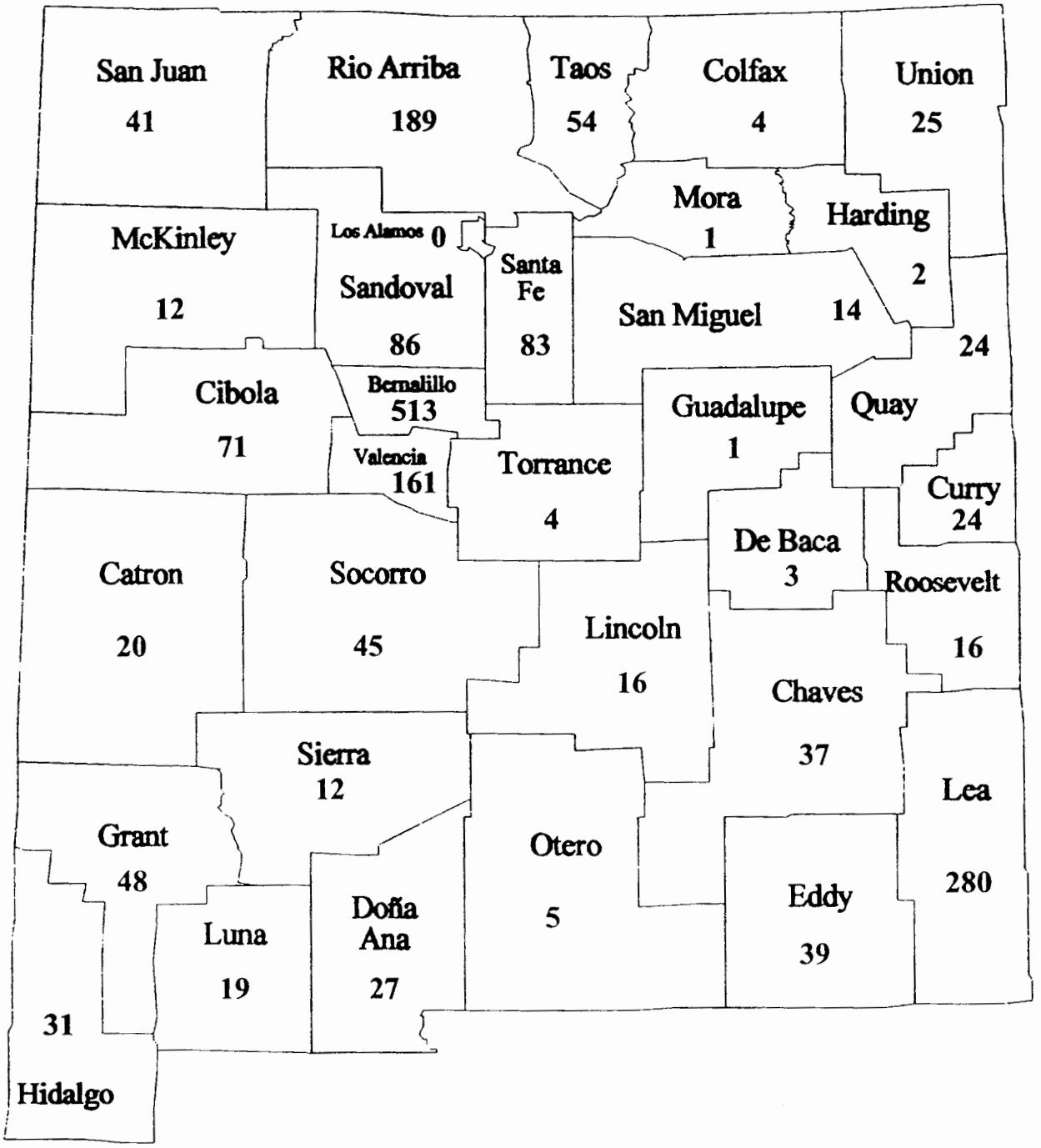
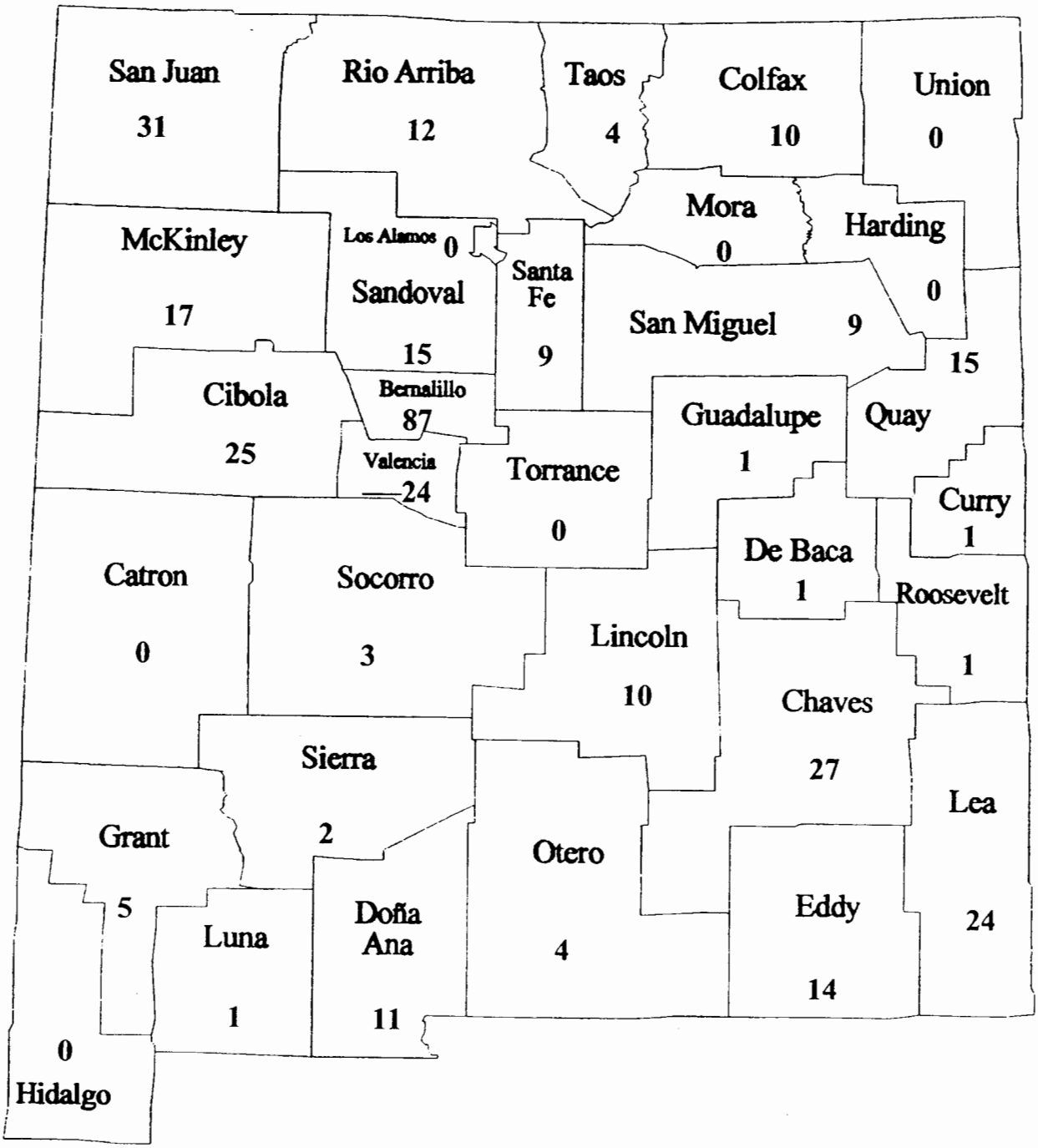


Figure 16.

Ground Water Cleanups in New Mexico.

363 Sites, Distributed County-by-County.



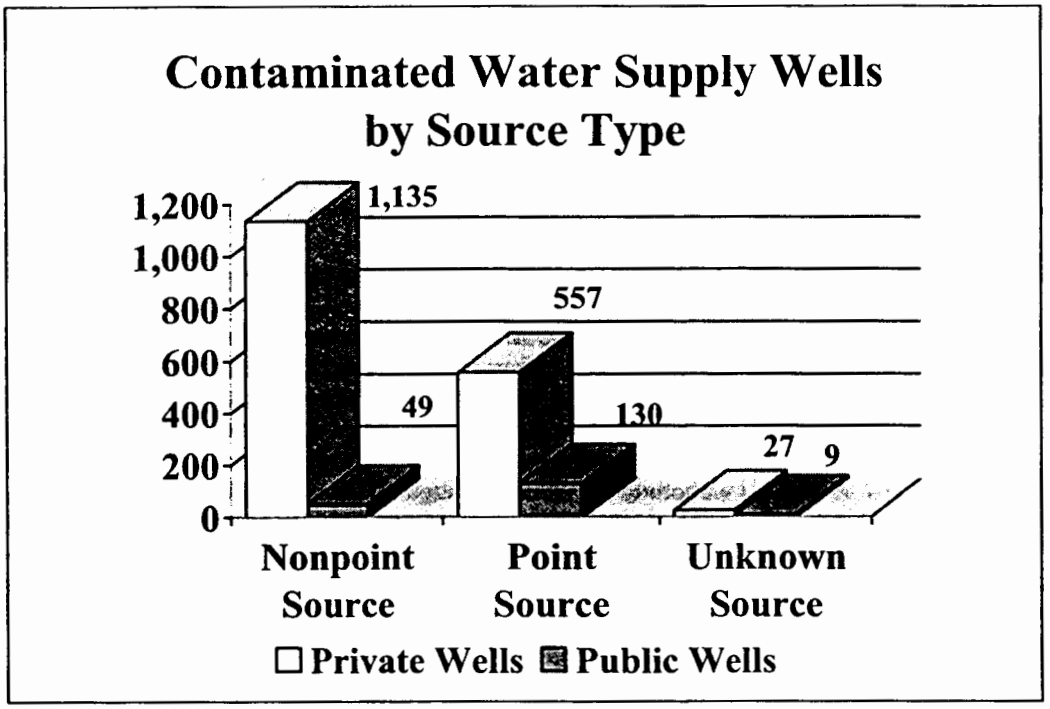


Figure 17. Contaminated Public and Private Water Supply Wells by Source Type in New Mexico.

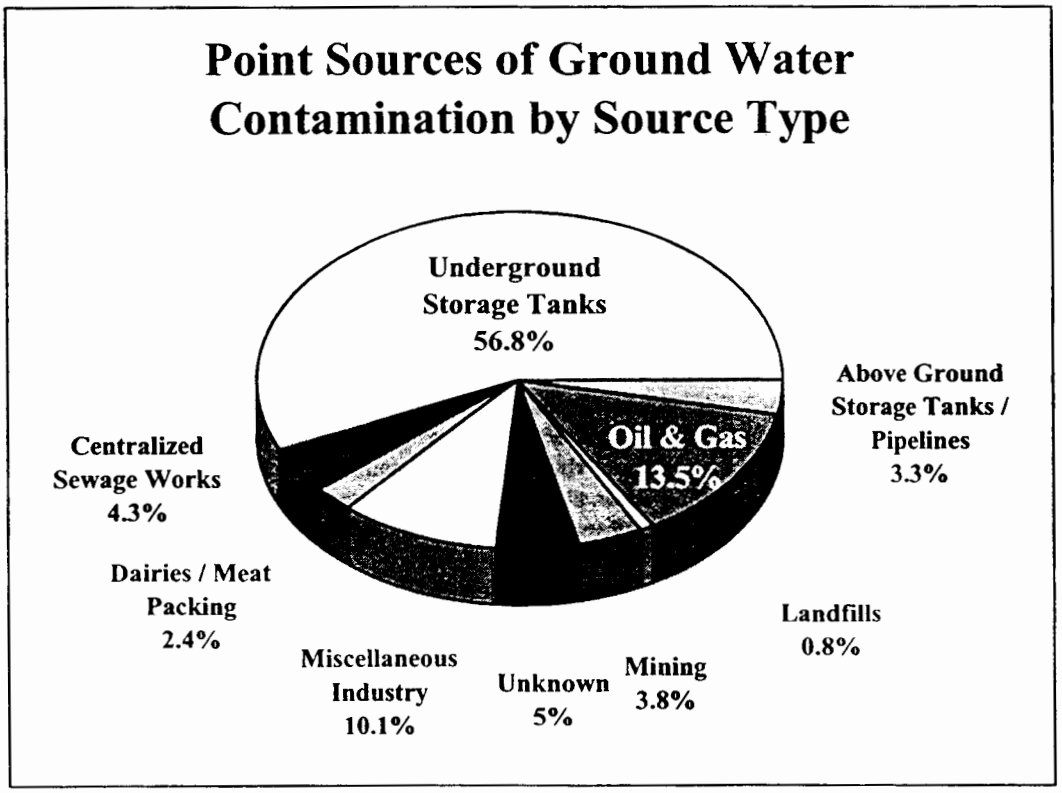


Figure 18. Point Sources of Ground Water Contamination in New Mexico by Source Type.

tank discharges or by naturally occurring geologic deposits such as humus and peat. Iron, manganese and hydrogen sulfide, typical anoxic contaminants, can cause severe taste and odor problems and can stain laundry and porcelain, but are not known to be hazardous to human health. Nitrate contamination, on the other hand, typically lacks such aesthetic problems, but can cause methemoglobinemia, a rare but potentially serious and sometimes fatal disease affecting infants. Questions have also been raised as to whether nitrates can cause cancer in healthy adults. Ground water nitrate levels resulting from household septic tank contamination have been monitored at concentrations as high as thirty milligrams per liter as nitrogen (thirty mg/L as N), three times the health standard.

Conditions of severe anoxic and nitrate contamination are mutually exclusive due to differences in the oxidation-reduction potentials of the ground water involved. Organic chemicals and disease-causing microbes, however, can occur in conditions of both anoxic and nitrate contamination. Many household products, especially cleaners, contain organic chemicals. Trichloroethylene, in particular, is a well-known ground water contaminant released by septic tank discharges.

Household septic tanks and cesspools constitute the single largest known source of ground water contamination in the State. Widespread nitrate contamination and/or anoxic conditions have been documented in Chamita, Española, Pojoaque, Tesuque, Santa Fe, Bernalillo, Corrales, Albuquerque and its South Valley, Carnuel, Bosque Farms, Los Lunas, Belen, Carlsbad, Nara Visa, Lovington and Hobbs.

Agriculture

Evapotranspiration (ET) is a process in which water enters the atmosphere either by direct evaporation or by transpiration from living plants. Minerals left behind in the soil following ET water losses can increase the TDS of shallow ground water and form alkali deposits. In the Rio Grande Valley, for example, irrigation canals have diverted river water for hundreds of years. Percolating irrigation water has caused the shallow water table in many valley areas to rise and be more vulnerable to ET. This problem can be remedied by the construction of drains to lower the water table, as was done in Albuquerque in the 1930s.

Another concern with agriculture is the application of agricultural chemicals. NMED, and the U.S. Geological Survey have conducted various sampling projects for pesticides in ground water. Trace concentrations (low ug/l or less) of arsenal, atrazine, bromacil, carbaryl, carbofuran, dacthal, disulfoton, DDE, DDT, heptachlor, lindane, metolachlor, napropamide, prometon, and propazine have been detected in ground water at various locations in the state. Carbon tetrachloride, a former grain fumigant, has been detected at levels up to 500 ug/l. Additionally, agricultural fertilizers have contaminated ground water with nitrate at several locations.

Point Sources of Contamination: Oil Field Sources

The most common cause of oil field contamination is the past practice of disposal of produced water to unlined pits. Other causes include leaks of crude petroleum and/or produced water from pipelines and well casings.

Produced waters, often brines, tend to gravitate to the lowest part of a freshwater aquifer and migrate along a hydraulic gradient different from that of the water. In addition to inorganic contaminants, such as chloride, most produced waters contain aromatic hydrocarbons that also can contaminate ground water. At the present time, ninety percent of the approximately 454 million barrels of water produced annually in the State is injected into deep wells for the purposes of secondary recovery, pressure maintenance or disposal.

Crude oil and natural gas condensate, if discharged in the liquid phase by upsets or spills, will float atop the water table and their water soluble constituents will dissolve into the ground water.

An August 1989 OCD survey of reported spills found that nearly half were due to corrosion of tanks, valves or pipelines.

Oil field contamination of ground waters has been a more serious problem in southeastern production areas of the State than in those in the northwest part of New Mexico. This is due to the larger quantity and generally poorer quality of water produced in the southeast, as well as the relative vulnerability of southeastern sole-source aquifers (e.g. the Ogallala). Cases of documented ground water contamination as a result of oil and gas exploration and production, however, are increasing in northwestern New Mexico. A priority OCD study of unlined pits in northwestern New Mexico funded by U.S. Environmental Protection Agency (EPA) under a Clean Water Act (CWA) grant documented ground water contamination resulting from produced water disposal to unlined pits (2).

Oil Conservation Division Ground Water Quality Studies

The Cedar Hill/Animas Valley Gas Study is attempting to determine the source of natural gas in ground water and domestic water wells in the area along the Animas River north of Aztec in San Juan County, and extending to Bondad, Colorado. The study is continuing and has identified some oil and gas production wells as conduits for migration of natural gas. Wells found to be acting as conduits are required to have remedial cementing or to be plugged. In addition, OCD has instituted new cementing requirements for oil and gas wells in the San Juan Basin.

Refined Petroleum Product Sources

The most common cause of petroleum product contamination in the State is leaking underground storage tanks (LUSTs). It is estimated that less than 5% of the approximately 4,051 underground storage tanks in the State are leaking. Causes of leaks include overfill, and faulty installation, as well as tank and line corrosion. All tanks systems had to comply with strict new performance standards by December 22, 1998. In addition to ground water contamination, LUSTs can cause explosive hazards when product vapors migrate to basements and utility corridors.

Other sources of refined petroleum product contamination include leaks and

tank-bottom water discharges from above-ground storage tanks, leaks and hydrostatic test water discharges from pipelines, transportation accidents and waste oil disposal.

Nitrate Sources

Point sources of nitrate contamination include sewage treatment plants, residential and commercial septic tank leachfields, food processing facilities, dairies, slaughterhouses, fertilizers, mining facilities, explosives disposal sites, and other industrial facilities. Nitrate contamination, such as from mining, can result in considerably higher concentrations (e.g. 500 mg/L as N) than those resulting domestic wastewater, which seldom exceed 30 mg/L as N (the health standard is 10 mg/L). Dairies, which are common in New Mexico, can cause nitrate contamination up to 280 mg/L as N.

Many discharge plans reviewed by NMED are for domestic wastewater disposal systems. Systems subject to discharge plan requirements include both private domestic wastewater systems discharging over 2,000 gallons a day, such as those serving trailer parks and resort developments, and public systems such as municipal sewage disposal systems which do not discharge to "waters of the United States" (40 CFR § 122.2).

The number of dairies in New Mexico has rapidly increased over the last decade. Currently there are 164 dairies in the state, and as of the end of 1998, there were approximately 155 dairies which discharge wastewater under ground water discharge permits. Ground water contamination identified at dairy operations is generally characterized as nitrate, chloride and\or TDS concentrations which exceed the WQCC ground water standards.

Solvents Sources

Halogenated or aromatic solvents are used by many different industries such as machine shops and electronics firms, and also occur in a variety of household products. The most common solvents being detected in the State's ground water are benzenes and chlorinated methanes, ethanes, ethylenes and propanes.

Metals/Minerals Sources

Extraction of a variety of minerals is an important activity in New Mexico, with copper, molybdenum and uranium receiving major permitting attention in past years. At present, all former uranium mills are closed or undergoing reclamation and remediation with the exception of Quivera Mining Company which is on standby for possible ore processing in the future. Copper and molybdenum mining operations continue to operate and expand operations in New Mexico. Mining ground water discharge permitting is expected to be a priority for the next few years and NMED is in the process of modifying all mining permits to incorporate comprehensive corrective action plans to address existing ground water contamination and closure plans which will protect ground water quality after mining operations cease.

Contamination by metals and/or minerals may be caused by mining and milling or other ore processing activity. Common contaminants include sulfate, pH, nitrate, total dissolved solids, heavy metals, radionuclides and other trace elements.

Ore refining mills produce large quantities of tailings, the raffinate of which typically contains elevated levels of metals/minerals. Due to engineering convenience and economic advantages, tailing impoundments have often been located in alluvial valleys close to the mill. This frequently causes ground water contamination, which persists long after removal or amelioration of the sources of contamination.

Public Landfills

Concern about the potential for landfills to contaminate ground water has grown in recent years. Very little is known about the composition of wastes buried in landfills in the State. Constituents known to occur in landfill leachate include chlorides, nitrogen species, solvents and a large number of other organic contaminants.

Household wastes alone contain a large number of leachable constituents. In Oklahoma, for example, more than forty organic compounds, including phthalates and alkybenzenes, were detected in ground water contaminated by a landfill that did not receive appreciable amounts of industrial wastes (**3**). In an Albuquerque survey of household hazardous waste, more than 50% of the wastes identified were disposed of in area landfills, including more than 53,000 gallons of used motor oil per year (**4**).

Large quantities of septage (solids and liquids pumped from septic tanks periodically) have in the past been discharged to unlined pits at several landfills in the State, a practice no longer allowed. The septage in several cases has been commingled with industrial wastes such as produced water, waste petroleum products and chlorinated solvents.

NMED has conducted a limited study of ground water quality impacts of landfills in the State. Ground water contamination has been documented at eight landfills (**5**, **6**). The United States Bureau of Land Management is conducting studies at several of its landfills, particularly in Doña Ana and San Juan Counties.

Septage Disposal

Vacuum truck operators provide a vital service to septic tank owners by periodically removing accumulated solids. In some areas of the State, however, operators do not dispose of septage using legally or environmentally sound mechanisms. Several septage disposal sites have been found to contain petroleum products, metals, minerals and solvents. To help correct the situation, NMED is in the process of developing septage tracking regulations and is working with local governments and private operators to permit environmentally sound and legal septage disposal facilities around the state.

PROGRAMS FOR GROUND WATER POLLUTION CONTROL

New Mexico relies on several programs to protect and maintain ground water quality. These include programs established under the New Mexico Water Quality Act (§ 74-6-1 et seq., NMSA 1978), the major statute dealing with water quality management at the State level, as well as other programs and actions taken under other State law and regulations which have components related to ground water pollution (see Appendix E). In addition, the State cooperates with the federal government on various ground water pollution control programs derived from federal mandates. Counties and municipalities also have broad authorities relevant to ground water pollution control. Important aspects of both State and federal programs and of local authorities are described below.

State Regulation of Ground Water Quality

New Mexico's ground water protection program was well-established before most federal legislation addressing ground water quality was adopted. In 1967, the State's first water quality protection law, the Water Quality Act, was adopted by the New Mexico legislature. This law was amended in 1973 to allow the State to adopt regulations requiring permits for water quality protection. By 1977 the State had adopted a comprehensive ground water quality program applicable to most types of discharges in the form of regulations promulgated by the New Mexico Water Quality Control Commission (WQCC). These regulations have been modified and updated over the years, but the framework for water quality protection in New Mexico has remained essentially the same since 1977. Key features of New Mexico's 1977 water quality protection rules include a requirement for dischargers to obtain a Ground Water Discharge Permit to prevent ground water contamination from discharges that have the potential to impact ground water quality, requirements for reporting and addressing spills and releases, and numerical standards for common ground water contaminants. The rules and standards protect all ground water in New Mexico that has a total dissolved solids concentration of 10,000 mg/l or less. These rules have been updated through the years to include additional ground water quality standards, ground water pollution assessment and abatement regulations, and underground injection control (UIC) requirements. Programs established under the New Mexico Oil and Gas Act, Hazardous Waste Act, Ground Water Protection Act, Solid Waste Act, Emergency Management Act, Voluntary Remediation Act and Environmental Improvement Act also contain provisions which are designed to protect ground water quality and which implement the WQCC ground water quality standards by reference.

NEW MEXICO WATER QUALITY ACT AND WATER QUALITY CONTROL COMMISSION REGULATIONS

Under the authority of the Water Quality Act, the New Mexico Water Quality Control Commission (WQCC) has promulgated regulations to protect the State's ground waters, including the broadly applicable ground water protection regulations of Subpart III, the more detailed additional requirements of Subpart V for underground injection control, and the spill response and abatement regulations found in Subparts I and IV. and the found in Subparts I and IV.These regulations are commonly referred to as the WQCC Regulations and are described in more detail below (7).

Subpart I - Notification of Discharge/Removal

Section 1203 of the WQCC regulations imposes notification and corrective action requirements on any unpermitted discharger of any water contaminant. The majority of discharges currently handled under this regulation are spills of petroleum products, sewage and industrial chemicals.

Relatively minor discharges handled under a WQCC § 1203 Corrective Action Report and are closed out in a short period of time, usually under 180 days. For cases that cannot be cleaned up to standards in 180 days, NMED and OCD may require the submission of an abatement plan pursuant to Subpart IV of the WQCC regulations. For more complicated cases, NMED uses the Toxic Sites Triage System, a multi-media risk-based numerical priority model to assign case priorities. Because of limitations of staff at both NMED and OCD, only the most serious problems are assigned active case status (Figure 19).

Subpart III - Permitting and Ground Water Standards

Subpart III of the Water Quality Control Commission Regulations includes the State's ground water quality standards and ground water discharge permit/pollution prevention requirements. These regulations are designed to protect all ground waters with total dissolved solids concentrations of 10,000 mg/L or less for present and potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow for uses designated in the New Mexico Water Quality Standards for Interstate and Intrastate Streams (7). As of 1998, 47 numeric ground water quality standards had been adopted by the Water Quality Control Commission. Additionally, 87 organic compounds are listed as toxic pollutants which cannot exceed concentrations in ground water which create a lifetime risk of more than one cancer per 100,000 exposed persons.

The cornerstone of the State's pollution prevention efforts are the ground water

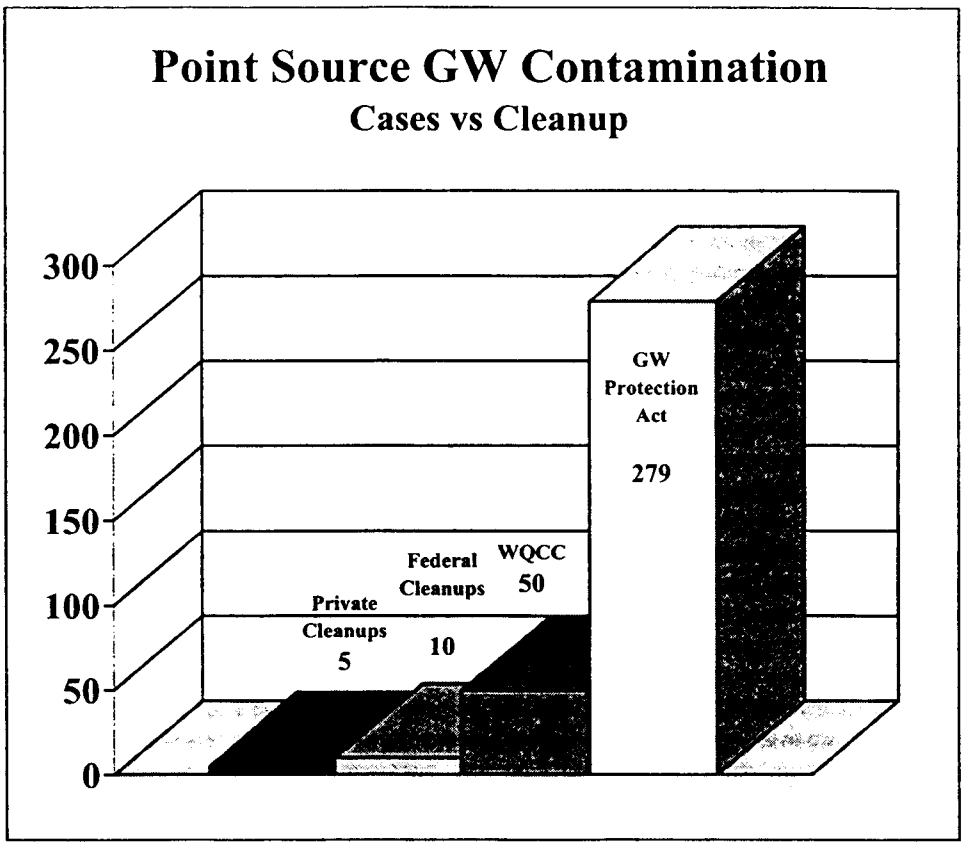


Figure 19. Point Source Ground Water Contamination Cases in Relation to Cleanup Efforts by Regulatory Authority.

discharge permit regulations. These regulations require that a person discharging onto or below the surface of the ground demonstrate he will not cause ground water standards to be exceeded in ground water at any place of withdrawal for present or foreseeable future use, and will not cause any stream standard to be violated. Ground water discharge permits include operational requirements for the facility, ground water and effluent monitoring programs, and contingency and closure plans. The regulations also provide authority to require financial assurance for proper closure of the facility. Since their adoption, these regulations have been a relatively effective tool in preventing ground water contamination.

NMED is delegated responsibility for enforcement of the State ground water protection regulations as they apply to industrial facilities (including mining), domestic waste treatment and disposal systems, municipal discharges, food processing facilities, and agricultural discharges. By the end of 1998, NMED had received and processed over 1,245 discharge plans.

OCD is delegated responsibility for enforcement of the State ground water protection regulations as they apply to oil refineries, natural gas processing plants and compressor stations, carbon dioxide facilities, geothermal installations, natural gas transmission lines, brine production wells and oil field service companies. Through December 1999, OCD was responsible for approximately 325 discharge permits. The discharge permit requirement can be described as a discharge plan prepared by the discharger which the New Mexico Environment Department (NMED) or the Energy, Minerals and Natural Resources Department's Oil Conservation Division (OCD) approves, approves with conditions or disapproves. Discharges that are covered by these regulations include discharges to surface impoundments and leach fields, application of wastes to land, and injection or infiltration of contaminants into the subsurface. Among discharges specifically exempted are those related to coal surface mining which are regulated under the New Mexico Coal Surface Mining Act (§§ 69-25A-1 et seq., NMSA 1978), discharges from oil and natural gas exploration and production activities which are regulated under the New Mexico Oil and Gas Act (§§ 70-2-1 et seq., NMSA 1978) and individual domestic septic tank discharges of less than 2,000 gallons a day, which are regulated under the State's liquid waste disposal regulations. Water used in irrigated agriculture is also exempted unless the irrigation water is effluent from a system for treating or disposing of sewage, industrial wastes, or other wastes that will pollute any waters of the state.

Discharge permits usually are approved for a period of five years. Because the regulations became effective in 1977, many discharge plans have been in effect for five years or more. As a result, an increasing portion of the discharge permit review process is for renewal or modification of existing discharge plans. The number of new

requests for discharge permits also continues to increase. New permit requests include domestic wastewater treatment and disposal facilities, dairies, and new industrial dischargers.

Fees collected from facilities seeking a ground water discharge permit help fund NMED and OCD discharge permit programs. Fees pay for approximately 10% of the cost of issuing, modifying and renewing permits, and periodic monitoring of permitted facilities.

Implementation of the ground water discharge permit program also involves the compliance inspection of permitted facilities, as well as the review and evaluation of self-monitoring reports and enforcement. Compliance inspections generally are scheduled annually, and include split-sampling of monitor wells with the permittee. Most facilities are required to sample monitor wells on a quarterly basis, and the once a year split-sample is considered adequate to assure the accuracy of the self-monitoring data. For NMED's regulated facilities, basic information including date of receipt, whether the data was complete and whether there was an exceedance of the ground water standards, is entered into a computerized database. All NMED programs have direct access to this database.

Subpart V - Underground Injection Control

The State of New Mexico has primary enforcement authority for the underground injection control program established by the federal Safe Drinking Water Act (SDWA). Primacy was obtained in 1982 for injection wells used in drilling for and production of oil and natural gas, known as Class II wells in the EPA's classification system, and for all other classes of wells in 1983. Primacy makes a state eligible for an annual federal grant under the SDWA. In New Mexico, primacy also avoids the necessity of having EPA run a federal underground injection control program in the State in duplication of the long-established State ground water discharge permit program.

New Mexico's underground injection control program is carried out partly under the authority of the New Mexico Oil and Gas Act and partly under the authority of WQCC regulations promulgated pursuant to the New Mexico Water Quality Act. OCD is the lead State agency for the under ground injection control program because the majority of injection wells in the State are associated with oil and natural gas production. Regulation of these wells is described below under Oil and Gas Act.

The WQCC regulations apply to underground injection wells other than those associated with oil and natural gas production. NMED administers this program except for OCD-administered brine production wells and those wells disposing of effluent from refineries, geothermal operations and the oil field service industry. All types of injection wells subject to WQCC regulations must comply with general ground water protection provisions of Subpart III. Injection wells used for effluent disposal and *in situ* mineral extraction must also meet the technical requirements imposed by Subpart V of the WQCC regulations, which were adopted in 1982.

In 1998 NMED issued a UIC permit for the injection of 648,000 gallons per day of saline water from the Lake Meredith Salinity Control Project into a class V disposal well. Lake Meredith is the drinking water source for 500,000 residents of 11 Texas cities. Since its construction, lake Meredith has experienced a gradual decline in water quality due to increasingly high salt concentrations due to a leaking brine aquifer. The salinity control project is designed to decrease the input of saline water to the lake by pumping from the shallow brine aquifer and reinjecting the brine into a deeper formation approximately 4,000 feet below the ground surface.In 1998 NMED issued a renewed/modified ground water discharge permit for DLD Resources to discharge a maximum of 200 gpm of neutralized hydrochloric and sulfuric acid wastewater to the subsurface using a Class 1 Non-Hazardous Injection well. The injectate is neutralized and injected approximately 4,350-5000 feet below ground surface. Although the permit has been issued, this facility is currently not operating. The ground water discharge permit requires financial assurance to be in place prior to discharging.

An inventory of operating underground injection wells in New Mexico as of the end of 1998 shows the following:

Class I (industrial effluent disposal)	5
Class II (oil and gas activity)	5500
Class III (mineral extraction)	29
Class IV (unpermittable injections)	0
Class V (miscellaneous)	369

Enforcement of Water Quality Control Commission Regulations

Enforcement of WQCC regulations for ground water pollution control are pursued as resources allow. Major enforcement efforts are aimed at assuring that intentional discharges of sewage, industrial and mining effluents—dairy wastewater, and other effluents are in conformance with discharge permit requirements, which in turn should assure that ground water will not be degraded beyond standards. Other major enforcement efforts are aimed at requiring responsible parties to address pollution caused by leaks, spills, or other discharges not made in conformance with regulations.

In general, three methods for achieving compliance with regulations are used by the State. These include attempts to obtain voluntary compliance, including notices of noncompliance and settlement

agreements; issuance of Notices of Violation and compliance orders; and civil law suits filed in State district court under the Water Quality Act or applicable portions of the Public Nuisance Statute (c.f., §§ 30-8-3, 30-8-12, NMSA 1978) or both (including negotiated settlement agreements filed with the court pursuant to those suits).

The Water Quality Act was amended in 1993 to provide constituent agencies of the WQCC with the authority to issue compliance orders which can include administrative penalties (§ 74-6-10. A. and C. NMSA 1978). Compliance Order authority provides both a deterrent to future illegal activities as well as providing a more rapid enforcement capability when voluntary compliance cannot be achieved.

Effectiveness

NMED has been working to improve the effectiveness of the ground water discharge permit program. For example: written policies and guidelines have improved consistency in the requirements imposed on different facilities and in communicating to the regulated community minimum standards for permit approval and the State's ground water pollution prevention program has adopted a team approach to issuing permits which should streamline the process and provide consistency. Requiring permits for facilities that were in operation at the time the program started in 1977 (pre-1977 facilities) has been an increasing priority for the ground water discharge program. Additionally, the program has been collecting industry-specific information on unpermitted facilities in order to systematically require these facilities to obtain permits.

The program has also been working with older permitted facilities to bring them into compliance with current standards, policies and guidelines. Contingency plans which delineate corrective actions for operational failures or violations of ground water standards are required for all new permits and at renewal for existing permits plans. Corrective action may include source control measures or ground water remediation. Closure plans are also being required for new permits and for modifications and renewals of older permits. Financial assurance for closure and contingency plans has also been required for some facilities.

Historically, facilities often made great efforts to avoid the permitting process. During the past several years, however, the State has established a proactive and cooperative working relationship with industry groups, and many facilities now view the permitting process as a routine part of their business startup and day-to-day operations. Furthermore, many lending institutions are working closely with the State to ensure that the facilities have obtained necessary permits before business loans are approved or renewed. There are many positive indications that the program is effective at protecting New Mexico's ground water resources.

NEW MEXICO OIL AND GAS ACT

In addition to the WQCC regulations, OCD administers several water protection programs under the Oil and Gas Act. The Act authorizes OCD to "regulate the disposition of water produced or used in connection with the drilling for or producing of oil and gas, or both, and to direct surface or subsurface disposal of such water in a manner that will afford reasonable protection against contamination of fresh water supplies designated by the State Engineer" (§ 70-2-12.B (15) NMSA 1978). The designation by the State Engineer generally protects all streams and surface waters and all ground water having 10,000 mg/L or less total dissolved solids, except for those ground waters having no present or reasonably foreseeable beneficial use.

The OCD requires that permits be obtained statewide for drilling, for waste oil treatment plants and for commercial and centralized surface waste disposal. Most regulated activities allow for a public hearing to be requested before permit issuance.

Statewide rules require surface disposal of oil and gas related waste (including produced water, sediment oil, and drilling fluids) to be performed in a manner which prevents contamination of fresh water. For certain geographic areas of the State, specific rules have been adopted that prohibit or limit certain disposal practices. Examples include limitations on disposal of produced water into unlined pits in southeastern New Mexico beginning in 1969, and in northwestern New Mexico beginning in 1985. In 1986, rules were adopted to require permits for commercial and centralized produced water disposal facilities in the San Juan Basin of northwestern New Mexico. In 1988, extensive statewide rules for licensing of commercial surface waste disposal facilities were adopted.

The Oil Conservation Commission in January 1993 adopted Order R-7940C, a set of stringent rules governing the disposal of produced water from oil and gas wells. These rules expand previously defined vulnerable ground water areas, create wellhead protection areas and prohibits the disposal of oil and gas wastes and water into unlined pits in vulnerable ground water areas in northwestern New Mexico. Order R-7940C prohibits disposal of all oil and gas wastes into unlined pits in these areas and requires existing pits to be closed in accordance with OCD regulations and guidelines. In 1993 the OCD issued Surface Impoundment Closure Guidelines which provide recommended risk-based cleanup levels and closure procedures to be used in the closing of surface impoundments and for remediation of leaks, spills and releases. An additional fresh water related problem currently receiving attention is the large

number of production wells that have been shut in or temporarily abandoned. The reason for this increase is that the lower price of oil and natural gas since 1985 has led to the shutdown of marginal producing wells. However, these wells cannot be left indefinitely in this condition because natural processes cause casing deterioration that can lead to interstrata communication and possible fresh water contamination. As of the end of 1996, there were 48,022 producing oil and gas wells and 7,420 wells which were shut in. OCD has instituted rule changes to require proper temporary plugging for wells shut in for over six months. Such plugging would be allowed for a maximum of five years without reapproval.

In 1989 amendments to the Oil and Gas Act and to the Environmental Improvement Act (§§ 74-1-1 et seq., NMSA 1978) transferred responsibility for regulating some nonhazardous wastes away from NMED (under authority of the Environmental Improvement Act) to OCD (under authority of the Oil and Gas Act). The wastes now regulated under the jurisdiction of OCD are non-domestic solid wastes resulting from the exploration, development, production, transportation, storage, treatment or refinement of crude oil, natural gas or geothermal energy. These wastes may be generated at production sites, gas plants, refineries and oil field service companies. OCD is required to regulate disposal to protect public health and the environment, and is incorporating review of solid waste practices in discharge plan review and in review of surface disposal applications.

OCD performs ground water monitoring both to carry out responsibilities delegated to it by the Water Quality Control Commission and to ensure reasonable protection of fresh water as required by the Oil and Gas Act. OCD performs necessary monitoring as part of discharge plan review and at approved discharge plan sites. These discharge plans include the regulation of natural gas plants, natural gas compression facilities, oil refineries, geothermal installations, brine production wells and oil field service companies. At a minimum, inspections and sampling of effluents and ground water are conducted before plan approval and again prior to plan renewal In addition to monitoring carried out by OCD personnel, self-monitoring is also required of dischargers under conditions specified in individual discharge plans. Finally, monitoring at selected locations is conducted in response to citizen complaints in areas of oil and gas production activity. OCD is currently developing a computerized database management system for discharge plan and water quality monitoring.

As with the discharge permit process under the Water Quality Act, the permitting process under the Oil and Gas Act is much more effective at preventing new pollution from current activities than it is at coping with historical pollution problems. The most common cause of oil field contamination is the past practice of produced water disposal in unlined pits. This has been regulated in the southeastern part of the State since 1969 and in the northwestern part since 1985, but effects of past practices still persist. Although generally effective in controlling the effects of present discharges, the effectiveness of the regulatory program under the Oil and Gas Act could be improved in two areas: (1) upgrade temporary abandonment procedures to guard against interstrata communication at wells that are temporarily out of production; and (2) additional integrity testing and berming requirements to provide better environmental protection from leaks and spills at aging pipelines, tanks and other equipment.

NEW MEXICO HAZARDOUS WASTE ACT

The New Mexico Hazardous Waste Act (§§ 74-4-1 et seq., NMSA 1978) authorizes the Environmental Improvement Board (Board) to adopt regulations for the management of hazardous waste and underground storage tanks (USTs). These regulations are to be equivalent to, and under certain circumstances may be more stringent than, federal regulations adopted by the EPA pursuant to the federal Resource Conservation and Recovery Act (RCRA). However, the Board may adopt regulations for the management of hazardous waste that are more stringent than federal regulations adopted by the EPA pursuant to RCRA, after notice and public hearing, if the Board determines that such federal regulations are not sufficient to protect public health and the environment. Under this authorization, hazardous waste management regulations (which currently incorporate the federal regulations by reference) and underground storage tank regulations have been adopted. These two regulatory programs are described below. This Act also authorizes NMED to take action to protect persons from harm arising from hazardous substance emergency incidents and establishes an emergency fund to be used for cleanup of such incidents. The genesis and makeup of the Board are described in the section on the Environmental Improvement Act later in this chapter.

Hazardous Waste Management Regulations

Under the New Mexico Hazardous Waste Act, the Board adopted the hazardous waste management regulations in 1983, and most recently amended them in 1995. Since these regulations, with their subsequent amendments, are equivalent to EPA's regulations promulgated under RCRA, New Mexico retains authorization to administer most of the federal hazardous waste management program. This program applies to those wastes meeting the specific criteria to be considered 'hazardous wastes' subject to the regulations. Many substances otherwise considered "hazardous" do not meet these criteria.

The federal Hazardous and Solid Waste Amendments of 1984 (HSWA), which amended RCRA, required significant changes to be made to the New Mexico program if authorization was to be retained. New Mexico legislation enacted in 1987 and 1989 provided the legislative authority to adopt most of the HSWA requirements. Although the State does not have complete primacy to administer HSWA, the State can and does use its authority to enforce State regulations (which mirror federal HSWA-derived regulations) at RCRA facilities. On January 2, 1996, New Mexico received Corrective Action Authorization from EPA in the Federal Register at FR 2450 (1/26/96). EPA provides oversight of these actions.

Administration of the State hazardous waste management regulations is carried out by NMED for all types of facilities, including oil refinement facilities. The regulations provide for 'cradle to grave' tracking and management of materials meeting the definition of 'hazardous waste'. Generators of hazardous waste must have EPA identification numbers, and can dispose of their waste only at an authorized facility.

TSD Facilities

Hazardous waste treatment, storage or disposal facilities (TSDFs) are required to obtain operating permits. Because site-specific detailed permits could not be issued immediately for every TSDF already in operation, EPA created a two-part permit system. Facilities that properly notified and submitted a short form (Part A) permit application were granted 'interim status'; in effect, a temporary operating permit until a site-specific operating permit could be issued. Interim status facilities are subject to a set of category-specific regulations. An interim status facility must either close under an approved closure plan or apply for an operating permit by submission of a 'Part B' application. All TSDFs in New Mexico have either applied for an operating permit or submitted closure plans for their hazardous waste units. In New Mexico, there are thirteen permitted TSDFs, six of which are open burn open detonation operations and three of which are mixed waste permit operations. Eight facilities have submitted applications for post closure care.

A primary intent of the hazardous waste management program is to prevent contamination of water resources by hazardous waste units. Any facility which has a landfill, surface impoundment, waste pile, or land treatment unit which is used to treat, store, or dispose of hazardous waste is subject to ground water monitoring requirements. If ground water contamination does exist, then the permit will specify a corrective action program to halt the escape of hazardous wastes and to restore the ground water, both on-site and off-site.

In New Mexico, the owners and operators of facilities that treat, store, or dispose of hazardous waste are subject to the ground water monitoring requirements.

Small Quantity Generators

An exemption from most of the hazardous waste management regulations is granted to 'conditionally exempt small-quantity generators,' facilities which generate less than 100 kilograms (kg) of hazardous wastes a month. There is also a category of small quantity generator for the generation of between a 100 kg and a 1,000 kg a month. This category must follow more of the regulations than the generator of less than a 100 kg a month but not as many as the generator of more than a 1,000 kg a month. In any case, no facility is allowed to dispose of hazardous wastes on its own property unless it is permitted as a disposal facility. There is currently no authorized disposal facility in New Mexico for off-site hazardous wastes. However, there are two storage transfer facilities within the State to serve as an accumulation point to which the generators can consign their wastes. The storage facility operator finds an appropriate disposal facility and the generator does not have to deal with the disposal facility.

Household Wastes

Household wastes are currently exempt from the hazardous waste regulations, but the disposal of items such as cleaners, thinners, solvents, pesticides poses a threat to the ground water beneath local landfills and surface waters down gradient from such landfills. The City of Albuquerque periodically sponsors household hazardous waste collection events. During these events, household wastes are accepted by a City contractor, packaged and shipped to an approved disposal facility. Such projects should become more common as other municipalities become aware of the hazards to ground water posed by even relatively small quantities of domestic waste items.

Under the State's Hazardous Waste Program, ground water data is being collected at fourteen individual sites as follows: two United States Department of Energy sites, six United States Department of Defense sites, one United States National Aeronautics and Space Administration site, and seven sites at private facilities. Monitoring parameters at all sites are hazardous constituents regulated under the federal Resource Conservation and Recovery Act.

These State regulations are patterned after the requirements of the federal Resource Conservation and Recovery Act. Although they are stringent, they are extremely cumbersome and lengthy. NMED's Hazardous and Radioactive Materials Bureau (HRMB) is developing measures of effectiveness. They have found the "population at risk" index recommended in EPA guidance to be inadequate. A measurement index should enable comparisons of ground water contamination over time based on the volume of contaminated water at each site. HRMB proposes that the index include three components: (1) the population living within a fixed distance from each site; (2) a current estimate of the volume of contaminated aquifer associated with each site; and, (3) "*aquifer at risk*" from site contamination should be factored into the risk estimate. Also needed is a measure to list sites with a potential for release of contaminants to aquifers.

Data are not currently available to support this proposed measure for the six sites with contamination that has migrated off-site.

Underground Storage Tank Program

In New Mexico, there are an estimated 4,252 underground storage tanks (USTs). NMED is currently aware of 2,216 past and current cases of soil contamination including 639 documented cases of ground water contamination resulting from leaking USTs (LUSTs) through reports from NMED inspectors, voluntary reporting and complaint investigations. Approximately 39 public wells, 47 private and 150 water supply wells have been contaminated or threatened by LUSTs. For ten years the department aggressively promoted and enforced implementation of leak detection and upgrading of UST systems to more stringent construction and design standards. Approximately 98% of active tanks now meet the December 22, 1998 standards for construction, operation and leak detection.

Although USTs are located throughout the State, they are predominantly associated with service stations, petroleum suppliers, and government facilities, all of which tend to be located in population centers. These population centers in turn are concentrated near surface water and vulnerable aquifers in river valleys characterized by permeable, unconsolidated sediments and shallow water tables. Without monitoring, a leak can go undetected for years, thus creating severe environmental and health problems that might easily have been remedied initially. Widespread compliance with the 1998 pollution prevention requirements is interpreted to result in a much lower percentage of leaks from the UST population in New Mexico.

Requirements to report and cleanup leaks and spills from LUSTs and other sources that might impact water quality have been part of the WQCC regulations for many years. In 1987, the New Mexico Hazardous Waste Act was amended to give NMED specific authority to control many more aspects of USTs. This program applies to any owner or operator of an UST system which contains a regulated substance, including petroleum products and hazardous substances, with very few exceptions.

NMED is responsible for ensuring that the environment and public health are not threatened by operation of underground storage tanks. This is accomplished by both prevention and corrective action activities including:

- inspecting the installation, operation and removal of USTs in the State;
- requiring upgrade of all USTs by December 22, 1998;
- investigating suspected and confirmed releases from USTs, and overseeing the cleanup of resulting contamination;
- implementing a public education program, which includes an annual conference and trade show, and extensive use of the Internet;
- administering a Corrective Action Fund which is used to remediate contamination caused by leaking underground storage tanks, and which significantly relieves tank owners and operators of the financial burden of taking corrective actions;
- rigorously enforcing regulations requiring presence and operation of leak detection mechanisms;
- development and use of innovative remediation technologies that ensure technically adequate and cost-efficient cleanups; and
- certifying both tank installers and scientists performing corrective action on behalf of tank owners and operators.

New Mexico UST Regulations

The New Mexico Underground Storage Tank Regulations were adopted by the Environmental Improvement Board in phases starting in 1989. By 1991, the State had in effect regulations covering the following areas: registration of tanks, assessment of fees, new and upgraded UST systems, general operating requirements for UST systems, release detection, reporting and corrective action; closure of USTs, financial responsibility for tank owners, and certification of tank installers. In 1990 certain provisions of the regulations were found to be more stringent than the federal requirements which is a violation of the Hazardous Waste Act. To remedy the situation, the Board adopted those federal requirements by reference. At the present time the UST Regulations are being revised to better clarify the existing regulations, adopt new revisions including the implementation of risk based decision making which enables the UST Bureau to better focus its resources on sites where the risk to public health and the environment are greatest, and the addition of new options that local governments can use to meet other financial responsibility requirements.

In June 1991 the Environmental Improvement Board (Board) passed Part XV of the Ground Water Protection Act (GWPA) Regulations. This established department priorities for corrective action at sites contaminated by releases of regulated substances from Underground Storage Tanks, defined the minimum site assessment for which an owner or operator is responsible, and set out procedures for administering the Corrective Action Fund. This fund is used for State-sponsored activities such as investigations, mitigation, containment, and remediation of contamination resulting from releases of regulated substances.

On September 22, 1992 NMED adopted the corrected the Corrective Action Fund Payment and Reimbursement Regulations as directed by the 1992 amendments to the GWPA. NMED developed proposed revisions to them in December 1993 and they were adopted on March 4, 1994. Further revisions were adopted in December 1994, April 1997 and October 1999. These regulations establish a program and procedures to reimburse the owners, operators, or their agents for their costs for corrective action

As of October 1999 USTB of NMED was overseeing corrective action at 1,100 leaking underground storage tank (LUST) sites. Since the program began, 1,106 LUST sites have been granted "No Further Action" status, including 76 sites that had ground water contamination. Federal LUST trust funds are used to oversee corrective action at sites. Most tank owners and operators take the required corrective action; but where tank owners are unknown, unwilling, or unable to take corrective action, the state Corrective Fund has been used by USTB to take the necessary corrective action. USTB has addressed 97 sites in this

manner at a cost of $28.6 million. A total of $77.9 million in state funds has been spent on corrective action at LUST sites to date. From the inception of the program to October 1999, USTB has made over 5, 482 payments totalling $49.3 million. NMED currently processes from 55 to 60 payments a month.

The prevention area of the program (from October 1, 1995 through November 8, 1999) completed 4,078 compliance inspections and issued 466 notices of violation. Most facilities, either have corrected their violations or closed, and 98% of all active facilities are in compliance with the regulations for system installation and operation.

GROUND WATER PROTECTION ACT

The Petroleum Storage Cleanup Act, enacted by the New Mexico Legislature in 1988, was repealed in 1990 and replaced with the Ground Water Protection Act (§§ 74-6B-1 et seq., NMSA 1978). The new act provides a State Corrective Action Fund for corrective action at sites contaminated by the contents of leaking underground storage tanks. It also recognizes that the owners and operators of facilities containing underground storage tanks must, under federal law, provide financial assurance and allows the "Corrective Action Fund" to serve that purpose as well. In 1991, the Ground Water Protection Act was amended to define "owner" as owner of an underground storage tank rather than owner of a site containing an underground storage tank, and allow for reimbursement of tank owners and operators for costs of corrective action.

EMERGENCY MANAGEMENT ACT

The Emergency Management Act, (§§ 74-4B-1 et seq., NMSA 1978) as amended in 1986 and again in 1989, is the statutory authority for New Mexico's hazardous materials emergency response program. Under the Act, the State government has the primary responsibility for management of hazardous materials incidents, including incidents contaminating surface or ground waters. Local governments assist the State in performing emergency response functions in their respective jurisdictions. The 1989 amendments provided that the Secretary of the New Mexico Department of Public Safety shall have the final authority to administer the provisions of the Act, and shall serve as the central coordinator to direct the response function of the State agencies which may be involved in a hazardous materials or radiological incident.

Under the authority of the Act, New Mexico developed a Hazardous Materials Emergency Response Plan (8) which defines procedures and response functions of various State agencies. NMED is one of the agencies with responsibility for providing information necessary to control and mitigate hazardous materials and radiological discharge incidents.

NMED attempts to provide such information to those on-site entities at any incident which threatens the quality of the environment, or poses a threat to public health or safety. NMED contracts with the New Mexico Health Department's Epidemiology unit to receive and properly refer emergency incident reports. During a hazardous materials or radiological incident, NMED may provide technical assistance and advice, provide for environmental monitoring and sampling when necessary, ensure that adequate cleanup is performed, and take appropriate enforcement action. NMED staff, however, do not enter the exclusion zone during a hazardous materials or radiological incident. A contract is maintained with one or more firms with emergency response capability to furnish immediate response to emergency incidents. Work under contract is funded through the Hazardous Waste Emergency Fund established by § 74-4-8 of the New Mexico Hazardous Waste Act.

NEW MEXICO ENVIRONMENTAL IMPROVEMENT ACT

The New Mexico Environmental Improvement Act (§§ 74-1-1 et seq., NMSA 1978) was enacted in 1971. It established the Environmental Improvement Division (EID) of the Health and Environment Department. In 1991 EID was elevated to Executive Office Cabinet-level status and redesignated the New Mexico Environment Department by the first session of the 40th Legislature. The Environmental Improvement Act also established the Environmental Improvement Board, consisting of five members appointed by the Governor for terms not to exceed five years, and gave the Board authority to promulgate regulations in numerous areas relevant to environmental management and consumer protection. Among regulations adopted by the Board are several affecting ground water quality, including those described above in the section on the Hazardous Waste Act, as well as Liquid Waste Disposal Regulations, Solid Waste Management Regulations, and Regulations Governing Water Supplies.

Liquid Waste Program Regulations

Liquid waste is the wastewater discharged from homes and other establishments and normally includes wastes from toilets, baths, dishwashers, clothes washers, sinks and garbage disposals. In situations where such wastes cannot be disposed of through a

community sewage treatment plant, treatment and disposal must be accomplished through individual facilities. The potential problems from such systems vary depending upon a number of factors, including the type and design of the system, the amount of waste to be discharged, nearness to surface or ground water, amount of precipitation, type of soil, area and slope of land involved, and pollutant loading density due to other discharges in the area.

In New Mexico it is estimated that there are over 175,000 on-site liquid waste disposal systems, serving approximately 460,000 people statewide. Approximately 6,000 new systems are installed each year according to program permitting records. The large majority of such systems ultimately discharge to ground water. Bacteriological, viral, and chemical ground water pollution can result from improperly sited, designed, constructed, and/or maintained individual liquid waste systems. More than one-half of the recorded cases of ground water contamination in New Mexico are attributed to on-site liquid waste systems.

NMED's liquid waste program is directed at preventing and abating adverse environmental and public health effects from individual liquid waste systems receiving, treating, and disposing of up to 2,000 gallons of domestic wastewater a day. The large majority of such systems are 'conventional' systems consisting of a septic tank and drainfield serving a single residence. Where the standards cannot be met with installation of a conventional system due to site limitations, one of various recognized 'alternative' systems may be required. By nature, nearly all such systems are buried, which makes their location, configuration, performance, and even existence difficult to determine. Their major negative environmental impact, degradation of ground water quality, is gradual, cumulative, and extremely difficult to legally prove or to correct.

The Liquid Waste Disposal Regulations (LWDR) were first adopted by the Board in 1973, and were most recently amended in December 1989. They contain specific requirements that each system include a treatment unit and be situated in conformance with standards designated to protect surface and ground water from degradation. The regulations include provision for granting variances to the requirements in cases where it can be shown that site-specific conditions or additional treatment processes exist which will provide adequate protection. The regulations also allow the imposition of more stringent requirements where necessary to prevent a hazard to public health or the degradation of a body of water. The LWDR cover only systems that are exempt under the WQCC regulations which cover any system receiving more than 2,000 gallons a day design flow or any non-domestic waste.

The principal method for limiting the impact of microbiological and soluble chemical contaminant pollution due to liquid waste systems is to restrict the density of systems. Many subdivisions were platted, approved and sold prior to the adoption of the current liquid waste disposal regulations. Lots platted prior to February 1, 1990 complying with the requirements of minimum lot size standards in effect at the time of their platting are allowed to be developed with a single house per lot (9). While real estate developers have generally sought to subdivide property to the highest density legally permissible, this has resulted in restricting purchasers to using expensive alternative systems or using community subdivision wastewater systems. A certain number of lots exist which are simply not appropriate for conventional on-site systems, yet people desire to build and live on these lots. In such instances, alternative systems, lot expansions and legitimate variance allowance must be considered.

Local city and county governments have legal authority for zoning and subdivision approval, as well as authority to adopt environmental protection standards more stringent than the State's, if necessary. In those areas of environmental sensitivity or current ground water problems, the counties and municipalities are encouraged to exercise their authority to prevent further local degradation of ground water. NMED is seeking local government cooperation in requiring evidence of an appr[illegible] NMED liquid waste permit before issu[illegible] building or mobile home moving perm[illegible] This would insure a higher percentage [illegible] installations meeting standards.

Enforcement

Enforcement activities generally resu[illegible] from information contained in [illegible] complaint to the local NMED offic[illegible] concerning a failed system or [illegible] improper installation. Nearly [illegible] complaints are followed up, and nearly all discovered violations are voluntarily corrected by the system owners without court action. It should be noted that the violations most commonly found are obvious ones, such as system installation without a permit, improper proximity of a system to a well or watercourse, system failure such that raw sewage reaches the soil surface, or improper dumping of septage. Systems existing prior to November 1973, were 'grandfathered-in' and, as a consequence, so were any potential problems associated with them. Problems and complaints about these earlier systems concern cesspools, surfacing sewage, overflowing tanks, and illegal pumping. Correction of such problems often involves modification of the existing system or providing for new installations.

These regulations adopted under the authority of the Environmental Improvement Act control discharges from individual domestic septic systems. These systems are responsible for more instances of known ground water contamination in New Mexico than any other source. The reasons for the relative ineffectiveness of these regulations are: (1) system siting standards are applied at the time of installation or modification, and requiring existing system upgrades to meet subsequent more stringent standards is commonly impractical, systems installed under less stringent standards are allowed to continue to discharge; and, (2) lots divided prior to the February 1, 1990 change in minimum lot size standards are still allowed to develop with on-site systems. Therefore, the hazard to ground water from these older systems, or from new systems allowed to be installed on lots divided prior to February 1990, is considered to be

substantial. The primary available remedy consists of community collection, treatment and disposal, which is outside the scope of these regulations.

Septage

Another problem associated with liquid waste disposal is the disposal of the residual solids (i.e., septage) from septic tanks. Regular pumping of septic tanks is encouraged to preserve the capacity, and treatment efficacy, of disposal systems. Traditional methods for septage disposal (i.e., to municipal wastewater treatment plants and landfill pits) are facing increasing question as to their environmental safety. Municipal wastewater treatment plants face ever-increasing pressures for compliance with stricter NPDES effluent limitations, and are sometimes unwilling to bear the costs associated with treating septage. Landfill operators are faced with legal liability for contamination from septage disposal and find that public land administrators are less willing to take the liability associated with accepting septage disposal to pits. Also, the New Mexico Solid Waste Management Regulations ban disposal of liquids at landfills. In the arid southwest, the most environmentally beneficial method of disposal of septage derived from residential sources would involve wide-area land application with incorporation into the soil in areas where there is no threat to surface or ground waters. However, this procedure has largely been precluded by EPA's technical criteria for sludge (including septage) which was published in October 1991 pursuant to the federal CWA. The number of septage disposal sites for which approval was applied for under WQCC regulations has continued to increase in the most recent biennium, but the number of approved sites still falls far short of the need. Illegal dumping of septage into sewers, watercourses, or arroyos is practically impossible to prevent. Such practices will predictably increase unless safe, legal methods are defined and promoted. NMED is in the process of developing septage-tracking regulations which will help to minimize illegal dumping of septage in unpermitted areas.

Public Drinking Water Supply Programs

The quality of water provided by public water supply systems in New Mexico is one measure of ground water quality. The primary contaminants in public water supply systems in New Mexico are total coliforms and nitrates, most often originating from human and animal waste and septic tanks respectively. However, as a result of expanded federal sampling requirements volatile organic contaminants (VOCs) are being discovered to be more widespread than previously recognized. Some wells have been shut down because of VOCs, while others have installed treatment systems. New Mexico also has naturally occurring elements including arsenic, fluorine, radium, radon, selenium, and uranium which may adversely affect the quality of drinking water.

1996 reauthorization of the federal Safe Drinking Water Act (SDWA) mandates that EPA set new or revised standards for two constituents which are naturally occurring in New Mexico ground water: radon and arsenic.

EPA must promulgate a standard for radon by December 2000, with a proposal by August 1999. There is at present no drinking water standard for radon. Radon is an important issue for this state. Present sampling data suggest that radon could possibly be evident in 84% of New Mexico's water supply wells. Annual treatment costs to remove radon could be substantial, depending on the level at which EPA sets the standard. Under the 1996 amendments to the Safe Drinking Water Act, New Mexico may seek a waiver from this rule by:

- Seeking a risk assessment and risk reduction study from an independent scientific organization;
- Propose a standard based on that assessment;
- New Mexico may adopt a less stringent standard with multimedia mitigation.

EPA promulgation of a revised regulation for arsenic has been mandated for no later than January 1, 2001. The present standard for arsenic is 0.05 mg/l, and suggestions for a revised standard range from 0.002 mg/l upwards. In New Mexico, arsenic naturally occurs at or above 0.002 mg/l in more than fifty percent of the state's water supplies. Like radon, the costs to remove arsenic could be substantial depending on the level at which EPA sets the standard.

Recent studies for the City of Albuquerque have shown that compliance with a new SDWA standard for arsenic would have capital outlay costs ranging from $100 million for a standard of 20 ug/L to >$300 million if the standard is set at 5 ug/L. Annual operating and maintenance fees for the compliance program would range from about $2 million to over $15 million using the above figures. Conservative statewide costs could double these estimates. These are huge costs that will have no measurable benefit in terms of reduced mortality or morbidity. EPA is in the process of conducting epidemiology studies to support this standard, however, they will not be completed until 1 to 2 years *after* the standard has been promulgated. There have been no scientific studies to date in the United States which demonstrate any verifiable evidence of deleterious health risks to humans greater than 10^{-4} concerning longterm ingestion of aqueous-phase arsenic in concentrations below 50ug/L.

The State, in addressing these naturally occurring constituents, would like to approach these problems by a new approach:

Assume a low vulnerability for most water systems and that the State should be allowed to set sampling frequencies based on vulnerability;

- Sample low vulnerability systems every five years which would reduce the frequency of sampling for most small systems;
- There would be more frequent monitoring for vulnerable systems thus focusing the resources based on the probable risk;
- Detection level (percent of Maximum Contaminant Level as set by EPA) triggers more frequent sampling;
- Simplification of sampling requirements so that it is the same for all types and sizes of systems.

Since the 1920s, almost 200 public water supply wells in New Mexico have been adversely affected by pollutants caused by human activities. More than half of these wells have been taken out of use for human consumption. Some are still used for non-sensitive activities such as road watering, while others are being used for blending with water from other wells or treated to remove impurities. The details of these contamination incidents are described below.

Water Supply Regulations

The Water Supply Regulations, adopted by the Board and which follow the Federal Primary Drinking Water Regulations, apply to public water supply systems. The State of New Mexico was granted primacy for the enforcement of regulations governing water supplies pursuant to the federal Safe Drinking Water Act on April 1, 1978. The State regulations have been, and will continue to be, further amended to meet the requirements of the SDWA amendments of 1996 if the State wishes to retain primacy.

As an example of how the State is supporting local communities in meeting these standards is the Composite Correction Program (CCP) (**10**) which is an approach developed by the EPA and Process Applications, Inc. to improve surface water treatment plant performance and help assure cost-effective compliance with the Surface Water Treatment Rule (SWTR) which is included in the New Mexico Water Supply Regulations. The SWTR, which took effect on June 29, 1993, requires a minimum 3 log (99.9%) removal/ inactivation of giardia cysts, a minimum 4 log (99.99%) removal/inactivation of viruses, requires lower finished water turbidity, and requires minimum levels of disinfection. These requirements are also listed in the NMED Primary Drinking Water Regulations.

The CCP approach consists of two aspects, the Comprehensive Performance Evaluation (CPE) and Comprehensive Technical Assistance (CTA). A CPE is a thorough evaluation of an existing treatment plant resulting in an assessment of the unit treatment process capabilities and the impact of the operation, maintenance and administrative practices on optimal performance of the plant. CTA is used to optimize the performance of an existing plant by addressing the factors limiting performance which were identified during the CPE. The CCP approach can be utilized to evaluate the ability of a water filtration plant to meet the turbidity and disinfection requirements of the SWTR.

The New Mexico State University (NMSU) Doña Ana Branch Water Utilities Technical Assistance Program has been contracted by NMED's Drinking Water Bureau to implement the evaluation and technical assistance process at surface water treatment facilities in New Mexico.

The Safe Drinking Water Act was amended in 1996 (PL 104-182) and established new guidelines for the protection of the nation's public water systems. Congress, in amending the act, was relying on a good working partnership between the States and the EPA to carry out these new provisions. The 1996 Amendments include, among other things, the following:

- Elimination of mandatory additional water quality standards (standards for 25 new contaminants every three years). Provisions for national regulation if the contaminants exist in significant and sufficient areas to warrant regulation (§ 1412 SDWA);
- Incorporating risk assessment and good scientific data as criteria for establishing standards. Include was the provision for increased flexibility for states to tailor monitoring and treatment requirements for all water systems and to grant variances and waivers to small systems (§ 1412 SDWA);
- Specification of minimum standards for certification (and recertification) of the operators of community and noncommunity public water systems (§ 1419 SDWA);
- Establishment of a Capacity Development Program for the states. In New Mexico, the capacity development program is operated by the Environmental Finance Center through the New Mexico Engineering Research Institute/ University of New Mexico. The long term goal of this project is to create a more reliable and consistent method of evaluating small water systems viability and to provide information to the State which will ultimately improve the focus and application of technical assistance and funding to small water systems (§ 1420 SDWA);
- Provisions for a federal financial assistance program administered by the States as a Drinking Water State Revolving Loan Fund. This fund would provide low interest loans to water systems for capital improvements and other activities (§ 1452 SDWA); and
- More emphasis on proactive protection of sources for drinking water rather than the reactive after the fact detection and treatment (§§ 1429, 1453 and 1454 SDWA).

Most requirements of the State regulations pertain to the quality of water delivered (i.e., end of pipe) by public water supply systems. Other provisions provide for protection of public health by setting requirements for siting, construction, operation, and maintenance of public water supply systems. The State regulations have been, and will continue to be, further amended to meet the requirements of the SDWA amendments of 1986 if the State wishes to retain primacy.

The first session of the 39th Legislature empowered NMED to collect fees from water systems for services provided to water systems to assist in complying with the new requirements. In the Fall of 1989, a fee structure was established to fund NMED services requested by water systems in pursuit of compliance with the Amendments.

NMED currently regulates 1,223 public water systems in New Mexico. Nearly all of these water supplies are derived from ground water sources. Four hundred ninety-five are '*non-community water systems*' which are sampled for nitrates once every 4 years. There are 596 '*community systems*' which are sampled for nitrates, fluoride and trace elements (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium and

silver) once every 3 years; for radiological parameters (gross *a* (alpha), radium^{226} and radium^{228}) every 4 years; and 8 regulated organic chemicals and 51 other contaminants once every 3 to 5 years depending on the vulnerability of the water supply sources.

Monitoring for trihalomethanes is required annually for systems serving populations greater than 10,000. A new class of public water supply has been defined: '*non-transient non-community*' water systems. New Mexico has 159 such systems serving schools, factories, etc. These systems will be required to monitor the same parameters and on the same schedule that '*community systems*' do now. All public water supply systems are required to conduct periodic microbiologic analyses. Analyses consist of total coliform counts and are done on a frequency determined by the population served.

Monitoring required by the State and federal regulations governing water supplies is usually performed by the water supply operators. In addition, NMED periodically collects samples for all parameters.

Source Water Protection: Wellhead Protection Programs

The NMED Drinking Water Bureau is the primary contact for Wellhead Protection throughout New Mexico. Since its approval by EPA in 1990, the New Mexico Wellhead Protection Program (WHPP) has increased community participation in drinking water protection by providing technical assistance, identifying potential sources of contamination, and creating Wellhead Protection Areas throughout New Mexico. The WHPP became a part of the Source Water Assessment and Protection Program (SWAPP) with the 1996 Amendments to the Safe Drinking Water Act.

In New Mexico, Wellhead Protection is a voluntary, community-based program designed to prevent pollution and protect drinking water quality. A Wellhead Protection Area (WPA) is a delineated space around a wellhead (i.e. a 1000-foot radius) to reduce potential sources of contamination in that zone. Other specific wellhead protection measures include a sanitary seal of the well, a four-inch thick cement pad sloping away from the well casing, and a fence or wellhouse to protect the well from vandalism and contamination.

New Mexico communities have a vested interest in safeguarding their sources of drinking water. With a growing population and increased demands for safe, clean water, more communities are recognizing the need to create WPAs, enact longterm water resource plans, and implement best management practices that directly relate to the public water supply. Using the following five-step process, a WHPP is useful for pollution prevention and drinking water quality protection.

Five steps to wellhead protection include:

1. Form a community-based wellhead protection team;
2. Define the area to be protected;
3. Identify actual and potential sources of contamination;
4. Manage the wellhead protection zone; and
5. Develop a plan for emergencies and the future.

NEW MEXICO SOLID WASTE ACT

New Mexico has responded to increasing discoveries of ground water pollution below old landfills and the additional perceived threat of large scale disposal of other states' solid waste in New Mexico.

In 1990, the State Legislature passed the Solid Waste Act. This new law (§§ 74-9-1 through 74-9-42 and §§ 74-9-72 through 74-9-73, NMSA 1978) mandated development of a comprehensive statewide solid waste management program. It also authorized NMED to impose fees for processing permit applications, seek increased penalties for noncompliance and expand facility requirements for permitting and financial responsibility. The Act was amended in 1993 and required local governments to provide financial assurance and established permit life criteria for private and public entities while expanding the public notice requirements to tribal governments. In October of 1991, EPA promulgated the federal Part 258 requirements for municipal landfills, which became effective in October of 1993. Certain options were provided to states that could demonstrate that their permit programs were sufficient to implement requirements equivalent to the federal criteria. In response to the amendments to the Solid Waste Act, the promulgation of the federal criteria, and recommendation provided in a statewide solid waste management plan, the Environmental Improvement Board adopted extensive amendments to the regulations on July 8, 1994. The regulations became effective on August 17, 1994. Application to EPA for federal approval of the State program was made on July 18, 1994 was received on December 21,1994.

The Solid Waste Management Regulations establish permit requirements for landfills, recycling facilities, processing facilities (preparation of waste for reuse), special waste (waste with unique handling, transport or disposal requirements ~ such as asbestos and infectious waste), composting facilities, transformation facilities (e.g., incinerators, distillation and gasification operations) and transfer stations. Particular categories of waste handling and disposal facilities are governed by specific siting and design criteria, operational requirements and closure and postclosure requirements. Financial assurance is required for closure and postclosure care and ground water monitoring. Certified operators are required for most solid waste facilities. Where monitoring wells show ground water contamination, remediation is required. Numerical standards for water quality parameters are established, and for contaminants with potentially serious

health, safety or environmental effects, remedial action levels are generally set at 75 % of the standards. The standards adopted by the Board are at least as stringent as those adopted by the WQCC.

Solid Waste Disposal

The most widely used method of solid waste disposal is land disposal. As of December 1999, there are approximately 48 active landfills operating in New Mexico of which 33 are municipal, 5 are federally owned and ten are privately owned. Since 1989, approximately 150 landfills have closed, with a number of them being replaced with transfer stations for eventual transport to other landfills. More landfills are expected to close to avoid the additional requirements imposed by the 1994 regulations, which are equivalent to the federal Part 258 requirements. It is expected the requirements of the Act and regulations will result in fewer, larger, better-loc sites that will afford significan increased protection of water resource

The new regulations, which becam effective on January 31, 1992, provid basis for adequate protection of surface and ground water resource They require permits for new and existing facilities that require geologic and hydrologic evaluations of sites

OTHER STATE PROGRAMS

There are several other State programs that contribute to the protection of ground water quality. These are summarized below and also are listed in Appendix E.

Ground Water Storage and Recovery Act

The recently adopted Ground Water Storage and Recovery Act (§§72-5A-6 et seq., NMSA 1978) authorizes any governmental entity to apply for and obtain a permit from the State Engineer to transfer existing surface or ground water rights to underground aquifers where the stored water may be recovered for future use by the permittee through ground water pumping. Permitted projects allow the permittee to add measured volumes of water by injection or infiltration to an aquifer or system of aquifers, to store the water underground, and to recover it for beneficial use. Water added to an aquifer to be stored for subsequent recovery for beneficial use pursuant to a project permit is not public water and is not subject to forfeiture.

In adopting the Ground Water Storage and Recovery Act the legislature found that ground water recharge, storage and recovery have the potential to:

(1) offer savings in the costs of capital investment, operation and maintenance and flood control and may improve water and environmental quality;

(2) reduce the rate at which ground water levels will decline and may prevent overstressing or dewatering aquifer systems;

(3) promote conservation of water within the state;

(4) serve the public welfare of the state; and

(5) may lead to more effective use of the state's water resources.

Coal Surface Mining Regulations

The protection of ground water quality at coal mines is controlled under the Coal Surface Mining Regulations adopted by the Coal Surface Mining Commission pursuant to the New Mexico Surface Mining Act (§§ 69-25A-1 et seq., NMSA 1978). The regulations are administered by the Mining and Minerals Division of the Energy, Minerals and Natural Resources Department. This Division also administers programs under the Abandoned Mine Reclamation Act (§§ 69-25B-1 et seq., NMSA 1978).

Hard Rock Mining Regulations

Permitting of hard rock mines is required pursuant to the New Mexico Mining Act (§§ 69-36-1 to 69-36-20 NMSA 1978) which is administered by the Mining and Minerals Division of the Energy, Minerals & Natural Resources Department. Rules to implement the Mining Act were adopted by the newly created Mining Commission in 1994 and have been amended a number of times. New and existing mining operations and exploration operations must obtain Mining Act permits which include reclamation or closeout requirements. The Mining Act requires the issuance of these permits to be closely coordinated with other established regulatory programs including NMED's ground and surface water protection programs, in order to ensure that conflicting and/or duplicative requirements are not imposed on facilities. A key provision of the Mining Act is a requirement that the Secretary of NMED provide a determination that environmental standards, including water quality standards, are expected to be met, before a new mine permit or a closeout plan for an existing mine can be approved.

Pesticide Use and Disposal

The use and disposal of pesticides is controlled under 21 NMAC 17.50 under the Board of Regents of NMSU. This order was adopted pursuant to the Pesticide Control Act (§§ 76-4-1 et seq., NMSA 1978) and is administered by the Division of Agricultural and Environmental Services of the NM Department of Agriculture. This regulatory order does not include specific provisions to protect ground water quality. However, the Department of Agriculture is developing a generic Pesticides State Management Plan Guidance for Ground Water Protection which will focus on management of pesticides to prevent negative health and environmental effects.

Office of the State Engineer

The New Mexico Office of the State Engineer has authority under several statutes (§ 69-3-6, § 70-2-12.B (15), §§ 72-12-1 through 72-12-28, § 72-13-4 and § 72-13-6, NMSA 1978) to control activities affecting ground water quality. New Mexico Supreme Court decisions have further defined this authority (Appendix E). The State Engineer has general supervision of certain water quality issues in the State. His office has authority over plugging mine discovery or drill holes, drilling, casing, and plugging artesian wells to prevent

commingling, pumpage control to prevent salt water encroachment, and designation of aquifers to be protected by the OCD.

The 1991 Legislature amended State law to provide that periods of non-use during which water rights are placed in a water conservation program approved by the State Engineer and prepared by a conservancy district, acequia or community ditch or the Interstate Stream Commission (ISC) are not computed as part of the four-year forfeiture period.

In 1987 the New Mexico Legislature authorized the ISC to appropriate ground water or purchase water rights on behalf of the various regions of the State and to make grants or loans for the purpose of regional water planning. The purpose of the regional water planning effort is to identify future water needs and to develop information needed to conserve water for future use. Since 1987 the Legislature has appropriated over $2,500,000 for the preparation of regional plans, for an update of the State water resources assessment data and for the initiation of a State water conservation program. These monies have been matched by approximately $500,000 in local funding plus many thousands of dollars of in-kind services and volunteer time. This program has funded initial water planning efforts in water planning regions that cover 32 of New Mexico's 33 counties as well as several water assessment studies and water conservation demonstration projects. The program has also funded the development and distribution of related educational materials.

State Land Office

The New Mexico State Land Office (SLO) administers approximately 9,000,000 acres of surface estate and 13,000,000 acres of mineral estate held in trust for New Mexico schools, universities and other beneficiaries. By State statute, the agency is required to maximize the long-term return to the Trust and protect the resource. The SLO is not authorized to expend Trust funds for improvement of Trust Land; however, federal Agricultural Stabilization and Conservation Service funds or private funds may be expended by lessees to improve Trust Lands.

The SLO has developed and is enforcing reclamation standards for oil and gas development, in addition to a road policy which contains elements of appropriate Best Management Practices designed to control sediment, erosion, and other pollutants. The agency has also revised its sand and gravel lease procedure to (1) require a spill prevention and control plan which outlines leak and spill prevention methods and subsequent cleanup methods of any accidental spills; (2) require water diversion ditches up-gradient and runoff berms downgradient from the operation to prevent sediment runoff; (3) enforce stringent reclamation requirements; and is (4) currently developing the requirement of a systematic field inspection schedule for active sand and gravel leases.

The agency encourages its agricultural lessees to enter into Great Plains Contracts or ranch/farm plans with the federal Natural Resources Conservation Service which provides information and encourages proper range management practices. In an effort to promote the longterm health of New Mexico's range resources, the agency has designed a program which rewards lessees who excel in managing State Trust Lands called the Range Stewardship Incentive Program. The central feature of this voluntary program is a 25 % fee reduction on each acre in good or excellent condition with a stable or upward trend. By definition, there is minimal erosion and therefore minimal nonpoint source pollution from rangeland in high ecological condition. Approximately 325,000 acres are currently managed under this program.

The agency has made Educational Easements available to schools to provide the opportunity to teach environmental education and enhance student understanding of resource issues and the need for protection of the Trust resource for future generations. The SLO has worked with NMED concerning surface water monitoring and ground water discharge plans and reviews discharge proposals for potential impacts to the Trust resources regarding surface and ground waters. The agency is active in the Upper Rio Grande Basin Ecosystem Management Project, the Zuni River Watershed Project, the Statewide Water Plan, and the Riparian Council. In addition to the above, leasing of State Trust Lands for mining, grazing, rights-of-ways, and commercial use is being reviewed to address biological, archaeological, and other environmental concerns, and to apply appropriate stipulations to the leases in order to protect the quality of ground and surface waters.

Additional programs initiated by the SLO include a riparian improvement program (RIP) whose purpose is to identify, prioritize, and implement restoration projects in riparian areas and associated watersheds located on state trust lands in cooperation with lessees, adjoining land owners, and land management agencies. The SLO has also initiated a program to identify and control noxious weeds found on state trust lands. The program relies on cooperative efforts with land management agencies, county governments, and other interests to prevent to the extent possible the spread of noxious weeds and the consequent loss of productive agricultural lands.

PUBLIC INVOLVEMENT

In New Mexico public involvement is an important aspect of programs to protect ground water quality. Public participation includes public notices, opportunities for public hearing, and the formation of advisory groups for regulation development and revision and the recommendation of public policy. Public recognition is given to businesses and organizations that have shown excellence in their efforts to protect the State's ground water. An example is

given below.

Water Fair Program

At one or two-day water fairs, NMED, cooperating agency staff, and local volunteers set up a mobile laboratory and conduct free field testing of drinking water samples collected by private citizens from their individual water supplies. Public concern about contaminated private wells led NMED to develop a program to conduct free tests for nitrate, pH, mineral content, and volatile organic chemicals. Tests for iron, manganese, sulfate, fluoride and sulfide can be done if warranted. Well numbers are assigned to each source and the sample results entered into the water fair database. Although the information is suitable only for screening purposes, follow-up samples are collected for laboratory analysis when health threatening pollutants are detected at levels of concern.

When contamination of the well is noted by the water fair testing, follow-up samples are collected for laboratory analysis. The water supply users are advised of proper steps to take to protect themselves, and a referral is made to the proper ground water program so that the source of contamination can be found. In many cases, either the State or the party responsible for the contamination has provided a new water supply.

In addition to water quality test results, visitors to a water fair are provided with health and pollution prevention information. Published in English and Spanish, packets include fact sheets about water-borne diseases, health risks from drinking contaminated water, household toxics and pesticides, and an illustrated brochure about New Mexico's ground water resources (11) which suggests ways to prevent contamination. Water fairs bring water scientists to small communities where they are available to discuss ways to protect ground water and proper waste disposal while answering questions about our ground water resource. The basic ground water information generated becomes available to the public and all NMED programs.

FEDERAL PROGRAMS RELATED TO GROUND WATER QUALITY

There are a number of federal programs that contribute to ground water quality protection in New Mexico. Some of these, such as the hazardous waste, underground injection control, and underground storage tank programs, are being carried out by the State under authority of State legislation and are described in the sections on the relevant State acts. Others, such as Superfund, are essentially federal programs in which the State plays a role.

Department of Energy Environmental Oversight and Monitoring Program

The four DOE facilities in New Mexico are Sandia National Laboratories (SNL) and the Lovelace Respiratory Research Institute (LRRI), formerly the Inhalation Toxicology Research Institute (ITRI) in Albuquerque, the Los Alamos National Laboratory (LANL) in Los Alamos and the Waste Isolation Pilot Plant (WIPP) in Carlsbad. The New Mexico Agreement-in-Principle is designed to help assure that activities at DOE facilities are protective of the public health and safety and the environment. To accomplish the goals of the agreement, an oversight program was developed with four primary objectives:

- To assess the DOE's compliance with existing laws including regulations, rules, and standards;
- Prioritize cleanup and compliance activities;
- Develop and implement a vigorous program of independent monitoring and oversight; and
- To communicate with the public so as to increase public knowledge of environmental matters about the facilities, including coordination with local and tribal governments.

The DOE Oversight Bureau carries out the oversight and monitoring activities of the program. Although the Oversight Bureau has no regulatory status, it facilitates compliance with applicable environmental regulations by reporting water quality concerns and infractions to DOE and the appropriate regulatory NMED Bureaus (i.e., Surface Water Quality, Ground Water Quality, and Hazardous & Radioactive Materials). DOE Oversight Bureau staff communicate routinely with the public to increase public knowledge of oversight, monitoring, and environmental issues involving the facilities. The Oversight Bureau issues quarterly and annual implementation reports to the DOE describing the scope of work, objectives, accomplishments and significant issues that occurred during each period. Results of oversight and monitoring activities are also available to the public along with numerous documents transmitting technical comments and concerns relative to specific program areas. These reports and documents are a source of reliable technical information for the writers of facility proposals and decision makers at regulatory agencies.

Ground Water Protection at DOE Facilities

NMED is responsible for preserving, protecting and perpetuating the State's ground water resources for future generations. The oversight program accomplishes this at DOE facilities through review and technical investigation in four broad areas: site wide and site-specific hydrogeology, waste management, surveillance and environmental restoration. Oversight Bureau staff evaluate the facility's conceptual hydrogeologic model, review the facility's investigations to improve their conceptual model and conduct studies necessary to better understand the hydrogeologic systems and to support technical recommendations at the facilities.

One of the early NMED deliverables in the oversight program was an assessment of the ground water surveillance at each facility. This involved evaluating the adequacy of existing ground water monitoring networks and practices at the facilities, in view of their hydrogeologic

setting and the location, number and character of waste disposal sites. On-going surveillance activities include sampling and co-sampling of ground water at wells and springs; compiling a database of previous analytical results, as well as determining and investigating any trends in the concentration of constituents of concern.

For information on ground water and surface water data, conclusions and recommendations from oversight and monitoring at New Mexico DOE Facilities see the NMED report titled *Initial Inspection of Site Water Systems and Wells at DOE Facilities in New Mexico*, **(12)** which satisfies X.A.B.3, Action No. 17 of the DOE/NMED Agreement in Principle.

Superfund

The 1980 federal Comprehensive Environmental Response, Compensation and Liability Act (Superfund), as modified by the Superfund Amendments and Reauthorization Act of 1986 (SARA), provides for cleanup of inactive hazardous waste sites ranked on the National Priorities List (NPL). Superfund also provides for emergency response by the EPA to clean up hazardous waste sites which pose an imminent hazard to public health or the environment. Superfund further directs EPA to determine liability for improper hazardous waste disposal and to recover costs from responsible parties for cleanup. Finally, Superfund provides a mechanism for states and others to file claims to gain compensation for damages to natural resources.

With the exception of the emergency incident provisions of the Hazardous Waste Act that has limited applicability, New Mexico has no State-funded program to address the problems of inactive or abandoned hazardous waste sites. EPA administers the federal Superfund program and is the lead agency for most Superfund activities in New Mexico. NMED maintains a Multi-Project Cooperative Agreement with EPA. This agreement provides 100 % federal funds to allow the State the lead role in certain projects and to permit State involvement in projects where EPA is the lead agency. The State takes the lead role in identifying and investigating potential new Superfund sites. Twenty to thirty sites are investigated each year. The most serious sites are scored using the Hazard Ranking System and are nominated for the NPL. Nationally, there are approximately 1,236 sites on this list.

Eleven New Mexico sites are currently included on the NPL: Albuquerque South Valley Site; United Nuclear Corporation Uranium Mill Tailings in McKinley County; Homestake Mining Company Uranium Mill Tailings in Cibola County; Atchison, Topeka and Santa Fe Railroad sites in Clovis and Albuquerque; Prewitt Refinery in McKinley County; Cleveland Mill in Grant Count; Lee Acres Landfill in San Juan County and Cimarron Mining Company in Lincoln County. The North railroad Avenue Plume site in Española, Rio Arriba County, and the Fruit Avenue plume in downtown Albuquerque, Bernalillo County, were included on the NPL in 1999. The old Rinchem Company site in Albuquerque was deleted from the NPL in December 1998.

EPA is the lead agency for the required Remedial Investigations and Feasibility Studies at these sites with the exception of the North Railroad Avenue Plume site in Española and the Fruit Avenue plume in Albuquerque that are a State-lead sites. EPA funds NMED to participate in these projects by reviewing and commenting on workplans, proposals and reports. Federal law requires New Mexico to pay ten % of final Superfund remedies when federal Superfund money is used for remedial actions.

Superfund has conducted several emergency removals in New Mexico. EPA investigates candidates for emergency removals and performs the cleanups, if deemed necessary. NMED works with EPA to determine when such action is necessary. Between January 1997 and December 1998, NMED oversaw the removal assessments at 4 sites and removal actions at 2 abandoned mining sites.

Between January 1997 and December 1998, NMED's federally funded Superfund Program completed 35 site investigations requiring varying degrees of effort. These sites investigated can be categorized as follows: 24 solvent sites; 7 mining sites, 1 landfill, and 4 other sites. Several sites have received more than one level of investigation.

The Superfund Program has also provided Management Assistance to EPA on 9 EPA-lead NPL sites which have required varying degrees of effort from reviewing and supplying comments to creating reports such as *Human Health and Ecological Risk Assessments* and overseeing Administrative Orders on Consent.

OTHER GROUND WATER QUALITY MONITORING

More Federal Programs

Please see the Office of Technology Assessment's Protecting the Nation's Ground Water from Contamination **(13)** and the Environmental Protection Agency's Protecting the Nation's Ground Water: EPA's Strategy for the 1990s **(14)** for summaries of federal programs, including some of the programs described below.

U. S. Geological Survey

USGS, through its Water Resources Division's District Office in Albuquerque, often obtains information on the quality of ground water as part of limited duration studies conducted in New Mexico. These studies are conducted for specific ground water systems in cooperation with State, local or other federal agencies. Information about these and other activities are available through bibliographies and catalogs of information. USGS also publishes "Water Resources Data New Mexico," an annual report which includes ground water levels and water quality data. The report explains how to obtain access to

WATSTORE, the national water data storage and retrieval system established for handling water data collected through the activities of USGS, and for providing an effective and efficient means of releasing the data to the public.

More State Programs

Office of the State Engineer

The Office of the State Engineer along with the SWCD, the SPD and the USGS cooperate in ground water quality monitoring in conjunction with the State Engineer's primary mission of administering use of the State's water resources. Areas from which extensive salinity data are available include the Roswell and San Juan Basins, the Bolson-Mesilla Valley, and Curry and Roosevelt Counties.

Other Sources

Other organizations who collect, record, or make use of other sources of ground water data to create useful reports include the New Mexico Water Resources Research Institute, the New Mexico Agricultural Extension Service, the Mining and Minerals Division of the Energy, Minerals, and Natural Resources Department and New Mexico Bureau of Mines and Mineral Resources. Monitoring activities are also undertaken by the United States Bureau of Land Management under their statutory authority.

Ground Water Quality Monitoring and Data Management

During the past several decades, numerous federal, State and other government agencies have generated a large body of ground water quality and related data in New Mexico. Also, large amounts of data concerning known and potential contamination sources are kept by various entities. There is, however, no comprehensive bibliographic or data retrieval system for all ground water quality resources in New Mexico.

The plethora of ground water-related databases creates two major problems. First, it is difficult for water quality investigators to acquire comprehensive information needed, for example, to establish background water quality conditions. Secondly, information pertaining to historic water quality problems has often been filed away, forgotten or otherwise effectively lost. This situation creates unnecessary hardships for those who must deal with new developments in such cases. Poorly accessible information may cause investigators to arrive at erroneous conclusions, repeat past investigations or spend excessive amounts of staff time obtaining data.

Substantial progress has been made during the past few years to rectify some of the above problems. A major effort to computerize data management systems within NMED has been undertaken. Also efforts to integrate State and federal data systems have been started.

There is a widespread need to share ground water data between programs within NMED. In part because of this need, a Data General minicomputer system was installed in early 1990. One purpose of this system was to make data sharing among NMED programs easier by having programs transform their databases currently stored on multiple personal computer systems to a single database on the minicomputer. This solves the problem of having data on stand-alone independent computer systems using incompatible hardware and software and widely varying data formats. Finally, the minicomputer has a dedicated hookup to the EPA computer network. The result of this new computer system has been to facilitate data exchange within NMED, as well as enhance electronic communication with EPA.

Other ground water quality data management activities in New Mexico are noteworthy and are summarized in the rest of this section. NMED has developed substantial capability to model hydraulic head, mass transport and geochemical conditions in ground water. As more data management applications are transferred to NMED's minicomputer system, it is expected that some of these models will become available on the minicomputer.

Also of note is the growing use of geographic information systems (GIS) in the State for the management of ground water and other related environmental data. ARC/INFO software has become the *de facto* standard for GIS development in New Mexico. The Water Resources Division of USGS in Albuquerque has developed extensive GIS map data-layers relating to ground water quality issues. The City of Albuquerque has also accumulated some information in their GIS that is useful for ground water quality analysis. The State Engineer Office has started to develop GIS capabilities that will be used for ground water administration and data analysis.

Currently, the SWQB uses GIS to document water quality impacts and to provide coverages for use by various bureaus within the department for public meetings, grant-related requirements and general information dissemination.

COUNTY AND MUNICIPAL AUTHORITIES RELATED TO GROUND WATER QUALITY

The New Mexico State Legislature has given extensive authority to counties and municipalities in the areas of regulation of land use and of protection of public health and safety, areas with substantial implications for ground water quality protection. The principal statutes in these areas are summarized in Appendix E, while the most important aspects for water quality are described below. The statutes grant to local governments broad authority to adopt regulations or take other measures pertaining to protection of health, suppression of disease, sewage facilities, water facilities, refuse collection and disposal, etc. In reviewing these statutes, one should be aware of the provision in § 4-37-1, NMSA 1978 which states: "All counties are granted the same powers that are granted municipalities except for those powers that are inconsistent with statutory or constitutional limitations placed on counties."

Although counties and municipalities have extensive legislative authority to institute measures to protect ground water quality, most have not taken full advantage of this authority. One reason is that most counties and municipalities have limited resources. Another factor that deters some local governments from instituting aggressive ground water protection programs is a division of opinion among citizens about land use regulations that limit what they can do with their property, and whether such programs are desirable.

Subdivision Regulations

The New Mexico Subdivision Act, first adopted in 1973, was extensively amended in 1995. The new amendments change the definition of "subdivision" to include almost all divisions of land. They require counties to adopt regulations regarding items of critical concern such as water availability and quality, utility easements, roads, protection of cultural sites, and liquid and solid waste disposal. Under the new amendments the subdivider must meet the needs of the subdivision with respect to these items; previously, the subdivider only had to satisfy whatever proposals he made in his disclosure statement. The Counties of Bernalillo, Doña Ana and Santa Fe had until July 1, 1996 to adopt regulations meeting the new criteria, whereas all other counties have until July 1, 1997 to do so.

Planning and Zoning

Counties and municipalities have authority for planning and platting and, under the Zoning Enabling Act (§§ 3-21-1 et seq., NMSA 1978), authority to establish zoning restrictions designed, among other things, to promote health and general welfare and to facilitate adequate provision for water and sewerage. Newly discovered ground water contamination problems, resulting from old underground storage tanks, industrial wastes, septic systems, and evapotranspiration system leakage, have aroused the interest of public officials in new planning and land-use approaches based on very real, current needs, and may well provide the impetus for a new generation of realistic land-use regulation.

Conditions Applied to State Requirements

A condition affecting what the State can require of local governments was added to the Constitution of the State of New Mexico in 1984:

"*A State rule or regulation mandating any county or city to engage in any new activity, to provide any new service or to increase any current level of activity or to provide any service beyond that required by existing law, shall not have the force of law, unless, or until, the State provides sufficient new funding or a means of new funding to the county or city to pay the cost of performing the mandated activity or service for the period of time during which the activity or service is required to be performed.*"

REFERENCES: PROGRAMS FOR GROUND WATER POLLUTION CONTROL

New Mexico Environmental Improvement Division

1) 1980 Boyer, David G., Dennis McQuillan and Maxine S. Goad. New Mexico Surface Impoundment Assessment, February 1980. Santa Fe. 98 pages plus appendices.

New Mexico Oil Conservation Division

2) 1989 Olson, William C. Volatile Organic Contamination of Ground Water Around Unlined Produced Water Pits. Open File Report H89-9, Hydrology Program, New Mexico Institute of Mining and Technology. 69 pages.

3) 1974 Robertson, J.M., C.R. Toussaint and M.A. Jorque. Organic Compounds Entering Ground Water From a Landfill. EPA-660/2-74-077. 47 pages.

Albuquerque Environmental Health and Energy Department

4) 1983 Salas, A., L.J. Gordon and R. Anglada. City of Albuquerque Residential Hazardous/Toxic Waste Survey. Albuquerque. 32 pages.

New Mexico Environmental Improvement Division

5) 1986 McQuillan, Dennis and Patrick Longmire. Water Quality Investigations at Lee Acres Landfill and Vicinity, San Juan County, New Mexico. Santa Fe. 47 pages.

6) 1988 Baker, David L. and Dennis McQuillan. Los Angeles Landfill Site Summary, City of Albuquerque, New Mexico. New Mexico Environmental Improvement Division. Santa Fe. 53 pages.

New Mexico Water Quality Control Commission

7) 1996 Regulations, 20 NMAC 6.2, as amended through November 15, 1996. Santa Fe. 83 pages.

New Mexico Emergency Management Task Force

8) 1986 Hazardous Materials Emergency Response Plan and Procedures Manual. New Mexico State Police. Santa Fe. 50 pages plus appendix.

University of New Mexico

9) 1989 Lamberson, Anna Weniger. Estimate of Compliance Costs and Benefits of Proposed Revisions to the New Mexico Liquid Waste Regulations. Bureau of Business and Economic Research. Albuquerque. 69 pages.

U.S. Environmental Protection Agency

10) 1991 Renner, R.C., B.A. Hegg, J.H. Bender, and E. M. Bissonette, *Handbook - Optimizing Water Treatment Plant Performance Using the Composite Correction Program*, EPA 625/6-91/027, U.S. EPA, Cincinnati, Ohio, February 1991.

New Mexico Environmental Improvement Division

11) 1989 Deardorff, Anna Maria. Ground Water: New Mexico's Buried Treasure. Ague Subterranean: Tesoro Escondido de Nuevo Mexico. Santa Fe. 8 pages.

New Mexico Environment Department

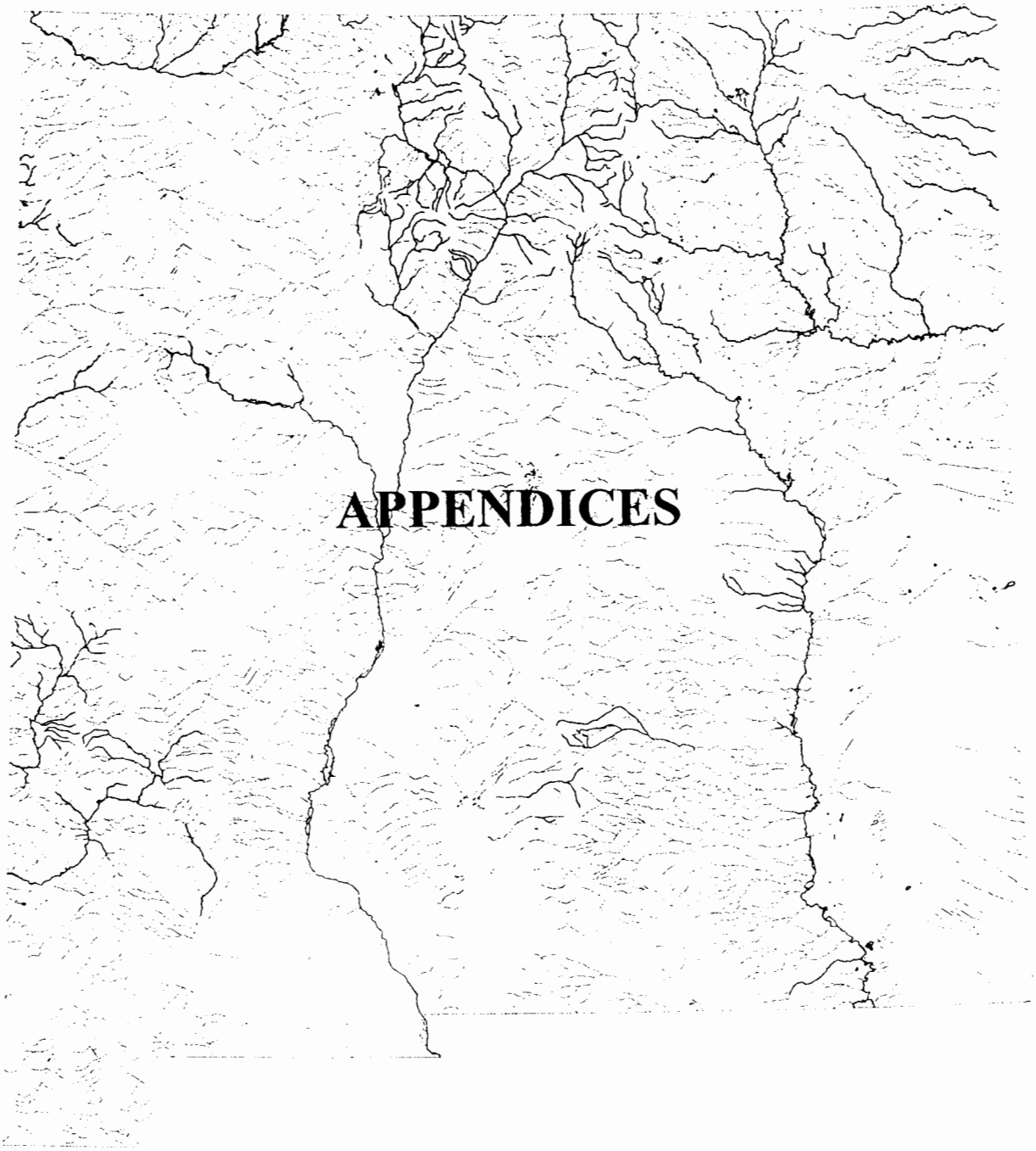
12) 1993 Stone, W.J., Monahan, P.K. and McDonald, W.S. Initial Inspection of Site Water Systems and Wells at DOE Facilities in New Mexico. September 1993. Report NMED/DOE/AIP-93/2, 49 pages.

United States Office of Technology Assessment

13) 1984 Protecting the Nation's Ground Water from Contamination. Congress of the United States. Washington, DC. 503 pages.

United States Environmental Protection Agency

14) 1991 Protecting the Nation's Ground Water: EPA's Strategy for the 1990s, the Final Report of the EPA Ground Water Task Force. Office of the Administrator (WH-550G). Washington, DC. 84 pages.



APPENDICES

Appendix A

Background Information on Surface Waters

Appendix A. New Mexico Geographic Information Summary. Data is from 1990 Census of Population and Housing, United States Environmental Protection Agency and the New Mexico Environment Department.

Summary Information

State Population	1,515,069
State surface area (sq. mi.)	121,666
Number of water quality basins	11
Total number of stream miles[a]	110,741
- Number of perennial stream miles[a]	8,682
- Number of intermittent stream miles	99,332
- Number of ditch/canal miles	2727
- Number of border stream miles	0
Number of lakes/reservoirs[a]	5,973
Acres of lakes/reservoirs[a]	997,467
Acres of freshwater wetlands	Unknown

[a] Preliminary estimate made by the U.S. Environmental Protection Agency as documented in "Reach File 3." Total stream miles include mileage for perennial, intermittent and ephemeral streams as well as for ditches and canals. Number and acreage of lakes include all types of lakes.
NMED estimates the number of perennial river miles in New Mexico to be 5,948 and the number of freshwater, publicly accessible lakes to be 170, totaling 135,410 acres.

Summary of Classified Uses

In New Mexico, perennial streams, publicly owned reservoirs and permanent lakes are classified for use by the Water Quality Control Commission. Ephemeral waters and most intermittent streams are not classified for use. Surface waters have been classified for uses consistent with the goals of the Federal Clean Water Act as follows:

Type of Water	Total Waters Classified	Waters Classified For Uses Consistent with Federal Clean Water Act Goals (Fishable/swimmable[a])	Total Waters Unclassified
Perennial			
Streams (miles)	5,875[b]	5,875	73
Lakes (acres)	148,883	148,883	2,437
Wetlands	0	0	Unknown

[a] The fishable goal of the Federal Clean Water Act is defined as protection and propagation of fish, shellfish and wildlife. The swimmable goal is defined as providing for recreation in and on the water.
[b] Based on a review of U.S. Geological survey 7 1/2 minute quadrangle maps conducted by the NMED.

Appendix B

Waterbodies Fully Supporting with Impacts Observed, Partially, or Not Supporting Designated Attainable Uses

Table 15: Assessed Stream Reaches Fully Supporting with Impacts Observed, Partially Supporting, or Not Supporting Designated or Attainable Uses ~ Pages B3 through B33;

Table 16: Assessed Lakes not Fully Supporting Designated or Attainable Uses ~ Pages B35 through B47;

Table 17: Codes for Designated Uses and Nonpoint Sources of Pollution, page B49; and

Table 18a: Publicly Owned or Operated Lakes in New Mexico, pages B51 through B63.

Table 18b: Publicly Owned or Operated *Playa* Lakes in New Mexico, pages B64 through B66.

Tab 5. Assessed Stream Reaches either Fully Supporting w/ Impacts Ot ed, Partially Supporting or Not Supporting their Designated Uses

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Rio Grande from Rio Pueblo de Taos to New Mexico ~ Colorado border (Rio Grande, 2119), M Partially Supported	51.1	Agriculture (1500), Hydromodification (7400), Recreation (8700)	0	CWF	Turbidity [c], Stream bottom deposits [f]			NO
Rio Grande from Guaje Canyon to Rio Pueblo de Taos (Rio Grande, 2111), M Not Supporting	47.1	Agriculture (1200, 1500), Removal of riparian vegetation (7600), Unknown (9000)	0	MCWF, WWF	Metals [c], Turbidity [c], Stream bottom deposits [f]		Al	NO
Rio Grande from Northern Border of Isleta Pueblo to Jemez River [d] (Rio Grande, 2105, 2105.1), M Partially Supporting	38.3 (34.7)	Municipal point sources (0200), Urban runoff/storm sewers (4000)	12: Rio Rancho #2; Rio Rancho #3; General Electric; Albuquerque WWTP; Siemans; PNM (Reeves Station); Sandia Peak Ski Area; Delta Environmental/ Diamond Shamrock; Wylie Corp.; Holnam; Corrales Chevron; Duke City Distributing; Rio Grande Resources, Incorporated	LWWF, SC, IRR	Fecal coliform			YES Rio Grande Silvery Minnow Endangered
Rio de los Pinos from Colorado-New Mexico border to New Mexico-Colorado border (Rio Grande, 2120), M Partially Supporting	19.6	Agriculture (1200, 1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300), Recreation (8700)	0	HQCWF	Metals [c], Total phosphorous [c], Temperature [c] Stream bottom deposits [f]		Al[c]	NO
San Antonio River from mouth on Los Pinos River to the headwaters (Rio Grande, 2120), E Partially Supporting	28	Agriculture (1200, 1500), Silviculture (2200), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700), Recreation (8700)	0	HQCWF	Stream bottom deposits [f]			NO
Costilla Creek from New Mexico-Colorado border to irrigation diversion above Costilla (Rio Grande, 2120), M Partially Supporting	3	Agriculture (1200, 1500), Hydromodification (7100, 7400), Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposits [f], Turbidity, Metals	Al		NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Costilla Creek from irrigation diversion above Costilla to ComancheCreek (Rio Grande, 2120), M Fully Supporting, Impacts Observed	13	Agriculture (1500), Hydromodification (7400), Road maintenance/runoff (8300)	0	HQCWF	Turbidity			NO
Costilla Creek from Comanche Creek to Costilla Dam (Rio Grande, 2120), M Not Supporting	5	Agriculture (1500), Hydromodification (7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Metals [c]	Al [c]		NO
Comanche Creek from mouth on Costilla Creek to Little Costilla Creek (Rio Grande, 2120), M Partially Supporting	4.3	Agriculture (1500), Silviculture (2300), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Metals, Stream bottom deposits [f]		Al	NO
Comanche Creek from Little Costilla Creek to the headwaters (Rio Grande, 2120), M Fully Supporting, Impacts Observed	7.2	Agriculture (1500), Silviculture (2300)	0	HQCWF	Temperature [e], Stream bottom deposits [e f],			NO
Cordova Creek from mouth on Costilla Creek to the headwaters (Rio Grande, 2120), E Not Supported	3.8	Construction (3100), Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8705)	0	HQCWF	Total phosphorous [c g], Stream bottom deposits [c f g], Turbidity [c g]			NO
Red River from mouth on Rio Grande to Placer Creek (Rio Grande, 2119), M Not Supported	20.2	Agriculture (1500), Resource extraction (5600, 5700, 5900), Road maintenance/runoff (8300)	3: Molycorp Inc.; Red River Fish Hatchery; Red River	CWF, LW, IRR	Metals [c], Stream bottom deposits [f]	Al [c]		NO
Red River from Placer Creek to the headwaters (Rio Grande, 2119),M Not Supported	8.0	Land development (3200), Resource extraction (5600, 5700, 5900), Road maintenance/runnoff (8300)	0	CWF, LW, IRR	Metals [c]	Al[c]		NO
Bitter Creek from mouth on Red River to the headwaters (Rio Grande, 2120), M Not Supported	7.1	Agriculture (1500), Resource extraction (5100, 5800), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Recreation (8700)	0	HQCWF	Metals, Stream bottom deposits [c f]	Al [c]	CHRONIC	NO

		Recreation (8700)						
Pioneer Creek from mouth on Red River to the headwaters (Rio Grande, 2120), M Not Supported	4.3	Resource extraction (5200, 5900), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700), Recreation (8701, 8705)	0	HQCWF	Turbidity [e], Stream bottom deposits [e f]	Al[e]		NO
Placer Creek from mouth on Red River to the headwaters (Rio Grande, 2120), M Not Supported	1.3	Resource extraction (5300, 5900), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Stream bottom deposits [e f], Metals [e]	Al[e]		NO
Cabresto Creek from mouth on Red River to the headwaters (Rio Grande, 2120), M Not Supported	14.6	Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Metals [e]		Al[e]	NO
Rio Fernando de Taos from mouth on Rio Pueblo de Taos to the headwaters (Rio Grande, 2120), M Partially Supported	15.6	Agriculture (1500), Onsite Wastewater Systems (6500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700, 8701)	0	HQCWF	Metals [e], Turbidity [e], Stream bottom deposits [f]	Al[e]		NO
Rio Pueblo de Taos from mouth on Rio Grande to Rio Grande del Rancho (Rio Grande, 2119), M Partially Supported	7.5	Municipal point sources (0200), Agriculture (1500)	1: Taos	CWF, IRR	Temperature, Total ammonia, Fecal coliform [e], Metals [e]		Al[e]	NO
Rio Grande del Rancho from mouth on Rio Pueblo de Taos to bridge on State Hwy 518 (Rio Grande, 2119), E Partially Supported	13.6	Agriculture (1200, 1500), Road construction (3100), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700)	0	HQCWF	Stream bottom deposits [f]			NO
Rio Santa Barbara from Picuris Pueblo boundary to USFS Boundary [d] (Rio Grande, 2120), M Partially Supporting	9.2 (4.1)	Agriculture (1500), Construction (3200), Hydromodification (7400), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700)	0	HQCWF	Steam bottom deposits [f], Metals [e]		Al[e]	NO
Rio Santa Barbara from USFS boundary to confluence of East and West Forks (Rio Grande, 2120), M Fully Supporting, Impacts Observed	4.0	Recreation (8700, 8701)	0	HQCWF	Plant nutrients [e]			NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Rio Pueblo from the Picuris Pueblo to the headwaters (Rio Grande, 2120), M Partially Supporting	22.2	Agriculture (1500), Construction (3200), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700), Recreation (8700, 8701)	0	HQCWF	Steam bottom deposits [f]			NO
Embudo Creek from mouth on Rio Grande to border of Picuris Pueblo (Rio Grande, 2111), M Not Supported	11.0	Agriculture (1500), Land development (3200), Hydromodification (7100, 7200), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	MCWF, WWF	Metals [c], Turbidity [c], Stream bottom deposits [c f]		Al [c]	NO
Rio Quemado from mouth on Santa Cruz River to confluence of North and South Forks (Rio Grande, 2118), E Fully Supporting, Impacts Observed	14.7	Agriculture (1200, 1500), Land Disposal (6500)	0	HQCWF	Siltation [e], Temperature [e], Stream bottom deposits [e f]			NO
Pojoaque River from mouth on Rio Grande to Nambe Dam[d] (Rio Grande, 2111), E Partially Supported	14.4 (13.8)	Domestic point sources (0201), Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	2: Pojoaque Terraces Mobile Home Park; Pojoaque Valley Schools-Jacona Site	MCWF, WWF	Stream bottom deposits [f]			N/A
Rio en Medio from mouth on Pojoaque River to Aspen Ranch (Rio Grande, 2118), M Fully Supporting, Impacts Observed	4.5	Agriculture (1500), Removal of riparian vegetation (7600), Recreation (8700)	0	HQCWF	Turbidity [e]			NO
Rio Tesuque from southern border of Tesuque Pueblo to confluence of Tesuque Creek and Little Tesuque Creek [d], (Rio Grande, 2111), M Fully Supporting, Impacts Observed	2.1	Agriculture (1200), Land development (3200)	0	MCWF, WWF	Temperature [e]			N/A
Tesuque Creek from the confluence with Little Tesuque Creek to the confluence of North and South Forks of Tesuque Creek (Rio Grande, 2118), M Not Supporting	6.7	Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Turbidity [c]			NO

Little Tesuque C[illegible] from Big Tesuque Creek to the headwaters (Rio Grande, 2118), M Not Supported	8.1	Recreation (8700, 8701)	0	HQCWF [e]	Metals [e], Turbidity [e]	Al [e]		NO
South Fork Tesuque Creek from confluence with North Fork to headwaters (Rio Grande, 2118), M Fully Supporting, Impacts Observed	1	Unknown (9000)	0	HQCWF	Metals [e]		Al [e]	NO
Rio Frijoles from confluence with Rio Medio to Pecos Wilderness boundary (Rio Grande, 2112), E Partially Supported	2.5	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	HQCWF	Unknown			NO
Placer Creek from mouth on Rio Vallecitos to Hopewell Lake (Rio Grande, 2112), E Fully Supporting, Impacts Observed	3.6	Resource extraction (5300, 5900), Streambank modification/ destabilization (7700)	0	HQCWF	Stream bottom deposits [e f]			NO
Placer Creek from inflow to Hopewell Lake to the headwaters (Rio Grande, 2112), E Fully Supporting, Impacts Observed	3	Removal of riparian vegetation (7600), Streambank modification/ stabilization (7700) Recreation (8700, 8701)	0	HQCWF	Plant nutrients			NO
Rio Chupadero from USFS boundary to the headwaters Rio Grande, 2118), M Not Supported	4.1	Road maintenance/runoff (8300) Recreation (8700), Unknown (9000)	0	HQCWF	Metals [e], turbidity [e], Stream bottom deposits [e f]	Al [e]		NO
Rito Cañon de Frijoles from mouth on Rio Grande to the headwaters (Rio Grande, 2118), M Partially Supported	2.8	Land disposal (6300)	0	HQCWF	Pesticides (DDT)			NO
Capulin Creek from mouth on Rio Grande to the headwaters (Rio Grande, 2118), E Partially Supported	12.1	Silviculture (2100)	0	HQCWF	Stream bottom deposits [f], Turbidity			NO
Rio Chamita from mouth on Rio Chama to New Mexico/ Colorado border (Rio Grande, 2116), E Not Supported	12.6	Municipal point sources (0200), Agriculture (1500), Onsite wastewater systems (6500) Removal of riparian vegetation (7600)	1: Chama	HQCWF, IRR	Temperature [e g], Total phosphorus [e g], Total ammonia [e g], Fecal coliform [e g] Metals[e], Total organic carbon[e]		Al [e]	NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Lower Rito de Tierra Amarilla at US Highway 112 culvert (Rio Grande, 2116) M Not Supported	6	Removal of riparian vegetation (7600)	0	HQCWF	Turbidity, Temperature[c], Stream bottom deposits [f]			NO
Rio Chama from mouth of Rio Brazos to Little Willow Creek (Rio Grande, 2116), E Partially Supported	12.6	Municipal point sources (0200), Agriculture (1200, 1500), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700) Unknown (9000)[e]	1: Parkview Fish Hatchery	HQCWF	Metals[c], Temperature[c]		Al[c]	NO
Rio Chama from mouth on Rio Grande to Abiquiu Dam[d] (Rio Grande, 2113), E Not Supported	31.6 (28.2)	Agriculture (1201, 1500), Hydromodification (7300)	0	MCWF, WWF	pH[c], Metals[c], Dissolved oxygen		Al[c]	NO
Rio Brazos from mouth on Rio Chama to Chavez Creek (Rio Grande, 2116), E Not Supported	3.8	Hydromodification (7100, 7200), Removal of riparian vegetation (7600)	0	HQCWF	Temperature			NO
Chavez Creek from the confluence with the Rio Brazos to the headwaters (Rio Grande, 2116), M Not Supported	2.5	Hydromodification (7100, 7200), Removal of riparian vegetation (7700)	0	HQCWF	Temperature[c], Stream bottom deposits[c], Turbidity[c]			NO
Canjilon Creek from inflow to Abiquiu Reservoir to Canjilon Lakes outfall (Rio Grande, 2116), E Not Supported	24.3	Agriculture (1200, 1500), Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700)	0	HQCWF	Conductivity[c], Turbidity[c], Dissolved oxygen[c], Temperature[c]. Total organic carbon[c]			NO
Rio Nutrias from the confluence with the Rio Chama to the headwaters (Rio Grande, 2116), M Not Supported	45	Agriculture (1200, 1500), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700)	0	HWCWF	Turbidity[c], Temperature[c]			NO
Rio Cebolla from the confluence with the Rio Chama to the headwaters (Rio Grande, 2116), M Full Supporting, Impacts Observed	32.2	Removal of riparian vegetation (7600)	0	HQCWF	Temperature[c]			NO
Abiquiu Creek from mouth on Rio Chama to the headwaters (Rio Grande, 2113), M Partially Supported	6.1	Agriculture (1500), Hydromodification (7100), Road maintenance/runoff (8300)	0	MCWF, WWF	Dissolved oxygen, Fecal coliform[g]			

Rio del Oso from [illegible]th on Rio Chama to the headwaters (Rio Grande, 2112), M Not Supported	15.1	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8702)	0	HQCWF	Turbidity [c], Temperature [c], Dissolved oxygen [c]			NO
El Rito, perennial reaches above El Rito (Rio Grande, 2112), E Not Supported	20.8	Agriculture (1200, 1500)	0	HQCWF	Turbidity [c]			NO
El Rito Creek below El Rito (Rio Grande, 2113), M Not Supported	8.6	Natural (8600), Unknown (9000)	0	HQCWF	Metals [c]		Al [c]	NO
Rio Vallecitos from the confluence with the Rio Tusas to the headwaters (Rio Grande, 2112), M Not Supported	33.4	Agriculture (1200, 1500), Resource extraction (5100), Hydromodification (7100), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Recreation (8700)	0	HQCWF	Metals [c e], Temperature [c], Turbidity [c] Total organic carbon [c]	Al [c], Cu, Zn [f]	Al [c]	NO
Rio Tusas from the confluence with the Rio Vallecitos to the headwaters (Rio Grande, 2113), M Fully Supporting, Impacts Observed	38	Agriculture (1500)	0	MCWF, WWF	Dissolved oxygen [c]			NO
Rio Ojo Caliente from the mouth on the Rio Chama to the confluence of the Rio Vallecitos and Rio Tusas (Rio Grande, 2113), M Not Supported	22.4	Agriculture (1500) Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700), Road maintenance or runoff (8300), Recreation (8700)	0	MCWF, WWF	Stream bottom deposits [c f], Temperature [c], pH [c], Metals		Al	NO
Cañones Creek from the inflow to Abiquiu Reservoir to the headwaters (Rio Grande, 2116), M Not Supported	17.9	Agriculture (1500), Silviculture (2100), Removal of riparian vegetation (7600)	0	HQCWF	Metals [c], Turbidity [c], Temperature [c], Total organic carbon [c], Fecal coliform [c]	Al [c]		NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Polvadera Creek from the mouth on Cañones Creek to the headwaters (Rio Grande, 2116),M Partially Supported	12.2	Removal of riparian vegetation (7600)	0	HQCWF	Temperature			NO
Clear Creek from mouth on Rio Gallina to headwaters (Rio Grande, 2116), M Partially Supported	2.5	Silviculture (2300), Streambank modification/ destabilization (7700)	0	HQCWF	Stream bottom deposits [f]			NO
Cecilia Canyon Creek from the mouth on Rio Capulin to San Pedro Parks Wilderness (Rio Grande, 2116), M Partially Supported	5.6	Streambank modification/ destabilization (7700), Recreation (8701)	0	HQCWF	Stream bottom deposits [f]			NO
Rito Resumidero from the mouth on Rio Puerco de Chama to the headwaters (Rio Grande, 2116), M Partially Supported	4.3	Silviculture (2100, 2200, 2300), Streambank modification / destabilization (7700)	0	HQCWF	Stream bottom deposits [f]			NO
Rio Puerco de Chama from Abiquiu Reservoir to Poleo Creek (Rio Grande, 2115), M Not Supporting	5.4	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Temperature [c], Fecal coliform [c]			NO
Rio Puerco de Chama from Poleo Creek to the headwaters (Rio Grande, 2116), M Fully Supporting, Impacts Observed	10.3	Agriculture (1500)	0	HQCWF	Total organic carbon [c]			NO
Poleo Creek from the mouth on the Rio Puerco de Chama to the headwaters (Rio Grande, 2116), M Not Supported	6.3	Agriculture (1500), Silviculture (2300), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Turbidity [c], Total organic carbon [c]			NO
Rito Encinco from the mouth on the Rio Puerco de Chama to the headwaters (Rio Grande, 2116), M Not Supported	7.8	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	HQCWF	Turbidity [c]			NO

Coyote Creek from the mouth on the Rio Puerco de Chama to the headwaters (Rio Grande, 2116), M Not Supported	13.4	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Temperature [a], Total organic carbon [c]			NO
Rito Redondo from the mouth on the Rito Resumidero to headwaters (Rio Grande, 2116), M Not Supported	2	Agriculture (1500)	0	HQCWF	Total organic carbon [c]			NO
Santa Fe River from the Cochiti Pueblo to the Santa Fe WWTP [d] (Rio Grande, 2110), M Not Supported	12.7 (6.1)	Municipal point sources (0200), Agriculture (1500), Resource extraction (5100, 5700)	1: Santa Fe WWTP	MCWF, WWF, LW	Total residual chlorine [c g], pH[c], Stream bottom deposits [c f g] Dissolved oxygen [c]			NO
Cienega Creek from the mouth on the Santa Fe to Cienega Village (Rio Grande, 2110), M Partially Supported	4.1	Municipal point sources (0200), Agriculture (1500), Land disposal (6500), Unknown (9000)	2: Valle Vista Sewer Co.; Arroyo Hondo (Geohydrology Association)	MCWF, WWF, IRR	Fecal coliform, Total residual chlorine			NO
Rio Puerco from Rito Olguin to the headwaters (Rio Grande, 2107), E Partially Supported	39.6	Agriculture (1500), Removal of riparian vegetation(7600), streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	CWF	Temperature, Stream bottom deposits [f]			NO
San Pablo Creek from the mouth on the Rio Puerco to the headwaters (Rio Grande, 2107), E Partially Supported	10.8	Agriculture (1500), Resource extraction (5100), Removal of riparian vegetation (7600), Streambank modification / destabilization (7700)	0	HQCWF	Turbidity[c], Plant Nutrients, Stream bottom deposits [f]			NO
La Jara Creek, tributary to the Rio Puerco, perennial portions (Rio Grande, 2107), M Fully Supporting, Impacts Observed	7	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Stream bottom deposits [c f]			NO
Rito de los Piños, tributary to the Rio Puerco, perennial portions (Rio Grande, 2107), M Fully Supporting, Impacts Observed	2.3	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Stream bottom deposits [c f]			NO
Rito Leche, perennial portions (Rio Grande, 2107), E Partially Supported	2.9	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Stream bottom deposits [f]			~~YO~~ NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BO[illegible]AME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Nacimiento Creek from USFS boundry to San Gregorio Reservoir (Rio Grande, 2107), E Partially Supported	4.6	Agriculture (1500), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700)	0	CWF	Plant nutrients, Stream bottom deposits [f]			NO
Las Huertas Creek from Placitas to Capulin Canyon (Rio Grande, 2108.5), E Partially Supported	8.8	Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Recreation (8700, 8701)	0	CWF	Stream bottom deposits [f]			NO
Galisteo Creek, perennial portions (Rio Grande, unclassified), E Partially Supported	5.5	Agriculture (1500), Hydromodification (7000), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	WWF	Stream bottom deposits [f]			NO
Sulphur Creek above Redondo Creek to the headwaters (Rio Grande, 2106),M Not Supported	6.8	Natural (8600), Unknown (9000)	0	HQCWF	pH [c], Conductivity [c], Turbidity [c]			NO
Redondo Creek from the mouth on Sulphur Creek to the headwaters (Rio Grande, 2106), M Not Supported	5.2	Agriculture (1500)	0	HQCWF	Fecal coliform [c] Turbidity [c], Temperature [c]			NO
San Antonio Creek from the confluence with the East Fork of the Jemez River to the headwaters (Rio Grande, 2106), M Not Supported	23.6	Agriculture (1500), Silviculture (2300), Land development (3200), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Natural (8600), Recreation (8700, 8702)	0	HQCWF	Temperature, Total organic carbon [c], Turbidity [c]			NO
East Fork of the Jemez River from the confluence with San Antonio Creek to the headwaters (Rio Grande, 2106), M Not Supported	16.3	Agriculture (1500), Siviculture (2100), Streambank modification/ detabilization (7700), Recreation (8700)	0	HQCWF	Turbidity [c], Total organic carbon [c]			NO

Jemez River from Rio Guadalupe to the confluence of the East Fork of the Jemez River and San Antonio Creek (Rio Grande, 2106), M Not Supported	13.4	Municipal Pnt. Src.s (0200), Domestic Pnt. Src.s (0201), Agriculture (1201, 1500), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700), Road maintenance/runoff (8300) Natural (8600), Recreation (8700, 8701)	2: Jemez Springs WWTP; Jemez Springs Municipal Schools	HQCWF, CWF, LW	Turbidity [c g], Stream bottom deposits [c f g], Metals	Al		NO
Jemez River from mouth on Rio Grande to Rio Guadalupe (Rio Grande, 2106), M Fully Supporting, Impacts Observed	26.9	Agriculture (1500), Removal of riparian vegetation (7600), Natural (8600), Unknown (9000)	0	LWWF, LW	Fecal coliform			NO
Rio Cebolla from confluence with the Rio de las Vacas to Fenton Lake (Rio Grande, 2106), M Partially Supported	9.1	Agriculture (1500), Removal of riparian vegetation (7600), Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposits [f]			NO
Rio Cebolla from inflow to Fenton Lake to the headwaters (Rio Grande, 2106), M Not Supported	7	Agriculture (1500, 1700), Land disposal (6500), Removal of riparian vegetation (7600), Road maintenance/runoff (8300)	1: Seven Springs Fish Hatchery	HQCWF	Temperature, Stream bottom deposits [c f]			NO
Rio de las Vacas from the confluence with Rio Cebolla to Rito de las Palomas (Rio Grande, 2106), M Not Supported	14	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Temperature [c], Total organic carbon [c]			NO
Rito Peñas Negras from the mouth on the Rio de las Vacas to the headwaters (Rio Grande, 2106), M Partially Supported	11.6	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Temperature, Stream bottom deposits [f], Total organic carbon			NO
Rio Guadalupe from the mouth on the Jemez River to the confluence of the Rio de las Vacas and Rio Cebolla (Rio Grande, 2106), M Not Supported	12.4	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Natural sources (8600) Recreation (8700)	0	HQCWF	Conductivity [c], Fecal coliform [c], Turbidity [c g], Stream bottom deposits [f g], Metals		Al	NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. (SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.)
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BO[illegible] NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Rio Vallecitos from the headwaters to Paliz Campground (Rio Grande, 2106), M Not Supported	12.6	Removal of riparian vegetation (7600)	0	HQCWF	Temperature [c]			NO
Clear Creek from the confluence with the Rio de las Vacas to the headwaters (Rio Grande, 2106), M Not Supported	6.8	Natural (8600) Unknown (9000)	0	HQCWF	Total organic carbon [c], Turbidity [c]			NO
Calaveras Creek from the confluence with the Rio Cebolla to the headwaters (Rio Grande, 2106), M Not Supported	2.0	Flow regulation/ modification (7400), Road runoff (8701)	0	HQCWF	Stream bottom deposits [c f]			NO
American Creek from the mouth on the Rito de las Palomas to the headwaters (Rio Grande, 2106), E Partially Supported	3.8	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Temperature, Turbidity, Stream bottom deposits [f]			NO
Vallecito Creek from the eastern Jemez Pueblo boundary to the Village of Ponderosa (Rio Grande, 2105.5), E Not Supported	5.7	Agriculture (1500), Hydromodification (7100, 7400), Removal of riparian vegetation (7600), Unknown (9000)	0	CWF, SC	Temperature, Total ammonia [c], pH [c], Fecal coliform [c], Stream bottom deposits [f]			NO
Rio Moquino from mouth on Rio Paguate to headwaters (Rio Grande, 2107), E Not Supported	2	Resource extraction (5100, 5700), Removal of riparian vegetation (7600)	0	CWF	Temperature [c], Stream bottom deposits [f]			NO
Rio Paguate from inflow to Paguate Reservoir to headwaters (Rio Grande, 2107), M Not Supported	11.5	Resource extraction (5100, 5700, 5900), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	CWF	Metals [c], Temperature, Stream bottom deposits [f]		Se [c]	NO
Bluewater Creek, portions on State Lands above Bluewater Reservoir and from private inholdings to the headwaters (Rio Grande, 2107), M Not Supported	10.2	Agriculture (1500), Silviculture (2100, 2300), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700)	0	CWF	Metals [c], Temperature [c e], Turbidity [c], Stream bottom deposits [f]	Al	Pb [c]	NO

Bluewater Cre... from USFS boundary to private inholdings (Rio Grande, 2107), M Fully Supporting, Impacts Observed	6.2	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	CWF	Stream bottom deposits [e f]			NO
Bluewater Creek from the mouth on the Rio San Jose to Bluewater Dam (Rio Grande, 2107), E Partially Supported	9.6	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Plant nutrients			NO
Rio San Jose from USGS guage at Correo to Horrace Springs[d] (Rio Grande, 2107), E Not Supported	26.4	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	CWF	Temperature [c], Dissolved oxygen [c], pH [c], Stream bottom deposits [f]			NO
Alamosa Creek, perennial portions above Monticello diversion ditch (Rio Grande, 2103), E Partially Supported	12.2	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Natural (8600)	0	MCWF, WWF	Unknown			YES Alamosa Spring Snail Endangered
Percha Creek from perennial portions above Caballo Reservoir to confluence of Middle and South Forks (Rio Grande, 2103), E Partially Supported	10.5	Agriculture (1500), Resource extraction (5300), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	MCWF, WWF	Unknown			NO
Pecos River from Jacks Creek to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	17.8	Agriculture (1500), Recreation (8700)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Pecos River from Alamitos Canyon to Willow Creek (Pecos River, 2214), M Not Supported	10.4	Construction (3100, 3200), Resource extraction (5600, 5700), Land disposal (6600), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Recreation (8701, 8703)	1: Lisboa Fish Hatchery	HQCWF	Metals [c], Turbidity	Zn [c]	Al [c]	NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of strea bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Pecos River from Cañon del Oso to Alamitos Canyon (Pecos River, 2213), M Partially Supported	71.6	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	2: Glorieta Baptist Conference Center; Native American Prep School	MCWF	Stream bottom deposits [f]			NO
Pecos River from the inflow to Sumner Reservoir to Cañon del Oso (Pecos River, 2211), M Partially Supported	102.1	Agriculture (1500), Hydromodification (7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	2: Rock Lake Fish Hatchery; Santa Rosa WWTP	LWWF	Metals, Stream bottom deposits [f]		Al	NO
Pecos River from Black River to Lower Tansil Dam (Pecos River, 2202), M Partially Supported	22.8	Agriculture (1201,1500), Removal of riparian vegetation (7600), Streambank modification/ stabilization (7700), Unknown (9000)	1: Carlsbad	WWF	Stream bottom deposits [f]			NO
Pecos River from the New Mexico-Texas border to Black River (Pecos River, 2201), M Not Supported	30.8	Agriculture (1200, 1500), Hydromodification (7400), Removal of riparian vegetation (7600), Streambank modification/ stabilization (7700), Natural (8600)	0	WWF, IRR, LW	Metals [e], Temperature[e], Stream bottom deposits [f], Biological criteria [c]		Al [e]	NO
Rito Azul from the mouth on the Rito del Padre to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	2.7	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification /stabilization (7700), Recreation (8700,8701)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Rito Sebodilloses from the mouth on Rito del Padre to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	1.3	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification /stabilization (7700), Recreation (8700,8701)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Panchuela Creek near its mouth on the Pecos River (Pecos River, 2214), E Fully Supporting, Impacts Observed	3	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification /stabilization (7700), Recreation (8700,8701)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Rio Mora from mouth on Pecos River to the headwaters (Pecos River, 2214), M Partially Supported	0.25	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	HQCWF	Stream bottom deposits [f]			NO

Rito los Esteros from the mouth on the Rio Mora to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	1.6	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ stabilization (7700)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Rito del Oso from the mouth on the Rio Mora to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	1.5	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ stabilization (7700)	0	HQCWF	Turbidity, Stream bottom deposits [e f]			NO
Willow Creek from the mouth on the Pecos River to the headwaters (Pecos River, 2214), M Partially Supported	4.6	Resource extraction (5700), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road mainenance/runoff (8300) Unknown (9000)	0	HQCWF, DWS, IRR, LW, WH, SC, FC	Metals, Conductivity, Turbidity, Stream bottom deposits [f]	Cu, Zn, Cd		NO
Willow Creek in the drainage of the Terrero Mine (Pecos River, 2114), M Not Supported	0.5	Resource extraction (5700)	0	HQCWF, DWS, IRR, LW, WH, SC, FC	Metals [c], Siltation [c], Conductivity [c], Turbidity [c]		Cu [c], Cd [c], Zn [c]	NO
Holy Ghost Creek from mouth on Pecos River to Doctor Creek (Pecos River, 2214), M Partially Supported	4.5	Removal of riparian vegetation (7600), Road maintenance/runoff (8300) Recreation (8700)	0	HQCWF	Metals		Al	NO
Indian Creek from the mouth on the Pecos River to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	5.7	Resource extraction (5900), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700)	0	HQCWF	Turbidity [e], Stream bottom deposits [e f]			NO
Macho Canyon Creek from the mouth on the Pecos River to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	4.8	Resource extraction (5900), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700),	0	HQCWF	Turbidity [e], Stream bottom deposits [e f]			NO
Dalton Canyon Creek from the mouth on the Pecos River to the headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	4	Agriculture (1500), Silviculture (2300), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700)	0	HQCWF	Turbidity [e], Stream bottom deposits [e f]			NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Cow Creek from mouth on Pecos River to headwaters (Pecos River, 2214), E Partially Supported	36.7	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ detabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposits [f]			NO
Rito Manzanares from mouth on Cow Creek to headwaters (Pecos River, 2214), E, Fully Supporting, Impacts Observed	5.4	Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposits [e f]			NO
Bull Creek from mouth on Cow Creek to headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	14.9	Agriculture (1500), Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposits [e f]			NO
Rito Ruidoso from mouth on Bull Creek to headwaters (Pecos River, 2214), E Fully Supporting, Impacts Observed	2.8	Agriculture (1500)	0	HQCWF	Stream bottom deposits [e f]			NO
Tecolote Creek from Village of Tecolote to headwaters (Pecos River, 2212), E Not Supported	26.4	Agriculture (1500), Construction (3200), Land disposal (6500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300) Recreation (8701, 8703)	0	HQCWF	Temperature, Conductivity, Turbidity [c], Stream bottom deposits [e f]			NO
Wright Canyon from the mouth on Tecolote Creek to Forest Road 291 (Pecos River, 2212), E Partially Supported	0.5	Agriculture (1500), Road maintenance/runoff (8300) Recreation (8700)	0	HQCWF	Turbidity, Stream bottom deposits [f]			NO
Gallinas River from the diversion for the Las Vegas reservoir to headwaters (Pecos River, 2212), M Not Supported	7	Agriculture (1400, 1800), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Turbidity, Metals [c], Temperature [c], Stream bottom deposits [f]	Al [c]		NO

Gallinas Riv[illegible]om San Augustin to the diversion for the Las Vegas municipal reservoir (Pecos River, 2213), M Not Supported	62	Municipal point sources (0200), Agriculture (1500), Hydromodification (7100, 7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Spills (8400), Unknown (9000)	1: Medite, Incorporated	MCWF	Unknown toxicity, Total ammonia [c], Stream bottom deposits [f]			NO
Beaver Canyon Creek from the mouth on Porvenir Creek to the headwaters (Pecos River, 2214), E Partially Supported	6	Agriculture (1500), Hydromodification (7500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	HQCWF	Stream bottom deposits [f]			NO
Beaver Creek from confluence with Hollinger Creek to headwaters (Pecos River, 2212), M Fully Supporting, Impacts Observed	6	Agriculture (1510), Hydromodification (7500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	HQCWF	Stream bottom deposits [e f]			NO
Hollinger Creek from confluence with Beaver Creek to headwaters (Pecos River, 2212), E Fully Supporting, Impacts Observed	6.0	Agriculture (1510), Removal of riparian vegetation (7600), Recreation (8700)	0	HQCWF	Stream bottom deposits [e f]			NO
Rio Hondo, perennial portions up to confluence of Rio Ruidoso and Rio Bonito (Pecos River, 2208), E Partially Supported	8	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF, IRR	Unknown			NO
Rio Ruidoso from Seeping Springs Lakes to the Mescalero Apache Reservation (Pecos River, 2209), M Partially Supported	12.2	Agriculture (1500), Construction (3200), Land disposal (6500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700)	0	HQCWF	Temperature, Turbidity, Stream bottom deposits [f]			NO
Rio Bonito from the confluence with Rio Ruidoso to Angus Canyon (Pecos River, 2208), E Partially Supported	31.2	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	CWF, IRR	Stream bottom deposits [f]			NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BO[illegible] NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Rio Peñasco, perennial portions (Pecos River, 2208), E Partially Supported	42.5	Agriculture (1500), Removal of Riparian Vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	1: Sacramento Methodist Assembly	CWF	Stream bottom deposits [f]			NO
Sitting Bull Creek from its mouth at Lost Chance Canyon to Sitting Bull Springs (Pecos Rvr, unclassified), E, Partially Supported	3	Agriculture (1500), Land disposal (6500), Removal of riparian vegetation (7600), Recreation (8700, 8701, 8703)	0	WWF, SC	Plant nutrients, Temperature, Fecal coliform, Stream bottom deposits [f]			NO
Black River from the mouth on the Pecos River to the headwaters (Pecos River, 2202), M Partially Supported	16.9	Agriculture (1200, 1500), Resource extraction (5500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	WWF	Metals [e], Unknown		Al [e]	NO
Delaware River from the mouth on the Pecos River to the New Mexico/Texas border (Pecos River, 2202), M Fully Supporting, Impacts Observed	8.3	Agriculture (1500), Resource extraction(5500), Removal of riparian vegetation (7600), Streambank destabilization (7700)	0	WWF	Plant nutrients, Stream bottom deposits [e f]			NO
Canadian River from Cimarron River to the New Mexico-Colorado border (Canadian River, 2305), E Fully Supporting, Impacts Observed	53.8	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700, 8701, 8703)	1: Maxwell WWTP	LWWF, IRR	Fecal coliform[e]			NO
Chicorica Creek from the mouth on the Canadian River to Raton Creek (Canadian River, 2305), E Partially Supported	9.2	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700, 8701, 8703)	0	LWWF, IRR	Plant nutrients, Fecal coliform [e]			NO
Hunter Creek from inflow to Throttle Reservoir to the headwaters (Canadian River, 2305), E Fully Supporting, Impacts Observed	1	Agriculture (1500), Unknown (9000)	0	LWWF	Fecal coliform [e]			NO
Raton Creek from the mouth on Chicorica Creek to the headwaters (Canadian River, 2305), E Partially Supported	17.3	Municipal point sources (0200), Agriculture (1500), Unknown (9000)	2: Raton WWTP; Raton Public Service Co.	LWWF	Plant nutrients			NO

Una de Gato C[illegible] from the mouth on Chicorica Creek to Throttle Dam (Canadian River, 2305), E Fully Supporting, Impacts Observed	14.7	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	LWWF, IRR	Fecal coliform [e]			NO
Cieneguilla Creek from the inflow to Eagle Nest Lake to the headwaters (Canadian River, 2306), M Not Supported	13.6	Domestic point sources (0201), Agriculture (1500), Animal Holding/Management Areas (1800), Onsite Wastewater Systems (6500) Recreation (8705), Wildlife Impacts (8706)	0	HQCWF, IRR	Fecal coliform [c g], Turbidity [c g], Stream bottom deposits [c f g], Metals [c e], Temperature [c]	Pb [c]	Al [c]	NO
Six-Mile Creek from the inflow to Eagle Nest Lake to the headwaters (Canadian River, 2306) M Not Supported	6.6	Agriculture (1500) Animal Holding/ Management Areas (1800), Onsite Wastewater Systems (6500), Wildlife Impacts (8706)	0	HQCWF, IRR	Fecal coliform [c g], Turbidity [c g]			NO
Moreno Creek from the inflow to Eagle Nest Lake to the headwaters (Canadian River, 2306), M Not Supported	14.4	Rangeland (1500), Animal Holding/ Management Areas (1800), Onsite Wastewater Systems (6500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Recreation (8700) Wildlife Impacts (8706)	0	HQCWF, IRR	Fecal coliform [c g], Plant nutrients [c], Turbidity [c g],			NO
Cimarron River from Turkey Creek to Eagle Nest Dam (Canadian River, 2306), M Partially Supported	17.6	Agriculture (1500), Recreation (8700)	0	HQCWF	Metals		Al	NO
Cimarron River from the mouth on the Canadian River to Turkey Creek (Canadian River, 2305), E Partially Supported	35.3	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	LWWF	Plant nutrients			NO
Ponil Creek from the mouth on the Cimarron River to the confluence of North Ponil and South Ponil Creeks (Canadian River, 2306), M Not Supported	15.8	Municipal point sources (0200), Agriculture (1500) Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Temperature [c], Conductivity [c], Turbidity [c] Fecal coliform [e] Streambottom deposits [c]			NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BO NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
North Ponil Creek from the confluence with South Ponil Creek to the mouth of M[c]Crystal Creek (Canadian River, 2306), M Not Supported	17.6	Agriculture (1500), Silviculture (2300), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Natural (8600), Unknown (9000)	0	HQCWF, IRR	Temperature [c g], Fecal coliform [c], Total phosphorus [c g], Stream bottom deposits [c f g], Turbidity [c g], Total organic carbon [c]			NO
M[c]Crystal Creek from the confluence with North Ponil Creek to the headwaters (Canadian River, 2306), M Partial Support	3	Removal of riparian vegetation (7600)	0	HQCWF	Temperature			NO
Middle Ponil Creek from the confluence with South Ponil Creek to the headwaters (Canadian River, 2306), M Not Supported	20.9	Agriculture (1500), Silviculture (2300), Removal of riparian vegetation (7600), Natural (8600), Road runoff (8701), Unknown (9000)	0	HQCWF	Stream bottom deposits [c f], Temperature [c], Turbidity, Total organic carbon [c]			NO
Rayado Creek from the Miami Lake diversion to the headwaters (Canadian River, 2306), M Fully Supporting, Impacts Observed	21.2	Agriculture (1500), Recreation (8700)	0	HQCWF	Temperature [c], Stream bottom deposits [c f]			NO
Mora River from Rio la Casa to the headwaters (Canadian River, 2306), E Not Supported	22.3	Agriculture (1500)	0	HQCWF	Turbidity [c], Fecal coliform [c], Stream bottom deposits [c f]			NO
Mora River from the mouth on the Canadian River to Wolf Creek (Canadian River, 2305), E Partially Supported	50.9	Agriculture (1500) Unknown (9000)	0	LWWF	Metals, Fecal coliform [c]		Pb	NO
Sapello River from the mouth on the Mora River to Manuelitas Creek (Canadian River, 2305.3), M Partially Supported	27.1	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	MCWF, WWF	Unknown			NO
Ocate Creek from below the Village of Ocate to Wheaton Creek (Canadian River, 2305.3, 2306), E Partially Supported	7.1	Agriculture (1200, 1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700) Road maintenance/runoff (8300)	0	HQCWF, MCWF, WWF	Unknown			NO

Manuelas C[illegible]om Wheaton Creek to Manuelitas Canyon (Canadian River, 2306), E Partially Supported	1.5	Agriculture (1200, 1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Unknown			NO
Rio la Casa from the mouth on the Mora River to the confluence of North and South Forks (Canadian River, 2306), E Partially Supported	5.8	Construction (3100), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	HQCWF	Stream bottom deposts [f]			NO
Coyote Creek from mouth on Mora River to Black Lake (Canadian River, 2606), E Not Supported	30.1	Agriculture (1201, 1500), Road maintenance/runoff (8300)	0	HQCWF	Fecal coliform [c], Stream bottom deposits [f]			NO
Little Coyote Creek from inflow to Black Lake to the headwaters (Canadian River, 2306), E Not Supported	1	Road Construction (3100)	0	HQCWF	Turbidity [c], Temperature [c], Stream bottom deposits [c f]			NO
San Juan River from Cañon Largo to Navajo Dam (San Juan River, 2405), E Not Supported	11.1	Agriculture (1500), Resource extraction (5500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	HQCWF, WWF	Turbidity [c], Stream bottom deposits [c f]			NO
San Juan River from the Animas River to Cañon Largo (San Juan River, 2401), M Not Supported	26	Agriculture (1200, 1500), Urban runoff (4000), Resource extraction (5500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	3: Farmington Sand and Gravel; Bloomfield; Bloomfield Municipal Schools	MCWF, WWF	Stream bottom deposits [c f], Fecal coliform [c]			NO
San Juan River from the Chaco River to the Animas River (San Juan River, 2401), M Partially Supported	31.2	Agriculture (1200, 1500), Resource extraction (5500, 5900), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	7: San Juan Concrete; Farmington; Farmington DWTP; Harper Valley Subdivision; Central Consolidated Schools; San Juan Coal Company, San Juan Mine; Public Service Company, San Juan Plant	MCWF, WWF	Stream bottom deposits [f]			YES Colorado Squaw Fish Endangered

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Animas River from the mouth on the San Juan River to Estes Arroyo (San Juan River, 2403), M Partially Supported	16.5	Urban runoff (4000), Resource extraction (5500), Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	4: Aztec WWTP; Farmington Animas Steam Plant; Farmington MOC; North Star Water Project	MCWF, WWF	Stream bottom deposits [f]			NO
Animas River from Estes Arroyo to the New Mexico-Colorado Border (San Juan River, 2404), M Partially Supported	19.9	Agriculture (1200, 1500), Urban runoff (4000), Resource extraction (5500), Hydromodification (7100), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Stream bottom deposits [f]			NO
La Plata River from the mouth on the San Juan River to the New Mexico-Colorado border (San Juan River, 2402), E Partially Supported	24.7	Agriculture (1500) Resource extraction (5100, 5500, 5900), Removal of Riparian Vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	2: Black Diamond Coal Company – La Plata; San Juan Coal Company – La Plata Mine	LWWF, MCWF	Plant nutrients			NO
Rio Nutria from mouth on Zuni River to headwaters[d] (Lower Colorado River, unclassified), E Partially Supported	22.8 (7)	Unknown (9000)	0	WWF	Metals		Hg	NO
San Francisco River from Centerfire Creek to Largo Canyon (San Francisco River, 2602), M, Fully Supporting, Impacts Observed	15.5	Agriculture (1500), Removal of Riparian Vegetation (7600), Streambank modification/ destabilization (7700), Upstream impoundment (8800)	0	CWF	pH [e]			NO
San Francisco River from Centerfire Creek to the New Mexico/Arizona border (San Francisco River, 2602), M, Not Supported	15	Natural (8600), Source Unknown (9000)	0	CWF, PC	Temperature[e], Turbidity, Streambottom deposits [e f]			NO
Centerfire Creek from the mouth on the San Francisco River to the headwaters (San Francisco River, 2603), M, Partially Supported	7.1	Agriculture (1500), Removal of Riparian Vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Temperature [e], Conductivity, Plant nutrients			NO

San Francisco [illegible] above Pueblo C[illegible] (San Francisco River, 2601), M Not Supported	71	Natural (8600), Source unknown (9000)	0	MCW	Streambottom deposits [c f]			NO
San Francisco River above Luna (San Francisco River, 2602), M Not Supported	4	Agriculture (1500), Natural (8600), Upstream impoundment (8800), Source unknown (9000)	0	CWF, PC	Turbidity, Streambottom deposits [c f]			NO
San Francisco River at Glenwood Gage (San Francisco River, 2601), M Not Supported	58	Natural (8600), Source unknown (9000)	0	MCW	Streambottom deposits [c f]			NO
San Francisco River above Reserve (San Francisco River, 2602), M Not Supported	30	Natural (8600), Source unknown (9000)	0	CWF, PC	Temperature [c], Turbidity, Streambottom deposits [c f]			NO
San Francisco River below Reserve (San Francisco River, 2602), M Not Supported	5	Natural (8600), Unknown	0	MCW	Stream bottom deposits [c f]			NO
Tularosa River from the mouth on the San Francisco River to Apache Creek (Tularosa River above SFR) (San Francisco River, 2603), M, Not Supported	22.5	Natural (8600), Source unknown (9000)	0	HQCWF	Conductivity [c], Streambottom deposits [c f]			NO
Tularosa River from the mouth on the San Francisco River to Apache Creek (Tularosa River at FR233) (San Francisco River, 2603), M Not Supported	12	Natural (8600), Source unknown (9000)	0	HQCWF	Conductivity [c]			NO
Tularosa River above Apache Creek to Tularosa Springs (San Francisco River, 2603), M Not Supported	10	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c], Conductivity [c], Streambottom deposits [c f]			NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Apache Creek at its mouth on the Tularosa River (San Francisco River, 2603), E, Not Supported	2.5	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c], Conductivity [c], Dissolved oxygen [c]			NO
Negrito Creek from the mouth on the Tularosa River to South Fork Negrito Creek (San Francisco River, 2603), M Fully Supporting, Impacts Observed	12	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c]			NO
Negrito Creek above Tularosa confluence (San Francisco River, 2603), M Fully Supporting, Impacts Observed	5	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c], Streambottom deposits [c f]			NO
South Fork of Negrito Creek from the confluence with the North Fork to the headwaters (San Francisco River, 2603), M, Partially Supported	5.4	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature			NO
Mineral Creek from the mouth on the San Francisco River to headwaters (San Francisco River, 2603), M Not Supported	17	Natural (8600), Source unknown (9000)	0	HQCWF	Metals [c], Temperature [c]		Al [c]	NO
Silver Creek from the mouth on Mineral Creek to Little Fannie Mine (San Francisco River, 2603), M, Not Supported	3.3	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c], Turbidity [c], Conductivity [c]			NO
Silver Creek below Bearup Mine (San Francisco River, 2603), M Not Supported	3.3	Natural (8600), Source unknown (9000)	0	HQCWF	Temperature [c], Turbidity [c], Conductivity [c]			NO

Whitewater Creek from the mouth on the San Francisco River to Whitewater Campground (Whitewater Creek at Catwalk) (San Francisco River, 2603), M, Partially Supported	5.6	Hydromodification (7100, 7200, 7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300), Natural (8600), Source unknown (9000)	0	HQCWF	Metals [a], Turbidity [a], Stream bottom deposits [f]	Zn	Al	NO
Whitewater Creek from the mouth on the San Francisco River to Whitewater Campground (Whitewater Creek at Glenwood) (San Francisco River, 2603), M Not Supported	5.6	Natural (8600), Unknown (9000)	0	HQCWF	Metals [c], Streambottom deposits [f], Turbidity	Zn [c]	Al [c]	NO
Trout Creek from the mouth on the San Francisco River to the headwaters (San Francisco River, 2603), M, Fully Supporting, Impacts Observed	4	Natural (8600), Source unknown (9000)	0	HQCWF	Metals [c]		Pb [c]	NO
Gila River from Mangas Creek to Mogollon Creek (Gila River, 2502), M Not Supported	15	Agriculture (1200, 1500), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700)	0	MCWF, WWF, PC	Turbidity [c], Stream bottom deposits [c f]			YES Spikedace and Loach Minnow Threatened
Gila River from Mogollon Creek to the East and West Forks of the Gila River (Gila River, 2502), M Not Supported	39.8	Agriculture (1500), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700)	0	MCWF	Turbidity [c]			YES Spikedace and Loach Minnow Threatened
Gila River from the New Mexico-Arizona border to Mangas Creek (Gila Rvr., 2501, 2502), M Not Supported	38.6	Agriculture (1201, 1500), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700)	0	LWWF, WWF, MCWF, PC	Turbidity [c], Stream bottom deposits [c f]			YES Spikedace and Loach Minnow Threatened
Middle Fork of the Gila River from the mouth on the West Fork of the Gila River to the USFS Ranger Station (Middle Fork of the Gila above Iron Creek) (Gila River, 2503), M Partially Supported	40.0	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Metals, Temperature, Turbidity, Plant nutrients, Dissolved oxygen, Conductivity, pH		Al	YES Spikedace and Loach Minnow Threatened

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Iron Creek from the mouth on the Middle Fork of the Gila River to the headwaters (Iron Creek above the Middle Fork of the Gila) (Gila River, 2503), M Partially Supported	10.8	Agriculture (1500)	0	HQCWF	Plant nutrients, pH, Temperature, Conductivity, Turbidity, Dissolved oxygen			YES Gila Trout Endangered
East Fork of the Gila River from the confluence with the West Fork of the Gila River to the confluence of Beaver and Taylor Creeks (East Fork of the Gila above the West Fork of the Gila) (Gila River, 2503), M Partially Supported	25.5	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Metals, pH, Total organic carbon, Dissolved oxygen, Temperature, Conductivity		Al	YES Spikedace and Loach Minnow Threatened
West Fork of the Gila River from the confluence with the East Fork of the Gila River to above the Gila Cliff Dwellings (West Fork of the Gila River above the East Fork of the Gila River) (Gila Rvr., 2502, 2503), M Not Supported	5.7	Agriculture (1500)	0	HQCWF	Turbidity [c], Plant nutrients [c], Temperature [c], pH [c], Conductivity [c], Dissolved oxygen [c]			YES Spikedace and Loach Minnow Threatened
West Fork of the Gila River above the confluence with the Middle Fork of the Gila River (West Fork of the Gila River above the Middle Fork of the Gila River) (Gila River, 2503), M Not Supported	6.5	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Turbidity [c], Temperature [c], pH [c], Plant nutrients [c] Conductivity [c], Dissolved oxygen [c]			YES Spikedace and Loach Minnow Threatened
Gilita Creek from the confluence with Snow Canyon Creek to Willow Creek (Gilita Creek above Snow Canyon Creek) (Gila River, 2503), M Partially Supported	6	Agriculture (1500), Land disposal (6500), Removal of riparian vegetation (7600)	0	HQCWF	Metals, Dissolved oxygen, Plant nutrients, Temperature, pH, Turbidity, Conductivity		Al	NO
Snow Canyon Creek from the confluence with Gilita Creek to Snow Lake (Snow Canyon Creek above Gilita) (Gila River, 2503), M Not Supported	1	Agriculture (1500), Removal of riparian vegetation (7600), Upstream impoundment (8800), Unknown (9000)	0	HQCWF	Metals [c], Temperature [c], Dissolved oxygen [c], Plant nutrients [c], Turbidity [c], Conductivity [c], pH [c], Stream bottom deposits		Al	NO

headwaters (Canyon Creek at FR 142) (Gila River, 2503), M Not Supported	4.5	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Turbidity [c], Conductivity [c], pH [c], Dissolved oxygen [c]			NO
Hoyt Creek upstream from Wall Lake (Hoyt Creek above Wall Lake) (Gila River, 2503), M Not Supported	4.2	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Temperature [c], Plant nutrients [c], Turbidity [c], Conductivity [c], pH [c], Dissolved oxygen			NO
Turkey Creek from the mouth on Gila River to the headwaters (Turkey Creek above the Gila River) (Gila River, 2503), M Partially Supported	2.0	Removal of riparian vegetation (7600), Natural (8600)	0	HQCWF	Temperature, Plant nutrients, pH, Dissolved oxygen, Turbidity			NO
Taylor Creek from the confluence with Beaver Creek to Wall Lake (Taylor Creek below Wall Lake) (Gila River, 2503), M Not Supported	1.5	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ Destabilization (7700), Unknown (9000)	0	HQCWF	Temperature [c], Metals [c], pH [c], Turbidity [c], Conductivity [c], Dissolved oxygen [c],			NO
Diamond Creek from the mouth on the East Fork of the Gila River to the headwaters (Diamond Creek at FR 225) (Gila River, 2503), M Partially Supported	2.3	Agriculture (1500), Removal of riparian vegetation (7600)	0	HQCWF	Temperature, Plant nutrients, pH, Dissolved oxygen, Turbidity, Conductivity, Metals			YES Gila Trout Endangered
Black Canyon Creek from the mouth on the East Fork of the Gila River to the headwaters (Black Canyon Creek at the Wilderness Boundary) (Gila River. 2503), M Not Supported	2	Agriculture (1500), Silviculture (2100), Removal of riparian vegetation (7600), Streambank modification/ Destabilization (7700)	0	HQCWF	Temperature [c] Plant nutrients [c], Turbidity [c], Dissolved oxygen [c], Conductivity [c], pH [c]			NO
Sapillo Creek from the mouth on the Gila River to Lake Roberts (Sapillo Creek below Lake Roberts) (Gila River, 2503), M Partially Supported	5.0	Agriculture (1500), Hydromodification (7100), Removal of Riparian Vegetation (7600), Streambank modification/ destabilization (7700), Upstream impoundment (8800)	0	HQCWF	Biological impairment, Temperature, pH, Turbidity, Conductivity, Plant nutrients, Dissolved oxygen			NO

[a] = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
[b] = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
[c] = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
[d] = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
[e] = Fully supported; impacts observed.
[f] = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
[g] = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Sapillo Creek from the mouth on the Gila River to Lake Roberts (Sapillo Creek at the Wilderness Boundary) (Gila River, 2503), M Partially Supported	5.0	Agriculture (1500), Hydromodification (7700), Upstream impoundment (8800)	0	HQCWF	Biological impairment, Plant nutrients, Dissolved oxygen, Conductivity, Turbidity, pH, Temperature			NO
Mogollon Creek, perennial portions above the USGS gauge (Gila River, 2503), M Partially Supported	12.6	Agriculture (1500), Resource Extraction (5600, 5900), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	HQCWF	Metals, Stream bottom deposits [f], pH, Turbidity, Plant nutrients, Temperature, Conductivity, Dissolved oxygen		Pb, Al	YES Gila Trout Endangered
Mangas Creek from the mouth on the Gila River to Mangas Springs (Mangas Creek at FR 809) (Gila River, 2502), M Partially Supported	4.7	Agriculture (1500), Resource extraction (5700), Hydromodification(7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	MCWF, WWF, PC	Turbidity [e], Plant nutrients, Stream bottom deposits [f] Temperature, pH, Metals, Conductivity, Dissolved oxygen			NO
Mangas Creek below Mangas Springs (Gila River, 2502), M Not Supported	7.0	Agriculture (1500), Resource extraction (5700), Hydromodification (7400), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	MCWF, WWF, PCR	Turbidity [c], Temperature [c], pH [c], Metals [c], Conductivity [c], Plant nutrients [c], Dissolved oxygen [c]			NO
Mangas Creek from Mangas Springs to headwaters (Gila River, 2502), M Fully Supporting, Impacts Observed	2.5	Resource extraction (5200, 5800)	0	MCWF, WWF	Metals [e]		Al [c], Co [c], Cu [c], Zn [c], Cd [c], Pb [c]	NO
Bear Creek from the mouth on the Gila River to the headwaters (Bear Creek above Cyprus Mine) (Gila River, 2502), M Partially Supported	2.5	Agriculture (1500), Resource extraction (5100, 5700), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	1: Cyprus Pinos Altos Corp.	MCWF, WWF, LW	Metals, Plant nutrients, Temperature, Turbidity, Conductivity, pH, Dissolved oxygen	Al, Zn, Cu		NO
Bear Creek from mouth on the Gila River to the headwaters (Bear Creek below Cyprus Mine) (Gila River, 2502), M Partially Supported	2.5	Agriculture (1500), Resource extraction (5100, 5700), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	1: Cyprus Pinos Altos Corp.	MCWF, WWF, LW	Metals, Plant nutrients, Temperature, Turbidity, Conductivity, pH, Dissolved oxygen	Al, Zn, Cn		NO

Carlisle Creek, perennial portions in New Mexico (Carlisle Creek above Carlisle Mine) (Gila River, 2501), M Partially Supported	5	Agriculture (1500), Resource extraction (5800)	0	LWWF, IRR, LW	Metals, Plant nutrients, pH, Conductivity, Dissolved oxygen	Al, Cu, Zn, Cd		NO
Carlisle Creek, Perennial portions in New Mexico (Carlisle Creek below Carlisle Mine) (Gila River, 2501), M Partially Supported	5	Agriculture (1500), Resource extraction (5800)	0	LWWF, IRR, LW	Metals, Plant nutrients, pH, Conductivity, Dissolved oxygen	Al, Cu, Zn, Cd		NO
Dry Cimarron River, perennial portions (Dry Cimarron River, 2701), E Not Supported	71.9	Agriculture (1500), Removal of rip. veg. (7600), Streambank mod./ destabilization (7700), Natural (8600)	0	CWF	Temperature [c], pH [c], Total ammonia [c], TDS [c], Stream bottom deposits [c f], Fecal coliform [c]			NO
Long Canyon, perennial portions (Dry Cimarron River, 2701), E Not Supported	4.9	Agriculture (1500), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700), Natural (8600)	0	CWF	Temperature [c]			NO
Oak Creek from the mouth on the Dry Cimarron River to the headwaters (Dry Cimarron River, 2701), E Partially Supported	9.1	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Natural (8600)	0	CWF	Temperature [c], Total ammonia [c], pH [c], Unknown			NO
Carrizozo Creek from the mouth on the Dry Cimarron River to the headwaters (Dry Cimarron River, 2701), E, Partially Supported	1.5	Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	CWF	Chloride [c], Unknown			NO
Sacramento River, perennial portions (Closed basins, 2801), E Fully Supporting, Impacts Observed	13.8	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Road maintenance/runoff (8300)	0	MCWF	Stream bottom deposits [c f]			NO
Tularosa Creek from the town of Tularosa to the headwaters (Closed basins, 2801), M Partially Supported	10.2	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700), Unknown (9000)	0	CWF	Metals [c], Unknown		Hg	NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. {SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.}
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS	TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)	PROBABLE SOURCE(s) OF POLLUTANT/THREAT (see Table 17b)	NUMBER OF NPDES PERMITS ON THE REACH	USES NOT FULLY SUPPORTED/ THREATENED [a] (see Table 17a)	SPECIFIC POLLUTANT OR THREAT	TOXICS AT ACUTE LEVELS[b]	TOXICS AT CHRONIC LEVELS[b]	AQUATIC T or E SPECIES ON THE REACH
Three Rivers, perennial portionsfrom U.S. Hwy 54 to White Mountain Wilderness Boundary (Closed Basins, 2802), M Not Supported	7.5	Agriculture (1500)	0	HQCWF	Temperature [c], Conductivity [c]			NO
Mimbres River from Sheppard Canyon to Cooney Campground (Mimbres River, 2804), M Not Supported	11.6	Agriculture (1500), Resource extraction (5400), Hydromodification (7200), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	HQCWF	Metals [c], Dissolved oxygen [c], Temperature [c], Stream bottom deposits [f]		Al [c]	YES Chihuahua Chub Threatened
Mimbres River, perennial portions below Sheppard Canyon (Mimbres River, 2803), M Not Supported	12.5	Agriculture (1200, 1500), Hydromodification (7200), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF, IRR	Metals [c], Temperature[c], Fecal coliform [c], Stream bottom deposits[f]		Al [c]	YES Chihuahua Chub Threatened
Gallinas Creek from the mouth on the Mimbres River to the headwaters (Mimbres River, 2803), E Partially Supported	14.0	Agriculture (1200, 1500), Resource extraction (5900), Removal of riparian vegetation (7600), streambank modification/ destabilization (7700), Natural (8600)	0	CWF	Temperature, Fecal coliform [c], Stream bottom deposits [f]			NO
Hot Springs Creek from the mouth on the Mimbres River to the headwaters (Mimbres River, 2803), E Not Supported	11.0	Agriculture (1500), Removal of riparian vegetation (7600), Streambank modification/ destabilization (7700)	0	CWF	Unknown			NO
Cold Springs Creek from the mouth on Hot Springs Creek to the headwaters (Mimbres River, 2803), E Not Supported	8.0	Resource extraction (5200, 5700)	0	CWF	Metals [c]	Cu, Zn		NO

a = Conclusions concerning attainment of fishery uses are largely based on water quality analysis; where available, biological data was used to verify these results.
b = All toxics for which USEPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by USEPA.
c = Pollutants present in concentrations or combinations such that designated or attainable uses are not supported.
d = This reach includes areas wholly or in-part on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.
e = Fully supported; impacts observed.
f = NMED/SWQB has no physical data to support "stream bottom deposits" listings. (SWQB is in the process of developing stream bottom deposit protocols for the expressed purpose of measuring the impacts of stream bottom deposits.)
g = A Total Maximum Daily Load for this pollutant has been approved by the WQCC on this streamreach.

Table 16. Assessed Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status[a]	Uses Affected[b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels[c]	Toxics at Chronic Levels[c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support[d]
Lagunitas Lakes (Rio Grande, 2120) E	E	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	10	U
Laguna Larga (Rio Grande, 2120) E	ND	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	15	U
Cabresto Lake (Rio Grande, 2120) M	M	HQCWF	Fish tissue mercury	-	Hg (Fish)	Unknown (9000)	15	PS
Heart Lake (Rio Grande, 2120) E	ND	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	3	U
Shuree Ponds (Rio Grande, 2120) E	ND	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	8	U

[a] Trophic status based on Carlson trophic state index:
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses, con't.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Alice Lake (Rio Grande, 1120) E	ND	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	4	U
Goose Lake (Rio Grande, 1120) E	E	HQCWF	Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	5	NS
San Leonardo Lake (Rio Grande,2120) M	O	HQCWF	pH	-	-	Natural (8600)	5	FSIO
Heron Reservoir (Rio Grande, 2117)M	OM	HQCWF	Fish tissue mercury	-	Hg (Fish)	Unknown (9000)	5,906	PS
El Vado Reservoir (Rio Grande, 2117) M	M	CWF	Nuisance algae, Siltation, Fish tissue mercury	-	Hg (Fish)	Agriculture (1500), Recreation (8700), Unknown (9000)	3,500	PS
Canjilon Lakes (Rio Grande, 2116) M	M to E	HQCWF	Nutrients, pH, Siltation, Dissolved oxygen	-	-	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Reduction of riparian vegetation (7600), Bank destabilization (7700)	18	FSIO
Abiquiu Reservoir (Rio Grande, 2114) M	OM	CWF, WWF	Siltation	-	-	Spills (8400), Agriculture (1500), Unknown (9000)	4,000	FSIO

Hopewell Lake (Rio Grande, 2112) E	E	HQCWF	pH, Dissolved oxygen, Turbidity, Nuisance algae, Siltation	-	-	Recreation (8700), Agriculture (1500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	14	PS
Cochiti Reservoir (Rio Grande, 2109) M	E	WWF, CWF	Siltation, Nuisance algae, Pesticides	-	-	Agriculture (1500)	1,240	PS
Fenton Lake (Rio Grande, 2106) E	E	HQCWF, SC	Total phosphorus, Nuisance algae, Siltation	-	-	Land disposal (6500), Agriculture (1500), Recreation (8700), Road Maintenance (8300), Reduction of riparian vegetation (7600)	27	PS
Bluewater Reservoir (Rio Grande, 2106) M	ME	HQCWF	Metals, Turbidity, Nutrients, Temperature, Conductivity, Siltation	Al	Cd	Agriculture (1500), Silviculture (2000), Recreation (8700, 8702), Road Maintenance (8300), Reduction of riparian vegetation (7600), Bank destabilization (7700)	2,350	FSIO
Elephant Butte Reservoir (Rio Grande, 2104) E	E	WWF	Metals, Fish tissue mercury Siltation,	-	Hg (Fish)	Agriculture (1500), Recreation (8700), Unknown (9000)	40,000	PS
Caballo Reservoir (Rio Grande, 2102) M	E	WWF	Nutrients, Fish tissue mercury Siltation,	-	Hg (Fish)	Agriculture (1500), Recreation (8700), Unknown (9000)	11,000	PS
McAllister Lake (Pecos River, 2211.3) M	E	CWF, SC	Nutrients, Nuisance algae, Siltation	-	-	Recreation (8700, 8701), Natural (8600), Agriculture (1201), Reduction of riparian vegetation (7600), Bank destabilization (7700)	100	PS

[a] Trophic status based on Carlson trophic state index.
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses, con't.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Storrie Reservoir (Pecos River, 2211.5)M	M	CWF, WWF	Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701, 8702), Reduction of riparian vegetation (7600), Bank destabilization (7700)	1,200	FSIO
Santa Rosa Lake (Pecos River, 2210) M	ME	WWF	Nutrients, Siltation, Fish tissue mercury	-	Hg (Fish)	Agriculture (1500), Recreation (8700, 8701, 8702), Unknown (9000), Reduction of riparian vegetation (7600), Bank destabilization (7700)	1,500	PS
Power Dam Lake (Pecos River, unclassified) E	ND	MCWF, WWF	Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701, 8702), Reduction of riparian vegetation (7600), Bank destabilization (7700)	20	U
Sumner Reservoir (Pecos River, 2210) M	E	WWF	Nutrients, Nuisance algae, Siltation, Fish tissue mercury	-	Hg (Fish)	Agriculture (1500), Recreation (8700), Unknown (9000), Reduction of riparian vegetation (7600), Bank destabilization (7700)	4,650	PS
Alto Lake (Pecos River, 2209) E	E	HQCWF	Dissolved oxygen, Nutrients, Nuisance algae, Siltation, Turbidity	-	-	Agriculture (1500), Recreation (8700), Silviculture (2300), Reduction of riparian vegetation (7600), Bank destabilization (7700)	20	PS

Bonito Lake (Pecos River, 2209) E	E	HQCWF	pH, Dissolved oxygen, Nutrients, Nuisance algae, Turbidity, Siltation	-	-	Agriculture (1500), Recreation (8700), Silviculture (2300), Reduction of riparian vegetation (7600), Bank destabilization (7700)	45	FSIO
Brantley Reservoir (Pecos River, 2205) M	ME	WWF	Fish tissue mercury	-	Hg (Fish)	Unknown (9000)	2,000	PS
Avalon Reservoir (Pecos River, 2204) M	E	WWF	Fish tissue mercury, Siltation, Nutrients	-	Hg (fish)	Unknown (9000), Agriculture (1200, 1500)	930	PS
Tansill Lake (Pecos River, 2203) E	ND	WWF	Nutrients, Siltation	-	-	Recreation (8700, 8701, 8702, 8703), Hydromodification (7400), Construction (3200), Reduction of riparian vegetation (7600), Bank destabilization (7700)	94	U
Bataan Lake (Pecos River, 2203) E	ND	WWF	Nutrients, Siltation	-	-	Recreation (8700, 8701, 8702, 8703), Hydromodification (7400), Construction (3200), Reduction of riparian vegetation (7600), Bank destabilization (7700)	42	U
Lake Maloya (Canadian River, 2306) M	E	HQCWF	Metals, Nutrients, Nuisance algae	Zn	-	Recreation (8700), Road Maintenance (8300), Unknown (9000), Reduction of riparian vegetation (7600), Bank destabilization (7700)	150	FSIO

[a] Trophic status based on Carlson trophic state index.
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes.
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses, con't.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Eagle Nest Lake (Canadian River, 2306) M	E	HQCWF	Nutrients, Nuisance algae, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701), Reduction of riparian vegetation (7600), Bank destabilization (7700)	2,000	FSIO
Morphy Lake (Canadian River, 2306) E	E	HQCWF	Nutrients, pH, Dissolved oxygen, Siltation	-	-	Agriculture (1500), Silviculture (2000), Recreation (8700)	50	PS
Springer Lake (Canadian River, unclassified) M	M	MCWF, WWF	Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700), 8701, 8702, 8703)	450	FSIO
Charette Lakes (Canadian River, 2305.5) M	E	CWF, WWF	Temperature, Nutrients, Fish tissue mercury, Siltation	-	Hg (Fish)	Agriculture (1500), Recreation (8700, 8701, 8702, 8703), Unknown (9000)	410	FSIO
Maxwell Lake #12 (Canadian River, unclassified) M	E	CWF, WWF	Nutrients, Siltation	-	-	Agriculture (1500), Unknown (9000)	335	FSIO
Maxwell Lake #13 (Canadian River, unclassified) M	E	CWF, WWF	Nutrients, Siltation, Pesticides	-	-	Agriculture (1200), Unknown (9000)	326	FSIO
Maxwell Lake #14 (Canadian River, unclassified) M	E	CWF, WWF	Nutrients, Siltation	-	-	Agriculture (1200), Unknown (9000)	120	FSIO

Stubblefield Reservoir (Canadian River, unclassified) M	E	CWF, WWF	Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701)	683	FSIO
Laguna Madre (Canadian River, unclassified) M	E	CWF, WWF	Nutrients, Siltation	-	-	Agriculture (1200, 1500), Recreation (8700, 8701), Reduction of riparian vegetation (7600), Bank destabilization (7700)	390	FSIO
Conchas Reservoir (Canadian River, 2304) M	M	WWF	Nutrients, Fish tissue mercury	-	Hg (Fish)	Agriculture (1500), Recreation (8700, 8701), Unknown (9000), Reduction of riparian vegetation (7600), Bank destabilization (7700)	16,600	PS
Clayton Lake (Canadian River, unclassified) M	ME	WWF	Dissolved oxygen, Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701, 8702), Reduction of riparian vegetation (7600), Bank destabilization (7700)	176	FSIO
Ute Reservoir (Canadian River, 2302) unclassifed) M	M	WWF	Metals, Fish tissue mercury, Siltation	-	Al, Hg, (Fish)	Agriculture (1500), Recreation (8700, 8701)	8,200	PS
Lake Farmington (Beeline) (San Juan River, 2401) M	O	WWF	Fish tissue mercury	-	Hg (Fish)	Unknown (9000)	198	PS
Navajo Reservoir (San Juan River, 2406) M	OM	CWF, WWF	Metals, Fish tissue mercury	-	Hg (Fish)	Unknown (9000)	15,000	PS

[a] Trophic status based on Carlson trophic state index:
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses, con't.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Jackson Lake (San Juan River, unclassified) M	E	MCWF, WWF	Nutrients	-	-	Ariculture (1500), Recreation (8700), Hydromodification (7400), Reduction of riparian vegetation (7600), Bank destabilization (7700)	60	FSIO
Quemado Lake (Lower Colorado River, unclassified) E	E	CWF	Nutrients, Nusiance algae, Siltation, Agriculture	-	-	Natural (8600), Silviculture (2100), Recreation (8700), Agriculture (1500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	130	PS
Ramah Lake		WH, LW, IRR, MCWF, SCR	Nutrients, Nusiance algae, Siltation, Agriculture	-	-	Natural (8600), Silviculture (2100), Recreation (8700), Agriculture (1500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	130	U
McGaffey Lake (Lower Colorado River, unclassified) M	E	CWF, SC	pH, Nutrients, Nuisance algae, Siltation	-	-	Natural (8600), Recreation (8700, 8701), Road Maintenance (8300), Reduction of riparian vegetation (7600), Bank destabilization (7700)	13	NS
Snow Lake (Gila River, 2503) E	E	MQCWF, SC	Nutrients, Nuisance algae, Siltation	-	-	Natural (8600), Silviculture (2000), Agriculture (1500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	100	FSIO

Wall LakeE (Gila River, unclassified) E		HQCWF, SC	Dissolved oxygen Nutrients, Nuisance algae, Siltation	-	-	Agriculture (1500), Silviculture (2000), Natural (8600), Road Maintenance (8300), Reduction of riparian vegetation (7600), Bank destabilization (7700)	10	PS
Lake Roberts (Gila River, unclassified) E	E	CWF, SC	Dissolved oxygen, Nutrients, Siltation	-	-	Natural (8600), Agriculture (1500), Land Disposal (6500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	71	FSIO
Bear Canyon Reservoir (Southwestern Closed Basins, 2804) E	E	HQCWF	Dissolved oxygen, Nutrients, Siltation	-	-	Agriculture (1500), Reduction of riparian vegetation (7600), Bank destabilization (7700)	22	PS

[a] Trophic status based on Carlson trophic state index:
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed *Playa* Lakes either Fully Supporting w/ Impacts Observed, Partially Supporting or Not Supporting Their Designated Uses.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Chicosa Lake (Canadian River, unclassified) E	ND	WWF	pH, Dissolved oxygen, Nutrients, Siltation	-	-	Agriculture (1500), Recreation (8700, 8701, 8702) Reduction of riparian vegetation (7600), Bank destabilization (7700)	40	U
Laguna Gatuna	NA	WH, LW	High salinity, Siltation	-	-	Agriculture (1500), Resource Extraction (5500, 5900), Unknown (9000), Reduction of riparian vegetation (7600)	392	NS
Williams Sink	NA	WH, LW	High salinity	-	-	Mill Tailing (5600), Salt Storage Site (8900)	350	PS
Lane Salt Lake	NA	WH, LW	High salinity	-	-	Agriculture (1500), Resource Extraction (5501), Natural (8600)	400	NS
Middle Lake (4 lakes area)	NA	WH, LW	High salinity, Siltation	-	-	Agriculture (1500), Natural (8600), Reduction of riparian vegetation (7600)	40	FSIO
Laguna Uno	NA	WH, LW	High salinity, Siltation, Mine waste	-	-	Agriculture (1500), Mill and Mine Tailings (5600, 5700), Reduction of riparian vegetation (7600)	600	NS
Laguna Walden	NA	WH, LW	Siltation	-	-	Agriculture (1500), Natural (8600), Reduction of riparian vegetation (7600)	60	FSIO

Laguna Quatro	NA	WH, LW	High salinity, Siltation	-	-	Agriculture (1500), Resource Extraction (5500, 5900), Unknown (9000), Reduction of riparian vegetation (7600)	150	NS
Laguna Tres	NA	WH, LW	High salinity	-	-	Agriculture (1500), Resource Extraction (5200, 5500)	400	NS
Chicosa Lake	U	WH, LW	Siltation	-	-	Agriculture (1500), Reduction of riparian vegetation (7600)	40	PS
"Sacaton" (No Name) Playa	NA	WH, LW	Siltation	-	-	Agriculture (1400, 1500)	600	FSIO
N. Lordsburg Playa	NA	WH, LW	Siltation, High radium	-	-	Agriculture (1500), Natural (8600), Unknown (9000)	2,880	PS
S. Lordsburg Playa	NA	WH, LW	Siltation	-	-	Agriculture (1500), Highway Maintenance/Runoff (8300), Natural (8600)	7,040	FSIO
S. Lake Lucero	NA	WH, LW	High Salinity, Siltation	-	-	Natural (8600), Unknown (9000), Reduction of riparian vegetation (7600)	3,885	PS
N. Lake Lucero	NA	WH, LW	Siltation	-	-	Natural (8600), Unknown (9000), Reduction of riparian vegetation (7600)	3,895	PS
Lake Stinky	M	WH, LW	High pH, Siltation	-	-	Hydromodification (7400), Road/Parking Lot Runoff (8701), Natural (8600)	25	PS
Gabaldon Lake	M	WH, LW	High pH, Siltation	-	-	Silviculture (2200), Dredging (7200), Natural (8600)	5	PS

[a] Trophic status based on Carlson trophic state index.
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 16. Assessed *Playa* Lakes either Fully Supporting w/ Impacts Observed, Partially or Not Supporting Their Designated Uses, con't.

Water Body (Basin, segment) Evaluated or Monitored (E/M)	Trophic Status [a]	Uses Affected [b] (see Table 18a)	Probable Cause of Nonsupport	Toxics at Acute Levels [c]	Toxics at Chronic Levels [c]	Probable Sources of Nonsupport (See Table 18b)	Total Size Affected (Acres)	Status of Support [d]
Pine Lake	E	WH, LW	Siltation	-	-	Agriculture (1500), Natural (8600), Unknown (9000) Bank destabilization (7700)	80	FSIO
"Little El Caso" Lk (NN)	M	WH, LW	Siltation	-	-	Agriculture (1500), Natural (8600), Unknown (9000) Bank destabilization (7700)	10	FSIO
"Laguna Seco" (NN)	ME	WH, LW	Siltation	-	-	Agriculture (1400, 1500), Road Construction Maintenance (2300), Bank destabilization (7700)	20	FSIO
Laguna Americana	ME	WH, LW	Siltation	-	-	Agriculture (1500), Hydromodification (7200, 7600), Reduction of riparian vegetation (7600),	10	PS
T6NR13WS19 (NN)	ME	WH, LW	Siltation	-	-	Agriculture (1500), Reduction of riparian vegetation (7600)	4	PS
El Caso Lake (Big)	E	WH, LW	Siltation	-	-	Agriculture (1500), Natural (8600), Unknown (9000), Bank destabilization (7700)	80	FSIO
Green Acres Lake	E	WH, LW, WWF	Siltation, Nutrients, Oil and grease	-	-	Urban runoff/stormsewers (4000), Highway maintenance/ Runoff (8300), Natural (8600), Refuse Disposal/Littering (8703), Unknown (9000), Reduction of riparian vegetation (7600), Bank destabilization (7700)	10	PS

Little Tule Lake	E	WH, LW	Siltation	-	-	Agriculture (1400, 1500), Bank destabilization (7700)	8	FSIO
Tule Lake	E	WH, LW	Siltation	-	-	Agriculture (1400, 1500), Bank destabilization (7700)	50	FSIO
Dennis Chavez Lake	E	WH, LW, WWF	Siltation, Nutrients, Oil and grease	-	-	Urban runoff/storm sewers (4000), Natural (8600), Refuse desposal/littering (8703)	4	PS
Laguna del Perro	ME	WH, LW	Siltation	-	-	Agriculture (1400, 1500)	4,690	FSIO
"Mikes" Playa (NN)	ME	WH, LW	Siltation	-	-	Agriculture (1400, 1500), Bank destabilization (7700)	30	FSIO
Williams Playa	E	WH, LW	Nutrients, Nuisance algae	-	-	Urban runoff/storm sewers (4000), Domestic point source (0201), Natural (8600)	15	FSIO
Ingram Playa	E	WH, LW	Nutrients, Nuisance algae	-	-	Urban runoff/stormsewers (4000), Natural (8600)	8	FSIO
Malpais Springs	ME	WH, LW	Siltation	-	-	Agriculture (1500), Natural Natural (8600), Reduction of riparian vegetation (7600), Bank destabilization (7700)	1	FSIO
Mound Springs	ME	WH, LW	Siltation	-	-	Agriculture (1500), Natural (8600), Reduction of riparian vegetation (7600), Bank destabilization (7700)	1	FSIO

[a] Trophic status based on Carlson trophic state index:
ND = Not determined E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic O = Oligotrophic NA = Not Applicable

[b] Conclusions concerning attainment of fishery uses are largely based on water quality analysis, where available, biological data are used to verify these results.

[c] All toxins for which EPA has prepared a federal Clean Water Act § 304(a) guidance document were reviewed as required by EPA.

[d] Use support summary for assessed New Mexico Lakes:
FSIO = Fully supporting, Impacts Observed PS = Partially supporting NS = Not supporting U = Unknown/lack of current data precludes adequate evaluation

Table 17. Codes for Designated Uses and Nonpoint Sources of Pollution.

17a: Codes for Uses Not Fully Supported (In Order of Stringency):

DWS	=	Domestic Water Supply	IRR	=	Irrigation
HQCWF	=	High quality coldwater fishery	LW	=	Livestock watering
CWF	=	Coldwater fishery	WH	=	Wildlife habitat
MCWF	=	Marginal coldwater fishery	PC	=	Primary contact
WWF	=	Warmwater fishery	SC	=	Secondary contact
LWWF	=	Limited warmwater fishery	FC	=	Fish Culture

17b: Codes for Sources of Nonsupport:

0100	**Industrial point sources**
0200	**Municipal point sources**
0201	Domestic point sources
0400	**Combined sewer overflows**
	(septic tanks, etc.)
1000	**Agriculture**
1100	Nonirrigated crop production
1200	Irrigated crop production
1201	Irrigation return flows
1300	Specialty crop production (e.g. truck farming and orchards)
1400	Pastureland
1500	Rangeland
1510	Riparian grazing
1600	Feedlots - all types
1700	Aquaculture
1800	Animal holding/management areas
1900	Manure lagoons
2000	**Silviculture**
2100	Harvesting, restoration, residue management
2200	Forest management
2300	Road construction maintenance
3000	**Construction**
3100	Highway/road/bridge
3200	Land development
3201	Resort development
3300	Hydroelectric
4000	**Urban runoff/Storm sewers**
5000	**Resource Extraction**
5100	Surface mining
5200	Subsurface mining
5300	Placer mining
5400	Dredge mining
5500	Petroleum activities
5501	Pipelines
5600	Mill tailing
5700	Mine tailings
5800	Road construction/maintenance
5900	Spills
6000	**Land Disposal**
6100	Sludge
6200	Wastewater
6300	Landfills
6400	Industrial land treatment
6500	Onsite wastewater systems
6600	Hazardous waste
6700	Septage disposal
6800	UST leaks
7000	**Hydromodification**
7100	Channelization
7200	Dredging
7300	Dam construction/repair
7400	Flow regulation/modification
7500	Bridge construction
7600	Removal of riparian vegetation
7700	Streambank modification/destabilization
8000	**Other**
8010	Vector control activities
8100	Atmospheric deposition
8200	Waste storage/storage tank leaks
8300	Highway maintenance/runoff
8400	Spills
8500	In-place contaminants
8600	Natural
8700	Recreational activities
8701	Road/parking lot runoff
8702	Off-road vehicles
8703	Refuse disposal/littering
8704	Spills
8705	Ski slope runoff
8800	Upstream Impoundment
8900	Salt storage sites
9000	**Source Unknown**

Table 18a. Publicly Owned or Operated Lakes in New Mexico

Lake	County	Location Lat. or Township/Range	Long.	Acres	Elev. (ft.)	Trophic Status[a]	Drainage Basin Area (km^2)	Volume ($10^6 m^3$)	Mean Depth (m)
Abiquiu Reservoir[c]	Rio Arriba	361552	1062752	3,795	6,212	OM	5,562	194.7	12.7
Alice Lake	Colfax	365719	1042308	4	7,110	-	-	-	-
Alto Lake[c]	Lincoln	332345	1054025	20	7,265	E	31.62	0.235	3.21
Aspen Lake	Rio Arriba	T27NR5ES36		2	9,550	-	-	-	-
Avalon Reservoir[c]	Eddy	233000	1041500	930	3,160	E	29,080	4.9	2.0
Bear Canyon Reservoir[c]	Grant	325305	1075935	22	6,200	E	60.38	0.387	4.2
Bear Canyon Reservoir	Otero	325033	1053400	2	7,275	-	-	-	-
Bear Lake[b]	Taos	363202	1052519	10	11,606	-	-	-	-
Bear Lake 2[b]	Taos	364720	1052607	3	11,480	-	-	-	-
Beaver Lake	Rio Arriba	365810	1064314	3	9,150	-	-	-	-
Bernardin Lake[b]	Taos	361631	1052522	2	9,700	-	-	-	-

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic
[b] High mountain lakes (over 11,000 ft.)
[c] Lakes 20 acres or larger in size.
[d] EV = Ephemeral/Variable.
[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat.	Long. or Township/Range	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
Bill Evans Lake[c]	Grant	325200	1083353	62	4,800	ME	0.93	1.2	4.8
Bitter Lakes[c]	Chaves	National Wildlife Refuge		100	3,491	-	-	-	-
Bitter Lake (a)	Chaves	332827	1042448	-	-	-	-	-	-
Bitter Lake (b)	Chaves	332745	1042406	-	-	-	-	-	-
Bitter Lake (c)	Chaves	332718	1042352	-	-	-	-	-	-
Bitter Lake (d)	Chaves	332633	1042403	-	-	-	-	-	-
Bitter Lake (e)	Chaves	332554	1042428	-	-	-	-	-	-
Bitter Lake (f)	Chaves	332520	1042452	-	-	-	-	-	-
Bitter Lake (g)	Chaves	332521	1042446	-	-	-	-	-	-
Blue Hole	Guadalupe	345625	1044022	<0.2	-	-	-	-	-
Blue Lake	Rio Arriba	363323	1061928	2	9,900	-	-	-	-
Bluewater Reservoir[c]	Cibola/McKinley	351742	1080659	2,350	7,375	ME	520.6	47.5	6.7
Bonito Lake[c]	Lincoln	332725	1054359	45	7,377	E	87.0	1.87	6.0
Bosque Redondo Lake	De Baca	8 Mi SE of Ft. Sumner		15	3,965	-	-	-	-
Bottomless Lakes[c]	Chaves	~ State Park, Roswell		60	3,458	-	-	-	-

Cottonwood Lake	Chaves	332021	1041959	-	-	-	-	-	-
Mirror Lake	Chaves	332014	1041955	-	-	-	-	-	-
Inkwell Lake	Chaves	332008	1041954	-	-	-	-	-	-
Figure Eight Lake	Chaves	332003	1041954	-	-	-	-	-	-
Pasture Lake	Chaves	331953	1041943	-	-	-	-	-	-
Lea Lake	Chaves	331909	1041948	-	-	-	-	-	-
Brantley Reservoir[c]	Eddy	323729	1042002	2,000	3,267	ME	28,405	429.9	5.06
Bull Creek Lake[b]	Taos	364643	1052915	2	11,460	-	-	-	-
Burn Lake	Doña Ana	321740	1064749	7	3,890	-	-	-	-
Burns Lake	Rio Arriba	363502	1062123	2.5	9,900	-	-	-	-
Butler Street Reservoir	San Juan	364507	1081154	3	5,470	-	-	-	-
Caballo Reservoir[c]	Sierra	325755	1071746	11,000	4,204	E	79,574	428.0	7.0
Cabresto Lake	Taos	364454	1052949	15	9,340	M	-	-	-
Canjilon Lakes	Rio Arriba	Carson National Forest		25	10,000	-	-	-	-
Canjilon Lake (a)	Rio Arriba	363345	1061944	(8)	10,100	M	-	-	-

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic
[b] High mountain lakes (over 11,000 ft.)
[c] Lakes 20 acres or larger in size.
[d] EV = Ephemeral/Variable.
[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat. or Township/Range	Long.	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
Canjilon Lake (b)	Rio Arriba	363339	1061937	-	-	-	-	-	-
Canjilon Lake (c)	Rio Arriba	363323	1061945	-	-	-	-	-	-
Canjilon Lake (d)	Rio Arriba	363322	1061951	-	-	-	-	-	-
Canjilon Lake (e)	Rio Arriba	363300	1062028	-	-	-	-	-	-
Canjilon Lake (f)	Rio Arriba	363255	1062027	(5)	9,780	E	-	-	-
Carlsbad Municipal Lakes (2)	Eddy								
Bataan Lake[c]	Eddy	322538	1041310	42	3,108	_	_	_	_
Tansill Lake[c]	Eddy	322601	1041312	94	3,110	_	_	_	_
Carrizozo Lake	Lincoln	333823	1055131	2	5,500	_	_	_	_
Chaparral Lake	Lea	State Highway 18 between Lovington and Hobbs		10	3,877	_	_	_	_
Charette Lake (Upper)[c]	Mora	361030	1044858	110	6,685	E	_	_	_
Charette Lake (Lower)[c]	Mora	361106	1044811	300	6,500	-	_	_	_
Clayton Lake[c]	Union	363449	1031828	176	5,193	ME	_	_	_
Cochiti Reservoir[c]	Sandoval	353732	1061854	1,240	5,323	E	31,096	61.13	12.2

Cold Lake	Rio Arriba	363344	1061917	1.5	10,000	_	_	_	_
Conchas Reservoir[c]	San Miguel	352537	1041155	16,600	4,215	M	19,189	456.64	11.9
Conservancy Park Lake	Bernalillo	350516	1064033	15	4,945	_	_	_	_
Cow Lake[b]	Taos	363655	1053220	2	11,290	_	_	_	_
Deep Lake	Rio Arriba	362720	1062045	4	9,000	_	_	_	_
Dennis Chavez Park Lake	Eddy	342432	1031311	_	_	_	_	_	_
Eagle Nest Lake[c]	Colfax	363214	1051450	2,000	8,200	E	432.5	97.95	9.9
Eagle Rock Lake	Taos	364212	1053425	3	7,435	OM	_	_	-
Elephant Butte Reservoir[c]	Sierra/Socorro	33252	1070927	40,000	4,347	E	76,257	2,603.0	18.3
Elk Lake[b]	Taos	3633118	1052403	2	11,835	-	-	-	-
El Vado Reservoir[c]	Rio Arriba	363647	1064460	3,500	6,912	ME	2,263	229.73	18.3
Encantada (Enchanted) Lake[c]	Mora	325701	1052853	31	10,750	-	-	-	-
Escondida Lake	Socorro	340721	1066324	4	-	-	-	-	-
Ensenada Lake	Rio Arriba	363715	1061143	0.5	8,598	-	-	-	-
Estancia Park Lake	Torrance	344524	1060337	1	6,115	-	-	-	-

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat. or Township/Range	Long.	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
Eunice Lake	Lea	322754	1031336	4	3,525	-	-	-	-
Fawn Lake	Taos	Carson National Forest		2	8,430	-	-	-	-
Fawn Lake (West)	Taos	364220	1052703	-	-	-	-	-	-
Fawn Lake (East)	Taos	364221	1052700	-	-	E	-	-	-
Fenton Lake[c]	Sandoval	355259	1064333	27	7,500	E	123.8	0.326	3.4
Glenwood Pond	Catron	331907	1085255	2	4,710	-	-	-	-
Goose Lake[b]	Taos	363808	1052657	5	11,640	E	-	-	-
Green Meadows Lake	Lea	324457	1030957	14	3,645	-	-	-	-
Harroun Dam (Ten Mile) Lake[c]	Eddy	321906	1040327	20	2,973	-	-	-	-
Harroun Lake[c]	Eddy	321405	1040135	140	-	-	-	-	-
Heart Lake[b]	Taos	364722	1052724	3	11,490	-	-	-	-
Heron Reservoir[c]	Rio Arriba	364109	1064207	5,906	7,186	0	-	-	-
Hidden Lake (Lake Hazel)[b]	Rio Arriba	360018	1053813	2	11,280	-	-	-	-
Hopewell Lake	Rio Arriba	364222	1061404	14	9,765	E	14.2	0.0987	1.74

Horseshoe Lake[b] Wheeler Peak Wilderness	Taos	363352	1052420	5	11,920	0	0.752	0.0436	1.61
Horseshoe Lake[b] Alamitos	Taos	360108	1053200	8	11,760	-	-	-	-
Indian Lake	Taos	360715	1053110	3	9,500	-	-	-	-
Jackson Lake[c]	San Juan	364834	1081333	60	5,488	E	-	-	-
Jal Lake	Lea	320604	1031115	10	-	-	-	-	-
Jose Vigil Lake[b]	Mora	355722	1053857	1	11,720	-	-	-	-
Johnson Lake[b]	Santa Fe	355106	1054409	6	11,090	M	0.746	0.0166	1.85
La Cueva Lake	Taos	360906	1052954	2	10,140	-	-	-	-
Laguna Larga	Rio Arriba	365306	1060619	10	9,008	-	-	-	-
Laguna Hondo	Rio Arriba	363215	1062116	4.5	8,700	-	-	-	-
Lagunitas Lakes	Rio Arriba	Carson National Forest		10	10,000	-	-	-	-
Lagunitas Lake #1	Rio Arriba	365309	1061918	-	-	-	-	-	-
Lagunitas Lake #2	Rio Arriba	365301	1061913	-	-	-	-	-	-
Lagunitas Lake #3	Rio Arriba	365249	1061953	-	-	E	0.248	0.00373	0.93

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat. or Township/Range	Long.	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
La Joya Lakes[c]	Soccoro	342422	1065008	480	4,699	-	-	-	-
Lake Farmington[c] (Beeline)	San Juan	364759	1080613	198	5,636	O	-	-	-
Lake Katherine[b]	Santa Fe	355002	1054506	12	11,742	M	0.406	0.6304	13.1
Lake Maloya[c]	Colfax	365921	1042214	150	7,511	E	-	-	-
Lake Roberts[c]	Grant	330147	10809034	71	6,035	E	226	1.12	4.3
Lake Van	Chaves	331137	1042124	12	3,429	-	-	-	-
Lea County Lake	Lea	321109	1034655	2	-	-	-	-	-
Los Alamos Reservoir	Los Alamos	355301	1062114	2	-	-	-	-	-
Lost Bear Lake[b]	Mora	355703	1053201	2	11,220	-	-	-	-
Lost Lake[b]	Taos	363440	1052413	6	11,495	OM	o.699	0.15115	4.45
Maddox Lake[c]	Lea	E1/2 SW1/4 of S25 T18SR36E		20	-	-	-	-	-
Maestas (Lost) Lake	San Miguel	355110	1053052	3	9,951	OM	0.344	-	-
Maxwell Lakes[c] (5)	Colfax	Canadian and Vermejo		1,854	-	E	-	-	-
Stubblefield[c]	Colfax	363437	1043939	(683)	-	E	-	-	-

Laguna Madre[c]	Colfax	363612	1043820	(390)	-	E	-	8.42	-
Maxwell #12[c]	Colfax	363348	1043538	(335)	-	E	-	1.12	-
Maxwell #13[c]	Colfax	363456	1043452	(326)	-	E	-	5.5382	-
Maxwell #14[c]	Colfax	363455	1043356	(120)	-	E	-	0.4182	-
McAllister Lake[c]	San Miguel	353119	1051033	100	6,433	E	-	-	1.75
McGaffey Lake	McKinley	352240	1083045	14	7,821	E	10.9	0.1345	-
Middle Fork Lake[b]	Taos	363545	1052501	6	10,845	M	0.597	0.0578	1.75
Middle Fork Lake of Rio de la Casa[b]	Mora	355929	1053143	1.5	11,705	-	-	-	-
Monastery Lake	San Miguel	353542	1054054	6	7,040	-	-	-	-
Morphy (Murphy) Lake[c]	Mora	355629	1052351	50	7,840	E	0.58	0.503	3.9
Nabor Lake	Rio Arriba	365844	1063734	4	-	-	-	-	-
Nambe Lake[b]	Santa Fe	354801	1054634	3	11,380	E	0.433	0.0039	0.43
Nat Lake II[b]	Taos	360259	1053211	2	11,500	-	-	-	-
Nat Lake IV[b]	Taos	360138	10553153	1.5	11,700	-	-	-	-
Navajo Reservoir[c]	Rio Arriba	364824	1073647	15,000	5,900	ME	8,380	2,108	33.3

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat.	Long. or Township/Range	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
Ned Houk Lakes (2)[c]	Curry	T4NR36E NE Cor of Sect. 32, T4NR36E NE or of Sect. 34		4	-	-	-	-	-
No Fish Lake[b]	Rio Arriba	T20NR13E56		1	11,420	-	-	-	-
Nogal Lake[c]	Lincoln	333204	1054110	40	7,135	-	-	-	-
North Fork Lake[b]	Mora	360040	1053132	2	11,810	-	-	-	-
Nutrias (Trout) Lakes	Rio Arriba	Carson National Forest		20	9,400	-	-	-	-
Nutrias Lake A	Rio Arriba	363629	1062252	-	-	-	-	-	-
Nutrias Lake B	Rio Arriba	363626	1062252	-	-	-	-	-	-
Nutrias Lake C	Rio Arriba	363622	1062245	-	-	-	-	-	-
Nutrias Lake D	Rio Arriba	363622	1062236	-	-	-	-	-	-
Nutrias Lake E	Rio Arriba	373620	1062236	-	-	-	-	-	-
Oasis Park Lake	Roosevelt	341525	1032101	2	-	-	-	-	-
Pacheco Lake	Mora	325741	1052854	5	10,865	-	-	-	-
Park Lake	Guadalupe	345625	1044042	2	4,585	-	-	-	-
Pecos Baldy Lake[b]	Mora	355445	1053850	8	11,480	M	0.641	0.04704	1.62

Perch Lake	Guadalupe	345533	1043948	2	4,595	-	-	-	-
Pioneer Lake[b]	Taos	363945	1052718	2	11,260	-	-	-	-
Power Dam Lake	Guadalupe	345540	1044041	15	4,544	-	-	-	-
Quemado Lake[c]	Catron	340803	1082927	130	7,630	E	206	2.526	4.6
Rancho Grande Ponds (4)	Catron	334103	1085121	2	6,315	-	-	-	-
Romero Lake	Taos	360757	1052527	2	9,700	-	-	-	-
San Gregorio Lake[c]	Sandoval	360223	1065052	32	9,410	-	-	-	-
San Leonardo Lake[b]	Rio Arriba	360001	1053858	5	11,340	D	-	-	-
Santa Cruz Reservoir[c]	Santa Fe	355830	1055500	90	6,285	OM	-	-	-
Santa Fe Lake[b]	Santa Fe	354720	1054638	6	11,620	M	0.159	0.0583	3.0
Santa Rosa Lake[c]	Guadalupe	350147	1044130	1,500	-	ME	3,910	246.7	-
Serpent Lake[b]	Taos	360247	1053230	3	11,740	-	-	-	-
Shuree Ponds	Colfax			8	8,430	-	-	-	-
North	Colfax	364629	1051136						
South	Colfax	364621	1051134						

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18a. Publicly Owned or Operated Lakes in New Mexico, continued.

Lake	County	Location Acres Lat. or Township/Range	Long.	Elev.	Trophic (ft.)	Drainage Status[a]	Volume Basin Area (km^2)	($10^6 m^3$)	Mean Depth (m)
Six Mile Dam Lake[c]	Eddy	322111	1040933	125	2,930	-	-	-	-
Snow Lake[c]	Grant	332519	1082953	100	7,425	E	235.4	1.973	4.0
South Fork Lake[b]	Taos	362233	1052618	2	11,115	-	-	-	-
Spirit Lake	Santa Fe	354900	1054406	7	10,809	M	0.178	0.02496	2.1
Springer Lake[c]	Colfax	362506	1043916	450	5,933	M	-	-	-
Stewart Lake	Santa Fe	354944	1054329	5	10,232	OM	1.7	0.07819	6.0
Storrie Reservoir[c]	San Miguel	354005	1051421	1,200	6,599	M	-	16.4	11.0
Sumner (Alamogordo) Reservoir[c]	De Baca	343747	1042331	4,650	4,275	E	11,370	125.32	8.1
Tonita Lake	Rio Arriba	363510	1062528	1	8,400	-	-	-	-
Trampas Lakes[b]	Rio Arriba			10	11,420	-	-	-	-
West	Rio Arriba	355935	1053813	-	-	-	-	-	-
East	Rio Arriba	355933	1053805	-	-	-	-	-	-
Tres Lagunas[c]	Guadalupe	Santa Rosa		63	-	-	-	-	-
Tres Lagunas NE	Guadalupe	345721	1043837	-	-	-	-	-	-

Tres Lagunas SE	Guadalupe	345712	1043840	-	-	-	-	-	-
Tres Lagunas West	Guadalupe	345727	1043917	-	-	-	-	-	-
Truchas Lake (South)	Mora	355813	1053805	2	-	0	0.325	0.01565	1.56
Truchas Lake (North)[b]	Mora	355818	1053806	4	11,480	0	-	-	-
Tucumcari Lake[c]	Quay	351051	1034145	430	4,008	E	64.8	-	1.0
Ute Reservoir[c]	Quay	352106	1033103	8,202	3,760	M	28,853	133.451	8.0
Wall Lake	Grant	332057	1080442	10	6,393	E	258.4	0.232	2.9
Williams Lake[b]	Taos	363322	1052543	10	11,220	0	4.6	0.0319	1.

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18b. Publicly Owned or Operated *Playa* Lakes in New Mexico.

Lake	County	Location Lat. or Township/Range	Long.	Acres	Elev. (ft.)	Trophic Status[a]	Drainage Basin Area (km^2)	Volume ($10^6 m^3$)	Mean Depth (m)
Laguna Gatuna[c]	Lea	323451	1034200	3,922	3,495	NA	ND	EV[d]	EV[d]
Lane Salt Lake[c]	Lea	332728	10333648	400	4,153	NA	ND	EV[d]	EV[d]
Middle Lake[c]	Lea	332227	1032959	40	4,120	NA	ND	EV[d]	EV[d]
Laguno Uno[c]	Eddy	322221	1035605	600	2,998	NA	ND	EV[d]	EV[d]
Laguna Walden[c]	Eddy	321934	1035812	50	2,966	NA	ND	EV[d]	E[d]
Laguna Quatro[c]	Eddy	322001	1035510	150	2,980	NA	ND	EV[d]	EV[d]
Laguna Tres[c]	Eddy	321934	1035633	430	2,972	NA	ND	EV[d]	EV[d]
Williams Sink[c]	Eddy	323416	1034911	350	3,428	NA	ND	EV[d]	EV[d]
Wagon Mound Salt Lake[c]	Mora	360204	1044226	240	6,152	E	ND	EV[d]	EV[d]
Chicosa Lake[c]	Harding	360213	1040931	40	5,837	U	ND	EV[d]	EV[d]
"Sacaton" (No Name) Playa[c]	Hidalgo	322312	1085500	600	4,155	M	ND	EV[d]	EV[d]
N. Lordsburg Playa[c]	Hidalgo	322251	1085425	2,880	4,152	NA	ND	EV[d]	EV[d]
S. Lordsburg Playa[c]	Hidalgo	321729	108514	7040	4,144	NA	ND	EV[d]	EV[d]
S. Lake Lucero[c]	Doña Ana	324133	1062318	est. 2240	3,885	NA	ND	EV[d]	EV[d]

N. Lake Lucero[c]	Doña Ana	324738	1062527	est. 3500	3,895	NA	ND	EV[d]	EV[d]
Davies Tank	Doña Ana	322058	1062348	1	4,015	E	-	-	-
Lake Stinky[c]	Otero	334816	1060728	25	4,000	M	ND	EV[d]	EV[d]
Malpais Springs	Otero	331751	1061832	1	4,160	ME	-	-	-
El Caso Lake[c]	Catron	340607	10893019	80	8,520	E	ND	EV[d]	EV[d]
Crater Lake	Catron	3440041	1083058	5	8,660	E	ND	EV[d]	EV[d]
Gabaldon Lake	Catron	340804	1082348	5	8,415	M	ND	EV[d]	EV[d]
Pine Lake[c]	Catron	340751	1082428	80	3,415	E	ND	EV[d]	EV[d]
"Little El Caso" Lake (NN)	Catron	340629	1083003	10	8,625	M	ND	EV[d]	EV[d]
"Leyba" Lake (NN)	Catron	340526	1082609	7	8,520	E	ND	EV[d]	EV[d]
Green Acres Lake	Curry	342505	1031223	8	4,265	E	-	-	-
Little Tule Lake	Curry	342103	1034157	8	4,150	E	-	-	-
Tule Lake[c]	Curry	342054	1033954	50	4,139	E	-	-	-
Dennis Chavez Lake	Curry	342445	1031309	4	4,265	E	-	-	-

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic
[b] High mountain lakes (over 11,000 ft.)
[c] Lakes 20 acres or larger in size.
[d] EV = Ephemeral/Variable.
[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Table 18b. Publicly Owned or Operated *Playa* Lakes in New Mexico, continued.

Lake	County	Location Lat. or Township/Range	Long.	Acres	Elev. (ft.)	Trophic Status[a]	Drainage Basin Area (km^2)	Volume ($10^6 m^3$)	Mean Depth (m)
Ingram Lake	Curry	342252	1031024	8	4,195	E	-	-	-
Williams Playa	Curry	342131	1030710	15	4,138	E	-	-	-
"Laguna Seco" (NN)[c]	Cibola	344331	1081210	20	7,350	ME	ND	EV[d]	EV[d]
Laguna Americana	Cibola	355628	1081013	10	7,585	ME	ND	EV[d]	EV[d]
T6NR13WS19 (NN)	Cibola	344339	1081437	4	7,400	ME	ND	EV[d]	EV[d]
Laguna del Pero	Torrance	343557	1065747		6,045	ME	-	-	-
"Mike's" Playa (NN)[c]	Torrance	343704	1065403	30	6,065	ME	-	-	-
Stinking Lake[ce]	Rio Arriba	363729	1065304	1,018	7,102	E	-	-	-
Mound Springs	Lincoln	332532	1061703	1	4,340	ME	-	-	-
Brown's Marsh	San Miguel	353223	1051112	5	6,460	E	-	-	-
Lake Bentley[c]	San Miguel	353329	1051010	49	6,542	ME	-	-	-
Wallace Lake[c]	San Miguel	353231	1050951	142	6,495	E	-	-	-

[a] Symbols used to indicate trophic status are as follows:
E = Eutrophic ME = Mesoeutrophic M = Mesotrophic OM = Oligomesotrophic OL = Oligotrophic D = Dystrophic

[b] High mountain lakes (over 11,000 ft.)

[c] Lakes 20 acres or larger in size.

[d] EV = Ephemeral/Variable.

[e] This reach includes areas largely on Tribal Lands which are removed and separate from State of New Mexico jurisdictional authority.

Appendix C

Table 19: Fish Consumption Guidelines Due To Mercury Contamination, pages C5 through C8.

FISH CONSUMPTION GUIDELINES DUE TO MERCURY CONTAMINATION

NEW MEXICO DEPARTMENT OF HEALTH
NEW MEXICO ENVIRONMENT DEPARTMENT
NEW MEXICO DEPARTMENT OF GAME AND FISH

Because mercury has been found in some fish at concentrations which could lead to significant adverse human health effects, the following guidelines have been prepared. These guidelines allow those who fish and their families to make an informed decision as to what fish they can safely eat. While the occasional consumer of fish from these waters is at little risk if they are otherwise in good health, ingestion of mercury at levels found in some of these fish over a long period of time could result in health problems such as kidney disease and/or eye, respiratory tract, nervous system or brain damage.

These are only guidelines, there are currently no legal restrictions due to mercury on catching or eating fish from the State's lakes or streams. There is no health risk related to mercury from activities such as camping, swimming or boating in these waters. Handling caught fish will not expose the fisherman to elevated levels of this contaminant. The State continues to recommend fishing and camping at these waters as enjoyable forms of recreation. In addition, the State continues to encourage including non-contaminated fish as an important part of a healthy diet.

Table 20 below shows those fish species which have been tested and groups them into one of four classes based on size. After catching a fish, measure it from the tip of its nose to the end of the tail. Then compare its length with the chart below to determine if it is safe for you or your family to eat. Fish which are at the dividing line between groups should be considered to be in the higher (more restrictive) group. In Table 20, "L.T." means "less than" while "G.T." means "greater than."

Group 1 Fish: Pregnant women should eat no more than one meal a month of fish of this size. No other restrictions apply.

Group 2 Fish: Fish of this size should not be eaten by pregnant or breast-feeding women, women who plan to have children, or anyone under eighteen years of age. Everyone else should eat no more than twenty-six meals of these fish in a year and no more than thirteen of the twenty-six meals should be consumed in one month. The remaining meals should be evenly spaced over the remainder of the year.

Group 3 Fish: Fish of this size should not be eaten by pregnant or breast-feeding women, women who plan to have children, or anyone under eighteen years of age. Everyone else should eat no more than thirteen meals of these fish per year with no more than seven of the thirteen meals in any single month. The remaining meals should be evenly spaced over the remainder of the year.

Group 4 Fish: Fish of this size should not be eaten by anyone.

Waters which are not listed have not yet been tested. Fish species which are not listed have not been tested. These guidelines are for mercury contamination only. In the absence of specific information, use guidelines from the nearest lake. If the fish you catch is not listed herein use the guidelines for the most similar fish species.

If there are any questions on these guidelines please call the Surface Water Quality Bureau of the New Mexico Environment Department at 827-0187. If you have questions on medical concerns related to mercury ingestion please the Office of Epidemiology of the New Mexico Health Department at 827-0006. Questions on fishing opportunities or regulations should be addressed to the New Mexico Department of Game and Fish at 827-7905.

Table 19: Fish Consumption Guidelines Due to Mercury Contamination.

Amended Guidelines for Abiquiu Reservoir
Amended March 1993, First Issued December 1991

Species	Group 1	Group 2	Group 3	Group 4
Kokanee Salmon	L.T.[a] 18 in.	Unknown	Unknown	Unknown
River Carpsucker	L.T.[a] 19 in.	Unknown	Unknown	Unknown
Brown Trout	L.T.[a] 14 in.	Unknown	Unknown	Unknown
White Crappie		L.T.[a] 8 in.	Unknown	Unknown
Channel Catfish		L.T.[a] 12 in.	12 - 16 in.	G.T.[b] 16 in.
Carp	L.T.[a] 17 in.	17 - 23 in.	23 - 29 in.	G.T.[b] 29 in.

Guidelines for Avalon Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Channel Catfish	L.T.[a] 19 in.	Unknown	Unknown	Unknown

Guidelines for Bear Canyon Reservoir
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Channel Catfish	L.T.[a] 14 in.	Unknown	Unknown	Unknown
Largemouth Bass	L.T.[a] 14 in.	14 - 16.5 in.	16.5-18.5 in.	G.T.[b] 18.5 in.
White Crappie and Bluegill	L.T.[a] 7 in.	7 - 8 in.	8 - 9 in.	G.T.[b] 9 in.

Guidelines for Carlsbad Municipal Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Largemouth Bass	L.T.[a] 17 in.	17 - 20.5 in.	20.5 - 24 in.	G.T.[b] 24 in.

Amended Guidelines for Charette Lakes
Amended March 1993, First Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Yellow Perch		L.T.[a] 10 in.	10 - 13 in.	G.T. 13 in.
Black Bullhead		L.T.[a] 10 in.	G.T.[b] 10 in.	Unknown
White Sucker	L.T.[a] 21 in.			
Rainbow Trout	~ NO RESTRICTIONS ~			

Guidelines for Eagle Nest Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Cuthroat Trout	~ NO RESTRICTIONS ~			
Kokanee Salmon	~ NO RESTRICTIONS ~			
Rainbow Trout	L.T.[a] 22 in.	Unknown		
White Sucker	L.T.[a] 14 in.	Unknown		
Longnose Dace	L.T.[a] 8.5 in.	8.5 - 9.5 in.	Unknown	

[a] L.T. = Less Than

[b] G.T. = Greater Than

Table 19: Fish Consumption Guidelines Due to Mercury Contamination, continued.

Amended Guidelines for El Vado Reservoir
Amended March 1993, First Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Rainbow Trout	~ NO RESTRICTIONS ~			
Brown Trout	L.T.[a] 18 in.	Unknown	Unknown	Unknown
Kokanee Salmon	L.T.[a] 15 in.	Unknown	Unknown	Unknown
White Sucker	L.T.[a] 15 in.	15 - 17.5 in.	17.5 - 20 in.	G.T.[b] 20 in.

Amended Guidelines for Heron Reservoir
Amended March 1993, First Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Kokanee Salmon	L.T.[a] 16 in.	Unknown		
Lake Trout	L.T.[a] 28 in.	Unknown	Unknown	Unknown
White Sucker	L.T.[a] 14.5 in.	14.5 - 16 in.	16 - 17.5 in.	G.T.[b] 17.5 in.

Guidelines for Lake Maloya
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Rainbow Trout	~ NO RESTRICTIONS ~			
White Sucker	L.T.[a] 17 in.	Unknown		

Guidelines for McAllister Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Rainbow Trout	~ NO RESTRICTIONS ~			
White Sucker	~ NO RESTRICTIONS ~			

Guidelines for Springer Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Carp	~ NO RESTRICTIONS ~			
Northern Pike	L.T.[a] 41 in.			
Largemouth Bass	L.T.[a] 9 in.	Unknown		
Black Bullhead	L.T.[a] 9 in.	Unknown		
Yellow Perch	L.T.[a] 12 in.	Unknown		
Channel Catfish	L.T.[a] 20 in.	20-25.5 in.	25.5-29.5 in.	G.T.[b] 29.5 in.

Guidelines for Storrie Lake
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
White Sucker	L.T.[a] 28.5 in.			
Rainbow Trout	L.T.[a] 24 in.			
White Crappie	L.T.[a] 11.5 in.	Unknown		
Channel Catfish	L.T.[a] 26 in.	G.T. 26 in.		

[a] L.T. = Less Than

[b] G.T. = Greater Than

Table 19: Fish Consumption Guidelines Due to Mercury Contamination, continued.

Guidelines for Stubblefield Reservoir
Issued March 1993

Species	Group 1	Group 2	Group 3	Group 4
Walleye		L.T.[a] 22 in.	22-25.5 in.	G.T.[b] 25.5 in.
Black Bullhead		L.T.[a] 19 in.	19 - 24.5 in.	
White Sucker	L.T.[a] 18 in.	Unknown		
Channel Catfish	L.T.[a] 24 in.	Unknown		

Preliminary Guidelines for Clayton Lake
Issued March 1992

Species	Group 1	Group 2	Group 3	Group 4
Walleye		L.T.[a] 24 in.	24 - 28 in.	G.T.[b] 28 in.
Channel Catfish	L.T.[a] 27 in.	27 - 30 in.	G.T.[b] 30 in.	Unknown
Bluegill		G.T.[b] 8 in.	Unknown	Unknown

Guidelines for "Quality Waters" of the San Juan River
Issued March 1992

Species	Group 1	Group 2	Group 3	Group 4
Rainbow Trout		~ NO RESTRICTIONS ~		

Guidelines for Pecos River above Pecos
Issued March 1992

Species	Group 1	Group 2	Group 3	Group 4
Brown Trout		~ NO RESTRICTIONS ~		

Guidelines for Caballo Reservoir
Issued December 1991

Species	Group 1	Group 2	Group 3	Group 4
White Bass	L.T.[a] 13 in.	13 - 15 in.	15 - 17 in.	G.T.[b] 17 in.
Walleye	L.T.[a] 17 in.	17 - 23 in.	23 - 28 in.	G.T.[b] 28 in.
Channel Catfish	L.T.[a] 28 in.	28 - 35 in.	G.T.[b] 35 in.	Unknown
Largemouth Bass	L.T.[a] 12 in.	Unknown	Unknown	Unknown
White Crappie	L.T.[a] 12 in.	Unknown	Unknown	Unknown

Preliminary Guidelines for Cochiti Reservoir
Issued December 1991

Species	Group 1	Group 2	Group 3	Group 4
Channel Catfish	L.T.[a] 13 in.	13 - 19 in.	19 - 26 in.	G.T.[b] 26 in.
Black Crappie	L.T.[a] 8 in.	Unknown	Unknown	Unknown
Walleye				All sizes

Guidelines for the San Juan River
Hammond Diversion to the Hogback
Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Carp	L.T.[a] 24 in.	Unknown	Unknown	Unknown
Channel Catfish	L.T.[a] 31 in.	31 - 41 in.	Unknown	Unknown

[a] L.T. = Less Than

[b] G.T. = Greater Than

Table 19: Fish Consumption Guidelines Due to Mercury Contamination, continued:

Guidelines for the San Juan River
The Hogback to Cudei
Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Carp	L.T.[a] 24 in.	Unknown	Unknown	Unknown
Channel Catfish	L.T.[a] 22 in.	Unknown	Unknown	Unknown

Guidelines for the San Juan River
Cudei to the mouth of the Mancos River
Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Carp	L.T.[a] 24 in.	Unknown	Unknown	Unknown
Channel Catfish	L.T.[a] 29 in.	29 - 37 in.	Unknown	Unknown

Guidelines for Fawn Lakes
Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Trout		~ NO RESTRICTIONS ~		
Suckers		~ NO RESTRICTIONS ~		

Updated Guidelines for Navajo Reservoir
Issued October 1991

Species	Group 1	Group 2	Group 3	Group 4
Bass	L.T.[a] 13 in.	13 - 16 in.	16 - 17 in.	G.T.[b] 17 in.
Channel Catfish	L.T.[a] 24 in.	24 - 38 in.	G.T.[b] 38 in.	Unknown
Northern Pike	L.T.[a] 31 in.	31 - 41 in.	G.T.[b] 41 in.	Unknown
Crappie	L.T.[a] 11 in.	G.T.[b] 11 in.	Unknown	Unknown
Bluegill	L.T.[a] 11 in.	G.T.[b] 11 in.	Unknown	Unkno
Trout	L.T.[a] 20 in.	Unknown	Unknown	Unknown
Carp	L.T.[a] 26 in.	Unknown	Unknown	Unknown

Guidelines for Sumner Reservoir
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Walleye		L.T.[a] 7 in.	7 - 13 in.	G.T.[b] 13 in.
Bass	L.T.[a] 10 in.	10 - 11 in.	11 - 13 in.	G.T.[b] 13 in.
Channel Catfish	L.T.[a] 14 in.	14 - 19 in.	19 - 23 in.	G.T.[b] 23 in.

Guidelines for Brantley Reservoir
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
White Bass	L.T.[a] 12 in.	12 - 13 in.	13 - 14 in.	G.T.[b] 14 in.
Largemouth Bass	L.T.[a] 15 in.	15 - 18 in.	18 - 21 in.	G.T.[b] 21 in.
Channel Catfish	L.T.[a] 20 in.	20 - 24 in.	Unknown	Unknown
Bluegill	L.T.[a] 10 in.	Unknown	Unknown	Unknown
Walleye	L.T.[a] 15 in.	Unknown	Unknown	Unknown

[a] L.T. = Less Than

[b] G.T. = Greater Than

Table 19: Fish Consumption Guidelines Due to Mercury Contamination, continued.

Guidelines for Conchas Reservoir
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Walleye	L.T.[a] 16 in.	16 - 18 in.	18 - 21 in.	G.T.[b] 21 in.
Bass	L.T.[a] 14 in.	14 - 16 in.	16 - 18 in.	G.T.[b] 18 in.
Channel Catfish	L.T.[a] 20 in.	Unknown	Unknown	Unknown
Crappie	L.T.[a] 12 in.	Unknown	Unknown	Unknown

Preliminary Guidelines for Lake Farmington (Beeline Lake)
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Largemouth Bass	L.T.[a] 12 in.	Unknown	Unknown	Unknown
Channel Catfish	L.T.[a] 13 in.	Unknown	Unknown	Unknown

Guidelines for McGaffey Lake
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Green Sunfish	~ NO RESTRICTIONS ~			
Rainbow Trout	~ NO RESTRICTIONS ~			

Preliminary Guidelines for Elephant Butte Reservoir
Issued September 1991

Species	Group 1	Group 2	Group 3	Group 4
Bass	L.T.[a] 9 in.	9 - 17 in.	17 - 23 in.	G.T.[b] 23 in.

Guidelines for Ute Reservoir
Issued April 1991

Species	Group 1	Group 2	Group 3	Group 4
Walleye	L.T.[a] 9 in.	9 - 12 in.	12 - 14 in.	G.T.[b] 14 in.
Channel Catfish	L.T.[a] 18 in.	18 - 19 in.	19 - 21 in.	G.T.[b] 21 in.
White Bass	L.T.[a] 10 in.	10 - 12 in.	12 - 13 in.	G.T.[b] 13 in.
Black Bass	L.T.[a] 7 in.	7 - 13 in.	13 - 16 in.	G.T.[b] 16 in.
Bluegill/Crappie	L.T.[a] 8 in.	8 - 11 in.	11 - 13 in.	G.T.[b] 13 in.

Guidelines for Santa Rosa Reservoir
Issued March 1991

Species	Group 1	Group 2	Group 3	Group 4
Walleye	L.T.[a] 8 in.	8 - 13 in.	13 - 16 in.	G.T.[b] 16 in.
Bass	L.T.[a] 8 in.	8 - 13 in.	13 - 16 in.	G.T.[b] 16 in.
Channel Catfish	L.T.[a] 14 in.	14 - 18 in.	18 - 22 in.	G.T.[b] 22 in.
Carp	L.T.[a] 16 in.	16 - 19 in.	19 - 23 in.	G.T.[b] 23 in.
Carpsucker	L.T.[a] 20 in.	Unknown	Unknown	Unknown
Bluegill	L.T.[a] 10 in.	Unknown	Unknown	Unknown
Bullhead	L.T.[a] 10 in.	Unknown	Unknown	Unknown

[a] L.T. = Less Than

[b] G.T. = Greater Than

Appendix D

Surface Water Monitoring Systems Information

Figure 20: Location of Stream Monitoring Stations in New Mexico Sampled Regularly by the United States Geological Survey, page D4;

Table 20: Location of Current U.S. Geological Survey Stream Quality Monitoring Stations funded b N.M. Environment Department, page D5;

Table 21: Parameters and STORET Codes for organic chemicals analyzed during the special water quality surveys conducted in 1996 and 1997, page D6;

Table 22: Sample Types, Parameters, and STORET Codes for Environmental Measurements Performed during Special Surveys Conducted by the New Mexico Environment Department, page D7; and

Table 23: Toxics Monitored in Selected Point Source Discharges, 1998, page D8.

Surface Water Monitoring Systems Information

Stream Monitoring Stations

During the period covered by this report, the fixed-station sampling network used by NMED consisted of 17 stations on ten New Mexico streams, one station on the Animas River in Colorado and one station on the Rio Grande in Texas (Figure 20). All data from these stations are collected by the United States Geological Survey (USGS). All water quality data from these stations are entered into STORET, the EPA computerized data storage system, and WATSTORE, the USGS computerized data storage system (Table 21). Water quality sampling efforts at the 19 stream stations of interest are funded jointly by NMED and USGS. The station on the Animas River near Cedar Hill, Colorado, is funded by the United States Bureau of Land Management. The station on the Rio Grande at El Paso is funded by USGS as part of two different longterm projects ~ the National Stream Quality Accounting Network (NASQAN) and the National Water Quality Assessment Program (NAWQA). Stations under these studies were selected to represent outflow from major drainage basins or sub-basins. The primary objective of these networks is to measure any regional variations in water quality and to detect water quality trends.

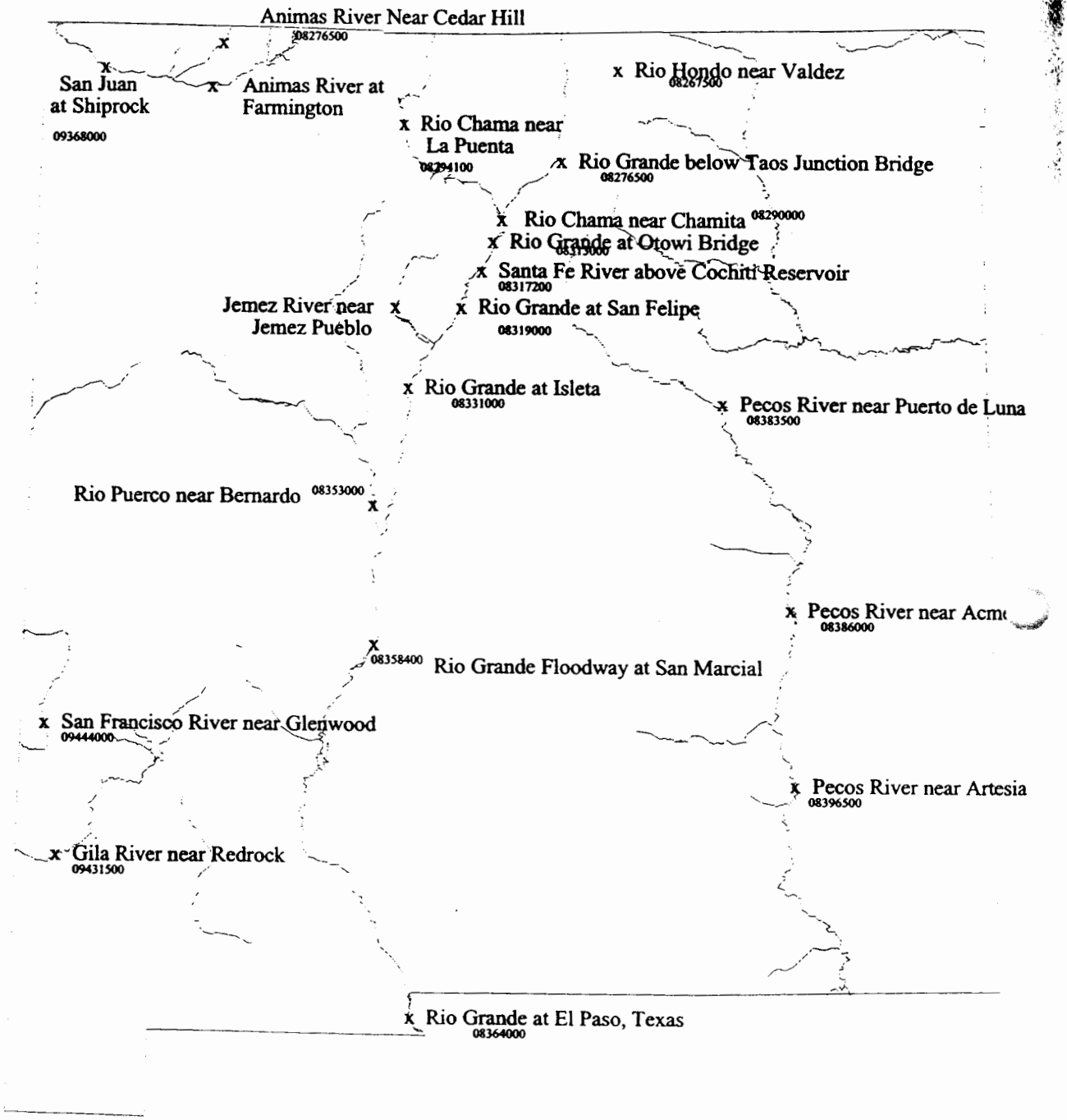
Special Surveys

The Surface Water Quality Bureau of the NMED conducts several special surveys each year on a prioritized basis in selected stream segments. Parameters sampled during these surveys are listed in Table 22.

Toxics Monitoring

Total concentrations of certain trace elements are monitored, generally on a semiannual basis, at all except one of the stations in the New Mexico water quality surveillance network. Bottom material samples are collected annually at all stations and analyzed for the parameters listed. Trace element data are also collected routinely during special surveys. Organic chemicals monitored during special surveys of major watersheds are listed in Table 21. Table 23 lists toxics monitored during a 1998 survey of representative effluent discharges.

Figure 20. Location of Stream Monitoring Stations of Interest to New Mexico Sampled Regularly by the United States Geological Survey.



x = Stream Water Quality Monitoring Station

Table 20. Location of Current U.S. Geological Survey Stream Quality Monitoring Stations funded by the New Mexico Environment Department

WATSTORE or STORET Station No.	Location
08267500	Rio Hondo near Valdez
08276500	Rio Grande below Taos Junction Bridge
08284100	Rio Chama near La Puente
08290000	Rio Chama near Chamita
08313000	Rio Grande at Otowi Bridge
08317200	Santa Fe River above Cochiti Lake
08319000	Rio Grande at San Felipe Pueblo
08324000	Jemez River near Jemez Pueblo
08331000	Rio Grande at Isleta Pueblo
08353000	Rio Puerco near Bernardo
08358400	Rio Grande Floodway at San Marcial
08383500	Pecos River near Puerto de Luna
08396500	Pecos River near Artesia
09364500	Animas River at Farmington
09368000	San Juan River at Shiprock
09431500	Gila River near Redrock
09444000	San Francisco River near Glenwood

Table 21. **Parameters and STORET Codes for Organic Chemicals Analyzed During the Special Water Quality Surveys Conducted in 1996 and 1997.**

Aldrin	039330
Alpha Benzene Hexachloride	039337
Beta Benzene Hexachloride	039338
Chlordane, alpha	039348
Chlordane, gamma	039810
Chloropyrifoser	077969
DDD	039360
DDE	039365
DDT	039370
Delta Benzene Hexachloride	034259
Dieldrin	039380
Endosulfan	039388
Endosulfan Sulfate	082623
Endosulfan, beta	082624
Endrin	039390
Endrin Aldehyde	082622
Endrin Ketone	078008
Gamma-BHC(Lindane)	039340
Heptachlor	039410
Heptachlor Epoxide	039420
Hexachlorobenzene	039700
Hexachlorocyclopentene	078022
Methoxychlor	039480
PCB - 1232	039492
PCB - 1242	039496
PCB - 1248	039500
PCB - 1254	039504
PCB - 1260	039508
PCP (Pentachlorophenol)	039032
Picloram	039720
Pronamide	039080
Propachlor	030295
Propoxur	030296
Silvex	039760
Simazine	039055
Terbacil	030311
Toxaphene	039400
Triadimefon	038892
Trifluralin	081284

Table 22. Sample Types, Parameters and STORET Codes for Environmental Measurements Performed During Special Surveys Conducted by the New Mexico Environment Department

TYPE	PARAMETER	STORET CODE
Physical	Conductivity	00402
	Temperature	00010
	Total non-filterable residue (TSS)	00530
	Total filterable residue (TDS)	70300
	Color	00081
	Fluoride	00951
Chemical	Bicarbonate	00440
	BOD_5 (5-day)	00310
	Calcium	00916
	Chloride	00940
	Magnesium	00925
	pH	00400
	Potassium	00935
	Sodium	00930
	Sulfate	00945
	Total Kjeldahl nitrogen	00625
	Total residual chlorine	450060
	Total ammonia nitrogen	00610
	Total nitrite + nitrate nitrogen	00630
	Total hardness (as $CaCO_3$)	00900
	Total organic carbon	00680
	Total phosphorus	00665
	Total alkalinity	00410
	Total cyanide	00720
	Aluminum dissolved (total)	01106 (01105)
	Arsenic dissolved (total)	01000 (01002)
	Barium dissolved (total)	01005 (01007)
	Beryllium dissolved (total)	01010 (01012)
	Boron dissolved (total)	01020 (01022)
	Cadmium dissolved (total)	01025 (01027)
	Calcium dissolved	82036 (82032)
	Chromium dissolved (total)	01030 (01034)
	Cobalt dissolved (total)	01035 (01037)
	Copper dissolved	01040 (01042)
	Iron dissolved (total)	01046 (01045)
	Lead dissolved (total)	01049 (01051)
	Magnesium dissolved	82037 (82033)
	Manganese dissolved (total)	01056 (01055)
	Mercury dissolved (total)	71890 (71900)
	Molybdenum dissolved (total)	01060 (01062)
	Nickel dissolved (total)	01065 (01067)
	Selenium dissolved (total)	01145 (01147)
	Silicon dissolved	01140 (01142)
	Silver dissolved (total)	01075 (01077)
	Strontium dissolved	01080 (01082)
	Tin dissolved (total)	01140 (01142)
	Vanadium dissolved (total)	01085 (01087)
	Zinc dissolved (total)	01090 (01092)
Biological	Fecal coliform bacteria (MF)	74055
	BOD_5 (5 day)	00310
Radiochemistry	Radium-226 total	09501
	Radium-228 total	11501
	Radium-226 + -228	11503

Table 23. Toxics Monitored in Selected Point Source Discharges, 1998.

Parameter	STORET Code
Water Chemistry	
BOD_5	00310
TSS Residual Total Non-filterable	00530
COD	00340
Phosphate as P	00665
Nitrate Nitrogen as N	00630
Ammonia Nitrogen as N	00610
Total Kjeldahl Nitrogen as N	00625

APPENDIX E

Summary of New Mexico State and Local Government Authorities
To Control Pollution of Ground and Surface Waters.

APPENDIX E. SUMMARY OF NEW MEXICO STATE AND LOCAL GOVERNMENT AUTHORITIES TO CONTROL POLLUTION OF GROUND AND SURFACE WATERS.

DIVISION OF NEW MEXICO STATE GOVERNMENT WITH AUTHORITY TO CONTROL POLLUTION OF WATER	AUTHORIZING AUTHORITY	ADOPTED REGULATIONS, CODES OR PROCEDURES	TYPES OF FACILITIES, ACTIVITIES AND SOURCES OF CONTAMINATION
ENVIRONMENT DEPARTMENT	WATER QUALITY ACT 74-6-1 through 74-6-17 NMSA 1978	Water Quality Control Commission Regulations	Industrial discharges (except oil and gas production/refinement), mining, milling and smelting (except coal mining), agricultural (except those irrigation practices which pose no threat), municipal and private sewage and sludge, spills and leaks
	HAZARDOUS WASTE ACT 74-4-1 through 74-4-14 NMSA 1978	Hazardous Waste Management Regulations	Hazardous waste generation, handling and disposition
		Underground Storage Tank Regulations 20 NMAC 5.1-14	Underground storage tanks
	GROUND WATER PROTECTION ACT 74-6B-1 through 74-6B-11 NMSA 1978	Underground Storage Tank Regulations 20 NMAC 5.15-17	Financing cleanups at gasoline stations and other facilities with underground storage tanks
	ENVIRONMENT IMPROVEMENT ACT 74-1-1 through 74-1-13 NMSA 1978	Liquid Waste Disposal Regulations 20 NMAC 7.3	Residential septic tanks
		Drinking Water Regulations 20 NMAC 3.1	Public water supplies
	RADIATION PROTECTION ACT 74-3-1 through 74-3-16 NMSA 1978	Radiation Protection Regulations	Medical uses of radiation including X-rays
	PUBLIC NUISANCE STATUTE 30-8-1, 30-8-2, and 30-8-8 NMSA 1978	None	Any facility or activity which endangers public health or welfare

APPENDIX E. SUMMARY OF NEW MEXICO STATE AND LOCAL GOVERNMENT AUTHORITIES TO CONTROL POLLUTION OF GROUND AND SURFACE WATERS, CONTINUED.

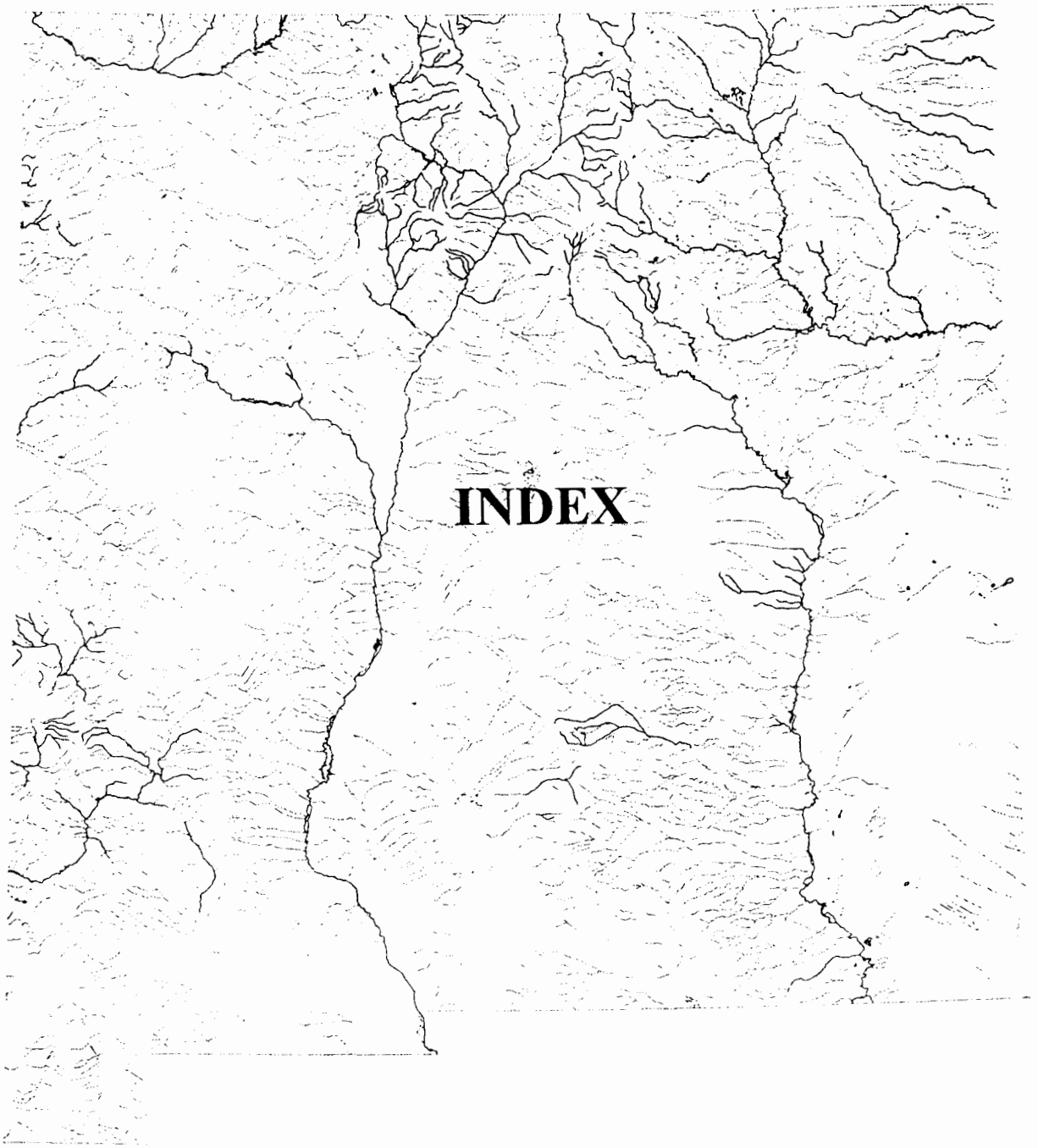
DIVISION OF NEW MEXICO STATE GOVERNMENT WITH AUTHORITY TO CONTROL POLLUTION OF WATER	AUTHORIZING AUTHORITY	ADOPTED REGULATIONS, CODES OR PROCEDURES	TYPES OF FACILITIES, ACTIVITIES AND SOURCES OF CONTAMINATION
ENVIRONMENT DEPARTMENT	SOLID WASTE ACT 74-9-1 through 74-9-42 NMSA 1978	Solid Waste Management Regulations - 20 NMAC 9.1	Municipal, industrial, commercial, and residential solid waste disposal
	EMERGENCY MANAGEMENT ACT 74-4B-1 through 74-4B-14 NMSA 1978	Hazardous Materials Emergency Response Plan	Businesses and other facilities which store/sell/ transport hazardous material
STATE ENGINEER OFFICE	STATE ENGINEER 72-2-1 through 72-2-17 NMSA 1978	State Engineer Rules and Regulations Governing Drilling of Wells	General supervision of water Plugging discovery and drill holes
	ARTESIAN WELLS 72-13-4, 72-13-6 NMSA 1978	Appropriations and Use of Ground Water in New Mexico	Drilling casing and plugging artesian wells to prevent commingling
	UNDERGROUND WATERS 72-12-1 through 72-12-28 NMSA 1978	State Engineer Order #25A, 1950	Pumpage control to prevent commingling of polluted and non polluted aquifers
		State Engineer Order #139, 1987	Pollution plume control and recovery wells
	GROUND WATER STORAGE AND RECOVERY ACT 72-5-6 NMSA 1978	Pending	Government agencies transferal of water rights for longterm aquifer storage and beneficial retrieval
	SURFACE WATERS 72-5-1 through 72-5-39 NMSA 1978		
	New Mexico Supreme Court Decision: Heine v. Reynolds, 69 NM 398, 367, P.2d708, 1962	Hearing Orders	Pumpage control to prevent salt water encroachment

DEPARTMENT OF AGRICULTURE Division of Agricultural and Environmental Services	PESTICIDE CONTROL ACT 76-4-1 through 76-4-39 NMSA 1978	Pesticide Regulations 21 NMAC 17.50	Agricultural pesticide application and waste disposal
STATE CORPORATION COMMISSION Pipeline Division	Constitution of the State of New Mexico, Article XI, Sections 1 through 18, NMSA 1978	Rules and Regulations for the Transportation of Natural and other Gas by Pipeline - Minimum Standard	Transportation of petroleum and petroleum products by intrastate transmission pipelines
	PIPELINE SAFETY ACT 70-3-11 through 70-3-20 NMSA 1978	Rules and Regulations of the Corporation Commission of the State of New Mexico Relating to Pipelines Transporting Oil (Order No. 401)	
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT Oil Conservation Division	OIL AND GAS ACT 70-2-1 through 70-2-38 NMSA 1978	Oil Conservation Division Rules and Regulations 19 NMAC 15	Oil and natural gas production, transport, and storage facilities; produced water and drilling fluid disposal; and carbon dioxide facilities
	WATER QUALITY ACT 74-6-1 through 74-6-17 NMSA 1978	Water Quality Control Commission Regulations 20 NMAC 6.2	Oil field servicing and companies; refineries; natural gas processing and transportation; brine production, transport and disposal
	GEOTHERMAL RESOURCES CONSERVATION ACT 71-5-1 through 71-5-24 NMSA 1978	Geothermal Resources Rules and Regulations	Geothermal facilities
Mining and Minerals Division	SURFACE MINING ACT 69-25A-1 through 69-25A-36 NMSA 1978	Surface Coal Mining Regulations 19 NMAC 8.2	Surface and underground coal mining
	ABANDONED MINE RECLAMATION ACT 69-25B-1 through 69-25B-12 NMSA 1978	New Mexico Reclamation Plan for Abandoned Mine Lands	Abandoned mines (coal mines and certain other mines)
	NEW MEXICO MINING ACT 69-36-1 through 69-36-20	Mining Act Rules 19 NMAC 10.2	Reclamation of hard rock (non-coal) mines
STATE LAND OFFICE	Constitution of the State of New Mexico, Article XIII		Public trust lands management
	PUBLIC LANDS 19-1-1, 2; 19-6-5, 19-6-3 NMSA 1978	State of New Mexico Land Office Rules and Regulations 19 NMAC 3	Prevention of wasted resource

APPENDIX E. SUMMARY OF NEW MEXICO STATE AND LOCAL GOVERNMENT AUTHORITIES TO CONTROL POLLUTION OF GROUND AND SURFACE WATERS, CONTINUED.

DIVISION OF NEW MEXICO STATE GOVERNMENT WITH AUTHORITY TO CONTROL POLLUTION OF WATER	AUTHORIZING AUTHORITY	ADOPTED REGULATIONS, CODES OR PROCEDURES	TYPES OF FACILITIES, ACTIVITIES AND SOURCES OF CONTAMINATION
STATE CORPORATION COMMISSION State Fire Marshal's Office	FLAMMABLE LIQUIDS STATUTE 59A-52-16 through 59A-52-17, NMSA 1978	State Fire Board Rules and Regulations Relating to Flammable and Combustible Liquids	Transportation, marketing, distribution, handling and use of flammable liquids
Motor Transportation Division	MOTOR CARRIER ACT 65-2-80 through 65-2-127 NMSA 1978	New Mexico Motor Carrier Rules and Regulations Relating to Flammable and Combustible Liquids Rule 40 - Governing Transportation of Explosives and Inflammables, Section 1	Transportation by motor carrier of hazardous materials including petroleum products
COUNTIES OF THE STATE	SUBDIVISION ACTS 47-5-1 through 47-6-29 3-20-1 through 3-20-16 NMSA 1978	County Subdivision Regulations	Subdivisions, including liquid and solid waste disposal and water supply systems
	ZONING ACT 3-21-1 through 3-21-16 NMSA 1978	County Zoning Regulations	Restrictions on location and use of facilities to promote public health and welfare
	REFUSE ACT 4-56-1 through 4-56-3 NMSA 1978	County Refuse Systems	Collection and disposal of refuse
	COUNTY ORDINANCE ACT 4-37-1 through 4-37-13 NMSA 1978	County Ordinances, and Grant of Same Authorities Granted Municipalities with Certain Exceptions	Landfills, liquid waste systems and other facilities and activities affecting health and safety in counties

MUNICIPALITIES OF THE STATE	PLANNING AND PLATTING; MUNICIPALS SUBDIVISION ACT 3-19-1 through 3-20-16, NMSA 1978	Municipal Planning and Platting and Municipal Subdivision Regulations	Municipal planning and regulations of subdivision within municipal planning jurisdictions
	ZONING ACT 3-21-1 through 3-21-26 NMSA 1978	Municipal Zoning Regulations	Restrictions on location and use of facilities to promote public health and welfare
	HEALTH; CONTROL OF DISEASE 3-43-1 through 3-43-2, NMSA 1978	Municipal Health Codes	Activities affecting public health
	WATER FACILITIES 3-27-1 through 3-27-9 NMSA 1978	Control of Municipal Potable Water Supplies	Protection of municipal water supply sources within and without municipal boundaries
	SEWAGE FACILITIES 3-26-1 through 3-26-3 NMSA 1978	Sanitary Sewer Authorities	Sewage collection, treatment and disposal
	REFUSE ACT 3-48-1 through 3-48-7 NMSA 1978	Authority to Regulate Refuse	Refuse collection and disposal
	POWERS OF MUNICIPALITIES 3-18-1 through 3-18-31 NMSA 1978	Municipal Ordinances	Facilities and activities within the jurisdiction of a municipality



INDEX

A

Abiquiu 92, B13-15, B17, B38, B51, C4, D4
~ Creek 29, B14
Above-ground storage tank (AST) ..... x, 28-29, 92
Acequia 107
Acid 22, 30, 55, 96
~ic 29, 51, 98
~ precipitation 51, 98
Act ..... v, vi, vii, viii, x, xvii, 5-6, 13, 21-23, 26, 30, 35, 37-38, 41, 43-45, 51, 53, 55-56, 62, 64, 70, 72, 80-82, 85-86, 92-94, 96, 98-106, 109, 111, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56, E6
Atomic Energy ~ 22
Clean Water ~ (CWA) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
Comprehensive Environmental Response, Compensation and Liability ~ (CERCLA), aka *Superfund*) ..... viii, x, 6, 23-24, 26, 44, 108-109
Emergency Management ~ ..... viii, 6
Ground Water Protection ~ 101
Mining ~ (NMMA) ..... x, 24, 38, 44, 85, 96, 106, E6
Petroleum Storage Cleanup ~ 101
Resource Conservation and Recovery ~ (RCRA) ..... x, 38, 98-100, 109
Safe Drinking Water ~ (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
Solid Waste ~ ..... viii, x, 6, 38, 106
Subdivision ~ 111
Superfund ~ (*aka* Comprehensive Environmental Response, Compensation and Liability ~ (CERCLA) ..... viii, x, 6, 23-24, 26, 44, 108-109
Water Pollution Control ~ (*See also* Clean Water Act) ..... xvii, 41
Water Quality ~ (WQA) ..... vii, 5, 6, 38, 41, 43, 70, 82, 93, 96, 98, 109
Action ..... xi, xvii, 13, 30, 29, 32, 35, 43-44, 82, 83, 86, 96, 98-102, 106, 109
corrective ~ ..... x, 6, 42, 44, 79, 83, 93, 98-101
Acute 23, 29, 32, 48, 49, 52-53, B35, B37, B40, B43, B46, B48, B52
Additives, gasoline 22, 28-29
Administration 12, 26, 30, 43, 81, 82, 85, 99, 111, 108, 109
Agency
U.S. Environmental Protection ~ (EPA) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
Agreement ..... x, 6, 23, 87, 108, 109
~ In Principal (AIP) ..... x, 87
~ of Agreement (MOA) ..... x, 6
settlement ~s 96
Agricultural 4, 13, 16, 18, 20, 22, 23, 24, 22, 29, 42, 84, 92, 95, 106-107, 108, 110
~ land 22, 92, 108
U.S. ~ Stabilization and Conservation Service 107
~ water supply 42
Agriculture ..... iv, v, vii, x, xi, 2, 13, 16, 18, 20, 22-24, 26-33, 53, 56, 59, 63-64, 84, 87, 92, 94, 96, 107, B3-11, B13-15, B17-25, B27-28, B30-54, E5
New Mexico Department of ~ (NMDA) ..... iv, v, x, xi, 18, 22, 84, 106
AIP (Agreement In Principal) ..... x, 87

Al (Aluminum) 24, 29, 32, 52, 55, 93, B3-11, B13, B15, B21-22, B24-B25, B27, B29, B32, B34-36, B38, B44-48, B50-52, B54
Alamitos B25, B27, B59
~ Canyon B25, B27
Alamosa Spring Snail B25
Albuquerque (COA) ..... x, 13-14, 18, 20-21, 22, 24, 26, 28, 69-70, 87, 92-93, 99, 103, 108-112, B3
Algae 23, 24, 29, 27, 29, 55, 61
Alkali 22, 26, 92
Alluvium 25, 26, 28, 30, 32, 34, 35
Alpine lakes 55
Alteration 27-29, 32, 61
Alto 28, B41, B51
Aluminum (Al) 24, 29, 32, 52, 55, 93, B3-11, B13, B15, B21-22, B24-B25, B27, B29, B32, B34-36, B38, B44-48, B50-52, B54
American 13, 29, 22, B23, B27
Ammonia (NH_3) 22-23, 28-29, 32, 49-50, 58, 61
Analysis ..... xvii, 18, 35, 36, 48, 53, 55, 64, 68, 84, 98, 108, 111
Andesite 35
Angostura 22, 28-29
Animal 4, 59, 63, 68, 79, 83, 103, B3-36, B49
Animas Closed Subbasin 29
Anoxic 22, 24, 92
Anthony 22
Anthropogenic 14, 22, 56
Apache 22, 28-29, 31, B33, B43-44
Bosque del ~ 22
Jicarilla ~ Reservation 28, 31
Aquatic ..... vi, viii, 28, 43, 46, 49, 50, 52-53, 55-56, 86, 55, 61, 64, 84, 86-87, 89
~ life 50, 55-56, 64
~ system 28, 86
Aquifer ..... vi, x, 14, 15, 23, 26, 28, 30, 32, 34-35, 70, 87, 92, 96, 100, 106
Arizona 29, 27, 31-32, B42, B46
Arkansas-White-Red River Basin 14
Army Corps of Engineers (ACE) 5, 64, 62, 74
Aromatic ..... x, 33, 92, 93
polycyclic ~ hydrocarbon (PAH) ..... x, 92
Arroyo 22, 28, B18, B41
~ Hondo 22, B18
Aspen B9, B51
Arsenic (As) 5, 24, 26, 31, 24, 103, 104
Assessment ..... vi, xvii, 6, 7, 13, 18, 32, 43, 45, 46, 50, 55, 51, 55, 62, 70, 86, 87, 88, 101, 103, 104-105, 107, 109-110, 112
Assistance ..... v-vi, 18, 30, 35, 68, 80, 84, 103, 104, 105, 109
Assurance ..... x, 82, 86, 95, 96, 98, 101, 106
AST (above ground storage tank) ..... x, 28-29, 92
Atomic Energy Act 22
Attainable ..... viii, ix, xi, 2, 9, 23, 24, 29, 41, 49, 50-51, 53, 55, 56, 58, 59, 61-63, 94
~ use ..... viii, ix, xi, 2, 9, 23, 24, 29, 51, 55, 56, 61-63, 94
Audit
performance ~ inspection 68
Authority ..... viii, 5, 6, 38, 41, 70, 95-96, 98-99, 100, 102, 107-111, E4, E6

B

Bacteria 65, 79
Bank 27, 29, 49, 61, B35-44, B46-47, B49, B52-54
Basalt 29, 32, 35
Basin ..... v, viii, xvii, 14, 15, 18, 21-36, 65, 87, 92, 98, 108, B3, B5, B8,B13, B16, B19, B23, B27, B30, B33, B35, B37, B40-41, B43-44, B46-58, B60, B62, B65, B68, B71
    Animas Closed sub~ 29
    Arkansas-White-Red River ~ 14
    Lower Colorado River ~ Plan 36
    Rio Grande ~ ..... v, viii, 21-24, 29, 31, 35-36, 108
    San Juan ~ 15, 32-33, 87, 92, 98, 110, B24-25
    Southwestern Closed ~ ..... v, 29-30, 34-36
    water~ 16, 20, 34
    Western Closed ~ 16, 20, 34
Bass C4-6, C8, D4-6, D8
Bathing 64
Bayard 29
Bear 27, 29-30, 34, 84, 102, B47, B51, B61, C4, D4
    ~ Canyon 29-30, 34, B47, B51, C4, D4
        ~ Reservoir 30, 34, B47, B51, C4, D4
    ~ Creek B51
Beaver 27, B32, B47, B49, B51
Beds, fossil 32
Belen 21-22, 24, 92
Benzene 22, 28-29
Bernalillo 15, 22, 24-25, 92, 88-90, 109, 111, B56
    ~ County 15, 22, 88-90, 109
Bernardo 22
Beryllium 52
Best Management Practice (BMP) ..... vii, x, 5, 32, 83-88, 106-107
Biochemical 79, 94
Biological
    Bosque ~ Management Plan ..... vi, 62
Biomass 55
Biomonitoring 27, 47
Bioremediation 87
Biota 48, 84
Bitter Creek B6
Black Range 27
Blending 22, 103
BLM (U.S. Bureau of Land Management) ..... x, 32, 33, 85, 91
Bluewater 22, 24, B24, B38, B53
    ~ Creek B24
    ~ Reservoir B24, B38, B53
BMMR (N.M. Bureau of Mining and Mineral Resources) ..... iv, x
BMP (Best Management Practice) ..... vii, x, 5, 32, 83-88, 106-107
Board
    Environmental Improvement ~ (EIB) ..... x, 44, 98
Boating 51, 85
Bolson fill 34
BoR (U.S. Bureau of Reclamation) ..... x, 62, 85
Border 13, 14, 22, 29, 34, 63, 81, 82, B3, B41
    Colorado ~ B3-4, B11, B34, B41
        New Mexico - ~ B41
Bosque ..... vi, 22, 24, 22, 62, 92, B53

Bosque (con't.)
~ Biological Management Plan ..... vi, 62
~ del Apache 22
~ Farms 22, 24, 92
Boundary
International ~ and Water Commission sampling station 22, 29
Bridge
Otowi 29
Brine 28, 95, 96, 98
Bureau ..... iv, v, x, 14, 18, 32, 33, 36, 62, 87, 91, 93, 98, 110, 112, D4
Construction Programs ~ (CPB) ..... x, 80
Drinking Water ~ (DWB) ..... v, x, 103, 105
Hazardous and Radioactive Materials ~ (HRMB) 100
N.M. ~ of Mining and Mineral Resources (BMMR) ..... iv, x
Surface Water Quality ~ (SWQB) ..... x, 38, 83, 85-86, 111, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56
U.S. ~ of Land Management (BLM) ..... x, 32, 33, 85, 91
U.S. ~ of Reclamation (BoR) ..... x, 62, 85
Bush
tar ~ 23
Business 18, 98, 112

C

Caballo 22, B25, B39, B54, C6, D6
Cacti 32
Cadmium (Cd) 24, 29, 53, 95, 98, 104, B29, B38, B51-52
Calibration 68
Campground B23, B45, B54
Camping 27, 85
Canadian River 24, B34-39, B42-45, B48
Cancer 92
Cañon B11, B27, B39
~ de Frijoles B11
Canyon 28-29, 30-32, 34, B3, B16, B20, B25, B27, B29-34, B38, B42, B48-49, B52, B54, B47, B51, C4, D4
Alamitos ~ B25, B27
Bear ~ 29-30, 34, B47, B51, C4, D4
~ Reservoir 30, 34, B47, B51, C4, D4
~ Largo 31
Gobernador ~ 31
Pump ~ 32
White Rock ~ 29
Carbaryl 92
Carbon 58, 92, 95
organic ~ 58
Carlisle B52
Carlsbad 28, 87, 92, 108, B27, B55, C4, D4
Carlson 55, 98, B36, B39, B42, B45, B48, B51, B55
Carnuel 22, 92
Carrizo 29, 32
Carrizozo 28, B52, B55
Carson National Forest 28, B54, B57, B59, B63
Casa B38-39
~ Colorada 22
Catfish C4-8, D4-8

Catron 22, 29, 28, 35, 88-90, B58, B64, B69
~ County 28, 35, 88-90
Cattle 79, 84
Cd (Cadmium) 24, 29, 53, 95, 98, 104, B29, B38, B51-52
Cebolleta Mesa 35
Cedar 31-32, 86
Central ..... v, 15, 25, 26, 29, 32, 35-36, 107, B40
CERCLA (Comprehensive Environmental Response, Compensation and Liability Act, aka *Superfund*) ..... viii, x, 6, 23-24, 26, 44, 108-109
Certification ..... vi, vii, 5, 38, 41, 43-44, 55, 64, 66, 79, 80, 85, 101, 104
Chaco Wash 31
Chamita 92, B11
Channel 22, 27-29, 34, C4-8, D4-8
Chavez ..... iv, 25, 30, 88-90, B13, B54, B56, B70
~ County 28, 88-90
Check 68, 83
Chemical ..... x, xvii, 1, 45, 48, 62, 68, 79, 89, 92, 100, 102
Chicosa Lake B48, B50, B68
Chlordane 52, 53
Chloride 92, B52
Chlorinated 22, 28-29, 30, 35, 93
~ methane 28-29, 93
Chlorine 23, 50, 52-53, 58, 61, 66, 70
Chlorophyll 55, 98
Chromium 53, 104
Chronic 23, 24, 29, 32, 52-53, 49, 50, 53, 55, B35, B37, B40, B43, B46, B48, B52
Chuska Mountains 31, 32
Cibola 24, 29, 35, 88-90, 109, B53, B71
~ County 35, 88-90, 109
Cimarron 24, 92, 109, B34, B36, B52
~ River 92, B34, B36, B52
Cirque 51, 55
Cities 30, 13, 62, 69, 81, 96
City ..... x, 13, 28-29, 61, 66, 69, 70, 82, 83, 86, 99, 102-103, 111-112, B3
~ of Albuquerque ..... x, 13-14, 18, 20-21, 22, 24, 26, 28, 69-70, 87, 92-93, 99, 103, 108-112, B3
~ of Grants 61
~ of Santa Fe 29
Silver ~ 29, 66, 82, 86
Ciudad Juárez 81
Classification ..... x, 27, 32, 55, 62, 79, 86, 96, 98
Clean Water Act (CWA) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
Cleaning 23, 28
Cleanup ..... viii, 6, 23, 30, 41-43, 70, 79, 85, 87, 95, 98, 100-101, 107, 108, 109
NM Petroleum Storage ~ Act 101
Climate 13, 23, 24, 26, 28, 29, 31, 32, 30, 29
Closed
Animas ~ Subbasin 29
Southwestern ~ Basin ..... v, 29-30, 34-36
Western ~ Basins 16, 20, 34
Closure 93, 95, 98, 99, 101, 106
Clovis 28, 29, 68, 109

COA (City of Albuquerque) ..... x, 13-14, 18, 20-21, 22, 24, 26, 28, 69-70, 87, 92-93, 99, 103, 108, 109-112, B3
Coal 32, 33, 63, 96, 106, B40-41, E6
~ bed 63
~ fields 32
~ mining 33
Fruitland ~ Seam Development 32
Cobalt 24
COC (Constituent of concern) ..... x, 109
Cochiti 29, 62, B18, B38, B56, C6, D6
~ Dam 29, 62
~ Reservoir B38, B56, C6, D6
Colfax County 28, 88-90, 92
Coliform 58, 65, 79, 104
Collection 70, 73, 83, 88, 99, 102, 111, E8
Colonias ..... vii, 28, 81, 82
~ Wastewater Treatment Construction Grant 82
Colorada 22
Colorado ..... v, 14, 21, 29, 24, 29, 27, 28, 31, 32, 29, 36, 62, 65, 89, 92, B3-4, B11, B34, B40-41, B46-47
~ border B3-4, B11, B34, B41
~ Plateau 29, 27, 31
~ River ..... v, 14, 29, 27, 28, 36, 65, B41, B46-47
Comanche Creek B5
Commercial 33, 70, 85, 92, 98, 108
Commission
Federal Energy Regulatory ~ 43
Interstate Stream ~ (ISC) ..... iv, x, 28, 84, 87, 107-108
Soil and Water Conservation ~ (SWCC) ..... iv, x, 84
Water Quality Control ~ (WQCC) ..... v, x, 5, 14, 18, 21, 41-45, 79-83, 86-87, 92-93, 96, 98, 100, 102, 106, 108-109, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Communities 13, 22, 29, 35, 109, 62, 69, 70, 71, 80, 81, 82, 83, 87, 89, 94, 103, 106, 108
Community ..... vi, 9, 27, 35, 47, 62, 70, 100, 70, 80, 82, 84, 87, 97, 102, 104-107
Compensation
Comprehensive Environmental Response, ~ and Liability Act (CERCLA), aka *Superfund*) ..... viii, x, 6, 23-24, 26, 44, 108-109
Compliance 5, 22, 23, 27, 30, 43, 46, 68, 69, 80, 82, 85, 86, 87, 89, 94, 95, 96, 97, 100, 101, 102, 103, 104, 108, 112
~ evaluation inspection 68-69
~ sampling inspection 68
Comprehensive ..... x, 21, 23, 27, 103, 108, 109, 69, 70, 87, 93, 106, 110
~ Environmental Response, Compensation and Liability Act (CERCLA, aka *Superfund*) ..... viii, x, 6, 23-24, 26, 44, 108-109
~ survey 87
Concerns 21, 81, 84, 108
Conglomerate, Gila 34
Congress ..... v, xvii, 12, 18, 20, 22, 23, 24, 26, 29, 35, 36, 37, 109, 43, 55, 70, 95, 104
Conservation ..... iv, v, xi, x, 18, 29, 33-34, 38, 41, 62, 79, 80, 83-86, 90-92, 95, 98, 100, 106-107, 112, E5-6
U.S. Agricultural Stabilization and ~ Service 107
U.S. Forestry and Resource ~ Division (FRCD) ..... x, 85
U.S. Resource ~ and Recovery Act (RCRA) ..... x, 38, 98-100, 109
Constituents of concern (COC) ..... x, 109
Construction ..... vi, vii, x, 23, 28-29, 32, 38, 41, 43, 59-60, 62-63, 70-71, 80-82, 84-85, 89, 92, 94, 96, 100, 104, 109, B6, B8-9, B25, B31, B33, B39, B41-42, B52, B49
~ grant 62, 70-71, 82
~ loan 38, 41, 43, 80

~ Programs Bureau (CPB) ..... x, 80
Consumption ..... ix, xi, 3, 26, 32, 42, 50, 53, 56, 64, 103, C4-8, D4-6, D8
human ~ 26, 103
Containment 18, 70, 101
Contaminant 42, 70, 92, 102-103
maximum ~ level (MCL) ..... x, 24, 26
Contamination ..... vii, viii, ix, xi, 3, 4, 11, 15, 21-24, 28-30, 33, 45, 55, 64, 70, 87-88, 92-93, 95, 98-103, 105-106, 108, 110-112, C4-8, D4-6, D8
Continental Divide 22, 28-29, 31, 35
Control ..... iv-viii, x-xi, xvii, 5-6, 12, 18, 21-22, 24, 28, 30, 32, 34-37, 41, 44-45, 55, 62, 65-66, 69-70, 75, 84-87, 89-94, 96-98, 100, 102, 106-109, 112, A3, E3, E6-7
N.M. Water Quality ~ Commission (WQCC) ..... v, x, 5, 14, 18, 21, 41-45, 79-83, 86-87, 92-93, 96, 98, 100, 102, 106, 108-109, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
U.S. Water Pollution ~ Act (*See also* Clean Water Act) ..... xvii, 41
water pollution ~ ..... xvii, 18, 37, 41, 44, 79, 80, 88, 93, 109
~ program ..... xvii, 18, 93
Coordination 69, 80, 83, 87, 108
Copper 24, 28-29, 35, 52-53, 66, 93
~ milling 35
Corners, Four 31, 33
Corporation 109, E5
Corps
U.S. Army ~ of Engineers (ACE) 5, 62, 64, 74
Corrales 24, 22, 24, 92, B3
Corrective action ..... x, 6, 42, 44, 79, 83, 93, 98-101
Corrosion 92
Costilla Creek B4-6
Cottonwood B53
County ..... viii, 15, 20, 22, 24, 28-31, 34-35, 82, 84, 87-90, 92, 102, 108-109, 111-112, B51-52, B55, B57, B60, B62, B65, B68, B71, E6
Bernalillo ~ 15, 22, 88-90, 109
Catron ~ 28, 35, 88-90
Chavez ~ 28, 88-90
Cibola ~ 35, 88-90, 109
Colfax ~ 28, 88-90, 92
Curry ~ 20, 28, 88-90
De Baca ~ 28, 88-90
Doña Ana ~ 22, 29, 88-90
Eddy ~ 28, 88-90
Guadalupe ~ 28, 88-90
Harding ~ 88-90, 92
Hidalgo ~ 28, 34, 88-90
Lea ~ 28, 88-90
Lincoln ~ 28, 88-90, 109
Luna ~ 28, 88-90, 109
M^c^Kinley ~ 28, 88-90, 109
Mora ~ 92, 88-90
Otero ~ 28, 88-90
Quay ~ 28-29, 88-90
Rio Arriba ~ 28-29, 88-90, 109
Roosevelt ~ 28, 30, 88-90, 110
San Miguel ~ 24, 88-90
Sandoval ~ 29, 31, 88-90
Torrance ~ 28, 88-90
Valencia ~ 22, 24, 88-90

Court 82, 96, 102, 107, E5
Cowardin system 62
CPB (Construction Programs Bureau) ..... x, 80
Creek 24, 27-29, 31, B4-7, B9-11, B13-21, B23-25, B28-32, B34-39, B42-55
Abiquiu ~ 29, B14
Bear ~ B51
Bitter ~ B6
Bluewater ~ B24
Comanche ~ B5
Costilla ~ B4-6
Galisteo ~ B20
La Jara ~ 31, B18
Las Huertas ~ 29, B20
Little Tesuque ~ B10
Little Willow ~ B13
Mangas ~ B46, B51
Mogollon ~ B46, B50
Nacimiento ~ B19
Pioneer ~ B6
Santa Clara ~ 29
Silver ~ B45
Vallecitos ~ 29
Whitewater ~ 29, B45
Willow ~ 29, B13, B25, B29, B48
Wolf ~ B38
Creosote 23
Cretaceous 30, 35
Criminal 82
Cristobal, Fra 22
Crude oil 29, 30, 92, 98
Cuba 22, 24
Curry County 20, 28, 88-90
CWA (Clean Water Act) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
Cyanide 27, 50, 52-53

D

DA (N.M. Department of Agriculture) ..... iv, v, x, xi, 18, 22, 84, 106
Daily
Total Maximum ~ Load (TMDL) ..... x, 1, 38, 41, 45, 56, 61, 88-89, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Dairies 22, 29, 92, 96
Dairy 28-29, 79, 92, 96
Dam 22, 24, 29, 32, 43, 56, 59, 62, B5, B13, B24, B27, B35-36, B39-40, B49, B58, B64-65
Cochiti ~ 29, 62
Data 1, 5, 7-8, 18, 24, 29, 35, 43, 45-51,53, 55-56, 61-62, 64, 68, 86-89, 96, 99, 100, 103-104, 107, 109-111, A3
~base ..... x, 1, 7, 9, 13, 24, 45, 53, 55, 56, 87, 88, 89, 96, 98, 108, 109, 110
Datil 29, 35
~ Mountains 35
DDE (1,1-dichloro-2,2-*bis*(*p*-chlorophenyl) ethylene) 92
DDT (1,1,1-trichloro-2,2-*bis*(*p*-chlorophenyl) ethane) 92, B11
De Baca County 28, 88-90, B53, B66

Defense, U.S. Department of ~ (DoD) ..... x, 23, 27, 99
Defiance uplift 32
Degradation 14, 27, 102
Degreasing 23, 28-29, 35
Del
Bosque ~ Apache 22
Delegation 24, 72
Deming 35
Demonstration project 32, 69, 83, 86, 89, 107
Department ..... iv, v, vii, viii, ix, x, xi, x, xi, 1, 6, 13, 18, 20, 22-23, 27, 29, 33, 36, 38, 41, 44-45, 50, 64, 79, 81, 84-88, 91, 94-95, 98-101, 106, 108, 110-112, A3, C4, D4
~ of Agriculture (NMDA) ..... iv, v, x, xi, 18, 22, 84, 106
~ of Defense (DoD) ..... x, 23, 27, 99
~ of Energy (DoE) ..... vii, x, 22, 86-87, 99, 108-109
~ of Game & Fish (DGF) ..... iv, x, 29, 64, 98, C3, D4
~ of Health (DOH) ..... x, 64
~ of the Interior (DoI) ..... x, 18, 33, 36
~ of Labor (DOL) ..... x, 13
Energy, Minerals, and Natural Resources ~ (EMNRD) ..... v, x, 41, 44, 110
New Mexico Environment ~ (NMED) ..... v, vii-x, vi, 1, 3, 5, 6, 7, 8, 10, 22, 24, 27, 33, 36-38, 41-45, 50-51, 55, 62, 64, 66, 68-70, 72, 79-83, 85-89, 91-112, A3, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56, C3, D4
Deposition 32
Desert 13, 22, 23, 27, 29, 32
Design 42, 62, 71, 84-85, 100, 102, 106, 109
Designated ..... vi, viii, ix, xi, 2, 9, 14, 22-24, 27-32, 41, 45-46, 50-51, 53, 55-56, 58-59, 61-64, 70, 81-82, 86-87, 94, 98, 102, B35, B37, B40, B43, B46, B48-49, B52
~ use ..... vi, ix, xi, 2, 22, 27-32, 41, 45, 50-51, 53, 55-56, 62, 64, 70, 94, B35, B37, B40, B43, B46, B48-49, B52
Development 18, 20, 26, 28-30, 32-33, 38, 41, 45, 59, 62-63, 70, 81, 85, 86, 89, 98, 100, 104, 106-109, 111
Fruitland Coal Seam ~ 32
Dexter 28
DGF (N.M. Department of Game & Fish) ..... iv, x, 29, 64, 98
Diesel 22, 28, 27, 28, 29, 28
Digital Line Graph (DLG) ..... x, 13
Discharge ..... vi, viii, xi, 6, 14, 20, 27, 29-30, 35, 41-42, 45, 55, 62, 65, 68, 70, 79, 83-84, 87-89, 92-98, 100, 102, 108
~ plan 55, 92, 95-96, 98, 108
~er 7, 79, 82, 88, 95
Disclosure statement 111
Discontinuance 82
Disposal ..... vii, x, 6, 30, 24, 22, 29, 28, 41, 42, 44, 59, 60, 63, 69, 70, 79, 82, 83, 84, 85, 92, 93, 95, 96, 98, 99, 102, 106, 108, 109, 111, B9, B47, B53, B49, E3
Dissolved ..... x, 22, 24, 26-29, 30, 32, 35, 50, 52-53, 58, 61, 94, B13-15, B18, B25, B35-38, B41, B43-44, B46-52, B54
~ oxygen (DO) 24, 29-30, 32, 50, 58, 61, 94, B13-15, B18, B25, B35-38, B41, B43-44, B46-52, B54
Distribution ..... viii, 16, 22, 28-29, 62, 64, 84, 86, 95-96, 100, 107
District 82, 96, 107, 110
Ditch 107
Diversion 22, 28-29, 32, 73, 84, 107, C6, D6
Divide 22, 28-29, 31, 35
Division ..... iv, v, x, xi, x, 18, 20, 33, 38, 41, 44, 79, 85, 90, 92, 95, 106, 110-112, E5-7
DLG (Digital Line Graph) ..... x, 13

DO (dissolved oxygen) 24, 29-30, 32, 50, 58, 61, 94, B13-15, B18, B25, B35-38, B41, B43-44, B46-52, B54
Dockum Group 30
DoD (U.S. Department of Defense) ..... x, 23, 27, 99
DOE (U.S. Department of Energy) ..... vii, x, 22, 86-87, 99, 108-109
DOI (U.S. Department of Interior) x
Domestic 6, 15, 23-24, 26, 28-29, 31, 42, 44-45, 51, 54, 56, 59, 63, 65, 68, 92, 94-96, 98-100, 102, B9, B21, B35, B49, B54
Doña Ana 22, 24-25, 29, 34, 81, 88-90, 93, 103, 111, B54, B69
~ County 22, 29, 88-90
Drain 14, 24, 29
Drainage 3, 13-14, 25, 28-29, 31, 34-35, 62, 81, B51-52, B55, B57, B60, B62, B65, B68, B71
DRASTIC (an EPA database) ..... x, 32
Dredge-and-Fill ..... vi, 5, 45, 55, 73, 85-86, 89
~ permits 5, 44, 55, 86
~ Program ..... vi, 73
Drinking water ..... v, viii, x, 3, 5-6, 24, 26, 38, 46, 51, 53, 80, 86-87, 96, 103-106, 108, E4
~ Bureau (DWB) ..... v, x, 103, 105
U.S. Safe ~ Act (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
Dry 20, 22-24, 26-29, 32, 35, 84, B52
~ cleaning 23, 28
~land farming 31
Duck 27
Dulce 29, 31
DWB (Drinking Water Bureau) ..... v, x, 103, 105
Dystrophic 55, B52, B54, B57, B60, B62, B65, B67, B70, B72

E

Eagle Nest Lake 24, 92, B35-36, B43, B56, C4, D4
East Fork B20-21, B47, B49
Ecosystem ..... vi, 62, 84, 85, 89, 62, 108
Eddy County 28, 88-90
Education ..... vii, 22, 83-86, 100, 107
public ~ 100
Effluent 8, 27, 42, 65-66, 68-70, 82, 88-89, 95-96, 100, 102
Electric B3
El Paso 81
El Rito 29, B14-15
Element 86
Elephant Butte 29, 22, 51, B39, B56, C8, D8
~ Reservoir B56, C8, D8
Elk 29, B56
Emergency ..... viii, 6, 44, 98, 109, 112, E4
NM ~ Management Act ..... viii, 6
Hazardous Materials ~ Response Plan 6, 112
EMNRD (N.M. Energy, Minerals and Natural Resources Department) ..... v, x, 41, 44, 110
Employment 13, 18
Endangered 30, 33, B3, B25, B40, B47, B49, B50
~ species 30
Energy ..... vii, x, xi, x, 22, 33, 41, 43, 79, 85, 86-87, 95, 98-99, 106, 108, 110, 112
Department of ~ (DoE) ..... vii, x, 22, 86-87, 99, 108-109
~, Minerals, and Natural Resources Department (EMNRD) ..... v, x, 41, 44, 110
~ production 33
Federal ~ Regulatory Commission 43
Enforcement ..... vii, viii, 10, 27-28, 30, 62, 68-69, 80, 82-83, 85, 95-96, 102-103, 108-109

Engineer ..... iv, v, viii, x, 16, 20, 36, 44, 80, 88, 98, 106-107, 110-111, E4-5
U.S. Army Corps of ~s (ACE) 5, 64, 62, 74
Engineering ..... v, x, 93, 104
Enhancement 62
Environment ..... iv, v, viii, ix, x, xi, x, xi, 1, 6, 20, 27, 30, 36, 38, 41, 44-45, 50, 87-88, 95, 98, 100-101, 108-109, A3, C4, D4
New Mexico ~ Department (NMED) ..... v, vii-x, vi, 1, 3, 5, 6, 7, 8, 10, 22, 24, 27, 33, 36-38, 41-45, 50-51, 55, 62, 64, 66, 68-70, 72, 79-83, 85-89, 91-112, A3, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56, C3, D4
Environmental ..... v, vii, viii, ix, x, xi, xvii, 1, 6, 9, 18, 21-23, 26-27, 33, 35, 38, 44-45, 53, 68-69, 81, 84-88, 92, 97-98, 100-102, 104, 106-112, A3, B3, E5
Comprehensive ~ Response, Compensation and Liability Act (CERCLA), aka *Superfund*) ..... viii, x, 6, 23-24, 26, 44, 108-109
~ concerns 21, 81, 84, 108
~ improvement ..... viii, x, 6, 38, 44, 98, 101-102, 106, 112
~ Board (EIB) ..... x, 44, 98
~ pollution 27, 33
U.S. ~ Protection Agency (USEPA) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
~ restoration (ER) ..... x, 93, 109
EPA (U.S. Environmental Protection Agency) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
Equipment 68, 84, 98
ER (environmental restoration) ..... x, 93, 109
Erosion 29, 32, 50, 69, 84-85, 90, 107
Española 22, 24, 29, 92, 109
ET (Evapotransporation) ..... x, 5, 12, 14, 22, 24, 26, 28-29, 31, 35, 51, 55, 80, 92, 93, 95-96, 98, 101, 103, 106, 109, 111
Ethyl benzene 22, 28-29
Eutrophic 55, B36, B39, B42, B45, B48, B51-52, B54-55, B57, B60, B62, B65, B67, B70, B72
Evaluate 55, 62, 68, 80, 88-89, 92, 103, 109
Evaluation ..... vii, 9, 46, 55-56, 68, 87, 90, 92, 94, 96, 103
compliance ~ inspection 68-69
Evaporation 13, 14, 16, 31, 29, 92
Evapotranspiration (ET) ..... x, 5, 12, 14, 22, 24, 26, 28-29, 31, 35, 51, 55, 80, 92-93, 95-96, 98, 101, 103, 106, 109, 111
Examination 68
Exploration 4, 92, 96, 98, 106
Explosive 29, 92
~ manufacturing 29
Extraction ..... vii, 13, 27-29, 42, 59, 63, 85, 93, 96, B49-50

F

Facility ..... vi, vii, x, 22, 32, 38, 41-43, 68, 70, 79-80, 87, 95-96, 99, 106, 108-109
Family 47
Farmington 31, 33, 28-30, 69, 83, B39-41, B45, C8, D8
Farms
Bosque ~ 22, 24, 92
Fathead minnow 27
Fawn Lake B57-58, C8, D8

Fe (Iron) 24, 92, 108, B18, B46-47, B59-60, B62, B64, B66
Fecal 58, 65, 79, B3, B7, B11, B14-15, B17-18, B20-23, B34-39, B52, B54
Federal ..... v, vi, vii, viii, xvii, 5, 6, 11-15, 17-18, 20-24, 30, 35, 37-38, 41-45, 55, 62, 64, 68, 69, 70, 71, 79-87, 93-94, 96, 98-104, 106-110, A3
~ Energy Regulatory Commission 43
~ mandate 12, 21, 93-94
Fee 44, 104, 107
Feedlot 4
Fencing 83
Fertilizer 84
Field ..... x, 29-28, 36, 86-87, 92, 107-108
coal ~s 32
Fill
Dredge-and- ~ ..... vi, 5, 45, 55, 73, 85-86, 89
Fir 23, 31
Fire 24, 27-29, 84-85, E7
Fish ..... iv, ix, x, xi, xvii, 1, 3, 7, 27, 24, 29, 31-33, 35, 50-51, 56, 61-62, 64, 70, 86, 88-89, 98, B6, B13, B21, B25, B27, B35, B37-41, B43-45, B49, B63, C3-8, D4-6, D8
~able 56, A3
~ consumption advisories 3, C3-8
~eries 14, 27, 28, 45, 88
~ tissue 1, 24, 29, 32, 61, B35, B37-41, B43-45
N.M. Department of Game and ~ (DGF) ..... iv, x, 29, 64, 98, C3, D4
U.S. ~ and Wildlife Service ..... x, 33, 62, 64, 98
Flood 13, 22, 27-28, 32, 34-35, 62, 106
~ control 28, 62, 106
~ flow 27, 32, 35
~plain 21-22, 62
Florida Mountains 34
Flow 14-15, 22-29, 31-32, 34-35, 56, 60-61, 68, 87-88, 100, 102, B23, B49
~ alteration 23, 29, 32, 61
~ capacity 100
~ diversion 56
Fluoride 104, 108
Fluorine 103
Food 42, 92, 95
Forest ..... x, 3, 10, 23, 27, 28, 32, 55, 59, 69, 85, 91,B31, B49, B54, B57, B59, B63
Carson National ~ 28, B54, B57, B59, B63
U.S. ~ Service ..... x, 3, 10, 14, 55, 69, 85, 87, 91, 92
Forestry and Resource Conservation Division (FRCD) ..... x, 85
Fork
East ~ B20-21, B47, B49
Fossil beds 32
Four Corners 31, 33
Fra Cristobal 22
Freshwater 13, 51, 55, 92
Frijoles 29, B10
Fruitland Coal Seam Development 32
Ft. Sumner B53
Fuel 22, 28, 33, 85
~ industry 33
jet ~ 22, 28
Fully supporting ..... viii, ix, xi, 46, 48, 49, 50, 51-52, 56, 58-59, 61, 63, B5, B8-11, B15, B17-19, B21, B24-25, B27-32, B34-40, B42-46, B48, B51-B53, B55
Fund 6, 43, 44, 80-81, 94, 96, 98, 100-101, 104
Future ..... vi, vii, 22, 16, 22, 43, 55, 56, 62, 69, 80, 87, 88, 90, 93-96, 106-107, 109

G

Gage B42
Gaging station 22
Galisteo 29
~ Creek B20
Gallinas B32, B54
~ River 28, 35, 86, B32
Game and Fish (NM Department of ~ (DGF)) ..... iv, x, 29, 64, 98, C3, D4
Garbage 102
Gas ..... viii, 6, 24, 27-29, 32-33, 38, 41, 44, 63, 92, 95-96, 98, E5
natural ~ 44, 92, 95-96, 98
Gasoline 22, 24, 27-29
~ additives 22, 28-29
Generation 81, 99, 112
Geographic ..... x, xi, 21, 55, 80, 98, 111, A3
~ Information System (GIS) ..... x, 111
Gila 29, 27, 34-36, 62, 86, B46-52
~ conglomerate 34
~ River 27, 29, B46-52
~ Trout B47-50
~ Wilderness 27
GIS (Geographic Information System) ..... x, 111
Glorieta 26, 35, B27
~ Sandstone 26, 35
Gobernador Canyon 31
Goose Lake B37, B58
Governor 83
Grant ..... vii, 9, 15, 29, 34, 61, 80-82, 92, 96, 104, 109, 111, B51-52, B60, B65, B67, E7
construction ~ 62, 70-71, 82
wastewater ~ program 82
Grants ..... vi, 22, 24, 61-62, 71, 81, 84, 107, 109
City of ~ 61
Graph, Digital Line ~ (DLG) ..... x, 13
Grass 35
~land 31
Gravel 14, 29, 32, 107, B39
Grazing 13, 24, 29, 29, 32, 56, 59, 84, 86, 94, 108
livestock ~ 32, 94
wildlife ~ 56
Great Plains of the United States 30
Ground ..... v, vii, viii, x, xi, xvii, 1, 3-6, 8, 11-16, 20, 22-32, 30-32, 34-35, 38, 41-42, 44, 55, 62, 69-70, 79, 83-85, 87-88, 92-104, 106-111, E4
above-~ storage tank (AST) ..... x, 28-29, 92
~cover 13
~ water ..... v, x, 1, 3-6, 8, 11-16, 20, 22-24, 25-26, 28-32, 34-35, 41-42, 44, 55, 62, 69-70, 83-85, 87, 92-93, 95-104, 106-111
NM ~ Protection Act 101
~ protection program 11, 24, 30, 93, 108, 111
~ quality ..... v, 1, 3, 5, 6, 8, 11, 12, 15, 20, 30, 35, 44, 87, 93, 102, 103, 106-108, 110-111
~ vulnerability 15
Group 30
Growth 18, 28-29, 33, 81, 87
Guadalupe 22, 24, 28, 88-90, B21-22, B53, B64, B66
~ County 28, 88-90
Gulf of Mexico 14, 21, 23-24

H

Habitat 27-29, 32, 45, 47, 51, 54, 56, 61-64, 85-87
~ alteration 27-29, 32, 61
Hagerman 28
Halogenated 22, 28-29, 35,93
Hard 30, 44, 56, 106
~ rock 44, 106
Harding 24, 29, 88-90, 92, B68
~ County 88-90, 92
Hardness 52, 53
Hazard 26, 102, 109
~ Ranking System 26, 109
Hazardous ..... viii, xi, x, 6, 22-24, 26, 38, 44, 59, 85, 87, 92-93, 96, 98-99, 100-102, 108-109, 112, E3-4
~ and Radioactive Materials Bureau (HRMB) 100
~ Materials Emergency Response Plan 6, 112
~ waste ..... x, 6, 23-24, 26, 38, 44, 59, 85, 93, 98-99, 108-109, B49, E3
Head 26, 29, 111
~waters 21-22, 24, 28
Health ..... vi, 22-24, 26, 55, 64, 81, 92, 100, 103, 106-108, 110-112, C4, D4, E6
New Mexico Department of ~ (DOH) ..... x, 64
public ~ 6, 18, 23, 27, 30, 62, 64, 80, 87, 94, 98, 100-102, 104, 108-109, 111
~ protection 30
Heap 35
Hearing 41, 98, 108
Heavy metal 55, 64, 93
Hg (Mercury) ..... ix, xi, 1, 3, 7, 24, 29, 32, 45, 52, 61, 64, 88-89, 104, C3-8, D4-6, D8
Hidalgo 28-29, 34, 81, 88-90, B68-69
~ County 28, 34, 88-90
High
Southern ~ Plains ..... v, 28-30, 36
Highway ..... x, 23, 59-60, 85, 90, B13, B49, B50, B53, B55
Hiking 85
Historic 62, 110
Hobbs 28-29, 30, 68, 92, B55
Home 20, 28, 81, 102, B9
Hondo 29, 22, 28, 61, B18, B33, B59
Arroyo ~ 22, B18
Hopewell Lake 92, B11, B38, B58
Horse 35, 79
Horse Springs 35
Hot 22, 24, 31, B54-55
Housing 81-82, A3
HRMB (Hazardous and Radioactive Materials Bureau) 100
Human consumption 26, 103
Humus 24, 92
Hurley 82
Hydrocarbon ..... x, 92
Hydrogen sulfide 92
Hydrogeologic ..... x, 18, 29, 32, 70, 106, 109
Hydrology 21, 34, 62, 112
Hydromodification ..... vii, 2, 31, 23, 28-29, 32, 56, 59, 84-85, B3-6, B8-10, B13-15, B20, B23, B27, B32, B41-42, B45-46, B49-52, B54
Hypersaline 28, 55

I

Identification **70, 87, 99**
Illegal **82-83, 96, 102**
Impaired **2, 55-56**
~ reach 55
Impairment ..... vi, viii, 2-3, 16, 31, 55-56, 58, 60-61, 63-64, 70, 84-85
Implementation 5, 30, 32, 42, 44, 68, 70, 83-87, 89, 96, 100-101, 108
Impoundment 60, 98, 112, B49
Improvement ..... viii, x, 6, 38, 44, 98, 101-102, 106, 112
In situ 42, 70, 96, 102
Income 13, 81
Incorporate 93, 98, 108
Indian 16, 18, 30-31, 33, 63, B29, B59
Southern Ute ~ Reservation 63
Industrial ..... x, 22-23, 28-29, 30, 45, 62-63, 69-70, 81, 92-93, 95-96, 100, 111, B49, E3
Industry
fuel ~ 33
Infiltration 84, 96, 106
Information ... x-xii, xvii, 1, 6, 14, 18, 45, 55, 58, 60-62, 64, 68-69, 84, 86-89, 95-97, 102, 104, 107-111, A3
Geographic ~ System (GIS) ..... x, 111
Infrastructure 19, 81
Inhalation Toxicology Research Institute (ITRI) {*see also Lovelace Respiratory Research Institute (LRRI)*} ..... x, 87, 108
Injection ..... viii, 4, 41, 96, 106
~ well 4, 41, 96
Inspection 29, 68, 83, 85, 87, 96, 107, 109
compliance evaluation ~ 68-69
compliance sampling ~ 68
performance audit ~ 68
reconnaissance ~ 68
Installation ..... x, 92, 100-102
Installation Restoration Project (IRP) x
Institute ..... x, 87, 98, 104, 108, 110-112
Inhalation Toxicology Research ~ (ITRI) ..... x, 87, 108
Intensive 1, 7, 45, 48-49, 55, 88-89, 92
~ survey 1, 7, 45, 48, 49, 88
Interest ..... xvii, 30, 42, 43, 81, 84, 86, 104, 106, 112
Interior, Department of ~ (DoI) ..... x, 18, 33, 36
Intermittent 13, 22, 32, 35
International Boundary and Water Commission sampling station 22, 29
Interstate ..... iv, x, 5, 28, 44, 62, 84, 107, 109
~ Stream Commission (ISC) ..... iv, x, 28, 84, 87, 107-108
Intrastate 44, 62, 109
Inventory 3, 35, 87, 96
Investigation ..... x, 23, 29, 42, 55, 109
Iron (Fe) 24, 92, 108, B18, B46-47, B59-60, B62, B64, B66
Irrigation 20, 22-23, 26-29, 32, 34, 45, 51, 54, 56, 64, 84, 92, 94, 96, B49
ISC (Interstate Stream Commission) ..... iv, x, 28, 84, 87, 107-108
ITRI (Inhalation Toxicology Research Institute) {*see also Lovelace Respiratory Research Institute (LRRI)*} ..... x, 87, 108

J

Jemez 22, 29, 92, B3, B20-23
~ Mountains 22
~ River 22, 29, 92, B3, B20-23
Jet fuel 22, 28
Jicarilla Apache Reservation 28, 31
Jornada del Muerto 25-26
Juárez 81
Juniper 23, 31, 32, 84
Jurisdiction 31, 44, 98

K

Kilometer 81

L

La Jara Creek 31, B18
La Joya 22, B60
Laboratories
Los Alamos National ~ (LANL) ..... x, 87, 108
national ~ ..... x, 13, 87, 108
Sandia National ~ (SNL) ..... x, 87, 108
Laboratory 22, 68, 87, 98, 108
Laguna 22, 24, 26, B35, B44, B49-50, B52, B54, B59, B61, B68, B71
~ Gatuna B49, B68
~ Quatro B49, B68
~ Tres B50, B68
~ Uno B49
~ Walden B49, B68
Lake ..... vi-vii, ix, 2, 3, 24, 26-29, 32, 30, 35, 51, 55, 61, 63-64, 89, 92, 96, 98, B11, B21, B27, B35-72, C4-6, D4-6, D8
~ acres 2, 24, 27, 29, 32, 30, 51
Chicosa ~ B48, B50, B68
Eagle Nest ~ 24, 92, B35-36, B43, B56, C4, D4
Fawn ~ B57-58, C8, D8
Goose ~ B37, B58
Hopewell ~ 92, B11, B38, B58
Lane Salt ~ B49, B68
Middle ~ B49, B68
McGaffey ~ B46, B61, C5, D8
Playa ~ 26, 30, 55, 62
publicly-owned ~ 51, 55, 89
~s ..... vi, viii-ix, xi, 3, 13, 18, 22, 25, 29, 32, 30, 35, 51-53, 55, 62, 64, 89, 92, 94, 98, A3, B14, B33, B35-40, B42-43, B45-46, B48, B51-52, 54-55, B57, B59-60, B62-63, B65, B67-68, B70- 72, C4, C8, D4, D8
alpine ~ 55
Seeping Springs ~ B33
Truchas ~ 55
Santa Fe ~ 55, B64
Storrie ~ C5, D5
Land ..... viii, x, 6, 13-14, 22-24, 27-29, 32-33, 36, 46, 56, 59, 63, 69, 83-85, 90-91, 93, 96, 99, 102, 106, 107-108, 110-112, B6, B9-11, B18, B20, B21, B25, B31, B33-34, B38, B47-49, E6

Land (con't.)
~ disposal 23-24, 29, 59, 63, 106, B11, B18, B21, B25, B31, B33-34, B38, B48
dry~ farming 31
~fill ..... x, 69, 93, 99, 102, 109, 112
grass~ 31
~ Office ..... viii, 90, 107, E6
public ~ 32, 85, 93, 102
range~ ..... vii, 13, 29, 59, 69, 84, 107, B36, B49
Lane Salt Lake B49, B68
LANL (Los Alamos National Laboratories) ..... x, 87, 108
Las Cruces 13, 15, 18, 20, 22, 24, 66, 69, 81, 98
Las Huertas Creek 29, B20
Las Vegas 28, B32
Lava 29, 32, 35
Law 24, 35, 38, 80, 93, 96, 101, 106-107, 109, 112
Lea County 28, 88-90, B60
Leach 35, 81, 96
Leachate 93
Lead (Pb) 5, 23-24, 29, 35, 44, 52-53, 80, 83, 87, 96, 98, 104, 106, 109, B24, B35, B38, B45, B50-51
~ milling 35
Leak 100, 107
~ing underground storage tank (LUST) ..... x, 4, 6, 22, 27-29, 35, 43, 70, 92, 100-101
Legislation 12, 24, 93, 99, 108-109
Legislature 6, 80, 82, 88, 93, 101, 104, 106, 107, 111
Levee 73
Level
maximum contaminant ~ (MCL) ..... x, 24, 26
Liability
Comprehensive Environmental Response, Compensation and ~ Act (CERCLA), aka *Superfund*)
..... viii, x, 6, 23-24, 26, 44, 108, 109
Life
aquatic ~ 50, 55-56, 64
Limestone 14, 15, 24, 26, 29, 30, 35
Limited ..... vi, 12, 17, 18, 21, 16, 24, 25, 26, 32, 34-35, 50, 53-55, 70, 87, 93, 100, 109, 110, 111, B49
Lincoln 25, 28, 86, 88-90, 109, B51, B53, B55, B63, B71
~ County 28, 88-90, 109
Line
Digital ~ Graph (DLG) ..... x, 13
Liquid ..... vii, viii, x, 6, 22, 29, 28, 29, 30, 28, 44, 84-85, 92, 96, 102, 111, E3
~ petroleum storage 22, 28-29
~ waste 6, 44, 84-85, 96, 102
Little 27, 24-26, 29, 32, 56, 55, 62, 84, 89, 93, B5, B10, B13, B39, B45, B52, B54, B69-70
~ Tesuque Creek B10
~ Willow Creek B13
Livestock 23, 26, 31-32, 45, 51, 54, 56, 62, 65, 83-84, 94, B49
~ grazing 32, 94
~ watering 31, 45, 51, 54, 56, 62, B49
Loach Minnow B46-48
Load
Total Maximum Daily ~ (TMDL) ..... x, 1, 38, 41, 45, 56, 61, 88-89, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Loading 14, 22, 27, 44, 55, 85, 102
Loan ..... vii, 38, 43, 73, 80-81, 84, 94, 104
construction ~ 38, 41, 43, 80
revolving ~ program 43, 80, 82, 94

Los Alamos ..... x, 22, 24, 29, 87, 108, B60
~ National Laboratories (LANL) ..... x, 87, 108
Los Lunas 22, 24, 92
Los Montoyas 28
Los Pinos B4
Lovelace Respiratory Research Institute (LRRI) {*see also Inhalation Toxicology Research Institute (ITRI)*} ..... x, 87, 108
Lovington 28-29, 92, B55
Lower
~ Colorado River Basin Plan 36
~ Rio Grande ..... v, 22-23, 29, 36, 62
LRRI (Lovelace Respiratory Research Institute) {*see also Inhalation Toxicology Research Institute (ITRI)*} ..... x, 87, 108
Luna 29, 34, 81, 88-90, B42
~ County 29, 88-90
LUST (Leaking Underground Storage Tank) ..... x, 4, 6, 22, 27-29, 35, 43, 70, 92, 100-101

M

Machinery 42
Macroinvertebrate 47, 87, 89
Macrophytes 55
Mahogany 23
Maintenance ..... vii, 15, 19-20, 23-24, 27, 31, 29, 59-60, 63, 80, 83-85, 92, 94-95, 103-104, 106, B38-39, B42, B47, B50, B52
Major ..... xvii, 5, 9, 14-15, 21-24, 26-29, 31-33, 35, 38, 41-42, 44, 55, 56-59, 61, 63-64, 66, 68, 79, 80, 82, 86-88, 90-96, 100, 102, 110
Management ..... vi, v, vi, vii, viii, x, xvii, 1, 5-6, 8-9, 12, 14-15, 18, 21, 23-24, 27-28, 30-31, 33, 36, 38, 41, 43-44, 59, 62, 64-65, 69-70, 75, 80, 83-89, 91-94, 98-99, 102, 106-112, B35-36, E3-4
Bosque Biological ~ Plan ..... vi, 62
Best ~ Practice (BMP) ..... vii, x, 5, 32, 83-88, 106-107
NM Emergency ~ Act ..... viii, 6
Manganese 24, 92, 108
Mangas 27, 35, B46, B51
~ Creek B46, B51
~ Mountains 35
Manufacturing 13, 22-23, 28-29
explosive ~ 29
Manzano 22, 26, 28
~ Mountains 26
Marsh B71
Map ..... viii, 13, 15, 111
Materials
Hazardous and Radioactive ~ Bureau (HRMB) 100
Hazardous ~ Emergency Response Plan 6, 112
Maximum ..... x, 1, 26, 24, 35, 38, 41, 45, 51, 65, 82, 89, 95, 96, 98, 103, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
~ contaminant level (MCL) ..... x, 24, 26
Total ~ Daily Load (TMDL) ..... x, 1, 38, 41, 45, 56, 61, 88-89, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Maxwell 28-29, B34, B44, B61
McGaffey Lake B46, B61, C5, D8
M^c^Kinley 22, 24, 28-29, 31, 88-90, 109, B53, B61
~ County 28, 88-90, 109
MCL (maximum contaminant level) ..... x, 24, 26

Meat packing 22, 29
Memorandum 6, 36, 85
~ of Agreement (MOA) ..... x, 6
Mercury (Hg) ..... ix, xi, 1, 3, 7, 24, 29, 32, 45, 52, 61, 64, 88-89, 104, C3-8, D4-6, D8
Mesa 32, 35
Cebolleta ~ 35
Mesita 22
Mesquite 22-23
Mesoeutrophic 55, B36, B39, B42, B45, B48, B51-52, B54-55, B57, B60, B62, B65, B67, B70, B72
Mesotrophic 55, B36, B39, B42, B45, B48, B51-52, B54-55, B57, B60, B62, B65, B67, B70, B72
Metal 27, 29, 55, 64, 93, 98
heavy ~ 55, 64, 93
Methane
chlorinated ~ 28-29, 93
Methemoglobinemia 22, 92
Mexican 22, 27, 34, 81, 98
Mexico
Gulf of ~ 14, 21, 23-24
Republic of ~ 22, 29, 81
Microbes 92
Middle ..... v-vi, 21-22, 24, 28-29, 35-36, 62, 92, B25, B37, B46-49, B61, B68
~ Lake B49, B68
~ Rio Grande ..... v-vi, 21-22, 24, 28, 31, 36, 62, 92
Migratory 51, 81
Milan 24
Mile 22, 27, 29, 81, B36, B58, B65
Military 27-29
~ installations 28-29
Milling 27, 35
copper ~ 35
lead ~ 35
Mimbres 22-23, 28-29, 34, 62, 86, B54-55
~ Mountains 22
~ River 28-29, 34, B54-55
Mine 24, 29, 61, 63, 106-107, B29, B40-41, B45, B51, B52, B49, B50, E6
~ tailings 59, B50
Mineral ..... iv, v, x, 4, 27, 42, 96, 107, 108, 110, B44-45
N.M. Bureau of Mining and Mineral Resources (BMMR) ..... iv, x
N.M. Energy, ~s and Natural Resources Department (EMNRD) ..... v, x, 41, 44, 110
Mining ..... x, 24, 27-29, 30, 35, 38, 44, 59, 85, 92-93, 95-96, 106, 108-109, 110, 112, E6
~ Act (NMMA) ..... x, 24, 38, 44, 85, 96, 106, E6
~ and milling 24, 28-30, 35, 93
~ Division ..... x, 44, 106, 110, E6
coal ~ 33
~ Commission 106
Minnow 27, B3, B46-48
Fathead ~ 27
Loach ~ B46-48
Minor 10, 29, 55, 58-59, 61, 63, 68, 80, 95, 100
Mississippi River 14
MOA (Memoranda of Agreement) ..... x, 6
Mogollon 27, 29, B46, B50
~ Creek B46, B50
Molybdenum 24, 93
Molycorp B6
Monitor 22, 92, 96, 104

Monitoring ..... vii, viii, ix, xi, 1, 7-8, 11, 18, 24, 20, 32-33, 45, 51, 55-56, 62, 70, 80, 86-90, 95-100, 103-104, 106, 108-110
self-~ 68, 96, 98
Mora 24, 28-29, 92, B28, B38-39, B55-57, B59, B61-64, B66-68
~ County 88-90, 92
~ River 24, B38-39
Motor 93, E7
~ oil 93
Mountains 12, 13, 14, 29, 21-24, 26-29, 31-32, 34-35
Chuska ~ 31, 32
Datil ~ 35
Florida ~ 34
Jemez ~ 22
Mangas ~ 35
Manzano ~ 26
Mimbres ~ 22
San Mateo ~ 22
Sangre de Cristo ~ 24, 28-29
Zuni ~ 29, 32, 35
Muerto, Jornada del ~ 25-26
Municipal ..... viii, x, 5, 18, 22, 23, 28-29, 45, 51, 59, 62-63, 66, 68, 70, 80, 92, 94-95, 100, 102, 106, B3, B7, B11, B13, B18, B21, B32, B35-36, B39, B49, B55, C4, D4, E4, E6
Municipality 30, 62, 69, 82

N

Nacimiento 32, B19
~ Creek B19
Narrative ..... xvii, 41-46
~ standards 41
National ..... x, xi, x, 1, 13, 18, 20, 24, 26-28, 30, 55, 62, 70, 80, 86-89, 95, 98-99, 104, 108-110, B52, B54, B57, B59, B63
Carson ~ Forest 28, B54, B57, B59, B63
~ laboratories ..... x, 13, 87, 108
Los Alamos ~ Laboratories (LANL) ..... x, 87, 108
~ Pollutant Discharge Elimination System (NPDES) ..... xi, 1, 20, 27, 55, 62, 88, 108
Sandia ~ Laboratories (SNL) ..... x, 87, 108
~ Wildlife Refuge B52
Natural ..... x, xi, 13, 22-24, 29-31, 35, 41-42, 44, 60, 63, 79, 84-87, 91-92, 95-96, 98, 106-110, B15, B20-23, B25, B27, B37, B39, B42-47, B49-50, B52-54, E5
N.M. Energy, Minerals and ~ Resources Department (EMNRD) ..... v, x, 41, 44, 110
~ gas 44, 92, 95-96, 98
~ resource 13, 86, 109
Navajo 28-29, 31-32, B39, B45, B62, C8, D8
~ Reservoir 28, 32, B45, B62, C8, D8
~ River 31
Nest
Eagle ~ Lake 24, 92, B35-36, B43, B56, C4, D4
Network 88-89, 111
New Mexico ..... iv, v, vi, vii, viii, ix, x, xi, x, xi, xvii, 1-3, 5-6, 8-10, 12-14, 16, 18, 20-24, 26-33, 35, 36-38, 41, 43-45, 50-53, 55-57, 61-65, 68-70, 74, 79-90, 92-112, A3, B3-B4, B8, B11-12, B16, B19, B22, B26-27, B30, B33-34, B36-37, B39, B40-B43, B45-46, B48, B50-57, B60, B62, B65, B67-68, B70-72, C4, D4, E4-7
~-Colorado Border B41
~ Department of Agriculture (NMDA) ..... iv-v, x, xi, 18, 22, 84, 106
~ Department of Game and Fish (DGF) ..... iv, x, 29, 64, 98, C3, D4

New Mexico, (con't.)
~ Department of Health (DOH) ..... x, 64
~ Department of Labor (DOL) ..... x, 13
~ Emergency Management Act ..... viii, 6
~ Energy, Minerals and Natural Resources Department (EMNRD) ..... x, xi, 41, 79, 87
~ Environment Department (NMED) ..... v, vii-x, vi, 1, 3, 5, 6, 7, 8, 10, 22, 24, 27, 33, 36-38, 41-45, 50-51, 55, 62, 64, 66, 68-70, 72, 79-83, 85-89, 91-112, A3, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56, C3, D4
~ Environmental Improvement Board (EIB) ..... x, 44, 98
~ Forestry and Resource Conservation Division (FRCD) ..... x, 85
~ Ground Water Protection Act 101
~ Heritage Program 62
~ Legislature 80, 82, 89, 101, 107
~ Mining Act (NMMA) ..... x, 24, 38, 44, 85, 96, 106, E6
~ Soil and Water Conservation Commission (SWCC) ..... iv, x, 84
~ Solid Waste Act ..... viii, x, 6, 38, 106
~ State ..... x, xi, 6, 18, 20, 22, 28-29, 36, 44, 80, 85-86, 103, 107, 111-112
~ Highway and Transportation Department (NMSHTD) 85
~ Subdivision Act 111
~ Underground Storage Tank Regulations 101
~ Utility Operators Certification Advisory Board 80
~ Water quality ..... iv-v, vii-viii, x, 5-6, 18, 21, 36-38, 43-45, 50, 82, 93, 96-98, 108-109, 112
NM ~ Act (WQA) ..... vii, 5-6, 38, 41, 43, 70, 82, 93, 96, 98, 109
~ Wetlands Conservation Plan 62
Newsletter 86
NH_3 (ammonia) 22-23, 28-29, 32, 49-50, 58, 61
Nickel (Ni) 24, 52, 53
Nitrate 22, 28-29, 92-93, 108
Nitrogen 55, 92-93
NMDA (New Mexico Department of Agriculture) ..... iv, v, x, xi, 18, 22, 84, 106
NMED (New Mexico Environment Department) ..... v, vii-x, vi, 1, 3, 5, 6, 7, 8, 10, 22, 24, 27, 33, 36-38, 41-45, 50-51, 55, 62, 64, 66, 68-70, 72, 79-83, 85-89, 91-112, A3, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56, C3, D4
NMSHTD (New Mexico State Highway and Transportation Department) 85
Noncompliance 10, 19-20, 80, 82, 96, 106
Non-municipal 5, 62, 66, 68, 100
Nonpoint ..... vii-ix, xi, xvii, 1, 2-5, 7, 10-13, 15, 24, 31, 35-36, 41, 43-46, 50-51, 55-57, 59, 60, 62-63, 70, 75, 81, 83-92, 94, 98, 107, B49
~ source ..... vii-ix, xi, xvii, 1, 2-5, 11-13, 15, 24, 31, 35-36, 41-46, 50-51, 55-57, 59-60, 62-63, 70, 75, 81, 83-92, 94, 98, 107, B49
~ pollution ..... xvii, 1, 5, 12-13, 43-44, 50, 55, 60, 86, 88, 90-91, 98, 107
Nonsupport 27, 30, 55, B35, B37, B40, B43, B46, B48-49, B52
Non-toxic 64
Northern Plains 22
Not support B36, B39, B42, B45, B48, B51, B55
~ed 2, 23-24, 27-29, 46-47, 50, 52, 55-56, B6-7, B9-11, B13-15, B17-B18, B20-25, B27, B29, B31-32, B35-39, B42-49, B51-52, B54-55
~ing 49, B3, B5, B10, B17, B35-37, B39-40, B42-43, B45-46, B48, B51-52, B55
Notice 42, 98, 106
NPDES (National Pollution Discharge Elimination System) ..... vi, viii-ix, xi, 1, 5, 19, 20, 22, 27-28, 30, 42-44, 55, 62-64, 66, 68-70, 79-80, 82, 87-89, 94-96, 100, 102, 108-109, B3, B5, B8, B13, B16, B19, B23, B27, B30, B33, B37, B41, B44, B47, B50, B53

NPDES (National Pollution Discharge Elimination System), (con't.)
~ Permit ..... vi, viii, ix, 63-64, 94-95, 100
~ Program ..... vi, 5, 70
NPS (Nonpoint Source) ..... xi, 83-86, 89-92
Nuclear 109
Numeric ..... viii, 41, 45, 52-53, 70, 85
~ standards 53, 70
Nutrients 2, 23-24, 27-29, 32, 58, 61, 64, 94, B18, B35-44, B46-47, B49, B53-54
Nutt-Hockett 34

O

Oak 23, 32, B52
OCD (Oil Conservation Division) ..... xi, 33, 41-44, 79, 92, 95-96, 98, 107
Office ..... iv, viii, x, 18, 20, 36, 44, 86-88, 90, 102, 107, 110-112, C4, D4, E6-7
~ of the State Engineer (OSE) ..... iv, viii, x, 44, 107, 110
Off-road vehicle 24, 60, 85, B49
Ogallala 14, 30, 92
Oil ..... iv-v, viii-xi, 6, 27-29, 32-33, 38, 41-43, 44, 61, 63, 79, 84-85, 92, 95-96, 98-99, 107, 112, B53-54, E5-6
~ and gas 6, 28-29, 33, 41, 63, 92, 96, 98, 107
~ Act ..... viii, 6, 38, 44, 96, 98
~ Conservation ..... iv, v, xi, 33, 41, 79, 92, 95, 98, 112, E5-6
~ Division (OCD) ..... xi, 33, 41-44, 79, 92, 95-96, 98, 107
crude ~ 29-30, 92, 98
~ field 32, 28, 92, 95, 96, 98, 108, E6
motor ~ 93
Ojo Caliente 29, B15
Oklahoma 24, 93
Oligomesotrophic 55, B36, B39, B42, B45, B48, B51-52, B54-55, B57, B60, B62, B65, B67, B70, B72
Oligotrophic 55, B36, B39, B42, B45, B48, B51-52, B54-55, B57, B60, B62, B65, B67, B70, B72
Onshore 63
Operation ..... vii, 19-20, 23, 27-28, 69, 95, 97, 99-101, 103-104, 106-107
Operator ..... vii, 5, 42, 79, 80, 99-101
Utility ~ ..... vii, 5, 38, 41, 43, 79, 80
Order 8, 20, 16, 20, 29, 43, 44, 43, 68-70, 86, 92, 96-97, 98, 106, 108, B49, E4-5
~s ..... viii, 31, 42, 50, 80, 95-96, 110, E5
Ordinance 62, 69
Organ 22
Organic ..... ix, x, 15, 58, 94, 92-94, 104, 112
~ carbon 58
Otero 25, 28, 81, 88-90, B51, B69
~ County 28, 88-90
Otowi Bridge 29
Outdoor photography 85
Out-of-court settlement 82
Outreach 80, 83, 84, 86
Outreach ..... vii, 70, 85-86
public ~ 70, 85
Overflow 63, 83
Overgrazing 27
Owner 42, 100, 101
Oxbow 22
Oxygen (O_2)...22, 24, 29-30, 32, 50, 58, 61, 79, 94, B13-15, B18, B25, B35-38, B41, B43-44, B46-52, B54

P

Pacific Ocean 23
Packing 22, 29
Pagosa Springs 28
PAH (Polycyclic Aromatic Hydrocarbon) ..... x, 33
Paleozoic 32
Paper 36, 42, 98
Park B9, B53, B56-57, B63-64
  ~ing 24, 60, 63, 85, B50
  NM ~s Division (SPD) ..... iv, x, 90
Partial ..... xi, 2, 14, 23, 27, 109, B37
  ~ support 2, B37
  ~ly supported 2, 50, 55, 56, B3, B7, B9-11, B13-14, B16-25, B27-36, B38-42, B44-54
Pasture 13, 84, B53
  ~land 59, B49
Pathogen 30
Pb (Lead) 5, 23-24, 29, 35, 44, 52-53, 80, 83, 87, 96, 98, 104, 106, 109, B24, B35, B38, B45, B50-51
PCB (Polychlorinated Biphynl) ..... x, 24
Peat 24, 92
Peak,
  Wheeler 29, B58
Pecos ..... v, 14, 24, 26, 28-29, 36, 62, B10, B25, B27-34, B39-42, B64, C5, D6
  ~ River B25, B27-34, B39-42, C5, D6
Penalty ..... viii, 82, 95-96
Perch B64, C4-5, D4-5
Perennial 1, 13, 22, 24-27, 29-30, 34-35, 45, 55, A3, B52
  ~ stream 1, 13, 22, 26, 29-30, 34-35
Performance audit inspection 68
Permian 25, 35
Permit ..... viii, 5, 6, 10, 19, 20, 22, 27-28, 42, 43, 62-64, 68-70, 73, 79-80, 82, 85-86, 89, 93-99, 102, 106, 108-109
  Dredge-and-Fill ~s 5, 44, 55, 86
Pesticide 84, 106, E5
Petroleum 22, 28-29, 33, 43-44, 59, 92-93, 100-101, B50
  liquid ~ storage 22, 28-29
  ~ products 29, 93, 100
  refined ~ 22, 27-29, 92
  NM ~ Storage Cleanup Act 101
pH 23-24, 27-29, 50, 55, 58, 61, 79, 93, 108, B13, B15, B20, B23, B25, B35-38, B41-43, B46-52
Photography 85
Phosphorus 23, 29, 32, 50, 55, 58, 61
Pine 31-32, 84, B52, B69
Piños 22, 31, 29, B19
Pioneer Creek B6
Pipeline 32, E5
Plains
  Great ~ of the United States 30
  Northern ~ 22
  Southern High ~ ..... v, 28-30, 36
Plan
  Bosque Biological Management ~ ..... vi, 62
  discharge ~ 55, 92, 95-96, 98, 108
  Hazardous Materials Emergency Response ~ 6, 112
  ~ning 18, 21, 28, 41, 44, 62, 71, 80, 82, 84-85, 107, 111-112, E7

Plant ..... vii, 2, 30, 13, 23, 58, 69, 84, 86-87, 102-103, 108, 112, B8, B11, B18-19, B24, B34-36, B40-42, B46-52
~ings 32, 84-85
private sewage treatment ~s 29
public sewage treatment ~ 29
Plateau 29, 27, 31
Playa ..... ix, xi, 26, 30, 32, 35, 55, 61-63, 92, B48, B50, B52, B54, B68, B71
~ lake 26, 30, 55, 62
Plume 70, 109
PNM (Public Service Company of New Mexico) ..... x, B3
Point source 4, 5, 22, 23, 24, 22, 24, 28, 29, 28, 30, 35, 42, 55, 56, 62, 64, 70, 79, 81, 85, 86, 87, 88, 87, 92
~ discharge 5, 22, 42, 55, 62, 79
~ pollution 85
Pojoaque River 29, B9
Pollutant ..... xi, 1, 14, 20, 22-24, 27, 29, 32, 28, 30, 48, 55, 62, 70, 84, 88, 102, 108
Pollution ..... vi, vii, viii, ix, x, xi, xvii, 1-3, 5-6, 8, 10, 13, 15, 20, 22-24, 27, 31-32, 36, 41-44, 50-51, 55-57, 62, 64, 70-71, 75, 83-87, 89, 91-94, 96-98, 100, 102, 105-106, 108-109, 112, B49, E5
environmental ~ 27, 33
nonpoint source ~ ..... xvii, 1, 5, 12-13, 43-44, 50, 55, 60, 86, 88, 90-91, 98, 107
point source ~ 85
U.S. Water ~ Control Act (*See also* Clean Water Act) ..... xvii, 41
Polychlorinated biphenyl (PCB) ..... x, 24
Polycyclic Aromatic Hydrocarbon (PAH) ..... x, 33
Pond 16, B58
Ponderosa 32, 84, B23
Population 3, 13, 16, 18, 24-25, 27, 35, 70, 80-81, 85, 87, 100, 104, 106, A3
Portales Valley 30
Potable water 26, 81, 82
Potash 28
Poultry 79
Power 31, 43, B40, B64
Practice
Best Management ~ (BMP) ..... vii, x, 5, 32, 83-88, 106-107
Precipitation 13-14, 23-24, 27-32, 34-35, 55, 84, 87, 92, 98, 102
acidic ~ 51, 98
Pretreatment ..... vi, 28-30, 62, 69
Priority 26-27, 43, 50, 61, 68, 70, 81, 85, 88-89, 94, 92-93, 97
Private ..... viii, 3, 16, 24, 29-30, 84-85, 87, 90, 92-95, 99-100, 106-109
~ sewage treatment plants 29
~ water 3, 16, 24, 87, 109
Problem ..... xvii, 12, 23-24, 29, 70, 79, 83-84, 90, 92, 98, 102, 110
Product 84, 92
~s 4, 22, 27-29, 42, 44, 62, 92-93, 100
petroleum ~ 29, 93, 100
Program ..... vi, vii, viii, x, 1, 5-6, 9, 12, 15, 18, 20, 22, 24, 27-30, 32-33, 41-44, 55-56, 62, 65, 68-71, 73-75, 79-89, 91-94, 96-109, 112
Dredge-and-Fill ~ ..... vi, 73
~s ..... vi, vii, viii, x, xvii, 5-9, 11-12, 18-20, 24, 28, 30-31, 35, 38, 44, 55, 62, 69-70, 80, 82-88, 91, 93-96, 98, 103, 105-106, 108-112
Construction ~ Bureau (CPB) ..... x, 80
Project ..... x, 22, 28, 33, 32, 43, 45, 62, 69, 80, 86, 90, 96, 104, 106, 108-109, B41
demonstration ~ 32, 69, 83, 86, 89, 107
~s 1, 15, 18, 23, 27, 43, 80-81, 83-86, 89-92, 94, 99, 106, 108-109
Promotion 83

Protection ..... v-viii, x, xvii, 1, 5, 6, 8, 11-12, 14, 18, 23-24, 26, 30, 35, 38, 41, 42, 44, 52-53, 62, 69, 79, 84-88, 92-98, 101-102, 104-112, A3, E4, E7
public health ~ 30
U.S. Environmental ~ Agency (EPA) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
Public ..... vi, viii, x, xvii, 3, 5-6, 9, 16, 18, 23-24, 27, 29-30, 32, 35, 38, 41-42, 62, 64, 68, 70, 80, 85, 87, 90, 92-94, 96, 98, 100-104, 106, 108-112, B35, B40, E4, E6
~ education 100
~ health 6, 18, 23, 27, 30, 62, 64, 80, 87, 94, 98, 100-102, 104, 108-109, 111
~ protection 30
~ hearing 41, 98, 108
~ land 32, 85, 93, 102
~ outreach 70, 85
~ sewage treatment plant 29
~ water 3, 6, 38, 80, 103-104, 106, E4
~ly-owned lake 51, 55, 89
Pueblo
de Taos 29, B3, B7
San Filipe ~ 29
Puerco 22, 29, 86, B17-19
Pump 32, 70, 87
~ Canyon 32
~ tests 70
~-and-treat 87
Purification 87

Q

Quality ..... iv, v, vi, vii, viii, ix, x, xi, xvii, 1, 2, 5-8, 9, 10, 11, 12, 14-16, 18, 21-25, 27-32, 34-38, 41, 43-48, 50-53, 55-56, 61-62, 64-66, 68, 70, 80, 82-90, 92, 94-95, 92-93, 96-98, 103-106, 108-112, A3, C4, C6, D4, D6, E3, E6
N.M. Water ~ Act (WQA) ..... vii, 5, 6, 38, 41, 43, 70, 82, 93, 96, 98, 109
N.M. Water ~ Control Commission (WQCC) ..... v, x, 5, 14, 18, 21, 41-45, 79-83, 86-87, 92-93, 96, 98, 100, 102, 106, 108-109, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Quantity 25, 26, 62, 84, 92, 99
Quaternary 30, 35
Quay County 28-29, 88-90
Questa 22, 24

R

Radioactive ..... x, 22, 87, 100, 108
Hazardous and ~ Materials Bureau (HRMB) 100
Radionuclide (RN) ..... x, 22
Radium 103
Rain 13, 23
Rainfall 23, 27-28, 30-32, 79, 84
Range 24-27, 29, 30, 48, 56, 84, 103, 107, B51-52, B55, B57, B60, B62, B65, B68, B71
~land ..... vii, 13, 29, 59, 69, 84, 107, B36, B49
Ranger B46
Ranking system 26, 81, 109
hazard ~ 26, 109
Raton 24, 28, B35

RCRA (Resource Conservation and Recovery Act) ..... x, 38, 98-100, 109
Reach, impaired 55
Recharge ..... x, 16, 30, 32, 85, 106
Reclamation ..... x, 18, 23, 32-33, 44, 62, 69, 85, 93, 106-107, E6
U.S. Bureau of ~ (BoR) ..... x, 62, 85
Reconnaissance Inspection 68
Record 46, 68, 110
Recovery
U.S. Resource Conservation and ~ Act (RCRA) ..... x, 38, 98-100, 109
Recreation ..... vii, xvii, 2, 23, 27-29, 34, 53-54, 63-64, 84-85, 98, B3-4, B6-11, B14-17, B20-22, B24-25, B27-29, B31-38, B35-48
~ use 29
Recreational 24, 27-29, 35, 45, 51, 60, 85-86, 94, B49
~ use 29, 94
Recycling 87, 106
Red River ..... v, 14, 24, 28-29, 61-62, 86, 92, B6-7
Arkansas-White- ~ Basin 14
Town of ~ 61
Referral 108
Refined
~ petroleum 22, 27-29, 92
Refuge B52
Refuse 24, 41-42, 60, 79, 82, 111, B53-54, B49, E6-7
Region 24, 25, 27, 29, 31, 32, 33, 34, 63, 81, 82, 95-96
Regulations ..... vi, vii, viii, x, xvii, 5-6, 18, 20, 22-23, 28, 30, 41, 42, 43, 44, 55, 68, 69, 70, 72, 79, 80, 82, 83, 87, 93, 95-96, 98-104, 106, 108-109, 111-112, E3-7
Regulatory ..... viii, 22, 30, 43, 83, 85, 87, 95, 98, 106, 108
Federal Energy ~ Commission 43
Reinfiltration 70
Release ..... x, 22, 100-101
Remediation ..... vi, x, 6, 8, 18, 21, 24, 29, 38, 42, 63, 70, 87, 93, 98, 100, 101, 106
Report ..... v, xvii, 1, 18, 20, 24, 29, 35-37, 55, 68, 70, 83, 88, 87, 100, 109, 110, 112
Republic of Mexico 22, 29, 81
Requirements ..... viii, xvii, 6, 10, 27, 30-31, 35, 41, 62, 64, 68, 70, 72, 79-80, 83, 85, 92-93, 95-104, 106-107, 111-112
Research ..... x, 13, 18, 22, 62, 87, 98, 104, 108, 110, 112
Inhalation Toxicology ~ Institute (ITRI) {*see also Lovelace Respiratory ~ Institute (LRRI)*} ..... x, 87, 108
Lovelace Respiratory ~ Institute (LRRI) {*see also Inhalation Toxicology ~ Institute (ITRI)*} ..... x, 87, 108
Reservation
Jicarilla Apache ~ 28, 31
Southern Ute Indian ~ 63
Reservoir ..... vii, 16, 23, 29, 22, 24, 28-32, 34, 30, 51, 64, 89, 98, B14-15, B17, B19, B24-B25, B27, B35, B37-41, B44-45, B47, B51, B54, B60, C4-6, C8, D4-6, D8
Bear Canyon ~ 30, 34, B47, B51, C4, D4
Cochiti ~ B38, B56, C6, D6
Elephant Butte ~ B56, C8, D8
Navajo ~ 28, 32, B45, B62, C8, D8
Resource ..... vii, xi, x, 2, 16, 23, 27-30, 32, 38, 59, 63, 84-86, 98, 100, 106-108, B6-7, B11, B15, B18, B24-25, B29, B34, B39-41, B49-52, B54-55
~ Conservation and Recovery Act (RCRA) ..... x, 38, 98-100, 109
~ extraction 2, 23, 28-29, 32, 59, 63, 84-85, B6-7, B11, B15, B18, B24-25, B29, B34, B39-41, B51-52, B54-55
Forestry and ~ Conservation Division (FRCD) ..... x, 85

Resource, (con't.)
natural ~ 13, 86, 109
Respiratory ..... x, 87, 108
Response
Comprehensive Environmental ~, Compensation and Liability Act (CERCLA), aka *Superfund*
..... viii, x, 6, 23-24, 26, 44, 108-109
Hazardous Materials Emergency ~ Plan 6, 112
Responsibilities ..... v, 41, 43-44, 69, 86, 94, 98, 109
Responsibility 6, 23, 31, 41-42, 62, 64, 80, 95, 98, 101, 106
Restoration ..... x, 43, 59, 62, 85-86, 89-92, 108
environmental ~ (ER) ..... x, 93, 109
Revolving loan program 43, 80, 82, 94
Ribera 28
Rincon 22
Rio ..... v-vi, viii, 13-14, 21-24, 26, 28-29, 31, 35-36, 61-62, 81, 86, 89, 92, 108-109, B3-11, B13-25, B28, B33-39, B41, B51, B53, 54-59, B61-64, B66, B71
~ Arriba County 28-29, 88-90, 109
~ Brazos B13
~ Chama 14, 29, 92, B11, B13-15
~ Chamita B11
~ del Oso 29, B14
~ Embudo 86
~ Fernando de Taos B7
~ Grande ..... v, vi, viii, 13-14, 21-24, 29, 31, 35-36, 62, 81, 89, 92, 108, B3-11, B13-25, B35-39
~ Basin ..... v, viii, 21-24, 29, 31, 35-36, 108
Lower ~ ..... v, 22-23, 29, 36, 62
Middle ~ ..... v-vi, 21-22, 24, 28, 31, 36, 62, 92
~ Hondo 28, 29, 61, B33
~ Ojo Caliente 29, B15
~ Pueblo de Taos 29, B3, B7
~ Puerco 22, 29, 86, B17-19
~ Ruidoso B33
~ San Jose 22, 35, 61, B24-25
~ Tusas 29, B15
Riparian 27, 29, 31-33, 59-62, 84-87, 91, 108, B34, B41-42, B49
~ fencing 32
~ Program 32-33
~ vegetation 27, 29, 31, 60, 62, 85-86
Rito B11, B13-15, B17-19, B22-23, B27-28, B31
~ de los Frijoles 29, B11
~ Cañon de Frijoles B11
River ..... v, viii, ix, 2, 3, 13, 14, 20-24, 26-34, 28, 36, 55-56, 61-62, 65, 86, 90, 92, 100, 108, B3-4, B6-7, B9, B18, B20-22, B25, B27-55, C4, C6, C8, D4, D6, D8
Arkansas-White-Red ~ Basin 14
Canadian ~ 24, B34-39, B42-45, B48
Cimarron ~ 92, B34, B36, B52
Colorado ~ ..... v, 14, 29, 27, 28, 36, 65, B41, B46-47
Gallinas ~ 28, 35, 86, B32
Gila ~ 27, 29, B46-52
Jemez ~ 22, 29, 92, B3, B20-23
Mimbres ~ 28-29, 34, B54-55
Mississippi ~ 14
Mora ~ 24, B38-39
Navajo ~ 31
Pecos ~ B25, B27-34, B39-42, C5, D6
Pojoaque ~ 29, B9

River, (con't.)
Red ~ ..... v, 14, 24, 28-29, 61-62, 86, 92, B6-7
San Francisco ~ 29, B42-45
San Juan ~ ..... v, 14, 28, 31-33, 36, 65, B39-41, B45-46, C6, C8, D6, D8
Santa Fe ~ 29, 92, B18
RN (radionuclide) ..... x, 22
Road ..... vii, 12-13, 23-24, 27-29, 32, 36, 59-60, 63, 84-85, 89, 103, 107, B3-7, B10-11, B14-15, B18, B20-23, B25, B29-32, B34, B37-39, B42, B45, B47, B49-50, B52-53
~ watering 103
Rock 28-30, 83, 106, B27, B56
hard~ 44, 106
Roosevelt 28, 30, 110, B63
Roswell 28, 69, 110, B53
Rotation 84
Ruidoso 28, 86, B31, B33
Rule 28, 69, 98, 103, 112, E7
Runoff 4, 12, 21-24, 27-29, 59-60, 63, 69-70, 79, 85, 92, 107, B50, B53

S

Safe Drinking Water Act (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
Sagebrush 31
Saline 15, 25-26, 35, 44, 87, 96
Salinity 28, 29, 32, 58, 61, 65, 86, 96, 110, B50
Salt 31-32, 25, 26, 63, 86, 96, 107, B49, B68
~ cedar 31-32, 86
Sample ..... ix, xi, 53, 89, 92, 96, 103, 108
Sampling 5, 18, 22, 29, 48, 68, 86-90, 92, 96, 98, 103, 109
compliance ~ inspection 68
San Acacia 21
San Agustin 22
San Andres 22, 26, 28, 35
~ Limestone 35
San Felipe 29, 92
~ Pueblo 29
San Francisco 27, 29, 36, 62, 86, 92, B42-45
~ River 29, B42-45
San Jose 22, 35, 61
San Juan ..... v, 14-15, 28, 30-33, 36, 62, 65, 87-90, 92-93, 98, 109-110, 112, B39-41, B45-46, B54, B59-60, C6, C8, D6, D8
~ Basin 15, 32-33, 87, 92, 98, 110, B24-25
~ County 29-31, 88-90, 92, 109, 112
~ Mountains 28, 32
~ River ..... v, 14, 28, 31-33, 36, 65, B39-41, B45-46, C6, C8, D6, D8
San Marcial 21, 22, 62
San Mateo 22-23, 35
~ Mountains 22
San Miguel 24-25, 28-29, 88-90, B56, B61-62, B66, B71-72
~ County 24, 88-90
San Rafael 22
Sand 14, 107, B39
Sandia ..... x, 22, 28, 87, 108, B3
~ National Laboratories (SNL) ..... x, 87, 108
Sandoval 22, 24, 29, 31, 88-90, B56, B58, B64
~ County 29, 31, 88-90

Sandstone 14-15, 26, 29, 32, 35
Glorieta ~ 26, 35
Sangre de Cristo Mountains 24, 28-29
Sanitary 70, 82, 105, E5
Sanitation 81
Santa Clara Creek 29
Santa Fe ..... v, 13-14, 18, 20, 22, 24-25, 28-29, 36-38, 44, 55, 69, 87, 92, 97-98, 109, 111-112, B18, B59-60, B62, B64, B66
City of ~ 29
~ Lake 55, B64
~ River 29, 92, B18
Santa Rosa 28, 64, B27, B40, B64, B66, C4, D3
Santo Domingo Valley 29
SARA (Superfund Amendments and Reauthorization Act) ..... x, 109
Scenic
Wild and ~ River 29
School 80, 104, 107, B9, B21, B27, B39-40
SDWA (Safe Drinking Water Act) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
Seam
Fruitland Coal ~ Development 32
Seboyeta 24
Secchi 55, 98
Sedillo 22, 24
Sediment 13, 27-28, 32, 48, 64, 83, 85, 98, 107
Seeping Springs Lakes B33
Selenium 24, 29, 32, 52, 103, 104
Self 29, 68, 80, 96, 98
~-monitoring 68, 96, 98
Senator 62
Septage 6, 29, 82-83, 93, 102, B49
Septic 4, 22, 24, 27-29, 35, 81, 92-93, 96, 102-103, 111
~ tank 4, 22, 24, 27-29, 35, 81, 92-93, 96, 102-103
Service ..... xi, x, 3, 10, 13, 18, 20, 22, 28, 29, 33, 55, 64, 69, 84-86, 91, 93-95, 96, 98, 100, 107, 110, 112, B35, B40
~ stations 22, 28-29, 100
U.S. Agricultural Stabilization and Conservation ~ 107
U.S. Forest ~ (USFS) ..... x, 3, 10, 14, 55, 69, 85, 87, 91, 92, B8, B11, B19, B24, B46
U.S. Fish & Wildlife ~ (USFWS) ..... x, 33, 62, 64, 98
Settleable solids 79
Settlement 27, 82, 96
~ agreements 96
out-of-court ~ 82
Sevilleta 22
Sewage ..... vi, 22, 24, 27-29, 65, 68-69, 82-83, 92, 96, 100, 102, 111, E6
~ disposal 92
~ treatment 22, 27-29, 92, 100, 102
private ~ plants 2
public ~ plant 29
Shale 30
Shellfish ..... xvii, 35
Shrubs 32
Sierra 22, 24-25, 27, 29, 34, 81, 88-90, B54, B56
~ County 29, 88-90
~ de las Uvas 22
Significant 5, 10, 15, 24, 27-31, 34, 42, 47, 49, 51, 55, 62, 64, 70, 81, 83-87, 94, 99, 104, 108
Siltation 27, 29, 58, 61, 64, 84, B9, B29, B35-50, B52-54

Silver 28-29, 53, 66, 82, 86, 104, B45
~ City 29, 66, 82, 86
~ Creek B45
Silviculture ..... vii, 23, 24, 27, 29, 59, 63, 84-85, B4-5, B11, B15-17, B20, B24, B30, B37-38, B41, B43, B46-47, B49-50
Sink
Williams ~ B49, B68
Site ..... vii, x, 11, 22-23, 28-29, 41, 46-47, 68, 70, 80-81, 84-85, 99-102, 109, 112, B9, B49
Ski 60, 61, 86, B3, B49
Twining ~ Valley 61
Slaughterhouses 92
Slope 21, 28, 60, 102, B49
Sludge ..... vi, 30, 42, 62, 66, 68-69, 83, 102
Snail
Alamosa Spring ~ B25
SNL (Sandia National Laboratories) ..... x, 87, 108
Snow 13, B47-48, B65
Socorro 21-22, 24-25, 35, 88-90, B56-57
~ County 22, 35, 88-90
Soil ..... iv, x, 18, 22, 32, 35, 42, 62, 69, 84-86, 87, 90, 92, 100, 102
~ & Water Conservation Commission ..... iv, x, 84
~ Conservation Service 84
~ type 32, 87
Solid ..... v, viii, x, 6, 38, 44, 69, 82-83, 98-99, 102, 106, 109, 111, E4
~ waste 6, 38, 44, 82-83, 98, 106, 109, 111
NM ~ Act ..... viii, x, 6, 38, 106
Solids ..... x, 22, 24, 26-28, 30, 32, 35, 79, 93-94, 102
settleable ~ 79
Solution 24, 29
Solvents 22, 28-30, 35, 92-93, 99
Southern ..... v, 23, 24, 26, 28-29, 30-32, 34-36, 63, 81, 86
~ High Plains ..... v, 28-30, 36
~ Ute Indian Reservation 63
Southwestern Closed Basin ..... v, 29-30, 34-36
SPD (State Parks Division) ..... x, 90, 110
Species 27, 31, 47, 62, 64, 69, 84, 93, C4-8, D4-6, D8
endangered ~ 30
Spikedace B46-48
Spill 6, 24, 41, 79, 83, 85, 107
Spring 22-24, 26, 34, B25
Alamosa ~ Snail B25
~s 28-29, 32, 35, 87, 109, B21, B33-34, B43, B51, B54-55, B69, B71
Horse ~ 35
Pagosa ~ 28
Seeping ~ Lakes B33
Spruce 23, 31
Stabilization
U.S. Agricultural ~ and Conservation Service 107
Standard ..... x, 3, 5, 24, 26-27, 48, 55, 70, 86, 92, 95, 103, 111, E5
~s ..... viii, xi, 5, 6, 12-13, 18, 22, 25-26, 30-31, 24, 41-42, 45-46, 50-52, 55, 62, 64-66, 68, 70, 80, 85-90, 92-93, 95-98, 100, 102-104, 106-109
narrative ~ 41
State ..... iv, v, vi, vii, viii, x, xi, xvii, 1, 3-8, 10-16, 18, 20-24, 26, 28-33, 35-38, 41-45, 51, 55-56, 61-62, 64, 66, 68-71, 75, 79-104, 106-112, A3, B4, B7-8, B12, B16, B19, B22, B24, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56, B52-55, B57, B60, B62, B65, B67, B70, B72, C3, D3, E4-7

State, (con't.)
~ Engineer ..... iv, v, viii, x, 16, 20, 36, 44, 88, 98, 106-107, 110-111, E4-5
~ Office 20, 36, 88, 111
~ Highway ..... x, 85, 90, B55
~ Highway and Transportation Department (SHTD) ..... x, 85
~ Land Office ..... viii, 90, 107
~ Legislature 6, 106, 111
~ Parks Division (SPD) ..... iv, x, 90
Statement 111
Station 20, 22, 29, 48, 88-89, B3, B46
gaging ~ 22
service ~s 22, 28-29, 100
Statute 93, 96, 107
Storage ..... v, viii, x, 4, 22, 26-29, 32, 34, 38, 42, 44, 51, 56, 63, 87, 98-101, 106, 110, B49, E3
above-ground ~ tank (AST) ..... x, 28-29, 92
liquid petroleum ~ 22, 28-29
NM Petroleum ~ Cleanup Act 101
STORET ..... ix, x, xi, 45, 53, 89
Storm water 63, 68, 70, 84
Storrie Lake C5, D5
Stream ..... iv, vi, viii, ix, x, xi, 27-28, 13-14, 18, 22, 27-29, 32, 45, 47, 49, 55-56, 58-59, 61-62, 68, 70, 83-89, 92, 95, 100, 107, B3-7, B9, B11, B13, B15-25, B27-35, B37-41, B43, B45-46, B48, B50-54
~bank 29, 60, 85, B3-7, B9-11, B13-25, B27-42, B45, B48-54
~flow 32, 89
Studies ..... vii, 1, 7, 24, 26, 55, 88-89, 92-93, 103, 107, 109-110
Study 41, 45, 55, 62, 88, 92-93, 103
Subbasin
Animas Closed ~ 29
Subdivision 4, 82, 102, 111, B40, E6-7
NM ~ Act 111
Substances
toxic ~ 30
Sulfate 29, 93, 108
Sulfide 92
Sumner, Ft. B53
Superfund (*aka* Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) ..... viii, x, 6, 23-24, 26, 44, 108-109
~ Amendments and Reauthorization Act (SARA) ..... x, 109
Supplies
surface drinking water ~ 64
Support ..... vi, viii, 2, 18, 23-25, 28-29, 32, 43, 45-56, 49, 50-53, 55-56, 62, 65, 86, 100, 103, 109, B37, B40, B43, B46, B48, B52
Supporting, fully ..... viii, ix, xi, 46, 48, 49, 50, 51-52, 56, 58-59, 61, 63, B5, B8-11, B15, B17-19, B21, B24-25, B27-32, B34-40, B42-46, B48, B51-B53, B55
Surface ..... v, vi, vii, viii, x, xi, xvii, 1, 4-7, 9, 12-16, 21-27, 29-36, 38, 41-42, 45-46, 50, 56, 59, 62, 64-65, 70, 79, 82-89, 94-100, 102-103, 106-109, 112, A3, B49, C4, D4, E6
~ drinking water supplies 64
~ impoundment 4, 87, 96, 98-99
~ water ..... xvii, 1, 5, 6, 12, 14-16, 21, 25, 27, 29-32, 34, 41-42, 45, 56, 62, 65, 70, 79, 82, 85, 87-88, 94, 97-100, 103, 106, 108-109, A3
~ quality 1, 15, 41, 45, 65, 85, 88, 94, 109
~ Bureau (SWQB) ..... x, 38, 83, 85-86, 111, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56
Survey ..... viii, ix, x, xi, 7, 13, 61, 88, 92-93, 98, 110, 112
comprehensive ~ 87

Surveys ..... ix, xi, 1, 45, 48-49, 55, 62, 80, 88-89, 92, 94
Swimmable 50, 56
Swine 79
SWQB (Surface Water Quality Bureau) ..... x, 38, 83, 85-86, 111, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B56
System 28, 62, 86
    Cowardin ~ 62
    Eco~ ..... vi, 62, 84, 85, 89, 62, 108
    Geographic Information ~ (GIS) ..... x, 111
    life ~ 28, 86
    National Pollutant Discharge Elimination ~ (NPDES) ..... xi, 1, 20, 27, 55, 62, 88, 108
    ranking ~ 26, 81, 109
        hazard ~ 26, 109

T

Table ..... v, viii, xi, 24, 29, 46, 49-52, 53, 55-56, 58-59, 61-64, 70, 76-78, 89, 92, B3, B5, B8, B13, B16, B19, B23, B27, B30, B33, B35, B37, B40-B41, B43-44, B46-54, B-57, B60, B62, B65, B68, B71, C3-8, D3-6, D8
    ~s ..... v, viii
Tailing 42, 59, 63, 93, 109, B49-B50
    mine ~s 59, B50
Tank ..... v, viii, x, 4, 22, 24, 27-29, 35, 43-44, 81, 87, 92-93, 96, 100-103, B69, E3
    above-ground storage ~ (AST) ..... x, 28-29, 92
    ~s 4, 22, 24, 27-29, 32, 92, 98, 100-102
    septic ~ 4, 22, 24, 27-29, 35, 81, 92-93, 96, 102-103
Taos 22, 24, 29, B7, B51, B54, B56-59, B61-62, B64-65, B67
Tar bush 23
Tatum 28
TCE (trichloroethylene) 22, 28
TDS (Total Dissolved Solids) ..... x, 14, 22, 24, 27-30, 35, 42, 58, 61, 92-93, 98, B52
Technical ..... x, 18, 20, 30, 41-42, 68, 80, 83-84, 86-87, 96, 102-105, 108-109
Telemetry 83
Temperature 2, 23-24, 28-30, 32, 50, 55, 58, B3, B5, B7, B9-11, B13-18, B20-25, B31-39, B42-52, B54
    ~s 24, 29, 89
Terrace 32
Terrero 29, B29
Tertiary 30, 35
Test 92, 108
    ~s 27-28, 108
Tesuque 22, 92, B10
Texas 13, 22, 24, 28-29, 81, 89, 96, B34
Threatened ..... ix, xi, 2-3, 30, 33, 51, 55, 62, 70, 84, 100, B46-48, B54
Tillage 84
Timber 85-86, 89
Tissue 32, 61
TMDL (Total Maximum Daily Load) ..... x, 1, 38, 41, 45, 56, 61, 88-89, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
Toluene 22, 28-29
Topography ..... x, 22, 29, 30, 32-33
Torrance 22, 25, 28, 88-90, B57, B71
    ~ County 28, 88-90
Total ..... viii-x, 1, 3, 13-14, 16, 18, 22-25, 27-32, 35, 38, 41-42, 45, 50, 52-53, 55, 58-63, 80, 87-88, 93, 98, 101, 103-104, A3, B3-4, B6-8, B11-12, B14-23, B26, B30, B32-B33, B35, B37-38, B40, B43, B46-48, B50, B52-53, B57

Total, (con't.)
~ dissolved solids (TDS) ..... x, 14, 22, 24, 27-30, 35, 42, 58, 61, 92-93, 98
~ Maximum Daily Load (TMDL) ..... x, 1, 38, 41, 45, 56, 61, 88-89, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
~ organic carbon 23, 58, B11, B14-15, B17-18, B20-23, B37, B47
~ phosphorous 28, B3, B6
Town 22, 61
~ of Red River 61
Toxic ..... vi, 2, 27, 29-30, 48, 49, 62, 62, 66, 70, 112
~ substances 30
Toxicology
Inhalation ~ Research Institute (ITRI)) {*see also Lovelace Respiratory Research Institute (LRRI)*} ..... x, 87, 108
Toxins 23, 29, 32
Trace elements 93-94, 104
Trade 13, 81, 100
Training ..... vii, 43, 68, 80, 85-86
Transportation ..... x, 85, 91, 92, 98, E5, E7
Trash 82
Treat
pump-and-~ 87
Treatment ..... viii, x, 5, 9, 18, 20, 22, 27, 29-30, 32, 42-43, 45, 56, 62, 68-69, 71, 80-83, 94-96, 98-100, 102-104, 109, 112
Colonias Wastewater ~ Construction Grant Program 82
~ plant 18, 27, 29-30, 42, 56, 62, 69, 72, 82, 98, 100, 102-103
private sewage ~s 29
Triassic 30
Tributaries 21-22, 24, 27-29, 31-33
Tributary 22, 28-29, 32
Trichloroethylene (TCE) 22, 28
Triennial 41, 62
~ standards review 62
Trophic ..... vi, 47, 55, 89, 98, B35-37, B39-40, B42-43, B45-46, B48, B51-52, B55, B57, B60, B62, B65, B68, B71
~ state 55
Trout 27, B45, B47, B49-50, B63, C4-8, D4-6, D8
Gila ~ B47-50
Truchas B66-67
~ Lakes 55
Truck 93
Tucumcari 28-29, 30, B67
~ Shale 30
Tularosa 25-27, 29, 35, B43-44, B53
Turbidity 23-24, 28-29, 32, 50, 55, 58, 61, 84, 90, 103, B3-7, B9-11, B13-15, B17, B20-25, B27-33, B35-39, B41-42, B45-51
Twining Ski Valley 61

U

Unauthorized spills 29
Underground ..... v, viii, x, 6, 13, 16, 20, 22, 27-29, 32, 34, 38, 41, 44, 63, 70, 87, 92, 96, 98, 100-101, 106, 108-109, 111, E3
~ injection control 38, 41, 96, 108-109
~ storage tank ..... x, 6, 38, 44, 63, 70, 92, 98, 100-101, 108, 111, E3
~ Bureau (USTB) ..... x, 101
~ program ..... x, 38, 70, 108

Underground storage tank regulations 98
Unincorporated 81-82
Union 24, 29, B56
United States (U.S.) ..... v, viii, x, xi, x, xi, xvii, 1, 3, 5, 7, 10, 12-13, 18, 20-24, 26-30, 32-33, 35-38, 43, 45, 53, 55, 61, 62, 64, 68-70, 74, 81-82, 84-85, 88, 91-92, 97-99, 103, 110, 112, A3, B13, B54
~ Agricultural Stabilization and Conservation Service 107
~ Army Corps of Engineers 5, 62, 64, 74
~ Atomic Energy Act 22
~ Bureau of Land Management (BLM) ..... x, 33, 93, 110
~ Bureau of Reclamation (BoR) ..... x, 62, 85
~ Clean Water Act (CWA) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
~ Department of Defense (DoD) ..... x, 27, 99
~ Department of Energy (DoE) ..... x, 99
~ Department of the Interior (DoI) ..... x, 18, 33, 36
~ Environmental Protection Agency (EPA) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
~ Fish and Wildlife Service (USFWS) ..... x, 33, 62, 64, 98
~ Forest Service (USFS) ..... x, 3, 10, 14, 55, 69, 85, 87, 91, 92
~ Geological Survey (USGS) ..... viii, x, xi, 7,-8, 13, 22, 33, 43, 61, 86, 88-89, 110-111
Great Plains of the ~ 30
~ Resource Conservation and Recovery ~ (RCRA) ..... x, 38, 98-100, 109
~ Safe Drinking Water Act (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
University of New Mexico (UNM) ..... v, 18, 22, 62, 104, 112
Uplift 32
Upper ..... v, 21-23, 26-29, 31-32, 34, 36, 62, 108, B55
Uranium 22, 24, 27, 30, 93, 103, 109
U.S. (United States) ..... v, viii, x, xi, x, xi, xvii, 1, 3, 5, 7, 10, 12-13, 18, 20-24, 26-30, 32-33, 35-38, 43, 45, 53, 55, 61, 62, 64, 68-70, 74, 81-82, 84-85, 88, 91-92, 97-99, 103, 110, 112, A3, B13, B54
~ Agricultural Stabilization and Conservation Service (ASCS) 107
~ Army Corps of Engineers (ACE) 5, 62, 64, 74
~ Atomic Energy Act 22
~ Bureau of Land Management (BLM) ..... x, 33, 93, 110
~ Bureau of Reclamation (BoR) ..... x, 62, 85
~ Clean Water Act (CWA) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
~ Department of Defense (DoD) ..... x, 27, 99
~ Department of Energy (DoE) ..... x, 99
~ Department of the Interior (DoI) ..... x, 18, 33, 36
~ Environmental Protection Agency (EPA) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
~ Fish and Wildlife Service (USFWS) ..... x, 33, 62, 64, 98
~ Forest Service (USFS) ..... x, 3, 10, 14, 55, 69, 85, 87, 91, 92
~ Geological Survey (USGS) ..... viii, x, xi, 7,-8, 13, 22, 33, 43, 61, 86, 88-89, 110-111
~ Resource Conservation and Recovery Act (RCRA) ..... x, 38, 98-100, 109
~ Safe Drinking Water Act (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109

Use ..... vi, viii, 6, 13, 15, 20-24, 26, 28-29, 32, 41-42, 44, 46-47, 49, 50-53, 55-56, 62, 64, 69, 81, 84-87, 94-95, 98,-101, 103, 106-108, 110-112, B36, B39, B42, B45, B48, B51, B55, E4
attainable ~ ..... viii, ix, xi, 2, 9, 23, 24, 29, 51, 55, 56, 61-63, 94
~ attainment 51, 55, 62
designated ~ ..... vi, ix, xi, 2, 22, 27-32, 41, 45, 50-51, 53, 55-56, 62, 64, 70, 94, B35, B37, B40, B43, B46, B48-49, B52
recreation ~ 29
recreational use 29, 94
~ support ..... vi, viii, 46, 49-53, 55, B36, B39, B42, B45, B48, B51, B55
USEPA (United States Environmental Protection Agency) ..... v, viii, x, xvii, 1, 5, 6, 7, 9, 12-13, 15, 18, 24, 26-32, 38, 41-43, 45, 47, 48, 53, 55-56, 58, 60, 62-64, 68-70, 72, 79-80, 82-83, 86, 88-89, 92-93, 95-100, 102-106, 108-112, A3, B36, B39, B42, B45, B48, B51, B55
USFS (United States Forest Service) ..... x, 3, 10, 14, 55, 69, 85, 87, 91, 92, B8, B11, B19, B24, B46
USFWS (United States Fish & Wildlife Service) ..... x, 33, 62, 64, 98
USGS (United States Geological Survey) .. viii, x, xi, 7,-8, 13, 22, 33, 43, 61, 86, 88-89, 110-111, B25, B50
USTB (Underground Storage Tank Bureau) ..... x, 101
Utah 31
Ute 24, 31-32, 63, B45, B67, C6, D7
Southern ~ Indian Reservation 63
Utilities 43, 80, 103
~ Technical Assistance Program 80, 103
Utility ..... vii, 38, 41, 43, 55, 79-80, 90, 92, 95, 111
~ operator ..... vii, 5, 38, 41, 43, 79, 80

V

Vacuum truck 83, 93
Valencia 22, 24
Vallecitos B11, B15, B23
~ Creek 29
Valley
Portales ~ 30
Santo Domingo ~ 29
Twining Ski ~ 61
Valves 92
Vanadium (V) 66
Vapor 86, 87
~ ventilation 87
Vegetation 31, 27, 32, 62, 84, 86, B34, B41, B42, B49
Vehicle 22, 24, 27, 60, 85, B49
off-road ~ 24, 60, 85, B49
~s 27, 60
Violation 70, 82, 96, 101
~s 27, 55, 79, 85-86, 95, 98, 101-102
Virden 27
Volatile ..... x, 103, 108, 112
~ organic ..... x, 103, 108
Voluntary ..... x, 6, 12, 45, 38, 80, 83, 85, 96, 100, 105, 107
Volunteer 7, 86, 107
Vulnerability ..... viii, 15, 33, 87, 92, 103, 104
~ map 87
Vulnerable 3, 15, 87, 92, 98, 100, 103
~ aquifer 3, 87, 100
~ ground water 98

W

Wagon Mound 29, B68
Walleye C6-8, D6, D8
Wamel 29
Wash, Chaco ~ 31
Waste ..... v, vii, viii, x, 6, 22, 28-29, 38, 44, 59, 61-62, 69, 83, 85, 87, 92-95, 98-99, 100-103, 106, 108-109, 112, B49, E3-4
hazardous ~ ..... x, 6, 23-24, 26, 38, 44, 59, 85, 93, 98-99, 108-109, B49, E3
~ Isolation Pilot Plant (WIPP) ..... x, 87, 108
liquid ~ 6, 44, 84-85, 96, 102
~ oil 28, 92, 98
~s 22, 27-30, 62, 83, 93, 96, 98-99, 102, 111
Solid ~ Act ..... viii, x, 6, 38, 106
~water ..... vi-vii, 18, 20, 24, 27, 30, 38, 41-43, 45, 56, 59, 62, 69-71, 79, 80-82, 94, 92, 96, 100, 102, 109, B7, B35-36, B49
~ revolving loan program 38
Colonias ~ Treatment Construction Grant Program 82
Water ..... iv-xi, xvii, 1-16, 18, 20-38, 41-46, 48, 50-56, 58, 60-66, 68-72, 74-75, 79-112, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B35-37, B39-43, B45-46, B48-49, B51-53, B55-56, C4, D4, E3-4, E6-7
~ and Wastewater Association 80
~ basin 16, 20, 34
~bodies ..... xi, 5, 45, 51, 58, 60, 85, 88-89, 109
~body 49, 55, 58, 60, 88-89
Clean ~ Act (CWA) ..... v, vi, x, xvii, 3, 5, 12-16, 18, 20-22, 27-28, 30-31, 35, 37-38, 41, 43-45, 48, 50-51, 53, 55, 56, 62, 64, 68, 70, 72, 80-82, 84-87, 92, 94, 97, 102, 108-109, A3, B4, B8, B11, B15, B19, B22, B26, B30, B33, B36, B39-40, B42-43, B45-46, B48-49, B51, B53, B55-56
~course 22, 42, 62, 70, 79, 82, 87, 102
drinking ~ ..... v, viii, x, 3, 5-6, 24, 26, 38, 46, 51, 53, 80, 86-87, 96, 103-106, 108, E4
~ Bureau (DWB) ..... v, x, 103, 105
~fowl 51-52
Ground ~ Protection Act 101
livestock ~ing 31, 45, 51, 54, 56, 62, B49
~ pollution control ..... xvii, 18, 37, 41, 44, 79, 80, 88, 93, 109
~ Pollution Control Act (*See also* Clean Water Act) ..... xvii, 41
~ pollution control program ..... xvii, 18, 93
potable ~ 26, 81, 82
private ~ 3, 16, 24, 87, 109
public ~ 3, 6, 38, 80, 103-104, 106, E4
~ quality ..... iv-xi, xvii, 1-3, 5-9, 12-16, 18, 21-24, 26-38, 41, 43-45, 50-53, 55-56, 58, 60-63, 65-66, 68, 70, 79, 80-94, 96-98, 100, 104, 106-112, A3, C4, D4, E3, E6
~ Act (WQA) ..... vii, 5, 6, 38, 41, 43, 70, 82, 93, 96, 98, 109
~ Control Commission (WQCC) ..... v, x, 5, 14, 18, 21, 41-45, 79-83, 86-87, 92-93, 96, 98, 100, 102, 106, 108-109, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
~ Regulations ..... vii, viii, 41-42, 79, 82-83, 87, 96, 98, 100, 102
~ permit 31
~ Resources Research Institute (WRRI) 98, 110
road ~ing 103
Safe Drinking ~ Act (SDWA) ..... x, 5, 26, 30, 38, 80, 96, 103-105, 109
~shed ..... vii, 6, 13, 18, 22-23, 27-29, 30, 32, 36, 43, 47, 70, 83-86, 88-92, 108-109
storm ~ 63, 68, 70, 84
~ supply 5, 16, 24, 31, 54, 56, 70, 81, 94, 100, 103-104, 108
~ table 3, 15, 87, 92, 100

Water, (con't.)
~ Utilities Technical Assistance Program 80, 103
Welfare 106, 111
Well ..... v, xvii, 5, 7, 9, 13, 20, 22-23, 27-29, 32-33, 45, 51, 56, 62, 64, 69, 73, 79-80, 84-85, 88-89, 92-93, 96, 101-102, 105-109, 111-112
~ casings 92
~head protection ..... viii, x, 6, 98, 105-106
~ program (WHPP) ..... viii, x, 6, 105-106
~ basin 16, 20, 34
Western Closed Basins 16, 20, 34
Wetlands ..... vi, 3, 5, 18, 22, 30, 62, A3
~ Conservation Plan 62
Wheeler Peak 29, B58
White
Arkansas- ~ -Red River Basin 14
Rock Canyon 29
~water 29, 85, B45
~ Creek 29, B45
WHPP (Wellhead Protection Program) ..... viii, x, 6, 105-106
Wild 29, 85
~ and Scenic River 29
Wilderness 27, 29, 56, 51, 98, B10, B16, B49-50, B54, B58
Gila ~ 27
Wildlife ..... x, xvii, 22, 29, 31, 33, 35, 45, 51, 54, 56, 62, 64-65, 98, B35-36, B49, B52
~ grazing 56
Williams Sink B49, B68
Willow 27, 29, B13, B25, B29, B48
~ Creek 29, B13, B25, B29, B48
WIPP (Waste Isolation Pilot Plant) ..... x, 87, 108
Wolf Creek B38
Workshops 80
WQA (Water Quality Act) ..... vii, 5, 6, 38, 41, 43, 70, 82, 93, 96, 98, 109
WQCC (Water Quality Control Commission) ..... v, x, 5, 14, 18, 21, 41-45, 79-83, 86-87, 92-93, 96, 98, 100, 102, 106, 108-109, B4, B8, B12, B16, B19, B22, B26, B30, B33, B37, B40, B43, B46, B50, B53, B57
~ regulations 41-42, 79, 82-83, 87, 96, 98, 100, 102
WRRI (Water Resource Research Institute) 98, 110

X

Xylene 22, 28-29

Y

Yuccas 32

Z

Zinc 24, 29, 52-53
Zooplankton 55
Zuni Mountains 29, 32, 35

1

1,1-dichloro-2,2-*bis*(*p*-chlorophenyl) ethylene (DDE) 92
1,1,1-trichloro-2,2-*bis*(*p*-chlorophenyl) ethane (DDT) 92, B11